PROCUREMENT AND CONSTRUCTION AGREEMENT

FOR GRID CONNECTED SOLAR AND STORAGE PROJECT

by and between

Blue Heron Solar, LLC

and

NoBull Energy LLC

dated as of October 14, 2025

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This **PROCUREMENT AND CONSTRUCTION AGREEMENT** is made and entered into as of October 14, 2025 (the "**Execution Date**"), by and between Blue Heron Solar, LLC, a Delaware limited liability company ("**Owner**"), and NoBull Energy LLC, an Indiana limited liability company ("**Contractor**"). Each of Owner and Contractor is individually referred to herein as a "**Party**" and collectively they are referred to herein as the "**Parties**."

RECITALS

WHEREAS, Owner is developing an electrical generation facility consisting of approximately 147 MW AC of solar-powered electric generating capacity (the "**Solar Facility**"), and a related battery energy storage system with a nominal capacity of approximately 361 MWh (the "**BESS**"), to be procured, constructed, installed, tested and commissioned in accordance with the terms and conditions set forth in this Agreement, including a 345 kV project substation, a 345 kV Gen Tie Line connecting the Project Substation to the point of interconnection, and all other applicable work to interconnect the project located in Brown and Mills Counties, Texas (collectively, the "**Project**");

WHEREAS, Owner desires to engage Contractor to procure, install, construct, test, interconnect, and commission the Project on a turnkey, fixed-price, guaranteed-completion-date basis, and Contractor desires to provide such services, all as further defined by and in accordance with the terms and conditions set forth in this Agreement;

WHEREAS, Contractor guarantees the timely completion and performance of the Project in accordance with the terms and conditions of this Agreement.

NOW, THEREFORE, in consideration of the sums to be paid to Contractor by Owner and of the covenants and agreements set forth herein, the Parties agree as follows:

AGREEMENT

1. DEFINITIONS AND RULES OF INTERPRETATION

1.1 Definitions. For the purposes of this Agreement, except as otherwise expressly provided or unless the context otherwise requires, the following terms shall have the following meanings.

"**AAA**" shall have the meaning set forth in Section 24.1(c).

"**AC**" means alternating current.

"**Affiliate**" shall mean, as to a specified Person, any other Person that directly, or indirectly through one or more intermediaries, controls or is controlled by or is under common control with the Person in question. For the purposes of this definition, the concept of "control," when used with respect to any specified Person, shall signify the possession of the power to direct the management and policies of such Person, directly or indirectly, whether through the ownership of voting securities or partnership or other ownership interests, by contract or otherwise.

"**Agreement**" means this Procurement and Construction Agreement, including all Exhibits hereto, as the same may be modified, amended or supplemented from time to time in accordance with the terms hereof.

"**Applicable Law**" means and includes all laws, codes, ordinances, statutes, rules, regulations, orders, decrees, judgments, injunctions, specified standards or criteria contained in any Applicable Permit

or approval, notices or binding agreements promulgated by, and the official, written judicial interpretations of, any Governmental Authority having jurisdiction over either Party, the Project or a Party's obligations under this Agreement, including the ERCOT Protocols, as the same may be modified, amended or repealed from time to time.

"**Applicable Permit**" means any action, approval, consent, waiver, exemption, variance, franchise, order, permit (including, where applicable, conditional permits), authorization, right or license of or from a Governmental Authority that is required by Applicable Law or necessary for the performance of the Work or the design, development, engineering, procurement, construction, operation or maintenance of the Project.

"**Approved Plan**" shall have the meaning set forth in Section 7.3.

"**Availability Test**" shall have the meaning set forth in Exhibit H-2.

"**Availability Test Procedures**" shall have the meaning set forth in Exhibit H-2.

"**Availability Test Report**" shall have the meaning set forth in Exhibit H-2.

"**BESS**" means the battery energy storage system for the Project, as described in more detail in the Statement of Work.

"**BESS Performance Guaranty**" shall have the meaning set forth in Exhibit H-5.

"**BESS Performance Test**" shall have the meaning set forth in Exhibit H-5.

"**Block**" means a group of modules associated with one PCS, including the applicable mounting structures, interconnecting equipment and other Equipment (including the PVCS), in each case, associated with such group of modules, as further described in the Site Layout.

"**BOP**" means the Equipment and other items that are not part of the BESS or a Block but that are necessary to be completed to permit (a) the BESS or such Block to be Placed in Service or the achievement of Mechanical Completion, as applicable, or (b) the Project to be Placed in Service, or (c) the achievement of Substantial Completion, including, for example (and if applicable), energy management systems equipment, Project roads, fencing and so forth, as further described in Exhibit A.

"**Business Day**" means a day, other than a Saturday or Sunday or a public holiday, on which banks are generally open for business in Austin, Texas.

"**Capacity Guaranty**" means that the results of the Capacity Test performed in accordance with the Capacity Test Procedures for the Project shall demonstrate a Measured Capacity Ratio equal to at least the Guaranteed Capacity.

"**Capacity Test**" shall have the meaning set forth in Exhibit H-3.

"**Capacity Test Cure Period**" shall have the meaning set forth in Section 12.2(a).

"**Capacity Test Procedures**" shall have the meaning set forth in Exhibit H-3.

"**Capacity Test Report**" shall have the meaning set forth in Exhibit H-3.

"**Change In Law**" means the enactment, adoption, promulgation, modification (including a written change in interpretation by a Governmental Authority), suspension or repeal after the Execution Date of any Applicable Law that establishes new requirements or modifies existing requirements including Tariff Increases; provided that no Change In Law pursuant to this Agreement shall arise by reason of (a) any national, federal, state or provincial income Tax law (or any other Tax law based on income), (b) any federal law imposing a custom, duty, levy, impost, fee, royalty or similar charge for which Contractor is responsible hereunder with respect to the importation of Equipment from outside of the United States (other than Tariff Increases), (c) a labor wage law or other Applicable Law that affects Contractor's or its Subcontractor's costs of employment (other than any Prevailing Wage Law that affects the Work on the Site or surrounding area after the Execution Date), (d) a change in law outside of the United States of America, or (e) the final enactment, modification, amendment or repeal of an Applicable Law prior to the Execution Date with an effective date of such action that falls after the Execution Date.

"**Change In Work**" means a change in the Work as defined in Section 13.1.

"**Change Order**" means the form in respect of a Change In Work attached as Exhibit O.

"**Commencement Date**" means the date on which Owner issues the Notice to Proceed in accordance with Section 7.1(a) hereof.

"**Commissioning**" or "**Commissioned**" means the start-up, commissioning and testing activities to be conducted in accordance with the Commissioning Plan.

"**Commissioning Plan**" means the plan for start-up, commissioning and testing of the Project to be mutually agreed by Contractor and Owner in accordance with Section 10.1 and to be attached as Exhibit H-1.

"**Conditional Waiver and Release Upon Progress Payment**" means, as applicable, (a) a lien waiver to be delivered by Contractor pursuant to Section 21.2 in the form of Exhibit F-1 to this Agreement or (b) a lien waiver to be delivered by each Subcontractor and Supplier pursuant to Section 21.2 in a form substantially similar to Exhibit F-1 to this Agreement.

"**Confidential Information**" shall have the meaning set forth in Section 18.1.

"**Contract Price**" shall have the meaning set forth in Section 5.1.1, as the same may be adjusted pursuant to the terms hereof.

"**Contractor**" shall have the meaning set forth in the preamble.

"**Contractor Deliverables**" means all of the deliverables to be provided by Contractor pursuant to the requirements in the Contractor Deliverables Exhibit.

"**Contractor Deliverables Exhibit**" means Exhibit B.

"**Contractor Event of Default**" shall have the meaning set forth in Section 16.1.

"**Contractor Indemnified Party**" shall have the meaning set forth in Section 17.2.

"**Contractor Party**" means each of Contractor and any of its Affiliates.

"**Contractor Permits**" means the Applicable Permits set forth in Part I of Exhibit C, any additional Applicable Permits related to the Work required to be issued in Contractor's name to perform the Work or to transport on a public road any Equipment to the Site, and any other Applicable Permits other than Owner Permits.

"**Contractor's Invoice**" means an invoice from Contractor to Owner prepared by Contractor and in a form attached as Exhibit Q, which form shall also contain a schedule of values and an initial cash flow schedule.

"**Contractor's Manager**" means the construction and commissioning manager (or any replacement thereof) appointed by Contractor in accordance with this Agreement.

"Critical Electric Grid Equipment (CEGE)" shall have the meaning assigned in the ERCOT Protocols.

"Critical Electric Grid Services (CEGS)" shall have the meaning assigned in the ERCOT Protocols.

"**Daily Progress Report**" means a written daily progress report in form and substance to be agreed by the Parties prepared by Contractor in accordance with Section 7.4.

"**Day**" or "day" means a period of twenty-four (24) consecutive hours from 12:00 midnight (prevailing local time), and shall include Saturdays, Sundays, and all holidays except that in the event a time period set forth in this Agreement expires on a Day that is not a Business Day, such period shall be deemed to expire on the next Business Day thereafter.

"**Defect**" or "**Defective**" means (i) any defects in the design, application, engineering materials, installation, construction or workmanship or service of the Equipment or the Work (including the Module Installation Work), or (ii) any Equipment or Work that is not performed consistent with Industry Standards; (iii) any Equipment or Work that could reasonably be expected to materially and adversely affect the mechanical, electrical or structural integrity or the normal operation of the Project under anticipated operating conditions, or (iv) any failure of the Equipment or the Work to comply with the Statement of Work.

"**Defect Warranty**" shall have the meaning set forth in Section 14.1.

"**Defect Warranty Period**" shall have the meaning set forth in Section 14.2, as the same may be extended pursuant to Section 14.3.

"**Defect Warranty Service**" shall have the meaning set forth in Section 14.3.1.

"**Delay Liquidated Damages**" means (a) with respect to the failure to achieve Mechanical Completion by the Guaranteed Mechanical Completion Date, the applicable amount set forth in Exhibit K, and (b) with respect to the failure to achieve Project Substantial Completion by the Guaranteed Project Substantial Completion Date, the applicable amount set forth in Exhibit K.

"**Delay Notice**" shall have the meaning set forth in Section 8.2.

"**Design Plans**" means the designs and engineering drawings and specifications from Owner's Engineer as set forth in Exhibit A-1.

"**Dispute**" shall have the meaning set forth in Section 24.1.

"**Dispute Notice**" shall have the meaning set forth in Section 24.1(a).

"**Dollars**" or "**$**" means the lawful currency of the United States of America.

"**Equipment**" means all materials, supplies, apparatus, devices, equipment, machinery, tools, parts, components, instruments and appliances that are to be incorporated into the Project (including the Major Equipment) whether provided by Contractor, any Subcontractor or any Supplier.

"**ERCOT**" means Electric Reliability Council of Texas, or its successor in function.

"**ERCOT Protocols" or "Protocols**" means the documents and directives adopted by ERCOT from time to time, including any attachments or exhibits referenced therein, that contain the scheduling, registration, operating, planning, reliability and settlement policies, rules, guidelines, procedures and standards implemented and followed by ERCOT. The ERCOT Protocols specifically include the ERCOT Nodal Protocols, and the Nodal Operating and Planning Guides and Other Binding Documents, each as defined by the ERCOT Protocols. The version of the ERCOT Nodal Protocols in effect at the time of performance or non-performance of an action shall govern with respect to that action.

"**Event of Default**" means either a Contractor Event of Default or an Owner Event of Default, as the context may require.

"**Excluded Taxes**" shall have the meaning set forth in Section 5.1.1.

"**Excusable Event**" means, in the case of Contractor, an event that the Parties agree, or in the event the Parties disagree, a neutral third party determines, impacts the critical path of the Work or materially delays, or increases the cost of, Contractor's performance of the Work, to the extent such event is attributable to: (a) the occurrence of a Change In Law; (b) the occurrence of an Owner-Caused Delay; (c) any FERC, NERC, ERCOT, or PUCT requirement applicable to the Project that becomes effective after the Execution Date; provided that the final enactment, modification, amendment or repeal of such requirement prior to the Execution Date with an effective date of such action that falls after the Execution Date shall not be a change in such requirements pursuant to this definition; provided, further, that any such requirements do not result from a Non-Excusable Event; (d) the occurrence of any Force Majeure Event; (e) an Unforeseeable Site Condition (f) any material inaccuracy in the Owner Provided Information (including the geotechnical report), to the extent such inaccuracy has a material adverse impact on the timing or cost of the Work for Contractor, or (g) any change, amendment, supplement or modification to the PPA or Interconnection Agreement or any other material agreements for the Project which have been provided to the Contractor prior to the Execution Date to the extent such change, amendment, supplement, or modification has a material adverse impact on the timing or cost of the Work for Contractor.

"**Execution Date**" shall have the meaning set forth in the preamble.

"**Exemption Certificate**" means any certificate establishing a deduction, exception or exemption from Sales Taxes for project materials or any municipal approval exempting the Project from property taxes.

"**FERC**" means the Federal Energy Regulatory Commission or its successor.

"**Final Capacity Test**" means the last Capacity Test of the Project that has been Successfully Run prior to the expiration of the Capacity Test Cure Period or earlier termination thereof as designated by Notice from Contractor to Owner, which test shall be completed no later than the last day of the Capacity Test Cure Period.

"**Final Completion**" means satisfaction by Contractor or waiver by Owner of all of the conditions for Final Completion set forth in Section 11.7.

"**Final Completion Date**" shall have the meaning set forth in Section 11.8.

"**Final Completion Payment**" shall have the meaning set forth in Section 6.1.3.

"**Final Contractor's Invoice**" shall have the meaning set forth in Section 6.1.3.

"**Financial Closing Date**" means the date on which the Financing Documents providing for a financing solution sufficient to fund the total investment cost of the Project have been closed and a drawdown of initial funding pursuant to the Financing Documents has occurred.

"**Financing Documents**" means any and all loan agreements, leasing agreements, notes, indentures, security agreements, mortgages, guarantee documents, intercreditor agreements, subordination agreements, subscription agreements, partnership agreements, equity contribution agreements, interest rate contracts, and any foreign currency exchange swaps, commitment letters and other documents relating to the financing or refinancing of the development, engineering, design, construction, operation, ownership or maintenance of the Project, including long-term debt and leases and any agreements relating to any equity or any subordinated debt.

"**First Portion**" shall have the meaning set forth in Section 11.3.1.

"**First Portion Mechanical Completion Certificate**" shall have the meaning set forth in Section 11.3.1.

"**Force Majeure Event**" means an event beyond the reasonable control of the affected Party, which event such Party could not reasonably have foreseen or prevented utilizing all reasonable efforts under the circumstances and which was not due to the fault or negligence of the affected Party and with respect to which the affected Party has taken all reasonable precautions, care and alternative measures to avoid and mitigate the effects thereof in accordance with Applicable Law and Industry Standards, including (to the extent the foregoing requirements are met): an act of God such as a flood, hurricane, tornado or earthquake; Labor Disputes (but excluding strikes or other labor actions specific to the Project, Contractor, any Subcontractor or any Supplier); acts of declared or undeclared war; rebellion or sabotage (other than as provided below); insurrection; fire; riot; or explosion. Force Majeure Events shall not include the failure or inability of a Subcontractor or Supplier to furnish sufficient labor, services, materials or equipment in accordance with its contractual obligations, except, and only to the extent such failure or inability is itself due to a Force Majeure Event. Force Majeure Events shall not include (a) a Party's financial inability to perform under this Agreement; (b) reasonably foreseeable weather conditions taking into account the location of the Project and the climate patterns applicable thereto; (c) sabotage by employees or Subcontractors of the Party claiming the Force Majeure Event or (d) delays in delivery or breakage or failure of Equipment or other materials (except to the extent any such delay, breakage or failure is itself due to a Force Majeure Event).

"**Gen-Tie Line**" means the 345 kV transmission line, including fiber optic communications cables, as further described in Exhibits A, E, and H-1.

"**Governmental Authority**" means any federal, state, county, local, municipal or other governmental, regulatory, administrative, judicial, public or statutory instrumentality, utility, court or governmental tribunal, agency, commission, authority, body or entity, or any political subdivision thereof, having legal, administrative, executive, legislative, police, regulatory or taxing power or jurisdiction over the matter or Person in question.

"**Guaranteed Capacity**" shall have the meaning set forth in Exhibit H-3.

"**Guaranteed Dates**" means the Guaranteed Project Substation Completion Date, Guaranteed Mechanical Completion Date and the Guaranteed Project Substantial Completion Date, as such dates may be extended pursuant to any Change Order duly executed pursuant hereto.

"**Guaranteed Milestones**" means the Project Substation Completion Date, Mechanical Completion Date and Project Substantial Completion Date.

"**Guaranteed Mechanical Completion Date**" is the date upon which the Project shall have achieved Mechanical Completion and shall be as set forth in the Milestone Completion Schedule attached as Exhibit W, as such date may be extended pursuant to any Change Order duly executed pursuant hereto.

"**Guaranteed Performance Index**" shall have the meaning set forth in Exhibit H-4.

"**Guaranteed Project Substantial Completion Date**" is the date upon which the Project shall have achieved Substantial Completion and shall be as set forth in the Milestone Completion Schedule attached as Exhibit W, as such date may be extended pursuant to any Change Order duly executed pursuant hereto.

"**Guaranteed Project Substation Completion Date**" is the date upon which the Project shall have achieved Project Substation Completion and shall be as set forth in the Milestone Completion Schedule attached as Exhibit W, as such date may be extended pursuant to any Change Order duly executed pursuant hereto.

"**Hazardous Materials**" means any chemical, constituent, contaminant, pollutant, waste and any other carcinogenic, corrosive, ignitable, radioactive, reactive, toxic or otherwise hazardous substance, mixtures, or materials (whether solids, liquids, gasses) or material regulated or governed by any Applicable Permit or Applicable Law as, or any substance, emission or material now or hereafter deemed by any Governmental Authority to be, a "regulated substance," "hazardous material," "hazardous waste," "hazardous constituent," "hazardous substance," "toxic substance," "radioactive substance," "contaminant," "pollutant," "toxic pollutant" or "pesticide" or words of similar meaning and regulatory effect under Applicable Law including those laws, regulations and policies relating to the discharge, emission, spill, release, or threatened release into the environment or relating to the disposal, distribution, manufacture, processing, storage, transport, treatment, or other use of such substances.

"**HS&E Plan**" means a Site-specific health, safety and environmental plan for the performance of the Work developed by the Parties pursuant to Section 3.23.

"**Indemnified Party**" shall have the meaning set forth in Section 17.4.

"**Indemnifying Party**" shall have the meaning set forth in Section 17.4.

"**Independent Engineer**" means any independent engineer or engineering firm designated under Section 25.18.

"**Industry Standards**" means those construction, workmanship, operation, care and diligence practices, methods and standards specified in Exhibit A; provided that if the relevant practice, method or standard is not so specified or is ambiguous therein, then "Industry Standards" shall mean those standards of construction, workmanship, operation, care and diligence and those standards, practices, methods and acts that would be implemented and normally practiced or followed by ordinarily prudent construction firms in the procurement, installation, construction, testing, commissioning and interconnection of utility-scale PV and BESS facilities in Texas and which standards, practices, methods and acts, in the exercise of prudent and responsible professional judgment by those experienced in the industry in light of the facts known (or that reasonably should have been known) at the time the decision was made, could reasonably have been expected to accomplish the desired result consistent with good business practices, reliability, safety, Applicable Law, Applicable Permits and codes and other standards established for such work. Industry Standards are not necessarily limited to the optimum standard, practice, method or act, but rather is intended to be a spectrum of generally accepted standards, practices, methods or acts generally accepted in Texas. Solely with respect to Section 14.4(d), "Industry Standards" shall mean those standards of care and diligence normally practiced by entities that operate and maintain PV power plants.

"**Initial Capacity Test**" means a Capacity Test of the Project as designated by Notice from Contractor to Owner that has been Successfully Run prior to Project Substantial Completion.

"**Intellectual Property Rights**" means all licenses, trade secrets, copyrights, know-how, patents, trademarks, proprietary information or other intellectual property rights of any kind necessary for the design, construction, ownership, use, operation, maintenance, repair, alteration, commissioning, interconnection, de-commissioning, removal and disposal of the Project.

"**Interconnection Agreement**" means that certain Standard Large Generator Interconnection Agreement, dated as of October 31, 2024, by and between the Participating TO and Owner, as set forth in Exhibit I, as amended, supplemented, restated or otherwise modified from time to time.

"**Interconnection Facilities**" means the Project Substation, the Gen-Tie Line, the revenue meter and the other facilities and equipment that are located between the Project Substation and the Point of Interconnection necessary to physically and electrically interconnect the Project and the Interconnection Facilities to the Point of Interconnection, as further described in Exhibit A.

"**KWh**" means kilowatt hours.

"**Labor Dispute**" means work stoppages, slowdowns, strikes, disputes, disruptions, boycotts, walkouts and other labor difficulties or shortages.

"**Lien**" means, with respect to any property or asset, any mortgage, deed of trust, lien, pledge, charge, security interest, restrictive covenant or easement or encumbrance of any kind in respect of such asset, whether or not filed, recorded or otherwise perfected or effective under Applicable Law, or any preference, priority or preferential arrangement of any kind or nature whatsoever as well as the interest of a vendor or lessor under any conditional sale agreement, capital lease or other title retention agreement relating to such asset.

"**Limited Notice to Proceed**" or "**LNTP**" has the meaning set forth in Section 7.1(b).

"**LNTP Work**" shall have the meaning set forth in Section 7.1(b).

"**Lone Star Infrastructure Protection Act (LSIPA) Affiliate**" shall have the meaning assigned in the ERCOT Protocols.

"**Lone Star Infrastructure Protection Act (LSIPA) Designated Company**" shall have the meaning assigned in the ERCOT Protocols.

"**Lone Star Infrastructure Protection Act (LSIPA) Designated Country**" shall have the meaning assigned in the ERCOT Protocols.

"**Long Term Energy Test**" shall have the meaning set forth in Exhibit H-4.

"**Long Term Energy Test Measurement Period**" has the meaning set forth in Exhibit H-4.

"**Long Term Energy Test Procedures**" shall have the meaning set forth in Exhibit H-4.

"**Long Term Energy Test Report**" shall have the meaning set forth in Exhibit H-4.

"Losses" means any and all claims, liabilities, losses, damages, causes of action, orders of Governmental Authorities, fines, penalties, litigation, lawsuits, administrative proceedings, arbitration, mediation, administrative investigations, costs, and expenses, including, without limitation, reasonable attorneys' fees, court costs, and other reasonable costs of suit arbitration, dispute resolution or other similar proceedings.

"**Major Equipment**" means the Equipment related to the power transformer and modules, distribution transformers, step-up transformers, inverters, PVCS, battery modules, switchgear, racks, battery connection panels, integrated battery cabinets, storage inverters and converters, fire suppression system, HVACs, the Owner Provided Materials in accordance with the scope of Work hereunder, and the PCSs for the Project.

"**Major Subcontractor**" means any Subcontractor or Supplier which receives more than Two Hundred and Fifty Thousand Dollars ($250,000) for work or materials on the Project, except the Supplier of the Owner Provided Materials. An initial list of approved Major Subcontractors is set out in Exhibit J.

"**Measured Capacity Ratio**" has the meaning set forth in Exhibit H-3.

"**Mechanical Completion**" means with respect to the BESS and all Blocks, as applicable, the following conditions have been satisfied: (a) the BESS or such Block is mechanically completed, assembled, erected and installed (and ready for backfeed) in accordance with the Block installation specifications contained in Exhibit A and otherwise in accordance with this Agreement (other than Punchlist items) and is free from detectable and patent defects and deficiencies in installation, including any free of any defects that would prevent the safe, normal, and reliable operation of the BESS or Block, (b) Contractor has completed the relevant mechanical quality control inspections for the BESS or such Block and has provided such documentation to Owner, (c) Contractor has assisted Owner in attempting to obtain or obtaining any permits, certificates and approvals otherwise necessary to commence commissioning and (d) a Notice of Mechanical Completion has been executed by Owner and delivered to Contractor pursuant to Section 11.3; provided that with respect to the First Portion to achieve Mechanical Completion, it shall be an additional condition to Mechanical Completion that (1) no Block has generated any electricity that has been dispatched across the Point of Interconnection, (2) no module shall have received any backfeed power, (3) no Block shall have been interconnected to its respective breaker in the Project Substation, (4) no electric power shall have been transmitted from any module through the Project Substation to the Gen-Tie Line, (5) the synchronization of the Project or any part thereof with the transmission system as provided in Section 11.4(e) shall not have begun, (6) one hundred percent (100%) of the posts, trackers and inverters have been installed for the Project and (7) modules have been installed for at least thirty-two (32) Blocks in addition to the First Portion.

"**Mechanical Completion Date**" shall have the meaning set forth in Section 11.3.

"**Meteorological Stations**" means the meteorological stations to be installed at the Site, which shall meet the specifications set forth in Exhibit A.

"**Milestone Completion Schedule**" shall mean that schedule of milestones set forth in Exhibit W, as adjusted pursuant to this Agreement.

"**Minimum Guaranteed Capacity**" shall have the meaning set forth in Exhibit H-3.

"**Module Installation Work**" means that portion of the Work relating to (i) the storage of the modules which are provided by Owner in accordance with the scope of Work pending installation thereof or storage as spare modules, (ii) the procurement of the racking system and trackers and installation of the modules and the connection of the modules to the DC collection system circuit, and (iii) the procurement, installation and connection of the branch wiring, combiner boxes and DC feeders from the modules to the inverters, all in accordance with the module installation manual, the Site Layout and the Requirements.

"**Monthly Progress Report**" means a written monthly progress report prepared by Contractor setting forth the detail required in Exhibit G.

"**MW**" means 1,000,000 watts of electric power (expressed as AC).

"**NERC**" means the North American Electric Reliability Corporation or a successor organization that is responsible for establishing reliability criteria and protocols.

"**Non-Critical Deficiencies**" means each item of Work that (a) Owner or Contractor identifies as requiring completion or containing defects, (b) does not impede the continuous operation of the Project or any portion thereof in accordance with Industry Standards and, in any case, manufacturers' warranties, (c) does not materially affect the capacity, efficiency, reliability, operability or mechanical or electrical integrity of the Project and (d) does not create a safety risk for any Person.

"**Non-Excusable Event**" means (a) the negligence or willful misconduct of any Contractor Party or any Subcontractor; (b) the failure of any Contractor Party or any Subcontractor to comply with any of its obligations, or a breach, under this Agreement; and (c) any defect in the design, materials or workmanship of the Work or other matter that could result in a Contractor (or Subcontractor) Warranty obligation pursuant to Article 14.

"**Notice**" or "**Notification**" means a written communication between authorized representatives of the Parties required or permitted by this Agreement and conforming to the requirements of Section 22.1.

"**Notice of Final Completion**" means a Notice from Contractor to Owner stating that Contractor has satisfied the requirements for Final Completion under Section 11.7, substantially in the form attached hereto as Exhibit P-5, as approved by Owner in accordance with Section 11.8.

"**Notice of Mechanical Completion**" means a Notice from Contractor to Owner stating that Contractor has satisfied the conditions precedent for Mechanical Completion under Section 11.3, substantially in the form attached hereto as Exhibit P-2, as approved by Owner in accordance with Section 11.3.

"**Notice of Placed in Service**" means a Notice from Contractor to Owner stating that Contractor has satisfied the conditions precedent for Placed in Service for a Block or the Project (as applicable) under

Section 11.4, substantially in the form attached hereto as Exhibit P-3, as approved by Owner in accordance with Section 11.4.1.

"**Notice of Project Substantial Completion**" means a Notice from Contractor to Owner stating that Contractor has satisfied the conditions precedent for Project Substantial Completion under Section 11.5, substantially in the form attached hereto as Exhibit P-4, as approved by Owner in accordance with Section 11.6.

"Notice of Project Substation Completion" means a Notice from Contractor to Owner stating that Contractor has satisfied the conditions precedent for Project Substation Completion under Section 11.2, substantially in the form attached hereto as Exhibit P-1, as approved by Owner in accordance with Section 11.2.1.

"**Notice to Energize**" means a written notice from Owner authorizing Contractor to proceed with the Work to energize and interconnect the Project or portion thereof to the electric grid.

"**Notice to Proceed**" means a written notice, substantially in the form attached hereto as Exhibit L, releasing Contractor to fully proceed with all Work under this Agreement.

"**Notify**" means to provide a Notice or Notification.

"**Owner**" shall have the meaning set forth in the preamble.

"**Owner-Caused Delay**" means (a) a failure by Owner to perform any of its material obligations under this Agreement, which failure causes a material delay in Contractor's performance of the Work and which failure is not otherwise excused and for so long as such failure or breach has not otherwise been remedied, in each case, in accordance herewith, or (b) Owner's material interference with Contractor's performance of the Work or the critical path of the Work, without the right to do so under this Agreement; provided, that failure or interference by Owner under clauses (a) or (b) above shall not constitute an Owner-Cause Delay to the extent it is attributable to a Non-Excusable Event or the failure of Contractor or any Subcontractor to perform its obligations in accordance with this Agreement; provided, further, that any acts or omissions of Owner, Owner's agents, contractors (other than Contractor and its Suppliers and Subcontractors), or representatives or Owner Financing Parties that are taken under and in accordance with the terms of this Agreement shall not constitute Owner-Caused Delays.

"**Owner Event of Default**" shall have the meaning set forth in Section 16.3.

"**Owner Financing Party**" means (a) any and all Persons, or the agents or trustees representing them, providing senior or subordinated debt, lease or equity financing (including tax equity financing to Owner or an Affiliate thereof) or refinancing to Owner or an Affiliate thereof or (b) any Person providing letters of credit, guarantees, insurance or other credit support, or title insurance to Owner or an Affiliate thereof, in each case, in connection with the Project or a portfolio of projects that includes the Project. The term "Owner Financing Party" includes, for the avoidance of doubt, any Person or Persons that own the Project and lease the Project to Owner or an Affiliate of Owner, as applicable, under a lease, sale leaseback or synthetic lease structure.

"**Owner Indemnified Party**" shall have the meaning set forth in Section 17.1.

"**Owner-Instituted Change**" shall have the meaning set forth in Section 13.2.

"**Owner Permits**" means those Applicable Permits required for the performance of the Work or the design, development, engineering, procurement, construction, operation or maintenance of the Project (a) set forth in Part II of Exhibit C or (b) that Contractor Notifies Owner are required to be obtained by Owner in Owner's name pursuant to Applicable Law.

"Owner Provided Information" means the Design Plans and the reports, surveys, studies, specifications, drawings, and other information with respect to the Site provided by Owner to Contractor, as set forth in Exhibit V.

"Owner Provided Materials" means the main power transformers, 345 kV circuit breakers, PV modules, PV inverters and BESS which are provided by Owner for the Project as described in Exhibit A in accordance with the requirements of the Agreement.

"**Owner Representative**" means Owner's representative designated by Owner pursuant to Section 2.1.

"**Owner's Engineer**" means any engineering firm or firms or other engineer or engineers selected and designated by Owner.

"**Participating TO**" shall mean Transmission Operator identified in the Interconnection Agreement.

"**Participating TO's Interconnection Facilities**" means the facilities and equipment defined as "Transmission Provider's Interconnection Facilities" in the Interconnection Agreement.

"**Party**" and "**Parties**" shall have the meanings set forth in the preamble.

"**Payment Bond**" shall have the meaning set forth in Section 3.16.2.

"**PCS**" means the power conversion station(s) which consists of the static power inverters, inverter step up transformers, cabling and grounding systems, as further described in Exhibit A.

"**Performance Bond**" shall have the meaning set forth in Section 3.16.2.

"**Performance Guarantee**" means that the Performance Index for the Project shall not be less than the Guaranteed Performance Index, all as determined by the Long Term Energy Test performed in accordance with the Long Term Energy Test Procedures and Exhibit H-4.

"**Performance Index**" shall have the meaning set forth in Exhibit H-4.

"**Performance Security**" shall have the meaning set forth in Section 3.16.2.

"**Permit Expenses**" means the actual costs payable to a Governmental Authority and all other reasonable and documented third-party costs and expenses incurred in connection with the application for and issuance of an Applicable Permit.

"**Person**" means any individual, corporation, company, voluntary association, partnership, incorporated organization, trust, limited liability company, or any other entity or organization, including any Governmental Authority. A Person shall include any officer, director, member, manager, employee or agent of such Person.

"**Placed in Service**" means, with respect to the BESS, a Block or the Project, the satisfaction of all of the conditions set forth in Section 11.4.

"**Placed in Service Date**" shall have the meaning set forth in Section 11.4.1.

"**Point of Interconnection**" means the point identified as the "Point of Interconnection" in the Interconnection Agreement.

"**Power Purchaser**" means the party purchasing power under a PPA.

"**PPA**" means a power purchase agreement or other offtake agreement, in each case as included in Exhibit U, as the context may require, and together they are referred to herein as the "PPAs".

"**Pre-Existing Hazardous Material**" shall have the meaning set forth in Section 3.11.1.

"**Prevailing Wage and Apprenticeship Requirements**" means the requirements of Contractor and its Subcontractor related to paying prevailing wages and utilizing qualified apprentices in connection with the Work, as set forth in Exhibit X.

"**Prime Rate**" means the prime rate as published in the "The Money Rates" Section of *The Wall Street Journal* (U.S. Edition); provided that, if the *Wall Street Journal* (U.S. Edition) is discontinued, the parties shall use a comparable rate published by a reputable financial periodical selected by Owner.

"**Product**" means electricity, capacity, renewable energy credits, and other products and service being generated, sold or made available to each respective Power Purchaser as applicable under each respective PPA, as the context may require, and together, the "**Products**".

"**Project**" shall have the meaning set forth in the recitals.

"**Project Manager**" shall have the meaning set forth in Section 3.26.

"**Project Schedule**" means the schedule for the performance of all Work to be performed under this Agreement attached hereto as Exhibit S (including achievement of the Guaranteed Dates).

"**Project Substantial Completion**" means the satisfaction of all of the conditions set forth in Section 11.5.

"**Project Substantial Completion Date**" shall have the meaning set forth in Section 11.6.

"**Project Substation**" means the project interconnection substation (including any required upgrades and the step-up transformers) for the Project, as further described in Exhibit A.

"Project Substation Completion" means with respect to Project Substation, the satisfaction of all of the conditions set forth in Section 11.2.

"Project Substation Completion Date" shall have the meaning set forth in Section 11.2.1.

"**Property Taxes**" means any real or personal property Taxes related to the Site, the Project, the Equipment or any material, equipment or other property that will be incorporated into the Project.

"**Proposed Punchlist**" shall have the meaning set forth in Section 11.1.1.

"**PUCT**" means the Public Utility Commission of Texas, or its successor in function.

"**Punchlist**" shall have the meaning set forth in Section 11.1.1.

"**Punchlist Amount**" shall have the meaning set forth in Section 11.1.1.

"**Punchlist Holdback**" means an amount equal to two hundred percent (200%) of the Punchlist Amount for each Punchlist item.

"**PV**" means photovoltaic.

"**PVCS**" means the PV combining switchgear which collects the generated power from the power conversion station (which consists of the static power inverters, inverter step up transformers, cabling and grounding systems) and then serves the Interconnection Facilities.

"**Release**" means the release, discharge, deposit, injection, dumping, spilling, leaking or placing of any Hazardous Material into the environment so that such Hazardous Material or any constituent thereof may enter the environment, or be emitted into the air or discharged into any waters, including ground waters under Applicable Law.

"**Required Manuals**" means the operating data and manuals, Equipment and parts manuals, operation and maintenance manuals and instructions which are reasonably necessary to safely and efficiently operate, maintain and shut down the Project, in each case, to be provided in accordance with Exhibit B.

"**Requirements**" shall have the meaning set forth in Section 3.2.

"**Retainage**" shall have the meaning set forth in Section 6.7.1.

"**Sales Taxes**" shall have the meaning set forth in Section 5.1.3.

"**Selected Subcontractors**" shall have the meaning set forth in Section 14.6.

"**Separate Contractors**" shall have the meaning set forth in Section 3.21.1.

"**Serial Failure**" shall have the meaning set forth in Section 14.5.1.

"**Serial Failure Warranty Work**" shall have the meaning set forth in Section 14.5.2.

"**Serial Failure Warranty Work Completion Date**" shall have the meaning set forth in Section 14.5.2.

"**Serial Failure Warranty Work Start Date**" shall have the meaning set forth in Section 14.5.2.

"**Site**" means the Project site, as more particularly described in Exhibit N.

"**Site Conditions**" shall have the meaning set forth in Section 3.19.

"**Site Layout**" means the layout of the Project set forth in Exhibit E.

"**Statement of Work**" means, collectively, the requirements regarding the Work set forth in Exhibit A.

"**Subcontract**" means any contract for performance of any portion of the Work entered into with a Subcontractor, including supply of any Equipment by a Supplier.

"**Subcontractor**" means any Person, directly or indirectly, and of any tier (other than Contractor, but including any Affiliate of Contractor), including any Supplier, that performs any portion of the Work on behalf of Contractor in furtherance of Contractor's obligations under this Agreement.

"**Substation**" means the Project Substation.

"**Successfully Run**" means, with respect to any of the Availability Test, the Capacity Test or the Long Term Energy Tests, that (i) the most recent attempt at such test was completed in accordance with the procedures, conditions and requirements for the proper performance of such tests set forth in the Availability Test Procedures, Capacity Test Procedures or Long Term Energy Test Procedures, (as applicable) and Exhibits H-1, H-2, H-3, H-4 or H-5 (as applicable), and the other provisions of this Agreement applicable to such tests and (ii) the results from such test demonstrate that the Project has successfully achieved the results, conditions and/or requirements thereof being confirmed by such test, in each case in accordance with the PPAs and the Interconnection Agreement.

"**Supplier**" means a Person that supplies Equipment directly to Contractor in connection with the performance of the Work (including any Affiliate of Contractor).

"**Tariff Increases**" means after the Execution Date a change under Applicable Law imposing a custom, duty, levy, impost, fee, royalty or similar charge with respect to the importation of equipment (other than Owner Provided Materials) or raw materials or components thereof, into the United States of America, which may include antidumping and countervailing duty laws or similar laws that authorize remedial tariffs for which Contractor is responsible hereunder, as well as proven reactionary domestic pricing related to such changes, but excluding changes relating to taxation of net income for which Contractor is responsible under Section 5.1.3.

"**Taxes**" means any and all forms of taxation, charges, duties, imposts, levies and rates whenever imposed by any Governmental Authority, including transaction privileges, sales tax, use tax, gross receipts tax, transaction privilege tax, property tax, income tax, withholding taxes, corporation tax, franchise taxes, capital gains tax, capital tax, capital transfer tax, inheritance tax, value added tax, goods and services tax, customs duties, capital duty, excise duties, betterment levy, stamp duty, stamp duty reserve tax, national insurance, social security or other similar contributions, and generally any tax, duty, impost, levy, rate or other similar amount and any interest, penalty, fine or other amount due in connection therewith, excluding in all cases Permit Expenses.

"**Testing Laboratory**" means an independent testing laboratory as the Parties may agree in writing.

"**Unforeseeable Site Conditions**" means the presence or the discovery of (a) subsurface latent physical conditions at the Site differing materially from those indicated in the Owner Provided information provided by Owner to Contractor in Exhibit V or (b) previously unknown physical conditions at the Site of an unusual nature (including previously unknown and unexpected archaeological or religious sites, places, monuments or areas) that require means and methods that differ materially from the findings and/or recommendations of those engineering and geotechnical surveys, reports and other documents provided by Owner to Contractor with respect to the Site and were not identified by any Contractor Party during its inspection of the Site.

"**Waiver and Release Upon Final Payment**" means, as applicable, (a) a lien waiver to be delivered by Contractor pursuant to Section 21.2 in the form of Exhibit F-2 to this Agreement, or (b) a lien waiver to

be delivered by each Subcontractor and Supplier pursuant to Section 21.2 in a form substantially similar to Exhibit F-2 to this Agreement.

"**Warranties**" means the Defect Warranty.

"**Warranty Work**" means remedial Work undertaken to cause the Project to conform to the Defect Warranty, including any Defect Warranty Service and any Serial Failure Warranty Work.

"**Work**" means all of Contractor's obligations under this Agreement to procure, manufacture, construct and erect, install, equip, start-up, test, commission and complete the Project, set forth in or reasonably inferred from this Agreement (including the Statement of Work), including any of the foregoing obligations performed (i) pursuant to an LNTP or (ii) pursuant to a Change Order, all of which shall be deemed to be Work performed by Contractor under this Agreement. Work does not include the supply of the Owner Provided Materials.

1.2 Exhibits. This Agreement includes the Exhibits annexed hereto and any reference in this Agreement to an "Exhibit" by letter designation or title shall mean one of the Exhibits identified in the table of contents and such reference shall indicate such Exhibit herein. Each Exhibit attached hereto is incorporated herein in its entirety by this reference.

1.3 Interpretation. As used in this Agreement, unless otherwise indicated, the terms "herein", herewith" and "hereof" are references to this Agreement as a whole including the Exhibits, and the term "includes" or "including" shall mean "including without limitation"; the singular includes the plural and the plural the singular; words importing any gender include the other gender; references to statutes or regulations are to be construed as including all statutory or regulatory provisions consolidating, amending or replacing the statute or regulation referred to; references to agreements and other contractual instruments shall be deemed to include all subsequent amendments, restatements, supplements, extensions and other modifications to such instruments (without, however, limiting any restrictions to such amendments, restatements, supplements, extension and other modifications imposed by this Agreement); and a reference to a Person shall include its successors and permitted assigns.

1.4 Headings. All headings or captions contained in this Agreement are for convenience of reference only, do not form a part of this Agreement and shall not affect in any way the meaning or interpretation of this Agreement.

1.5 Conflicts in Documentation. This Agreement, including the Exhibits hereto shall be taken as mutually explanatory. If either Party becomes aware of an express conflict between the provisions of this Agreement or any Exhibit hereto, such Party shall promptly Notify the other Party of such conflict. In the event of a conflict between any provision within the body of this Agreement and any Exhibit hereto, the terms and provisions of the body of this Agreement shall take precedence over the Exhibits; and in the event of a conflict between any provisions within the Exhibits, Exhibit A, Exhibit A-1, Exhibits H-1 through H-5, Exhibit I, and Exhibit U shall take precedence over the remaining Exhibits unless expressly stated otherwise in this Agreement. In the event of a conflict between any provision or requirement of the body of this Agreement or any Exhibit, the stricter provision or requirement shall prevail.

2. RESPONSIBILITIES OF OWNER

Owner shall, at Owner's cost and expense:

2.1 Owner Representative. Designate an Owner Representative, who shall act as the single point of contact on behalf of Owner with respect to the prosecution and scheduling of the Work and any issues

relating to this Agreement. Owner may designate a new Owner Representative from time to time by a Notice delivered to Contractor.

2.2 Back Feed Power and Parallel Operation. Use commercially reasonable efforts to cause the Participating TO to commence testing of the Participating TO's Interconnection Facilities by no later than the applicable milestone date set forth in the Interconnection Agreement and to complete the testing of Participating TO's Interconnection Facilities by no later than the applicable milestone date set forth in the Interconnection Agreement to enable Contractor to obtain backfeed power from the Participating TO's Interconnection Facilities, commence trial operation or testing (as required by the Interconnection Agreement) and carry out testing of the Project as provided under this Agreement; provided that the failure of Owner to cause the Participating TO to comply with such dates shall be considered an Owner-Caused Delay (except where such failure results from (a) a Force Majeure Event or (b) a Non-Excusable Event), but shall be deemed not to be an Owner Event of Default.

2.3 Access to Site. Concurrently with the issuance of the Notice to Proceed (or, if applicable, pursuant to an LNTP), provide Contractor rights of ingress and egress to and use of the Site for Contractor and its Subcontractors as may be reasonably necessary for the performance of the Work, subject to any applicable restrictions set forth in any contract or agreement in respect of Owner's rights to the Site, which contract or agreement has been provided, to the extent possible, to Contractor prior to the Execution Date.

2.4 Cooperation. Cooperate with Contractor and the Subcontractors in coordinating the work of Owner's contractors who may be working at or near the Site with the Work being performed by Contractor and the Subcontractors. Owner shall not allow its, or its Affiliates', operations and activities on the Site to materially interfere with the performance of the Work by Contractor. At Contractor's written request, Owner shall provide reasonably requested assistance to Contractor with respect to Contractor's obtaining any Contractor Permits and complying with any Applicable Permits; provided that Contractor shall reimburse Owner for any out-of-pocket costs that Owner incurs in providing such assistance.

2.5 Owner Permits. Subject to Contractor's obligations to provide reasonably requested assistance to Owner in obtaining any Owner Permit (at no cost to Owner) in accordance with Section 3.14, obtain and maintain all Owner Permits.

2.6 Insurance. Obtain and maintain insurance required in accordance with Exhibit R.

2.7 Owner Force Majeure and Non-Excusable Events. Owner shall not be deemed to be in breach or default of its obligations under this Agreement to the extent that the performance of such obligations is delayed, limited or prohibited as a result of any Force Majeure Event, any Non-Excusable Event, any Change In Law or any FERC, NERC, ERCOT or PUCT requirement applicable to the Project that becomes effective after the Execution Date.

2.8 Site and Technical Information. Owner shall provide to, or has provided, Contractor the Owner Provided Information specified in Exhibit V. Contractor shall be entitled to rely on such Owner Provided Information furnished by Owner pursuant to this Section 2.8 provided that such reliance is reasonable in accordance with Industry Standards. To the extent that Contractor suspects there may be errors or omissions in any of the Owner Provided Information provided pursuant to this Section 2.8, Contractor shall promptly notify Owner of the same.

2.9 Owner Provided Materials. Owner shall provide Contractor reasonable notice of anticipated delivery dates of the Owner Provided Materials. Owner shall coordinate with Contractor when delivery will be made for the purposes of minimizing the impact on Contractor's performance of the Work

and limiting the need for storage of Owner Provided Materials by Contractor to that necessary for the efficient performance of the Work.

3. RESPONSIBILITIES OF CONTRACTOR

Contractor shall:

3.1 General. In accordance with and subject to the terms of this Agreement, (a) diligently, duly and properly perform and complete the Work and all of its other obligations set forth in this Agreement, (b) procure, provide and pay for all materials, equipment, machinery, tools, labor, transportation, administration and other items and services necessary for the proper execution and completion of the Project, whether temporary or permanent and whether or not incorporated or to be incorporated into the Work, including all procurement, installation and construction services, all administration, management, training and coordination, all commissioning and verification services, and all labor, Equipment, licenses, inspections, storage and transportation, temporary construction power, and all other items, goods, facilities and services necessary to perform the Work, (c) complete the construction and installation of the Project pursuant to this Agreement, including providing all control equipment necessary for the construction, interconnection and operation of the Project, all interconnections set forth in the Statement of Work, and all equipment not specifically described in the Statement of Work that is necessary to meet the requirements of the Statement of Work or complete the Project, (d) deliver the Equipment to Owner at the Site free of any Lien, (e) receive, offload, inspect and accept Owner Provided Materials (except when such is explicitly included in applicable Owner Provided Materials Purchase Order) and (f) achieve Project Substantial Completion and Final Completion. Contractor acknowledges and agrees that it is obligated to perform the Work on a "turnkey basis" which constitutes a fixed-price (subject to the terms hereof) obligation to procure, construct, test and commission the Project in accordance with the terms and conditions of this Agreement. Where this Agreement describes a portion of the Work in general, but not in complete detail, the Parties acknowledge and agree that the Work includes any incidental work reasonably inferred or required to complete the Work in accordance with this Agreement. Contractor is obligated to supply all of the material, equipment, Equipment, labor and design services and to supply and perform all of the Work as may reasonably be required or necessary (whether or not specifically set forth in this Agreement) to complete the Work in accordance with and subject to the terms and conditions of this Agreement, including the guarantees of performance (and the remedies applicable thereto) as set forth herein, all for the Contract Price.

3.2 Standard of Performance. Contractor shall perform, or cause to be performed, the Work in a workmanlike manner, using new material, and in compliance, in all material respects, with Applicable Law (including applicable FERC, NERC, ERCOT, or PUCT requirements), Applicable Permits, Industry Standards, the standards and requirements under each respective PPA, the Interconnection Agreement and any other contract or agreement entered into in connection with the Project by Owner (or an Affiliate of Owner) and provided to Contractor, all technical specifications set forth in this Agreement (including any Exhibits), the requirements of any contract for any Major Equipment (including the Warranty provisions thereof), the requirements of any insurance policies held pursuant hereto, and any other applicable requirements of this Agreement (the "**Requirements**"). If the standards or requirements derived from the foregoing are inconsistent and cannot be resolved by the order of precedence set forth in Section 1.5, Contractor shall perform, or cause to be performed, the Work in accordance with the most stringent rule, standard, criteria or guideline.

3.3 Construction of the Project.

3.3.1 Construction Obligation. In accordance with and subject to the terms of this Agreement, procure (other than Owner Provided Materials), construct, install, test, commission, maintain and interconnect the Project (including the Interconnection Facilities), so that it meets the Requirements

and any other standards of performance set forth in this Agreement, and is capable of operation in accordance with the Design Plans and design criteria specified in the Statement of Work and the guarantees of performance (subject to the remedies applicable thereto) as set forth in this Agreement, the PPA and the Interconnection Agreement. In addition to its obligations under Section 3.18, all drawings, plans and specifications provided as part of Contractor Deliverables shall be kept by Contractor in an orderly and catalogued fashion for reference by Owner during the performance by Contractor of the Work.

3.3.2 Record-Keeping. Maintain at the Site at least one (1) copy of all Contractor Deliverables, Change Orders and other modifications in good order and marked to record all changes made during performance of the Work, including, without limitation, all field deviations from the construction drawings.

3.3.3 Design and Engineering Review. Review and provide feedback on Project Design Plans and regularly attend in person or virtual meetings with Owner and Owner's Engineer. Contractor acknowledges that the Design Plans have been performed by certain third-party engineering firms (such third-party engineering firms, collectively "Engineers" or "Owner's Engineers" and each an "Engineer" or "**Owner's Engineer**") Contractor acknowledges, agrees and covenants that: (i) it has carefully and thoroughly reviewed, analyzed, compared and familiarized itself with the Design Plans, (ii) it has satisfied itself that such Design Plans are, or upon completion will be, in accordance with all Requirements and contains, or upon completion of such design and engineering work will contain, all data and information necessary to complete the portion of the Work to which it relates. Contractor represents and warrants to Owner that, to the best of Contractor's knowledge, the Design Plans do not contain any errors, omissions, mistakes, discrepancies or defects. Contractor shall promptly notify Owner and the Owner's Engineer upon Contractor's discovery of any purported errors, omissions, mistakes, discrepancies or defects in the Design Plans, regardless of when such discovery occurs. Contractor shall not be entitled to a Change Order based on a purported error, omission, mistake, discrepancy or defect in the Design Plans unless Contractor (i) demonstrates that such error, omission, mistake, discrepancy or defect in the Design Plans were not apparent or readily discoverable prior to the Execution Date and (ii) further demonstrates that such error, omission, mistake, discrepancy or defect in the Design Plans will result in a delay to the Project Schedule or increase the cost of Contractor's performance of the Work. Contractor agrees that it shall be responsible for and participate in any further design and engineering processes necessary or to be undertaken by the Engineers; provided that Contractor shall not modify or deviate from any specifications and designs set forth in, nor duplicate any Work or design or engineering services performed as part of, the Design Plans, and Contractor shall ensure conformance with specifications and designs set forth therein as if set forth in the Scope of Work or other Specifications.

3.3.4 Cost Savings Sharing. The Parties acknowledge that Contractor may propose modifications to the Design Plan specifications of the Work, which proposals are intended to reduce the Contract Price and which, if implemented, would still otherwise satisfy, in all material respects, the requirements of this Agreement (each, a "cost saving proposal"). Each such cost saving proposal shall be made in writing, shall describe the proposed modification to the applicable Design Plan specification in detail, and the anticipated Contract Price reduction involved in implementing the proposed modification to the specification. Contractor shall not be entitled to propose any modifications to any specifications provided by a Major Equipment provider without the approval of both Owner and such supplier (to be granted in their sole discretion). Owner agrees to consider in good faith the cost saving proposals of Contractor. If Owner accepts any cost saving proposal from Contractor (in Owner's sole discretion), it shall notify Contractor in writing and the Parties shall promptly prepare and execute a Change Order in respect thereof, which also shall include that (a) Owner will pay to Contractor twenty five percent (25%) of the Contract Price reduction resulting from the cost saving proposal as compared to the Contract Price (excluding price reductions resulting from the completion of design work from the 60% design to IFC (for which unit rates will apply) or any other items specified on Exhibit EE), and (b) Owner's payment shall be

due within thirty (30) days after the earlier of receipt of a Contractor's Invoice therefor and Final Completion.

3.4 Electrical Interconnection. Procure (other than Owner Provided Materials), construct, test, commission and interconnect the Interconnection Facilities.

3.5 Progress Reports. Provide Monthly Progress Reports and Daily Progress Reports in accordance with Section 7.4. In addition, Owner or any Affiliate of Owner shall be entitled to attend the daily meeting convened by Contractor on the Site to review progress with Subcontractors performing Work on the Site and, during such meeting, Owner or such Affiliate shall have a reasonable opportunity to ask questions of Contractor and such Subcontractors concerning progress of the Work. If Owner requests that Contractor cause any Subcontractor to attend any such meeting, Contractor shall use its reasonable efforts to cause such Subcontractor to attend either in-person or via telephone.

3.6 Insurance. Obtain and maintain insurance required in accordance with Exhibit R.

3.7 Inspection. Perform all inspection and other like services required for performance of the Work, including inspecting all Equipment and performing all inspections required or contemplated under the Statement of Work.

3.8 Organization. Maintain sufficient staff that are dedicated to the completion of the Work, and that have the technical and managerial expertise to control and execute the Work in accordance with the requirements of this Agreement.

3.9 Utilities and Services. Install, connect and maintain at its own expense all utilities (including temporary construction power) facilities and services required for the performance of the Work. Pay when due all utility usage charges and arrange with local authorities and utility companies having jurisdiction over the Site for the provision of utilities involving the Work, and perform all work and pay all costs for road upgrade and repair as specified in Exhibit A.

3.10 Interconnection Approvals and Agreement. Except as otherwise provided herein, at Contractor's sole cost and expense, Contractor shall (a) obtain all interconnection approvals and agreements necessary for testing and operation of the Interconnection Facilities in accordance with Industry Standards, Applicable Law and the Interconnection Agreement and (b) otherwise perform all other obligations under or with respect to the Interconnection Facilities that are set forth in the Statement of Work, in each case on or before the date required in the Project Schedule (as such date may be extended pursuant to and in accordance with this Agreement

3.11 Hazardous Materials.

3.11.1 Contractor shall not Release or dispose of, or permit any Subcontractor or any Person acting on its or their behalf or under its or their control to Release, or dispose of, Hazardous Materials, or exacerbate the condition of any Pre-Existing Hazardous Materials, on or about the Site other than as required by Contractor in connection with the performance of the Work and in accordance with Applicable Law and Applicable Permits and shall, if any such Hazardous Materials are so Released, generated or discharged, or the condition of any Pre-Existing Hazardous Materials exacerbated, prevent the spread of such Hazardous Materials. In the event Contractor encounters material reasonably believed to be a Hazardous Material on the Site, Contractor shall immediately stop work in the affected area and notify Owner of the condition. If Contractor or any Subcontractor has brought such Hazardous Materials onto the Site or generated such Hazardous Materials, or exacerbated the condition of Pre-Existing Hazardous Materials, Contractor shall promptly submit a plan for Owner's approval for remediating such Hazardous

Materials. Upon approval of such plan by Owner, Contractor shall remediate such Hazardous Material in accordance with the approved plan and shall thereafter resume Work in the affected area. If Contractor or any Subcontractor has brought such Hazardous Materials onto the Site or generated such Hazardous Materials or exacerbated the condition of any Pre-Existing Hazardous Materials, Contractor shall not be entitled to an adjustment to the Contract Price and/or Project Schedule and/or Milestone Completion Schedule, including the Guaranteed Dates. If the Hazardous Materials were Pre-Existing Hazardous Materials and represent an Unforeseeable Site Condition, then to the extent that Contractor or anyone under its control has not exacerbated the condition thereof, Contractor shall be entitled to an equitable adjustment to the Contract Price and/or Project Schedule and/or and Milestone Completion Schedule, including the Guaranteed Dates, so long as such release or discharge was not due to a Non-Excusable Event. As used herein, "**Pre-Existing Hazardous Material**" means any Hazardous Material existing at the Project Site prior to the commencement of the Work, regardless of whether such Hazardous Material is identified in this Agreement (including any Exhibits hereto), or any Hazardous Material introduced on the Project Site by a party in Owner's control.

3.11.2 Contractor shall indemnify, defend and hold harmless the Owner Indemnified Parties from and against all liabilities arising out of or relating to any violations by Contractor or any Subcontractor of any Applicable Law or Applicable Permits, including (i) the Release or deposit at, on, above, below or near the Site by Contractor or any Subcontractor of any Hazardous Materials that were brought onto the Site by Contractor or any Subcontractor or (ii) the Release or exacerbation of the condition of any Pre-Existing Hazardous Materials on the Site that Contractor knows or reasonably should have known were on the Site of and caused such Release due to its negligence or disregard for Owner's instructions; provided, however, that in no event shall Contractor be obligated under this Section 3.11.2 to the extent such liabilities arise due to the negligence or willful misconduct of Owner or any third party that is not under Contractor's or any Subcontractor's control. Owner shall indemnify, defend and hold harmless the Contractor Indemnified Parties from and against all liabilities arising out of or relating to any unknown Hazardous Materials that existed at the Site prior to the Execution Date; provided, however, that in no event shall Owner be obligated under this Section 3.11.2 to the extent such liabilities arise due to (x) a Non-Excusable Event or (y) exacerbation of Pre-Existing Hazardous Materials, by Contractor, any Subcontractor or any third party that is under Contractor's or any Subcontractor's control that the applicable Person knows or should have reasonably known were on the Site and the applicable Person caused such Release due to its negligence or disregard for Owner's instructions.

3.12 Access; Site Security. Contractor shall provide security measures as necessary to protect the Site and all materials and supplies stored thereon in accordance with the Contractor security procedures set forth in the HS&E Plan during the term of this Agreement, but shall provide access to the Site (and any other location where the Work is being performed) as reasonably necessary to Owner, the Owner Financing Parties, the Participating TO, Power Purchasers, PUCT, and their respective representatives, agents and, to inspect and review the Work being performed by Contractor; provided that, while on the Site, such Persons shall (a) observe Contractor's reasonable security and safety measures; and (b) not unreasonably interfere with Contractor's performance of the Work. Contractor shall keep the Site reasonably clean and presentable at all times. The scope and extent of Contractor's obligations to provide security measures is limited to the description of same as set forth in the HS&E Plan.

3.13 Handling, Shipping and Importation. Arrange for complete handling, shipping and importation, as necessary, of all Equipment, and construction equipment, including quality assurance, shipping, loading, unloading, customs clearance (and payment of any customs duties in connection therewith), receiving, and any required storage and claims. Contractor shall carry out the Work so as not to interfere unreasonably, unnecessarily or improperly with access to or use of private roads, footpaths or of properties of Owner or of any other Person. Contractor shall liaise with the landowners of the Site and Governmental Authorities, and comply with requirements of landowners of the Site and Governmental

Authorities in relation to vehicular access to and egress from the Site. Contractor shall select routes, choose and use vehicles, and restrict and distribute loads in compliance with Applicable Laws whenever Contractor uses public roads.

3.14 Applicable Law; Permits.

3.14.1 Applicable Law. Throughout the performance of all aspects of the Work, comply with, and shall ensure that each Subcontractor complies with, all Applicable Law.

3.14.2 Prevailing Wages and Apprenticeship Requirements. In performing the Work, Contractor agrees to comply with, and shall cause each of its applicable Subcontractors to comply with, the Prevailing Wage and Apprenticeship Requirements set forth in Exhibit X.

3.14.3 Permits. Obtain and maintain all Contractor Permits and pay all Permit Expenses in connection with such Contractor Permits.

3.14.4 Communications with Governmental Authorities. Contractor agrees to keep Owner updated on any material communications between Contractor and any Governmental Authority, including the PUCT, relating to the Project. Contractor shall provide Owner the opportunity to attend any material meetings and conference calls between Contractor and any Governmental Authority relating to the Work or the Project.

3.14.5 Cooperation. Provide reasonably requested assistance to Owner with respect to obtaining, and complying with, any Owner Permits; provided that, except in the case of building and construction permits and other permits that are similar in nature to those listed in Part I to Exhibit C and required under Applicable Law to be obtained in Owner's name, Owner shall reimburse Contractor for any reasonable and documented out-of-pocket costs that Contractor incurs in providing such assistance. Contractor shall provide Owner with sufficient advance notice (upon learning of such Owner Permit) to allow Owner to obtain such Owner Permit in accordance with Applicable Law in the reasonable course of its business and the exercise of reasonable care.

3.15 Commissioning Personnel. Provide, or cause to be provided, appropriate installation and commissioning representatives, as necessary supervising personnel, all equipment, tools, construction and temporary material and all other labor necessary for all of the Work to complete commissioning in accordance with Exhibit H-1.

3.16 Performance Security.

3.16.1 RESERVED.

3.16.2 Performance Security. Contractor shall obtain and deliver to Owner within sixty (60) days of the Execution Date, but in no event later than within five (5) days of the Commencement Date (i) a properly completed performance bond in the form attached hereto as Exhibit DD (a "**Performance Bond**") and (ii) a properly completed payment bond in the form attached hereto as Exhibit DD (a "**Payment Bond**"), in each case issued by an issuer reasonably acceptable to Owner and having a long-term, senior unsecured credit rating of at least A- (Standard & Poor's) or A3 (Moody's). The Performance Bond and Payment Bond shall be collectively referred to as the "**Performance Security**." The amount of (a) the Performance Bond shall be equal to the Contract Price and (b) the Payment Bond shall be equal to the Contract Price. Upon any increase in the Contract Price, Owner may request, and Contractor shall within ten (10) Business Days thereafter provide, an increase in the amount of the Performance Bond and the

Payment Bond such that each remains at a value not less than the Contract Price. All costs associated with providing and maintaining the Performance Bond and the Payment Bond shall be borne by Contractor.

3.16.3 Owner shall have the right to apply the Payment Bond and Performance Bond to satisfy any payment obligation of Contractor in connection with this Contract that is not paid when due hereunder. Each of the Payment Bond and Performance Bond shall permit Owner to make demand thereunder to satisfy any payment obligation of Contractor in connection with this Agreement that is not paid when due hereunder, after the expiration of any applicable grace period for such payment obligation. Owner shall deliver a copy of any demand made under each of the Payment Bond and Performance Bond to Contractor contemporaneously with the demand presented to the applicable issuer; provided, however, that failure to so deliver such demand shall not create a right of objection to any payment to be made under either the Payment Bond or Performance Bond. Demands under the Payment Bond and Performance Bond shall include identification of the provision of this Agreement entitling Owner to demand thereunder.

3.16.4 On the Final Completion Date, Owner shall return the Performance Bond and the Payment Bond. Upon return of the Performance Bond and the Payment Bond, the Performance Bond and Payment Bond shall be deemed fully exonerated.

3.17 Existing Improvements and Facilities. During the performance of the Work, Contractor shall take reasonable care to protect existing improvements, facilities and equipment at the Site and any adjacent properties, as well as the roadways and other infrastructure utilized by Contractor in the performance of the Work, unless they are to be altered or removed as a part of the Work. Contractor shall also make reasonable provisions to confine its activities so as to avoid and minimize any damage or compaction to any existing fences, crops or ground. To the extent that Contractor fails to comply with the requirements of the foregoing sentence and such failure causes Owner to become liable for damages to the owners of the Site or others that have a possessory interest in the Site, or any adjacent properties, roadways or other infrastructure utilized by Contractor in the performance of the Work, Contractor shall reimburse Owner in respect of its actual out-of-pocket expenses and damages. Contractor shall perform at its cost any improvements or alterations to roadways or other infrastructure utilized by Contractor in the performance of the Work in accordance with the requirements hereunder.

3.18 Contractor Deliverables. Deliver to Owner all Contractor Deliverables as and when required as set forth in the Contractor Deliverables Exhibit and as otherwise required under the terms of this Agreement. Contractor shall timely deliver each final version of any Contractor Deliverable (as approved by Owner to the extent required hereunder) in the file formats and to the locations in Owner's electronic data room as set forth in in the Contractor Deliverables Exhibit, and shall keep organized and up to date the Contractor's Deliverables located in any file folders within Owner's electronic data room designated as the Contractor's responsibility as set forth in the Contractor Deliverables Exhibit.

3.19 Site Conditions. Contractor (a) has visually inspected the Site, and has reasonably satisfied itself, through those documents provided to it by Owner in Exhibit V, as to all matters regarding the condition thereof, including those matters related to the environment, availability and quality of air and water, physical conditions at the Site, topography and ground surface conditions (including any flood zones or retention basins), sound attenuation conditions, subsurface geology and geotechnical conditions, nature and quality of surface and subsurface materials to be encountered (including Pre-Existing Hazardous Materials), transportation and access (including the availability and quality of roads), waste disposal, handling and storage of materials, the availability and quality of electric power, the location of underground utilities, obstructions, and equipment and facilities, climatic conditions and seasons, any religious, historical or archeological resources, existing Liens and encumbrances, and the presence of endangered or threatened species on the Site (collectively, "**Site Conditions**"), and shall be responsible for all necessary works in

relation to, or because of, such Site Conditions both below and above ground on the Site and (b) shall be solely responsible for performing any preliminary Work on the Site necessary for the commencement of construction to occur, including removal of all physical impediments to performing Work on the Site, above and below ground. Contractor specifically acknowledges and accepts the Site Conditions and agrees that subject to Section 13.1, no claims by Contractor for additional payment or extensions of time shall be permitted on the ground of any misunderstanding or misapprehension of the matters referred to in this Section 3.19. Contractor acknowledges that none of Owner, any of its Affiliates or any of its agents or representatives have made, nor shall they make, any express or implied warranty to Contractor as to Site Conditions.

3.20 Labor. Contractor shall have the discretion to make staffing and labor decisions in performing the Work, including, but not limited to, hiring employees, selecting Subcontractors, and determining whether to use union labor; provided that throughout the performance of all aspects of the Work, Contractor shall comply with, and shall ensure that each Subcontractor complies with, all Requirements. No Contractor decision regarding staffing or the use of union or non-union labor shall affect or excuse Contractor's performance of its obligations under this Agreement. Contractor shall adopt policies and practices designed to avoid Labor Disputes, and to minimize the risk of labor-related delays or disruption of the progress of the Work. Contractor shall advise Owner promptly, in writing, of any actual or threatened Labor Dispute of which Contractor has knowledge that might materially affect the performance of the Work by Contractor or by any of the Subcontractors. Notwithstanding the foregoing, the settlement of Labor Disputes shall be at the discretion of the Party having the difficulty. Contractor shall ensure that at the time of hiring, all its personnel and personnel of any Subcontractors performing the Work on the Site are (a) in possession of all such documents as may be required by any and all Applicable Laws (b) qualified for performing the Work in accordance with Industry Standards.

3.21 Additional Duties and Responsibilities. Contractor shall have the following duties and responsibilities under and pursuant to this Agreement related to the Work:

3.21.1 Cooperation of Contractor. Contractor shall reasonably cooperate with Owner in connection with Owner's efforts to obtain the approvals, certificates, and/or Applicable Permits which are Owner's responsibility to obtain pursuant to this Agreement, if any. Contractor acknowledges that concurrently with the performance of the Work under this Agreement as indicated on the Project Schedule or otherwise by Owner, other contractors, vendors, suppliers and consultants may be providing services in respect to other aspects of the Project on behalf of Owner pursuant to their respective separate contracts (the **"Separate Contractors"**). Contractor shall use commercially reasonable efforts to cooperate and cause its Subcontractors to cooperate with such Separate Contractors and shall cooperate in the performance of its Work to minimize any interference with the work of the Separate Contractors, but not to the extent of disrupting Contractor's schedule or sequence of Work, and Owner shall coordinate the performance of the Separate Contractors and their work with Contractor to minimize any interference with Contractor's performance of its Work. Scheduled daily meetings will occur with all Subcontractors, Separate Contractors (if any) and Owner to allow for proper coordination of that day's work. Contractor agrees to permit, without charge, reasonable access to, and use of, the Site and the Work, by the Separate Contractors or by Owner, whether such Work is partially or entirely complete, when such access and use does not interfere with the Work and such access or use is necessary for the timely performance and completion of the work of the Separate Contractors. Owner shall cause the work of any Separate Contractor to be properly coordinated and completed in accordance with the applicable schedules and the times of completion required by this Agreement.

3.21.2 Storage and Maintenance of Equipment and Other Items. Once any Equipment or Owner Provided Materials is delivered to the Site, Contractor shall receive, unload, inspect, clean, store and maintain the Equipment and Owner Provided Materials, as applicable, with reasonable care (including

ensuring that any original equipment manufacturer warranties are not voided as a result of any of the foregoing) and shall maintain or assume the care, custody and control thereof. To the extent the Owner Provided Materials are delivered during normal business hours, and Owner provides Contractor prior notice of the same pursuant to Section 3.9, Contractor shall not leave any Owner Provided Materials exposed, unsecured or unguarded without the written consent of Owner.

3.21.3 Testing of the Work. Contractor shall perform, or cause to be performed, all tests, approvals and inspections of the Work required by any Governmental Authority or elsewhere in this Agreement for construction work, or as otherwise necessary, appropriate or customary to assure the proper performance and operation thereof, in accordance with the Requirements. These tests, inspections and approvals shall be scheduled by Contractor so as not to delay the progress of the Work.

3.21.4 Tariff Risk Sharing. With respect to Contractor's and the Major Subcontractor's procurement of Equipment and materials, Contractor shall use commercially reasonable efforts to include risk sharing provisions in its procurement agreements to mitigate Tariff Increases.

3.22 Information Technology Framework; NERC Standards. Not later than thirty (30) days after the date of Notice to Proceed, Contractor will coordinate with Owner to implement the most current version of Owner's information technology protocols as it relates to Contractor's Work under this Agreement. The current version Owner's information technology protocols is set forth on Exhibit AA, which may be updated from time to time by Owner and in which case the most current version shall be provided to Contractor and shall be appended to this Agreement as Exhibit AA. With respect to each of the documents listed on Exhibit BB to be provided by the high voltage contractor, Contractor shall provide to Owner the final versions of each such document by no later than the Project Substantial Completion Date (or such later date as indicated in Exhibit BB), and Contractor shall provide to Owner a draft of each such document at least thirty (30) days prior to the relevant deadline for submission of such document for review and approval by Owner.

3.23 HS&E Plan. Contractor shall take necessary safety and other precautions to protect property and persons from damage, injury or illness arising out of the performance of the Work, and be responsible for the compliance by all of its agents, employees and Subcontractors with all Applicable Laws governing health and safety, including applicable Occupational Safety and Health Administration (OSHA) requirements. In addition, no less than sixty (60) days prior to the date of the Notice to Proceed, Contractor shall provide Owner with its draft of the HS&E Plan for review and approval by Owner. Contractor shall incorporate all of Owner's reasonable comments into the final HS&E Plan. Once approved by Owner, the HS&E Plan shall be attached to this Agreement as Exhibit D-1. During performance of the Work, Contractor shall publish work safety rules for the Site in compliance with the HS&E Plan, which safety rules shall apply to any and all visitors to the Site and Owner, Owner Financing Parties, other separate contractors of Owner and their subcontractors and suppliers. Contractor agrees to implement and follow such HS&E Plan during execution of the Work, employ good safety practices, and conduct regular, frequent safety meetings. Contractor shall be responsible for health and safety planning and implementation at the Site; provided, however, that Owner shall be responsible for ensuring that during any visit to the Site, each of Owner, Owner Financing Parties, agents and employees of Owner, other separate contractors of Owner and Owner's subcontractors and suppliers (other than, for the avoidance of doubt, Contractor and any Subcontractor hereunder), shall each comply with such onsite health and safety plans implemented by Contractor. Contractor further agrees to take corrective action immediately upon receipt of a safety citation, or any written notice of a safety violation. Contractor and Owner will notify the other immediately of any unsafe working condition encountered on the Site. Contractor shall designate an onsite supervisor who will be responsible for Contractor's compliance with all federal, state and local rules and ordinances concerning workplace safety and coordination and compliance with the HS&E Plan. Contractor is responsible for recording and reporting any safety incident to the necessary Governmental Authorities and in compliance with Applicable Law. Contractor shall immediately notify Owner of any incident involving injury to persons or damage to property

which arises or is alleged to have arisen on account of any work done by Contractor under this Contract or any firm or individual to whom Contractor may have contracted work.

(a) Upon becoming aware of any unsafe or hazardous (or potentially unsafe or hazardous condition) in or around the Site, Contractor shall immediately take any and all actions reasonably necessary to eliminate such condition and render the Site and surrounding areas safe.

(b) Contractor shall, in accordance with Industry Standards, take all reasonable precautions for safety of, and shall provide all reasonable protection to prevent damage, injury or loss resulting from the performance of the Work to persons, including members of the public and the employees, agents, contractors, consultants and representatives of Owner, Contractors, its Subcontractors, Owner's contractors and their subcontractors and suppliers, the Owner Financing Parties and others in the vicinity of the Site (including members of the public or people in and around buildings and areas adjacent to the Site) and other persons who may be affected thereby.

(c) Contractor shall furnish and maintain all necessary safety equipment such as barriers, signs, warning lights and guards as required, providing adequate protection to persons and property in connection with its performance of the Work at the Site.

(d) Contractor shall give reasonable notice to Owner in the event that any public or private property or utilities are susceptible to injury or damage through the performance of the Work and shall make all necessary arrangements with Owner relative to the removal and replacement or protection of such property or utilities.

3.24 Quality Assurance.

(a) Contractor shall use effective quality assurance programs throughout the performance of the Work. Within no less than thirty (30) days prior to the date of the Notice to Proceed, Contractor shall provide Owner with a copy of its proposed quality assurance and quality control program for review and approval by Owner. Contractor shall incorporate all of Owner's reasonable comments into the final quality assurance and quality control program. Once approved by Owner, such quality assurance and quality control program shall be attached to this Agreement as Exhibit D-2. Work shall be managed in accordance with such quality assurance and quality control program as approved by Owner. Quality assurance and quality control testing shall be documented by a representative of Contractor qualified to perform such quality assurance and quality control Work. Owner may observe and witness quality assurance and quality control actions taken by Contractor as desired. All completed quality assurance and quality control documents will be provided to Owner during the performance of the Work as reasonably requested by Owner.

(b) Contractor shall give prompt notice to Owner of any defects, deficiencies or non-conformity in or poor quality or condition of design, workmanship, equipment, components or parts of the Work that it detects and shall promptly remedy same. No such notice shall be deemed to cause a waiver or release of any of the Contractor's duties or obligations under this Agreement or of Owner's rights and

remedies thereunder. Contractor shall not be excused, released or relieved of liability for any such defect in the Work or for failing to perform the Work in accordance with the Milestone Completion Schedule on account of providing such notice to Owner and remedying the defect.

(c) Prior to Project Substantial Completion, Contractor shall, at its sole cost and expense, (i) promptly correct, repair or replace any damage or loss to the Site and any other property to the extent caused in whole or in part by Contractor, a Subcontractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, and (ii) except if such Defect is a Non-Critical Deficiency, in which case it shall be included on the Punchlist (a) correct, repair or replace any part of the Work that is Defective, or ceases to perform the operation or function for which it was designed, regardless of the stage of its completion or the time or place of discovery of such Defect and regardless of whether Owner has previously inspected or accepted such Work through oversight or otherwise, or (b) remove such Defective work from the Site and replace it with Work that is operable and functioning and not Defective. The foregoing obligations of Contractor are in addition to the Contractor's indemnity obligations under Article 17.

3.25 Business Practices. Contractor covenants that it will not make any payment or give anything of value to any government official (including any officer or employee of any Governmental Authority) to influence his, her or its decision or to gain any other advantage for Owner or Contractor in connection with the Work to be performed hereunder.

3.26 Project Manager. Contractor shall appoint a single representative, which appointment shall be subject to the prior written approval of Owner which shall not be unreasonably withheld, to act as its manager and coordinator of the Agreement on the Contractor's behalf who shall not be replaced without written notice to Owner, except in the instance where that representative leaves Contractor's employ or become incapacitated ("**Project Manager**"). The Project Manager shall be replaced at the request of Owner if Owner objects to such manager for reasonable cause. The Project Manager (i) shall normally be present at the Site during the performance of the Work, except for scheduled personal rotations home or vacations or as otherwise agreed by the Parties, (ii) shall act as the liaison for the Contractor's communications with Owner, (iii) shall be responsible for providing all reports due under this Agreement, and (iv) shall have authority to act on behalf of Contractor. All written communications given to or received from the Project Manager shall be deemed given to or received from Contractor. The Project Manager shall coordinate all activities of Contractor and its Subcontractors, including planning, scheduling, reporting activities, communication activities, insurance procurement and administration, as applicable.

3.27 Spare Parts. Owner may request Contractor to purchase Spare Parts, which shall be considered a Change Order.

3.28 Permanent Contracts. With respect to its obligations under Section 3.9, to the extent that the applicable utilities, facilities and services are meant to be utilized by Owner after Project Substantial Completion, the contracts therefor shall be entered into in the name of Owner, and Contractor shall only be required to bear the cost of such utilities or other services for the period prior to Project Substantial Completion.

4. COVENANTS, WARRANTIES AND REPRESENTATIONS

4.1 Contractor. Contractor represents and warrants, as of the Execution Date and the Commencement Date, as follows:

4.1.1 Organization, Standing and Qualification. Contractor is a limited liability company duly formed, validly existing and in good standing under the laws of the State of Indiana, and has full power and authority to execute, deliver and perform its obligations hereunder and to engage in the business it presently conducts and contemplates conducting, and is and will be duly licensed or qualified to do business and in good standing under the laws of each other jurisdiction wherein the nature of the business transacted by it makes such licensing or qualification necessary and where the failure to be licensed or qualified would have a material adverse effect on its ability to perform its obligations hereunder.

4.1.2 Due Authorization; Enforceability. This Agreement has been duly authorized, executed and delivered by or on behalf of Contractor and is, upon execution and delivery by each of the Parties hereto, the legal, valid and binding obligation of Contractor, enforceable against Contractor in accordance with its terms, except as such enforceability may be limited by applicable bankruptcy, insolvency or similar laws affecting creditors' rights generally and by general equitable principles.

4.1.3 No Conflict. The execution, delivery and performance by Contractor of this Agreement (a) will not conflict with or cause any default under: (i) its organizational documents; (ii) any indenture, mortgage, chattel mortgage, deed of trust, lease, conditional sales contract, loan or credit arrangement or other agreement or instrument to which Contractor is a party or by which it or its properties may be bound or affected; or (iii) any Applicable Law; and (b) will not subject the Project or any component part thereof or the Site or any portion thereof to any Lien other than as contemplated or permitted by this Agreement.

4.1.4 Government Approvals. Neither the execution nor delivery by Contractor of this Agreement requires the consent or approval of, or the giving of notice to or registration with, or the taking of any other action in respect of, any Governmental Authority. Contractor represents and warrants that all Contractor Permits and other Applicable Permits required to be in Contractor's name either have been obtained by Contractor and are in full force and effect or will be obtained and will be in full force and effect on or prior to the date on which they are required under this Agreement and Applicable Law, so as to permit Contractor to commence and prosecute the Work to completion in accordance with the terms and conditions of this Agreement.

4.1.5 No Suits, Proceedings. There are no actions, suits, proceedings, patent or license infringements, or investigations pending or, to Contractor's knowledge after due inquiry, threatened in writing against it at law or in equity before any court or before any Governmental Authority (whether or not covered by insurance) that individually or in the aggregate could result in any materially adverse effect on Contractor's ability to perform its obligations under this Agreement. Contractor has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any Governmental Authority that may result in any such materially adverse effect or such impairment.

4.1.6 Business Practices. Neither Contractor nor its representatives have made any payment or given anything of value to any government official (including any officer or employee of any Governmental Authority) to influence his, her or its decision or to gain any other advantage for Owner or Contractor in connection with the Work to be performed hereunder.

4.1.7 Licenses. All Persons who will perform any portion of the Work have and will have all business and professional certifications and licenses if and as required by the terms and conditions of this Agreement, Applicable Law and Applicable Permits to perform such portion of the Work under this Agreement.

4.1.8 Financial Condition and Adequate Resources. Contractor is financially solvent, able to pay its debts as they mature, and possessed of sufficient working capital to complete its obligations under this Agreement. Contractor has or will procure adequate resources and is qualified, in each case directly or through its Subcontractors, to perform the Work in accordance with the terms and conditions of this Agreement.

4.1.9 Patents. Contractor owns or has the right to use, or will be able to secure from its Subcontractors the right to use, all Intellectual Property Rights necessary to perform the Work without conflict with the rights of others and to enable Owner to exercise its rights hereunder to operate the Project without infringement thereof.

4.1.10 Lone Star Infrastructure Protection Act. To the extent that any equipment or services provided under this Agreement constitute Critical Electric Grid Equipment (CEGE) or Critical Electric Grid Services (CEGS), provision of such CEGE or CEGS will not result in direct or remote access to or control of CEGE by a Lone Star Infrastructure Protection Act (LSIPA) Designated Company or an LSIPA Designated Country, including access or control by Contractor except for access specifically allowed by Owner for product warranty and support purposes. This includes, but is not limited to, access to or control of CEGE by an LSIPA Affiliate of the Contractor.

4.2 Owner. Owner represents and warrants, as of the Execution Date and the Commencement Date, as follows:

4.2.1 Organization, Standing and Qualification. Owner is a limited liability company duly formed, validly existing, and in good standing under the laws of the State of Delaware, and has full limited liability company power and authority to execute, deliver and perform its obligations hereunder and to engage in the business Owner presently conducts and contemplates conducting, and is and will be duly licensed or qualified to do business and in good standing in each jurisdiction wherein the nature of the business transacted by it makes such licensing or qualification necessary and where the failure to be licensed or qualified would have a material adverse effect on its ability to perform its obligations hereunder.

4.2.2 Due Authorization; Enforceability. This Agreement has been duly authorized, executed and delivered by or on behalf of Owner and is, upon execution and delivery by each of the Parties hereto, the legal, valid, and binding obligation of Owner, enforceable against Owner in accordance with its terms, except as such enforceability may be limited by applicable bankruptcy, insolvency or similar laws affecting creditors' rights generally and by general equitable principles.

4.2.3 No Conflict. The execution, delivery and performance by Owner of this Agreement will not conflict with or cause any default under: (a) its organizational documents; (b) any indenture, mortgage, chattel mortgage, deed of trust, lease, conditional sales contract, loan or credit arrangement or other agreement or instrument to which it is a Party or by which it or its properties may be bound or affected; or (c) any Applicable Law.

5. COST OF WORK

5.1 Contract Price.

5.1.1 Contract Price. Contractor hereby agrees to accept as compensation for the performance of the Work and its other obligations hereunder One-Hundred Fourteen Million, Four-Hundred Sixty-Nine Thousand and Thirteen Dollars ($114,469,013) (as the same may be adjusted pursuant to the terms of this Agreement, the "**Contract Price**"). For the avoidance of doubt and subject to this Section 5.1.1, the Contract Price shall include all portions of the Work comprising the Project. Neither shall

the Contract Price be changed nor shall Contractor be entitled to any other compensation, reimbursement of expenses or additional payment of any kind without prior written authorization of Owner or as otherwise specifically set forth in Article 13 or Section 3.3.4 of this Agreement. Payments shall be made at the times and in the manner provided in Article 6. For the avoidance of doubt, the Contract Price excludes (a) Property Taxes and (b) any Taxes imposed on Owner by any Governmental Authority under Applicable Law, including but not limited to those imposed on Owner Provided Materials (the Taxes set forth in clauses (a) and (b), "**Excluded Taxes**"), in all cases which shall be payable by Owner.

5.1.2 RESERVED.

5.1.3 Taxes Included in Contract Price. The Contract Price includes any and all Taxes imposed under Applicable Law on Contractor, the Subcontractors, the Work, the construction or sale of Equipment to Owner or installation of the Project, including any sales, use, gross receipts, privilege transfer, documentary transfer, excise, similar or other tax levied by any state, county or local government with respect to the purchase, sale, lease or use of any property or services that are part of the Work, without regard to whether the person required by law to report collect or pay such Tax was Contractor, any Subcontractor, a person selling to either of them, or any other person, including any transaction privilege taxes, vehicle use tax and sales taxes imposed on the Work by any Governmental Authority (collectively, "**Sales Taxes**"), but excludes any Excluded Taxes or Taxes that constitute Tariff Increases. Contractor shall, in accordance with Applicable Law, timely administer and timely pay all Taxes that are included in the Contract Price and timely furnish to the appropriate taxing authorities all required information and reports in connection with such Taxes and furnish copies of such information and reports (other than information specifically pertaining to Contractor's income and profit) to Owner as reasonably requested by Owner. Contractor shall reasonably cooperate with Owner to minimize the Tax liability of Owner to the extent legally permissible, including supplying resale and Exemption Certificates with each invoice, if applicable, and other information as reasonably requested in all cases by taxing authorities. In addition, to the extent any other exemptions, abatements, credits against or deferrals of any Taxes may be available to Owner under Applicable Law, including property tax exemptions, the Parties shall reasonably cooperate in order to secure any such exemptions, abatements, credits against, or deferrals of, such Taxes, however Contractor assumes no liability if not granted, provided Contractor has made commercially reasonable efforts to secure all available exemptions. Each Contractor's Invoice shall be consistent with the provisions of this Section 5.1.3. For a period of six (6) years after the Project Substantial Completion Date, and within thirty (30) Days of a request therefor, Contractor shall provide Owner with any information regarding quantities and descriptions of property installed at the Project Site that Owner shall reasonably request in connection with the preparation of its Tax returns.

6. TERMS OF PAYMENT

6.1 Contractor Payments. The Contract Price shall be paid to Contractor on a monthly basis for its percent completion of each subcategory of the Work enumerated in the applicable Contractor's Invoice and verified as complete by Owner. Each payment to Contractor under this Section 6.1 shall be due and payable only to the extent it is supported, to Owner's reasonable satisfaction, by the completion of the applicable portion of the Work set forth in the Contractor's Invoice for such payment, and receipt of other supporting documentation for the Contractor's Invoice, including each Conditional Waiver and Release Upon Progress Payment and each Waiver and Release Upon Final Payment required under Section 21.2.

6.1.1 Payment Assessment. Contractor and Owner shall periodically, and in any event at least once each month, review the Work completed and assess the progress of on-Site Work completed. Included in Exhibit Q hereto as part of the form of Contractor's Invoice is the Contractor's "Schedule of Values," allocating the entire Contract Price, excluding any down payment, among the various portions of

the Work. The schedule of values shall be used as a basis for reviewing and approving the Contractor's Invoices.

6.1.2 Contractor's Invoices. Contractor shall electronically deliver to Owner a Contractor's Invoice no later than the fifth (5th) Business Day of each month for each payment owing to Contractor under this Article 6 and under any other provision of this Agreement for Work performed prior to such month. Contractor shall provide delivery schedules, purchase orders (which may be redacted for pricing), and/or invoices for Major Equipment as required by Owner. Each Contractor's Invoice shall be reasonably detailed and shall be accompanied by reasonable supporting documentation evidencing the achievement of the portion of the Work for which the payment is being requested (including invoices from any Major Subcontractor and any required documents related to Sales Taxes) and shall be accompanied by a Conditional Waiver and Release Upon Progress Payment from Contractor and each Subcontractor for the work being invoiced, as required to be delivered therewith as set forth below. A Contractor's Invoice will be deemed received only when all supporting documentation required herein has been satisfactorily submitted to Owner. Within five (5) Business Days after the receipt of each Contractor's Invoice (including for the avoidance of doubt the Final Contractor's Invoice), Owner shall review the Contractor's Invoice to verify (a) completion of the Work for which payment is sought; (b) that the Work conforms to the requirements of this Agreement; (c) that the Contractor's Invoice and supporting documentation have been properly submitted and that Owner has received each Conditional Waiver and Release Upon Progress Payment required to be delivered; and (d) that the invoiced amount reflects the percent of each subcategory of the Work completed in the applicable timeframe. Upon such verification, Owner shall approve the Contractor's Invoice or shall advise Contractor if all or any portion of the application is not certified. Owner shall provide all specific reasons in writing for any disapproval of a Contractor's Invoice or a portion thereof. If Owner cannot certify a portion of a Contractor's Invoice, Owner shall nonetheless certify payment of the remaining portion of the Contractor's Invoice for Work performed in accordance with this Agreement.

6.1.3 Final Completion Payment. On or after the date on which Contractor delivers to Owner a Notice of Final Completion accepted by Owner pursuant to Section 11.8, Contractor shall submit a final Contractor's Invoice (a "**Final Contractor's Invoice**") which shall set forth all amounts due to Contractor that remain unpaid as of the date of such invoice (including (a) any remaining Punchlist Holdback that has not been released to Contractor in accordance with Section 6.7.2, (b) any remaining Excluded Taxes for which Owner is liable to indemnify Contractor under this Agreement and (c) any other amount due to Contractor hereunder) and shall be accompanied by each Waiver and Release Upon Final Payment required to be delivered therewith pursuant hereto. Owner shall pay to Contractor the amount due under such Final Contractor's Invoice (the "**Final Completion Payment**") in accordance with Section 6.4. Notwithstanding the foregoing, the Final Completion Payment shall only become due and payable to Contractor if and only if all of the requirements of Final Completion set forth in Section 11.7 have been met. No later than ten (10) Business Days after the payment by Owner to Contractor of the Final Completion Payment, Contractor shall deliver to Owner a Waiver and Release Upon Final Payment in respect of Contractor and all Subcontractors (to the extent it has not yet been delivered at such time).

6.2 Warranty Work. Any Warranty Work performed by Contractor pursuant to this Agreement shall be at the sole expense of Contractor.

6.3 Undisputed Payments. Each Party shall pay any undisputed portion of any amount owed to other Party pursuant to this Agreement within thirty (30) days after receipt of the applicable invoice or demand for payment (meeting the relevant requirements therefor as set forth herein) from the Party seeking payment. Any undisputed payments not paid when due shall bear interest at a rate equal to the Prime Rate then in effect *plus* three percent (3%) per annum. This Section 6.3 shall also be applied to those sums, if any, disputed by Owner and resolved in Contractor's favor under Article 24.

6.4 Disputed Payments. If a Dispute arises regarding the payments to be made to Contractor or Owner hereunder, Owner or Contractor, as applicable, shall pay all undisputed amounts, and Owner and Contractor shall resolve the Dispute in accordance with the Dispute resolution provisions of Article 24.

6.5 Form and Manner of Payments. All payments made pursuant to this Agreement shall be made by check or wire transfer of immediately available funds to a bank account to be designated by the Party receiving such payment. Either Party may designate from time to time a different bank or account by notice to the other Party given not less than ten (10) Business Days prior to the payment date to which such payment instructions are to apply. If the date for any payment called for under this Agreement should fall on a day that is not a Business Day at the location designated for receipt of such payment, then such payment may be made on the next succeeding Business Day in such location with the same effect as if made on the date due.

6.6 Effect of Payment. Payment of the Contract Price, approval of any Contractor Invoice and/or execution of any completion certificates shall not constitute (i) Owner's acceptance or approval of any portion of the Work, (ii) Owner's acceptance of Work that has been or subsequently is determined to be defective or deficient or not to be completed or performed in accordance with the requirements hereunder, (iii) a waiver of any claim or right Owner may have at that time or thereafter, including claims regarding unsettled Liens, warranty rights and indemnification obligations of Contractor. No payment made by Owner shall be considered or deemed to represent that Owner has inspected the Work or checked the quality or quantity of the Work or Owner knows or has ascertained how or for what purpose Contractor has used sums previously paid. All payments of the Contract Price shall be subject to correction or adjustment in subsequent progress reviews and payments and as otherwise provided in this Agreement.

6.7 Retainage; Release of Punchlist Amounts.

6.7.1 Retainage. Owner shall retain an amount equal to five percent (5%) of the amount of each monthly Contractor's Invoice hereunder (less any Punchlist Holdback withheld concurrently with such monthly payment) made pursuant to a Contractor's Invoice (the "**Retainage**"), as performance security for Contractor's obligation to complete the items on the Punchlist and to achieve Final Completion. Retainage shall be released only as described in Section 6.7.2.

6.7.2 Release of Retainage. Owner shall release the Retainage as follows: (a) within thirty (30) days after the Project Substantial Completion Date, Owner shall pay Contractor an amount equal to the entire remaining amount of the Retainage withheld *less* an amount equal to the Punchlist Holdback of the Punchlist Amount for all of the Punchlist items that have not been completed at such time pursuant to the terms hereof; (b) after Final Completion, Owner shall release the remaining funds in the Retainage. Except as may be specifically required pursuant to Applicable Law, any interest accruing on the Retainage shall accrue for the account of the Contractor and Subcontractors, as applicable, provided that the Contractor shall be responsible to distribute any such interest to the Subcontractors in accordance with Applicable Law. If Contractor fails to perform any Punchlist item within thirty (30) days after the Project Substantial Completion Date, Owner may elect by written notice to Contractor to retain the Punchlist Holdback applicable to such Punchlist item and complete such Punchlist item itself. Upon Owner making such election, Contractor's obligation to perform such Punchlist item shall be deemed satisfied.

6.8 Withholding Payment. Notwithstanding any other provision to the contrary contained herein, Owner may withhold payments to Contractor hereunder, and Owner may decide not to certify payment or may nullify the whole or a part of a certification for payment made pursuant to a previous Contractor's Invoice to such extent as may be necessary to protect Owner from loss because of: (a) third party claims filed (or reasonable evidence indicating probable filing of such claims) for which Contractor is responsible (including Liens) against the Work, the Project or the Site, so long as payment therefor was previously made by Owner; (b) the unexcused failure of Contractor to make payments when due to Subcontractors or Suppliers; (c)

damage to Owner or another contractor, for which Contractor is liable, including damage to the property of Owner or any of its Affiliates; (d) Contractor's failure to carry out the scope of Work in accordance with this Agreement (including Work not having progressed to the point indicated in Contractor's Invoice or the quality of the Work not being in accordance with this Agreement); (e) the occurrence of a Contractor Event of Default; (f) Contractor's failure to achieve any Guaranteed Milestone by the applicable Guaranteed Date; (g) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price; or (h) repeated failure to carry out the Work in accordance with this Agreement. If Owner is unable to certify payment in the amount of the Contractor's Invoice, Owner will notify Contractor. If Contractor and Owner cannot agree on a revised amount, Owner will promptly notify Contractor of the amount that Owner deems to be due and owing. Contractor shall not have any rights of termination or suspension under this Agreement as a result of Owner's exercise of its rights under this Section 6.8, nor shall Contractor be entitled to claim a breach by Owner of this Agreement or any Owner-Caused Delay in connection therewith. Owner shall release payments or portions of payment withheld pursuant to this Section 6.8, to the extent not utilized by Owner in accordance with Section 16.2(c), within five (5) days from the date when the circumstance for which payment or the portion of payment has been withheld is resolved or the amount withheld is otherwise no longer needed to protect Owner.

6.9 Payments to Subcontractors. Contractor shall promptly pay each Subcontractor, upon receipt of payment from Owner, out of the amount paid to Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to Contractor on account of such Subcontractor's portion of the Work, subject to the Contractor's rights under its Subcontracts. Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Subcontractors in a similar manner. The Subcontractors are not intended to be third party beneficiaries of this provision, and this provision shall not be deemed to create any trust fund or fiduciary duty or other duty on the part of Contractor or Owner in favor of Subcontractors. Owner shall not have an obligation to pay or to see to the payment of money to any Subcontractor. No Contractor's Invoice shall include a request for payment of amounts payable under a Subcontract which Contractor does not then intend to pay a Subcontractor or Supplier or that it intends to use as a credit against amounts owed to Contractor by a Subcontractor or Supplier.

7. COMMENCEMENT AND SCHEDULING OF THE WORK

7.1 Effectiveness of Agreement.

(a) Contractor's obligations to fully perform the Work (other than that portion of the Work set forth in one or more LNTPs) shall commence upon Owner's issuance of the Notice to Proceed.

(b) Prior to the issuance of the Notice to Proceed, Owner shall have the right to issue one or more Notices (each, a "**Limited Notice to Proceed**" or "**LNTP**") directing Contractor to commence and complete any portion of the Work specified in any such Limited Notice to Proceed ("**LNTP Work**"). Any LNTP Work shall constitute portions of the Work and be subject to the terms of this Agreement and Contractor shall commence such LNTP Work after the date specified in relevant LNTP and thereafter diligently pursue the LNTP Work. Any payment by Owner with respect to such LNTP Work shall be as set forth in the relevant LNTP and paid in accordance with Article 6.

(c) Owner shall not be deemed, as a result of Owner's execution and delivery of this Agreement, or the issuance of the Notice to Proceed, to have (i) waived any deficiencies in any LNTP Work performed prior to the issuance of Notice to

Proceed, (ii) ratified any action by Contractor or any other Person in connection with such LNTP Work, or (iii) accepted such LNTP Work.

7.1.1 Owner Approval Condition Precedent. Other than as provided in this Section 7.1.1, the obligations of the Parties under this Agreement are subject to the condition precedent that Owner has received all approvals of the management and board of directors (or equivalent governing body) and all approvals of the shareholders of Owner and its Affiliates, including, if applicable, the approval of the shareholders of Concord New Energy Group Limited, as Owner determines in its sole discretion are required under its and their respective constituting documents for the performance by Owner of its obligations under this Agreement ("**Owner Approval**"). If Owner has not received the Owner Approval within one hundred (100) days of the Execution Date (the "**Owner Approval Deadline**"), then Owner may elect to terminate this Agreement by providing written notice of termination to Contractor within ten (10) Business Days after the Owner Approval Deadline. Other than amounts due to Contractor under any LNTP, neither Party will have any liability to the other Party in connection with the termination of the Agreement pursuant to this Section 7.1.1. Contractor acknowledges and agrees that, in connection with the Owner Approval process described in this Section 7.1.1., and notwithstanding the obligations of confidentiality set forth in Section 18, Owner or Owner's Affiliates are permitted to disclose that the Parties have entered into this Agreement and may disclose a summary of the material terms hereof as may be required for obtaining such approval.

In the event the Contract Price is changed as set forth in Article 13 or Section 3.3.4 of this Agreement by a cumulative increase of the Contract Price by greater than or equal to 20% (a "**Major Change Order Event**"), Owner shall seek Owner Approval for the Major Change Order Event. If Owner has not received the Owner Approval within one hundred (100) days of the Major Change Order Event (the "**Major Change Order Event Owner Approval Deadline**"), then Owner may elect to terminate this Agreement by providing written notice of termination to Contractor within ten (10) Business Days after the Major Change Order Event Owner Approval Deadline. Prior to Owner Approval for a Major Change Order Event, Owner may not direct Contractor to perform work subject to Section 13.4.

7.2 Scheduling of the Work.

(a) Contractor shall plan, supervise, control and coordinate the performance of the Work in accordance with the Project Schedule and Milestone Completion Schedule, including the Guaranteed Dates. Contractor shall regularly (and no less frequently than once per week with respect to the Work performed by any Major Subcontractor) obtain from Subcontractors information and data about the planning for and progress of the Work and the delivery of Equipment, shall coordinate and integrate such information and data into any updates to the status of the Work, and shall monitor the progress of the Work and the delivery of Equipment. Contractor shall act as the expeditor of its own forces and those forces of Subcontractors to prevent potential and actual delays, interruptions, hindrances or disruptions.

(b) Within thirty (30) days of Notice to Proceed, the Contractor shall submit to Owner the Level 3 Project Schedule, together with a written narrative describing the major work activities, activities on the critical path, and major constraints underlying the sequence and logic of the Project Schedule. The Level 3 Project Schedule shall depict all activities necessary to complete the Work, including, as applicable, all

submittal and submittal review activities, all procurement activities, and all field activities, including mobilization, construction, testing, commissioning, and punchlist. Activities shall be sufficiently detailed and limited in duration to enable proper planning and coordination of the Work, effective evaluation of the reasonableness and realism of the Project Schedule, accurate monitoring of progress, and reliable analysis of schedule impacts.

(c) Neither Owner's acceptance of, nor comments about, any schedule shall transfer responsibility for any schedule to Owner, nor imply Owner's agreement with (i) any assumption upon which such schedule is based or (ii) any matter underlying or contained in such schedule. Failure of Owner to discover errors or omissions in schedules that it has reviewed, to inform Contractor that Subcontractors or others are behind schedule, or to direct or enforce procedures for complying with the Project Schedule and Milestone Completion Schedule shall not relieve Contractor from its sole responsibility to perform and complete the Work to achieve each Guaranteed Milestone by the applicable Guaranteed Date, and shall not be a cause for an adjustment of the Contract Price or any Guaranteed Date.

7.3 Acceleration of the Work. Contractor shall keep the Project Schedule and narrative up to date, taking into account the actual progress of the Work, and such information shall be included with progress reports submitted to Owner hereunder. Subject to Article 8, if Contractor is not timely in the performance of the Work such that any critical path dates for the completion of an applicable Guaranteed Milestone are missed, or become reasonably likely to be missed, Contractor shall take all actions necessary, including working overtime, weekends, or holidays or adding additional personnel, equipment or work crews, and providing an Approved Plan as further described below, all at no cost to Owner, accelerate performance of the Work, meet the critical path dates and assure achievement of the Guaranteed Milestones by the corresponding dates therefor in the Milestone Completion Schedule. If, at any time (a) the actual progress of the Work against the Milestone Completion Schedule or Project Schedule shall be delayed by more than six (6) days, or (b) any milestone has not been achieved on or before the corresponding milestone date, other than as a result of an Excusable Event, then Owner may instruct Contractor to submit a plan to accelerate the performance of the Work that reasonably demonstrates that the Guaranteed Milestones will be achieved by the applicable Guaranteed Dates. Upon receipt of such plan, Owner shall promptly review the plan and notify Contractor of (i) Owner's acceptance of such plan (in which event such accepted plan shall constitute an "**Approved Plan**") or (ii) proposed revisions to or perceived deficiencies with such plan. Upon receipt of any such notice from Owner under clause (ii) of the preceding sentence, Contractor shall promptly revise the plan in accordance with the comments received from Owner or in accordance with such other changes as Contractor reasonably determines are appropriate, and submit the revised plan to Owner. The foregoing procedure shall be repeated until the Parties have agreed on an Approved Plan, at which time Contractor shall immediately and fully execute the Approved Plan. For the avoidance of doubt, nothing in this Section 7.3 shall entitle Contractor to an extension of time for, or to payment of the cost incurred (or to any other revision to, or relief from, any provision of this Agreement) in connection with any plan, Approved Plan or acceleration of the Work.

7.4 Progress Reporting. From and after the Commencement Date or the issuance of any LNTP (whichever is earlier) and until the Project Substantial Completion Date, Contractor shall prepare and provide (a) a Daily Progress Report, which shall be submitted to Owner no later than the beginning of the next Business Day by electronic mail to recipients to be notified by Owner to Contractor, and (b) a Monthly Progress Report, which shall be submitted to Owner no later than five (5) Business Days after the close of each calendar month. Contractor and Owner shall, during the period from Commencement Date until the Project Substantial Completion Date, hold weekly progress meeting on the last day of each week during such period (or as otherwise agreed by the Parties) to update Owner on the progress of the performance of the

Work during that week. If requested by Owner, Contractor's manager (or his designee) shall attend meetings with representatives of Owner to review such Daily or Monthly Progress Reports and discuss construction progress. Contractor shall schedule and hold a regular monthly meeting with Owner to discuss the Monthly Progress Report, including any delays or changes to the Project Schedule and Milestone Completion Schedule and Contractor's planned work for the next month.

8. EXCUSABLE EVENT

8.1 Certain Events. No failure or omission to carry out or observe any of the terms, provisions or conditions of this Agreement shall give rise to any claim against Contractor, or be deemed to be a breach or an Event of Default under this Agreement, if such failure or omission shall be caused by or arise out of an Excusable Event; provided that Contractor complies with the provisions of this Article 8. Notwithstanding anything to the contrary in the foregoing, the obligation to pay money in a timely manner in accordance with the terms hereof shall not be subject to the Excusable Event provisions hereof.

8.2 Notice of Excusable Event. If Contractor's ability to perform its obligations under this Agreement is affected by an Excusable Event, Contractor shall within five (5) Business Days of having knowledge of the Excusable Event provide Owner with written notice of the Excusable Event (a "**Delay Notice**") describing in reasonable detail the particulars of the occurrence giving rise to the claim, including what date Contractor became aware of the occurrence of such Excusable Event and an estimate of the event's anticipated duration and effect upon the performance of its obligations, and any action being taken to avoid or minimize its effect. Contractor shall have a continuing obligation to deliver to Owner regular updated reports and any additional documentation and analysis supporting its claim regarding an Excusable Event (other than an Owner-Caused Delay) promptly after such information becomes available to Contractor. If Contractor fails to timely provide Owner with a Delay Notice as provided in this Section 8.2 with respect to an Excusable Event that prevents Contractor from achieving a Guaranteed Date, Contractor shall receive no relief with respect to such period prior to delivering the Delay Notice. Contractor's failure to timely deliver a Delay Notice to Owner of an Excusable Event, shall not constitute a waiver of Contractor's right to relief due to such Excusable Event except to the extent Owner is actually prejudiced by such failure.

8.3 Excusable Event Conditions. Upon the occurrence of an Excusable Event:

(a) Contractor will have the burden of proof for the Excusable Event;

(b) the suspension of, or impact on, performance due to such Excusable Event shall be of no greater scope and no longer duration than is required by such Excusable Event (taking into account the obligations affected thereby);

(c) Contractor shall use its commercially reasonable efforts:

(i) to mitigate or limit the duration of, and costs arising from, any suspension or delay in, or other impact to, the performance of its obligations under this Agreement (including any impact to the schedule for the performance thereof);

(ii) to continue to perform its obligations hereunder not affected by such Excusable Event; and

(iii) to correct or cure the effect of such Excusable Event; and

(d) when Contractor is able to resume performance of its affected obligations under this Agreement, Contractor shall give Owner Notice to that effect and promptly resume performance of all of its obligations under this Agreement.

8.4 Contractor's Remedies.

(a) As Contractor's remedy for the occurrence of an Excusable Event, and provided that Contractor has otherwise materially complied with the applicable provisions of Section 8.2 and Section 8.3, if an Excusable Event occurs, and to the extent such Excusable Event has an actual and demonstrable adverse impact on Contractor's ability to perform its obligations hereunder so as to achieve a Guaranteed Date: (i) such Guaranteed Date shall be correspondingly extended on a day-for-day basis by the period of time (if any) that Contractor's achievement of the applicable Guaranteed Date is actually and demonstrably delayed as a result of the impact of such an Excusable Event, provided, that Contractor shall not under any circumstances be allowed to "double dip" and obtain multiple schedule adjustments for the same day; and (ii) for any Excusable Event, if Contractor's costs increase despite Contractor's commercially reasonable efforts to mitigate any such increases pursuant to Section 8.3(c), the Contract Price shall be increased by an amount equal to the actual and reasonably substantiated costs (including Sales Taxes) incurred by Contractor (including any costs incurred by Contractor in connection with the mitigation measures implemented by Contractor pursuant to Section 8.3(c) and any demobilization and re-mobilization costs) plus a five percent (5%) markup of such costs (provided that in no event will any markup be applied in respect to any Tariff Increases).

(b) Upon the occurrence of an event that entitles Contractor to relief under this Article 8, and subject to Contractor's compliance with the applicable provisions of this Article 8 and Article 13 in all material respects, Contractor and Owner shall prepare a Change Order in accordance with Article 13.

(c) Notwithstanding the occurrence of an Excusable Event, Contractor shall not be entitled to an adjustment to the Guaranteed Dates or Contract Price in relation to such Excusable Event to the extent that the performance of the Work affected by such Excusable Event would have otherwise been suspended, delayed or interrupted by any other cause that does not constitute an Excusable Event, including the fault or negligence of Contractor, its Subcontractors or any other Person for whom they may be liable.

9. SUBCONTRACTORS

9.1 Use of Subcontractors. The Parties acknowledge and agree that Contractor shall be entitled to engage Subcontractors in respect of the performance of the Work or any portion thereof; provided that neither the use by Contractor of any Subcontractor nor the review or failure to object by Owner of any Subcontractor under this Article 9 or any Major Subcontractor under Exhibit J shall (a) constitute any Owner approval of the Work undertaken by any such Person, (b) relieve Contractor of its duties, responsibilities, obligations or liabilities hereunder, (c) relieve Contractor of its responsibility for the performance of any Work rendered by any such Subcontractor, or (d) create any relationship between Owner, on the one hand, and any Subcontractor, on the other hand, or cause Owner to have any responsibility for the actions or payment of such Person. As between Owner and Contractor, Contractor shall be solely responsible for the acts, omissions or defaults of its Subcontractors and any other Persons for which Contractor or any such

Subcontractor is responsible (with the acts, omissions and defaults of its Subcontractors being attributable to it). In no event shall any act or omission by any Subcontractor constitute an Excusable Event except to the extent caused by an event or circumstance that itself constituted an Excusable Event. Notwithstanding the foregoing, Owner shall be a third party beneficiary of all Major Subcontracts and Contractor shall include a provision in each Major Subcontract specifically providing that Owner is a third party beneficiary to each such Major Subcontract; provided, however, that Owner may only pursue recourse under a Major Subcontract pursuant to this sentence if Contractor is in default under this Agreement. No Subcontractor is intended to be nor shall be deemed a third party beneficiary of this Agreement. Contractor shall notify each of its Subcontractors of the substance of this Section 9.1 with regard to the primary relationship between Owner and Contractor under this Agreement. In the event Contractor is in a dispute with a Subcontractor which has the potential to materially impact the Project Schedule and/or the Milestone Completion Schedule, Contractor shall timely notify Owner of such dispute.

9.2 Owner Consent. Set forth in Exhibit J is a schedule of the Major Subcontractors who, notwithstanding anything to the contrary herein, Contractor shall be entitled to engage in furtherance of Contractor's obligations under this Agreement without the consent of Owner, but only to the extent of the Work for such Subcontractor as described in Exhibit J. Contractor shall Notify Owner of any additional Suppliers or Subcontractors with whom Contractor anticipates engaging that, if engaged, would be deemed a Major Subcontractor, or if any Major Subcontractor listed in Exhibit J is engaged to perform Work for which it is not already approved as set forth in Exhibit J. Owner shall have the right to review and approve such engagement along with the Major Subcontract therefor. Following such Owner approval, Exhibit J shall be deemed to be amended to reflect such additional approved Major Subcontractor (which thereafter shall be deemed a Major Subcontractor, as applicable) or additional Work to be performed by such existing Major Subcontractor. Contractor shall ensure that each Subcontract with a Major Subcontractor is in writing and includes provisions which enable Contractor to discharge Contractor's liabilities and obligations to Owner under the terms of this Agreement in respect of the subcontracted work, including (a) an indemnification provision in favor of the Owner Indemnified Parties at least as favorable to the Owner Indemnified Parties as those indemnities set forth in Article 17, (b) confidentiality requirements substantively in accordance with those contained in Article 18, (c) provisions providing Owner with (i) ownership and use of any Contractor Deliverables pursuant to Section 19.3 and (ii) a license to Intellectual Property Rights to Owner consistent with Sections 19.1 and 19.2, (d) termination for convenience consistent with Section 16.6, and (e) those set forth in this Article 9. Owner shall have the right, upon written request, to receive promptly from Contractor a copy of any Major Subcontract, as well as a copy of all shop and field performance test reports, and vendor field representative reports, with respect to Work performed by Major Subcontractors.

9.3 Assignment. No Subcontract or purchase order shall bind or purport to bind Owner, but each Subcontract and purchase order with a Major Subcontractor shall provide for assignment of such Subcontract or purchase order to Owner or, at Owner's request, to the Owner Financing Parties upon the termination of this Agreement (a) due to a Contractor Event of Default, (b) for Owner's convenience in accordance with Section 16.6 or (c) for an extended Force Majeure Event in accordance with Section 16.7. Contractor hereby assigns to Owner all its interest in all Subcontracts and purchase orders now existing or hereafter entered into by Contractor for performance of any part of the Work, which assignment will be effective only upon acceptance by Owner in writing, and only after the earlier to occur of Substantial Completion or termination of this Agreement, and only as to those Subcontracts and purchase orders that Owner designates in said writing. Such assignment may not be withdrawn by Contractor, and Owner may accept said assignment at any time during the course of construction, throughout the Defect Warranty Period and throughout the term of such Subcontract or purchase order, if longer. Upon such acceptance of assignment by Owner: (i) Contractor shall promptly furnish to Owner the originals or copies of the designated unredacted Subcontracts and purchase orders, and (ii) Owner shall only be required to compensate the designated Subcontractor(s) for compensation accruing to same for Work done or materials delivered from and after the date as of which Owner accepts assignment of the Subcontract (s) or purchase order(s) in writing. All sums due and owing by

Contractor to the designated Subcontractor(s) for Work performed or material supplied prior to the date as of which Owner accepts in writing the assignment of such Subcontracts(s) or purchase order(s), and all other obligations of Contractor accruing prior to Owner's written acceptance of such assignment, shall constitute an obligation solely between such Subcontractor(s) and Contractor, and Owner shall have no liability with respect to such sums or any other obligations of Contractor, to the extent that Owner has paid Contractor all amounts payable to Contractor under this Agreement, with respect to such obligations prior to the date on which Owner accepts assignment. If Owner elects so to assume by notice of acceptance of assignment any such Subcontract or purchase order with a Major Subcontractor as described in this Section 9.3, or to have any such Subcontract or purchase order assigned to an Owner Financing Party, then, at the written request of Owner, Contractor shall enter into reasonable assignment documentation requested by Owner confirming the effectiveness of such assignment as between the Parties.

9.4 Information; Access. Contractor shall furnish Owner with (a) reports received from the Subcontractors or Contractor relating to recall notices, defect notices or other similar product communications and (b) such information and access to the Major Subcontractors, in each case, as Owner may reasonably request.

10. COMMISSIONING AND TESTING

10.1 Commissioning Plan. Contractor shall develop a Commissioning Plan for the Project, which shall at a minimum be consistent with the testing required under Exhibits H-2, H-3, H-4 and H-5 and shall provide the Commissioning Plan for Owner's review and approval as soon as reasonably practicable (but in no event more than ninety (90) Days) after the date of the Notice to Proceed. Owner shall have ten (10) Business Days from the date it receives the Commissioning Plan to review and provide comments to Contractor. Contractor shall incorporate all of Owner's reasonable comments into the final Commissioning Plan, and resubmit the same for Owner's review and approval (such approval not to be unreasonably withheld, conditioned or delayed; provided, that it shall be unreasonable for Owner to withhold such approval to the extent Contractor has incorporated all of Owner's reasonable comments into the final Commissioning Plan). The final Commissioning Plan approved by Owner shall be attached hereto as Exhibit H-1. Contractor shall perform its commissioning activities in accordance with the final approved Commissioning Plan.

10.2 Test Procedures. Contractor shall develop the Availability Test Procedures, the Capacity Test Procedures, the Long Term Energy Test Procedures and the BESS Performance Test procedures for the Project in accordance with the relevant requirements set forth in Exhibits H-2, H-3, H-4 and H-5 and shall provide such test procedures for Owner's review and approval in accordance with the relevant procedures set forth in Exhibits H-2, H-3, H-4 and H-5.

10.3 Test Schedules. Contractor shall agree with Owner on a testing schedule (including a weekly testing schedule to be provided to the Participating TO) for the Project and shall give advance Notice to Owner of each test (including any re-performance thereof) at least five (5) Business Days prior to commencing any such test. Notwithstanding the foregoing, Contractor shall provide Owner with twenty (20) Business Days' prior written notice of the initial energizing and start-up testing of the Project, and in any event Contractor shall not, and shall not permit any Subcontractor or any Person acting on its or their behalf or under its or their control to, enable (i) any Block to generate any electricity that will be dispatched across the Point of Interconnection, (ii) any module to receive any backfeed power from the Participating TO's Interconnection Facilities or (iii) the synchronization of the Project or any part thereof with the transmission system, prior to having received express written notice from Owner in substantially the form of Exhibit Z, and Contractor shall use reasonable efforts to ensure that safety procedures are put in place to prevent such actions from occurring prior to Owner having issued such notice, including isolating applicable equipment and ensuring that adequate lock out and tag out procedures are put in place at applicable points at the Site.

Contractor shall keep Owner Representative continuously apprised of the schedule for all testing and changes in the schedule, and the commencement and performance of any tests.

10.4 Testing of Project.

10.4.1 Availability Test. Contractor shall conduct the Availability Test for the Project in accordance with the Availability Test Procedures and the relevant requirements therefor in Exhibit H-2. Contractor must submit the Availability Test Report for the Availability Test in accordance with the Availability Test Procedures and the relevant requirements therefor in Exhibit H-2.

10.4.2 Capacity Test. Contractor shall conduct the Capacity Test for the Project in accordance with the Capacity Test Procedures and the relevant requirements therefor in Exhibit H-3. Contractor must submit the Capacity Test Report for the Capacity Test in accordance with the Capacity Test Procedures and the relevant requirements therefor in Exhibit H-3.

10.4.3 Long Term Energy Test. Contractor shall conduct the Long Term Energy Test for the Project in accordance with the Long Term Energy Test Procedures and the relevant requirements therefor in Exhibit H-4. Contractor must submit the Long Term Energy Test Report for the Long Term Energy Test in accordance with the Long Term Energy Test Procedures and the relevant requirements therefor in Exhibit H-4.

10.4.4 BESS Performance Test. Contractor shall conduct the BESS Performance Test for the Project in accordance with BESS Test Procedures and the relevant requirements therefor in Exhibit H-5. Contractor must submit the report for the BESS Performance Test in accordance with the relevant requirements therefor in Exhibit H-5.

10.4.5 Observation of Testing. Each of the Parties and its representatives (including Owner's Engineer and the Independent Engineer) shall have the right to be present during, and Owner shall have the right to invite any Owner Financing Party or representative or agent thereof, Power Purchasers and/or Participating TO, in each case, to observe, any of the tests conducted under this Article 10.

10.5 Non-Conforming Work. If, as a result of any inspection, examination or testing in accordance with this Agreement, any defective Work not in compliance with the requirements of this Agreement is identified, and regardless of whether payment has been made therefor, Owner may reject such portion of the Work prior to the Project Substantial Completion Date by prompt Notice to Contractor. Such Notice shall describe such defect in reasonable detail. Contractor shall, at its sole cost and expense, promptly correct any such defect (except if such defect is a Non-Critical Deficiency, in which case it shall be included on the Punchlist) and promptly provide Notice to Owner that such corrective measures have been completed. Any Dispute regarding the existence or correction of any such defect shall be resolved pursuant the Dispute resolution provisions hereof.

11. PUNCHLIST; COMPLETION

11.1 Punchlist.

11.1.1 Creation of Punchlist. Once Contractor believes that a finalized punchlist containing only Non-Critical Deficiencies for the Project is ready for Owner review and approval, Contractor and Owner shall jointly walk-down the Project and confer together as to the items which should be included on the finalized punchlist for the Project. Contractor shall then create a new list to reflect the result of such joint walk down and deliver the same to Owner for its review and approval, which submitted list shall be explicitly designated as the "**Proposed Punchlist**" and shall set forth all Work remaining to be

completed after the Project Substantial Completion Date. The Proposed Punchlist may only contain Non-Critical Deficiencies in the Work, and shall include a "**Punchlist Amount**" for the completion or repair of each such Non-Critical Deficiency and Contractor's estimated schedule for completion therefor. If Owner does not approve the Proposed Punchlist or deliver any changes to the Proposed Punchlist to Contractor within ten (10) Business Days after the later to occur of (a) Contractor's submission to Owner of such Proposed Punchlist, and (b) the date of the joint walk-down, then such failure shall constitute an Owner-Caused Delay. The Proposed Punchlist that is ultimately approved by Owner for the Project shall be referred to as the "**Punchlist**".

11.1.2 Completion of Punchlist. Contractor shall proceed promptly to complete and correct all items on the Punchlist. On a weekly basis after the Project Substantial Completion Date, Contractor shall revise and update the Punchlist to include the date(s) that items listed on such Punchlist are completed by Contractor and accepted by Owner. Notwithstanding any of the foregoing, the items listed on such Punchlist shall not be considered complete until Owner shall have inspected such Non-Critical Deficiencies and acknowledged, by notation on the updated Punchlist, that such item of Work is complete. If Owner does not so inspect and deliver such notations on the updated Punchlist to Contractor (or dispute completion of the applicable items of Work if not accepted) within ten (10) Business Days after Contractor submits the updated Punchlist containing such Punchlist item to Owner, and Contractor has actually completed and corrected any such Punchlist item listed on such Punchlist, such failure by Owner shall constitute an Owner-Caused Delay.

11.2 Project Substation Completion. Subject to Section 11.2.1, the following are the conditions precedent for Project Substation Completion:

(a) The Project Substation is mechanically completed, assembled, erected and installed (and ready for energization) in accordance with the Project Substation installation specifications contained in Exhibit A and otherwise in accordance with this Agreement (other than Punchlist items) and is free from detectable and patent defects and deficiencies in installation, including any free of any defects that would prevent the safe, normal, and reliable operation of the Project Substation;

(b) Contractor has completed the relevant mechanical quality control inspections for the Project Substation and has provided such documentation to Owner;

(c) Contractor has assisted Owner in attempting to obtain or obtaining any permits, certificates and approvals otherwise necessary to commence operating the Project Substation;

(d) The plant control system located in the Project Substation and all required protective and control features are installed and tested, and are operational; and

(e) The SCADA and all communication equipment for the Project to be located at the Project Substation have been properly installed and tested and are operational.

11.2.1 When Contractor believes that it has satisfied the conditions to Project Substation Completion set forth in Section 11.2.1, Contractor shall deliver to Owner a Notice of Project Substation Completion substantially in the form of Exhibit P-1, together with reasonable supporting documentation evidencing the satisfaction of the conditions to Project Substation Completion as set forth in Section 11.2. Owner shall, within ten (10) Business Days after receipt of such Notice of Project Substation Completion, deliver its countersignature to such Notice of Project Substation Completion, dated to reflect the Project Substation Completion Date, or if Owner rejects Contractor's Notice, respond in writing, giving its reasons

for such rejection. In the event of such rejection, Contractor shall take the appropriate corrective action. Upon completion of such corrective action, Contractor shall provide to Owner a new Notice of Project Substation Completion for approval. This process shall be repeated on an iterative basis until Owner accepts the Notice of Project Substation Completion, as applicable, and delivers its countersignature to such Notice of Project Substation Completion. The "**Project Substation Completion Date**" shall be the date on which Contractor signed and dated the final Notice of Project Substation Completion which was accepted and agreed by Owner.

11.3 Mechanical Completion. When Contractor believes that it has satisfied the conditions to Mechanical Completion set forth in the definition thereof Contractor shall deliver to Owner a Notice of Mechanical Completion substantially in the form of Exhibit P-2, together with reasonable supporting documentation evidencing the satisfaction of the conditions to Mechanical Completion set forth in the definition thereof. Owner shall, within ten (10) Business Days after receipt of such Notice of Mechanical Completion, deliver its countersignature to such Notice of Mechanical Completion, dated to reflect the applicable Mechanical Completion Date, or if Owner rejects Contractor's Notice, respond in writing, giving its reasons for such rejection. In the event of such rejection, Contractor shall take the appropriate corrective action. Upon completion of such corrective action, Contractor shall provide to Owner a new Notice of Mechanical Completion for approval. This process shall be repeated on an iterative basis until Owner accepts the Notice of Mechanical Completion, as applicable, and delivers its countersignature to such Notice of Mechanical Completion. The "**Mechanical Completion Date**" shall be the date on which Contractor signed and dated the final Notice of Mechanical Completion which was accepted and agreed by Owner.

11.3.1 Mechanical Completion of First Portion. In addition to its obligations under Section 11.3 above, when Contractor believes that it has satisfied each of the conditions set forth in clauses (a) through (d) of the definition of "Mechanical Completion" with respect to the Blocks comprising at least twenty percent (20%) of the Project, including the BOP therefor, to be mechanically completed (the "**First Portion**"), Contractor shall provide a Notice to Owner regarding achievement of such milestone, in the form of a certificate substantially in the form of Exhibit P-2 but solely as it relates to such Blocks and the BOP (such Notice, collectively, the "**First Portion Mechanical Completion Certificate**"). Owner shall, within ten (10) Business Days after receipt of such First Portion Mechanical Completion Certificate, deliver its countersignature to such First Portion Mechanical Completion Certificate, dated to reflect the applicable date on which Contractor satisfied each of the conditions set forth in clauses (a) through (d) of the definition of "Mechanical Completion" with respect to such Blocks and the BOP, or if Owner rejects Contractor's First Portion Mechanical Completion Certificate, respond in writing, giving its reasons for such rejection. In the event of such rejection, Contractor shall take the appropriate corrective action. Upon completion of such corrective action, Contractor shall provide to Owner a new First Portion Mechanical Completion Certificate for approval. This process shall be repeated on an iterative basis until Owner accepts the First Portion Mechanical Completion Certificate, as applicable, and delivers its countersignature to such First Portion Mechanical Completion Certificate.

11.4 Placed in Service. Subject to Section 11.4.1, the following are the conditions precedent for the BESS, a Block or the Project, as applicable, to be Placed in Service (including, in the case of the BESS, or a Block, all BOP):

(a) all Contractor Permits necessary to commence operation of the BESS, the Block or the Project (including on a commercial basis), as applicable, have been obtained and Owner has legal title to the Project pursuant to Section 15.1.4;

(b) Owner has physical and operational control of the BESS, the Block or the Project, as applicable, pursuant to Section 15.1.4;

(c) all critical pre-operation testing has been completed with respect to the BESS, the Block or the Project, as applicable;

(d) regular and daily operations of the BESS, the Block or the Project, as applicable, have commenced; and

(e) the BESS, the Block or the Project, as applicable, has been synchronized with the power grid.

11.4.1 When Contractor believes that it has satisfied the provisions of Section 11.4, with respect to the BESS, a Block or the Project, Contractor shall deliver to Owner a Notice of Placed in Service in the form of a certificate substantially in the form of Exhibit P-3, together with reasonable supporting documentation evidencing the satisfaction of the provisions in Section 11.4 with respect to the BESS, a Block or the Project. Owner shall, within ten (10) Business Days after receipt of such Notice of Placed in Service, deliver its countersignature to such Notice of Placed in Service, dated to reflect the applicable Placed in Service Date for the BESS, such Block or Project, as applicable, or if Owner rejects such Contractor's Notice, respond in writing, giving its reasons for such rejection. In the event of such rejection, Contractor shall take the appropriate corrective action. Upon completion of such corrective action, Contractor shall provide to Owner a new Notice of Placed in Service for the BESS, the Block or Project, as the case may be, for approval. The process in this Section 11.4.1 shall be repeated on an iterative basis until Owner accepts the Notice of Placed in Service or the Block or the Project, as applicable, and delivers its countersignature to such Notice of Placed in Service. The "**Placed in Service Date**" of the BESS, the Block or the Project, as applicable, shall be the date on which Contractor signed and dated the final Notice of Placed in Service which was accepted and agreed by Owner. Notwithstanding the foregoing, achievement of Placed in Service with respect to one or more Blocks shall not be deemed to have waived any of Contractor's rights or remedies hereunder related thereto or to be relieved of its obligations to achieve Placed in Service with respect to the Project.

11.4.2 Notwithstanding any provision in this Agreement to the contrary, Contractor shall not energize or interconnect the Project, or portion thereof with the electric grid (and for such purposes shall maintain an air gap, the actual method for which shall be approved by Owner and shall include the Owner's monitoring of Contractor's lockout/tagout procedure), until (1) Contractor certifies, by the issuance to the Owner a Certificate of Mechanical Completion (and Owner has accepted) that the Project, or portion thereof is complete, ready and safe to operate, and (2) the Owner has issued to Contractor a Notice to Energize, signed by Owner, stating that Contractor may proceed with the Work necessary to energize and interconnect the Project, or portion thereof with the electric grid. THE ENERGIZATION AND INTERCONNECTION OF THE PROJECT WITH THE ELECTRIC GRID BEFORE OWNER'S ISSUANCE OF THE NOTICE TO ENERGIZE MAY RESULT IN SIGNIFICANT ECONOMIC DAMAGE TO OWNER, FOR WHICH OWNER RETAINS ALL RIGHTS FOR RECOVERY AVAILABLE TO IT UNDER LAW AND EQUITY, SUBJECT TO THE LIMITATIONS OF CONTRACTOR'S LIABILITY SET FORTH IN THIS AGREEMENT. If Owner does not issue to Contractor a Notice to Energize within fifteen (15) days following achievement of Mechanical Completion Date, it shall constitute an Owner-Caused Delay.

11.5 Project Substantial Completion. Subject to Section 11.6, the following are the conditions precedent for Project Substantial Completion: the procurement and construction of the Project and every part thereof (other than any Non-Critical Deficiency included on the Punchlist) has been completed;

(b) the connection of all equipment (including each Block) and wiring to the Interconnection Facilities of the Project as required by way of wiring, controls, and safety systems has been completed.

(c) (i) all instruments and relays have been installed and are functional and (ii) all required protective and control features are operational;

(d) the Project is capable of unattended continuous operation in a safe manner without damage to the Project or any sub-system thereof, or any other property on or off the Site, and without injury to any Person in compliance with the Requirements and any other standards of performance set forth herein;

(e) the Project is synchronized with the transmission system and all testing under the PPAs required as a condition to achievement of "Commercial Operation Date" (as defined in the PPA), including testing required by the Power Purchasers to each respective PPA for delivery of electricity, has been satisfactorily completed;

(f) Owner has received all Contractor Deliverables and applicable spare parts in respect of the Project that are required to be delivered by the Project Substantial Completion Date, including all Required Manuals identified therein, in accordance with the requirements in Exhibit B;

(g) the Punchlist for the Project is in final form as provided for in Section 11.1.1;

(h) the following shall have been installed and placed into full operation by Contractor and be capable of unattended operation in a safe manner without damage to the Project or any sub-system thereof, or any other property on or off the Site, and without injury to any Person in compliance with the Requirements and any other standards of performance set forth herein:

(i) the Meteorological Stations for the Project;

(ii) the telemetry system for the Project; and

(iii) the telecommunications system for the Project.

(i) the Commissioning tests, the BESS Performance Test, the Availability Test and the Initial Capacity Test have each been Successfully Run, and the Project is ready to commence commercial operation;

(j) the Interconnection Facilities (and all testing under the Interconnection Agreement required as a condition to commencing parallel operation with the Participating TO's Interconnection Facilities) have been satisfactorily completed by Contractor as required under the Interconnection Agreement in accordance with the requirements thereof;

(k) without limiting the requirement under Section 11.4(i) that the Initial Capacity Test has been Successfully Run, either (i) the results of the Initial Capacity Test reflect achievement of the Capacity Guaranty, or (ii) the results of the Initial Capacity Test reflect achievement of at least the Minimum Guaranteed Capacity, and Contractor has demonstrated to satisfaction of Owner that the shortfall in the Initial Capacity Test is not due to any of the Work:

(l) Contractor has paid to Owner all undisputed amounts due and payable to Owner hereunder, including any undisputed Delay Liquidated Damages accrued up to Substantial Completion;

(m) No Contractor Liens in respect of amounts paid to Contractor hereunder shall be outstanding against the Project (unless bonded over) and Contractor has provided, as applicable, each Conditional Waiver and Release Upon Progress Payment and each Waiver and Release Upon Final Payment, as required pursuant to Section 21.2;

(n) All Subcontractor warranties required to have been assigned to Owner pursuant to Section 14.6 have been so assigned to Owner in accordance with Section 14.6, and copies of all such Subcontractor warranties have been provided to Owner in accordance with Section 14.6; and

(o) Contractor has delivered the Notice of Project Substantial Completion to Owner pursuant to Section 11.6.

11.6 Notice of Substantial Completion. When Contractor believes that it has satisfied the provisions of Section 11.5, Contractor shall deliver to Owner a Notice of Project Substantial Completion substantially in the form of Exhibit P-4, together with reasonable supporting documentation evidencing the satisfaction of the provisions in Section 11.5. Owner shall, within ten (10) Business Days after receipt of such Notice of Project Substantial Completion, deliver its countersignature to such Notice of Project Substantial Completion, dated to reflect the applicable Project Substantial Completion Date, or if Owner rejects Contractor's Notice, respond in writing, giving its reasons for such rejection. In the event of such rejection, Contractor shall take the appropriate corrective action. Upon completion of such corrective action, Contractor shall provide to Owner a new Notice of Project Substantial Completion for approval. The process in this Section 11.6 shall be repeated on an iterative basis until Owner accepts the Notice of Project Substantial Completion, as applicable, and delivers its countersignature to such Notice of Project Substantial Completion. The "**Project Substantial Completion Date**" of the Project shall be the date on which Contractor signed and dated the final Notice of Project Substantial Completion which was accepted and agreed by Owner.

11.7 Final Completion. Subject to Section 11.8, "**Final Completion**" shall occur only if all of the following have occurred:

(p) Project Substantial Completion shall have been achieved;

(q) all items on the Punchlist shall have been completed by Contractor or, pursuant to Section 6.7.2, including all restoration and reclamation as required under this Agreement, Owner has withheld any remaining Punchlist Holdback to complete any items on the Punchlist not completed by Contractor in accordance with the terms hereof;

(r) the Final Capacity Test of the Project (if any) shall have been Successfully Run;

(s) all Contractor's and Subcontractors' personnel shall have left the Site, and all supplies, tools, equipment, machinery, surplus materials, waste materials, rubbish and construction facilities other than those to which Owner holds title shall have been removed from the Site (other than Contractor's personnel, supplies, tools,

machinery, materials and equipment required for the performance of its obligations under any operations and maintenance agreement executed between the Parties, if applicable);

(t) Owner shall have received all Contractor Deliverables in relation to the Project;

(u) Contractor shall have delivered to Owner copies of final as-built and record drawings of the Project in accordance with the requirements set forth in Exhibit B (other than requirements related to timing for delivery for which any failure to comply has been cured) and the other documents and information required under the PPAs and the Interconnection Agreement in accordance with the requirements thereof;

(v) Contractor shall have delivered the Notice of Final Completion to Owner pursuant to Section 11.8;

(w) All amounts due and payable by Contractor to Owner hereunder shall have been paid in full; and

(x) No Contractor Liens in respect of amounts paid to Contractor hereunder shall be outstanding against the Project (unless bonded over) and Contractor shall have provided each Conditional Waiver and Release Upon Progress Payment and each Waiver and Release Upon Final Payment as required under Section 21.2.

11.8 Notice of Final Completion. When Contractor believes that it has satisfied the provisions of Section 11.7, Contractor shall deliver to Owner a Notice of Final Completion substantially in the form of Exhibit P-5, together with reasonable supporting documentation evidencing the satisfaction of the provisions in Section 11.7. Owner shall, within ten (10) Business Days after receipt of such Notice of Final Completion, deliver its countersignature to such Notice of Final Completion, dated to reflect the applicable Final Completion Date, or if Owner rejects Contractor's Notice, respond in writing, giving its reasons for such rejection. In the event of such rejection, Contractor shall take the appropriate corrective action. Upon completion of such corrective action, Contractor shall provide to Owner a new Notice of Final Completion for approval. The process in this Section 11.8 shall be repeated on an iterative basis until Owner accepts the Notice of Final Completion, as applicable, and delivers its countersignature to such Notice of Final Completion. The "**Final Completion Date**" of the Project shall be the date on which Contractor signed and dated the final Notice of Final Completion which was accepted and agreed by Owner.

11.9 Contractor's Access After Project Substantial Completion. Following Project Substantial Completion, Owner shall provide Contractor with reasonable and timely access to the Project to: (a) complete all remaining items on the Punchlist and (b) satisfy the other requirements with respect to the Project for Final Completion. Contractor shall perform any Work after Project Substantial Completion with minimal interference with commercial operation of the Project or any portion thereof and that reductions in and shut-downs of all or part of the Project's operations will be required only when necessary, taking into consideration the length of the proposed reduction or shut-down, and Owner's obligations and liabilities under the PPAs. Notwithstanding the foregoing, should a reduction in or shut-down of all or part of the Project's operations be required to complete any items on the Punchlist, then such reduction or shut-down shall be scheduled at the reasonable discretion of Owner, and Contractor shall complete such Work during such Owner scheduled reduction or shut-down. Contractor acknowledges that Owner may schedule such reduction or shut-down at any time including off-peak hours, nights, weekends and holidays. For the avoidance of doubt, during the Capacity Test Cure Period, if any, Owner shall have the right to operate the Project at its discretion, including the right to maximize the economic benefits of the Project.

11.10 Product and Revenues of the Project. Any Product or revenues generated by the Project at any time, including during the performance of any testing, shall be solely for the benefit of Owner.

12. LIQUIDATED DAMAGES

12.1 Delay Liquidated Damages.

(a) RESERVED

(b) Delay Liquidated Damages. Contractor agrees that if:

(i) Project Substation Completion is not achieved by the Guaranteed Project Substation Completion Date, then Contractor shall pay Delay Liquidated Damages to Owner for each day that Contractor fails to achieve Project Substation Completion after the Guaranteed Project Substation Completion Date;

(ii) Mechanical Completion is not achieved by the Guaranteed Mechanical Completion Date, then Contractor shall pay Delay Liquidated Damages to Owner for each day that Contractor fails to achieve Mechanical Completion after the Guaranteed Mechanical Completion Date; and

(iii) Project Substantial Completion is not achieved by the Guaranteed Project Substantial Completion Date, then Contractor shall pay Delay Liquidated Damages to Owner for each day that Contractor fails to achieve Project Substantial Completion after the Guaranteed Project Substantial Completion Date.

Any Delay Liquidated Damages payable by Contractor pursuant hereto shall be due within fifteen (15) days after the delivery by Owner to Contractor of an invoice for such Delay Liquidated Damages.

12.2 RESERVED.

12.3 RESERVED.

12.4 RESERVED.

12.5 Sole Remedy; Liquidated Damages Not a Penalty. The remedies provided for in this Article 12, shall, in addition to Owner's rights to terminate this Agreement, be the sole and exclusive remedies of Owner for failure of Contractor or the Project to achieve any Guaranteed Milestone by the applicable Guaranteed Date. The Parties agree that Owner’s actual damages in the event of such delays or failures may be extremely difficult or impracticable to determine. After negotiation, the Parties have agreed that the Delay Liquidated Damages, are in the nature of liquidated damages and are a reasonable and appropriate measure of the damages that Owner would incur as a result of such delays or failures, and do not represent a penalty.

12.6 Enforceability. The Parties explicitly agree and intend that the provisions of this Article 12 shall be fully enforceable by any court exercising jurisdiction over any Dispute between the Parties arising under this Agreement. Each Party hereby irrevocably waives any defenses available to it under law or equity relating to the enforceability of the liquidated damages provisions set forth in this Article 12.

13. CHANGES IN THE WORK

13.1 Change In Work. A "**Change In Work**" shall be limited to the following: (a) changes in the Work required by Owner as further described in Section 13.2; (b) the addition to, modification of, or deletion from the Work (performed or yet to be performed) during the performance of the Work mutually agreed to by the Parties in writing; or (c) the occurrence of an Excusable Event (as and only to the extent permitted by Section 8.4).

13.2 By Owner. Subject to Section 13.3, Owner shall have the right to make changes in the Work, within the general scope thereof, whether such changes are modifications, alterations or additions to the Work or accelerations or decelerations of any aspect of the Work (each such change, an "**Owner-Instituted Change**"), including changes in the Design Plans. All Owner-Instituted Changes shall be made in accordance with this Article 13, shall be documented in accordance with Section 13.3 and shall be considered, for all purposes of this Agreement, as part of the Work. Notwithstanding the foregoing, in no event shall Owner have the right to make any Owner-Instituted Changes, whether individually or in the aggregate, that would result in: (a) any portion of the Project being located at a site other than the Site; (b) any adverse effect on any portion of the Project being able to conduct or satisfy any of the tests provided for in this Agreement, including the Availability Test or Capacity Test or any other adverse effect whatsoever on the capacity or potential capacity of any portion of the Project or the ability of Contractor to cure any shortfalls in such capacity; or (c) any adverse effect on Contractor's ability to comply with its Warranty obligations or any of its other obligations under this Agreement or Contractor's ability to enforce any of its rights and remedies hereunder.

13.3 Preparation of Change Order.

13.3.1 Due to Owner-Initiated Change In Work or Change in Work Agreed to by the Parties. Upon the occurrence of any of the events set forth in Section 13.1(a) or Section 13.1(b), Owner or Contractor, as applicable, shall provide the other Party with a Notice of the occurrence of such event, and Contractor shall, as soon as practicable, prepare and submit to Owner a preliminary written estimate relating to the proposed Change In Work, including (a) any projected change in the cost of the performance of the Work and any projected modification of the Contract Price occasioned by such Change In Work, and (b) the effect such Change In Work could be expected to have on the Guaranteed Dates. Contractor's cost of any such Change in Work shall include and identify all elements of cost (without the cost of each such element) and a total lump sum cost calculated as follows: the actual and reasonably substantiated costs incurred by Contractor (including all Taxes other than those based on net income) and a profit margin of eight percent (8%) over any costs incurred; provided that no markup shall be applied in respect to Tariff Increases. Owner shall within fifteen (15) Business Days review and respond to such request, accepting or rejecting the change request or requesting additional information or time for review. During this period or after Owner returns comment to the change request, Contractor may choose to modify or remove the change request. Should Owner desire to request a decrease or increase in the Work or schedule from Contractor, Owner shall assemble and deliver to Contractor in writing the requested change in scope or schedule. Contractor shall within (10) Business Days, return comment to the requested change including the proposed addition or reduction in costs and schedule. Owner shall upon receipt of such information, with an additional (10) days respond to Contractor either accepting the proposal by Contractor or rejecting it. In either situation, both Parties shall work together to resolve any open change requests or modifications to the price and schedule of the Project. If the Parties cannot reach agreement on the matters listed in the Change Order submitted pursuant to this Section 13.3.1, such matter shall be referred to Dispute resolution provisions hereof.

13.3.2 Due to an Excusable Event. If an Excusable Event occurs for which Contractor is entitled to an adjustment to a Guaranteed Date or the Contract Price pursuant to Section 8.4, as applicable,

then Contractor shall, as soon as practicable, prepare and submit to Owner a proposed Change Order, which shall include (a) any projected change in the Contract Price occasioned by such Change In Work and (b) the effect such Change In Work could be expected to have on the relevant Guaranteed Date, as and to the extent provided in Section 8.4 or as otherwise contemplated in Section 13.1 and as set forth in the Change Order accepted by Owner. Owner shall within (15) Business Days review and respond to such request, accepting or rejecting the change request or requesting additional information or time for review. During this period or after Owner returns comment to the change request, Contractor may choose to modify or remove the change request. Should Owner desire to request a decrease or increase in the Work or schedule from Contractor, Owner shall assemble and deliver to Contractor in writing the requested change in scope or schedule. Contractor shall within (10) Business Days, return comment to the requested change including the proposed addition or reduction in costs and schedule. Owner shall upon receipt of such information, with an additional (10) days respond to Contractor either accepting the proposal by Contractor or rejecting it. In either situation, both Parties shall work together to resolve any open change requests or modifications to the price and schedule of the project. If the Parties cannot reach agreement on the matters listed in the Change Order submitted pursuant to this Section 13.3.2, such matter shall be referred to Dispute resolution hereunder.

13.4 Unable to Agree on Change of Work. Notwithstanding anything herein to the contrary, where the Parties are unable to agree on a Change in Work, Owner may direct Contractor to implement a Change in Work that is generally consistent with Contractor's scope of Work hereunder and in compliance with the limitations set forth in Section 13.2, in which event Contractor shall proceed with such Change in Work and Contractor shall be entitled to reimbursement in accordance with the procedures set forth in Section 13.3.1 for any additional costs and expenses incurred in connection with such Change in Work and any other changes if not agreed to by the Parties, subject to the Dispute resolution hereunder.

13.5 No Change Order Necessary for Emergency. Contractor shall not be obligated or required to obtain an executed Change Order if immediate action is reasonably required to address an emergency which endangers human health or property, but only in respect of the costs of such immediate action; provided that Contractor shall promptly Notify Owner of such emergency and shall seek a Change Order in accordance with Article 13 with respect to any costs associated with such emergency after the initial immediate action has been completed.

14. WARRANTIES CONCERNING THE WORK

14.1 Defect Warranty. Contractor warrants (such warranty, the "**Defect Warranty**") that (a) the Work and every component thereof will be performed in accordance with the Requirements and any other standards of performance set forth in this Agreement, and that all equipment, goods and materials furnished by Contractor hereunder (but specifically excluding Owner Provided Materials) will achieve the requirements set forth in the Statement of Work, be new and unused (when installed), be of good quality and good condition (when installed) and free of Defects, including in application, materials, installation, construction and workmanship, and (b) in addition to the warranty set forth in the foregoing clause (a) that is applicable the Major Equipment, each applicable item of Major Equipment shall also conform to the applicable warranty requirement set forth on Exhibit T.

14.2 Warranty Period. The Defect Warranty set forth in Section 14.1 above shall commence on the Execution Date and apply for a period equal to twenty-four (24) months after the Project Substantial Completion Date (or, if applicable, such other period as specified on Exhibit T) (as such period may be extended as provided for below, the "**Defect Warranty Period**"). In the event any portion of the Work is covered by a warranty of a Subcontractor for a period greater than that stated in the preceding sentence, Contractor will assign such warranty to Owner prior to the end of the Defect Warranty Period.

14.3 Remedy.

14.3.1 If, during the Defect Warranty Period, any of the Work is found not to be in compliance with the Defect Warranty set forth in Section 14.1, Contractor shall commence, within two (2) Business Days, at no cost to Owner, to make all necessary alterations, repairs or replacements to fix, correct or make good such non-compliance with the Defect Warranty (the "**Defect Warranty Service**"), and Contractor shall complete such Defect Warranty Service no later than ten (10) days after the earlier of (x) knowledge of the defect or (y) Notice from Owner of the defect. If the Defect cannot be corrected, Contractor shall replace the Work at no cost to Owner. The Defect Warranty Service shall include, at no cost to Owner, all necessary disassembly, transportation, reassembly and retesting, as well as reworking, repair or replacement of such Work, disassembly and reassembly of piping, ducts, machinery, equipment or other Work as necessary to give access to improper, defective or non-conforming Work and correction, removal or repair of any damage to other Work or property that arises from the defect. Whenever Defect Warranty Service is required, Contractor shall bear the risk of physical loss or damage to the Project as a result of Contractor's activities performing Defect Warranty Service, to the extent not covered by Owner's insurance, and in the event of any reimbursement by Owner's insurance for such damage, Contractor shall be responsible for associated deductibles or retention up to the maximum amount of permitted deductible. Any alterations, repairs or replacements made pursuant to this Article 14 shall be further warranted for a period of the longer of (x) twelve (12) months from the date of the reinstallation, alteration, repair or replacement or (y) the end of the Defect Warranty Period (or, if applicable, such other period as specified on Exhibit T); provided that in no event shall the Defect Warranty Period exceed thirty-six (36) months after the Project Substantial Completion Date (or, if applicable, such other period as specified on Exhibit T). For the avoidance of doubt, Contractor's obligations under this Article 14 shall apply to any Work found during the Defect Warranty Period to not to be in compliance with the Defect Warranty, regardless of whether Contractor is able to complete any necessary alterations, repairs or replacements of such non-compliant Work during the Defect Warranty Period.

14.3.2 In the event that Contractor fails to promptly undertake and prosecute reasonable actions to correct defects after written notice from Owner or knowledge of such Defect by Contractor, including reasonable time to prepare a plan to correct such defect, then Owner may correct such defect so that the defective component complies with the requirements of this Agreement, and Contractor shall be liable for all direct costs, charges and expenses reasonably incurred by Owner in connection with such repair or replacement and shall forthwith pay to Owner an amount equal to such costs, charges and expenses upon receipt of invoices with supporting documentation certified by Owner. For the purposes of this Section 14.3.2 "promptly" means a maximum of two (2) Business Days after receipt by Contractor of notice from Owner of a non-compliance with the Defect Warranty, unless the Defect Warranty Service is preventing operation of all or a portion of the Project.

14.4 Conditions of Warranty. The Defect Warranty set forth herein shall be exclusive of (a) normal wear and tear, (b) normal degradation of the Work or the Project, (c) misuse of the Work or the Project by Owner or negligence in its operation or maintenance; (d) cosmetic anomalies that do not impact performance, safety, reliability, or maintainability, (e) operation or maintenance of the Work or the Project not in accordance with applicable operating manuals or written Industry Standards, or (f) Owner Provided Materials unless the damage or defect is caused by Contractor's Work (collectively, "**Warranty Exclusions**").

14.5 Serial Failure.

14.5.1 A "**Serial Failure**" shall have occurred if at any time during the Defect Warranty Period, there are malfunctions from a Defect of, or breach of the Defect Warranty with respect to, ten percent (10%) or more of the total of the same component of the Equipment or of the Work performed; provided, however, that a Defect or failure to comply with the Defect Warranty with respect to the PV

modules or the Module Installation Work that occurs in three percent (3%) or more of the total PV modules in the Project or three percent (3%) or more of the battery modules in included in the BESS, shall constitute a Serial Failure with respect to the battery modules, the PV modules or the Module Installation Work, as applicable. Upon the occurrence of an alleged Serial Failure, Contractor shall, as soon as practicable, investigate the cause of the non-compliance or malfunctions and the affected components and whether or not such non-compliance or malfunctions constitute a Serial Failure, it being understood that Contractor must prove to Owner's reasonable satisfaction that such non-compliance or malfunctions do not constitute a Serial Failure. In the event of an alleged Serial Failure, Contractor shall perform or cause to be performed a root cause analysis with respect to such Serial Failure and, as soon as practicable, but no later than thirty (30) days from the date of delivery of Notice to Contractor of such alleged Serial Failure (unless otherwise agreed upon by the Parties), provide to Owner in writing, for Owner's review and approval, a written report concerning such root cause analysis and the proposed solution for such Serial Failure, including the planned method for redesign and/or repair, replacement or retrofit of the component for which the Serial Failure shall have occurred and the related or affected infrastructure facilities and Work. Owner and Contractor shall negotiate in good faith with a view to reaching an agreed solution for the Serial Failure; provided that, unless Contractor has provided evidence satisfactory to Owner (in its reasonable discretion) identifying the root-cause and demonstrating that such Serial Failure is limited to a part (but not all) of the type of Equipment provided by the relevant Supplier or to specific production run of such type of Equipment, such solution shall be the replacement or repair of all of the type of Equipment supplied by such Supplier. If Contractor shall not perform the root-cause analysis and provide the written report to Owner within the time period contemplated in this Section 14.5 or if Owner and Contractor do not agree as to the occurrence of a Serial Failure or the appropriate proposed solution for a Serial Failure within thirty (30) days after the Notice of the occurrence of the event giving rise to the Serial Failure, each of Contractor and Owner shall have the right to refer the matter for resolution pursuant to Section 14.8.

14.5.2 No later than five (5) Business Days following the determination of the existence of, and a solution for, a Serial Failure, either through agreement of Owner and Contractor or pursuant to Section 14.8 (the "**Serial Failure Warranty Work Start Date**"), Contractor shall commence to undertake such action as is required to give effect to the agreed solution for such Serial Failure, which agreed solution shall (i) be applied to all of the Equipment or the Work that have substantially the same Defect or failure to perform, regardless of whether or not such Equipment or Work has yet to exhibit the adverse consequences of such Defect or other root-cause, (ii) address the cause, and not just the effect, of such Serial Failure and (iii) bring the Equipment and the Work into compliance with the original requirements under this Agreement (the "**Serial Failure Warranty Work**"). Such agreed solution shall specify the period after which the Serial Failure Warranty Work is required to be completed (the "**Serial Failure Warranty Work Completion Date**"). Upon the completion of any redesign proposed to be included as part of the Serial Failure Warranty Work, but prior to any retrofitting required by this Section 14.5 as part of the Serial Failure Warranty Work, Contractor shall request the written approval of Owner, which shall not be unreasonably withheld, conditioned or delayed. For the avoidance of doubt, it is expressly agreed that the provisions of this Section 14.5 shall not change, affect or reduce Contractor's obligations under Section 14.5.

14.5.3 Without limiting any other remedy available to Owner pursuant to this Agreement, in the event Contractor fails to commence the Serial Failure Warranty Work by the Serial Failure Warranty Work Start Date or to complete the Serial Failure Warranty Work on a timely basis but in any event by the Serial Failure Warranty Completion Date, Owner shall, after giving Contractor at least five (5) days prior Notice of Owner's intent to perform or have third parties perform the Serial Failure Warranty Work, have the right to perform the necessary Serial Failure Warranty Work, or have third parties perform the necessary Serial Failure Warranty Work. Contractor shall, within thirty (30) days of receiving Owner's invoice for the costs of Owner in performing or causing to be performed such Serial Failure Warranty Work, reimburse Owner for all reasonable and documented costs and expenses incurred by Owner with respect to such Serial Failure Warranty Work. Notwithstanding the foregoing, If Contractor (or the relevant Subcontractors)

begins to perform the applicable Serial Failure Warranty Work during such five (5) period following Notice of Owner's intent to perform such Serial Failure Warranty Work; provided that such Serial Failure Warranty Work is completed by the Serial Failure Warranty Completion Date), Owner shall not perform, or cause any third party to perform, such Serial Failure Warranty Work.

14.5.4 In the event that Owner provides notice of an alleged breach of the Defect Warranty (including any Serial Failure) with respect to any Equipment under Section 14.1 or this Section 14.5, Contractor disputes such alleged breach, and Owner determines that such dispute may be resolved through testing performed by the Testing Laboratory, at Owner's election, such determination with respect to such alleged breach shall be submitted to the Testing Laboratory. Contractor shall cooperate (and shall cause the Supplier of such Equipment to cooperate) with the Testing Laboratory to conduct such tests as the Testing Laboratory determines are necessary to resolve the dispute within thirty (30) days or as soon as practicable. In the event the Testing Laboratory determines that there is a breach of the Defect Warranty or a Serial Failure with respect to such Equipment, Contractor shall pay the fees and expenses of the Testing Laboratory in determining the dispute. In the event the Testing Laboratory determines that there is no breach of the Defect Warranty and no Serial Failure with respect to such Equipment, then Owner shall pay the fees and expenses of such Testing Laboratory.

14.6 Warranty Administration. Contractor shall obtain customary warranties from all Major Subcontractors, and any other Subcontractors and Suppliers providing the equipment or services set forth in Exhibit Y (the "**Selected Subcontractors**"). Such warranties shall be obtained for the benefit of Owner as well as for Contractor, and shall either (a) be assignable to Owner or Owner's designee upon Owner's request or (b) expressly provide that the warranties are directly enforceable by Owner without the need for an assignment; provided that Owner hereby agrees to allow Contractor to call upon such warranties to the extent necessary to allow Contractor to fulfill its Warranty obligations hereunder. If a Contractor Event of Default exists and this Agreement has been terminated in accordance with Section 16.2, or otherwise at Project Substantial Completion, Contractor shall assign to Owner (unless previously assigned or to the extent that the warranties are directly enforceable by Owner without the need for an assignment) all unexpired and assignable original warranties of each Selected Subcontractor as requested by Owner, subject to the terms and conditions of any such warranties; provided that, notwithstanding such assignment, Contractor shall be entitled to enforce each such warranty to the exclusion of Owner through the earlier of the termination of this Agreement in accordance with Section 16.2 and the end of the Defect Warranty Period. Contractor shall deliver to Owner, at Project Substantial Completion (unless previously provided), copies of unexpired and assignable warranties of each Selected Subcontractor.

14.7 Limitations on Warranties. The provisions of this Article 14 set forth the exclusive remedies for all Warranty claims under Article 14. The foregoing Warranties are exclusive and are in lieu of all other warranties whether written, oral, implied, or statutory. NO IMPLIED OR STATUTORY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.

14.8 Warranty Disputes. Subject to Section 14.5.4, in the event that Owner provides Notice of an alleged breach of the Defect Warranty pursuant to Section 14.1, Contractor's obligations under Section 14.5, or the Performance Guarantee pursuant to Section 14.11, and Contractor disputes such alleged breach, the determination with respect to such alleged breach may, at the election of either Party, be submitted to neutral third party for resolution, which neutral third party shall be acceptable to both parties. In the event neutral third party determines that Contractor has breached such Defect Warranty, Contractor's obligations under Section 14.1, 14.5 or the Performance Guarantee, Contractor shall pay the fees and expenses of neutral third party in determining the dispute. For purposes of determining any such dispute, neutral third party shall, with respect to the appropriate remedy for any breach by Contractor of the Defect Warranty, its obligations under Section 14.1, Performance Guarantee or Section 14.5, take into account the cost (including the ability to mitigate the cost) of implementing, and the feasibility of, any proposed solution.

14.9 End of Warranty Period. During the thirty (30) day period prior to the scheduled end of the Defect Warranty Period, if Owner so requests, Contractor and Owner shall jointly conduct an inspection and test of the Work to determine if any additional warranty items are required to be repaired or replaced pursuant to the Defect Warranty in order to develop a list of such items; provided, however, that such actions by Owner shall not constitute a waiver of any of Owner's rights under this Agreement.

15. TITLE; RISK OF LOSS

15.1 Title.

15.1.1 Condition. Contractor warrants good title, free and clear of all Liens, claims, charges, security interests, and encumbrances whatsoever (other than those created by Owner, any third-party (other than a Subcontractor or Affiliate of Contractor or any of its subcontractors) or that result from Owner Provided Materials or Owner's failure to pay Excluded Taxes hereunder), to all Work, Equipment and other items furnished by Contractor or any of the Subcontractors that become part of the Project or that are to be used for the operation, maintenance or repair thereof, including the Contractor Deliverables.

15.1.2 Transfer. Title to the Equipment and other items that become part of the Project shall pass to Owner upon the earlier of (a) payment (less any Retainage or off-set) for such Equipment or other items and (b) delivery of such Equipment or other items to the Site. Passage of title shall not affect Contractor's right to payment under this Agreement.

15.1.3 Care, Custody and Control During Performance. The transfer of title shall in no way affect Owner's rights as set forth in any other provision of this Agreement. Contractor shall have care, custody and control of all Equipment and other items that become part of the Project and exercise due care with respect thereto until the respective dates set forth in Sections 15.1.4, and 15.1.5.

15.1.4 Transfer of Care, Custody and Control upon Placed in Service.

(a) Notwithstanding anything to the contrary herein, (i) upon Project Substation Completion Date, Contractor shall transfer care, custody, and control of such Substation to Owner, (ii) upon Placed in Service Date for the BESS, Contractor shall transfer care, custody, and control of the BESS to Owner and (iii) upon the earlier of (A) Project Substantial Completion Date or (B) Placed in Service Date with respect to a Block, Contractor shall transfer care, custody, and control of such Block to Owner; provided, however, that Contractor shall be entitled to retain such degree of care, custody and control as may be necessary to enable Contractor to complete the Work; provided, further, that Contractor shall not be deemed to have waived any of its rights or remedies hereunder related thereto or to be relieved of its obligations to achieve Substantial Completion. An act of Owner with respect to any Work (including any Block, the Project or any portion thereof) between the Placed in Service Date for the initial Block and the Substantial Completion Date, taken pursuant to Owner's care, custody and control of the portion of the Project that has been Placed in Service and which adversely affects Contractor's performance of the Work, shall constitute an Owner-Caused Delay.

15.1.5 Transfer of Care, Custody and Control upon Substantial Completion or Early Termination.

(a) On and after the Project Substantial Completion Date, Owner shall take complete possession, care, custody and control and assume responsibility for the daily

ownership, operation and maintenance of the Project. Possession, care, custody and control and assumption of responsibility by Owner of any Spare Parts delivered to the Site following the Substantial Completion Date shall occur upon delivery of the applicable Spare Parts to the Site.

(b) Upon the early termination of this Agreement, Owner shall have care, custody and control of (i) all Equipment and other items that have been installed and paid for as part of the Project, (ii) all Equipment to which Owner has title and (iii) all Equipment located at the Site but not previously installed as part of the Project to the extent Owner has paid for the same in accordance with this Agreement.

15.2 Risk of Loss.

15.2.1 Risk of Loss Before Placed in Service Date. Without limiting Contractor's obligations under Section 2.6, risk of loss with respect to each Block shall pass to Owner when such Block is Placed in Service. Except with respect to any Block that is Placed in Service prior to the Substantial Completion Date, and except as set forth in Section 15.2.2, until the Substantial Completion Date, Contractor assumes risk of loss, and, without limitation of its right to relief pursuant to Article 8, full responsibility for the cost of replacing or repairing any damage to the Work, Project or any portion thereof (including Equipment).

15.2.2 Risk of Loss After Placed in Service Date or Termination. Risk of loss to the Project shall pass to Owner from and after the Project Substantial Completion Date (or the earlier termination of this Agreement), unless such loss or damage (a) is caused by Contractor, a Subcontractor or a party over whom Contractor has control or any Affiliate of Contractor or (b) is caused by any work performed by Contractor with respect to the Defect Warranty or as otherwise provided pursuant to Article 14.

16. DEFAULTS AND REMEDIES

16.1 Contractor Events of Default. Contractor shall be in default of its obligations pursuant to this Agreement upon the occurrence of any one or more events of default set forth below (each, a "**Contractor Event of Default**"):

(a) Contractor becomes insolvent, generally does not pay its debts as they become due, admits in writing its inability to pay its debts, or makes a general assignment for the benefit of creditors, or Contractor commences any case, proceeding or other action seeking reorganization or receivership, or adopts an arrangement with creditors, under any bankruptcy, insolvency, reorganization or similar law of the United States or any state thereof for the relief of creditors or affecting the rights or remedies of creditors generally;

(b) insolvency, receivership, reorganization, or bankruptcy or similar proceedings are commenced against Contractor and such proceeding shall remain undismissed or unstayed for a period of thirty (30) days;

(c) any representation or warranty made by Contractor in Section 4.1 was materially false or misleading when made and if capable of remedy, Contractor fails to remedy such materially false or misleading representation or warranty within ten (10) days after Contractor receives a Notice from Owner with respect thereto, except such ten (10) day limit shall be extended if: (i) such failure is reasonably

capable of cure and curing such failure reasonably requires more than ten (10) days; and (ii) Contractor commences such cure within such ten (10) day period and diligently prosecutes and completes such cure within thirty (30) days thereafter, in each case, after the date on which Contractor becomes aware of such false or misleading representation;

(d) Contractor assigns or transfers this Agreement or any right or interest herein except in accordance with Article 20;

(e) Contractor fails to maintain any insurance coverages required of it hereunder, and Contractor fails to remedy such breach within five (5) Business Days after the date on which Contractor becomes aware of such failure;

(f) Contractor fails to perform any provision of this Agreement providing for the payment of money to Owner (except for any amounts disputed by Contractor in good faith) and such failure continues for twenty (20) Business Days after Contractor has received a Notice of such payment default from Owner;

(g) Contractor fails to perform any material provision of this Agreement not otherwise addressed in this Section 16.1 and such failure continues for thirty (30) days after Notice from Owner, except such thirty (30) day limit shall be extended if: (i) curing such failure reasonably requires more than thirty (30) days; and (ii) Contractor commences such cure within such thirty (30) day period and diligently prosecutes and completes such cure within sixty (60) days, in each case after the date on which Contractor becomes aware of such failure;

(h) Contractor fails to achieve (i) Project Substantial Completion within forty five (45) days after the Guaranteed Project Substantial Completion Date (as the same may be extended in accordance with this Agreement); or

(i) Contractor incurs liability hereunder in excess of the limitation on liability set forth in Section 23.2.1.

16.2 Owner's Rights and Remedies. If a Contractor Event of Default occurs, Owner shall have the following rights and remedies and may elect to pursue any or all of them, in addition to any other rights and remedies that may be available to Owner at law or in equity, and Contractor shall have the following obligations:

(a) Owner may terminate this Agreement, either in whole or in part, by giving Notice of such termination to Contractor and, upon such termination, Contractor shall withdraw from the Site, shall assign (to the extent such Subcontract may be assigned) to Owner (without recourse to Contractor) such of Contractor's Subcontracts as Owner may request, and shall license, in the manner provided herein, to Owner all Intellectual Property Rights (to the extent not previously licensed in accordance with the terms hereof) of Contractor related to the Work reasonably necessary to permit Owner to complete or cause the completion of the Work, and in connection therewith Contractor authorizes Owner and its respective agents to use such information in completing the Work (and otherwise in connection with the Project), shall remove such materials, equipment, tools, and instruments used by and any debris or waste materials generated by Contractor in the performance of the Work as Owner may direct, and Owner may take possession

of any or all Contractor Deliverables necessary for completion of the Work (whether or not such Contractor Deliverables are complete);

(b) Owner may, without prejudice to any other right or remedy, take possession of the Project Site and of all materials, equipment, tools and machinery thereon, and may finish the Work by whatever method Owner may deem expedient; and if the unpaid balance of the Contract Price exceeds the direct cost of finishing the Work, then Contractor shall be paid for all Work properly performed by Contractor to the date of termination (which amount shall in no event exceed the difference between the unpaid portion of the Contract Price and Owner's cost of completing the Work); provided, however, if the direct cost of finishing the Work exceeds the unpaid balance of the Contract Price, Contractor shall immediately pay the difference to Owner; provided, further, that the cost to Owner of completing the Work shall include the cost of any additional design, engineering, managerial and administrative services required thereby, attorneys' fees and expenses, and any other costs, expenses or damages Owner may incur in order to complete the Work;

(c) Owner may proceed against the Retainage, the Punchlist Holdback and/or amounts withheld pursuant to Section 6.8, in accordance with the terms hereto;

(d) Owner may make such payments, acting reasonably, that Contractor is failing to pay in connection with the relevant Contractor Event of Default and either offset the cost of such payment against payments otherwise due to Contractor under this Agreement or Contractor shall be otherwise liable to pay and reimburse such amounts to Owner;

(e) Owner may require Contractor to assign any and all warranties set forth on Exhibit T to Owner to the extent such warranties have not already been assigned to Owner and to require Contractor to provide evidence reasonably acceptable to Owner that Contractor has assigned such warranties to Owner; and

(f) Owner may pursue the dispute resolution procedures set forth in Article 24 to enforce the provisions of this Agreement and seek damages from Contractor.

16.3 Owner Event of Default. Owner shall be in default of its obligations pursuant to this Agreement upon the occurrence of any one or more events of default set forth below (each, an "**Owner Event of Default**"):

(a) Owner becomes insolvent, generally does not pay its debts as they become due, admits in writing its inability to pay its debts, or makes a general assignment for the benefit of creditors, or Owner commences any case, proceeding or other action seeking reorganization or receivership, or adopts an arrangement with creditors, under any bankruptcy, insolvency, reorganization or similar law of the United States or any state thereof for the relief of creditors or affecting the rights or remedies of creditors generally;

(b) insolvency, receivership, reorganization, or bankruptcy or similar proceedings are commenced against Owner and such proceeding shall remain undismissed or unstayed for a period of thirty (30) days;

(c) Owner assigns or transfers this Agreement or any right or interest herein, except in accordance with Article 20;

(d) Owner fails to perform any provision of this Agreement providing for the payment of money to Contractor (except for any amounts disputed by Owner in good faith) and such failure continues for twenty (20) Business Days after Owner has received a Notice of such payment default from Contractor; or

(e) Owner fails to maintain any other insurance coverages required of it hereunder and Owner fails to remedy such breach within thirty (30) days after the date on which Owner becomes aware of such failure.

16.4 Contractor's Rights and Remedies. If an Owner Event of Default occurs, Contractor shall have the following rights and remedies and may elect to pursue any or all of them, in addition to any other rights and remedies that may be available to Contractor hereunder:

(a) Subject to the terms of any consent to collateral assignment then in effect in accordance with Section 25.19, Contractor may terminate this Agreement after having given ten (10) Business Days prior written Notice of such termination to Owner (in which case Contractor shall be compensated in the manner set forth in Section 16.6);

(b) Contractor may pursue the dispute resolution procedures set forth in Article 24 to enforce the provisions of this Agreement; and

(c) Subject to the terms of any consent to collateral assignment then in effect in accordance with Section 25.19, Contractor may suspend the Work after having given five (5) Business Days prior written Notice of such suspension to Owner, which suspension may last until the earlier of the termination of this Agreement and the date on which the relevant Owner Event of Default has been cured by Owner or waived by Contractor.

Within thirty (30) days of any termination by Contractor in accordance with Section 16.4(a), Contractor shall invoice Owner for such amounts payable pursuant to Section 16.4(a); provided, that Contractor shall take reasonable steps to mitigate costs of effecting the termination, including without duplication demobilization costs and contract cancellation charges.

16.5 Suspension. Owner may, in its sole discretion, order Contractor to suspend the Work, in whole or in part, for a period of time as Owner may determine. The suspension shall commence on the day specified in Owner's Notice which shall be at least five (5) days after Owner Notifies Contractor concerning such suspension, unless such suspension is due to (a) a Contractor Event of Default or (b) an imminent threat of material injury or damage to Persons or property or is the result of a material injury or damage to Persons or property or as otherwise required by Applicable Law, in which case such suspension shall be immediate upon receipt of Notice by Contractor. Upon the commencement of the suspension, Contractor shall stop the performance of the suspended Work except as may be necessary to carry out the suspension and protect and preserve the Work completed prior to the suspension. The provisions of this Agreement related to Excusable Events attributable to Owner-Caused Delays shall be applicable to any suspension by Owner pursuant to this Section 16.5, unless such suspension has been commenced due to (1) a Contractor Event of Default or (2) an imminent threat of material injury or damage to Persons or property or is the result of a material injury or damage to Persons or property caused by Contractor or any of its Subcontractors, in which case Contractor

shall bear all impacts of such suspension. Contractor shall promptly initiate (and Contractor shall be entitled a Change Order adjusting the Project Schedule, Guaranteed Dates and Contract Price, as applicable) the resumption of any suspended Work within five (5) Business Days after Owner gives Contractor Notice to do so (or, in the case the suspension was due to an imminent threat of material injury or damage to Persons or property or is the result of a material injury or damage to Persons or property caused by Contractor or any of its Subcontractors, at such time that the injury or damage to Persons or property (or the threat thereof) was adequately addressed) and shall thereafter resume the Work fully.

16.6 Termination For Convenience. Owner may at any time suspend or terminate this Agreement without cause upon ten (10) calendar days' written notice to Contractor and payment to Contractor of (a) amounts due for all Work performed, (b) all reasonable and documented direct costs of effecting the termination, including without duplication demobilization costs and contract cancellation charges and (c) if such termination for convenience occurs after the issuance of the Notice to Proceed, five percent (5%) of the unpaid Contract Price, as of the day written notice of the termination is received by Contractor; provided that Contractor shall take reasonable steps to mitigate all such costs and charges. Contractor shall submit an invoice to Owner for such termination payment with supporting information and documentation of any fees or costs claimed by Contractor pursuant to this Section 16.6. Upon review and agreement that such invoice is proper, Owner shall pay such invoice within thirty (30) Days after its receipt of same unless in writing Owner disputes in good faith certain elements thereof, in which event only the undisputed portion of such termination payment need be made within such thirty (30) day period. Any amount of any down payment made by Owner to Contractor that is not yet earned at the time of termination shall be deducted from the amounts owing to Contractor pursuant to this Section 16.6. Contractor agrees that if this Agreement is terminated pursuant to this Section 16.6 prior to the issuance of Notice to Proceed, any amount payable to Contractor pursuant to this Section 16.6 as a result of such termination shall be limited to such amounts payable under any LNTP to the extent such amount has been earned by Contractor but remains unpaid as of the date of termination. If, at the date of termination under this Section 16.6, Contractor has properly performed services or purchased, prepared or fabricated off the Site any materials or equipment for subsequent incorporation at the Site, Owner shall have the option of having such materials or equipment or that portion of the Work prepared or fabricated by Contractor delivered to the Site or to such other place as Owner shall reasonably direct at Owner's expense. Payment of the amounts due under this Section 16.6 shall be the sole and exclusive liability of Owner relating to termination without cause, and the sole and exclusive remedy of Contractor relating to termination without cause, and in such event Owner shall have no further liability to Contractor notwithstanding the actual amount of damages that Contractor may have sustained in connection with such termination. Further, following any such termination for convenience, upon Owner's request, Contractor shall terminate, or send an appropriate notice of termination, for all Contractor Permits.

16.7 Termination for Extended Force Majeure Event. If a Force Majeure Event has occurred and continues for a period exceeding twelve (12) consecutive months, notwithstanding that Contractor may by reason thereof have been granted an extension of time pursuant to a Change Order, either Owner or Contractor shall be entitled to serve upon the other thirty (30) days' notice to terminate this Agreement. If at the expiry of the thirty (30) Days' Notice period, the Force Majeure Event shall still be continuing, this Agreement shall terminate, and neither Party shall have further liability to the other Party, except that Owner shall pay Contractor, within fifteen (15) Business Days after Owner's receipt of such invoice from Contractor, (a) amounts due for all Work performed, and (2) all reasonable and documented direct costs of effecting the termination, including without duplication demobilization costs and contract cancellation charges; provided that Contractor shall take reasonable steps to mitigate all such costs and charges; and provided further, that Contractor shall not be entitled to any profit, mark-up or G&A in respect of the amounts described in clause (2). Further, following any such termination for extended Force Majeure Event, upon Owner's request, Contractor shall terminate, or send an appropriate notice of termination, for all Contractor Permits.

16.8 Owner's Right to Elect to Assume Obligations with Subcontractors and Other Rights. Upon a termination of this Agreement, Owner shall have the right, at its option, to give notice of its acceptance of the assignment of, or assume, any subcontract or purchase order that Contractor has entered into with a Subcontractor in connection with the Work. If Owner elects to accept the assignment of, or assume, any such subcontract or purchase order as described in this Section 16.8, then (a) for the avoidance of doubt, the amounts payable by Owner, if any, pursuant to Section 16.4, Section 16.6 or Section 16.7 shall not include or reflect the amount of such obligations and commitments so assumed by Owner (unless they relate to termination or demobilization costs or to payments due for Work already completed for which Contractor remains obligated to pay); (b) the Parties shall comply with Sections 9.3 and 14.6 to give effect to the assignment of such subcontracts or purchase orders contemplated thereunder and Contractor shall execute all documents and take all other reasonable steps requested by Owner in order to give effect to the provisions of Sections 9.3 and 14.6; (c) with respect to any assignment of a subcontract or purchase order to be assumed by Owner under this Section 16.8 but not already effected pursuant to Sections 9.3 and 14.6, Contractor shall execute all assignments or other documents and take all other reasonable steps requested by Owner which may be required to vest in Owner all rights, set offs, benefits, and titles necessary to give effect to such assumption by Owner; (d) Owner shall in such assignment documentation, subject to any right of set off, simultaneously agree to indemnify Contractor against liabilities arising under such assumed subcontract or purchase order as a result of Work performed or actions taken by Owner after such assignment, and (e) Contractor shall in such assignment documentation simultaneously agree to indemnify Owner against liability arising under such assumed subcontract or purchase order with respect to Work performed or actions taken by Contractor or its Affiliates prior to such assignment.

17. INDEMNIFICATION

17.1 By Contractor. Contractor shall indemnify, defend, and hold harmless Owner, its Affiliates, the Owner Financing Parties, and the agents, officers, directors, employees, subcontractors and representatives of each of the foregoing (each, an "**Owner Indemnified Party**") from and against any and all Losses (including property damage to the Project) to the extent arising or resulting from, or occasioned by (i) any violation of Applicable Law or Permit by Contractor, an Affiliate of Contractor performing Work, a Subcontractor or anyone directly or indirectly employed by them, (ii) the negligence or willful misconduct of Contractor, an Affiliate of Contractor performing Work, a Subcontractor or anyone directly or indirectly employed by them, (iii) any breach, default, violation or nonperformance by Contractor of any term, covenant, condition, duty or obligation provided in this Agreement, (iv) Liens imposed on the Work, the Equipment, the Site or any portion thereof by Contractor, an Affiliate of Contractor performing Work, a Subcontractor or anyone directly or indirectly employed by them, except to the extent the same results from the unexcused failure of Owner to make payments of amounts owed to Contractor for the Work, and/or (v) Taxes for which Contractor is responsible hereunder.

17.2 By Owner. Owner shall indemnify, defend, and hold harmless Contractor, its Affiliates and the agents, officers, directors, employees, subcontractors and representatives of each of the foregoing (each, an "**Contractor Indemnified Party**") from and against any and all Losses to the extent arising or resulting from, or occasioned by (i) any violation of Applicable Law or Permit by Owner, an Affiliate of Owner or anyone directly or indirectly employed by Owner, (ii) the negligence or willful misconduct of Owner, an Affiliate of Owner or anyone directly or indirectly employed by Owner, (iii) any breach, default, violation or nonperformance by Owner of any term, covenant, condition, duty or obligation provided in this Contract, and/or (iv) Taxes for which Owner is responsible hereunder.

17.3 Intellectual Property Indemnity. Contractor shall defend, indemnify and hold harmless each Owner Indemnified Party from and against any and all Losses to the extent arising or resulting from, or occasioned by Contractor Indemnified Party's infringement of patents, misappropriation or improper use of other Intellectual Property Rights which occur in connection with Contractor's performance of the Work or

the ownership or use of any portion of the Work including any Contractor's Deliverables, excepting only those intellectual property rights related to Owner Provided Materials, which shall be obtained and maintained by Owner. Owner's acceptance of Contractor's design and/or proposed or supplied materials or equipment shall not be construed to relieve Contractor of any obligation hereunder. Contractor shall have the sole authority for the control of the defense of any and all such claims or suits brought thereon, and Owner shall render such assistance as Contractor shall reasonably require in connection therewith; provided that in any suit brought on such claim, the applicable Owner Indemnified Party shall have the right to be represented by counsel of its own choice at its own expense. Should any such claim materially impair Contractor's performance of the Work in accordance with the Project Schedule or Owner's continued use of the Work, then Contractor shall, at its own expense, timely procure the right to continue its performance of the Work so as not to materially impair the Project Schedule or Owner's continued use of the Work, or timely procure the right to continue use of the Work, and Contractor shall not settle any such claim in a manner that reasonably might be expected to interfere with its performance of the Work or the operation of the Project.

17.4 Indemnification Procedure. When a Party hereunder (the "**Indemnifying Party**") is required to indemnify any Person (the "**Indemnified Party**") in accordance with this Article 17, the Indemnifying Party shall assume on behalf of such Indemnified Party, and conduct with due diligence and in good faith, the defense of any claim against such Person, whether or not the Indemnifying Party shall be joined therein, and the Indemnified Party shall cooperate with the Indemnifying Party in such defense. The Indemnifying Party shall be in charge of the defense and settlement of such claim; provided that without relieving the Indemnifying Party of its obligations hereunder or impairing the Indemnifying Party's right to control the defense or settlement thereof, the Indemnified Party may elect to participate through separate counsel in the defense of any such claim, but the fees and expenses of such counsel shall be at the expense of such Indemnified Party, except in the event that (a) the Indemnified Party shall have reasonably concluded, acting in good faith and on the advice of counsel, that there exists a material conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defense of such claim (in which case the Indemnifying Party shall not have the right to control the defense or settlement of such claim, on behalf of such Indemnified Party), or (b) the Indemnifying Party shall not have employed counsel to assume the defense of such claim within a reasonable time after notice of the commencement of an action thereon, then, in each of cases (a) and (b), the fees and expenses of counsel shall be paid by the Indemnifying Party. The Indemnifying Party shall not, without the Indemnified Party's prior written consent, settle or compromise any claim, suit or cause of action asserted against the Indemnified Party, or consent to entry of a judgment in respect thereof, which imposes any future obligation on the Indemnified Party or which does not include, as an unconditional term thereof, the giving of a release in favor of the Indemnified Party from all liability in respect of such claim, suit or cause of action. An Indemnified Party shall provide Notice to the Indemnifying Party within thirty (30) days after receiving Notice of the commencement of any legal action or of any claims or threatened claims against such Indemnified Party in respect of which indemnification may be sought pursuant to this Article 17. The amount of any indemnity payment made under this Article 17 shall be reduced by the amount of all insurance proceeds received by the Indemnified Party with respect to the event giving rise to the right of indemnity under Sections 17.1 and 17.2.

17.5 Comparative Fault. Notwithstanding anything to the contrary herein, it is the intent of the Parties that where fault is determined to have been joint or contributory, principles of Texas comparative fault law will be followed and each Party shall bear the proportionate cost of any loss, damage, expense and liability attributable to such Party's fault.

17.6 Survival. The indemnities set forth in this Article 17 (other than the indemnity set forth in Section 17.3) shall survive the Final Completion Date or the earlier termination of this Agreement for a period expiring five (5) years following the Final Completion Date or said termination, whichever first occurs. All notices for a claim on any indemnity hereunder must be delivered, if at all, to the applicable Party prior to the expiration of such five (5) year period. The indemnifying period with respect to all claims identified in such

notice (and the indemnity obligation of the Parties hereunder with respect to such claim) shall extend through the final, non-appealable resolution of such claims. The indemnities set forth in Section 17.3 shall survive the Final Completion Date or earlier termination of this Agreement and shall survive for a period expiring six (6) years following the Final Completion Date or said termination, whichever first occurs. For purposes of clarification hereunder, without limiting the other rights granted hereunder to either Party, a Party may enforce the indemnity provisions hereunder without having to declare an Owner Event of Default or a Contractor Event of Default, as applicable.

18. CONFIDENTIAL INFORMATION

18.1 Confidential Information. Each Party shall hold in confidence any technical data or designs, engineering, sales or marketing data, business procedures or information concerning the affairs of the other Party or the Project designated as confidential by the disclosing Party (the "**Confidential Information**"), and shall not disclose, publish or make use of such Confidential Information unless (a) the disclosing Party (the "**Discloser**") agrees in writing to the release of such Confidential Information, (b) to the extent that non-disclosing Party (the "**Recipient**") can establish that the Confidential Information was generally available in the public domain at the time of such disclosure or was developed independently by the Recipient, (c) such Confidential Information is required by Applicable Law to be disclosed, or (d) Owner may disclose a copy of this Agreement to any actual or prospective Owner Financing Parties, insurers and/or in connection with an actual or prospective merger or acquisition or similar transaction where the party receiving the Confidential Information is bound by confidentiality obligations; provided that such disclosure shall be made only to the extent required by Applicable Law and only after providing the Discloser with prior notice and providing the Discloser with the opportunity to seek a protective order or other appropriate remedy, and the Recipient shall reasonably cooperate with the Discloser in connection with its efforts to seek such order or remedy or otherwise limit the scope of Confidential Information disclosed; provided, further that the Recipient shall have the burden of establishing the applicability of any of the exceptions set forth in clauses (a) through (c) above. The Parties shall use Confidential Information solely for the purpose of performing its obligations under this Agreement and not in any way detrimental to the Discloser or its Affiliates. To maintain the confidentiality of the Confidential Information, the Parties shall employ reasonable measures no less restrictive than the procedures used by the Party to protect its own confidential information and trade secrets, but no less than a reasonable degree of care, to prevent its unauthorized use, dissemination or publication. Notwithstanding the generality of the foregoing, the Discloser agrees that the Recipient may disclose such Confidential Information to its officers, directors, employees, agents, representatives and Subcontractors, on an as-needed basis; provided, that such recipient is subject to confidentiality requirements as stringent as those set forth in this Section 18.1; provided, further, that the Recipient remains liable to the Discloser for any breach of its confidentiality obligations hereunder by any such recipient. Upon any termination of this Agreement for any reason, each Party shall promptly return to the other Party all of the other Party's Confidential Information in that Party's possession (or in the possession of any other Person permitted hereby to possess such information) at such time, unless otherwise directed by the other Party. Each Party shall also, upon the other Party's request and specification, return to the other Party any Confidential Information as specified by the other Party in that Party's possession (or in the possession of any other Person permitted hereby to possess such information).

18.2 Ownership of Confidential Information. All rights and title to, and interest in, a Party's Confidential Information shall remain with such Party. All Confidential Information obtained, developed or created by or for Contractor exclusively for the Project, including copies thereof, is the exclusive property of Owner.

18.2 Confidential Information Remedy. The Parties acknowledge that the Confidential Information is valuable and unique, and that damages would be an inadequate remedy for breach of this Article 18 and the obligations of each Party under this Article 18 are specifically enforceable. Accordingly,

the Parties agree that a breach or threatened breach of this Article 18 by a Party shall entitle the other Party to seek an injunction preventing such breach, without the necessity of proving damages or posting any bond. Any such relief shall be in addition to, and not in lieu of, monetary damages or any other legal or equitable remedy available to such Party or its Affiliates. Notwithstanding anything to the contrary herein (and without any effect on the survival of any Warranty hereunder), the confidentiality provisions of this Agreement shall remain in full force and effect until the date that is three (3) years after the earlier of (a) the Final Completion Date or (b) the termination of this Agreement.

19. LICENSES

19.1 License. All Intellectual Property Rights contained within, accompanying or arising from the Work are and shall be solely owned by Contractor and are not being sold to Owner, but rather are being licensed in accordance with the terms and conditions of this Agreement. Contractor hereby grants to Owner, effective as of the date hereof and for the life of the Project, a paid-up, perpetual, irrevocable, non-exclusive, royalty-free right and license (with a right to sub-license or transfer such license to subsequent owner(s) of the Project on the same terms) under all Intellectual Property Rights of Contractor that are incorporated in or cover all or any part of the Work or that are embodied in any items or materials being provided by Contractor to enable use of the Work to use and exploit the Work, all Contractor Deliverables and all such items and materials provided by Contractor solely for Owner's operation, maintenance, use, modification, repair, disposal, removal or alteration of the Project or components thereof solely in connection with the Project, such use and exploitation, including the right to reproduce, and distribute such Contractor Deliverables and such items and materials provided by Contractor. Contractor shall, prior to engaging any Subcontractor to produce any design or engineering work or perform any services or Work in connection with the Project, obtain a valid license (sublicensable to Owner) of any Intellectual Property Rights from such Subcontractor on terms substantially similar to those that obligate Contractor to Owner as set forth in this Article 19. Owner shall bear all responsibility for its use of the Intellectual Property Rights other than as specified in the foregoing sentences of this Section 19.1, and shall indemnify and defend Contractor and its Subcontractors, and their respective successors, permitted assigns, officers, directors and employees against all claims, costs, and damages arising from Owner's use of the Intellectual Property Rights in any manner not specified in the foregoing sentence.

19.2 Assignment. The grant of licenses in Section 19.1 and this Section 19.2 shall be assignable to other Persons that succeed in interest to all or any portion of the Project or are otherwise assigned by Owner pursuant to Section 20.1. Contractor shall, prior to directing any Subcontractor to produce any design or engineering work in connection with the Project, obtain a valid license of any such Intellectual Property Rights from such Subcontractor in terms substantially similar to those that obligate Contractor to Owner as expressed in Section 19.1. Except as specifically stated in Section 19.1, no other license in such Intellectual Property Rights is granted pursuant to this Agreement.

19.3 Contractor Deliverables. The Contractor Deliverables accumulated or developed in respect of the Project, and transferred by Contractor, its employees or any Subcontractors and delivered to Owner, shall become the property of Owner upon delivery without any further consideration to be provided therefor.

20. ASSIGNMENT

20.1 Assignment to Other Persons. Except as otherwise provided in this Section 20.1, neither Party may assign or otherwise transfer this Agreement to any third party, whether by operation of law or otherwise, without the prior written consent of the other Party. Notwithstanding the foregoing: Owner may, without consent of Contractor, (i) collaterally assign its rights, title and interest under this Agreement (including any LNTPs) to any Owner Financing Party, who, subject to any consent entered into by Contractor with the Owner Financing Parties pursuant to Section 25.19, may further assign such rights, title and interest

under this Agreement upon exercise of remedies by an Owner Financing Party following a default by Owner under the Financing Documents entered into between Owner and the Owner Financing Parties, (ii) assign its rights, title and interest under this Agreement to an entity purchasing, in whole or in part, Owner or Owner's interests in, or the assets of, the Project or (iii) to any Affiliate of Owner. Any Party assigning this Agreement as set forth in this Section 20.1 shall promptly deliver notice of such assignment to the other Party; provided, that Contractor's execution of a consent to an assignment as described in subclause (i) of this Section 20.1 shall be deemed to constitute notice to Contractor of the underlying assignment. Any authorized assignment of this Agreement by either Party shall relieve such Party of its obligations hereunder at such time as the authorized successor agrees in writing to be bound in full by such assigning Party's obligations hereunder. Any purported assignment of this Agreement in violation of this Section 20.1 shall be null and void and shall be ineffective to relieve either Party of its obligations hereunder.

21. NON-PAYMENT CLAIMS

21.1 Liens. Except to the extent of any unexcused non-payment by Owner to Contractor of the Contract Price for Work performed hereunder, Contractor shall pay all labor, Subcontractors, equipment vendors, and providers of services of any kind, in compliance with any supply or service contract. Except to the extent of any unexcused non-payment by Owner to Contractor of the Contract Price for Work performed hereunder, Contractor shall not directly or indirectly assume, create, incur or suffer to be created by any employee, Subcontractor, laborer, materialman, equipment vendor, supplier of goods or provider of services any Lien on the Work, the Site, the Project, or any portion thereof resulting from Contractor's failure to make a payment to such Person when due and shall, at Contractor's sole expense discharge and cause to be released, whether by payment or posting of appropriate security, any Lien placed on the Project or the Site by any such Person, unless such Person is placing the Lien on the Project or the Site due to a failure of Contractor to pay such Person solely caused by Owner's unexcused failure to make payments as required hereunder. Such removal or bonding shall be accomplished within five (5) Business Days after receipt of written demand from Owner as to a Lien. Except to the extent of any unexcused non-payment by Owner to Contractor of the Contract Price for Work performed hereunder, any such bond shall survive the termination or expiration of this Agreement so long as such lien remains outstanding. If Contractor fails to remove or bond-over such Lien within five (5) Business Days, Owner may, but shall not be required to, effect such removal or substitute a bond at Contractor's expense, and Contractor shall fully indemnify, hold harmless and release Owner for its direct costs and expenses incurred in connection with such removal or substitution, including attorneys' fees, and Owner may withhold other amounts due or to become due to Contractor in satisfaction of such direct costs, expenses and fees. Except in the case of Owner's failure to comply with its payment obligations hereunder, Contractor shall not file a Lien until seven (7) days before the expiration of the statutory period for Liens. This Section 21.1 shall not apply to Liens that are the result of good faith disputes between Owner and Contractor.

21.2 Lien Waivers. Contractor shall deliver, together with (a) each Contractor's Invoice to be paid as a progress payment, (1) a Conditional Waiver and Release Upon Progress Payment from Contractor and each Subcontractor and Supplier, in each case in respect of work performed on, or equipment delivered to, the Site (or such other delivery point as is specified in any applicable Subcontract) during the period and for the amounts covered by such Contractor's Invoice, and (2) a Waiver and Release Upon Final Payment in respect of each Subcontractors that received its final payment under the relevant Subcontract with the amounts paid under the Contractor's Invoice for the prior month and (b) its application for the Final Completion Payment. No later than ten Business Days following Contractor's receipt of the Final Payment, Contractor shall deliver a Waiver and Release Upon Final Payment from Contractor and each Subcontractor and Supplier, except to the extent such Waiver and Release Upon Final Payment has already been delivered to Owner.

22. NOTICES AND COMMUNICATIONS

22.1 Requirements. Any Notice made pursuant to the terms and conditions of this Agreement shall be in writing and be: (a) delivered personally; (b) sent by certified mail, return receipt requested; (c) sent by a recognized overnight mail or courier service, with delivery receipt requested; or (d) sent by electronic mail or confirmed facsimile transmission, followed by confirmation in one of the other accepted methods in parts (a), (b), or (c) of this Section 22.1 to the following addresses:

If to Contractor:

NoBull Energy LLC
10435 Commerce Drive, Suite 120
Carmel, IN 46032
Attention: Brian Giffin, General Counsel & Commercial Manager
Email: briangiffin@nomadinf.com

With an additional copy to:

David Watts, Managing Partner
NoBull Energy LLC
10435 Commerce Drive, Suite 120
Carmel, IN 46032
Email: davidwatts@nobullenergy.com

If to Owner:

Manager, Red River Clean Energy
11515 Burnet Rd, Ste 825
Austin, TX 78758
Phone: (312) 883-4846
Email: mluo@redrivercleanenergy.com

With an additional copy to:

Raymond W. Faricy III
2000 IDS Center, 80 South 8th Street
Minneapolis, MN 55402-2119
Phone: (612) 371-3507
E-mail: FARICYR@ballardspahr.com

22.2 Representatives. Any technical or other communications pertaining to the Work shall be with the Parties' designated representative. Each Party shall provide Notice to the other in writing of the name of such representatives promptly after the Execution Date. The Contractor's Manager and the Owner Representative each shall have knowledge of the Work and be available at all reasonable times for consultation. Each Party's representative shall be authorized on behalf of such Party to administer this Agreement, agree upon procedures for coordinating the efforts of the Parties, and, when appropriate, to furnish information to or receive information from the other Party in matters concerning the Work.

22.3 Effective Time. Any Notice or Notification given personally, through overnight mail or through certified letter shall be deemed to have been received on delivery, any Notice given by express courier

service shall be deemed to have been received the next Business Day after the same shall have been delivered to the relevant courier, and any Notice given by facsimile transmission shall be deemed to have been received on confirmed dispatch.

23. LIMITATIONS OF LIABILITY AND REMEDIES

23.1 Limitations on Damages. Except (a) for liquidated damages as expressly set forth in this Agreement, (b) for any breach by Contractor of its obligations under Article 18 resulting in consequential damages or (c) to the extent damages (or other amounts) claimed by third parties (other than Owner Indemnified Parties or Contractor Indemnified Parties) for which Contractor or Owner has a duty to indemnify hereunder as expressly provided in Article 17 are shown to be consequential in nature, notwithstanding anything else in this Agreement to the contrary, neither Party (nor that Party's subcontractors) shall be liable to the other Party for any loss, damage or other liability otherwise equivalent to or in the nature of any indirect, incidental, consequential, exemplary, punitive or special damages arising from performing or a failure to perform any obligation under this Agreement, whether such liability arises in contract (including breach, indemnity or warranty), tort (including fault, negligence or strict liability), or otherwise, including for any loss of profits, loss of revenue or loss of use of Equipment, the Project, downtime costs, increased expense of operation or maintenance of the Equipment or the Project; loss of opportunity or goodwill, cost of purchased or replacement power, loss of use of equipment or systems, cost of capital, claims of customers for such damages, or any governmental fines, penalties or sanctions imposed. For the avoidance of doubt, the costs due to termination allowed under Section 16.2 or any liquidated damages payable hereunder shall be deemed to not be consequential or any other type of damages addressed by this Section 23.1.

23.2 Limitations on Liability.

23.2.1 Generally. In no event shall a Party be liable to the other Party for any damages, claims, demands, suits, causes of action, losses, costs, expenses and/or liabilities in excess of an amount equal to one hundred percent (100%) of the Contract Price, as adjusted for Change Orders, regardless of whether such liability arises out of breach of contract, guarantee or warranty, tort, negligence, product liability, indemnity, contribution, misrepresentation, strict liability, equity or any other legal theory; provided, however, the preceding limitation of liability shall not apply to, and no credit shall be issued against such liability for, in the case of Contractor: (i) Contractor's indemnity obligations set forth in Article 17 as to claims by third parties (that are not Owner Indemnified Parties) made against Owner Indemnified Parties; (ii) Contractor's indemnity obligations set forth in Section 3.11; (iii) any other claims resulting from the gross negligence, willful misconduct or fraud of Contractor or (iv) damages for which insurance proceeds are received from insurance required under this Agreement, it being the Parties' specific intent that the limitation of liability shall not relieve the insurers' obligations for such insured risks, and in the case of Owner: (1) Owner's indemnity obligations set forth in Article 17 as to claims by third parties (that are not Contractor Indemnified Parties) made against Contractor Indemnified Parties; (ii) any other claims resulting from the gross negligence, willful misconduct or fraud of Owner or (iii) damages for which insurance proceeds are received from insurance required under this Agreement, it being the Parties' specific intent that the limitation of liability shall not relieve the insurers' obligations for such insured risks. Notwithstanding any of the foregoing, none of the limits on the amount of insurance required to be maintained hereunder shall operate to limit either Party's liability under the Agreement. Without limiting the foregoing, this Section 23.2.1 shall apply if loss or damage, irrespective of cause or origin, results directly or indirectly to persons or property from the negligence, active or otherwise, of Owner, Contractor, Subcontractors and their respective agents and employees, and shall prevail over any conflicting or inconsistent provisions contained in this Agreement, except to the extent such conflicting or inconsistent provisions further restrict either Party's liability.

23.2.2 Liquidated Damages Caps. In no event will Contractor be liable hereunder for Delay Liquidated Damages in the aggregate, in excess of fifteen (15%) percent of the Contract Price.

23.3 Releases, Indemnities and Limitations. The releases, indemnities, waivers, subrogation, assumptions of and limitations on liabilities and limitations on remedies expressed in this Agreement, subject to the terms hereof, shall apply even in the event of fault, negligence, or strict liability of the Party released or indemnified, or whose liability is limited or assumed or against whom rights of subrogation are waived and shall extend to such Party's subcontractors, and in each case to such Party's and its subcontractors' Affiliates, officers, directors, members, managers, employees, licensees, agents and partners.

23.4 Limitation on Remedies. Except as otherwise expressly provided for herein, the rights and remedies of each Party as set forth in this Agreement shall be the exclusive rights and remedies of such Parties.

24. DISPUTES

24.1 Dispute Resolution. Any dispute, controversy or claim between the Parties arising out of or relating to this Agreement or the breach termination or validity thereof (a "**Dispute**") shall be resolved pursuant to the procedures set forth in this Article 24.

(a) either Party shall provide Notice to the other Party of the existence of the Dispute (the "**Dispute Notice**");

(b) a Vice President (or equivalent) of each of the Parties, each with authority to negotiate and resolve the Dispute, shall endeavor to meet, either in person or by telephonic conference, within ten (10) days after the receipt by a Party of the Dispute Notice, to seek to resolve the Dispute through mutual agreement; and

(c) in the event the procedures referenced in clause (b) above do not result for any reason in resolution of the Dispute within twenty (20) days after receipt by a Party of the Dispute Notice, each Party shall have the right to request mediation which shall be administered by the American Arbitration Association ("**AAA**") in accordance with its Commercial Mediation Rules then in effect, within sixty (60) days, unless otherwise agreed to by the Parties; and

(d) in the event the procedures referenced in clause (b) and (c) above do not result for any reason in resolution of the Dispute within 60 days after receipt by a Party of the Dispute Notice, such Dispute shall be settled by arbitration administered by the American Arbitration Association in accordance with its Commercial Arbitration Rules, and judgment on the award rendered by the arbitrators may be entered in any court having jurisdiction thereof

(i) The seat of arbitration shall be Austin, Texas;

(ii) There shall be three (3) arbitrators: (A) claimant shall appoint an arbitrator in its demand for arbitration, (B) respondent shall appoint an arbitrator within twenty (20) days after receipt of a copy of the demand, and (C) within fifteen (15) days after the appointment of the second arbitrator, the two (2) arbitrators appointed by the Parties shall select a third arbitrator who shall serve as chair of the arbitral tribunal. Each such arbitrator shall be an individual who has experience with and is knowledgeable regarding

the PV engineering, procurement and construction industry. Any arbitrator not timely appointed shall be appointed by the AAA using the listing ranking and striking procedures in the Commercial Arbitration Rules, with each Party being given three (3) strikes. When acting as appointing authority under this Article 24, AAA shall endeavor to appoint as each arbitrator (including any chair) an attorney who has experience with and is knowledgeable regarding the PV engineering, procurement and construction industry;

(iii) The Parties agree that any claims or counterclaims brought under this Agreement may be heard in a single arbitration, before the same arbitral tribunal.

(iv) The arbitral tribunal shall have no authority or power to enter an award which is in conflict with governing law. The award shall be in writing and shall contain the reasons on which it is based.

(v) The fees and expenses of the arbitration panel and the AAA shall be borne equally by Owner and Contractor and each Party shall bear its own legal expenses.

(vi) The Parties undertake to keep confidential all awards in their arbitration together with all materials in the proceedings created for the purpose of the arbitration and all other documents produced by another Party in the proceedings not otherwise in the public domain, save and to the extent that disclosure may be required of a Party by legal duty, to protect or pursue a legal right or to enforce or challenge an award in legal proceedings before a court or other judicial authority.

24.2 Third-Party Claims.

(a) Third-Party Claims. Notwithstanding the Parties' agreement to arbitrate disputes arising pursuant to this Agreement, in the event a Party is sued by a third party or sues a third party on claims that concern the other Party's obligations under this Agreement and the allocation of liability and/or damages among all the Parties (including the Party sought to be joined pursuant to this Section 24.2(a) to the suit), then, the Party sued or the Party initiating suit may join the other Party. However, as a condition to such joinder, the Party sued or initiating suit must first request the third party to arbitrate the dispute pursuant to this Article 24. Each Party agrees not to object to such joinder or challenge such proceeding on the grounds that the Parties agreed to arbitrate disputes pursuant to this Article 24.

(b) Stay of Arbitration. In the event the Parties are involved in a pending arbitration pursuant to this Article 24 and both Parties are parties to an action pursuant to Section 24.2(a) that is related to any of the issue(s) or claim(s) raised in the arbitration proceeding, it is agreed that, if the arbitral tribunal in the pending arbitration determines that such a stay would be appropriate, the arbitration proceeding shall be stayed pending the conclusion or settlement of the third-party action. Any conclusion or settlement of such third-party action shall be admissible as evidence (to the extent relevant) for purposes of the arbitration proceedings under this Agreement.

24.3 Pending Dispute: Duty to Continue. Pending the resolution of a Dispute, Contractor shall continue to perform the Work consistent with the applicable provisions of this Agreement, and Owner shall continue to pay all undisputed amounts required in accordance with the applicable provisions of this Agreement.

24.4 Subcontractors. To the extent that any dispute or matter in question between Contractor and Owner arises in connection with Work provided by any Subcontractor, such Subcontractor may be joined in any such dispute at Owner's sole election and, if a Subcontractor is so joined in any such dispute, such dispute shall be resolved in accordance with the dispute resolution procedures set forth in this Agreement and not in the relevant subcontract. Contractor shall incorporate an acknowledgement of this Section 24.5 in all of its Subcontracts with Subcontractors.

24.5 Attorneys' Fees. In any arbitration or litigation to enforce the provisions of this Agreement, the prevailing Party in such action shall be entitled to seek the recovery of its reasonable legal fees and expenses (including reasonable attorneys' fees and legal costs), its corresponding share of the fees of the arbitrator, and costs and expenses such as the prevailing Party's expert witness fees, all as awarded or determined by the arbitrator or court.

25. MISCELLANEOUS

25.1 Severability. The invalidity or unenforceability of any portion or provision of this Agreement shall in no way affect the validity or enforceability of any other portion or provision hereof. Any invalid or unenforceable portion or provision shall be deemed severed from this Agreement and the balance of this Agreement shall be construed and enforced as if this Agreement did not contain such invalid or unenforceable portion or provision. If any such provision of this Agreement is so declared invalid, the Parties shall promptly negotiate in good faith new provisions to eliminate such invalidity and to restore this Agreement as near as possible to its original intent and effect.

25.2 Governing Law; Limited Submission to Jurisdiction. This Agreement shall be governed by the laws of the State of Texas, without regard to any laws regarding conflict of laws thereof that would require the laws of another jurisdiction to apply. The Parties irrevocably accept and submit to the non-exclusive jurisdiction of the state or federal courts located in Austin, Texas, with respect to any suit, action or proceeding in aid of arbitration, including an action for an order of interim, provisional or conservatory measures to maintain the status quo and prevent irreparable harm and for recognition and enforcement of any award rendered by the arbitral tribunal, and the Parties irrevocably waive any objection to the laying of venue or defense that the forum is inconvenient with respect to any such suit, action or proceeding for such purpose. The Parties' right to apply for such judicial relief in aid of arbitration and the commencement of any such suit, action or proceeding in aid of arbitration shall not be deemed incompatible with, or a waiver of, the Parties' agreement to arbitrate. This consent to jurisdiction is being given solely for purposes of this Agreement, and it is not intended to, and shall not, confer consent to jurisdiction with respect to any other Dispute in which a party to this Agreement may become involved. The Parties acknowledge and agree that terms and conditions of this Agreement have been freely, fairly and thoroughly negotiated.

25.3 Waiver of Jury Trial. EACH PARTY HEREBY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY PROCEEDING BROUGHT UNDER THIS AGREEMENT. Each Party (a) certifies that no representative of the other Party has represented, expressly or otherwise, that such other Party would not, in the event of litigation, seek to enforce the foregoing waiver and (b) acknowledges that it and the other Party has been induced to enter into this Agreement by, among other things, the mutual waivers and certifications in this Section 25.3.

25.4 Survival of Termination. Contractor shall only be liable to Owner in connection with the non-performance of the Work only for causes of action for acts or omissions prior to Final Completion or, with respect to Warranty claims, prior to the end of the applicable Warranty Period; provided that Owner complies with its Notice obligations under Article 16 with respect to such Warranty claims. The terms of the preceding sentence shall in no way limit Contractor's or Owner's obligations in connection with provisions which by their nature are intended to survive the termination of this Agreement.

25.5 No Oral Modification. No oral amendment or modification of this Agreement by any officer, agent, member, manager or employee of Contractor or Owner, either before or after execution of this Agreement, shall be of any force or effect.

25.6 Amendments; Waiver. Amendments to this Agreement may be made from time to time; provided that no amendment or modification of this Agreement or any provision hereof shall be valid or effective unless in writing and signed by duly authorized representatives of both Parties. No consent to, or waiver, discharge or release of, any provision of or breach under this Agreement shall be valid or effective unless in writing and signed by the Party giving such waiver. No specific waiver shall constitute a waiver with respect to any other provision or breach, whether or not of similar nature, or in any way affect, limit, modify or waive that Party's right thereafter to enforce or compel strict compliance with any other term, covenant, condition or other provision hereof, any course of dealing or custom of the trade notwithstanding. Failure on the part of any Party to insist in any instance upon strict, complete and timely performance by the other Party of any provision of or obligation under this Agreement shall not constitute a waiver by such Party of any of its rights under this Agreement or otherwise.

25.7 Inspection, Review and Approval. Owner and its representatives (including Owner's Engineer), any Owner Financing Party, the Power Purchasers under each respective PPA and the Participating TO shall have the right to observe and inspect the Work at the Site, such observations and inspections to be arranged at reasonable times and with no less than five (5) Business Day's advance Notice to Contractor. Notwithstanding Owner's inspection, review, monitoring, observation, acknowledgement, comment or Owner's approval of any items reviewed, inspected, monitored or observed in accordance with this Agreement, neither Owner nor any of its representatives or agents reviewing such items, including the Owner's Engineer, shall have any liability for, under or in connection with the items such Person reviews or approves, and Contractor shall remain responsible for the quality and performance of the Work in accordance with this Agreement. Owner's or its representative's inspection, review, monitoring, observation, acknowledgement, comment or approval of any items shall not constitute a waiver of any claim or right that Owner may then or thereafter have against Contractor. Unless otherwise expressly provided herein, Owner shall not unreasonably delay its review of any item submitted by Contractor for review or approval for review or approval; provided that the foregoing shall not be used to decrease any express time limitation for such review or approval set forth herein. Any review, inspection, monitoring or observation by Owner or its representatives in accordance with this Agreement shall not constitute any approval of the Work undertaken by such Person, cause Owner to have any responsibility for the actions, the Work or payment of such Person (other than in respect of Owner's obligations to pay Contractor in accordance with Article 6) or to be deemed to be in an employer-employee relationship with Contractor or any Subcontractor, or in any way relieve Contractor of its responsibilities and obligations under this Agreement or be deemed to be acceptance by Owner with respect to such Work.

25.8 Third Party Beneficiaries. The provisions of this Agreement and all rights of the Parties hereunder are intended for the sole benefit of Owner and Contractor and there are no third-party beneficiaries hereof (other than the Owner Financing Parties, the Contractor Indemnified Parties and the Owner Indemnified Parties).

25.9 Further Assurances. Owner and Contractor will each use its reasonable efforts to implement the provisions of this Agreement, and for such purpose each, at the reasonable request of the other, will, without further consideration, promptly execute and deliver or cause to be executed and delivered to the other such assistance, or assignments, consents or other instruments in addition to those required by this Agreement, in form and substance satisfactory to the other, as the other may reasonably deem necessary or desirable to implement any provision of this Agreement.

25.10 Record Retention. Contractor agrees to retain for a period of four (4) years from earlier of the Final Completion Date and the termination of this Agreement all material records relating to its performance of the Work or Contractor's Warranty obligations herein.

25.11 Binding on Successors. Subject to Article 20, this Agreement shall be binding on the Parties and on their respective successors, heirs and permitted assigns.

25.12 Merger of Prior Contracts. This Agreement supersedes any other agreements, whether written or oral, that may have been made or entered into between Owner and Contractor or by any office or officer of such Party relating to the Project or the Work. This Agreement and the Exhibits attached hereto constitute the entire agreement between the Parties with respect to the procurement and construction of the Project, and there are no other agreements or commitments with respect to the Project except as set forth herein and therein.

25.13 Counterparts. This Agreement may be executed in any number of counterparts, and either Party may execute any such counterpart, each of which when executed and delivered shall be deemed to be an original and all of which counterparts taken together shall constitute but one and the same instrument. This Agreement shall become effective when each Party shall have received an executed counterpart of this Agreement, and an executed counterpart delivered by fax, .pdf or other means of electronic communications shall be deemed to be an original and shall be as effective for all purposes as delivery of a manually executed counterpart.

25.14 Set-Off. Either Party may deduct and set-off against any part of the balance due or to become due to the other Party pursuant to this Agreement any amounts that are due from such other Party pursuant to this Agreement.

25.15 Fees and Expenses. Except as specifically set forth herein, each Party shall be responsible for any legal fees and expenses, financial advisory fees, accountant fees and any other fees and expenses incurred by such Party in connection with the negotiation, preparation and enforcement of this Agreement and the transactions contemplated hereby.

25.16 Announcements; Publications. Contractor shall not (either directly or indirectly), issue or make any public release or announcement with respect to or concerning entering into this Agreement or a Party's performance of its obligations under this Agreement, or permit any Subcontractor, Supplier or customer to do the same, without the prior written consent of Owner and affording Owner a reasonable opportunity to provide comments on such proposed release or announcement.

25.17 Independent Contractor. Contractor is an independent contractor, and nothing contained herein shall be construed as constituting any relationship with Owner other than that of owner and independent contractor, except as expressly provided in this Agreement pursuant to which Owner appoints Contractor as Owner's agent, or as creating any relationship whatsoever between Owner and Contractor's employees. Neither Contractor nor any of its employees is or shall be deemed to be an employee of Owner.

25.18 Independent Engineer. Contractor acknowledges that the Independent Engineer will be engaged for the purpose of providing to Owner Financing Parties a neutral, third party overview of the Work. The Independent Engineer shall provide Owner Financing Parties with independent opinions and determinations, arrived at reasonably and in good faith, with respect to: (a) the status of the Work; (b) the performance of the Project and equipment and the Availability Test, Capacity Test and Long Term Energy Tests and the results and procedures related thereto; (c) invoices submitted by Contractor; (d) Contractor's quality control procedures for the Work and major components thereof; and (e) the approval of Changes In Work.

25.19 Financing Matters. In connection with any transaction (including collateral assignment by Owner of its rights, title and interest under this Agreement to any Owner Financing Party in accordance with Section 20.1) among the Owner Financing Parties and Owner or any of its Affiliates, Contractor shall execute and deliver, any usual, reasonable and customary consent document (which shall include acknowledgement of Owner Financing Parties' security interest, assignment as security of Owner's rights under this Agreement, notice of Owner default, step-in/step-out cure rights and other reasonable provisions customary in project financings), or other documents reasonably requested by Owner provided that Contractor shall not be obligated without a Change In Work to accept any undertaking imposed by any Owner Financing Party which Contractor reasonably believes will increase its obligations under the Agreement, whether such increased obligations be technical, economic, schedule related or otherwise. Contractor agrees to make available, or to use commercially reasonable efforts to cause its Subcontractors to make available, to the Owner Financing Parties and the Independent Engineer, subject to an appropriate confidentiality agreement, independent reviewers, feasibility consultants, and other financial institutions or parties involved in the financing process, such information in the control of Contractor, its Affiliates and Subcontractors (including financial information concerning Contractor, its Affiliates and the Subcontractors) as may be reasonably requested by Owner. Contractor acknowledges that the Owner Financing Parties and the Independent Engineer may monitor, inspect and review the Work as permitted by Article 10, Section 12.3 and Section 25.18.

25.20 Financial Statements.

25.20.1 Upon request from Owner Financing Party, Contractor shall deliver to Owner Financing Party as soon as available, but no later than sixty (60) days after the close of the first, second and third quarterly periods of its fiscal year, quarterly (and year-to-date) (consolidated, if applicable) its unaudited consolidated financial statements, including a balance sheet and statements of income and statements of cash flows; and

25.20.2 Upon request from Owner Financing Party, Contractor shall deliver to Owner Financing Party, as soon as available, but no later than one hundred twenty (120) days after the close of each applicable fiscal year, its audited consolidated financial statements, including statements of equity, balance sheets as of the close of such year, and statements of income and cash flows, all prepared in accordance with generally accepted accounting principles in the United States of America consistently applied and certified by a nationally recognized independent certified public accounting firm selected by Contractor and satisfactory to Owner.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed as of the Execution Date.

BLUE HERON SOLAR, LLC

By: Mike Luo
Mike Luo (Oct 14, 2025 14:06:38 CDT)

Name: Mike Luo
Title: Authorized Signatory

NOBULL ENERGY, LLC

By:
David Watts (Oct 14, 2025 14:24:56 CDT)

Name: David Watts
Title: Managing Partner

CWP - Chisme Solar EPC Agreement 14Oct2025

Final Audit Report 2025-10-14

Created:	2025-10-14
By:	Jean Chou (jchou@concordnewenergy.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAARWxKpuO9lFBCD16JRTCzahzt8dNroQCi

"CWP - Chisme Solar EPC Agreement 14Oct2025" History

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Document e-signed by David Watts (davidwatts@nobullenergy.com)
Signature Date: 2025-10-14 - 7:24:56 PM GMT - Time Source: server

Agreement completed.
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EXHIBIT A - STATEMENT OF WORK

PROJECT DESCRIPTION 1

A. Engineering and Quality Control: 4

B. Project Management and General Conditions: 6

C. Permit Compliance: 12

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E. Civil Infrastructure, Site Clearing and Fencing: 15

F. Foundations: 16

G. PV Array Procurement, and Construction: 17

H. BESS Procurement and Construction 19

I. AC Collection System: 21

J. Communication / Supervisory Control and Data Acquisition System (SCADA/DAS): 22

K. Project Interconnection Facilities: 24

L. Spare Parts and Owner Training: 25

M. Weather Stations 25

N. Security System 26

O. Operations & Maintenance Facilities 26

PROJECT DESCRIPTION

An electrical generation facility consisting of approximately 147 MW AC of solar-powered electric generating capacity (the "Solar Facility"), and a related battery energy storage system with a nominal capacity of approximately 361 MWh (the "BESS"), to be procured, constructed, installed, tested and commissioned in accordance with the terms and conditions set forth in this Agreement, including a 345 kV project substation, a 345 kV Gen Tie Line connecting the Project Substation to the point of interconnection, and all other applicable work to interconnect the project located in Brown and Mills Counties, Texas (collectively, the "Project")

Scope of Work

The Project's Scope of Work ("Work") generally consists of all management and control, procurement, construction, installation, quality control and quality assurance, inspections, environmental compliance, safety inspections, report and documentation, supervision, labor, materials, equipment, specialty items, commissioning, interconnection and approval, performance testing, and all other services required for executing the work to deliver and fully integrate the project as described above (the "Project"). The Work shall consist of the following, but not limited to efforts:

- Facility Construction, including site/civil work, Foundation infrastructure, mechanical, electrical, and monitoring/control systems construction.
- Perform all concrete washout off-site.
- Storm water, erosion and sedimentation control implementation.
- Procurement, maintenance, and ultimate close-out of all Contractor Permits.
- Procurement, transport, offloading, staging, preparation, installation, and commissioning of all Photovoltaic generation equipment ("Generation Equipment" or "PV Array") except as below under Provided by Owner.
- Procurement, transport, offloading, staging, preparation, installation, and commissioning of all Battery Energy Storage System equipment ("BESS") except as below under Provided by Owner.
- Procurement, transport, offloading, staging, preparation, installation, and commissioning of AC collection systems, and all facilities up to and including the Utility interconnection as defined as the point of interconnection with the Utility, and in accordance with the utility requirements except as below under Provided by Owner.
- Installation of piles, single-axis tracker system, and solar panels.
- Underground and aboveground DC electrical collection system. All wiring, conduits, and cable management as required.
- Transformation from DC to AC including all inverters, combiners, switchgear, and equipment pads or skids.
- Underground solar field and BESS AC collection system, including the overhead transmission line from the solar site's substation to Point of Interconnection at the Project's designated interconnection voltage
- Installation and coordination with the manufacturer for all inverters commissioning.
- Offloading, staging, preparation, handling, and installation of any Owner-provided equipment for the Project
- Installation, and implementation of SCADA/DAS/Met Stations and communication network to the inverter level, at minimum. All SCADA data shall also be mapped to Owner's PI network.
- Interface and coordination with the Participating Transmission Operator ("Utility") as required.
- Installation of Project fencing per engineered and approved plans.

- Project management, safety, and quality control and quality documentation throughout all phases of installation, commissioning, and final testing and verification.
- All safety equipment, dumpsters, off-hour security, chemical toilets, eye/hand washing stations, and lift equipment.
- Final commissioning, performance testing (other than noted above) and any other testing required under the Agreement and verifications found in Exhibits H – H5.

1. General Requirements

   a. The systems and equipment supplied by Contractor shall be suitable for the environment in which they will be located and shall be designed for a plant life of at least twenty five (25) years.

   b. The specifications provided herein are intended to identify overall system requirements and certain specific hardware requirements, which Owner requires to ensure that the Plant provided by Contractor shall operate reliably and safely during the Plant's design life.

   c. The general system performance criteria are defined in this Scope of Work and the attachments. Contractor is responsible for ensuring that criteria for Contractor Work included in this specification are met.

2. Reliability and Maintainability

   a. Contractor shall provide, as part of the training deliverables, general operations and maintenance information for reference, including sample inspection and preventive maintenance activities recommended by OEMs. Such materials are provided for informational purposes only and shall not constitute a warranty, representation, or guarantee of plant performance beyond the applicable warranty period.

Contractor shall provide familiarization training (which shall not be repeated due to Owner personnel change) for Owner's designated personnel on systems furnished and installed by Contractor. Contractor's obligation is limited to initial familiarization only; Owner is responsible for all subsequent training, certification, and ongoing O&M activities.This Scope of Work sets forth the work provided by Contractor, and provides additional clarification regarding certain items of work being provided by Owner. Unless specifically identified as work by Owner, Contractor shall provide all scope to provide a complete and functional Project.

Provided by Owner

The following are Owner provided items for the Projects:

- Investigation, full surface clearing and targeted subsurface clearing of unexploded ordinance (UXO)
- Vegetation removal and mulching

- Construction access rights and land use rights to construct the Project
- Easement Encroachment Agreement(s)
- Conditional Use Permits or Zoning Permits.
- Environmental studies, reporting and Agency Consultation
- USACE Permitting
- Project Design and Engineering
- Geotechnical Report
- Topographical and property boundary survey data
- Builder's All Risk Insurance
- Interconnection Agreement, including associated fees (see Exhibit I)
- Owner Provided Materials:
    - Main Power Transformers (QTY 2)
    - HV Circuit Breakers (QTY 3)
    - BESS System, including PCS and MV Transformer Skids (QTY 72)
    - PV Modules (QTY 392,040 + approx. 4,000 spares, of which 1,600 are allotted for construction spares)
    - PV Inverters (QTY 40)

The Contractor's Scope of Work includes all other work required to deliver the Project, including, but not limited to, the following:

B. Engineering and Quality Control:

1. Owner is responsible for engineering the Project.

2. Beyond the survey information provided by the Owner, the Contractor shall be responsible for any additional surveying that Contractor deems necessary to complete the Work.

3. A geotechnical assessment has been completed for the Project and provided by the Owner. Contractor shall be responsible for any supplemental geotechnical review that Contractor deems necessary to complete the Work.

4. In coordination with the PPC and SCADA vendor, Contractor shall provide full design and engineering documentation and shall work with Owner's Engineer to incorporate PPC/SCADA design into the Project Design Plans.

5. Contractor shall coordinate all equipment settings to ensure compliance with all relevant governing bodies (including but not limited to NERC, TX PUC, ERCOT, Oncor.)

6. All materials designed for incorporation into the Project shall be UL. ETL or CSA Listed, or listed by an equivalent organization if approved by Owner and the AHJ.

7. Contractor will develop site-specific Project QA/QC plans that clearly outline the management, communication, and overall quality control procedures that will be

employed on the Project. Contractor will develop forms and quality checks to ensure all work is inspected prior to being deemed complete. Contractor shall submit to Owner a final copy of its QA/QC plan for review no later than 45 days after contract execution for Owner review and comment.

8. All QA/QC testing procedures onsite shall be witnessed and documented by a qualified representative of the Contractor. Owner shall observe and witness QA/QC as necessary and at its discretion. A qualified field engineer/QA representative of Contractor shall date and sign documentation indicating completion and acceptance of each onsite QA/QC test procedure.

9. Contractor will keep and maintain organized and thorough as-built and quality documentation ("Job Books") for each Project throughout the course of construction. Quality control documents, submittals, and As-Built Drawings (in pdf and native format) shall be available for review throughout the course of construction and transmitted to the Owner prior to, and as a condition of, Final Completion. Contractor shall ensure that any Contractor procured materials supports the requirement to deliver a structurally sound project designed to operate a minimum of 25 years.

10. Job Books means all purchasing and other information relating to the Work, including:

(a) a drawing index;

(b) a reference index;

(c) copies of Subcontractor's and Sub-subcontractors' Permits;

(d) copies of all contracts and purchase orders for Major Sub-contractor's equipment (non-priced);

(e) Sub-subcontractor information for equipment purchased (as received from Sub-contractors) including instruction and maintenance manuals;

(f) one copy of the As-Built Drawings and documentation;

(g) training manuals;

(h) a cable and raceway schedule;

(i) the Operating Manuals;

(j) electrical one-line diagrams for the Project;

(k) field testing of power and fiber optic cable;

(l) a compilation of final Project safety records; and

(m) a final list and summary of the Work performed by all Sub-subcontractors

C. Project Management and General Conditions:

1. Contractor shall, at minimum, provide and maintain all Owner defined insurance requirements.

2. Contractor will perform quality assurance testing and quality control monitoring in accordance with the design documents, Generation Equipment manufacturers' technical specifications, and prudent industry practices, except as above under Provided by Owner.

3. Contractor will develop a detailed execution plan and Critical Path Method ("CPM") schedule specifically for the Project that will integrate related activities and comply with agreed-upon milestones. Contractor will provide periodic updates of the CPM schedule in accordance with Owner's meeting & reporting requirements.

   a. DEFINITIONS

      (1) Baseline – Project plan (schedule, commodity curves, etc.) upon which the executed contract is based. All Baseline deliverables are to be submitted within the time requirements established within the Agreement, or if no time is so stated then twenty-eight (28) days of the Effective Date of the Agreement (or date approved by Owner) and are required to be reviewed and approved by Owner. All Baseline deliverables will reflect the Contractor's schedule to achieve the Milestone and Guarantee Milestone Dates as reflected in Exhibit S – Project Schedule. The Baseline project schedule is maintained unchanged throughout the contract.

      (2) Target – Project plan (schedule, commodity curves, etc.) upon which the Contractor will execute the work. The Target project plan may vary from the Baseline plan as the Contractor modifies their execution plan.

      (3) Current – Project plan (schedule, commodity curves, etc.) reflective of actual progress to date and forecasted progress to complete the contractual scope of work.

   b. GENERAL PROGRAM REQUIREMENTS

      (1) Provide adequate methods and tools for budget control, scheduling, tracking, trending, and reporting of work in progress for the procurement and construction activities related to the Project.

      (2) Identify Contractor's organization.

c. MILESTONES AND GUARANTEED MILESTONES

(1) Milestones and Guaranteed Milestones have been established by Owner for the construction activities in Exhibit S - Project Schedule. Contractor shall provide Owner proposed dates for each Milestone and Guaranteed Milestone in Exhibit S. Exhibit S shall be approved by Owner at the time of Agreement.

(2) Contractor shall include in the comprehensive project schedule each Milestone and Guaranteed Milestone Date. The Milestones are to be logically tied to the scheduled activities. The Contractor's status against each Milestone and Guaranteed Milestone Date will be updated along with all schedule activities on a weekly basis through indicator updates.

(3) The Milestones and Guaranteed Milestone Dates status shall be reported on in the Monthly Management Review Meeting.

4. Contractor will be responsible for providing construction management, field inspection, oversight/planning, and general coordination of the Work.

5. Contractor will perform all staking, layout and final surveying to support compilation of As-Built Drawings for the Work.

6. Contractor will provide on-site Environmental Health, Security and Safety ("EHSS") coverage to manage the day-to-day EHSS program in accordance with the requirements of the Contract. Contractor will perform EHSS activities in accordance with Exhibit D, industry best practices and as required to facilitate an injury-free workplace. Owner shall cause its consultants, subcontractors, and personnel to wear required PPE and comply with the Contractor's on-site safety program.

7. Contractor will conduct EHSS "first-day first-hour" orientation for all personnel, inclusive of all personnel on site whether they are employed by Contractor or others, prior to the person being released to work on the Project site.

8. Contractor will provide regular operating reports to Owner in accordance with Owner's meeting and reporting requirements, as described in Exhibit B of the Agreement. Contractor shall provide comprehensive monthly reports due by the 5th Business Day of each month to be utilized for the monthly meeting agenda and to satisfy reporting requirements from Owner to other third parties. In addition Contractor shall hold weekly update meetings with the Owner to review past week's progress and review 3-week look-ahead schedule, safety updates, and address any critical issues. The minutes are to be submitted to the Owner within 48 hours of the meeting.

9. Contractor will provide copies of all testing results, As-Built Drawings and/or completion documentation for each component of the Work.

10. Contractor will provide security for the Project site during non-working hours through Substantial Completion. During working hours, security may be provided by Contractor's on-site staff. Contractor will provide security services for the project. Scope of security service will be dictated by the progress and extent of work occurring on the sites.

11. Contractor shall be responsible for installing adequate signage on site. All safety signage shall comply with the most recent ANSI Z535 standards. Danger signage, permit required signage, barricades, danger tape, and notices will be posted as required to administer EHSS. Temporary (but clearly legible and durable) signs will be installed at each PV Block designating block number. Temporary (but clearly legible and durable) signs will be installed as needed for overhead power lines, blind corners, dips, and other hazards including trucks entering roadways. Temporary (but clearly legible and durable) signs will be installed at site entry indicating Project name, Owner, Contractor, and entry requirements. Such signage will be approved by Owner prior to fabrication. Temporary signs will be installed during civil construction and maintained up to, and removed as a condition of, Final Completion.

12. Contractor shall implement a zero tolerance policy for employees that leave the work areas, drive on or otherwise disturb property not designated for impact or outside the limits of disturbance, cut "cross-country" versus utilizing designated travel ways, ignore environmental buffers, signage, or restrictions, litter at the Project site, or otherwise conduct themselves in a manner that does not align with the sensitive nature of a project on leased private lands. In addition, Owner will implement the same policy for its employees, consultants, or subcontractors.

13. In support of Contractor's warranty obligations, Contractor shall provide a Project warranty overview summary at the completion of the Project for all provided equipment components, warranty durations, start and end dates, etc.

14. Prior to mobilization, Contractor shall provide a Project execution plan with sufficient detail to develop an understanding of how the Project will be managed and controlled, including but not limited to the following items:

    a. Site management staff, including Safety, Quality control, Project Engineers, etc.

    b. Site trade staff.

    c. Equipment, including earthmoving equipment, forklifts, pile drivers, trucks, etc.

    d. Site traffic control plan.

    e. Training and qualification requirements.

    f. Safety Orientation Materials.

g. Startup and commissioning.

h. Project environmental management.

i. Handling of waste materials.

j. Handling of hazardous materials.

k. Unanticipated discoveries.

15. Contractor shall be responsible for mobilizing all labor, equipment, materials, and temporary facilities necessary to commence construction. This includes establishing laydown areas, construction trailers, temporary communications infrastructure, utilities, and safety signage.

16. Upon completion of the Work, the Contractor shall demobilize its own (including all subcontractors hired by Contractor) personnel, equipment, and temporary facilities, and remove construction debris and waste materials generated solely from its operations. The Contractor shall leave its work areas in a clean and orderly condition consistent with good Industry Practice. The Contractor's responsibilities related to SWPPP completion and submission of Notice of Termination (NOT) are limited to removing or converting temporary Best Management Practices (BMPs) and temporary stabilization measures it installed, in accordance with the applicable portions of the Project's Storm Water Pollution Prevention Plan (SWPPP). After Final Completion, all remaining SWPPP maintenance, stabilization, and related responsibilities will belong to the Owner.

17. Codes, Regulations and Standards

a. Contractor shall build the Plant in accordance with all applicable federal, state and local laws and codes, regulations and standards listed below. The codes and standards utilized shall be the latest editions in effect on the effective date of this Agreement. Where these codes do not govern specific features of the equipment or system, Contractor and Original Equipment Manufacturer (OEM) standards shall be applied. Where local codes or ordinances will have an impact on the design (e.g. building height restrictions) Owner shall address these with the local authorities having jurisdiction (AHJ).

b. Federal Regulations

(1) US Environmental Protection Agency Regulations

(a) Resource Conservation and Recovery Act Regulations

(b) Clean Water Act

(c) Clean Air Act

(d) Oil Pollution Act

(e) Comprehensive Environmental Response, Compensation and Liability Act

(f) Emergency Planning and Right-to-Know Act

(g) Toxic Substances Control Act

(2) National Environmental Policy Act

(3) US Fish and Wildlife Regulations (e.g. Endangered Species Act)

(4) US Army Corps of Engineers Regulations

(5) Occupational Safety and Health Act (OSHA)

(a) 29 CFR 1910 Occupational Safety and Health Standards

(b) 29 CFR 1926 Safety and Health Regulations for Construction

(6) US Department of Transportation Regulations

(7) Code of Federal Regulations

c. Applicable State, County and Local Codes and Regulations

(1) Texas Administrative Code

(2) County Regulations

(3) Department of Transportation Regulations

(4) Local Codes and Ordinances

d. Applicable Industry Codes and Standards from the following list. Alternative standards may be used only upon Owner's acceptance of Contractor's written request, which shall specify the proposed alternative standard, why such change is necessary and how compliance is to be achieved.

(1) Mechanical

(a) ANSI - American National Standards Institute,

(b) PTC - Power Test Codes - Applicable Test Codes

(c) ASNT - American Society for Nondestructive Testing

(d) ASTM - American Society for Testing and Materials

(e) AWS - American Welding Society

(f) SSPC - Steel Structures Painting Council

(g) MSS – Manufacturers Standardization Society

(2) Electrical

(a) ANSI - American National Standards Institute

(b) FM - Factory Mutual

(c) ICEA - Insulated Cable Engineers Association

(d) IEEE - Institute of Electrical and Electronics Engineers

(e) NETA – International Electrical Testing Association

(f) IESNA - Illuminating Engineering Society of North America

(g) ISA - International Society for Measurement and Control

(h) LPC - Lightning Protection Code

(i) NEC - National Electrical Code, latest version adopted by Authority Having Jurisdiction

(j) NEMA - National Electrical Manufacturers Association

(k) NESC - National Electrical Safety Code

(l) UL Underwriters Laboratories

(m) NFPA – National Fire Protection Agency

(n) IEC – International Electric Code

(3) Civil/Structural/Architectural

(a) ACI - American Concrete Institute

(i) ACI 318 - Building Code Requirements for Reinforced Concrete

(ii) ACI Manual of Standard Practice

(iii) ACI 350 – Environmental Engineering Concrete Structures

(b) ASCE 7 – Minimum Design Loads for Buildings and Other Structures

(c) AISC - American Institute of Steel Construction

(d) AISI - American Iron and Steel Institute "Specification for Design of Cold-Formed Steel Structural Members," Parts 1 and 2

(e) AWS - American Welding Society

(f) International Building Code and any State and local amendments and codes

(g) SSPC - Steel Structures Painting Council

D. Permit Compliance:

1. Contractor shall comply with all Owner permit requirements. Permits and Permit Conditions are included as an Exhibit to the Agreement.

2. Storm Water Pollution Prevention Plan ("SWPPP") – Contractor shall implement a SWPPP and obtain coverage under the Construction Stormwater Permit (CGP) and maintain SWPPP and relevant documentation through Final Completion. Contractor shall also be responsible for keeping Texas Commission on Environmental Quality updated with any civil design or erosion control design changes as well as the eventual termination of said permit coverage. For the avoidance of doubt, Owner shall design SWPPP and shall update design as required during duration of the Work.

3. Contractor shall be fully responsible for full-time dust control. In the event Contractor is not reasonably controlling dust, Owner shall have the right (but not the obligation) to supplement dust control efforts at the cost of the Contractor with written notice.

4. Contractor shall support the Owner in obtaining any remaining building permits and independently obtain transportation permits for project work as may be required by the County and the state of Texas.

5. Contractor shall schedule the County, City or State Inspectors, and special inspectors for any required field inspections.

6. Contractor will install Best Management Practices ("BMP's") prior to work in an area, and will maintain erosion control devices throughout the course of the work. Contractor will inspect and maintain BMP's in accordance with the SWPPP and maintain all documentation as required. Contractor shall incorporate a "BMP Map" in the office clearly showing the BMP's installed to date as well as a binder of all inspections dates, findings, and corrective actions taken.

7. Contractor acknowledges that the techniques, locations, and details shown in the SWPPP and associated drawings are performance based and may represent the minimum requirements. Proper erosion and sedimentation control practices on site involve constant monitoring, adaptation and incorporation of all additional means necessary to prevent silt migration and promote a stable worksite. As such, Contractor shall constantly monitor BMP effectiveness and immediately address erosion concerns with appropriate methods, including but not limited to, additional civil drainage details. For signs of scouring or sediment transport, Contractor shall incorporate matting, additional compaction, or other slope stabilization methods. Erosion control measures shall continue to be monitored through Final Completion.

8. Contractor shall mark the limits of disturbance in the field and maintain such markings and ensure that its personnel and subcontractors stay well within the limits for all activities (construction, access, etc.) unless specifically permitted to leave said areas after obtaining approval by Owner in writing.

9. Contractor acknowledges there are adjacent landowners not secured under lease by Owner or designated for disturbance, and will take full responsibility for any error in accessing or disturbing land not leased or scheduled for impact, as shown in Owner provided documents.

10. Contractor shall fully participate in any Owner site protocols for the protection, monitoring and reporting of wildlife that frequent the project area.

11. Contractor shall ensure that all equipment and vehicles are equipped with a shovel, spill kit, and fire extinguisher. Contractor shall provide process plan for refueling of vehicles and equipment on site, spill cleanup, and processing and disposal. All spills, regardless of quantity, shall be cleaned up immediately and Owner shall be notified immediately. A spill log that clearly shows "cradle to grave" shall be maintained. This shall include logs and current manifestations to clearly show source, type of spill, relevant dates, container, and final disposal site documentation.

12. Contractor shall develop and comply with a Project specific Spill Prevention Control & Countermeasure program (SPCC) including all secondary requirements for stored fuel or fueling stations.

13. All refuse that leaves the work area must be retrieved and disposed of promptly.

14. Contractor shall practice good job site housekeeping, promptly dispose of trash and debris, and cause said debris to be transported from the job site to a suitable disposal facility.

15. Contractor shall provide project recycling services and facilities to the extent possible.

16. Contractor shall immediately report any sightings of dead or injured wildlife to Owner.

17.

18. Contractor shall provide and obtain required permits for all necessary temporary facilities and utilities required to support construction activities, including but not limited to potable and non-potable water, septic treatment or disposal, power for tools and trailers, and appropriate disposal of construction and domestic waste in accordance with local, state, and federal requirements.

19. Contractor shall provide copies of drawings/specifications/ vendor manuals or other documents that Owner requires on-site during the project. Contractor shall also provide Owner personnel access to document control for specific information needs.

20. Any temporary trailers and storage facilities shall meet any state, federal, or local requirements.

21. Contractor to provide copy of Contractor obtained permits within 10 business days. Contractor is to CC Owner on all correspondence with AHJ(s).

E. Existing Infrastructure – Upgrades, Maintenance and Repair:

1. Pertaining to existing [County, State, US] roads, Contractor shall comply with the requirements of the Project Conditional Use Permit, as well as any/all additional conditions that may be imposed by the [County, State, US] (i.e. construction traffic speed limits).

2. Contractor shall assume responsibility to provide dust control for the existing [County, State, US] road(s) to be used by Contractor or subcontractors during the times of active construction from mobilization through Final Completion. Repairs made to the road after Final Completion or during construction and as deemed necessary by the [County, State, US] will be paid for by the Owner. Contractor

shall conduct a pre-construction survey to document state of roads prior to construction.

3. Contractor shall create and administer a detailed traffic plan and haul route map outlining this route and any additional Contractor selected routes. This haul route plan shall be reviewed and accepted by the [County, State, US] prior to increased traffic flow due to the project.

4. Contractor shall be responsible to work with County Officials and the Texas Department of Transportation, and shall comply with any requirements or recommendations. Proper notice shall be delivered to the local jurisdictions as required prior to starting any work in a County or State Right-of-Way.

5. Contractor shall perform any required upgrade work to existing private access roads sufficient for use throughout the life-cycle of the project construction. ***[Note: For Chisme Solar and Storage project please refer to Attachment G KMZ files for additional information.]***

F. Civil Infrastructure, Site Clearing and Fencing:

1. Where infrastructure is in close proximity to established limits of disturbance, Contractor shall implement strict protocols to ensure that disturbance does not encroach into areas not designated for improvements.

2. Contractor will construct civil infrastructure in accordance with the stamped IFC drawings. Main access roads will be constructed of material specified (and tested) to conform to the Civil Drawings and Specifications.

3. Contractor shall be responsible to maintain, repair, and provide suitable dust control for all newly constructed roads on site through Final Completion.

4. Contractor will turn over new roads to Owner in acceptable final condition for use during the operations phase.

5. Contractor will install a perimeter security per the civil improvement drawings.

6. Contractor will construct a suitable compacted native soil Project laydown area for temporary storage of the Generation Equipment and for the use in PV Array assembly.

7. Contractor will design and install appropriate erosion channel crossings, culverts, ditches, etc. as displayed on the IFC Civil Drawings or as field conditions dictate, so as to maintain the integrity of the road infrastructure and minimize road material from washing out or scouring other infrastructure.

8. Contractor will manage appropriate utility crossings required for completion of Contractor's Work. Prior to any work on site, Contractor and their subcontractors

are fully responsible to field verify the location of existing utilities or infrastructure.

9. Contractor will provide dust control for the duration of the Project, up to Final Completion. Dust control will consist of water trucks as needed based on current conditions. Chemical suppressants shall not be utilized unless written approval is received from Owner and the AHJ.

10. Contractor shall be responsible for metering, transporting, any temporary storage, etc., that may be necessary. Contractor shall reclaim, re-seed and/or stabilize all disturbed grounds other than those areas that are not intended for plant growth such as roads and retention areas. All temporary areas, enlarged entrances, collection system paths, embankments, fill slopes and any other areas of disturbance not considered "permanent" will be restored, or re-vegetated and monitored per State regulations until termination of coverage under the CGP, through the filing of the Notice of Termination (NOT). Final Completion may be achieved prior to NOT due to timing of stabilization measure establishment and environmental conditions that may prohibit growth. Contractor shall remove all trailers, conexes, and materials from the laydown area(s) and reclaim. Final restoration and shaping of PV Array strings and access roads shall take into account positive drainage to eliminate ponding or other drainage concerns.

11. Initial clearing and grubbing for the site shall be completed by Owner.

12. All non-organic construction related debris and material removed shall become the immediate property of Contractor and shall be removed from the premises and disposed of by Contractor in accordance with permits, Federal, State and local regulations.

13. All signs and barricades shall be provided and maintained by Contractor and shall be in accordance with good practice or jurisdictional regulations for safety and accident prevention. Contractor will post adequate speed limit, traffic control and direction signage on entrance roads and on the site during construction.

14. Contractor shall be responsible for compliance with State and local requirements for fugitive dust emissions. Contractor shall prevent the spread of dust during its operations. Contractor shall moisten all surfaces with water to reduce the risk of dust becoming a nuisance to the public and neighbors. Contractor shall furnish all labor, material and equipment necessary for dust control including tank trucks, hoses, water and commercial dust suppressants.

15. On-site open burning will not be permitted unless approved by appropriate local authorities and Concord New Energy.

G. Foundations:

1. Contractor shall utilize excess sub-soils as general fill for positive grading away from the PV Array, roadway support, or thin-spread across the PV Array areas.

2. Contractor shall install foundations/pilings straight and plumb, and shall correct or replace any racking foundations that are out of tolerance for the designed system as defined in Exhibit A-1.

3. Where Contractor is unable to install pile to specified embedment depth due to soil conditions ("Refusal"), Contractor shall use recommended methods approved by the Geotechnical report and Industry Standards to install piles. Methods may include pre-drill and backfill. Contract Price includes up to 5% pre-drill for pile Refusal. Refusal quantities greater than 5% of the total pile count included in the Work shall be billed according to the rates set out in Exhibit EE.

H. PV Array Procurement, and Construction:

1. Contractor shall procure all necessary equipment and materials, and construct the PV facility as designed, except as above in Provided by Owner.

2. PV Array procurement will include all material required for a complete and functional Project, other than those materials specifically noted as Owner Provided Materials.

3. Reserved.

4. PV Array installation will include, but is not limited to the following:

   a. Offload and QA/QC inspection of each component as it is delivered to site. Receiving and inventory documentation will be provided to Owner and filed in Job Books daily.

   b. Handling of PV Modules. Contractor shall prepare and execute a plan to protect PV modules from damage during unloading, transport and staging, including plans to (a) minimize the number of times pallets of PV modules are moved and (b) guarantee that pallets of PV modules are always placed on flat, stable and level ground. Contractor shall never allow pallets of PV modules to be placed on rough, rocky, muddy or any other ground surface that cannot evenly support 100% of the pallets structure.

   c. Owner shall be solely responsible for reviewing manufacturer flash test data and confirming that modules conform to project specifications and are free from defects. Contractor shall perform visual inspection of delivered modules solely to identify apparent shipping or handling damage. All visible damage must be documented by photographs, and any visible damage to packaging must be supported by a delivery driver's signature or, if applicable, noted in the Delivery Notice that the delivery driver refused to sign. Contractor shall be responsible for coordinating this documentation process but shall not bear the cost of delays or rejections resulting from Owner-furnished modules. Contractor shall not be obligated to discover any hidden or latent defects in the Owner-Provided Materials, including PV modules, and such inspection is not intended to

assure electrical, mechanical, or quality specifications of such provided equipment.

d. Contractor shall provide the specific installation manuals and related documentation to be adopted for this Project, except for those materials provided by Owner.

e. Project may have modules of different wattages. These must be placed in specific arrays per the electrical drawings to facilitate the correct DC inputs to the inverters.

f. Installation of all generation equipment and related infrastructure including, but not limited to, racking, modules, AC & DC wiring, conduits, combiners, re-combiners, inverters, weather station, DAS, pad mount transformer, main power transformers, metering, protection relays, disconnects, foundations, and switchgear/recloser per the approved and permitted engineered drawings and specifications. All of the aforementioned work will be installed in accordance with equipment manufacturer's guidelines and prudent industry practices. Any work not meeting these criteria will be corrected to the satisfaction of Owner and at the Contractor's expense. All torquing required per Generation Equipment manufacturer requirements or PV Array technical instruction is to be included by Contractor. Also to be included are documented 10% QA/QC verifications of all connections.

g. Contractor shall, at a minimum, follow the protocols and procedures as laid out in Exhibit FF (RRCE Hail Stow Protocol) with regards to stow during construction.

h. Contractor shall ensure that all PV module to module or module to home-run connections ("PV Connectors") are of identical make and model. **There is no such thing as "MC4 Compatible" PV connectors!!** Field made PV Connectors shall only be installed by trained and qualified personnel.

i. The Contractor shall coordinate with the Engineer of Record (EOR) and the cable management system supplier to ensure that cable routing, supports, and labeling align with the approved Design Plans. The cable management system design and labeling methodology shall be defined by the EOR and reflected in the Design Plans. The Contractor shall install and implement the approved system in accordance with those documents, applicable NEC requirements, and prudent Industry Standards. The Contractor's responsibility is limited to proper installation and labeling of the cable management components; the Contractor shall not be responsible for design adequacy, future modifications, or Owner operation and maintenance preferences.

j. Prior to final Performance Testing, each module shall be thoroughly cleaned array soiling shall be evaluated, and if Owner deems it necessary, Contractor shall thoroughly clean modules, which shall be considered additional services and reimbursable to Contractor.

k. Upon completion, joint inspections with Owner and Contractor will proceed to certify Substantial Completion. The goal is zero punch list items, but in case any items are identified, they will be corrected in a timely fashion.

l. [10%] torque verification, electrical testing, visual inspections, thorough and concise checklists, and all other quality control and testing will be documented on a daily basis and filed in the Job Books.

m. Contractor shall provide the equipment and tooling required to safely install the PV Array.

n. Contractor shall complete all fiber optical connections. Contractor shall perform fiber and OTDR testing after install and document good test and good connection results.

o. Contractor shall use a "reference block" approach which is designed to gain buy-in from all applicable parties (including tracker manufacturer) that the first module block is installed correctly, and then serve as a model finished product for all future module blocks at the Project.

p. Contractor shall perform all required commissioning services of each module block and the system as a whole. Contractor shall develop and manage a detailed and safe energization plan in conjunction with the Owner and Utility.

q. All wiring shall be clearly labeled, neat, and organized.

r. Contractor will complete punch list items applicable to the Work in a timely fashion.

s. Contractor shall perform a final Performance Test prior to, and as a condition of Final Completion to validate the PV Array's conformance to designed parameters. Performance Test requirements and procedures are contained within Exhibit H to the Agreement.

t. Cable shall be suitable for the intended application. Cables exposed to sunlight shall have ultra-violet resistant jackets and be listed for such use. Cable shall be ozone resistant, fire retardant and suitable for use in wet and dry locations. Cable support systems shall installed in accordance with recommendations from the cable manufacturer.

I. BESS Procurement and Construction

1. Contractor shall procure all necessary equipment and materials, and construct the BESS facility as designed, except as above under Provided by Owner.

2. BESS procurement will include all material required for a complete and functional Project, other than those materials specifically noted as Owner Provided Materials.

3. Contractor shall provide list of recommended spare parts for BESS system, including BESS DC system, BESS PCS and controls and BOS, with particular emphasis on vital items that will compromise the continued operations of the project if inoperable.

4. BESS installation will include, but is not limited to the following:

    a. Offload and QA/QC inspection of each component as it is delivered to site. Receiving and inventory documentation will be provided to Owner and filed in Job Books daily.

    b. Contractor shall review all manufacturer testing data and ensure BESS system components are received free of defects.

    c. Contractor shall provide the specific installation manuals and related documentation to be adopted for this Project.

    d. Installation of all generation equipment and related infrastructure including, but not limited to, BESS containers, PCS units, MV transformer skids, AC & DC wiring, conduits, DAS, pad mount transformer, metering, protection relays, disconnects, foundations, auxiliary transformers, transfer switches and switchgear/recloser per the approved and permitted engineered drawings and specifications. All of the aforementioned work will be in installed in accordance with equipment manufacturer's guidelines and prudent industry practices. Any work not meeting these criteria will be corrected to the satisfaction of Owner and at the Contractor's expense. All torquing required per Generation Equipment manufacturer requirements or BESS technical instruction is to be included by Contractor. Also to be included are documented 10% QA/QC verifications of all connections.

    e. Contractor shall be responsible for implementing a clean and organized cable management program and utilizing a standardized and detailed labeling methodology.

    f. Upon completion, joint inspections with Owner and Contractor will proceed to certify Substantial Completion. The goal is zero punch list items, but in case any items are identified, they will be corrected in a timely fashion.

g. [100%] torque verification, electrical testing, visual inspections, thorough and concise checklists, and all other quality control and testing will be documented on a daily basis and filed in the Job Books.

h. Contractor shall provide the equipment and tooling required to safely install the BESS.

i. Contractor shall complete all fiber optical connections.

j. Contractor shall perform all required commissioning services. Contractor shall develop and manage a detailed and safe energization plan in conjunction with the Owner and Utility.

k. All wiring shall be clearly labeled, neat, and organized.

l. Contractor will complete punch list items applicable to the Work in a timely fashion.

m. Contractor shall perform a final Performance Test prior to, and as a condition of Final Completion to validate the BESS's conformance to designed parameters. Performance Test requirements and procedures are contained within Exhibit H to the Agreement. Damages shall be paid for any performance shortfalls to compensate Owner for all current and future lost revenue caused by such design, installation, and/or performance discrepancies.

J. AC Collection System:

1. Contractor will construct an underground, direct buried electrical collection system. The collection system will generally consist of trenching for collection system cable, equalizer conductor, and fiber optic cable (discussed in more detail below). An equalizer ground wire (system ground) will be installed. Contractor is responsible for the full supply, and installation of all required junction boxes, elbows, arresters, splices and splice kits. Below ground splices shall be a last resort, and above ground junction boxes shall be utilized where feasible. If below ground splices are utilized, GPS locations shall be surveyed and located on the As-Built Drawings and locator balls shall be utilized.

2. Contractor shall be responsible for trenching, excavation, plowing, and related activities necessary to install the underground collection system to required depths and configurations in the design documents. Contractor shall provide proper backfill and compaction in accordance with project specifications and applicable codes. If existing soil is deemed unsuitable for backfill based on geotechnical data or field conditions, screened or select backfill shall be used, subject to Owner direction and equitable adjustment. Contractor shall not be responsible for errors or omissions in the design, electrical studies, or depth calculations provided by the Owner.

3. Contractor shall install cable marking tape in the trench, and "Buried Cable" signs at all access road crossings, if applicable.

4. Contractor shall install and terminate all power and fiber optic cables as required in support of the Work.

5. Contractor will provide and maintain testing documentation for the installed collection system, as per specifications in collection system drawings and QA/QC plan.

6. Contractor will provide adequate slack/service loops at all terminations wherever possible to support maintenance and additional terminations for future use.

7. Contractor shall provide, maintain and have available for review collection system QA/QC job books. Contractor shall keep and maintain accurate As-Built Drawings for the entire collection system.

8. Contractor shall test all conductor and terminations after the work is complete. Testing shall include, at minimum, VLF testing.

9. Contractor shall review manufacturer test results on each transformer prior to energization.

10. Contractor shall produce detailed commissioning and energization plans for review and approval by the Owner and the Utility, as applicable. The Electrical Commissioning Plan and Energization Plan are included as Exhibit H to the Agreement.

11. Contractor shall prepare and submit a "turnover book" for the collection system including all product data and shop drawings, as-built documentation, warranty information, and any other reasonable turnover documentation requested by Owner. Turnover book to be submitted within 30 days after Substantial Completion.

12. All cables are to be allocated a unique identification number (using the cable identification system in Exhibit A-1), which shall be clearly and securely fastened to both ends of the cables as soon as possible after installation.

13. The Contractor shall install MV cable terminations using manufacturer-approved kits, methods and Industry Standards, in accordance with manufacturer recommendations and the Engineer of Record's approved Design Plans.

K. Communication / Supervisory Control and Data Acquisition System (SCADA/DAS):

1. Contractor shall furnish, install, terminate, test, label and commission a complete fiber optic cabling network interconnecting the Contractor's proposed

SCADA/DAS to the inverter/combiner (at minimum), weather station, and OWNER SCADA/DAS (including all patch cables necessary).

2. Contractor shall support all coordination meetings required with Owner, the Utility, and other subcontractors to coordinate a fully functional SCADA/DAS system. The SCADA system shall provide all required control/status/etc. data from the Utility, as well as the Owner.

3. A minimum of 12-strand single-mode fiber will be provided within trench as the AC & DC collection systems where practicable.

4. Contractor shall perform splicing on all in-line fiber optic splices and will supply and perform all terminations.

5. A fully functioning SCADA/DAS system will be an absolute prerequisite to individual module block energization given the need for remote visibility, curtailment, reporting, and metering.

6. Junction and/or splice boxes shall be installed as required, and protected from future damage or vandalism up to Final Completion.

7. Contractor will complete OTDR testing for all fiber installed on site, and file results in the Job Books. Contractor shall replace any fiber runs with 2 or more fibers not fulfilling test requirement(s). Contractor shall keep and maintain accurate As-Built Drawings for turnover at the end of the project.

8. Contractor will provide sufficient slack/service loops to support maintenance and additional terminations for future use.

9. Contractor shall coordinate periodic conference calls, drawing reviews, and coordination meetings to ensure that Owner SCADA/IT requirements are properly documented in the SCADA/DAS design documents and completed in a timely fashion.

10. Contractor shall coordinate with all involved parties to ensure all systems work together, and receive/provide the information needed.

11. Contractor shall provide testing support and coordination with all involved communications and SCADA/DAS parties, to ensure systems work together as intended.

12. Contractor shall provide list of recommended spare parts for communication circuits, with particular emphasis on vital project communication circuits that will compromise the continued operations of the project if inoperable. (Modems, converters, etc.).

13. Contractor shall provide detailed training for the implemented SCADA/DAS platform.

L. Project Interconnection Facilities:

1. Contractor shall fully install the Project substation. This shall generally consist of all civil work, grounding, foundation, structures, electrical equipment, relaying and protections equipment, metering, SCADA, control wiring, fiber, fencing, and all other details as required to provide a complete and functional substation.

2. Contractor shall be responsible for meeting all Utility standards for construction and metering of the Project. The Contractor shall construct the Interconnection Facilities in accordance with the approved design, drawings, and specifications, including the project Interconnection Agreement.

3. Contractor acknowledges and agrees to manage and coordinate all procurement, construction and commissioning efforts, including, but is not limited to, the following:

    a. Participating in design review meetings

    b. Warranty, cost, and material tracking for the substation.

    c. Careful coordination and planning with Utility, including any switching, notification, etc. for outages as required. Coordination and full cooperation with Utility assigned construction administrators to witness installation, commissioning, and Energization.

    d. With the cooperation of Utility, develop a comprehensive substation Energization and switching plan which shall be provided to and approved by Owner.

    e. Preparing and submitting a "turnover book" for the substation including all product data and shop drawings, as-built documentation, warranty information, and any other reasonable turnover documentation requested by Owner. Turnover book to be submitted within 30 days of executing the Substation Completion Certificate.

    f. Preparation of submission materials, population of data needed for and submission of ERCOT 3 Part Checklist process in cooperation with Engineer of Record.

4. Contractor shall participate in all design review efforts with the Utility, and shall make all information available as requested (drawings, part numbers, product submittals, substation SCADA block diagrams and tag lists, etc.).

5. Prior to and during Energization, Contractor shall engage a qualified commissioning agent, to complete all required testing, point-point checks, protection relay testing, etc. Commissioning plan shall be submitted to Owner 60 days prior to Energization and a completed and clean "for record" commissioning plan shall be submitted to Owner no later than 30 days after Energization.

6. Contractor shall recommend spare parts list for Owner owned substation. Risk assessment evaluation (Low probability high impact / high probability low impact) of critical substation items with cost in excess of $15K (Transformer, breakers, CT's, VT's CCVT's, etc.). Provide normal standard expected lead time of all components in excess of $5K.

M. Spare Parts and Owner Training:

1. Owner may request Contractor to purchase Spare Parts, which shall be considered a Change Order.

2. Contractor shall provide Owner training prior to Final Completion for the PV Array, collection system, and interconnect.

   a. Hands on training of any specialty tools included with the site equipment.

   b. Hands on training of operation of the site equipment.

   c. A training course in electronic format to include:

      - Equipment specific training for the inverters, transformers, collection system, switchgear, relays, meters, etc.
      - Instructional training of preventive maintenance requirements for the Contractor supplied equipment.
      - Instructional training on integrated operations of the electrical systems including relaying/metering schemes and Start-up (S/U), Shut-down (S/D), and Normal Operations.
      - Training on SCADA/DAS platform and interfaces.

N. Weather Stations

1. Contractor shall procure and install meteorological and monitoring stations at the site to interact directly with the SCADA/DAS monitoring system. Site electrical design should indicate the best locations for all sensors. The weather stations should include the following equipment, at minimum:

   a. Three (3) Secondary Standard pyranometers with Dome Heater and Case Temp Sensor (Horizontal, Plane-of-Array (POA) and Rear-Plane-of-Array (RPOA)) and one (1) Albedometer

   b. Ambient temperature Sensor with a Gill radiation shield

   c. Anemometer ("wind vane", wind speed and direction)

   d. Hail Sensor

   e. Flood Sensor

f. Three (3) Back of Module Temperature Sensors (non-tubular probes) mounted on adjacent modules

g. Supporting mounting hardware for sensors

h. High quality shielded cables at an adequate length

i. A minimum of two (2) Module Soiling Sensor/Stations shall be provided

O. Security System

1. Contractor to provide a security system for the project. Proposed layout and equipment will be submitted to the Owner for review and approval to confirm quantity and scope of security coverage is adequate. Contract Price does not include permanent security system, which will be a Change Order.

P. Operations & Maintenance Facilities

1. Owner may request additional scope related to construction of an Operations and Maintenance Facility, which would be a Change Order.

Chisme Solar + Storage Project
Exhibit A-1 – Design Plans

This Exhibit A-1 – Design Plans contains the following:

BESS
2025.07.24 – Chisme BESS 60% Calc Package
2025.07.24 – Chisme BESS 60% Foundation
2025-08-01 – Chisme Storage – Cable Ampacity Study - 60%
2025-08-01 – Chisme Storage – Electrical Design - 60%
2025-08-01 – Chisme Storage – Short Circuit Study - 60%

Civil
Chisme Solar and Storage – 60% DD Civil-2025-09-19

PV
2025.09.05 – Chisme Foundation Drawings
2025.09.05 – Chisme PV – Foundation Calcs
2025-09-05 – Chisme Solar – Electrical – 60%
PVsyst – PPE-11055-01 – Chisme 60p-PVsyst-9.5.25
Studies – 2025-09-05 Chisme Solar – Cable Ampacity Study – 60%
Studies – 2025-09-05 Chisme Solar – Short Circuit Study – 60%

Site Plan
CG100 – Overall Grading Plan (Oncor)
Chisme Solar and Storage – 60% Site Plan Layout 2025-06-26
CS100 – Overall Site Plan

Substation
24144_GND_RevA
Chisme – 60p Substation Package for Review
Chisme – Updated SLD

60% PV Structural still pending and will be added to the Agreement by Amendment when available.

Structural Analysis of BESS Equipment & Light pole Foundation Design

For The Project:

Chisme Storage - TX-PS-2703

8987 CR 268 , Brown & Mills County, TX 76801

Presented to:

LANGAN

2999 Olympus Blvd, #165
Dallas, TX 75019

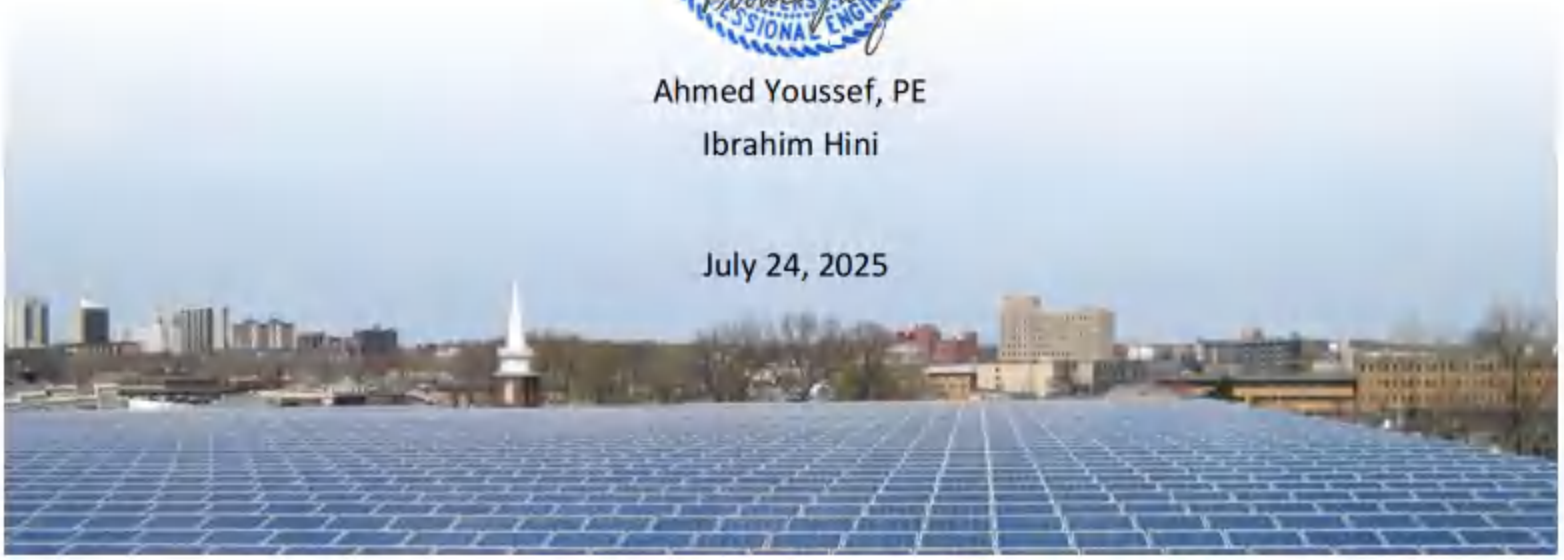
Presented by:

Pure Power Engineering, Inc.
111 River Street - Suite 1110
Hoboken, NJ 07030
www.PurePower.com
(201) 687-9975

PPE Project No. PPE-11055.02

Ahmed Youssef, PE
Ibrahim Hini

July 24, 2025



Codes and References

- 2015 International Building Code
- Minimum Design Loads for Buildings and Other Structures, ASCE 7-10
- Building Code Requirements for Structural Concrete, ACI 318-14

Design Criteria

Snow Load (Service)

Ground Snow Load:	5 psf
Risk Category:	III
Snow Exposure: C_e:	1.0
Snow Load Important Factor I_s:	1.1
Thermal Factor C_t:	1.2
Flat Snow Load:	4.6 psf
Rain Over Snow Surcharge	5.0 psf
Total Snow Load =	**9.6 psf**

Wind Load

Risk Category:	III
Ultimate Wind Speed:	120 mph
Exposure Category:	C

Seismic Load

Risk Category:	III
I_e, Seismic Importance Factor:	1.25
Site Class:	C
S_s, Mapped spectral response acceleration at short periods:	0.058
S_{DS}, Design spectral response acceleration at short periods:	0.047
S_1, Mapped spectral response acceleration at 1s period:	0.035
S_{D1}, Design spectral response acceleration at 1s period:	0.039
Seismic Design Category:	A

FORCES ON BESS CONTAINERS

PURE POWER ENGINEERING

Pure Power Engineering, Inc.
5 Marine View Plaza, Suite 301
Hoboken, NJ 07030

Client:	Langan	Date:	7/24/2025
Site Name:	Chester BESS	Prepared By:	IH
Job No:	PPE-11065.02	Checked By:	AY
Subject:	BESS Container	Page:	1

DESIGN CRITERIA

Basic Site Criteria:

Equipment Height: h = 9.51 ft

Structure Type: Square

Equipment Dimension:

Depth: b = 8.00 ft Width: 19.85 ft

Equipment Weight: W_e = 89.70 kip (Per Space)

Total Equipment Weight: W_t = 89.70 kip

Wind Design Parameters:

Risk Category: II

Ultimate Wind Speed: V_{ult} = 130 mph

Exposure Category: C

Topographic Category: 1

Topographic Factor: K_{zt} = 1.00

Gust Effect Factor: G_f = 0.85

Wind Directionality Factor: K_d = 0.95

Velocity Pressure Coefficient: K_z = 0.85

External Pressure Coefficient: C_f (perpendicular) = 1.82

C_f (parallel) = 1.82

Wind Design Load:

Wind Velocity Pressure: q_z = 28.16 psf $q_z = 0.00256\, K_z\, K_{zt}\, K_d\, V^2$

Vertical Wind Projected Area: A_v = 168.99 ft²

Horizontal Wind Load: F_h = 6.88 kip $F = q_z\, GC_f\, A$ $Moment_{base}$ = 32.65 kip-ft

Horizontal Wind Projected Area: A_h = 158.81 ft²

Vertical Wind Load: F_v = 5.79 kip $F = q_z\, GC_f\, A$

PURE POWER ENGINEERING
Pure Power Engineering, Inc.
5 Marine View Plaza, Suite 305
Hoboken, NJ 07030

Client:	Langan	Date:	7/24/2025
Site Name:	Oleyan BESS	Prepared By:	IH
Job No.	PPE-11055.02	Checked By:	KY
Subject:	BESS Container	Page:	2

DESIGN CRITERIA (Continued)

Seismic Design Parameters:

Site Class:		C		
Seismic Importance Factor:	I_e	1.25		(Section 11.5.1)
Mapped spectral response acceleration at short periods:	S_s	0.058		
Design spectral response acceleration at short periods:	S_{DS}	0.047		
Mapped spectral response acceleration at 1s period:	S_1	0.035		
Design spectral response acceleration at 1s period:	S_{D1}	0.039		
Long Period Transition Period:	T_L	12	s	
Response Modification Coefficient:	R	3.25		(Table 15.4-2)
Overstrength Factor:	Ω_0	2.50		(Table 15.4-2)
Deflection Amplification Factor:	C_d	2.50		(Table 15.4-2)
Building Period Coefficient:	C_t	0.02		(Table 12.8-2)
	x	0.75		(Table 12.8-2)
Building Fundamental Period:	T	0.109	s	(Section 12.8.2.1)
	C_u	0.65		$C_u = \frac{S_{D1}}{0.1I_e}$
	$C_{s,max}$	0.80		$C_{s,max} = \frac{S_{DS}}{R/I_e}$ for $T \le T_L$; $C_{s,max} = \frac{S_{D1}T_L}{T(R/I_e)}$ for $T > T_L$
	$C_{s,min}$	0.01		$C_{s,min} = 0.044 S_{DS} I_e \ge 0.01$; $C_{s,min} = \frac{0.5 S_1}{R/I_e}$ for $S_1 \ge 0.6g$
Seismic Response Coefficient:	C_s	0.01		(Equations: 12.8-2, 12.8-3, 12.8-4, 15.4-1, 15.4-2)

Seismic Design Load:

Is the structure considered a Rigid Nonbuilding Structure?		No		
Seismic Base Shear:	V	0.01	kip	(Equation 12.8-1 or 15.4-5) $V = C_s W \ge 0.3 S_{DS} W$
	$Moment_{seismic}$ =	7.85	kip-ft	

PURE POWER ENGINEERING
Pure Power Engineering, Inc.
5 Marine View Plaza, Suite 301
Hoboken, NJ 07030

Client:	Leagas	Date:	7/24/2023
Site Name:	Chrome BESS	Prepared By:	RH
Job No:	PPE-11085.02	Checked By:	AY
Subject:	BESS Container	Page:	3

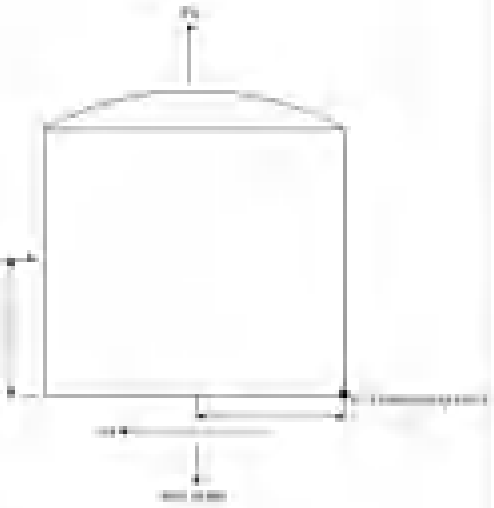
I. OVERTURNING MOMENT CHECK:

Condition 1: Equipment + Wind Load

Wind Load Factor:		1.00	
Overturning Moment From Wind:	M_o	12.69	kip-ft
Resisting Moment:	M_r	174.79	kip-ft
Overturning Check:		Good	
Safety Factor:		13.78	

Condition 2: Equipment + Seismic Load

Seismic Load Factor:		1.00	
Overturning Moment From Seismic:	M_o	20.84	kip-ft
Resisting Moment:	M_r	174.79	kip-ft
Overturning Check:		Good	
Safety Factor:		17.07	



II. SLIDING CHECK:

Condition 1: Equipment + Wind Load

Wind Load Factor:		1.00	
Friction Coefficient:	μ	0.60	Conservative
Sliding From Wind:	F_w	3.69	kip
Resisting Friction:	F_r	49.96	kip
Sliding Check:		Good	
Safety Factor:		8.33	

Condition 2: Equipment + Seismic Load

Seismic Load Factor:		1.00	
Friction Coefficient:	μ	0.60	
Sliding Force From Seismic:	F_s	2.48	kip
Resisting Friction:	F_r	46.85	kip
Sliding Check:		Good	
Safety Factor:		14.12	

REQUIRED ANCHOR DESIGN STRENGTH:

Solar

Anchor Spacing:		7.83	ft
Required Tension Design Strength:		0.00	kip
Required Shear Design Strength:		0.00	kip

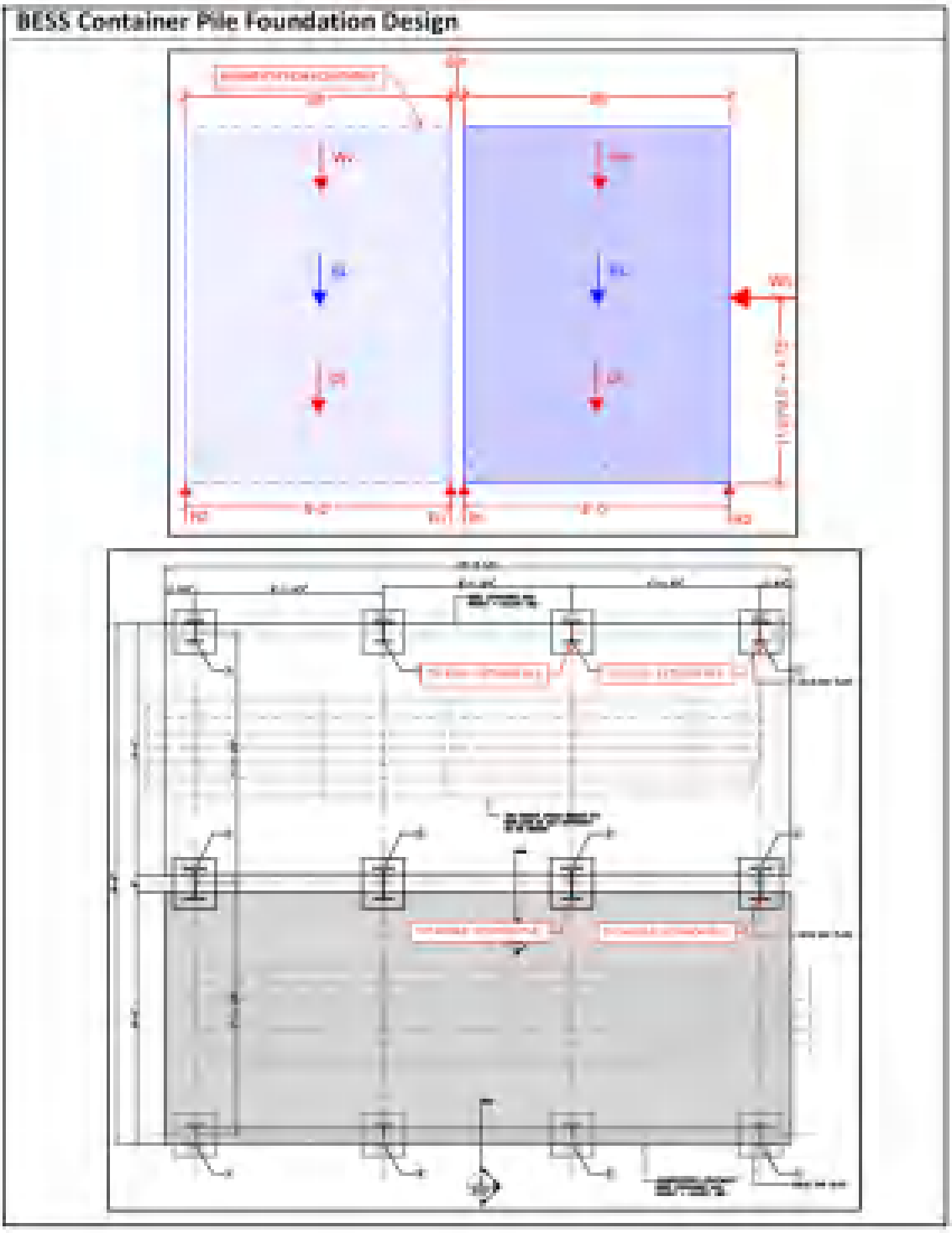
Per 4 Cipal

*The above load reported design strengths are based on a safety factor of 2.5 and include minimum strength factors.

PUREPOWER ENGINEERING Pure Power Engineering	Project:				Job No:	
	Section:				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

Reactions from Equipment:

BESS Container Pile Foundation Design



PUREPOWER ENGINEERING Pure Power Engineering	Project				Job No.	
	Location				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

BESS Container Pile Foundation Design

See following sheets for load calculations

Total W (t) =	93.70	kip
Total SL =	1.53	kip
Total Wh =	6.84	kip
Total Wv =	5.79	kip

Snow Load = 9.6 psf

Load Combinations (ASD)

LC1: D + 0.6W

LC2: D+0.750.6W)+0.75L

LC3: 0.6D+0.6W

Notes:

* Edge Interior Pile Trib = 30% from Total equipment Trib.
* Edge exterior Pile Trib = 20% from Total equipment Trib.
* Middle Interior Pile loads = Twice the reaction R1.
* Middle Exterior Pile loads = Twice the reaction R1.
* Interior Piles take 50% more than the exterior Piles.
* The Calcs Below Shows only the worst case loading.

Pile Forces (ASD)

LC1: D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* (DL + 0.6Wv)/2	19.43 kip	V = 0.344 kip	(middle exterior pile)
R1 = 2* (DL + 0.6Wv)/2	25.15 kip	V = 0.816 kip	(middle interior pile)
R2 = [(DL + 1.5Wv)/2] + (0.6Wh/4 ft)/2	19.21 kip	V = 0.344 kip	(Edge exterior pile)
R2 = [(DL + 1.5Wv)/2] + (0.6Wh/4 ft)/2	15.31 kip	V = 0.816 kip	(Edge interior pile)

LC2: D + 0.750.6W)+0.75SL (Vertical) **[Vertical] V = 0.45Wh /12**

R1 = 2* [(DL + 0.75(0.6Wv) +0.75SL)/2	19.49 kip	V = 0.258 kip	(middle exterior pile)
R1 = 2* [(DL + 0.75(0.6Wv) +0.75SL)/2	25.28 kip	V = 0.387 kip	(middle interior pile)
R2 = [(DL + 0.75(0.6Wv) +0.75SL)/2 + (0.45Wh/4 ft)/2	19.31 kip	V = 0.258 kip	(Edge exterior pile)
R2 = [(DL + 0.75(0.6Wv) +0.75SL)/2 + (0.45Wh/4 ft)/2	15.41 kip	V = 0.3257 kip	(Edge interior pile)

PUREPOWER ENGINEERING Pure Power Engineering	Project				Job No.	
	Section				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

LC5: 0.6D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* [(0.6DL + 0.6Wv)/2	11.04 kip	V = 0.384 kip		(middle exterior pile)
R1 = 2* [(0.6DL + 0.6Wv)/2	17.91 kip	V = 0.576 kip		(middle interior pile)
R2 = [(0.6DL + 0.6Wv)/2] + [(0.6Wh*4.75)/8	6.46 kip	V = 0.384 kip		(Edge exterior pile)
R2 = [(0.6DL + 0.6Wv)/2] + [(0.6*Wh*4.75)/8	9.69 kip	V = 0.576 kip		(Edge interior pile)

Controlling Middle/Exterior Pile Load

Downward =	18.89	kip
Uplift =	0.00	kip
Lateral =	0.48	kip

Controlling Middle/Interior Pile Load

Downward =	19.24	kip
Uplift =	0.00	kip
Lateral =	0.62	kip

Controlling Edge/exterior Pile Load

Downward =	19.31	kip
Uplift =	0.00	kip
Lateral =	0.48	kip

Controlling Edge/Interior Pile Load

Downward =	19.81	kip
Uplift =	0.00	kip
Lateral =	0.62	kip

Lateral check and bending of the pile are minimal because the maximum Pile reveal is 2'-8" max, however see the calculation below for verification.

(1)

Design of the Middle/Interior Pile

1 – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion
- The post that will be used is the W12x50.
- Per the Geotech report, the corrosion characteristics are as follows:

6.3 Soil Corrosivity and Resistivity

[illegible] Soil electrical resistivity test values generally ranged from about 1,100 to 2,000 Ω-cm, except for TP-5, which exhibited resistivity test values ranging from about 5,000 to 30,000 Ω-cm. Resistivity values generally increased with probe spacing, increased to about 30 feet, and remained [illegible]. Based on guidelines published in Corrosion Basics: An Introduction, 2nd Ed. (2006), the results of these [illegible] tests generally indicate a moderately corrosive to extremely corrosive environment. ERI results are presented on Illustration C.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-PIN METHOD

PROJECT NAME:	[illegible]		
PROJECT NUMBER:	[illegible]	INSPECTOR:	[illegible]
DATE:	[illegible]	TIME:	[illegible]
TEST LOCATION:	[illegible]	WEA:	[illegible]

DIRECTION 1: <0-3>

ELECTRODE SPACING 'a' (ft)	a (m)	PROBE PENETRATION (inch)	ACTUAL PENETRATION (ft)	a (m)	RESISTANCE (ohm)	RESISTIVITY (ohm-cm)
2	0.61	4.8	0.4	0.12	[illegible]	[illegible]
5	1.52	4	0.3	0.09	[illegible]	[illegible]
10	3.05	6	0.5	0.15	[illegible]	[illegible]
20	6.10	12	1	0.30	[illegible]	[illegible]
30	9.14	24	2	0.61	[illegible]	[illegible]
40	12.19	36	3	0.91	[illegible]	[illegible]
50	15.24	48	4	1.22	[illegible]	[illegible]
60	18.29	60	5	1.52	[illegible]	[illegible]

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a **3-mil of zinc on wide flange shapes and a 50-year** project life:

Table 5 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.53	3.3
1250 – 3000	0.39	2.2

PURE POWER ENGINEERING

Pure Power Engineering

Project				Job No.	
Section				Sheet no./rev.	
Calc. by	Date	Check by	Date	Appd by	Date

Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in.

W12X50

	Original Dims. (in)	Reduced Dims. (in)
t_w =	0.370	0.259
t_f =	0.640	0.529
d =	12.200	12.089
b_f =	8.080	7.969

CALCULATION OF SECTION PROPERTIES

Trophy calculation by version 2.0.17

Area

A = 11.23 in²

2nd moment of area

I_{xx} = 311. in⁴ I_{xy} = 44.6 in⁴ I_{yx} = 311. in⁴ I_{yy} = 44.6 in⁴

Radius of gyration

r_{xx} = 5.26 in r_{xy} = 1.99 in r_{yx} = 5.26 in r_{yy} = 1.99 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 86.8 in³ Z_{yy} = 17.0 in³

Distance to combined centroid

X_c = 0.00 in Y_c = 0.00 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

X_p = 0.00 in Y_p = 0.00 in

Elastic section modulus

S_{xx} = 51.4 in³ S_{yy} = 11.2 in³

3 – Post design using RAM Element: - (Middle Piles)

The pile reveal is 30 inches. According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judment the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 4.5 feet.

Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.09 < 1.00 ∴ W12X50 OK !

RAM Elements

Steel Code Check

Summary - Group by description

Description	Section	Member	Ch'k Pt	Ratio	Status	Combination
	W (Grid) - Moment Connection	1	LC1 to LC5	0.09	OK	

4- Axial Check:

W8x67 reduced section due to corrosion:

perimeter = $2[b_f + d] + 4[(b_f - t_w)/2]$ = 55.51"/12 = **4.6275 ft**

Area = $2*b_f*t_f + (d - 2\,t_f)*t_w$ = 11.49 in²/144 = **0.078 ft²**

The axial load P = 29,41 lbs, according to the worst case combination load analysis:
LC2 = Ds + 0.75SL + 0.45 Wi

- The allowable skin friction, as mentioned in the geotechnical report, is as follows.

Table 11 - Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (feet)	Allowable End Bearing (psf)	Allowable Unit Skin Friction psf	
			Compression	Tension
Stratum 1	0 – 4			
Stratum 2	4 – 20	20,000	750	525
Stratum 3*	0 – 30	20,000	550	385
Stratum 4	12 – 20	25,000	1,000	700

Notes:
(1) Capacity from geotechnical capacity = factor of safety of 2.5 was used to reduce ultimate values. Skin friction in strata (1) is neglected to avoid loading soil due to frost heave. Uplift capacity should be determined by the structural engineer.
(2) Uplift capacity from geotechnical capacity = factor of safety of 3.0 was used to reduce ultimate values. Skin friction in strata (1) is neglected to avoid loading soil due to frost heave. Uplift capacity should be determined by the structural engineer.
(3) Pile load test was performed in stratum 3 was encountered. Recommended compressive pile tip is 20 feet. Strata 3 should not be considered for load capacity.

- **Allowable Friction force:**

Stratum 1: from 0 – 4 ft = **0 lbs**

Stratum 2: from 4 – 8ft (Conservative Height) = 750 psf x 8ft x 4.6275ft = **13,882 lbs**

Stratum 3: from 8 – 18ft = 550 psf x 10ft x 4.6275ft = **16,196lbs**

- **Allowable End Bearing: 20,000 psf** (Pile to Rest Within stratum 2)

Net bearing Resisting Force = 20,000 psf X 0.078ft² (Section Area) = **1560 lbs**

Total resistance = 13,882+ 16,196+ 1560 = **31,638 lbs > 29,410 lbs → Ratio: 94% OK!**

Therefore, the **W12x50** pile with **18ft** embedment is performing adequately for the axial load check.

5- Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summarized below:

Skin friction on the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative skin friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 4.6275 ft = 16.512 ft^2

Soil Heave Uplift force = 750 psf X 18.51 ft^2 = **13,882 lbs**

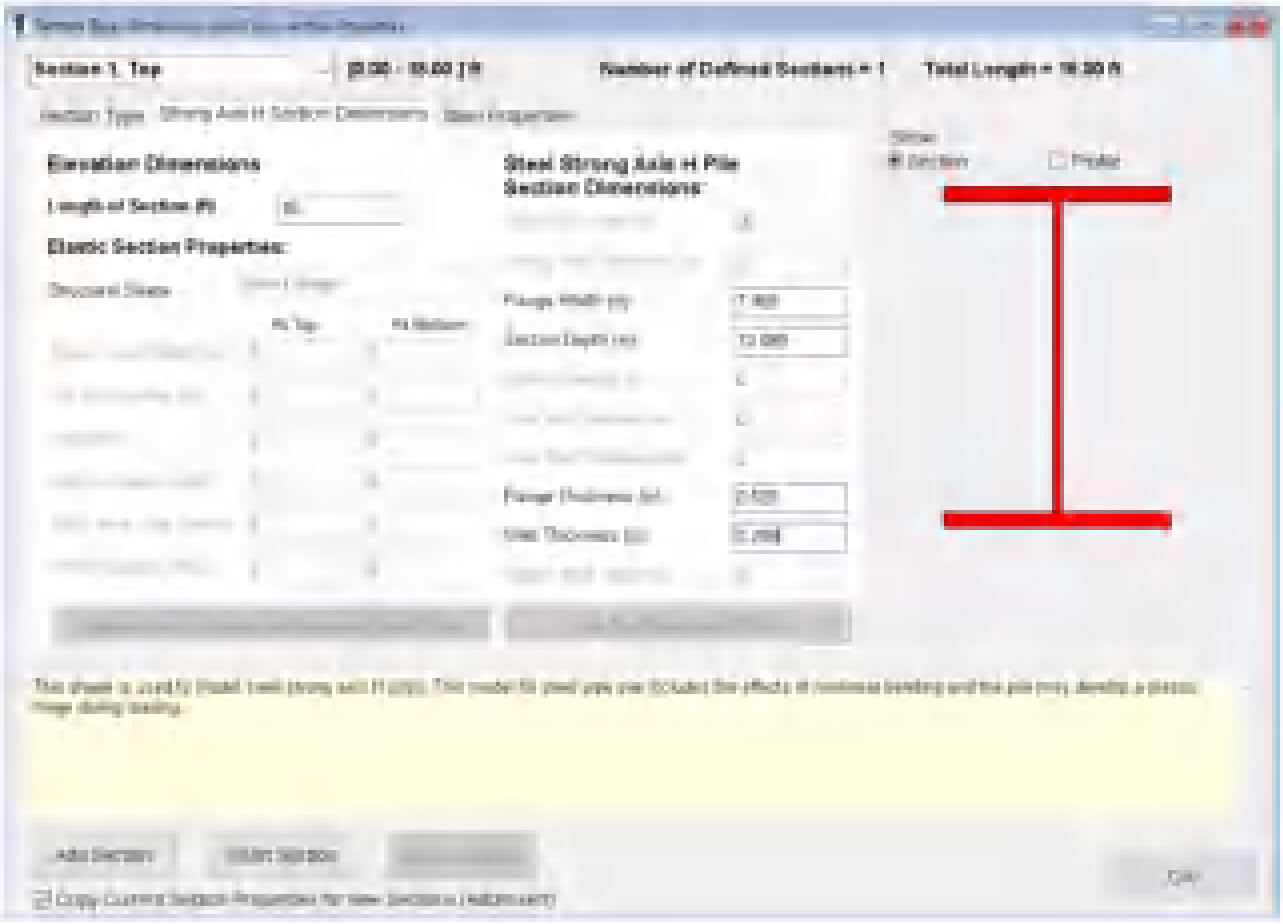
Skin Friction Resistance Force = 13,882lbs + 16,196lbs = **30,078 lbs**

Skin Friction Resistance Force = 13,882lbs < 30,078 Lbs → 47% OK!

6- W12x50 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) - L-Pile Inputs:

- W12x50 reduced section due to corrosion
- 18ft embedment.

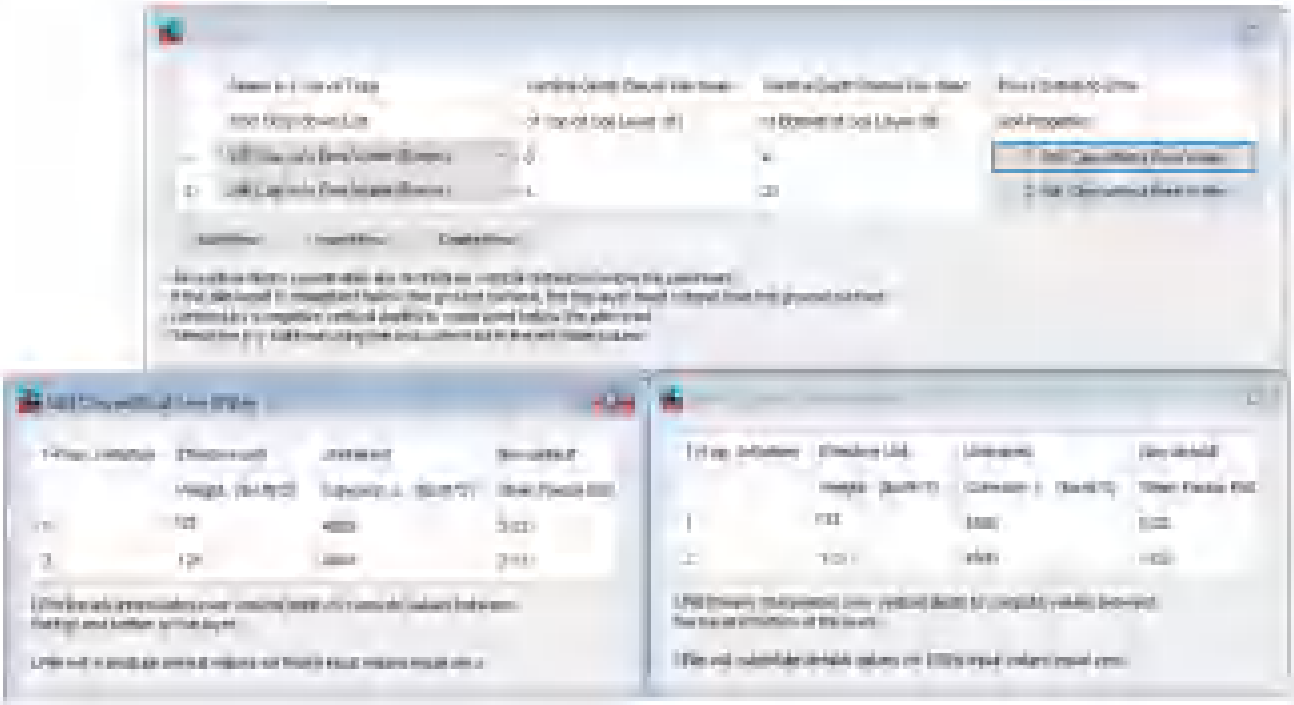


B) Soil Parameter:

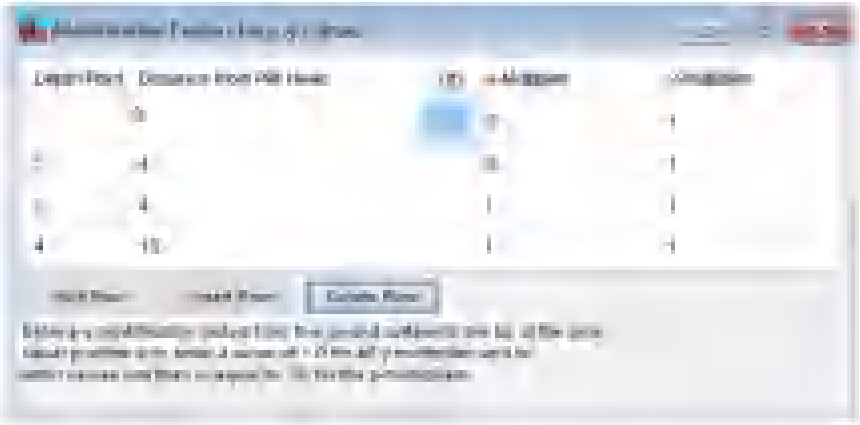
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	4,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.



C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

The Governing load combination is: **LC2 = DL + 0.75SL + 0.45 WL**

Axial: **29,410 Lbs**

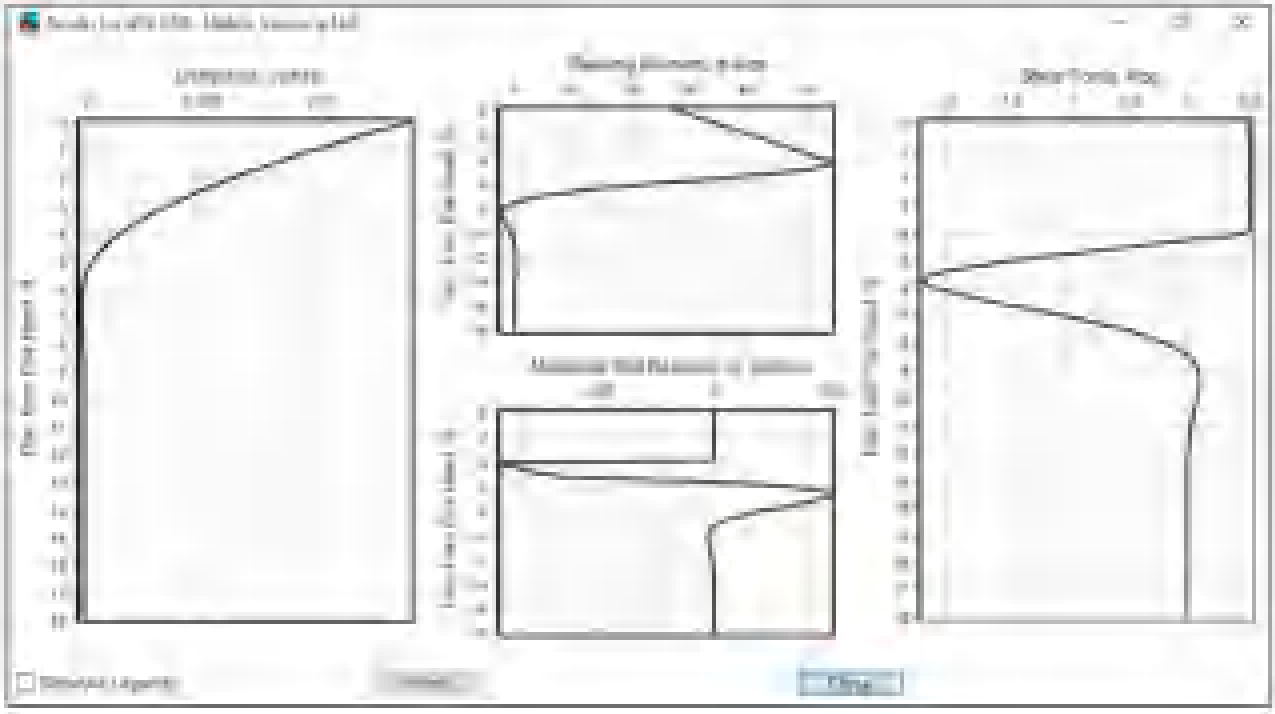
Shear = **520 lb**

Moment = 2.34 kips-ft = 2340 lb-ft = **28,080 lbs-in**

Load L-pile Inputs

Pure Power Engineering	Project				Job No:	
	Section				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

D) L-Pile Result:



Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 520.0 lbs
Applied moment at pile head = 28080.0 in-lbs
Axial thrust load on pile head = 29410.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.01385	28080.	520.0000	3.53E-04	2965.	9.01E+09	0.00	0.00	0.00

Deflection = 0.013" < 0.50" W12X50 W/12ft Embedment min.

E) Moment capacity check:

$Mn/\Omega = (50\ Ksi) * (51.4\ in^3)/1.67 =$ 1538 Kip-in > 54.572 Kip-in OK!

Output Summary for Load Case No. 1:

Pile-head deflection = 0.01384533 inches
Computed slope at pile head = -0.0003529 radians
Maximum bending moment = 54572. inch-lbs
Maximum shear force = -2193. lbs
Depth of maximum bending moment = 4.32000000 feet below pile head
Depth of maximum shear force = 5.76000000 feet below pile head
Number of iterations = 9
Number of zero deflection points = 4

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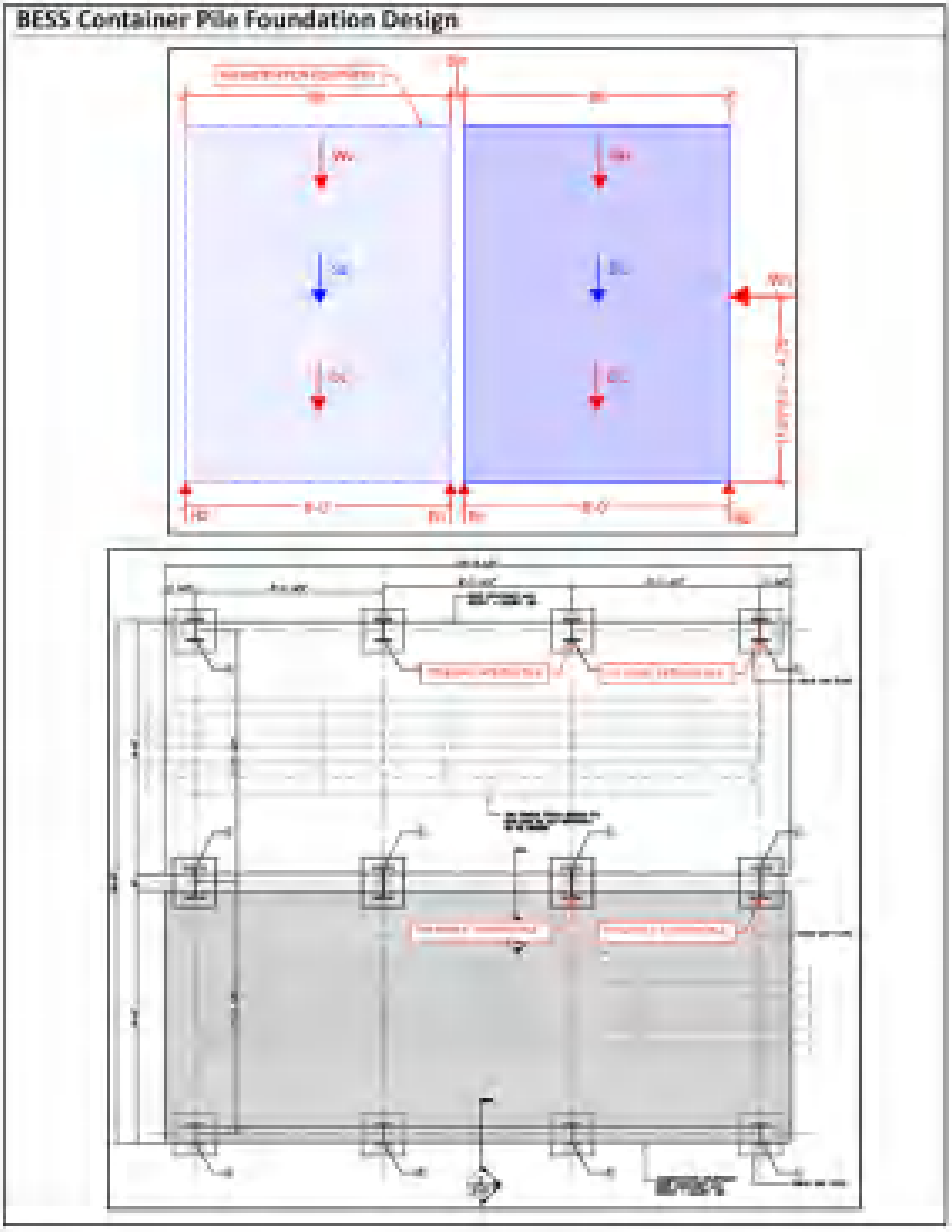
Reactions from Equipment:



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BESS Container Pile Foundation Design

See following sheets for load calculations

Total DL =	41.70	kip
Total SL =	1.53	kip
Total Wh =	6.86	kip
Total Wv =	5.76	kip

Snow Load = 9.6 psf

Load Combination (ASD)

LC1: D + 0.6W

LC2: D+0.750.6W)+0.75S

LC3: 0.6D+0.6W

Notes:

* Edge interior Pile Trib = 80% from Total equipment Trib.
* Edge exterior Pile Trib = 20% from Total equipment Trib.
* Middle Interior Pile loads = Twice the reaction R1.
* Middle Exterior Pile loads = Twice the reaction R2.
* Interior Piles take 50% more than the exterior Piles.
* The Calcs Below Shows only the worst case loading.

Pile Forces (ASD)

LC1: D + 0.6W (Vertical) — **(Vertical) V = 0.6Wh /12**

R1 = 2* (DL + 0.6Wv)/2	19.63 kip	V =	0.344 kip	(middle exterior pile)
R1 = 2* (DL + 0.6Wv)/2	30.13 kip	V =	0.516 kip	(middle interior pile)
R2 = (DL + 0.6Wv)/2 + 0.6Wh/4 /2	10.91 kip	V =	0.344 kip	(Edge exterior pile)
R2 = (DL + 0.6Wv)/2 + 0.6Wh/4 /2	15.81 kip	V =	0.516 kip	(Edge interior pile)

LC2: D + 0.750.6Wh+0.75L (Vertical) — **(Vertical) V = 0.45Wh /12**

R1 = 2* (DL + 0.750.6Wv)+0.75SL)/2	23.49 kip	V =	0.258 kip	(middle exterior pile)
R1 = 2* (DL + 0.750.6Wv)+0.75SL)/2	29.24 kip	V =	0.387 kip	(middle interior pile)
R2 = (DL + 0.750.6Wv)+0.75SL)/2 + 0.75(0.6Wh/4 /2	13.11 kip	V =	0.258 kip	(Edge exterior pile)
R2 = (DL + 0.750.6Wv)+0.75SL)/2 + 0.75(0.6Wh/4 /2	19.17 kip	V =	0.3787 kip	(Edge interior pile)

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LC3: 0.6D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* (0.6DL + 0.6Wv)/2	11.04 kip	V = 0.344 kip	(middle exterior pile)
R1 = 2* (0.6DL + 0.6Wv)/2	17.91 kip	V = 0.516 kip	(middle interior pile)
R2 = [(0.6DL + 0.6Wv)/2] + (0.6Wh*4.75)/8	5.46 kip	V = 0.344 kip	(Edge exterior pile)
R2 = [(0.6DL + 0.6Wv)/2] + (0.6Wh*4.75)/8	9.69 kip	V = 0.516 kip	(Edge interior pile)

Controlling Middle/Exterior Pile Load

Downward =	15.49	kip
Uplift =	0.00	kip
Lateral =	0.00	kip

Controlling Middle/Interior Pile Load

Downward =	19.24	kip
Uplift =	0.00	kip
Lateral =	0.52	kip

Controlling Edge/exterior Pile Load

Downward =	10.21	kip
Uplift =	0.00	kip
Lateral =	0.34	kip

Controlling Edge/Interior Pile Load

Downward =	13.31	kip
Uplift =	0.00	kip
Lateral =	0.52	kip

Lateral check and bending of the pile are minimal because the maximum Pile reveal is 2'-6" max, however see the calculation below for verification.

(2)

Design of the Middle/exterior Pile

1 – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion
- The post that will be used is the W12x50.
- Per the Geotech report, the corrosion characteristics are as follows:

6.3 Soil Corrosivity and Resistivity

Field electrical resistivity test values generally ranged from about 1,100 to 3,000 Ω-cm, except for TP-5, which exhibited resistivity test values ranging from about 5,000 to 30,000 Ω-cm. Resistivity values generally increased with probe spacing, increasing to about 30 feet, and remained relatively constant with probe spacing over 30 feet. Based on guidelines published in Corrosion Basics: An Introduction, 2nd Ed. (2006), the results of these field resistivity tests generally indicate a moderately corrosive to extremely corrosive potential. ERT results are provided in Attachment C.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-PIN METHOD

PROJECT NAME:			
PROJECT NUMBER:		INSPECTION:	
DATE:		TIME:	
TESTED BY:		WEA:	

DIRECTION 1: <E-W>

ELECTRODE SPACING 'a' (ft)	(m)	PROBE PENETRATION 'b' (in)	ACTUAL PENETRATION (ft)	(m)	RESISTANCE (ohm)	RESISTIVITY (ohm-cm)
2	0.61	1.5				
5	1.52	4				
10	3.05	8				
20	6.10	12				
30	9.14	20				
40	12.19	28				
50	15.24	36				
60	18.29	52				

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a **3-mil of zinc on wide flange shapes and a 50-year** project life:

Table 5 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
200 – 750	0.64	5.5
750 – 1200	0.53	3.3
1200 – 3000	0.39	2.2

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Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in.

W12X50

	Original Dims. (in)	Reduced Dims. (in)
t_w =	0.370	0.259
t_f =	0.640	0.529
d =	12.200	12.089
b_f =	8.080	7.969

CALCULATION OF SECTION PROPERTIES

Trophy calculation by version 2.0.17

Area

A = 11.23 in²

2nd moment of area

I_{xx} = 311. in⁴ I_{xy} = 44.6 in⁴ I_{yx} = 311. in⁴ I_{yy} = 44.6 in⁴

Radius of gyration

r_{xx} = 5.26 in r_{xy} = 1.99 in r_{yx} = 5.26 in r_{yy} = 1.99 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 86.8 in³ Z_{yy} = 17.0 in³

Distance to combined centroid

X_c = 0.00 in Y_c = 0.00 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

X_p = 0.00 in Y_p = 0.00 in

Elastic section modulus

S_{xx} = 51.4 in³ S_{yy} = 11.2 in³

PUREPOWER ENGINEERING Pure Power Engineering	Project				Job No.	
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3 - Post design using RAM Element: - (Middle Piles)

The pile reveal is 30 inches. According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judment the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 4.5 feet

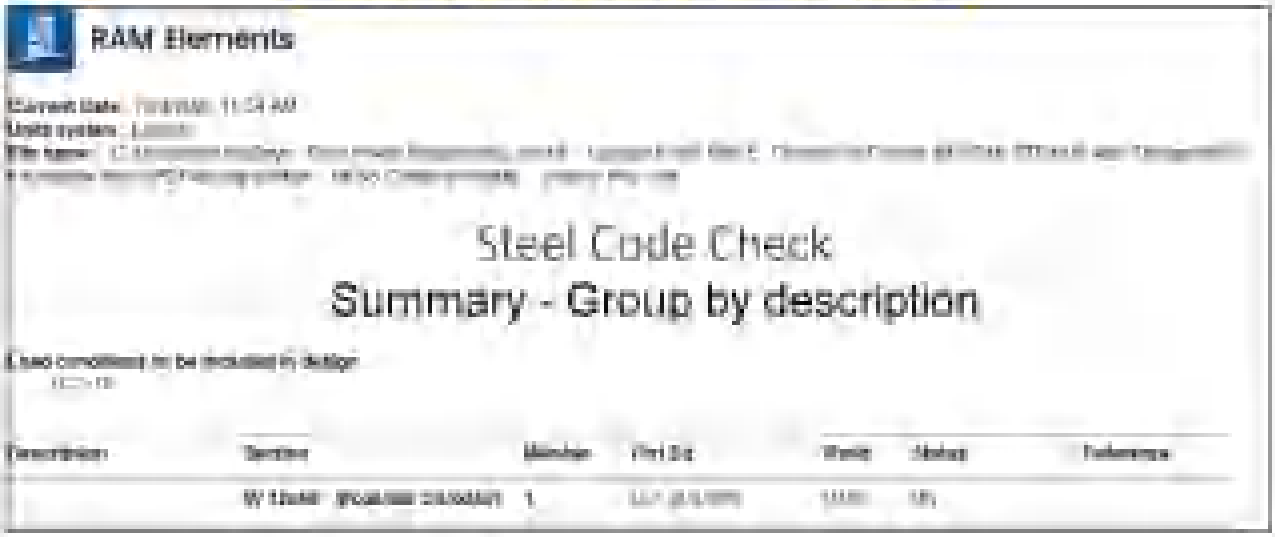
Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.09 < 1.00 ∴ W12X80 OK !



RAM Elements

Steel Code Check

Summary - Group by description

4- Axial Check:

W8x67 reduced section due to corrosion:

perimeter = $2(b_f + d) + 4\,[(b_f - t_w)/2]$ = 49.5 in /12 = 4.128 ft

Area = $2 * b_f * t_f + (d - 2\,t_f) * t_w$ = 15.79 in²/144 = 0.1165 ft²

The axial load P = 18,803 lbs, according to the eight-case combination load analysis.
LC2 = Ds + 0.75SL + 0.45 Wt

- The allowable skin friction, as mentioned in the geotechnical report, is as follows.

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (feet)	Allowable Soil-Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4		–	
Stratum 2	4 – 80 (Controlled by Pile Tip Elevation)	20,000	700	350
Stratum 3	80 – 120	20,000	1,400	700
Stratum 4	120 – 200	20,000	1,800	900

Notes:
1) Compressive skin friction shall be neglected along the upper 4 feet of Stratum 1 and Stratum 2 when computing pile capacity to resist uplift or lateral loading. Stratum 1 and Stratum 2 shall be neglected in the upper 4 feet when computing pile capacity to resist downward loads.
2) A minimum embedment depth of 12 feet shall be required for each pile, unless a greater depth is required to develop the required capacity. Piles shall be driven to the minimum depth or greater, as required to develop the required capacity.
3) The Contractor shall be responsible for selecting pile lengths sufficient to develop the required capacity. Pile lengths shall be determined by the Contractor's engineer and submitted to the Engineer of Record for review and approval prior to ordering piles.

- Allowable Friction force:

Stratum 1: from 0 – 4 ft = 0 lbs

Stratum 2: from 4 – 80 (Centerwall height) = 750 psf x 80 x 4.6/750 = 13,892 lbs

Stratum 3: from 8 – 12ft = 350 psf x 4ft x 4.6275ft = 6,478 lbs

- Allowable End Bearing: 20,000 psf (Pile to Bear Within stratum 2)

Net bearing Resisting Force = 20,000 psf X 0.078ft² (Section Area) = 1560 lbs

Total resistance = 13,892 + 6,478+ 1560 = 21,920 lbs > 18,560 lbs ✓ Ratio: 50% OK!

Therefore, the W12X50 pile with 12ft embedment is performing adequately for the axial load check.

5- Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summarized below:

Skin friction on the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative skin friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 4.6275 ft = 16.512 ft^2

Soil Heave Uplift force = 750 psf X 18.51 ft^2 = **13,882 lbs**

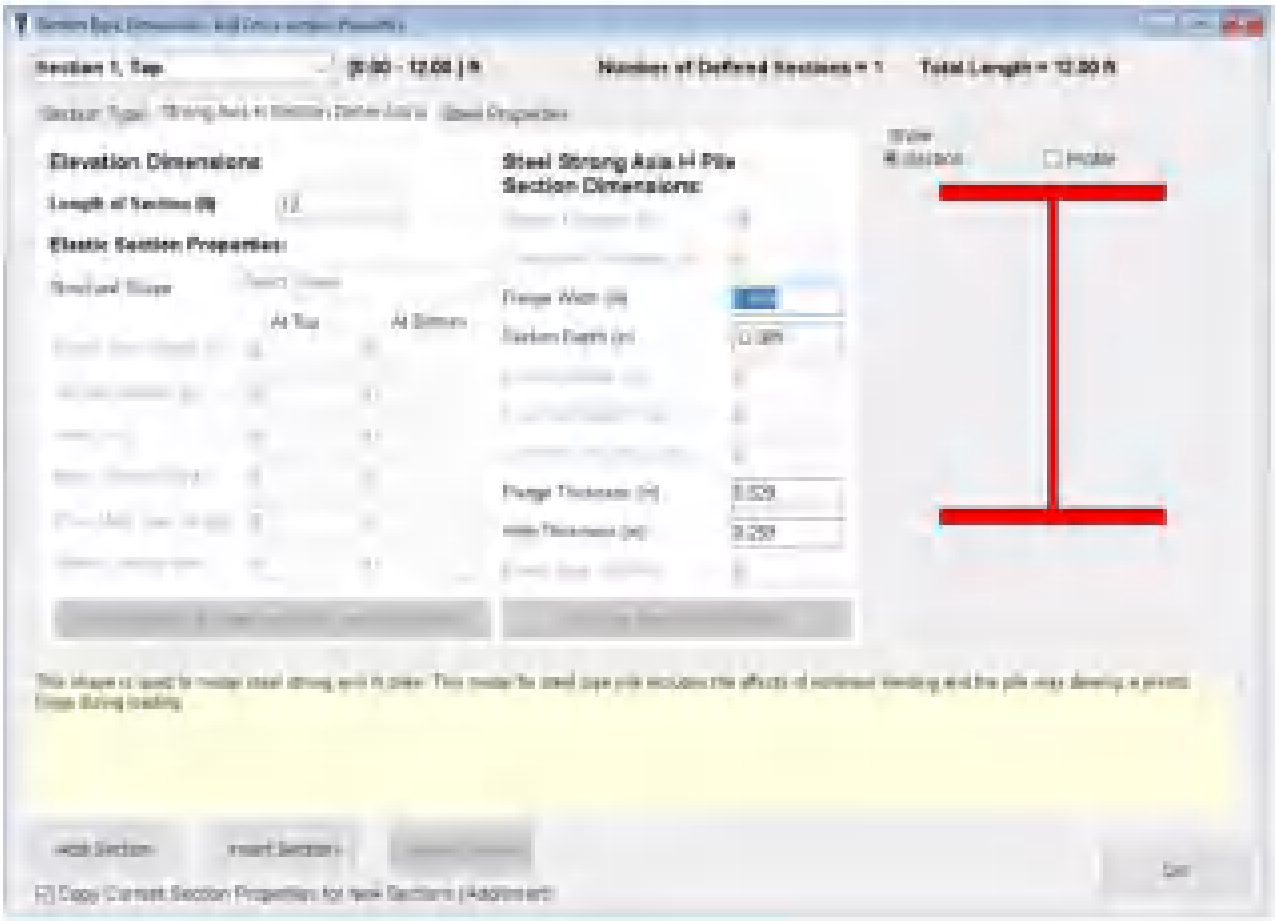
Skin Friction Resistance Force = 13,882lbs + 6,478lbs = **20,360 lbs**

Skin Friction Resistance Force = 13,882lbs < 20,360 Lbs → 69% OK!

6- W12x50 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) - L-Pile Inputs:

- W12x50 reduced section due to corrosion
- 12ft embedment

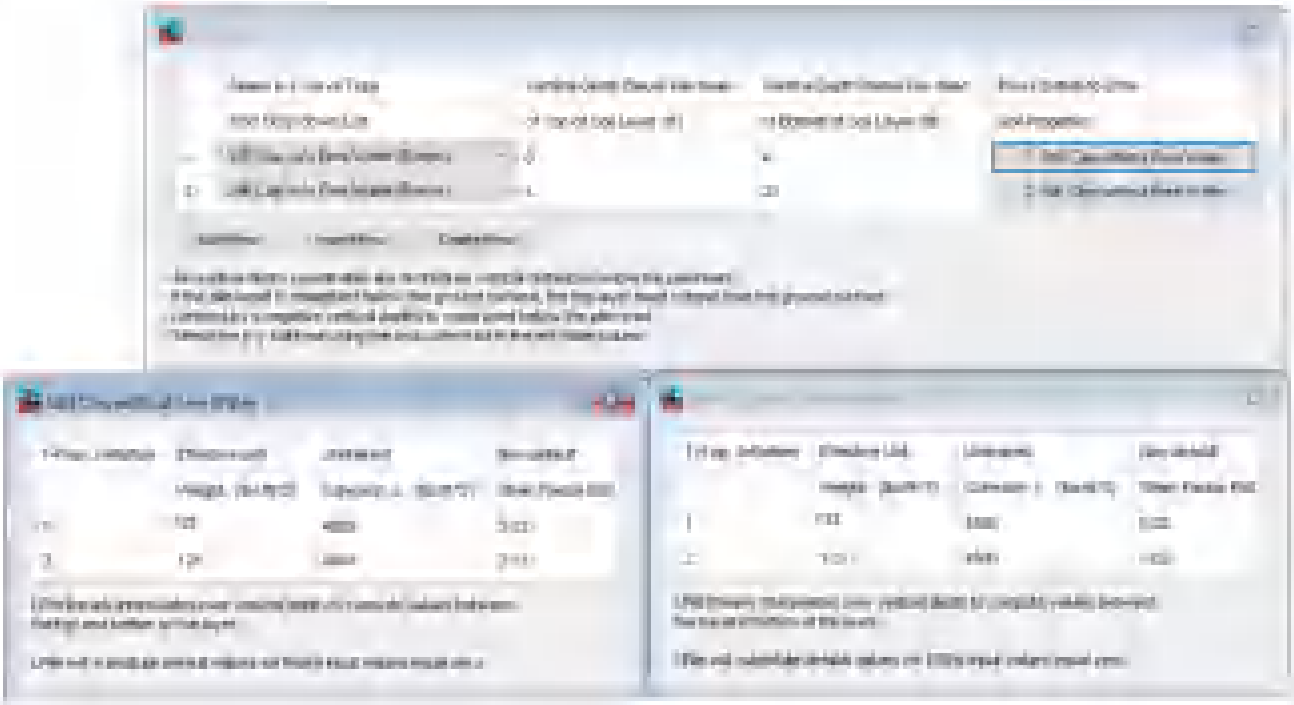


B) Soil Parameter:

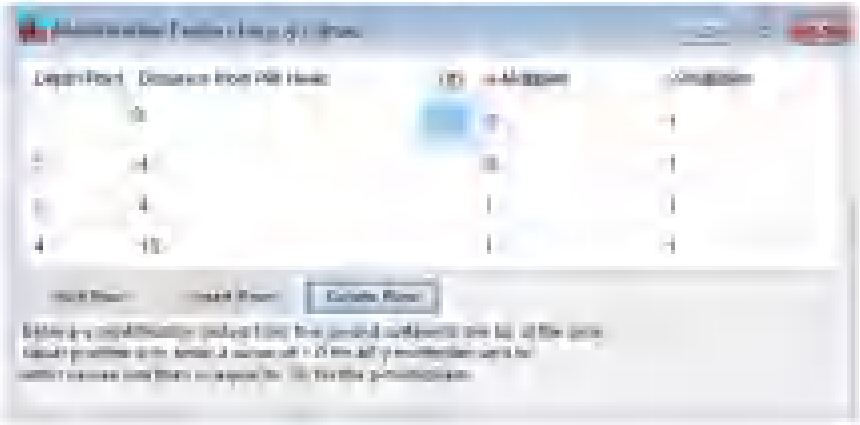
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	4,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.



C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

The Governing load combination is: **LC2 = DL + 0.75SL + 0.45 WL**

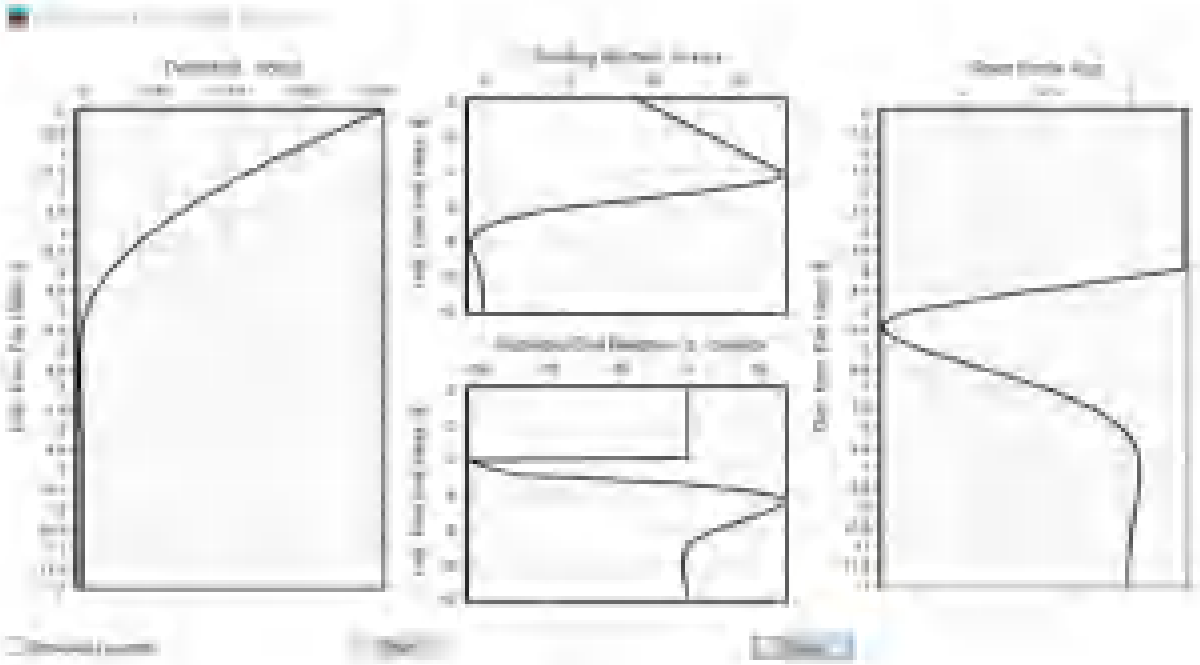
Axial: **19,660 Lbs**

Shear = **340 lb**

Moment = 1.53 kips-ft = 1530 lb-ft = **18,360 lbs-in**

Load L-pile Inputs

D) L-Pile Result:



Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 340.0 lbs
Applied moment at pile head = 18360.0 in-lbs
Axial thrust load on pile head = 19660.0 lbs

Depth x feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.0867	18360.	340.0000	-2.19E-04	1977.	9.01E+09	0.00	0.00	0.00

Deflection = 0.09" < 0.50" W12X50 W/12ft Embedment min.

E) Moment capacity check:

M_n/Ω =(50 Ksi)*(51.4 in^3)/1.67 = 1538 Kip-in > 35.331 Kip-in OK!

Pile-head deflection	=	0.00822678 inches
Computed slope at pile head	=	-0.0002188 radians
Maximum bending moment	=	35331. inch-lbs
Maximum shear force	=	-1481. lbs
Depth of maximum bending moment	=	4.20000000 feet below pile head
Depth of maximum shear force	=	5.40000000 feet below pile head
Number of iterations	=	7
Number of zero deflection points	=	3

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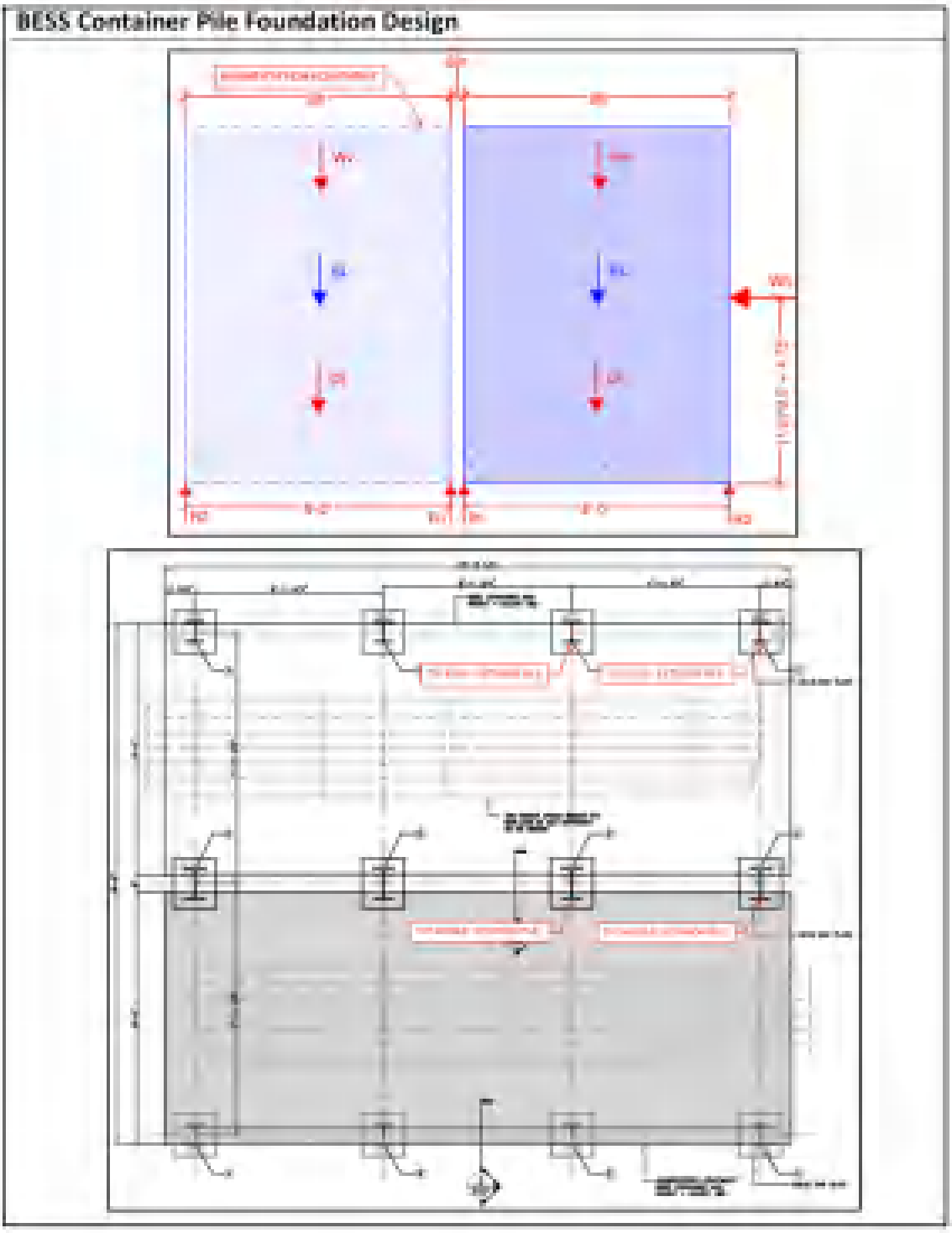
Reactions from Equipment:

BESS Container Pile Foundation Design



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	Location				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

BESS Container Pile Foundation Design

See following sheets for load calculations

Total W (t) =	93.70	kip
Total SL =	1.53	kip
Total Wh =	6.84	kip
Total Wv =	5.79	kip

Snow Load = 9.6 psf

Load Combinations (ASD)

LC1: D + 0.6W

LC2: D+0.750.6W)+0.75L

LC3: 0.6D+0.6W

Notes:

* Edge Interior Pile Trib = 30% from Total equipment Trib.
* Edge exterior Pile Trib = 20% from Total equipment Trib.
* Middle Interior Pile loads = Twice the reaction R1.
* Middle Exterior Pile loads = Twice the reaction R1.
* Interior Piles take 50% more than the exterior Piles.
* The Calcs Below Shows only the worst case loading.

Pile Forces (ASD)

LC1: D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* (DL + 0.6Wv)/2	19.43 kip	V = 0.344 kip	(middle exterior pile)
R1 = 2* (DL + 0.6Wv)/2	25.15 kip	V = 0.816 kip	(middle interior pile)
R2 = [(DL + 1.5Wv)/2] + (0.6Wh/4 ft)/2	19.21 kip	V = 0.344 kip	(Edge exterior pile)
R2 = [(DL + 1.5Wv)/2] + (0.6Wh/4 ft)/2	15.31 kip	V = 0.816 kip	(Edge interior pile)

LC2: D + 0.750.6W)+0.75SL (Vertical) **[Vertical] V = 0.45Wh /12**

R1 = 2* [(DL + 0.75(0.6Wv) +0.75SL)/2	19.49 kip	V = 0.258 kip	(middle exterior pile)
R1 = 2* [(DL + 0.75(0.6Wv) +0.75SL)/2	25.28 kip	V = 0.387 kip	(middle interior pile)
R2 = [(DL + 0.75(0.6Wv) +0.75SL)/2 + (0.45Wh/4 ft)/2	19.31 kip	V = 0.258 kip	(Edge exterior pile)
R2 = [(DL + 0.75(0.6Wv) +0.75SL)/2 + (0.45Wh/4 ft)/2	15.41 kip	V = 0.3257 kip	(Edge interior pile)

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LC5: 0.6D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* [(0.6DL + 0.6Wv)/2	11.04 kip	V = 0.384 kip		(middle exterior pile)
R1 = 2* [(0.6DL + 0.6Wv)/2	17.91 kip	V = 0.576 kip		(middle interior pile)
R2 = [(0.6DL + 0.6Wv)/2] + [(0.6Wh*4.75)/8	6.46 kip	V = 0.384 kip		(Edge exterior pile)
R2 = [(0.6DL + 0.6Wv)/2] + [(0.6*Wh*4.75)/8	9.69 kip	V = 0.576 kip		(Edge interior pile)

Controlling Middle/Exterior Pile Load

Downward =	18.89	kip
Uplift =	0.00	kip
Lateral =	0.48	kip

Controlling Middle/Interior Pile Load

Downward =	19.24	kip
Uplift =	0.00	kip
Lateral =	0.62	kip

Controlling Edge/exterior Pile Load

Downward =	19.31	kip
Uplift =	0.00	kip
Lateral =	0.48	kip

Controlling Edge/Interior Pile Load

Downward =	19.81	kip
Uplift =	0.00	kip
Lateral =	0.62	kip

Lateral check and bending of the pile are minimal because the maximum Pile reveal is 2'-8" max, however see the calculation below for verification.

(3)

Design of the Edge/Interior Pile

2 – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion
- The post that will be used is the W8x24
- Per the Geotech report, the corrosion characteristics are as follows:

6.3 Soil Corrosivity and Resistivity

6.3.1 ERT Test Results

Field electrical resistivity (soil volume resistivity) values from about 1,700 to 9,000 Ω-cm across the ERT-5 which reflected resistivity test values ranging from about 5,100 to 30,100 Ω-cm. Minimum values generally decreased as probe spacing increased to about 30 feet, and maximum values generally increased with probe spacing past 30 feet. Based on guidelines presented in Corrosion Basics, An Introduction, 2nd Ed. (2006), the results of these field resistivity tests indicate [illegible] soil. ERT results are provided in Attachment D.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-PIN METHOD

PROJECT NAME:			
PROJECT NUMBER:		DEPTH:	
DATE:		TIME:	
TEST LOCATION:		TEMP:	

DIRECTION:						
ELECTRODE SPACING 'a'		DEPTH OF PENETRATION (SPL) 'b'	ACTUAL PENETRATION		RESISTANCE	RESISTIVITY = 2πaR (Ω-cm)
(ft)	(m)	(in)	(ft)	(m)	(Ω)	
2	0.61	1.5	1	0.3048	1.7	2,137
5	1.52	3	4	1.2192	0.4	12,566
10	3.05	6	9	2.7432	0.2	12,566
20	6.10	12	19	5.7912	0.1	12,566
30	9.14	18	29	8.8392	0.1	18,850
40	12.19	24	39	11.8872	0.1	25,133
50	15.24	30	49	14.9352	0.1	31,416
60	18.29	36	59	17.9832	0.1	37,699

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a **3-mill of zinc on wide flange shapes and a 50-year** project life.

Table 6 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.50	2.5
1250 – 3000	0.39	2.2

PURE POWER ENGINEERING

Pure Power Engineering

Project				Job No.	
Section				Sheet no./rev.	
Calc. by	Date	Check by	Date	Appd. by	Date

Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in.

W8x24

	Original Dims. [in]	Reduced Dims. [in]
t_w =	0.245	0.134
t_f =	0.400	0.289
d =	7.930	7.819
b_f =	6.500	6.389

CALCULATION OF SECTION PROPERTIES

Area

A_s = 4.66 in²

2nd moment of area

I_{xx} = 56.6 in⁴ I_{yy} = 12.6 in⁴ I_{xx} = 56.6 in⁴ I_{yy} = 12.6 in⁴

Radius of gyration

r_{xx} = 3.48 in r_{yy} = 1.64 in r_{xx} = 3.48 in r_{yy} = 1.64 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 15.7 in³ Z_{yy} = 5.83 in³

Distance to combined centroid

$\bar{x}_c$ = 0.00 in $\bar{y}_c$ = 0.00 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

$\bar{x}_e$ = 0.00 in $\bar{y}_e$ = 0.00 in

Elastic section modulus

S_{xx} = 14.5 in³ S_{yy} = 3.93 in³

3 - Post design using RAM Element

The pile reveal is 30 inches. According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judgment the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 4.5 feet

Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.13 < 1.00 ∴ W8X24 OK !

RAM Elements

Steel Code Check

Summary - Group by description

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	W Major - MODIFIED COMP	1			OK	

PURE POWER ENGINEERING Pure Power Engineering	Project				Job No:	
	Section				Sheet no /rev:	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

4- Axial Check:

Wind induced suction due to corrosion:

perimeter = $2(b_f + d) + 4\,[(b_f - t_w)/2]$ = 2(6.389 + 7.810)+ 4[(6.389-0.134)/2] = 40.598'/12 = **3.4105 ft**

Area = $2^* b_f{}^* t_f + (d - 2\,t_f)^* t_w$ = 2*6.389*0.389 + (7.810-2*0.389)*0.134 = 5.05 in²/144 = **0.032 ft²**

The axial load P = 15,380 lbs, according to the Most-case combination load analysis.
LC2 = 0.6 + 0.75L + 0.45 Wi

- The allowable skin friction, as mentioned in the geotechnical report, is as follows:

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (ft)	Allowable End-Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4	–	–	–
Stratum 2	4 – 20 4 – 13	20,000	750	540
Stratum 3	8 – 20	22,000	350	260
Stratum 4	13 – 20	25,000	1,000	800

Notes:
(1) [illegible]
(2) [illegible]
(3) [illegible]

- **Allowable Friction force:**

Stratum 1: from 0 – 4 ft = **0 lbs**

Stratum 2: from 4 – 8ft (Conservative margin) = 750 psf x 8ft x 3.4105ft = **10231 lbs**

Stratum 3: from 8 – 13ft = 350 psf x 5ft x 3.4105ft = **5968 lbs**

- **Allowable End Bearing: 20,000 psf** (Pile to Bear Within stratum 2)

Net Bearing Resisting Force = 22,000 psf X 0.032ft² (Section Area) = **704 lbs**

Total resistance = 10,231 + 5,968 + 704 = **16,903 lbs > 15,380 lbs → Ratio 91% OK!**

Therefore, the W6X8 pile with **13ft** embedment is performing adequately for the axial applied shear.

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	Section				Sheet no./rev.	
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5- Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summarized below:

Skin friction on the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative skin friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 3.4105ft = 13.642 ft^2

Soil Heave Uplift force = 750 psf X 13.642 ft^2 = **10231.5 lbs**

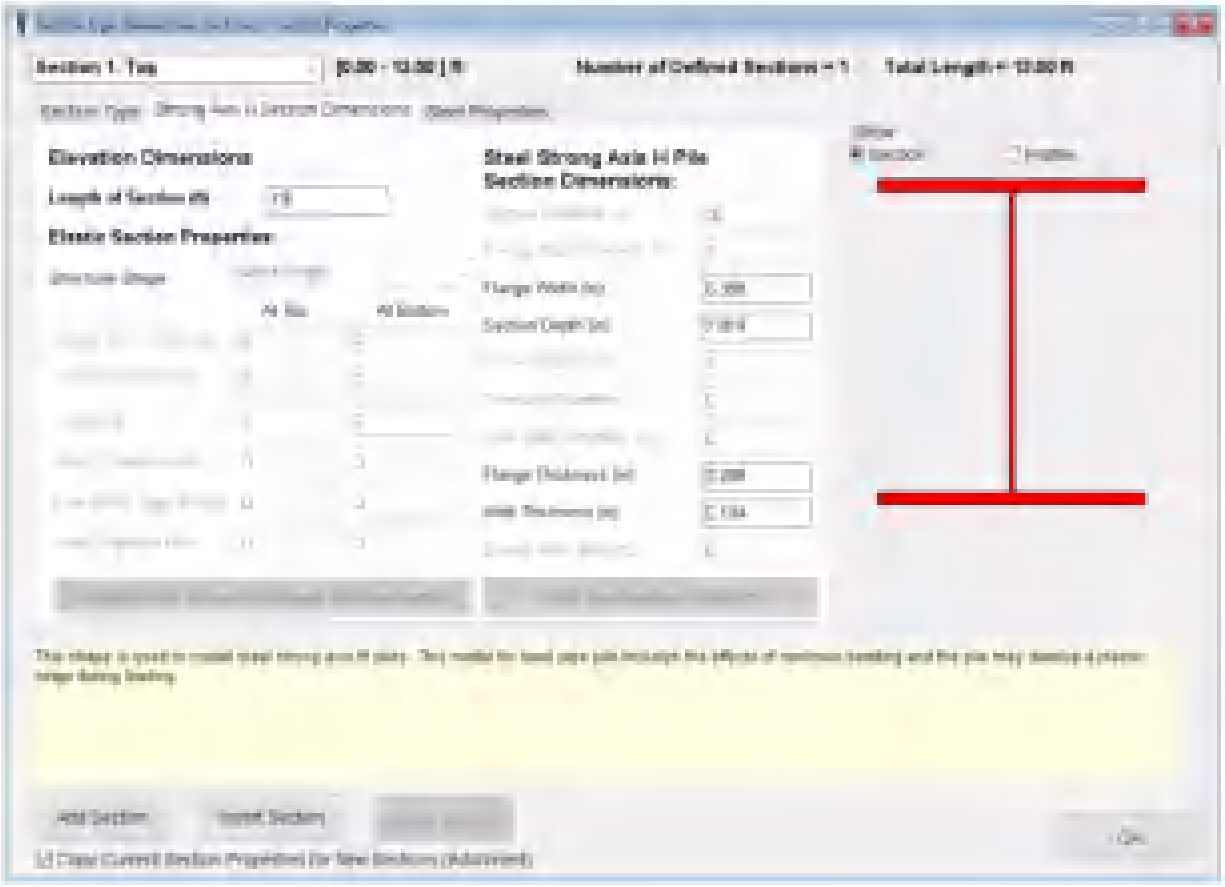
Skin Friction Resistance Force = 10,231 lbs + 5,968 lbs = **16,199 lbs**

Skin Friction Resistance Force = 10231 lbs < 16,199 Lbs → 63% OK

6- W8x24 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) – L-Pile Inputs:

- **W8x24** reduced section due to corrosion
- **13ft** embedment.

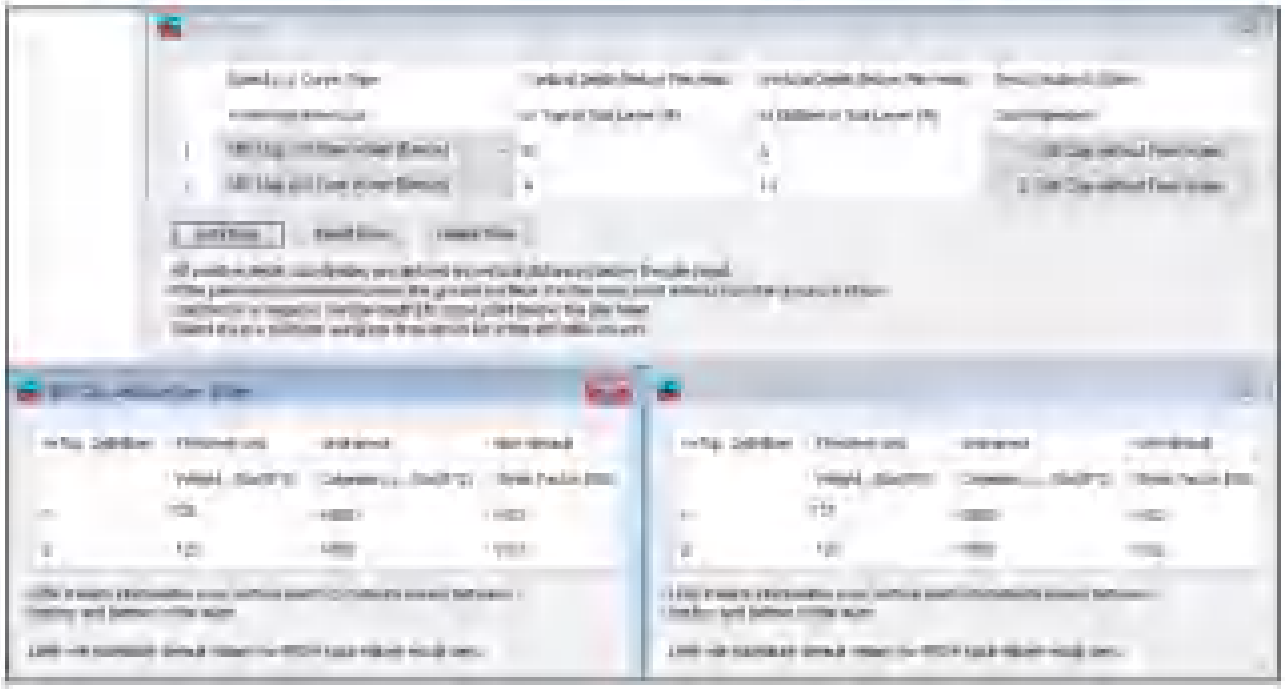


B) Soil Parameter:

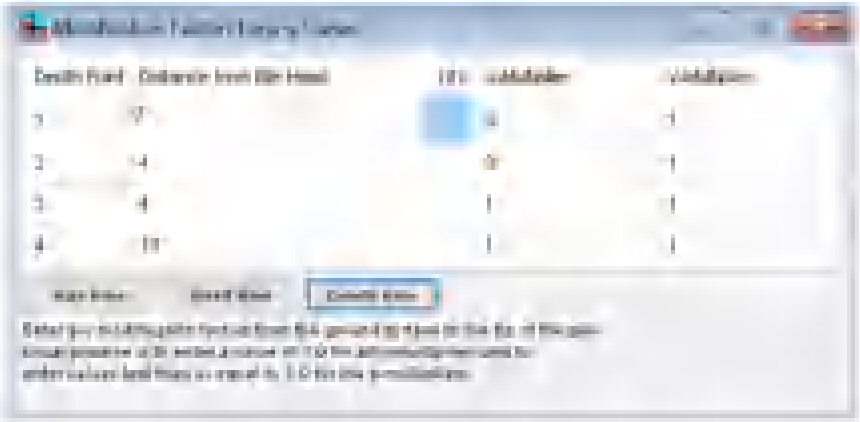
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	4,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.



C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

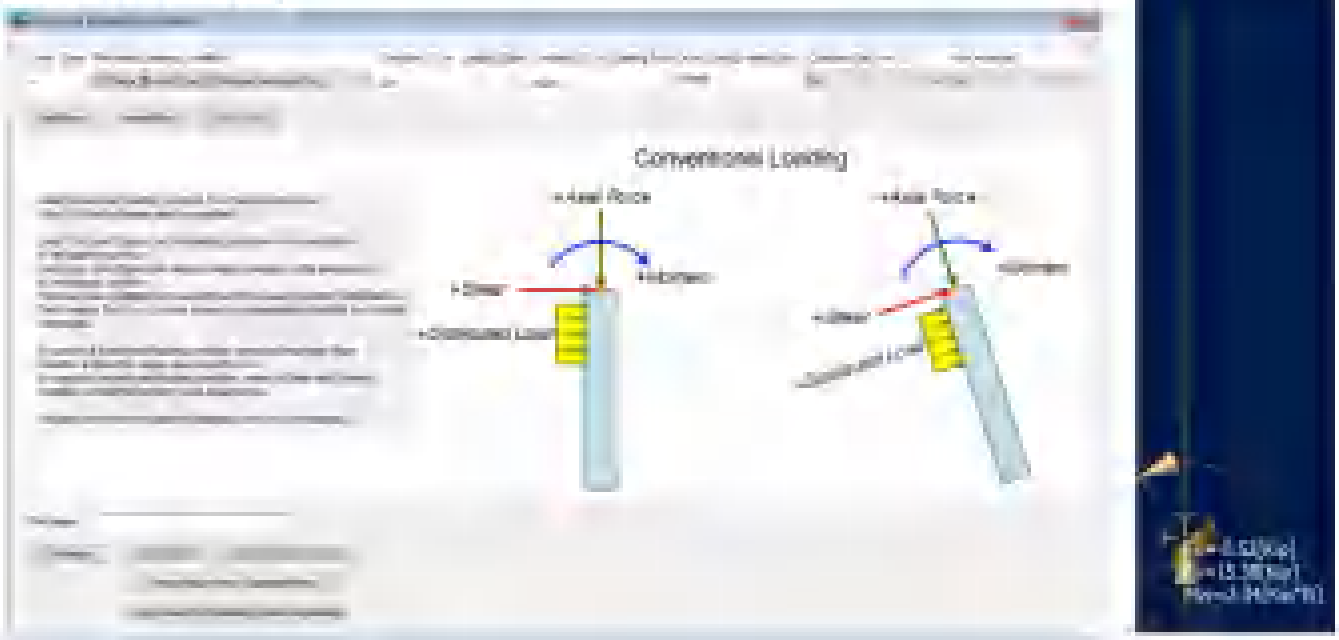
The Governing load combination is: **LC2 = DL + 0.75L + 0.45 WL**

Axial: **15,380 lb**

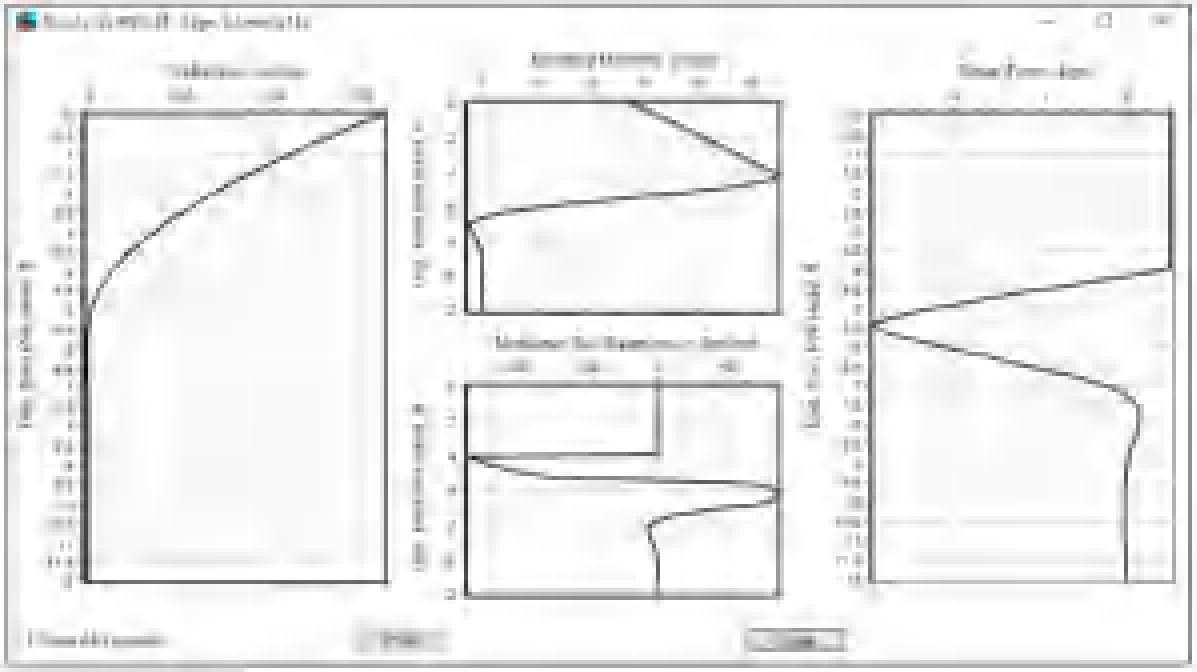
Shear = **520 lb**

Moment = 2.34 kips-ft = 2340 lb-ft **=28,080 lbs-in**

Load L-pile Inputs



D) L-Pile Result:



Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 520.0 lbs
Applied moment at pile head = 28080.0 in-lbs
Axial thrust load on pile head = 15380.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. p	Soil Spr. Es*H	Distrib. Lat. Load
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.06521	28080.	520.0000	0.00178	4883.	1.64E+09	0.00	0.00	0.00

Deflection = 0.06" < 0.50" W8X24 W/13ft Embedment min.

E) Moment capacity check:

Mn/Ω =(50 Ksi)*(14.5 in³)/1.67 = 434 Kip-in > 54.683 Kip-in OK!

Pile-head deflection	=	0.06520701 inches
Computed slope at pile head	=	-0.0017842 radians
Maximum bending moment	=	54683. inch-lbs
Maximum shear force	=	-2932. lbs
Depth of maximum bending moment	=	4.20000000 feet below pile head
Depth of maximum shear force	=	5.40000000 feet below pile head
Number of iterations	=	14
Number of zero deflection points	=	4

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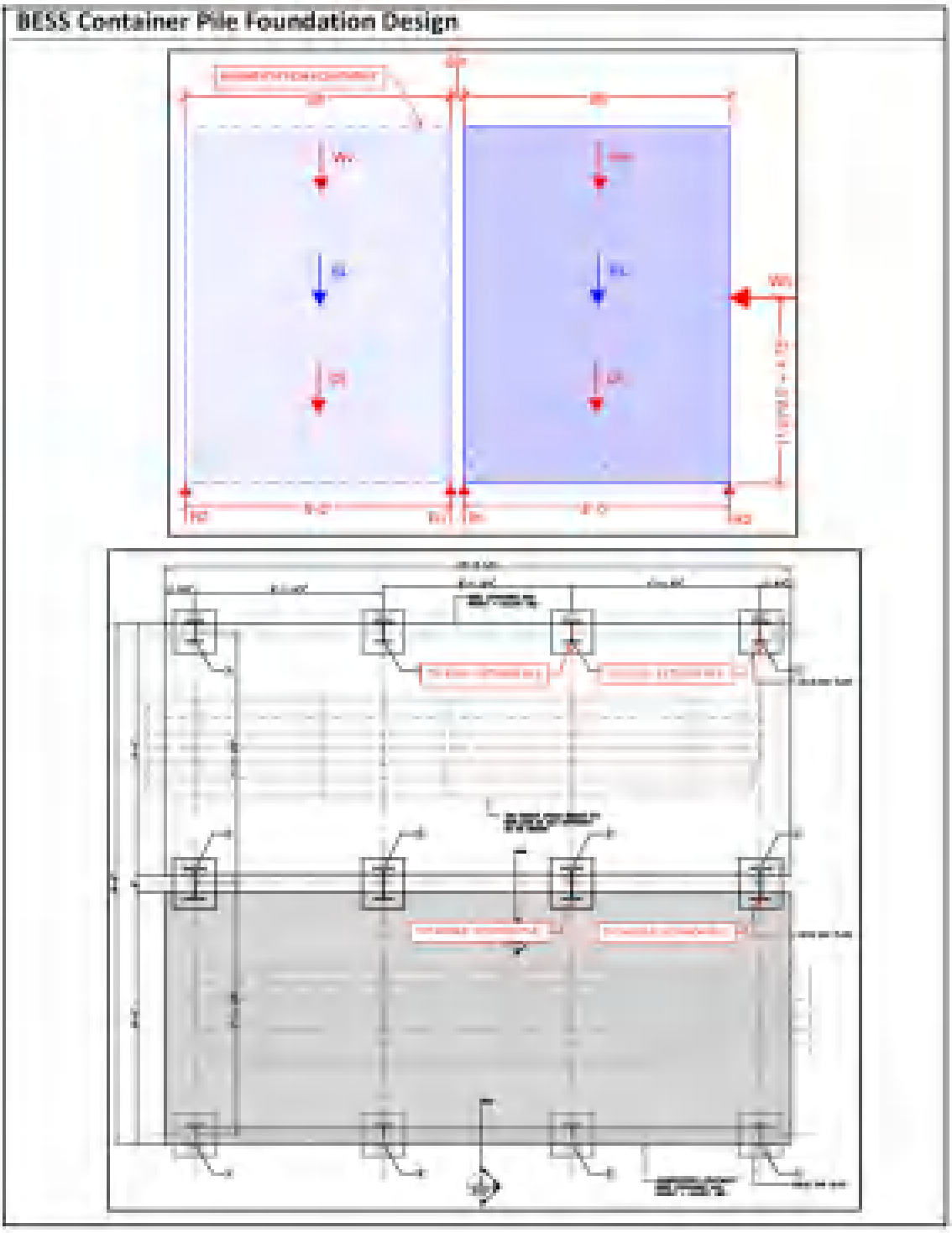
Reactions from Equipment:

BESS Container Pile Foundation Design



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BESS Container Pile Foundation Design

See following sheets for load calculations

Total W (t) =	93.70	kip
Total SL =	1.53	kip
Total Wh =	6.84	kip
Total Wv =	5.79	kip

Snow Load = 9.6 psf

Load Combinations (ASD)

LC1: D + 0.6W

LC2: D+0.750.6W)+0.75L

LC3: 0.6D+0.6W

Notes:

* Edge Interior Pile Trib = 30% from Total equipment Trib.
* Edge exterior Pile Trib = 20% from Total equipment Trib.
* Middle Interior Pile loads = Twice the reaction R1.
* Middle Exterior Pile loads = Twice the reaction R1.
* Interior Piles take 50% more than the exterior Piles.
* The Calcs Below Shows only the worst case loading.

Pile Forces (ASD)

LC1: D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* (DL + 0.6Wv)/2	19.43 kip	V = 0.344 kip	(middle exterior pile)
R1 = 2* (DL + 0.6Wv)/2	25.15 kip	V = 0.816 kip	(middle interior pile)
R2 = [(DL + 1.5Wv)/2] + (0.6Wh/4 ft)/2	19.21 kip	V = 0.344 kip	(Edge exterior pile)
R2 = [(DL + 1.5Wv)/2] + (0.6Wh/4 ft)/2	15.31 kip	V = 0.816 kip	(Edge interior pile)

LC2: D + 0.750.6W)+0.75SL (Vertical) **[Vertical] V = 0.45Wh /12**

R1 = 2* [(DL + 0.75(0.6Wv) +0.75SL)/2	19.49 kip	V = 0.258 kip	(middle exterior pile)
R1 = 2* [(DL + 0.75(0.6Wv) +0.75SL)/2	25.28 kip	V = 0.387 kip	(middle interior pile)
R2 = [(DL + 0.75(0.6Wv) +0.75SL)/2 + (0.45Wh/4 ft)/2	19.31 kip	V = 0.258 kip	(Edge exterior pile)
R2 = [(DL + 0.75(0.6Wv) +0.75SL)/2 + (0.45Wh/4 ft)/2	15.41 kip	V = 0.3257 kip	(Edge interior pile)

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LC5: 0.6D + 0.6W (Vertical) **[Vertical] V = 0.6Wh /12**

R1 = 2* [(0.6DL + 0.6Wv)/2	11.04 kip	V = 0.384 kip		(middle exterior pile)
R1 = 2* [(0.6DL + 0.6Wv)/2	17.91 kip	V = 0.576 kip		(middle interior pile)
R2 = [(0.6DL + 0.6Wv)/2] + [(0.6Wh*4.75)/8	6.46 kip	V = 0.384 kip		(Edge exterior pile)
R2 = [(0.6DL + 0.6Wv)/2] + [(0.6*Wh*4.75)/8	9.69 kip	V = 0.576 kip		(Edge interior pile)

Controlling Middle/Exterior Pile Load

Downward =	18.89	kip
Uplift =	0.00	kip
Lateral =	0.48	kip

Controlling Middle/Interior Pile Load

Downward =	19.24	kip
Uplift =	0.00	kip
Lateral =	0.62	kip

Controlling Edge/exterior Pile Load

Downward =	19.31	kip
Uplift =	0.00	kip
Lateral =	0.48	kip

Controlling Edge/Interior Pile Load

Downward =	19.81	kip
Uplift =	0.00	kip
Lateral =	0.62	kip

Lateral check and bending of the pile are minimal because the maximum Pile reveal is 2'-8" max, however see the calculation below for verification.

(4)
Design of the Edge/Exterior Pile

2 – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion
- The post that will be used is the W8x24
- Per the Geotech report, the corrosion characteristics are as follows:

6.3 Soil Corrosivity and Resistivity

6.3.1 ERT Test Results

Field electrical resistivity (soil volume resistivity) values from about 1,700 to 9,000 Ω-cm across the ERT-5 which reflected resistivity test values ranging from about 5,100 to 30,100 Ω-cm. Minimum values generally decreased as probe spacing increased to about 30 feet, and maximum values generally increased with probe spacing past 30 feet. Based on guidelines presented in Corrosion Basics, An Introduction, 2nd Ed. (2006), the results of these field resistivity tests indicate [illegible] soil. ERT results are provided in Attachment D.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-PIN METHOD

PROJECT NAME:			
PROJECT NUMBER:		DEPTH:	
DATE:		TIME:	
TEST LOCATION:		TEMP:	

DIRECTION:						
ELECTRODE SPACING 'a'		DEPTH OF PENETRATION (SPL) 'b'	ACTUAL PENETRATION		RESISTANCE	RESISTIVITY = 2πaR (Ω-cm)
(ft)	(m)	(in)	(ft)	(m)	(Ω)	
2	0.61	1.5	1	0.3048	1.7	2,137
5	1.52	3	4	1.2192	0.4	12,566
10	3.05	6	9	2.7432	0.2	12,566
20	6.10	12	19	5.7912	0.1	12,566
30	9.14	18	29	8.8392	0.1	18,850
40	12.19	24	39	11.8872	0.1	25,133
50	15.24	30	49	14.9352	0.1	31,416
60	18.29	36	59	17.9832	0.1	37,699

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a **3-mill of zinc on wide flange shapes and a 50-year** project life.

Table 6 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.50	2.5
1250 – 3000	0.39	2.2

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Project				Job No.	
Section				Sheet no./rev.	
Calc. by	Date	Check by	Date	Appd. by	Date

Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in.

W8x24

	Original Dims. [in]	Reduced Dims. [in]
t_w =	0.245	0.134
t_f =	0.400	0.289
d =	7.930	7.819
b_f =	6.500	6.389

CALCULATION OF SECTION PROPERTIES

Area

A_s = 4.66 in²

2nd moment of area

I_{xx} = 56.6 in⁴ I_{yy} = 12.6 in⁴ I_{xx} = 56.6 in⁴ I_{yy} = 12.6 in⁴

Radius of gyration

r_{xx} = 3.48 in r_{yy} = 1.64 in r_{xx} = 3.48 in r_{yy} = 1.64 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 15.7 in³ Z_{yy} = 5.83 in³

Distance to combined centroid

$\bar{x}_c$ = 0.00 in $\bar{y}_c$ = 0.00 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

$\bar{x}_e$ = 0.00 in $\bar{y}_e$ = 0.00 in

Elastic section modulus

S_{xx} = 14.5 in³ S_{yy} = 3.93 in³

PUREPOWER ENGINEERING Pure Power Engineering	Project				Job No.	
	Section				Sheet no./rev.	
	Calc. by	Date	Check by	Date	App'd by	Date

3 - Post design using RAM Element

The pile reveal is 30 inches. According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judgment the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 4.5 feet.

Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.08 < 1.00 :) W8X24 OK !

RAM Elements

Current Date:
Units system:
File name:

Steel Code Check

Summary - Group by description

Load combinations to be calculated:

Description	Section	Member	Ctrl Eq	Ratio	Status	Reference
	W 8X24 - MODERATE CORD...	1			OK	

4- Axial Check:

Wide flange section due to corrosion:

perimeter = $2(b_f + d) + 4\ [(b_f - t_w)/2]$ = 2(6.389 + 7.813)+ 4[(6.389-0.134)/2] = 40.528"/12 = **3.4105 ft**

Area = $2^* b_f{}^* t_f + (d - 2\ t_f)^* t_w$ = 2(6.389)(0.285) + (7.813-2*0.285)(0.134 = 8.88 in²/144 = **0.062 ft²**

The axial load P = 10,280 lbs, according to the Most-case combination load analysis.
LC2 = 0.6 + 0.75L + 0.45 Wt

- The allowable skin friction, as mentioned in the geotechnical report, is as follows:

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (ft)	Allowable End-Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4	-	-	-
Stratum 2	4 – 20	20,000	750	540
	4 – 13			
Stratum 2*	8 – 20	20,000	360	260
Stratum 3	13 – 70'	20,000	1,000	720

Notes:
(1) [illegible]
(2) [illegible]
(3) [illegible]

Allowable Friction force:

Stratum 1: from 0 – 4 ft = **0 lbs**

Stratum 2: from 4 – 8ft (Conservative Height) = 750 psf x 4ft x 3.4105ft = **10231 lbs**

Stratum 3: from 8 – 13ft = 360 psf x 5ft x 3.4105ft = **5968 lbs**

- **Allowable End Bearing: 20,000 psf** (Pile to Bear Within stratum 3)

Net bearing/resisting force = 20,000 psf X 0.062ft² (Section Area) = **704 lbs**

Total resistance = 10,231 + 5,968 + 704 = **16,903 lbs > 10,280 lbs → Ratio: 61%** OK!

Therefore, the **W6x24** pile with **13ft** embedment is performing adequately for the axial load check.

5- Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summerized below:

Side friction in the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative side friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 3.4105ft = 13.642 ft^2

Soil Heave Uplift force = 750 psf X 13.642 ft^2 = **10231.5 lbs**

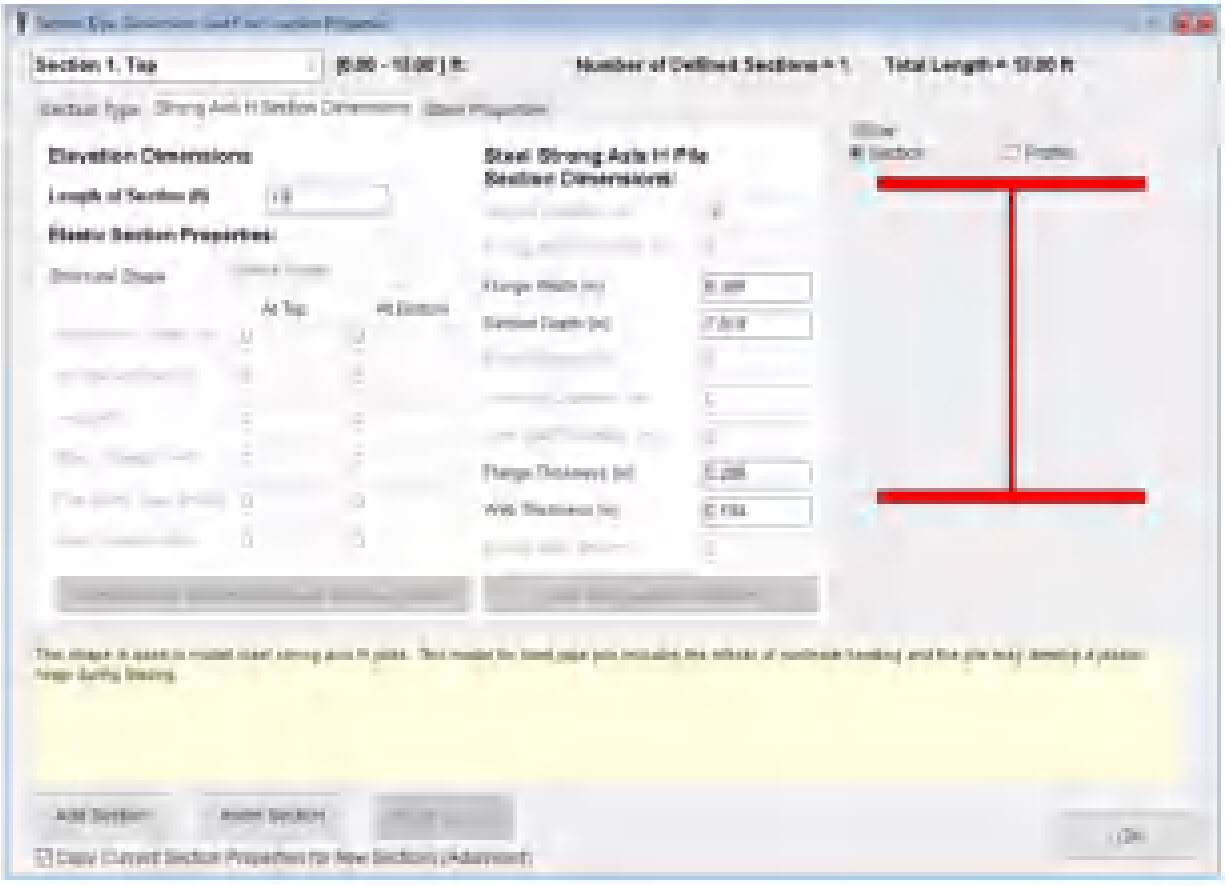
Skin Friction Resistance Force = 10,231 lbs + 5,968 lbs = **16,199 lbs**

Skin Friction Resistance Force = 10231 lbs < 16,199 Lbs → 63% OK

6- W8x24 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) - L-Pile Inputs:

- **W8x24** reduced section due to corrosion
- **13ft** embedment.

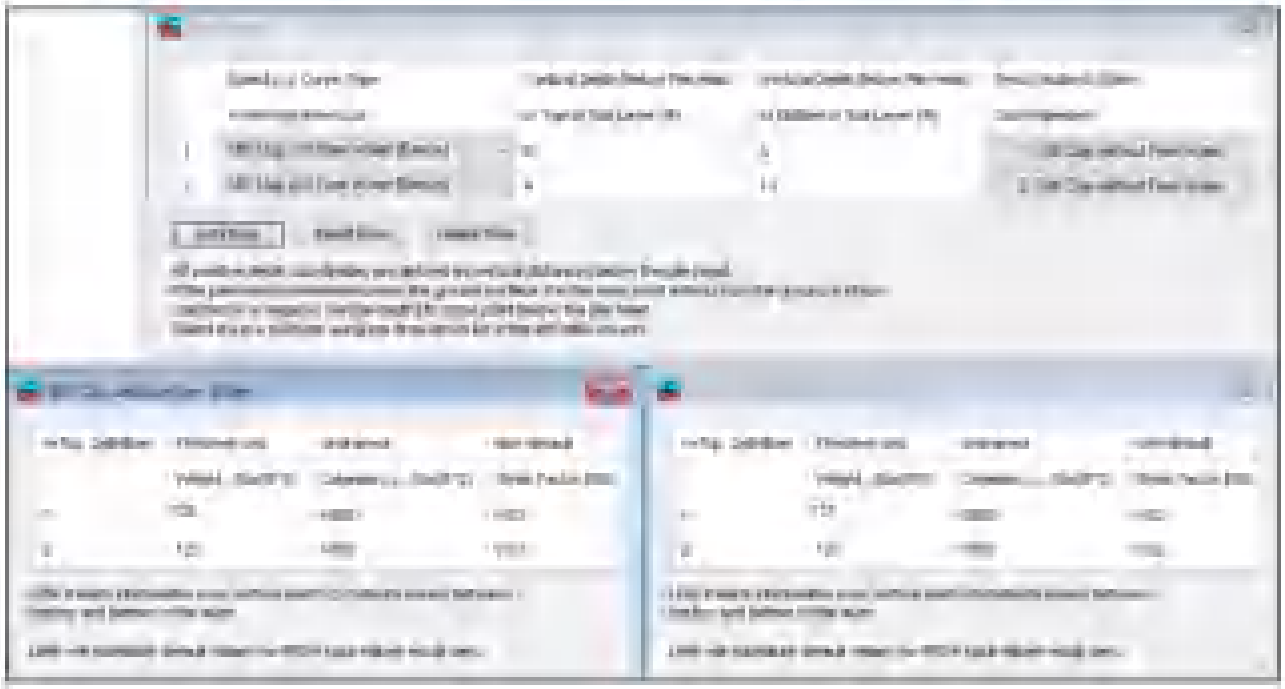


B) Soil Parameter:

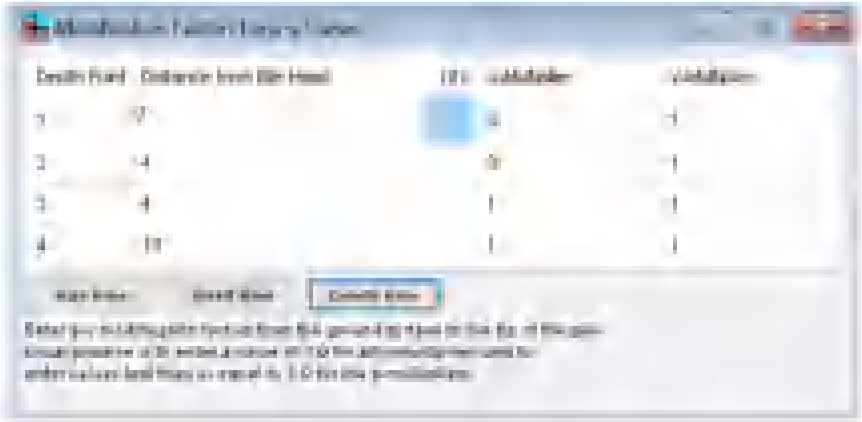
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	4,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.



C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

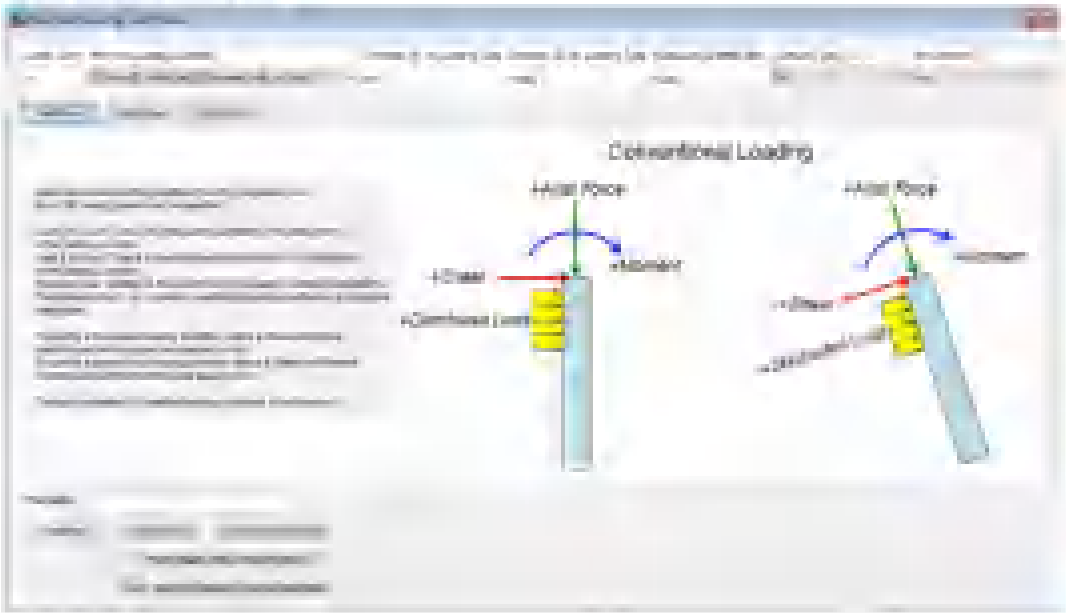
The Governing load combination is: **LC2 = DL + 0.75L + 0.45 WL**

Axial: **10,280 lb**

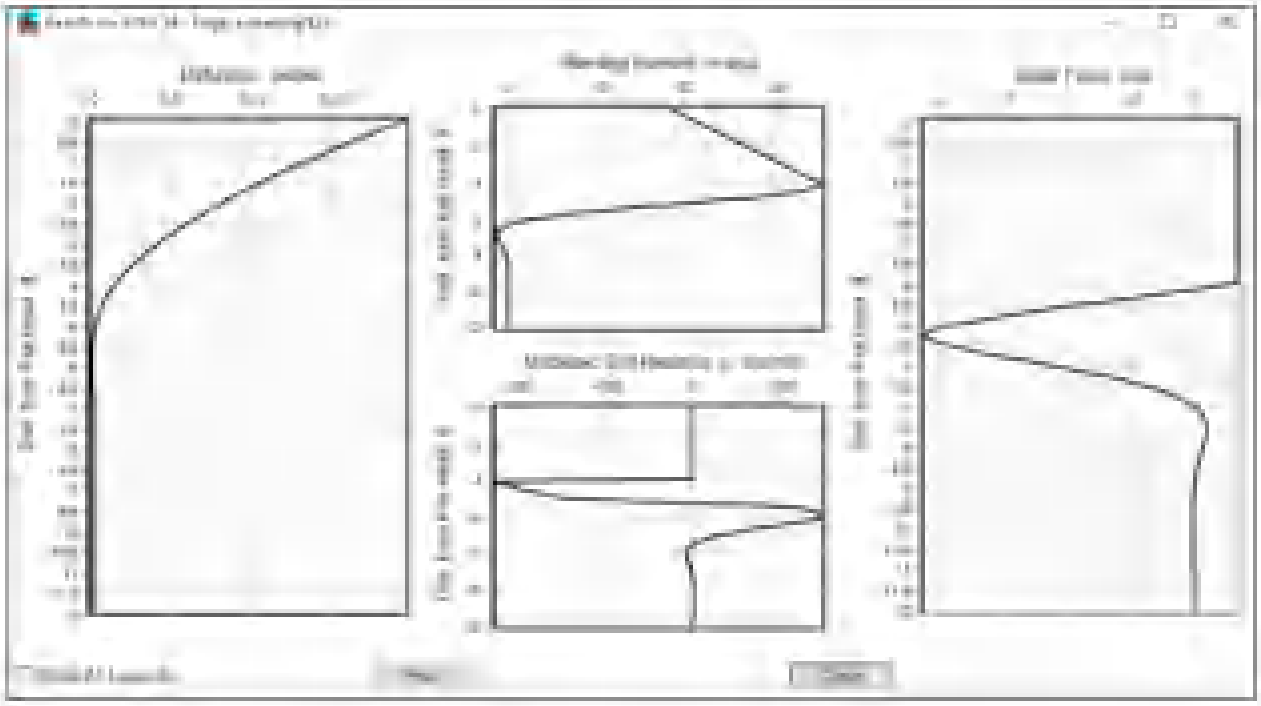
Shear = **340 lb**

Moment = 1.53 kips-ft = 1530 lb-ft = **18,360 lbs-in**

Load L-pile Inputs



D) L-Pile Result:



Pile head conditions are Shear and Moment (Loading type 1)

Shear force at pile head = 340.0 lbs
Applied moment at pile head = 18360.0 in lbs
Axial thrust load on pile head = 10280.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.03928	18360.	340.0000	-0.00111	3241.	1.64E+09	0.00	0.00	0.00

Deflection = 0.04" < 0.50" W8X24 W/13ft Embedment min.

E) Moment capacity check:

$M_n/\Omega = (50\ Ksi)*(14.5\ in^3)/1.67 =$ 434 Kip-in > 35.424 Kip-in OK!

Output Summary for Load Case No. 1:

Pile-head deflection = 0.03928029 inches
Computed slope at pile head = -0.0011131 radians
Maximum bending moment = 35424. inch-lbs
Maximum shear force = -2103. lbs
Depth of maximum bending moment = 4.20000000 feet below pile head
Depth of maximum shear force = 5.28000000 feet below pile head
Number of iterations = 12
Number of zero deflection points = 4

FORCES ON MVT

PURE POWER ENGINEERING
Pure Power Engineering, Inc.
5 Marine View Plaza, Suite 301
Hoboken, NJ 07030

Client:	Langan	Date:	7/24/2025
Site Name:	Channel 68/69	Prepared By:	IH
Job No:	PPE-11065.02	Checked By:	AY
Subject:	ahv1	Page:	1

DESIGN CRITERIA

Basic Site Criteria:

Equipment Height: h = 9.51 ft

Structure Type: Square

Equipment Dimensions:

Depth: b = 8.00 ft Width: 19.83 ft

Equipment Weight: W_e = 33.78 kip (Per Guess)

Total Equipment Weight: W_t = 33.78 kip

Wind Design Parameters:

Risk Category: II

Ultimate Wind Speed: V_{ult} = 130 mph

Exposure Category: C

Topographic Category: 1

Topographic Factor: K_{zt} = 1.00

Gust Effect Factor: G_f = 0.85

Wind Directionality Factor: K_d = 0.95

Velocity Pressure Coefficient: K_z = 0.85

External Pressure Coefficient: C_f (perpendicular) = 1.82

C_f (parallel) = 1.82

Wind Design Load:

Wind Velocity Pressure: q_z = 28.16 psf $q_z = 0.00256\, K_z\, K_{zt}\, K_d\, V^2$

Vertical Wind Projected Area: A_v = 168.99 ft²

Horizontal Wind Load: F_h = 6.88 kip $F = q_z\, GC_f\, A$ $Moment_{base}$ = 32.65 kip-ft

Horizontal Wind Projected Area: A_h = 155.81 ft²

Vertical Wind Load: F_v = 5.29 kip $F = q_z\, GC_f\, A$

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5 Marine View Plaza, Suite 305
Hoboken, NJ 07030

Client:	Langan	Date:	7/24/2025
Site Name:	Chevron 90554	Prepared By:	IH
Job No.	PPE-11065.02	Checked By:	AY
Subject:	MNT	Page:	2

DESIGN CRITERIA (Continued)

Seismic Design Parameters:

Site Class:		C		
Seismic Importance Factor:	I_e	1.25		(Section 11.5.1)
Mapped spectral response acceleration at short periods:	S_s	0.058		
Design spectral response acceleration at short periods:	S_{DS}	0.047		
Mapped spectral response acceleration at 1s period:	S_1	0.035		
Design spectral response acceleration at 1s period:	S_{D1}	0.039		
Long Period Transition Period:	T_L	12	s	
Response Modification Coefficient:	R	3.25		(Table 15.4-2)
Overstrength Factor:	Ω_0	2.50		(Table 15.4-2)
Deflection Amplification Factor:	C_d	2.50		(Table 15.4-2)
Building Period Coefficient:	C_t	0.02		(Table 12.8-2)
	x	0.75		(Table 12.8-2)
Building Fundamental Period:	T	0.109	s	(Section 12.8.2.1)
	C_u	0.65		$C_u = \frac{S_{D1}}{0.1g}$
	$C_{s,max}$	0.80		$C_{s,max} = \frac{S_{DS}}{(R/I_e)}$ for $T \le T_L$; $C_{s,max} = \frac{S_{D1} T_L}{T(R/I_e)}$ for $T > T_L$
	$C_{s,calc}$	0.02		$C_{s,calc} = 0.044 S_{DS} I_e \ge 0.01$; $C_{s,calc} = \frac{0.5 S_1}{(R/I_e)}$ if $S_1 \ge 0.6g$
Seismic Response Coefficient:	C_s	0.02		(Equations: 12.8-2, 12.8-3, 12.8-4, 15.4-1, 15.4-2)

Seismic Design Load:

Is the structure considered a Rigid Nonbuilding Structure?		No		
Seismic Base Shear:	V	0.02	kip	(Equation 12.8-1 or 15.4-5) $V = C_s W \ge 0.3 S_{DS} W$
	$Moment_{seismic}$ =	2.83	kip-ft	

PURE POWER ENGINEERING

Pure Power Engineering, Inc.
5 Marine View Plaza, Suite 301
Hoboken, NJ 07030

Client:	Leegal	Date:	7/24/2015
Site Name:	Chrome (8232)	Prepared By:	HH
Job No:	PPE-11085.02	Checked By:	AY
Subject:	MVT	Page:	3

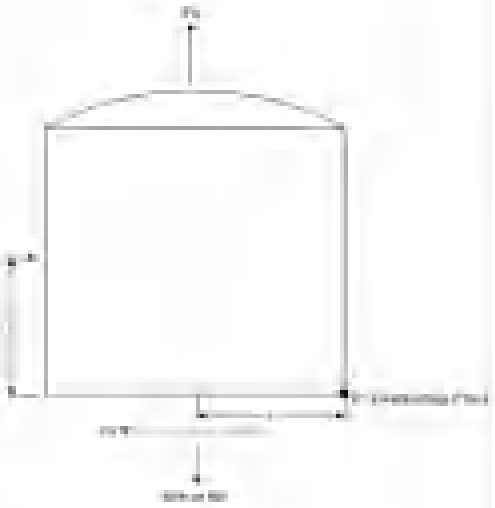
I. OVERTURNING MOMENT CHECK:

Condition 1: Equipment + Wind Load

Wind Load Factor:		1.00	
Overturning Moment From Wind:	M_o	12.09	kip-ft
Resisting Moment:	M_r	224.92	kip-ft
Overturning Check:		Good	
Safety Factor:		18.61	

Condition 2: Equipment + Seismic Load

Seismic Load Factor:		1.00	
Overturning Moment From Seismic:	M_o	7.84	kip-ft
Resisting Moment:	M_r	224.92	kip-ft
Overturning Check:		Good	
Safety Factor:		27.07	



II. SLIDING CHECK:

Condition 1: Equipment + Wind Load

Wind Load Factor:		1.00	
Friction Coefficient:	μ	0.60	Conservative
Sliding From Wind:	F_w	3.89	kip
Resisting Friction:	F_r	13.97	kip
Sliding Check:		Good	
Safety Factor:		3.60	

Condition 2: Equipment + Seismic Load

Seismic Load Factor:		1.00	
Friction Coefficient:	μ	0.60	
Sliding Force From Seismic:	F_s	2.52	kip
Resisting Friction:	F_r	15.97	kip
Sliding Check:		Good	
Safety Factor:		14.18	

REQUIRED ANCHOR DESIGN STRENGTH:

Solar

Anchor Spacing:		7.83	ft
Required Tension Design Strength:		0.00	kip
Required Shear Design Strength:		0.00	kip

Uplift Governs

(Per 4 Clips)

*The above load reported design strength is using an safety factor of 2.5 and includes minimum strength factor.

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	Section:				Sheet no./rev.	
	Calc. by:	Date:	Check by:	Date:	Appr'd by:	Date:

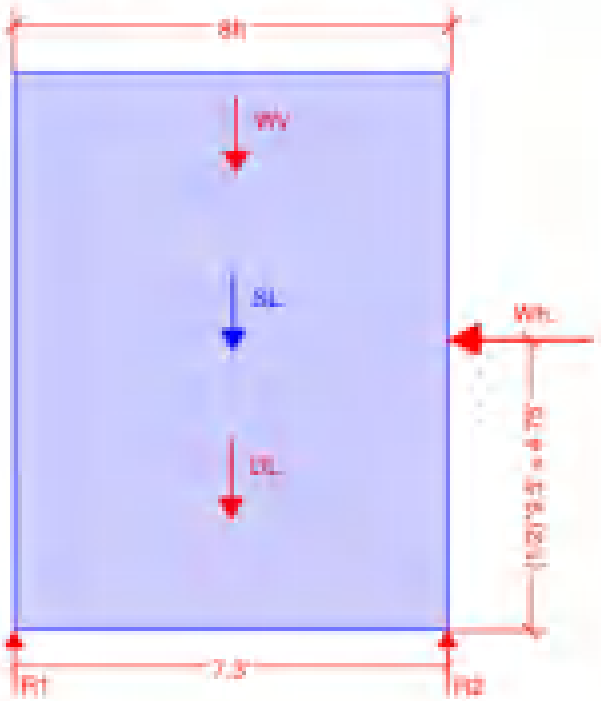
Mvt Equipment Pile Design

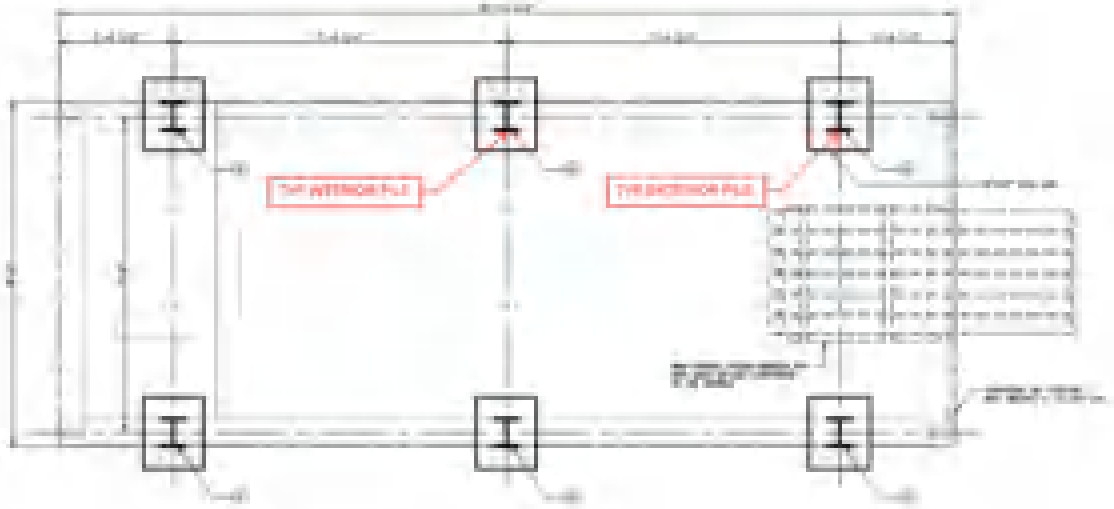
PUREPOWER ENGINEERING Pure Power Engineering	Project:				Job No:	
	Section:				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	App'd by	Date

1 - Reactions from Equipment:

MV Station Skid Pile Foundation Design

See following sheets for skid load calculations





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Pure Power Engineering	Section	Sheet no./rev.
Calc. by	Date	Chk'd by	Date	App'd by	Date

MV Station Skid Pile Foundation Design

See following sheets for skid load calculations

Tot(D+DL) =	33.73	kip
Total SL =	1.57	kip
Total Wh =	8.68	kip
Total Wv =	4.79	kip

Snow Load = 3.6 psf

Load Combination (ASD)

LC1: D + 0.6W

LC2: D+0.75(0.6W)+0.75S

LC3: 0.6D+0.6W

Notes:

* Interior Pile Trib = 57.5% from Total equipment Trib.
* Exterior Pile Trib = 31.25% from Total equipment Trib.

* Design Will Be performed on the Interior Pile

Pile Forces (ASD)

LC1: D + 0.6W (Vertical)

R1 = (Tot+0.6Wv)/2 + (0.6Wh x 4.75'/7.5') = 7.96 kip

R2 = (Tot+0.6Wv)/2 - (0.6Wh x 4.75'/7.5') = 5.97 kip

(Lateral) V = 0.6Wh /6

V = 0.83 kip

LC2: D + 0.75(0.6W)+0.75SL (Vertical)

R1 = (Tot + 0.75*0.6*Wv +0.75 SL)/2 + (0.6Wh x 4.75/7.5) = 8.61 kip

R2 = (Tot + 0.75*0.6*Wv +0.75 SL)/2 - (0.6Wh x 4.75/7.5) = 6.00 kip

(Lateral) V = 0.75*0.6Wh /6

V = 0.62 kip

LC3: 0.6D + 0.6W (Vertical)

R1 = (0.6*DL + 0.75*0.6*Wv +0.75 SL)/2 + (0.6Wh x 4.75/7.5) = 5.48 kip

R2 = (0.6*DL + 0.75*0.6*Wv +0.75 SL)/2 - (0.6Wh x 4.75/7.5) = 3.47 kip

(Lateral) V = 0.6Wh /6

V = 0.83 kip

Controlling Pile Load

Downward =	8.01	kip
Uplift =	0.00	kip
Lateral =	0.83	kip

Lateral check and bending of the pile are required because the maximum Pile reveal is 2'-6" (max. however see the calculation below for verification.

2 – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion
- The post that will be used is the W8x24
- Per the Geotech report, the corrosion characteristics are as follows:

6.3 Soil Corrosivity and Resistivity

6.3.1 ERT Test Results

Field electrical resistivity (soil volume resistivity) values from about 1,700 to 9,000 Ω-cm across the ERT-5 which reflected resistivity test values ranging from about 5,100 to 30,100 Ω-cm. Minimum values generally decreased as probe spacing increased to about 30 feet, and maximum values generally increased with probe spacing past 30 feet. Based on guidelines presented in Corrosion Basics, An Introduction, 2nd Ed. (2006), the results of these field resistivity tests indicate [illegible] soil. ERT results are provided in Attachment D.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-PIN METHOD

PROJECT NAME:			
PROJECT NUMBER:		DEPTH:	
DATE:		TIME:	
TEST LOCATION:		TEMP:	

DIRECTION:						
ELECTRODE SPACING 'a'		DEPTH OF PENETRATION (SPL) 'b'	ACTUAL PENETRATION		RESISTANCE	RESISTIVITY = 2πaR (Ω-cm)
(ft)	(m)	(in)	(ft)	(m)	(Ω)	
2	0.61	1.5	1	0.3048	1.7	2,137
5	1.52	3	4	1.2192	0.4	12,566
10	3.05	6	9	2.7432	0.2	12,566
20	6.10	12	19	5.7912	0.1	12,566
30	9.14	18	29	8.8392	0.1	18,850
40	12.19	24	39	11.8872	0.1	25,133
50	15.24	30	49	14.9352	0.1	31,416
60	18.29	36	59	17.9832	0.1	37,699

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a **3-mill of zinc on wide flange shapes and a 50-year** project life.

Table 6 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.50	2.5
1250 – 3000	0.39	2.2

PURE POWER ENGINEERING

Pure Power Engineering

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Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in.

W8x24

	Original Dims. [in]	Reduced Dims. [in]
t_w =	0.245	0.134
t_f =	0.400	0.289
d =	7.930	7.819
b_f =	6.500	6.389

CALCULATION OF SECTION PROPERTIES

Area

A_s = 4.66 in²

2nd moment of area

I_{xx} = 56.6 in⁴ I_{yy} = 12.6 in⁴ I_{xx} = 56.6 in⁴ I_{yy} = 12.6 in⁴

Radius of gyration

r_{xx} = 3.48 in r_{yy} = 1.64 in r_{xx} = 3.48 in r_{yy} = 1.64 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 15.7 in³ Z_{yy} = 5.83 in³

Distance to combined centroid

$\bar{x}_c$ = 0.00 in $\bar{y}_c$ = 0.00 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

$\bar{x}_e$ = 0.00 in $\bar{y}_e$ = 0.00 in

Elastic section modulus

S_{xx} = 14.5 in³ S_{yy} = 3.93 in³

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3 - Post design using RAM Element

The pile reveal is 30 inches. According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judgment the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 4.5 feet

Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.13 < 1.00 :) W8X24 OK !

RAM Elements

Steel Code Check

Summary - Group by description

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	W8X24 - W-DESIGNATION COMBO...	1		0.13	OK	

4- Axial Check:

Wt&ft reduced section due to corrosion:

perimeter = $2[b_f + d] + 4[(b_f - t_w)/2]$ = 2(6.389 + 7.810)+ 4((6.389-0.134)/2) = 40.598'/12 = **3.4105 ft**

Area = $2*b_f * t_f + (d - 2\,t_f)* t_w$ = 2(6.389*0.259) + (7.810-2*0.259)*0.134 = 5.05 in²/144 = **0.033 ft²**

The axial load P = 8,080 lbs, according to the worst case combination load analysis:
LC2 = 0.9 + 0.75L + 0.45 Wt

- The allowable skin friction, as mentioned in the geotechnical report, is as follows.

Table 13 - Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (feet)	Allowable End Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4	-	-	-
Stratum 2	4 – 8	20,000	750	375
	4 – 10			
Stratum 3	8 – 30	20,000	350	175
Stratum 4	10 – 30	20,000	1,000	500

Notes:
1) Geotechnical driven pile capacities only. Structural capacity of the pile to be determined by the structural engineer. Pile capacities include a factor of safety of 2.0 and are for combined dead and live loads. Allowable capacities may be increased by one-third for short duration loadings.
2) Pile tip elevations given are estimates only. Actual pile tip elevations should be determined during pile installation based on the results of the pile driving analyzer tests and the load capacities required.
3) Allowable capacities are for vertical piles loaded axially. Capacity of battered (batter not to exceed 4 horizontal to 1 vertical) piles to be evaluated by the structural engineer.

Pile vertical area = 3.4105' x 6' (based on 30' total embedment & ignoring the upper 6.0') = 20.463 ft²

- **Allowable Friction force:**

Stratum 1: from 0 – 4 ft = **0 lbs**

Stratum 2: from 4 – 8ft (Conservative Height) = 750 psf x 4ft x 3.4105ft = **10231 lbs**

Stratum 3: from 8 – 9ft = 350 psf x 1ft x 3.4105ft = **1193 lbs**

- **Allowable End Bearing: 20,000 psf** (Pile to Bear Within stratum 2)

Net bearing Resisting Force = 22,000 psf X 0.033ft² (Section Area) = **704 lbs**

Total resistance = 10231 + 1193 + 704 = **12128 lbs > 8,080 lbs → Ratio 67% OK!**

Therefore, the **W6x24** pile with **9ft** embedment is performing adequately for the axial load check.

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	Calc. by	Date	Chk'd by	Date	App'd by	Date

5- Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summerized below:

Side friction in the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative side friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 3.4105ft = 13.642 ft^2

Soil Heave Uplift force = 750 psf X 13.642 ft^2 = **10231.5 lbs**

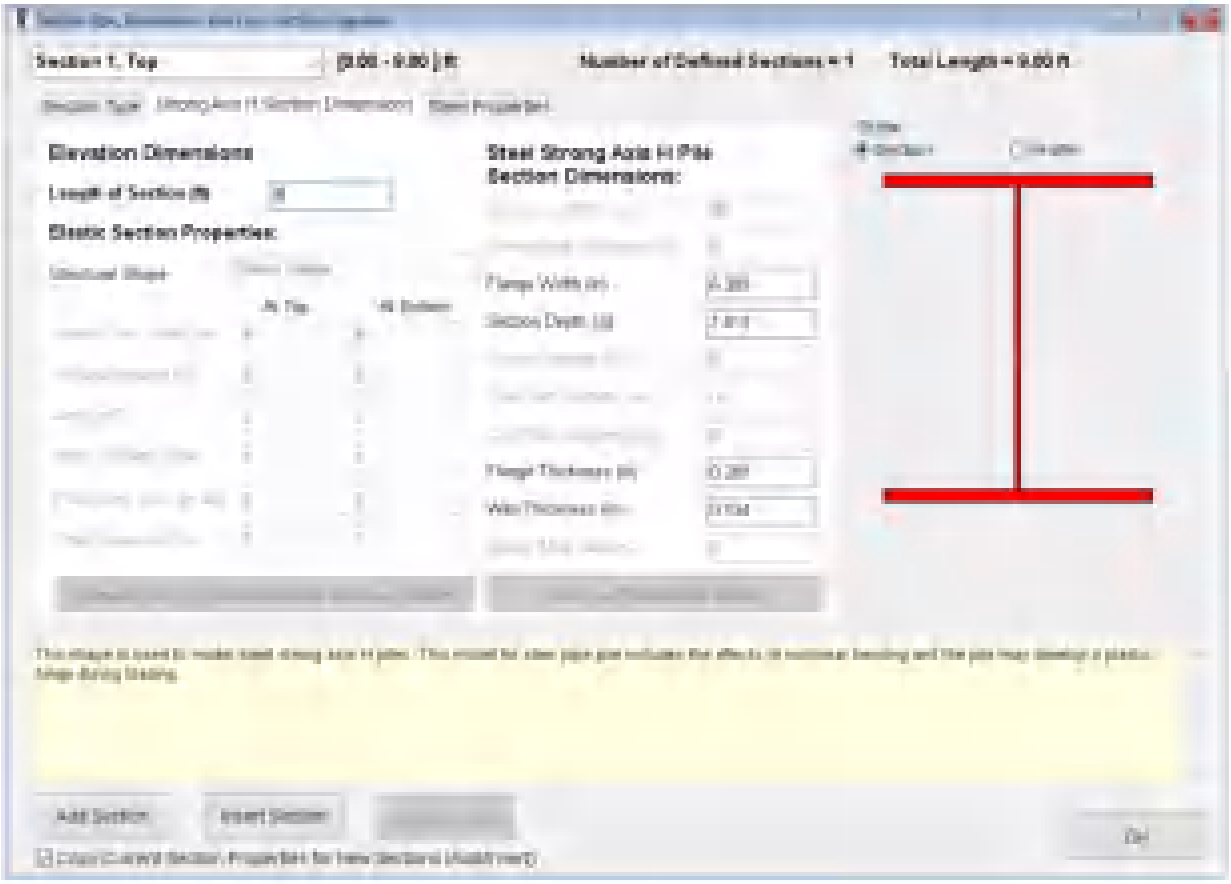
Skin Friction Resistance Force = 10,231 lbs + 1,193 lbs = **11,424 lbs**

Skin Friction Resistance Force = 10,231 lbs < 11,424 Lbs → 89.55% OK

6- W8x24 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) - L-Pile Inputs:

- W8x24 reduced section due to corrosion
- 5ft embedment.

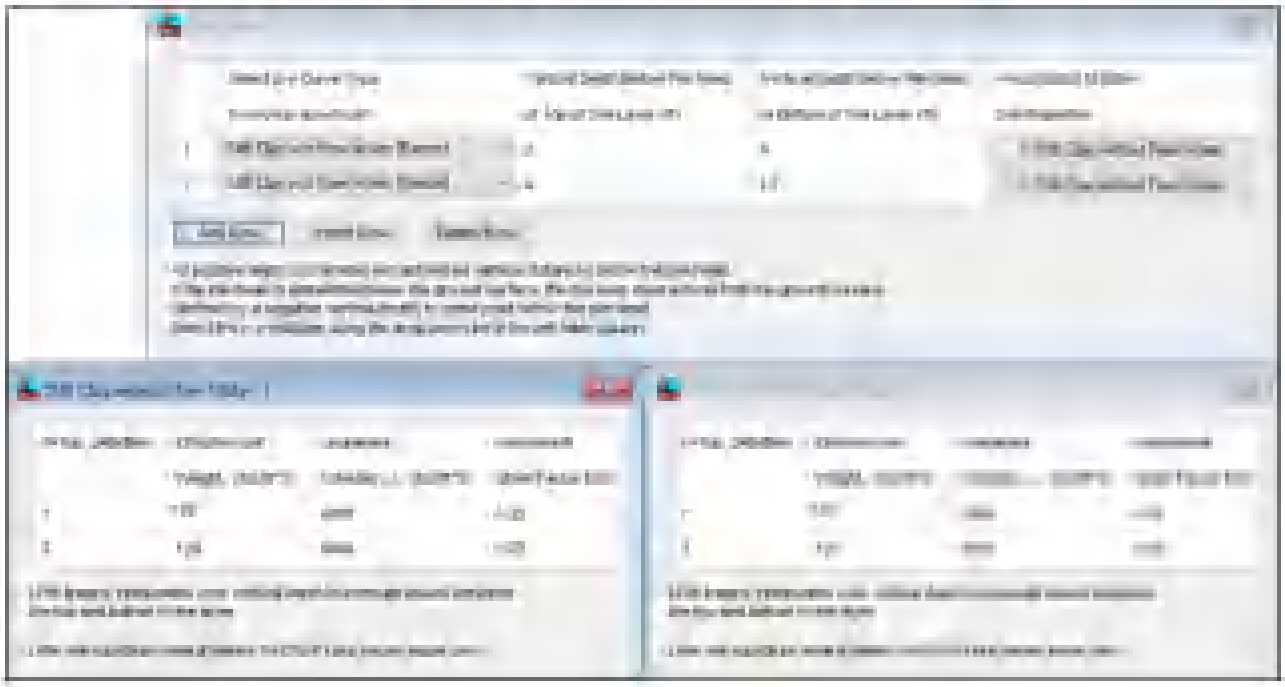


B) Soil Parameter:

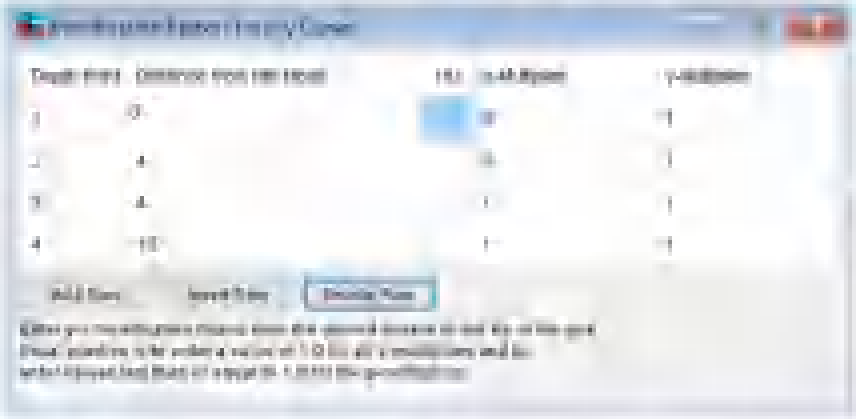
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	132	Stiff Clay w/o Free Water	4,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.



C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

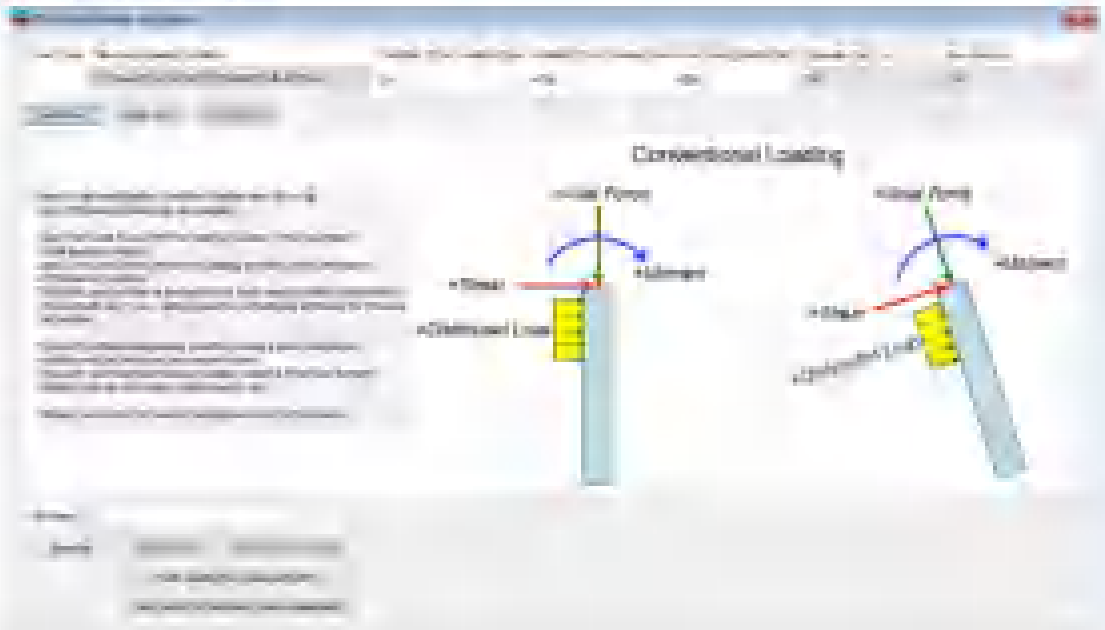
The Governing load combination is: **LC2 = DL + 0.75L + 0.45 WL**

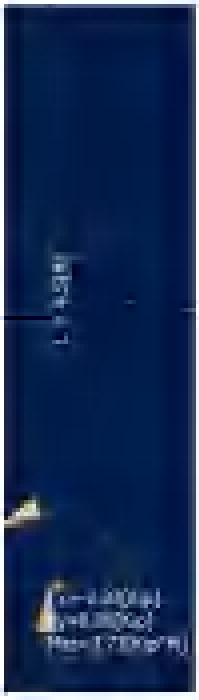
Axial: **8080lb**

Shear = **830 lb**

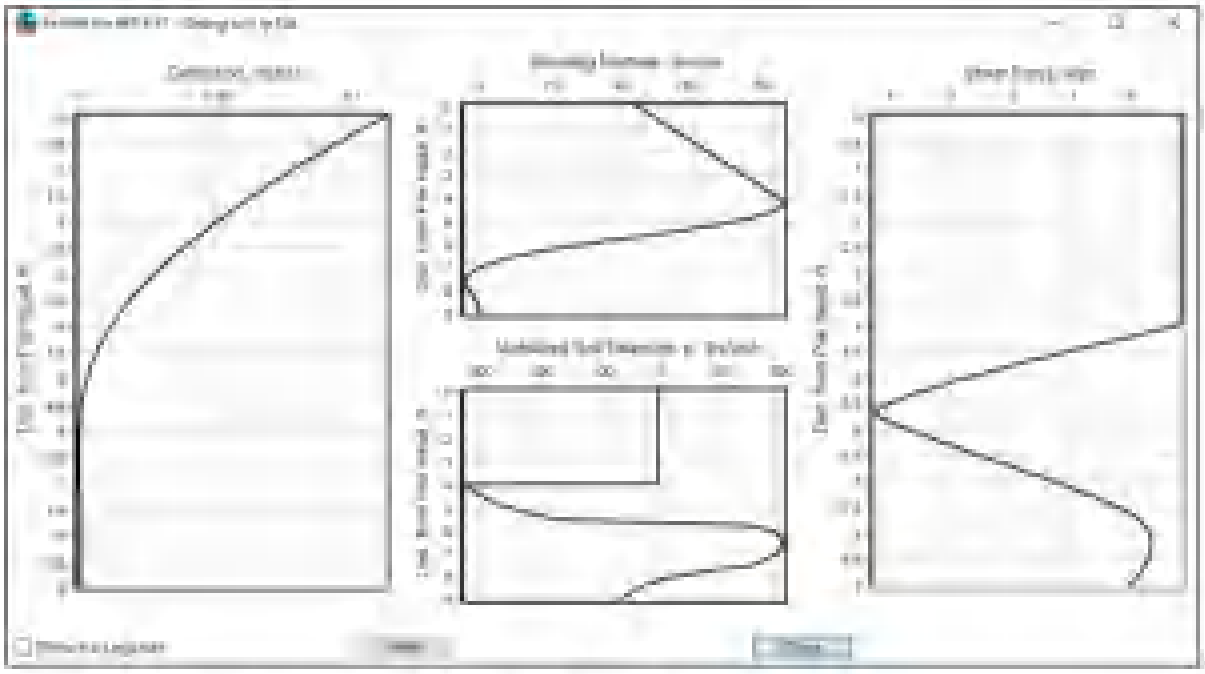
Moment = 3.73kips-ft = 3730 lb-ft = **44,760 lbs-in**

Load L-pile Inputs





D) L-Pile Result:



Shear force at pile head	=	830.0 lbs
Applied moment at pile head	=	44760.0 in-lbs
Axial thrust load on pile head	=	8000.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1125	44760.	830.0000	-0.00290	4258.	1.64E+09	0.00	0.00	0.00

Deflection = 0.12" < 0.50" W8X24 W/9ft Embedment min.

E) Moment capacity check:

Mn/Ω =(50 Ksi)*(14.5 in³)/1.67 = 434 Kip-in > 96.257 Kip-in OK!

Pile-head deflection	=	0.11254617 inches
Computed slope at pile head	=	-0.0029641 radians
Maximum bending moment	=	86622. inch-lbs
Maximum shear force	=	-4173. lbs
Depth of maximum bending moment	=	4.23000000 feet below pile head
Depth of maximum shear force	=	5.67000000 feet below pile head
Number of iterations	=	16
Number of zero deflection points	=	2

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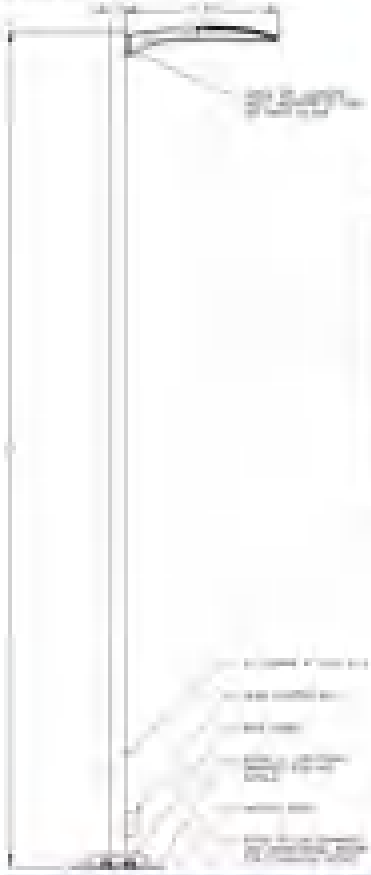
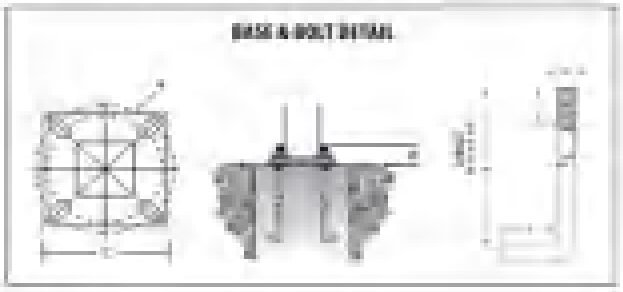
Light Pole Foundation Design

PUREPOWER ENGINEERING	Project:				Job Ref:	
Pure Power Engineering	Section:				Sheet no./rev.	
	Calc. by	Date	Ch'kd by	Date	Appd by	Date

Light Pole Foundation





Pole Length: [illegible] ft
Pole Width: [illegible] in.
Failure Horiz. Force: [illegible] lb
Failure Moment: [illegible] ft-lb
Failure Vert.: [illegible] lb
Tot. Pole Wt.: [illegible] lb

Light Pole Bending Moment

1. Flagpole Dead Load Eccentricity

Flagpole Moment: [illegible] ft-lb (ASD)

2. Impact Load - Person

Impact Load: [illegible] lb
Impact Dir.: [illegible] ft.
Impact Moment: [illegible] ft-lb (ASD)

Pure Power Engineering	Project:				Job Ref:	
	Section:				Sheet no./rev.	
	Calc. by	Date	Chkd by	Date	Appd by	Date

3. Wind Loading - Light Pole

Pure Power Engineering, Inc.	Client:	Longpoint	Date:	7/20/2025
	Site Name:	Channel Blvd	Prepared By:	NH
	Job No:	PPE-LT-1068.02	Checked By:	AR
	Subject:	Light Pole	Page:	1

DESIGN CRITERIA

Basic Site Criteria:

Equipment Height: h = 28.00' ft

Structure Type: Davit

Equipment Dimension:

Davit: B = 2.33 ft, A = 0.00 ft, Width = 4.00 ft

E =

Equipment Weight: W_E = 0.27 kip (Per Vendor)

Total Equipment Weight: W_T = 0.27 kip

Wind Design Parameters:

Risk Category: III

Ultimate Wind Speed: V_{ult} = 120 mph

Exposure Category: C

Topographic Category: 1

Topographic Factor: K_{zt} = 1.00

Gust Effect Factor: G_f = 0.85

Wind Directionality Factor: K_d = 0.95

Velocity Pressure Coefficient: K_z = 0.98

External Pressure Coefficient: G_f (Overhead) = 1.8

G_f (Horizontal) = 3.4

Wind Design Load:

Velocity Pressure: q_z = 32.84 psf $q_z = 0.00256 K_z K_{zt} K_d V^2$ (psf)

Vertical Wind Projected Area: A_f = 0.60 ft²

Horizontal Wind Load: F_H = 0.43 kip $F_H = q_z G C_f A_f$ Allowable $F_{H,allow}$ = 1.00 kip OK!

Horizontal Wind Projected Area: A_f = 0.33 ft²

Vertical Wind Load: F_V = 0.07 kip $F_V = q_z G C_f A_f$

PUREPOWER ENGINEERING Pure Power Engineering	Project:				Job Ref:	
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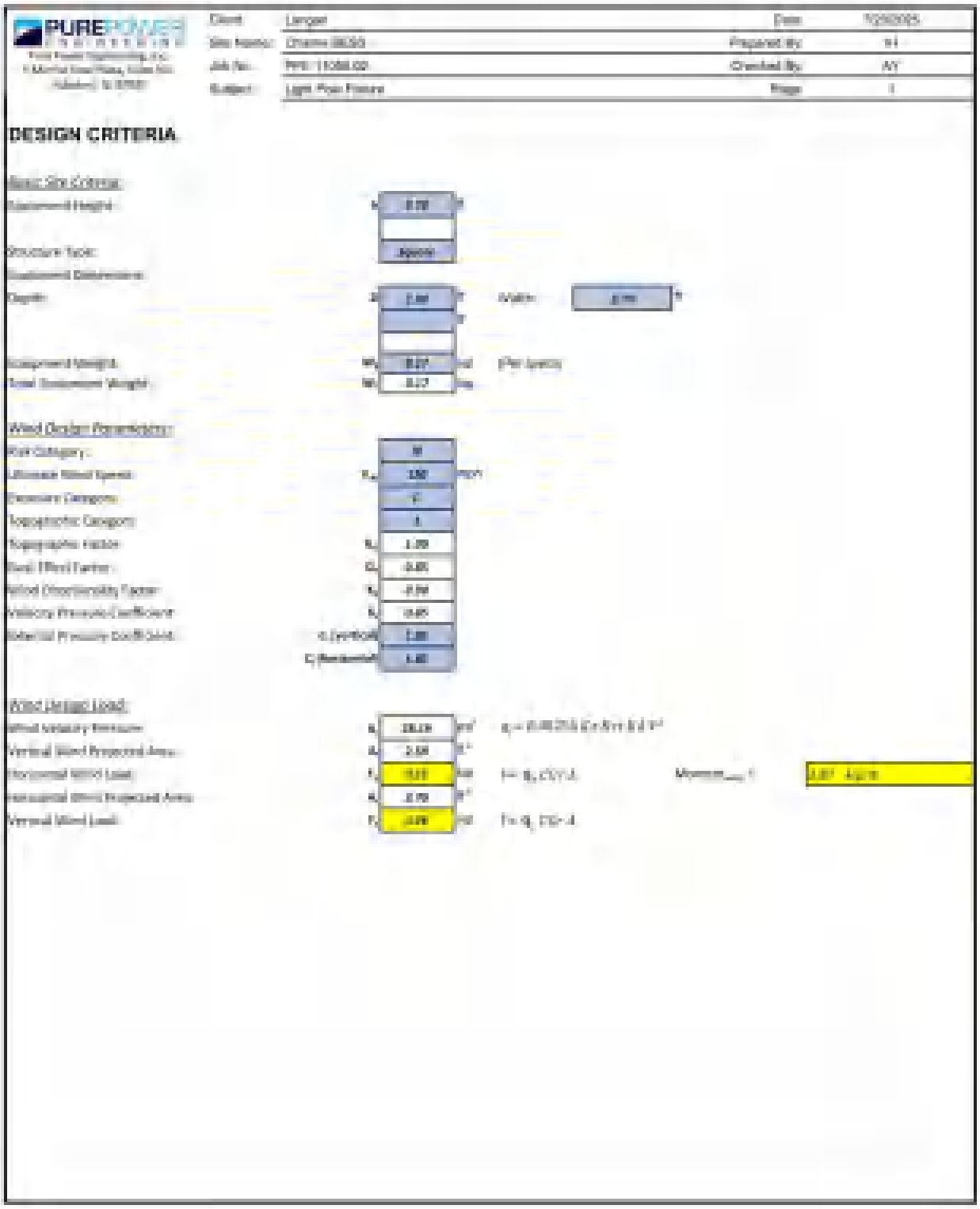
4. Wind Loading - Light Pole Fixture



PUREPOWER ENGINEERING

Client:	Langan	Date:	12/9/2025
Site Name:	Chelsea (BESS)	Prepared By:	YH
Job No.:	PPE-11068.00	Checked By:	AY
Subject:	Light Pole Fixture	Page:	1

DESIGN CRITERIA

Basic Site Criteria:

Equipment Height:

Structure Type:

Equipment Dimensions:

Depth:

Width:

Equipment Weight:

Total Equipment Weight:

(Per Spec)

Wind Design Parameters:

Risk Category:

Ultimate Wind Speed:

Exposure Category:

Topographic Category:

Topographic Factor:

Gust Effect Factor:

Wind Directionality Factor:

Velocity Pressure Coefficient:

Solar/Sil Pressure Coefficient:

Wind Design Load:

Wind Velocity Pressure:

Vertical Wind Projected Area:

Horizontal Wind Load:

Horizontal Wind Projected Area:

Vertical Wind Load:

Moment:

Pure Power Engineering	Project:				Job Ref.	
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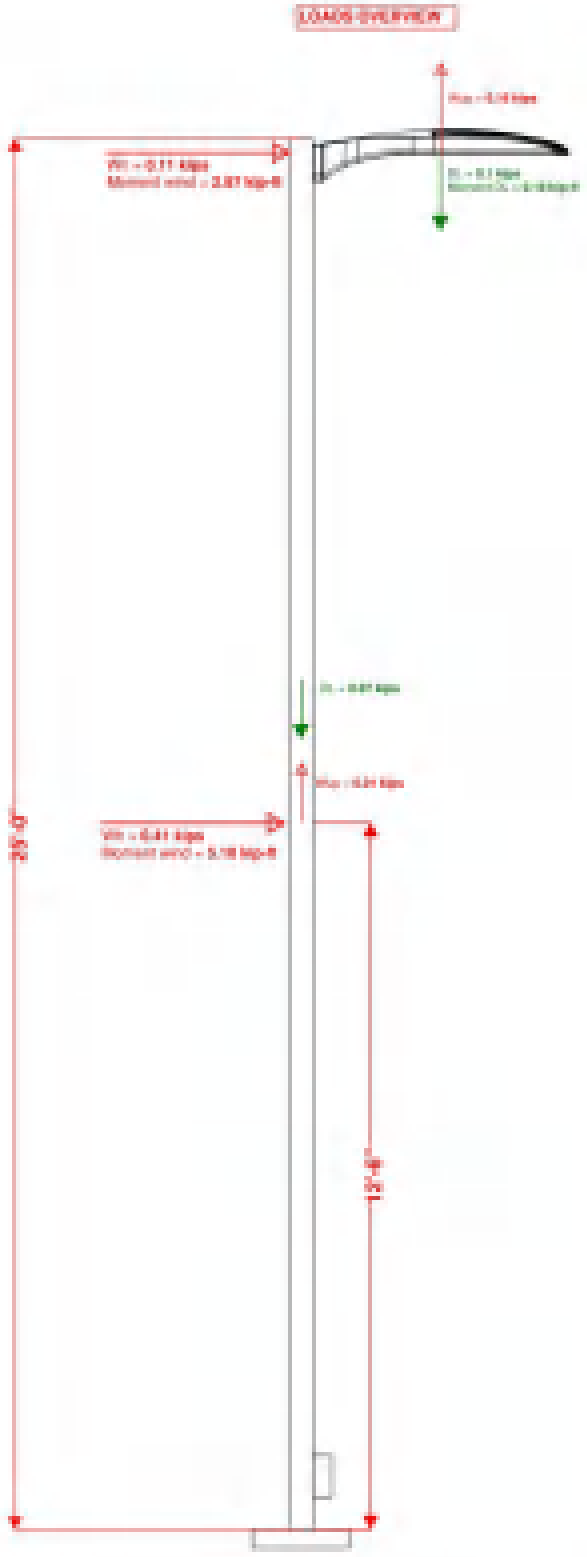

PUREPOWER ENGINEERING Pure Power Engineering	Project:				Job Ref.	
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	Calc. by	Date	Chk'd by	Date	Appr'd by	Date

Option 1 – Footing Design

Tekla Tedds Pure Power	Project				Job Ref	
	Section				Sheet no./rev. 1	
	Calc. by A	Date 7/20/2025	Chk'd by	Date	App'd by	Date

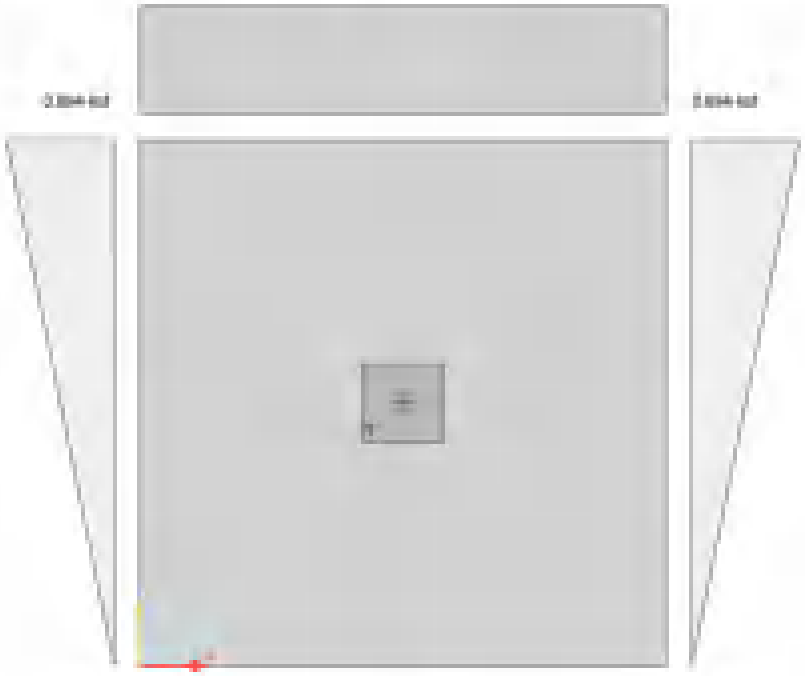
FOOTING ANALYSIS

In accordance with ACI318-14

Tedds calculation version 3.3.08

Pad footing details

Length of footing	L_x = **4.5** ft
Width of footing	L_y = **4.5** ft
Footing area	$A = L_x \times L_y$ = **20.25** ft²
Depth of footing	h = **36** in
Depth of soil over footing	h_{soil} = **0** in
Density of concrete	γ_{conc} = **150.0** lb/ft³



Column no.1 details

Length of column	l_{c1} = **8.00** in
Width of column	b_{c1} = **8.00** in
position in x-axis	x_1 = **27.00** in
position in y-axis	y_1 = **27.00** in

Soil properties

Gross allowable bearing pressure	q_{allow_Gross} = **2.5** ksf
Density of soil	γ_{soil} = **120.0** lb/ft³
Angle of internal friction	ϕ_b = **32.0** deg
Design base friction angle	δ_{bb} = **16.7** deg
Coefficient of base friction	$\tan(\delta_{bb})$ = **0.300**
Self weight	$F_{self} = h \times \gamma_{conc}$ = **450** psf

Tekla Tedds Prise Power	Project				Job No.	
	Section				Sheet no./rev. 2	
	Calc. by A	Date 7/20/2025	Chk'd by	Notes	Appr'd by	Date

Column no.1 loads

Dead load in z — $F_{z,D}$ = **0.2 kips**

Live roof load in z — $F_{z,L}$ = **0.2 kips**

Snow load in z — $F_{z,S}$ = **0.2 kips**

Wind load in z — $F_{z,W}$ = **-0.2 kips**

Wind load in y — $F_{y,W}$ = **0.5 kips**

Dead load moment in y — $M_{y,D}$ = **0.2 kip_ft**

Live load moment in y — $M_{y,L}$ = **0.7 kip_ft**

Wind load moment in y — $M_{y,W}$ = **0.0 kip_ft**

Footing analysis for soil and stability

Load combinations per IBC 2016

1.00 (0.188)

1.00 + 1.0L (0.207)

1.00 + 1.0Lr (0.192)

1.00 + 1.0S (0.192)

1.00 + 1.0R (0.188)

1.00 + 0.75L + 0.75Lr (0.206)

1.00 + 0.75L + 0.75S (0.206)

1.00 + 0.75L + 0.75R (0.202)

1.00 + 0.6W (0.307)

(1.0 + 0.14 - S_{DS})D + 0.7E (0.169)

1.00 + 0.75L + 0.75Lr + 0.45W (0.316)

1.00 + 0.75L + 0.75S + 0.45W (0.316)

1.00 + 0.75L + 0.75R + 0.45W (0.312)

(1.0 + 0.10 - S_{DS})D + 0.75L + 0.75S + 0.525E (0.206)

0.60 + 0.6W (0.483)

(0.6 - 0.14 - S_{DS})D + 0.7E (0.112)

Combination 15 results: 0.60 + 0.6W

Forces on footing

Force in y-axis — F_{fy} = $\gamma_{fy} \times F_{y,W}$ = **0.3 kips**

Force in z-axis — F_{fz} = $\gamma_D \times A_f \times F_{soil}$ + $\gamma_c \times (F_{z,D} + L_c \times L_f \times h_{wall} \times \gamma_{conc})$ + $\gamma_{fz} \times F_{z,W}$ = **8.5 kips**

Moments on footing

Moment in x-axis, about x is 0 — M_{fx} = $\gamma_D \times A_f \times F_{soil} \times L_f / 2$ + $\gamma_D \times ((F_{z,D} + L_c \times L_f \times h_{wall} \times \gamma_{conc}) \times x_c)$ + $\gamma_D \times (F_{z,W} \times x_c)$ = **12.8 kip_ft**

Moment in y-axis, about y is 0 — M_{fy} = $\gamma_D \times A_f \times F_{soil} \times L_f / 2$ + $\gamma_D \times ((F_{z,D} + L_c \times L_f \times h_{wall} \times \gamma_{conc}) \times y_c + M_{y,D})$ + $\gamma_{fz} \times (F_{z,W} \times y_c + M_{y,W} + F_{y,W} \times (h_f))$ = **18.1 kip_ft**

Uplift verification

Vertical force — F_{fz} = **8.468 kips**

PASS - Footing is not subject to uplift

Stability against overturning in x direction, moment about z is 0

Overturning moment — $M_{fx,ot}$ = $\gamma_{fx} \times (F_{y,W} \times z_c)$ = **-8.33 kip_ft**

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Resisting moment $M_{res} = \gamma_{G,fav} \cdot A \cdot P_{res} \cdot L_x / 2 + \gamma_{G,fav} \cdot ((P_{conc} \cdot b_c \cdot L_y \cdot h_{ped} \cdot \rho_{conc}) \cdot L_x / 2) = 12.53$ kip_ft

Factor of safety $abs(M_{res} / M_{ovx}) = 54.693$

PASS - Overturning moment safety factor exceeds the minimum of 1.50

Stability against overturning in x direction, moment about x is L_x

Overturning moment $M_{ovx} = V_{ult} \cdot (h_{ped} - L_x/2) = 0.23$ kip_ft

Resisting moment $M_{res} = -1 \cdot \gamma_{G,fav} \cdot A \cdot P_{res} \cdot L_x / 2 + \gamma_{G,fav} \cdot ((P_{conc} \cdot b_c \cdot L_y \cdot h_{ped} \cdot \rho_{conc}) \cdot (h_{ped} - L_x/2) = 12.53$ kip_ft

Factor of safety $abs(M_{res} / M_{ovx}) = 54.693$

PASS - Overturning moment safety factor exceeds the minimum of 1.50

Stability against overturning in y direction, moment about y is 0

Overturning moment $M_{ovy} = \gamma_{G,unfav} \cdot (P_{conc} \cdot \gamma_{G,unfav}) = -8.25$ kip_ft

Resisting moment $M_{resy} = \gamma_{G,fav} \cdot A \cdot P_{res} \cdot L_y / 2 + \gamma_{G,fav} \cdot ((P_{conc} \cdot b_c \cdot L_y \cdot h_{ped} \cdot \rho_{conc}) \cdot \gamma_{G,fav} \cdot M_{ovy} + \gamma_{G,fav} \cdot (M_{resy} + P_{resy} \cdot |N|) = 18.38$ kip_ft

Factor of safety $abs(M_{resy} / M_{ovy}) = 19.998$

PASS - Overturning moment safety factor exceeds the minimum of 1.50

Stability against overturning in y direction, moment about y is L_y

Overturning moment $M_{ovy} = \gamma_{G,unfav} \cdot (M_{ovy} + \gamma_{G,unfav} \cdot (P_{conc} \cdot (y - L_y/2) \cdot M_{ovy} + \gamma_{G,unfav} \cdot (N)) = 8.08$ kip_ft

Resisting moment $M_{resy} = -1 \cdot \gamma_{G,fav} \cdot A \cdot P_{res} \cdot L_y / 2 + \gamma_{G,fav} \cdot ((P_{conc} \cdot b_c \cdot L_y \cdot h_{ped} \cdot \rho_{conc}) \cdot (\gamma_{G,fav} \cdot L_y/2)) = 12.53$ kip_ft

Factor of safety $abs(M_{resy} / M_{ovy}) = 2.099$

PASS - Overturning moment safety factor exceeds the minimum of 1.50

Stability against sliding

Resistance due to base friction $F_{resx} = \gamma_{G,fav} \cdot P_{res} \cdot \tan(\delta_b) = 1.64$ kips

Stability against sliding in y direction

Total sliding resistance $F_{resy} = F_{resx} = 1.64$ kips

Factor of safety $abs(F_{resy} / F_{ovy}) = 6.26$

PASS - Sliding factor of safety exceeds the minimum of 1.50

Bearing resistance

Eccentricity of base reaction

Eccentricity of base reaction in x-axis $e_{bx} = M_{ovy} / (\gamma_{G,unfav} \cdot P_{conc}) = 0$ in

Eccentricity of base reaction in y-axis $e_{by} = M_{ovx} / (\gamma_{G,unfav} \cdot P_{conc}) - L_y / 2 = 12.791$ in

Length of bearing in y-axis $L_{yy} = \min(L_y, 3 \cdot (L_y / 2 - abs(e_{by}))) = 42.628$ in

Pad base pressures

$q_1 = 0$ ksf

$q_2 = 0.634$ ksf

$q_3 = 0$ ksf

$q_4 = 0.634$ ksf

Minimum base pressure $q_{min} = \min(q_1, q_2, q_3, q_4) = 0$ ksf

Maximum base pressure $q_{max} = \max(q_1, q_2, q_3, q_4) = 0.634$ ksf

Allowable bearing capacity

Allowable bearing capacity $q_{all} = q_{allow_user} = 2.5$ ksf

q_{max} / q_{allow} = **0.274**

PASS - Allowable bearing capacity exceeds design base pressure

FOOTING DESIGN

In accordance with ACI318-14

Tedds calculation version 1.3.09

Material details

Compressive strength of concrete	f'_c = **3500** psi
Yield strength of reinforcement	f_y = **60000** psi
Compression-controlled strain limit (21.2.2)	ε_{cy} = **0.00200**
Cover to top of footing	$c_{top,f}$ = **1.5** in
Cover to side of footing	$c_{side,f}$ = **3** in
Cover to bottom of footing	$c_{base,f}$ = **3** in
Concrete type	Normal weight
Concrete modification factor	λ = **1.00**
Column type	Concrete

Analysis and design of concrete footing

Load combinations per IBC 2018

1.4D (0.008)
1.2D + 1.6L + 0.5Lr (0.001)
1.2D + 1.6L + 0.5S (0.001)
1.2D + 1.6L + 0.5R (0.001)
1.2D + 1.0L + 1.6Lr (0.001)
1.2D + 1.0L + 1.6S (0.001)
1.2D + 1.0L + 1.6R (0.001)
1.2D + 1.6Lr + 0.5W (0.004)
1.2D + 1.6S + 0.5W (0.004)
1.2D + 1.6R + 0.5W (0.004)
1.2D + 1.0L + 0.5Lr + 1.0W (0.007)
1.2D + 1.0L + 0.5S + 1.0W (0.008)
1.2D + 1.0L + 0.5R + 1.0W (0.008)
(1.2 + 0.2 × S_{DS})D + 1.0L + 0.2S + 1.0E (0.001)
0.9D + 1.0W (0.005)
(0.9 - 0.2 × S_{DS})D + 1.0E (0.000)

Combination 11 results: 1.2D + 1.0L + 0.5Lr + 1.0W

Forces on footing

Ultimate force in y-axis	F_{yu} = γ_{conc} × F_{flap} = **0.5** kips
Ultimate force in z-axis	F_{zu} = γ_D × A × $F_{soil,allow}$ × (F_{DL} + L_r × k_{Lr} × R_{red} × n_{col}) + γ_L × (F_{LL} + n_{col} × F_{col}) + γ_W × F_{WU} = **11.1** kips

Moments on footing

Ultimate moment in x-axis, about y is 0	M_{xu} = γ_D × A × F_{soil} × L_x / 2 + γ_D × ((F_{DL} - L_r × k_{Lr} × R_{red} × n_{col}) × x) + γ_{Lr} × (F_{LL} × x) + γ_W × (F_{WU} × x) = **24.9** kip_ft

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Ultimate moment in y-axis about y to 0 $M_{uy} = p_{z1} \times A_1 \times F_{ult} \times L_y / 2 + p_{z1} \times (((F_{ult} \times h_1 + p_{y1} \times h_{col}) \times y) + M_{uy1}) + p_{z2} \times (M_{uy1} + p_{z1} \times (F_{ult} \times y) + p_{z2} \times (F_{ult} \times y) + M_{uy2} + F_{uy2} \times (0)) = 35.4$ kip_ft

Eccentricity of base reaction

Eccentricity of base reaction in x-axis $e_{bx} = M_{uy} / F_{ult} - L_x / 2 = 0$ in

Eccentricity of base reaction in y-axis $e_{by} = M_{ux} / F_{ult} - L_y / 2 = 11.329$ in

Length of bearing in y-axis $L_{yb} = \max(L_y / 3, (L_y / 2 - \text{abs}(e_{by}))) = 47.614$ in

Pad base pressures

$q_{z1} = 0$ ksf

$q_{z2} = 1.258$ ksf

$q_{z3} = 0$ ksf

$q_{z4} = 1.258$ ksf

Minimum ultimate base pressure $q_{min} = \min(q_{z1}, q_{z2}, 0) = 0$ ksf

Maximum ultimate base pressure $q_{max} = \max(q_{z1}, q_{z2}, 0) = 1.258$ ksf

Shear diagram, x axis (kips)

Moment diagram, x axis (kip_ft)

Moment design, x direction, positive moment

Ultimate bending moment $M_{x,bot} = 0.058$ kip_ft

Tension reinforcement provided 8 No.8 bottom bars @7 in c/c

Area of tension reinforcement provided $A_{s,bot,prov} = 3.52$ in²

Minimum area of reinforcement (8.6.1.1) $A_{s,min} = 0.0018 \times L_y \times h = 3.499$ in²

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinforcement (8.7.2.2) $s_{max} = \min(2 \times h, 18\text{ in}) = 18$ in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinforcement $d = h - c_{bot,y} - \phi_{y,bot} - \phi_{x,bot} / 2 = 31.875$ in

Depth of compression block $a = A_{s,bot,prov} \times f_y / (0.85 \times f'_c \times L_y) = 1.316$ in

Neutral axis factor $\beta_1 = 0.85$

Depth to neutral axis $c = a / \beta_1 = 1.547$ in

Strain in tensile reinforcement $\varepsilon_t = 0.003 \times (d / c - 0.003) = 0.05883$

Minimum tensile strain (8.3.3.1) $\varepsilon_{t,min} = 0.004 = 0.00400$

PASS - Tensile strain exceeds minimum required

Nominal moment capacity — $M_n = A_{s,provided} \times f_y \times (d - a / 2) =$ **548.431** kip_ft

Flexural strength reduction factor — $\phi = \min(\max(0.65 + 0.25 \times (\varepsilon_t - \varepsilon_{ty}) / (0.005 - \varepsilon_{ty}), 0.65), 0.9) =$ **0.900**

Design moment capacity — $\phi M_n = \phi \times M_n =$ **494.488** kip_ft

$M_{y,ult} / \phi M_n =$ **0.800**

PASS - Design moment capacity exceeds ultimate moment load

One-way shear design, x direction

One-way shear design does not apply. Shear failure plane fall outside extents of foundation

Shear diagram, y axis (kips)

Moment diagram, y axis (kip_ft)

Moment design, y direction, positive moment

Ultimate bending moment — $M_{y,ult} =$ **4.223** kip_ft

Tension reinforcement provided — 8 bars in bottom layer (0.7 in c/c)

Area of tension reinforcement provided — $A_{s,provided} =$ 3.62 in²

Minimum area of reinforcement (8.6.1.1) — $A_{s,min} = 0.0018 \times b_w \times h =$ **3.456** in²

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinforcement (8.7.2.2) — $s_{max} = \min(2 \times h, 18 \text{ in}) =$ **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinforcement — $d = h - c_{clear} - d_{bar} / 2 =$ **22.625** in

Depth of compression block — $a = A_{s,provided} \times f_y / (0.85 \times f'_c \times L_y) =$ **1.315** in

Neutral axis factor — $\beta_1 =$ **0.85**

Depth to neutral axis — $c = a / \beta_1 =$ **1.547** in

Strain in tensile reinforcement — $\varepsilon_t = 0.003 \times (d / c - 0.003) =$ **0.36028**

Minimum tensile strain (9.3.3) — $\varepsilon_{ty} = 0.004 =$ **0.00400**

PASS - Tensile strain exceeds minimum required

Nominal moment capacity — $M_n = A_{s,provided} \times f_y \times (d - a / 2) =$ **562.631** kip_ft

Flexural strength reduction factor — $\phi = \min(\max(0.65 + 0.25 \times (\varepsilon_t - \varepsilon_{ty}) / (0.005 - \varepsilon_{ty}), 0.65), 0.9) =$ **0.900**

Design moment capacity — $\phi M_n = \phi \times M_n =$ **506.368** kip_ft

$M_{y,ult} / \phi M_n =$ **0.833**

PASS - Design moment capacity exceeds ultimate moment load

Tekla Tedds Pad Piles	Project				Job Ref	
	Location				Sheet no./rev. 7	
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Moment design, y direction, negative moment

Ultimate bending moment	$M_{y,ult,neg} = -3.853$ kip_ft
Tension reinforcement provided	6 No.8 top bars @7 in c/c
Area of tension reinforcement provided	$A_{s,prov,neg} = 3.52$ in²
Minimum area of reinforcement (8.6.1.1)	$A_{s,min} = 0.0018 \cdot l_{min} \cdot h = 3.469$ in²
	PASS - Area of reinforcement provided exceeds minimum
Maximum spacing of reinforcement (8.7.2.2)	$s_{max} = \min(2 \cdot h, 18\ in) = 18$ in
	PASS - Maximum permissible reinforcement spacing exceeds actual spacing
Depth to tension reinforcement	$d = h - c_{base} - \phi_{bar,y} / 2 = 34.125$ in
Depth of compression block	$a = A_{s,prov,neg} \cdot f_y / (0.85 \cdot f'_c \cdot l_{min}) = 1.319$ in
Neutral axis factor	$\beta_1 = 0.85$
Depth to neutral axis	$c = a / \beta_1 = 1.547$ in
Strain in tension reinforcement	$\varepsilon_t = 0.003 \cdot (d - c) / c - 0.003 = 0.06318$
Minimum tensile strain (8.3.3.1)	$\varepsilon_{t,min} = 0.004 = 0.05469$
	PASS - Tensile strain exceeds minimum required
Nominal moment capacity	$M_n = A_{s,prov,neg} \cdot f_y \cdot (d - a/2) = 836.031$ kip_ft
Flexural strength reduction factor	$\phi = \max(\min(0.65 + 0.25 \cdot (\varepsilon_t - \varepsilon_{ty}) / (0.005 - \varepsilon_{ty}), 0.9), 0.65) = 0.906$
Design moment capacity	$\phi M_n = \phi \cdot M_n = 836.128$ kip_ft
	$abs(M_{y,ult,neg}) / \phi M_n = 0.007$
	PASS - Design moment capacity exceeds ultimate moment load

One-way shear design, y direction

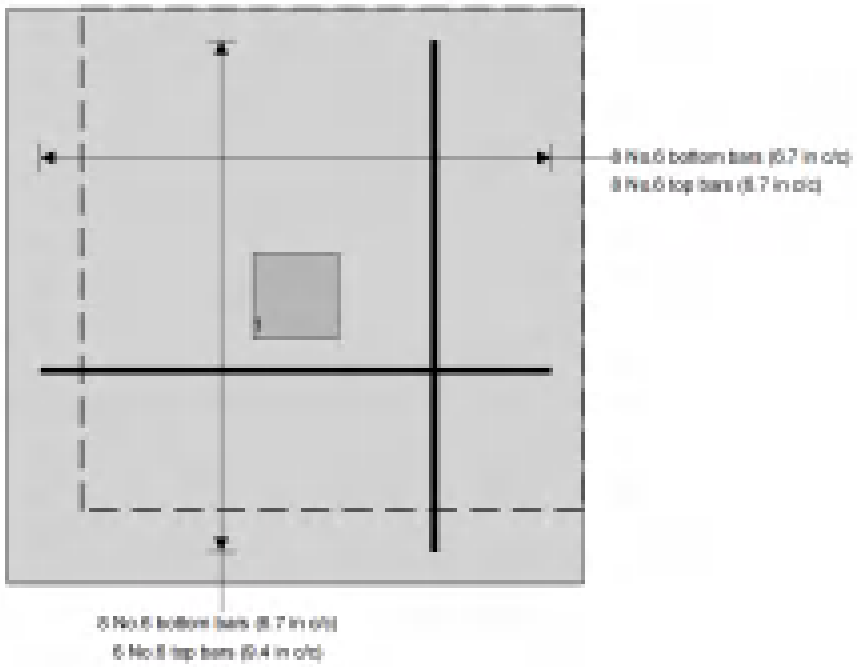
One-way shear design does not apply. Shear failure plane fall outside extents of foundation

Two-way shear design at column 1

Depth to reinforcement	$d_{v1} = 32.25$ in
Shear perimeter length (22.6.4)	$l_{p1} = 41.125$ in
Shear perimeter width (22.6.4)	$l_{p2} = 41.125$ in
Shear perimeter (22.6.4)	$b_{p1} = l_{p1} + l_{p2} = 84.250$ in
Shear area	$A_{p1} = l_{p1} \cdot l_{p2} = 3236.769$ in²
Surcharge loaded area	$A_{sur} = A_p - l_{p1} \cdot l_{p2} = 2166.769$ in²
Ultimate bearing pressure at centre of shear area	$q_{p,ult} = 2.032$ ksf
Ultimate shear load	$F_{v,ult} = (F_{v,ult} - l_{p1} \cdot l_{p2}) \cdot q_{p,ult} + F_{v,ult} \cdot l_{p1} \cdot l_{p2} / A_p \cdot q_{p,ult} / A_p = 29.436$ kips
Ultimate shear stress from vertical load	$v_{up} = \max(F_{v,ult} / (b_{p1} \cdot d_{v1}), 0\ psi) = 0.868$ psi
Column geometry factor (Table 22.6.5.2)	$\beta = l_{p1} / l_{p2} = 1.00$
Column location factor (22.6.5.3.4)	$\alpha_{s1} = 30$
Concrete shear strength (22.6.5.2)	$v_{c1} = (2 + 4 / \beta) \cdot \lambda \cdot \sqrt{f'_c} = (2 + 4 / 1.00) \cdot 1.00 \cdot \sqrt{5000\ psi} = 564.965$ psi
	$v_{c2} = (\alpha_{s1} \cdot d_{v1} / b_{p1} + 2) \cdot \lambda \cdot \sqrt{f'_c} = (30 \cdot 32.25\ in / 84.250\ in + 2) \cdot 1.00 \cdot \sqrt{5000\ psi} = 531.169$ psi
	$v_{c3} = 4 \cdot \lambda \cdot \sqrt{f'_c} = 4 \cdot 1.00 \cdot \sqrt{5000\ psi} = 282.843$ psi
	$v_c = \min(v_{c1}, v_{c2}, v_{c3}) = 282.843$ psi
Shear strength reduction factor	$\phi_v = 0.75$
Nominal shear stress capacity (Eq. 22.6.1.2)	$v_n = v_c = 282.843$ psi
Design shear stress capacity (8.5.1.1(d))	$\phi v_n = \phi_v \cdot v_n = 177.482$ psi

$V_{sg} / \phi v_c$ = **0.000**

PASS - Design shear stress capacity exceeds ultimate shear stress load



Option 2 – Sonotube Design

Tekla Tedds
Pure Pow Engineering
111 River Street
Suite 1110
Hoboken, NJ 07030

Project					Job Ref.	
Section					Sheet no./rev. 1	
Calc. by	Date 7/20/2025	Checked by	Date		Approved by	Date

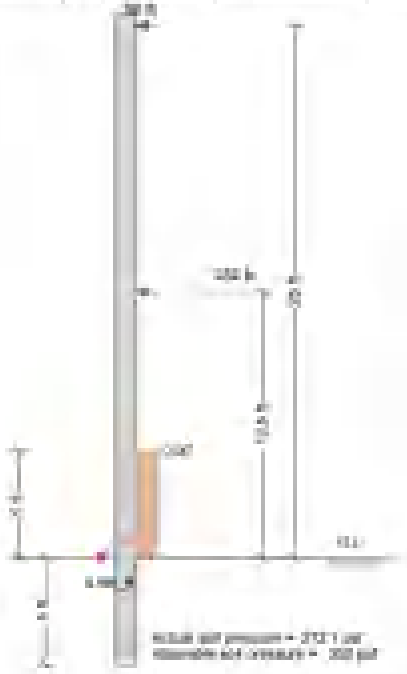
FLAGPOLE EMBEDMENT (IBC)

In accordance with IBC 2018

Tedds calculation version 1.2.04

Design summary

Description	Unit	Allowable	Actual	Utilization	Result
Lateral passive pressure	psf	300.0	272.1	0.91	PASS



Soil capacity data

Allowable passive pressure	L_{allow} = **100** pcf
Maximum allowable passive pressure	P_{max} = **150** psf
Load factor 1 (1806.1)	LDF_1 = **1.00**
Load factor 2 (1806.3.4)	LDF_2 = **2.0**

Pole geometry

Shape of the pole	**Round**
Diameter of the pole	Dia = **36** in
Laterally restrained	**Yes**

Load data

First point load	P_1 = **66** lbs
Distance of P_1 from ground surface	H_1 = **25** ft
Second point load	P_2 = **252** lbs
Distance of P_2 from ground surface	H_2 = **12.5** ft
Uniformly distributed load	W = **0** plf
Start distance of W from ground surface	a = **0** ft
End distance of W from ground surface	a_1 = **5** ft
Applied moment	M_1 = **0.0** lb_ft

Distance of M_1 from ground surface $H_3 = 0$ ft

Shear force and bending moment

Total shear force $F = P_1 + P_2 + W \cdot (a_0 - a) = 318$ lbs

Total bending moment at grade $M_g = P_1 \cdot H_1 + P_2 \cdot H_2 + W \cdot (a_1 - a) \cdot (a + a_1) / 2 + M_1 = 4808.9$ lb_ft

Distance of resultant lateral force $h = \text{abs}(M_g / F) = 15.1$ ft

Embedment depth (1807.3.2.2)

Embedment depth provided $D = 5$ ft

Allowable lateral passive pressure $S_3 = \min(P_{max}, L_{abv} \cdot \min(D, 12\text{ ft})) \cdot LDF_1 \cdot LDF_2 = 360$ psf

Embedment depth required $D_1 = ((4.25 \cdot \text{abs}(F) \cdot h) / (S_3 \cdot Dia))^{0.5} = 4.76$ ft

Actual lateral passive pressure $S_4 = (4.25 \cdot \text{abs}(F) \cdot h) / (D^2 \cdot Dia) = 272.1$ psf

PASS - Provided depth is adequate

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	Section:				Sheet no./rev.	
	Calc. by	Date	Check by	Date	Appd by	Date

Evaluation of Sonotube Diameter and Verification of Bearing Capacity

Max Axial force on the pipe is 170 + 200 = **370 lb.**

P axial = 370 lbs + conc wt (7.07x5'x0.150) = **5.7 kip.**

Q = P axial / Area = 5700 lb / 7.07 ft^2 = **802 psf < 20,000 psf** (allowable bearing pressure)

therefore, a 36" diameter sonotube minimum.

Sonotube Design (Depth) Using Tedds.

5ft Embedment is ok!

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Hoboken, NJ 07030
Tel: 201-987-8855
tomtower@quarrelbum.com

Project					Job Ref	
Section					Sheet no./ rev. 1	
Calc. by A	Date 7/20/2025	Checked	Notes		Approved by	Date

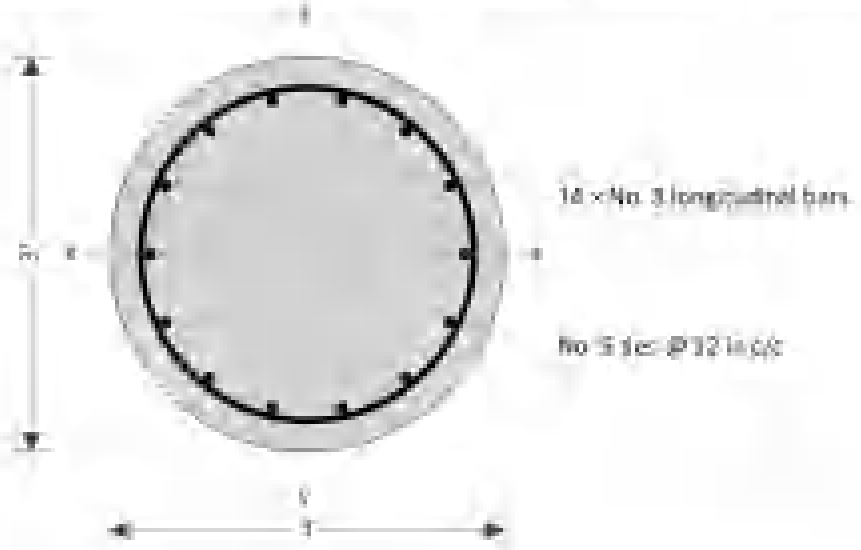
RC COLUMN DESIGN

In accordance with ACI318-14

Tedds calculation version 4.2.07

Design summary

Description	Unit	Capacity	Applied	Utilization	Result
For ultimate axial load 0.7 kips					PASS
Bending, x axis	kip_ft	80.1.8	0.7	0.012	PASS



Applied loads

Ultimate axial force acting on column	P_{u_ult} = **0.17** kips
Ultimate moment about major (X) axis	M_{ux_ult} = **0.87** kips_ft

Geometry of column

Column diameter	h = **36.0** in
Clear cover to all reinforcement	c_c = **2.50** in
Unsupported height of column about x axis	L_x = **5.0** ft
Effective height factor about x axis	k_x = **2.00**
Column sway about the x axis	Braced
Unsupported height of column about y axis	L_y = **5.0** ft
Effective height factor about y axis	k_y = **2.00**
Column sway about the y axis	Braced

Reinforcement of column

Numbers of bars of longitudinal steel	N = **14**
Longitudinal steel bar diameter number	D_{bar_num} = **8**
Diameter of longitudinal bar	D_{long} = **1.000** in
Stirrup bar diameter number	D_{tie_num} = **5**
Diameter of stirrup bar	D_{tie} = **0.625** in
Specified yield strength of reinforcement	f_y = **60000** psi
Specified compressive strength of concrete	f'_c = **3500** psi

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	Section				Sheet no./ rev. 2	
	Calc. by A	Date 7/20/2025	Chk'd by	Date	Appd'd by	Date

Modulus of elasticity of bar reinforcement $E_s = 29 \cdot 10^6$ psi

Modulus of elasticity of concrete $E_c = 57000 \cdot f'^{0.5} \cdot (1\,psi)^{0.5} = 3372165$ psi

Yield strain $\varepsilon_y = f_y / E_s = 0.00207$

Ultimate design strain $\varepsilon_u = 0.003$ mm

Check for minimum area of steel

Gross area of column $A_g = \pi \cdot r^2 / 4 = 1017.876$ in²

Area of steel $A_{st} = N_b \cdot (\pi \cdot (D_{bar})^2) / 4 = 10.998$ in²

Minimum area of steel required $A_{st_min} = 0.01 \cdot A_g = 10.179$ in²

$A_{st} > A_{st_min}$ **PASS - Minimum steel check**

Check for maximum area of steel - 10.6.1.1

Permissible maximum area of steel $A_{st_max} = 0.08 \cdot A_g = 81.430$ in²

$A_{st} < A_{st_max}$ **PASS - Maximum steel check**

Design of column ties - 25.7.2

Spacing of lateral ties $s_{ties} = 12.000$ in

16 times longitudinal bar diameter $L_1 = 16 \cdot D_{bar} = 16.000$ in

48 times tie bar diameter $L_2 = 48 \cdot D_{tie} = 30.000$ in

Least column dimension $L_3 = \min(h, b) = 36.000$ in

Required tie spacing $s = \min(s_{ties}, L_1, L_2) = 16.000$ in

$s_{prov} < s$ **PASS**

Slenderness check about x axis

Radius of gyration $r_x = 0.25 \cdot h = 9$ in

Actual slenderness ratio $sr_{x_act} = k_x \cdot l_{ux} / r_x = 13.33$

Slenderness ratio is less than 22, slenderness effects may be neglected

Slenderness check about y axis

Radius of gyration $r_y = 0.25 \cdot h = 9$ in

Actual slenderness ratio $sr_{y_act} = k_y \cdot l_{uy} / r_y = 13.33$

Slenderness ratio is less than 22, slenderness effects may be neglected

Axial load capacity of axially loaded column

Strength reduction factor $\phi = 0.650$

Area of steel in compression face $A_{sc} = A_{st} / 2 = 5.499$ in²

Area of steel in tension face $A_{st} = A_{st} / 2 = 5.498$ in²

Net axial load capacity of column $P_n = 0.8 \cdot (0.85 \cdot f'_c \cdot (A_g - A_{st}) + f_y \cdot A_{st}) = 2524.163$ kips

Ultimate axial load capacity of column $P_u = \phi \cdot P_n = 1909.786$ kips

***PASS* - Column is safe in axial loading**

Biaxially loaded circular column

Details of column cross section

d/h ratio $\gamma = 0.833$

Depth of tension steel $d' = h - c_{cc} = 32.615$ in

Depth of N.A. from extreme compression face $c_c = f_{cc} \cdot h = 7.662$ in

Factor of depth of compressive stress block $\beta_1 = 0.850$

Depth of equivalent rectangular stress block $a = \min(\beta_1 \cdot c_c, h) = 6.513$ in

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Net angle subtended by compression concrete: $\theta_{net} = \arccos((h/2 - d_s)/(h/2)) = 50.3$ deg

Angle in radians: $\theta_{rad} = \theta_{net} / 90\ deg \times \pi/2 = 0.879$

Area of compression concrete: $A_{conc} = h^2 \times (\theta_{rad} - \sin(\theta_{rad}) \times \cos(\theta_{rad}))/4 = 125.898$ in²

Moment of area of compressive block: $I_{conc} = h^4 \times (\sin(\theta_{rad}))^3/12 = 1774.227$ in⁴

Yield strain in steel: $\varepsilon_y = f_y / E_s = 0.002$

Strength reduction factor: $\phi = 0.900$

Details of concrete block

Force carried by concrete

Forces carried by concrete: $P_{conc} = 0.85 \times f'_c \times A_{conc} = 373.357$ kips

Moment carried by concrete

Moment carried by concrete: $M_{conc} = 0.85 \times f'_c \times I_{conc} = 439.861$ kip_ft

Details of steel layer 1

Depth of layer: $x_{s1} = 3.956$ in

Strain of layer: $\varepsilon_{s1} = \varepsilon_c \times (1 - x_{s1} / c_n) = 0.00144$

Stress in layer: $\sigma_{s1} = \max(f_y, E_s \times \varepsilon_{s1}) - 0.85 \times f'_c = 38772.27$ psi

Force carried by layer: $P_{s1} = 2 \times A_{bar} \times \sigma_{s1} = 80.983$ kips

Moment carried by steel layer: $M_{s1} = P_{s1} \times (h/2 - x_{s1}) = 71.128$ kip_ft

Details of steel layer 2

Depth of layer: $x_{s2} = 8.791$ in

Strain of layer: $\varepsilon_{s2} = \varepsilon_c \times (1 - x_{s2} / c_n) = 0.00025$

Stress in layer: $\sigma_{s2} = \max(f_y, E_s \times \varepsilon_{s2}) = 59225.63$ psi

Force carried by layer: $P_{s2} = 2 \times A_{bar} \times \sigma_{s2} = 16.059$ kips

Moment carried by steel layer: $M_{s2} = P_{s2} \times (h/2 - x_{s2}) = 15.048$ kip_ft

Details of steel layer 3

Depth of layer: $x_{s3} = 11.791$ in

Strain of layer: $\varepsilon_{s3} = \varepsilon_c \times (1 - x_{s3} / c_n) = -0.00181$

Stress in layer: $\sigma_{s3} = \max(-1 \times f_y, E_s \times \varepsilon_{s3}) = -46983.18$ psi

Force carried by layer: $P_{s3} = 2 \times A_{bar} \times \sigma_{s3} = -23.141$ kips

Moment carried by steel layer: $M_{s3} = P_{s3} \times (h/2 - x_{s3}) = -38.016$ kip_ft

Details of steel layer 4

Depth of layer: $x_{s4} = 16.500$ in

Strain of layer: $\varepsilon_{s4} = \varepsilon_c \times (1 - x_{s4} / c_n) = -0.00405$

Stress in layer: $\sigma_{s4} = \max(-1 \times f_y, E_s \times \varepsilon_{s4}) = -60000.00$ psi

Force carried by layer: $P_{s4} = 2 \times A_{bar} \times \sigma_{s4} = -54.248$ kips

Moment carried by steel layer: $M_{s4} = P_{s4} \times (h/2 - x_{s4}) = 0.000$ kip_ft

Details of steel layer 5

Depth of layer: $x_{s5} = 24.237$ in

Strain of layer: $\varepsilon_{s5} = \varepsilon_c \times (1 - x_{s5} / c_n) = -0.00649$

Stress in layer: $\sigma_{s5} = \max(-1 \times f_y, E_s \times \varepsilon_{s5}) = -60000.00$ psi

Force carried by layer: $P_{s5} = 2 \times A_{bar} \times \sigma_{s5} = -54.248$ kips

Moment carried by steel layer $M_{sc} = P_{s3} \times (h / 2) - x_{s3}) = 48.956$ kip_ft

Details of steel layer 6

Depth of layer $x_{s6} = 29.239$ in

Strain of layer $\varepsilon_{s6} = \varepsilon_c \times (1 - x_{s6} / c_b) = -0.00845$

Stress in layer $\sigma_{s6} = \max(-f_y, E_s \times \varepsilon_{s6}) = -60000.00$ psi

Force carried by layer $P_{s6} = 2 \times A_{bar} \times \sigma_{s6} = -94.248$ kips

Moment carried by steel layer $M_{s6} = P_{s6} \times (h / 2) - x_{s6}) = 89.270$ kip_ft

Details of steel layer 7

Depth of layer $x_{s7} = 32.616$ in

Strain of layer $\varepsilon_{s7} = \varepsilon_c \times (1 - x_{s7} / c_b) = -0.00963$

Stress in layer $\sigma_{s7} = \max(-f_y, E_s \times \varepsilon_{s7}) = -60000.00$ psi

Force carried by layer $P_{s7} = 2 \times A_{bar} \times \sigma_{s7} = -94.248$ kips

Moment carried by steel layer $M_{s7} = P_{s7} \times (h / 2) - x_{s7}) = 113.970$ kip_ft

Force carried by steel

Sum of forces by steel $P_{sc} = -373.2$ kips

Total force carried by column

Nominal axial load strength $P_{n3} = 0.196$ kips

Strength reduction factor $\phi_c = 0.900$

Ultimate axial load carrying capacity of column $P_{c3} = \phi_c \times P_{n3} = 0.177$ kips

Total moment carried by column

Total moment carried by column $M_{sc} = 735.348$ kip_ft

Ultimate moment strength capacity of column $M_{n3} = \phi_b \times M_{n3} = 661.813$kip_ft

Check load capacity for uniaxial loads about the x axis

Factored axial load $P_{u_x} = 0.2$ kips

Ultimate axial capacity $P_{cx} = 0.2$ kips

PASS - Ultimate axial capacity exceeds factored axial load

Factored moment about x axis $M_{ux_ult} = 9.7$ kip_ft

Ultimate moment capacity about the x axis $M_{nx} = 661.8$ kip_ft

PASS - Ultimate moment capacity exceeds factored moment about x axis

SPECIAL INSPECTIONS

TABLE 1705.3 : REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD	IBC REFERENCE
1. INSPECT REINFORCEMENT, INCLUDING PRESTRESSING TENDONS, AND VERIFY PLACEMENT.	——	X	ACI 318: CH.20, 25.2, 25.3 26.6.1–26.6.3	——
2. REINFORCING BAR WELDING: a. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706; b. INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16"; AND c. INSPECT ALL OTHER WELDS.	—— X	X X	AWS D1.4 ACI318: 26.6.4	——
3. INSPECT ANCHORS CAST IN CONCRETE.	——	X	ACI 318: 17.8.2	——
4. INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS. a. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS; b. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4.a	X ——	—— X	ACI 318: 17.8.2.4 ACI 318: 17.8.2	—— ——
5. VERIFY USE OF REQUIRED DESIGN MIX.	——	X	ACI 318: CH. 19, 26.4.3, 26.4.4.	——
6. PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMERATURE OF THE CONCRETE.	X	——	ASTM C31 ASTM C172 ACI 318.26.5, 26.12	——
7. INSPECT CONCRETE AND SHOTCRETE PLACMENT FOR PROPER APPLICATION TECHNIQUES.	X	——	ACI 318.26.5	——
8. VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	X	——	ACI 318.26.5.3 – 26.5.5	——
9. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED	X	——	ACI 318.26.5.3 – 26.5.5	——

TABLE 1705.6 : REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATION ARE ADEQUATE TO ACHIEVE THE DESIGN CAPACITY.	——	X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	——	X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	——	X
4. DURING FILL PLACMENT, VERIFY USE OF PROPER MATERIALS AND PROCEDURE IN ACCORDANCE WITH THE PROVISIONS OF THE APPROVED GEOTECHNICAL REPORT. VERIFY DENSITIES AND LIFT THICKNESSES DURING PLACMENT AND COMPACTION OF COMPACTED FILL.	X	——
5. PRIOR TO PLACMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	——	X

TABLE 1705.7 : REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. VERIFY ELEMENT MATERIALS, SIZES AND LENGTHS COMPLY WITH THE REQUIREMENTS.	X	——
2. DETERMINE CAPACITIES OF TEST ELEMENTS AND CONDUCT ADDITIONAL LOAD TESTS, AS REQUIRED.	——	X
3. INSPECT DRIVING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT.	——	X
4. VERIFY PLACMENT LOCATIONS AND PLUMBNESS, CONFIRM TYPE AND SIZE OF HAMMER, RECORD NUMBER OF BLOWS PER FOOT OF PENETRATION, DETERMINE REQUIRED PENETRATIONS TO ACHIEVE DESIGN CAPACITY, RECORD TIP AND BUTT ELEVATIONS AND DOCUMENT ANY DAMAGE TO FOUNDATION ELEMENT.	X	——

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 2015 INTERNATIONAL BUILDING CODE.
2. ALL CONSTRUCTION SHALL BE UNDER STATE SPECIAL INSPECTION REQUIREMENTS, AS REQUIRED BY 2015 INTERNATIONAL BUILDING CODE.
3. COORDINATE ALL WORK OF THESE DRAWINGS WITH WORK REQUIRED ON ELECTRICAL AND/OR MECHANICAL DRAWINGS.

DESIGN CRITERIA

1. RISK CATEGORY: (III)
2. FOUNDATION DESIGN LIFE: 50 YEARS.
3. GROUND SNOW LOAD, Pg = 5 psf
4. WIND CRITERIA:
   - BASIC WIND SPEED = 120 MPH
   - WIND IMPORTANCE FACTOR, Iw = 1.15
   - EXPOSURE CATEGORY = C
5. EARTHQUAKE DESIGN DATA:
   - SEISMIC USE GROUP = III
   - SEISMIC IMPORTANCE FACTOR, Ie = 1.25
   - MAPPED SPECTRAL ACCELERATION FOR SHORT PERIOD, Ss = 0.058 g
   - MAPPED SPECTRAL ACCELERATION FOR 1 SECOND PERIOD, S1 = 0.035 g
   - SITE CLASS = C
   - SPECTRAL RESPONSE COEFFICIENTS, SDs = 0.047 g, SD1 = 0.059 g
   - SEISMIC DESIGN CATEGORY = A

ALLOWABLE BEARING CAPACITY: 2500 PSF AS PER THE GEOTECHNICAL REPORT No: 52Q102301 DATED APRIL 10TH 2025 AND PREPARED BY LANGAN

MATERIAL SPECIFICATIONS:

CONCRETE/PADS

1. ALL CONCRETE SHALL CONFORM TO ACI 318-14.
2. REINFORCED CONCRETE IN THE FOUNDATION (I.E. FOUNDATION WALLS, GRADE BEAMS, PIER & SLAB ON GROUND) SHALL BE OF NATURAL AGGREGATE CONFORMING TO ASTM C-33.
3. PROPORTION CONCRETE MIXTURE AS FOLLOWS:
   a. MINIMUM COMPRESSIVE STRENGTH: 3500 PSI AT 28 DAYS.
   b. MAXIMUM WATER-CEMENTITIOUS MATERIALS RATIO: 0.45.
   c. SLUMP LIMIT: 5 INCHES FOR CONCRETE WITH VERIFIED SLUMP OF 2 TO 4 INCHES BEFORE ADDING HIGH-RANGE WATER-REDUCING ADMIXTURE, PLUS OR MINUS 1 INCH.
4. REINFORCEMENT SHALL BE HIGH TENSILE GRADE DEFORMED BARS CONFORMING TO ASTM A-615 GRADE 60, WELDED WIRE FABRIC SHALL CONFORM TO ASTM A-185.
5. CALCIUM CHLORIDE ADMIXTURES OR ADMIXTURES CONTAINING CHLORIDE SALTS SHALL NOT BE ADDED TO THE CONCRETE.
6. FOLLOW A.C.I. RULES AS TO STIRRUPS, ANCHORAGE, TEMPERATURE REINFORCEMENT AND SPACING OF BARS IN BEAMS UNLESS OTHERWISE NOTED.
7. ALL CONCRETE EXPOSED TO THE WEATHER TO BE AIR ENTRAINED AND SHALL CONFORM TO ASTM C-260.
8. REINFORCING BARS SPLICED AT POINTS OF STRESS TO BE LAPPED A MINIMUM OF 40 DIAMETERS UNLESS OTHERWISE NOTED.
9. PROVIDE SUPPORTS FOR REINFORCEMENT IN ACCORDANCE WITH A.C.I. STANDARDS.
10. CONTRACTOR SHALL NOTE AND PROVIDE ALL MISCELLANEOUS CURBS, EQUIPMENT AND MECHANICAL BASES THAT ARE REQUIRED BY THE ARCHITECTURAL, MECHANICAL & ELECTRICAL DRAWINGS.
11. COORDINATE ANCHORAGE DETAIL REQUIREMENTS AND LOCATIONS WITH EQUIPMENT MFR. PROVIDE A MIN OF (4) ANCHORS PER PIECE OF EQUIPMENT.
12. MEASUREMENTS OF CONDUIT WINDOWS AND CONDUIT WINDOW PLACEMENT ARE FOR RECOMMENDATION PURPOSES ONLY. GENERAL CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF CONDUIT WINDOWS IN THE FIELD.
13. IF SLEEVE IS REQUIRED, DIAMETER OF SLEEVE TO BE CONDUIT DIAMETER + 1".
14. SLEEVES TO BE PLACED BETWEEN REBAR. MAINTAIN 2" MIN. DISTANCE FROM REBAR FROM ALL SIDES.
15. AT PAD OPENINGS, SEE 2/S100.

STEEL/PILES:

1. ALL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC.
2. ALL STEEL SHALL BE GRADE 50.
3. FOR SOIL PREPARATION PLEASE REFER TO GEOTECHNICAL REPORT NO: 52Q102301 DATED APRIL 10TH 2025 AND PREPARED BY LANGAN.
4. ALL STEEL AND HARDWARE SHALL BE COATED WITH MIN. 3MIL ZINC COATING OR GALVANIZED TO RESIST CORROSION.
5. WIDE FLANGE SECTIONS: MUST BE A992 STEEL COVERED WITH WITH 3 MIL MIN. ZINC COATING — HOT DIPPED GALVANIZED PER ASTM A123.
6. PILE FOUNDATIONS AND DRILLED PIER INSTALLATION. A SPECIAL INSPECTOR SHALL BE PRESENT WHEN PILE FOUNDATIONS ARE BEING INSTALLED AND DURING TESTS. THE SPECIAL INSPECTOR SHALL MAKE AND SUBMIT TO THE COMMISSIONER RECORDS OF THE INSTALLATION OF EACH PILE AND RESULTS OF LOAD TESTS.

DATE	REVISION DESCRIPTION	PM	ENG	CHK
07/24/2025	50% PROGRESS	AT	AY	AT

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PREPARED FOR

LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE
GENERAL NOTES, DESIGN CRITERIA & SPECIAL INSPECTION

DRAWING #
S001

PLOT DATE: 7/24/2025 9:41 PM

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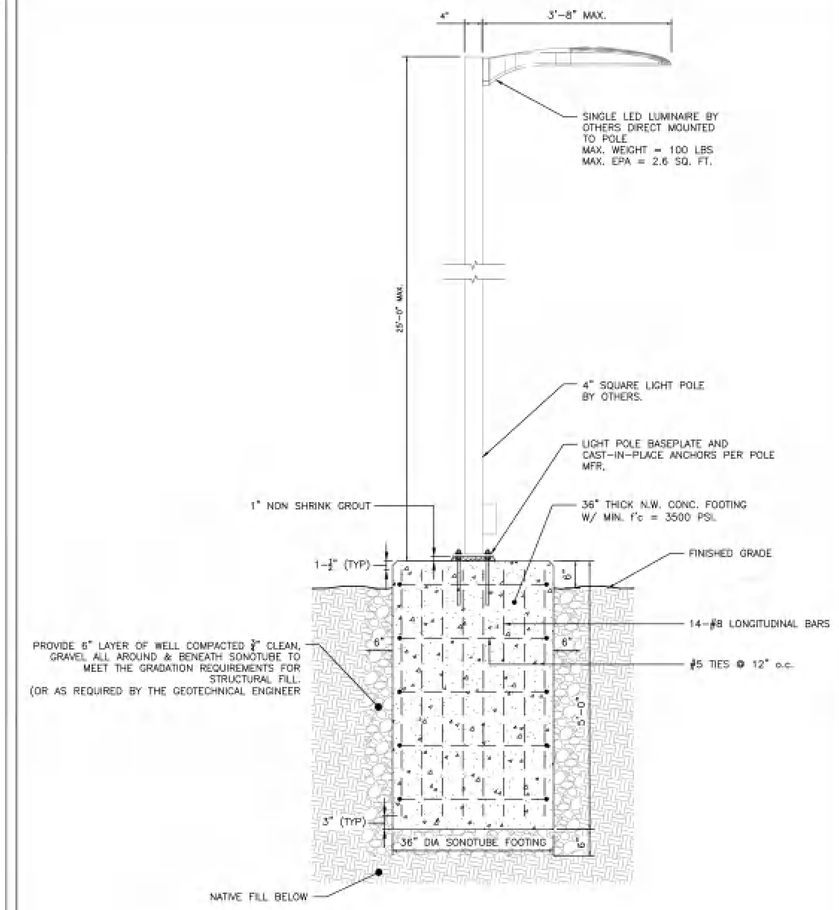
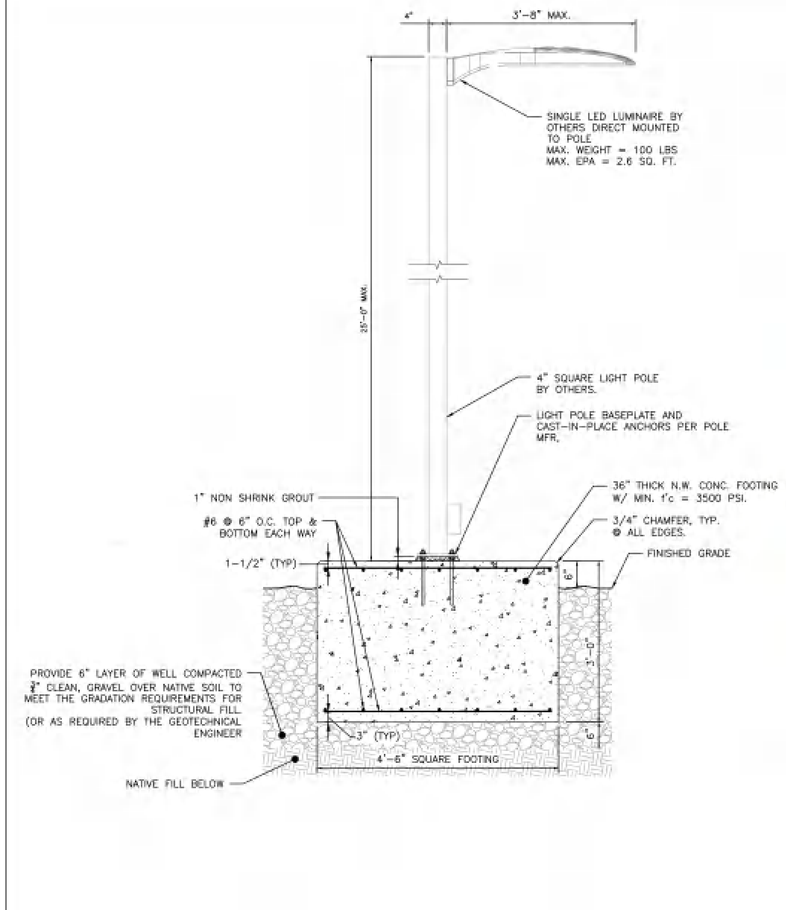


1 S103 OPTION 2 – LIGHT POLE FOUNDATION DETAIL
SCALE: 3/4" = 1'-0"



1 S103 OPTION 1 – LIGHT POLE FOUNDATION DETAIL
SCALE: 3/4" = 1'-0"

PLOT DATE: 7/29/2025 9:41 PM

RULER IN INCHES: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

DATE	REVISION DESCRIPTION	PM	ENG	CHK
07/24/2025	60% PROGRESS	AT	AK	AT

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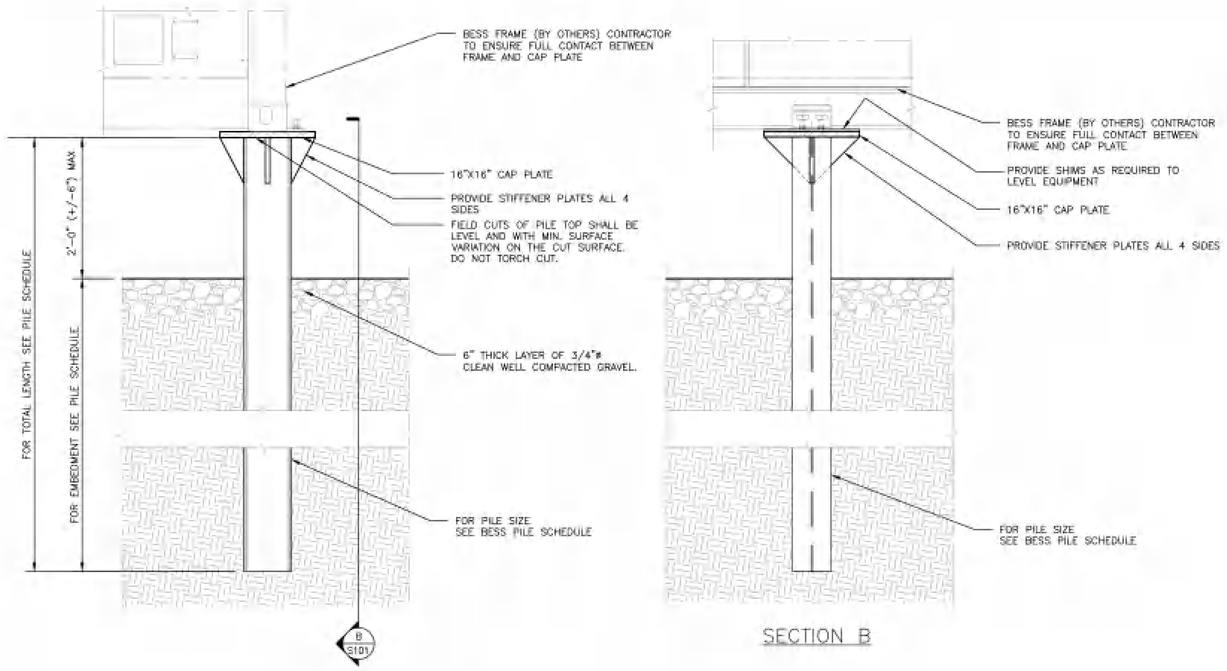
PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

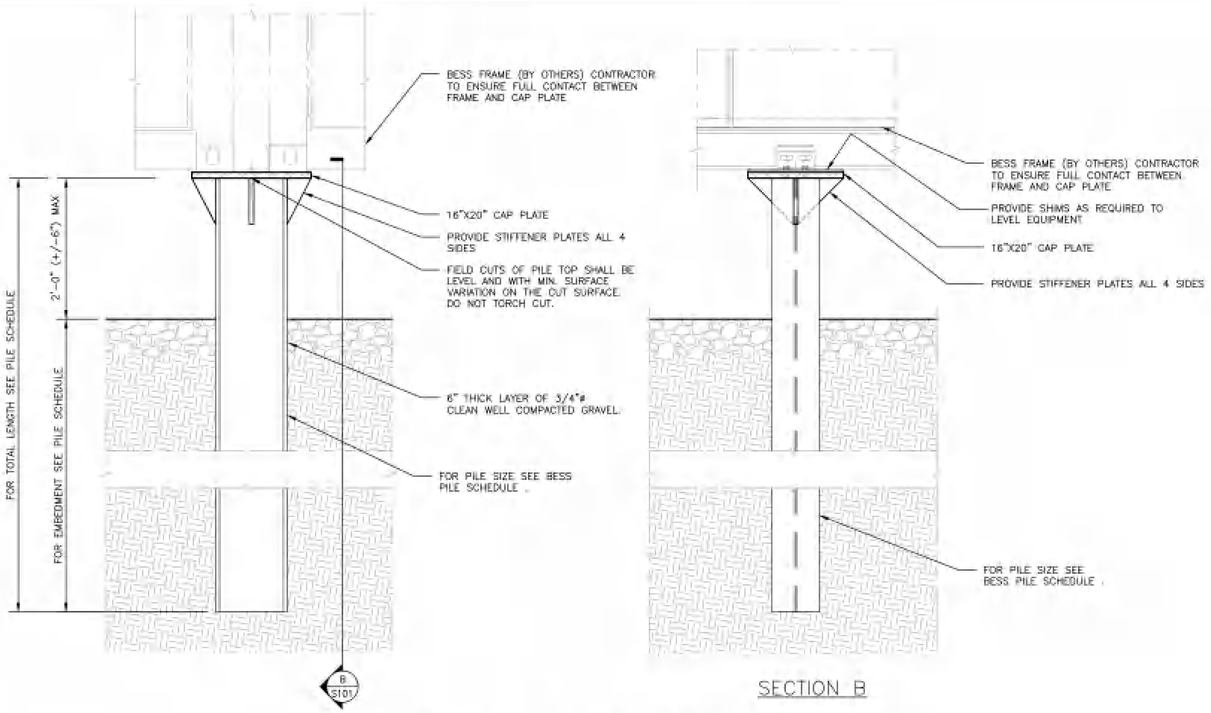
NOT FOR CONSTRUCTION

DRAWING TITLE
LIGHT POLE FOUNDATION DETAILS

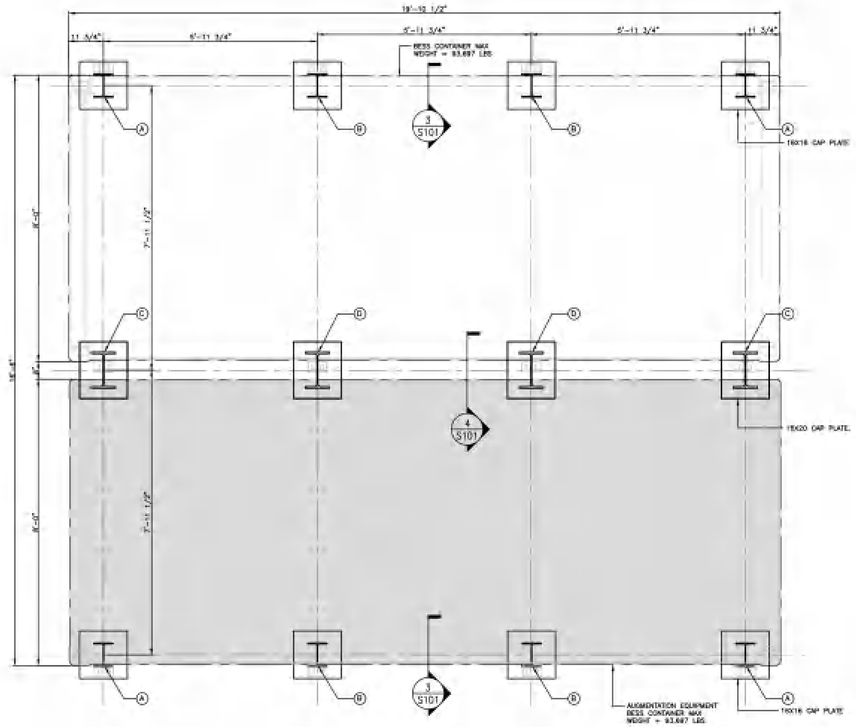
DRAWING #
S100



3 S101 BESS FRAME MOUNTING DETAIL – EDGE PILES
SCALE: 1" = 1'-0"



4 S101 BESS FRAME MOUNTING DETAIL – MIDDLE PILES
SCALE: 1" = 1'-0"



1 S101 BESS CONTAINERS PILE LAYOUT
SCALE: 1/2" = 1'-0"

NOTES
1. PILES SHALL BE PLACED DIRECTLY UNDER THE CENTROID OF THE BESS FRAME, SEE SUNGROW STRUCTURAL DRAWING PAGE 5 OVER 7 FOR MORE INFORMATION. CONTRACTOR TO FIELD VERIFY DIMENSION.
2. TOP OF THE PILES ELEVATIONS SHALL BE AT THE SAME ELEVATION.

BESS - PILE SCHEDULE					
PILE TAG	SIZE	QUANTITY	EMBEDMENT	REVEAL LENGTH	TOTAL LENGTH
A (EDGE / EXTERIOR)	W8X24	4	13FT	2FT (+/-6") MAX	15FT (+/-6") MAX
B (EDGE / INTERIOR)	W8X24	4	13FT	2FT (+/-6") MAX	15FT (+/-6") MAX
C (MIDDLE / EXTERIOR)	W12X50	2	12FT	2FT (+/-6") MAX	14FT (+/-6") MAX
D (MIDDLE / INTERIOR)	W12X50	2	18FT	2FT (+/-6") MAX	20FT (+/-6") MAX

2 S101 MVT PILE SCHEDULE

NOT FOR CONSTRUCTION

DRAWING TITLE: PILE FOUNDATION PLAN & DETAILS

DRAWING # S101

REVISION	DESCRIPTION	DATE	PM	ENG	CHK
	60% PROGRESS	07/24/2025	AT	AY	AY

PURE POWER ENGINEERING
111 RYAN STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM

PREPARED FOR: LANGAN
LANGAN, LLC
300 KIMBAL DRIVE
PARSIPPANY, NJ 07054
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

STATE OF TEXAS AHMED YOUSSEF 144877 REGISTERED PROFESSIONAL ENGINEER 07/24/2025

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PLOT DATE: 7/29/2025 9:41 PM

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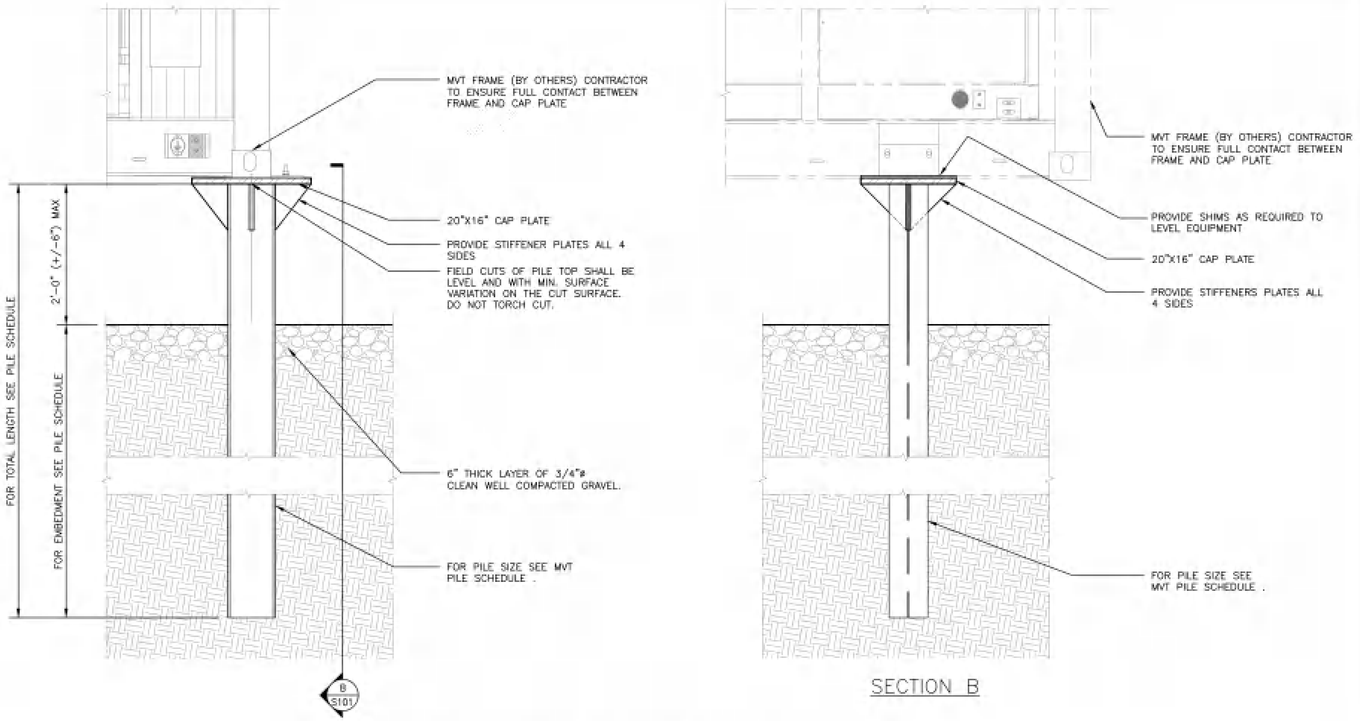
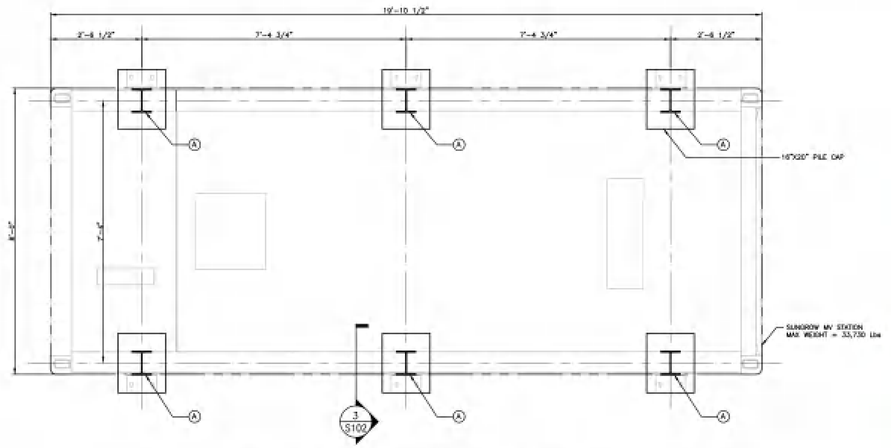


SECTION B

3 S102 MVT FRAME MOUNTING DETAIL
SCALE: 1" = 1'-0"



1 S102 MV TRANSFORMER PILE LAYOUT
SCALE: 1/2" = 1'-0"

NOTES
1. PILES SHALL BE PLACED DIRECTLY UNDER THE CENTER OF THE MVT FRAME, SEE SUNGROW STRUCTURAL DRAWING PAGE 6 FOR MORE INFORMATION. CONTRACTOR TO FIELD VERIFY DIMENSION.
2. TOP OF THE PILES ELEVATIONS SHALL BE AT THE SAME ELEVATION.

MVT - PILE SCHEDULE					
PILE TAG	SIZE	QUANTITY	EMBEDMENT	REVEAL LENGTH	TOTAL LENGTH
A (TYP)	W8X24	6	9FT	2FT (+/-6") MAX	11FT (+/-6") MAX

2 S102 MVT PILE SCHEDULE

NOT FOR CONSTRUCTION

DRAWING TITLE: MVT PAD PLAN AND ELEVATION

DRAWING #: S102

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 300 KIMBAL DRIVE, PARSIPPANY, NJ 07054, WWW.LANGAN.COM

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AHMED YOUSSEF, 144977, STATE OF TEXAS, REGISTERED ENGINEER, 07/24/2025

NO.	REVISION DESCRIPTION	DATE	PM	ENG	CHK
1	60% PROGRESS	07/24/2025	AT	AY	AY

PLOT DATE: 7/25/2025 9:41 PM

RULER IN INCHES: 0 1/4 1/2 3/4 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

PURE POWER ENGINEERING, INC.
111 RIVER STREET, SUITE 1110
HOBOKEN, NJ 07030

CABLE AMPACITY STUDY
FOR
CHISME SOLAR AND STORAGE – TX-PS-2701
8987 CR 268 BROWN AND MILLS COUNTY, TEXAS
31.578332° -98.834972°
AUGUST 1, 2025

PRELIMINARY

Pure Power Engineering Project Number: PPE-11055

Project Owner/EPC: Red River Clean Energy

Study commissioned by (Client): Langan

Revision History

Date	Revision Description	PM	ENG	CHK
04/28/2025	30% Preliminary Release	BA	MRH	EL
08/01/2025	60% Preliminary Release	BA	MRH	EL

PRELIMINARY

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The following report was prepared by Pure Power Engineering utilizing industry-accepted standards and practices and the proprietary methodologies and analysis tools of Pure Power Engineering. Pure Power Engineering assumes no responsibility for inaccuracies in data provided by others.

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PRELIMINARY

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PRELIMINARY

1 INTRODUCTION

1.1 SUMMARY

The Project is a 152 MW / 304 MWh Battery Energy Storage System (BESS).

Equipment	Make	Model	Quantity	Discharge Duration (Hours)	Power Rating (kW)	Energy Rating (kWh)
Battery	Sungrow	ST5015kWh-2500kW-2h	70	2	2,500	5,015
MV Skid	Sungrow	MVS5140-LS	35	N/A	N/A	N/A

Table 1.1-1: Major Equipment List

The facility utilizes a 34.5kV collector system with direct buried medium voltage (MV) feeders.

See Appendix D for applicable codes and standards.

1.2 BACKGROUND AND SCOPE

The purpose of this study is to determine the maximum current a cable can sustain without the deterioration of any of its electrical or mechanical properties. This study along with the Short Circuit study identifies the minimum required MV cable specifications.

The scope of this study will include details of the project specific analysis of the conductor ampacities for the AC system associated with the project.

PRELIMINARY

Above ground conductors are sized using the NRC Chapter 3 requirements. The conductor size (gauge) and minimum self-supported arc sized using the CYMCAP application.

2.1 SOFTWARE

The ampacity analysis were performed using CYMCAP 8.0.

CYMCAP is a Windows based software application designed to perform thermal analysis of cables.

The program utilizes the Neher – McGrath method and the IEC 60287 and IEC 60853 international standards to model the cable ampacity based on load conditions, cable construction, and bonding. The program provides the maximum current a cable can carry while not exceeding over a long-conductor temperature.

2.2 ENGINEERING DESIGN INPUTS

The design used in CYMCAP models the conductor conditions shown in the Pure Power Engineering design drawings. CYMCAP evaluates cross sections of circuits and the design drawings are used to identify cross sections that represent points in the circuit runs that need to be evaluated. These points give the evaluation that it is assumed the rest of the circuit runs will also pass.

If available for the installation, the Pure Power Engineering short circuit calculation report will be used to provide conductor thermal (CN) sizes. In early installations where the short circuit study has not been completed, the following assumptions will be used for CN conductors:

- 1000MCM and above: 1/0 CN
- Between 4/0 AWG and 1000MCM: 1/0 CN
- 4/0 AWG: 2/0 CN

2.3 STEADY STATE & TRANSIENT ANALYSIS

2.3.1 Steady State Analysis

The steady state analysis assumes constant current loading. The techniques and formulas outlined in the international standards IEC 60287, IEC 60853 and IEC 60949 issued by the International Electrotechnical Commission are used throughout the calculations. CYMCAP also includes analysis options, computation methods, and cable configurations that are not directly addressed in the IEC standards.

Since generation facilities typically operate under a steady state condition, a purely steady state analysis of cable loading would be overly conservative. To consider the daily varying of generation, a cyclic loading analysis must be carried out.

2.3.2 Cyclic Loading Analysis

Cyclic loading analysis is a simple way of representing cable loading varying by using a cable loading factor (LF) to consider load variations that take place during a period. The LF is the ratio of the average hourly load over a period to the peak load occurring in that period. These load variations allow higher peak loading of the conductors during off period is provided. When performing the cyclic loading analysis the Neher-McGrath method is used.

For a 69kV supply in a wind where hourly data is not available, a conservative approach using a LF of 0.7 will be used in the analysis. This has been determined from analysis with other methods to provide a reasonably conservative cable loading when utilizing purely steady state analysis.

The result of the cyclic loading analysis is cable loading in amps that results in a target cable dimensions and the installed LF. The cable summarization report may be less than the cable used conductors.

2.3.3 Transient Analysis

Transient loading analysis is a more detailed loading analysis than a cyclic loading analysis. In a transient analysis, a load profile is constructed that represents the loading of the cable over a period of hours, months or years.

The transient load profile for a BESS project is a charge-style followed by a discharge-style with a period equal to the maximum charge or discharge rate. For example, a 4-hour storage BESS will have a 4-hour period at maximum discharge current followed by the maximum charge current for the required charge period and that will be used to build a 24-hour load profile.

Arbitrary 24-hour periods together will provide a worst-case loading profile for any total period needed.

The initial conditions for ampacity and temperature for the transient analysis are based on the steady-state cyclic analysis. The cyclic LF is adjusted in an iterative process checking that the transient analysis shows that a long-term cable temperature equal to or less than 90% of the cable rated temperature is maintained past the 1,500 hour mark for MV cables, and the 500 hour mark for DC conductors. This has been found to result in a cable temperature that will peak at a point equal to or less than 98% of the cable rate temperature in the first 48 hours and stays under the cable rating after that. The resulting cable ampacity is typically higher than that found using the cyclic loading analysis alone. Using this analysis technique has been found to provide realistic results compared to a full transient study while requiring much less processing run time.

2.4 ENVIRONMENTAL INFORMATION

Evaluation of the site environmental conditions for the ampacity simulations and other calculations presented here is contingent upon the environmental data made available in the particular project-required industry standard meteorological datasets. The available data will be reviewed to identify the maximum soil temperature at typical cable burial depths, selection of the appropriate soil thermal resistivity (RHO), and selection of the ambient air temperatures.

The data sources typically used are the geotechnical report for the site, ASHRAE climatic data, and USDA Natural Resources Conservation Service (NRCS) regional SCAN probe data.

2.4.1 Soil Data

Soil Temperature

Soil data from the SCAN station closest to the project site can be used to find historical soil data. The maximum average hottest daily ground temperature data is found from the hourly mean soil temperature data at a depth chosen to minimize the cable temperature rise over a historical period.

Soil Moisture

Soil data from the SCAN station closest to the project site can be used to find historical soil data, or data from the geotechnical report may be used if it covers summer. If the SCAN data is used, then the minimum average moisture is found from the hourly mean soil moisture data at a depth chosen to represent the cable installation depth over a historical period.

Soil Thermal Resistivity

The soil thermal resistivity data comes from the geotechnical report.

2.4.2 Soil Zones

The site is divided up into three zones:

Zone 1: Native undisturbed soil

Zone 2: Backfill, may be native soil or soil from off site

Zone 3: This zone contains the cables. This is the dry out box where the soil moisture is driven out by the heated cables and a moisture value of 0% is used. The boundaries are 1ft from the center, making the box 2ft on a side.

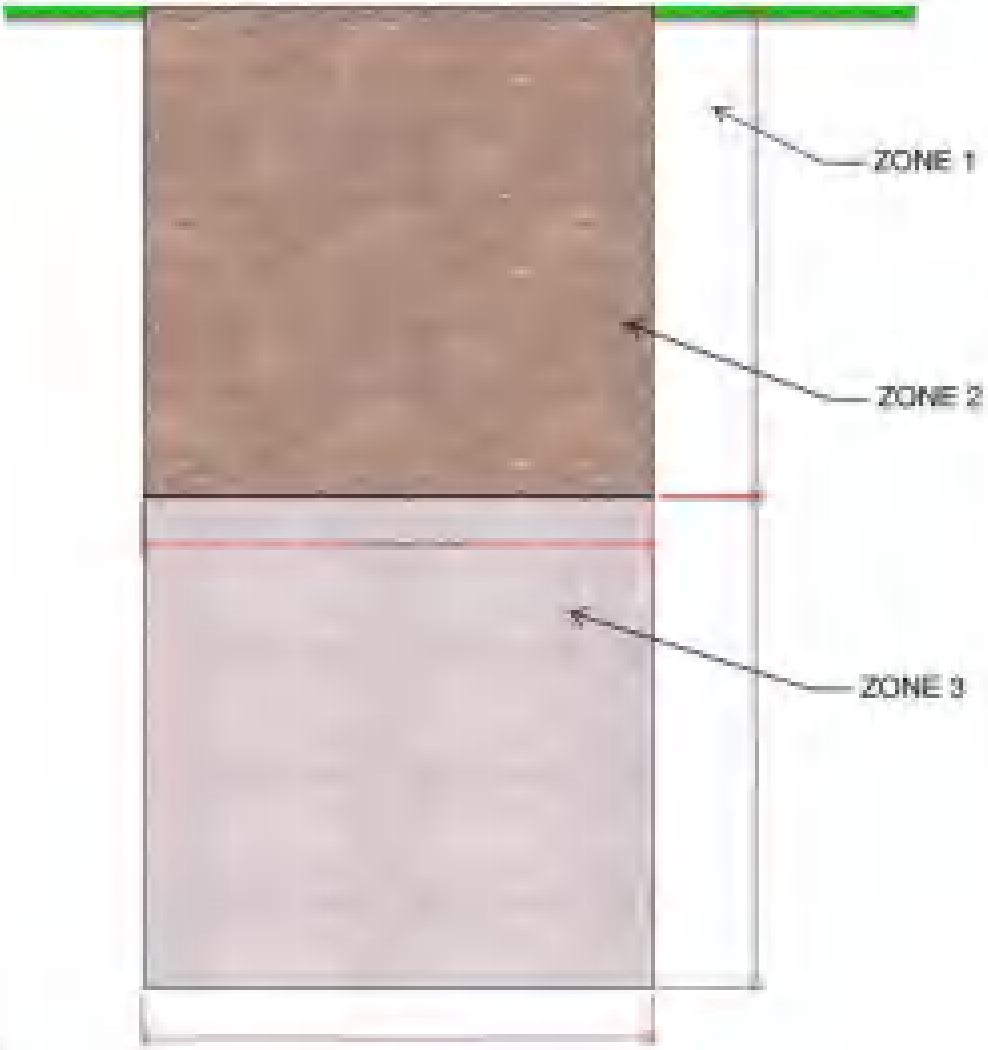


Figure 2.4.2: Soil Zones

2.5 UNDERGROUND CONDUCTOR LOCATION SELECTION

CYMCAP simulates cables in a cross section of the cable run. Therefore, the engineer must select cross sections in the site to simulate which are representative of the worst-case examples for ampacity calculation.

3 STUDY MODEL

3.1 ENGINEERING DESIGN INPUT

The following engineering documents are used as the basis for the CYMCAP model in this study.

- Pure Power Engineering electrical design 2025-08-01 Chisme BESS Electrical 60% dated 8/1/2025

3.2 PROJECT LOCATION

The site location is Brown County, Texas, 31.578332° -98.834972°. The weather station will be selected for SCAN sites nearest to the project location/address.

3.3 SOIL MODEL

3.3.1 Soil Historical Data

The SCAN station used is named Stephenville. Figure 3.3.1-1 shows the location of the Project and the SCAN site.

Figure 3.3.1-1: SCAN Station

Soil Temperature

The SCAN site hourly mean soil temperature historical data shown in Figure 3.3.1-2 at a conservative 40-inch depth and shows a maximum mean hourly temperature of 90°F (32.2°C).

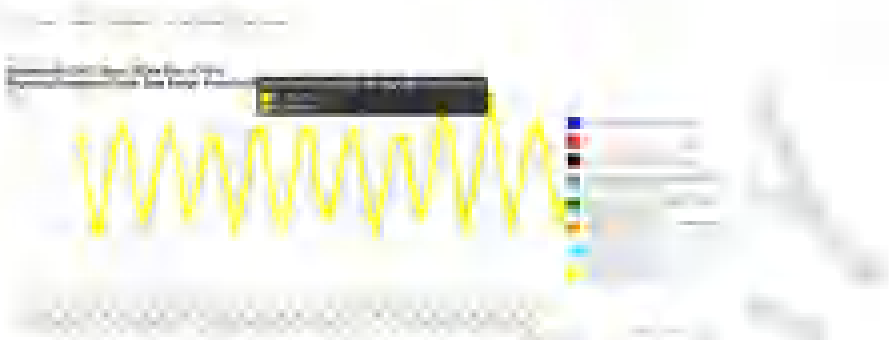


Figure 3.3.1-2: Soil Temperature at 40-inch Depth

Soil moisture

The SCAN site hourly mean soil moisture historical data is shown in Figure 3.3.1-3 at a conservative 40-inch depth and shows a minimum average moisture of 8.8%.

Figure 3.3.1-3: Soil Moisture at 40-inch Depth

3.3.2 Soil Zones:

Three soil zones are illustrated for installations in the cable ampacity study. Zone 1 is identified as the native soil which is an area around the trench. Zone 2 is the backfill area above the cable dry-out region and the moisture level is estimated to be 1/2 that of zone 1 because the soil is disturbed in the cable installation process, and we will assume it has less moisture than zone 1 soil. Zone 3 is identified as the cable dry-out region. Figure 3.4.2-1 illustrates the various zones.

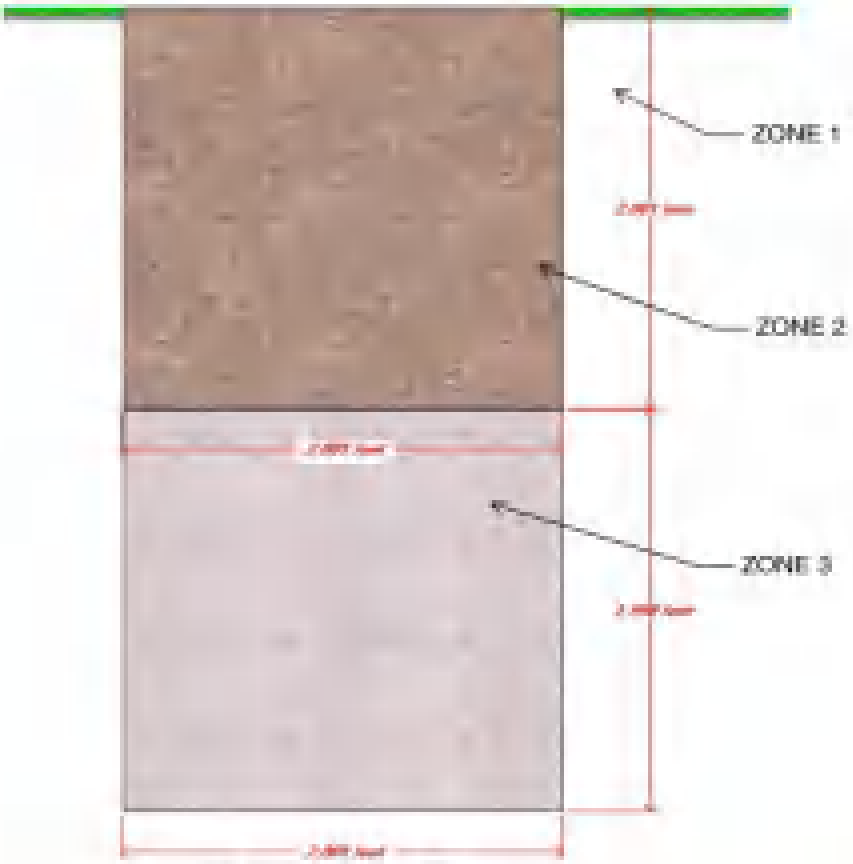


Figure 3.3.2-1: Soil Zones

Table 3.4.2-1 shows the moisture values for the three zones used in the study model.

Zone	Description	Moisture (%)
1	Native Soil	8.8
2	Trench Backfill	4.4
3	Dry-Out Zone	0.0

Table 3.4.2-1; Soil Moisture Values for Zones

3.3.3 Soil Thermal Resistivity

The Thermal Resistivity dry out curve from the Geotech report is shown in Figure 3.3.3-1.

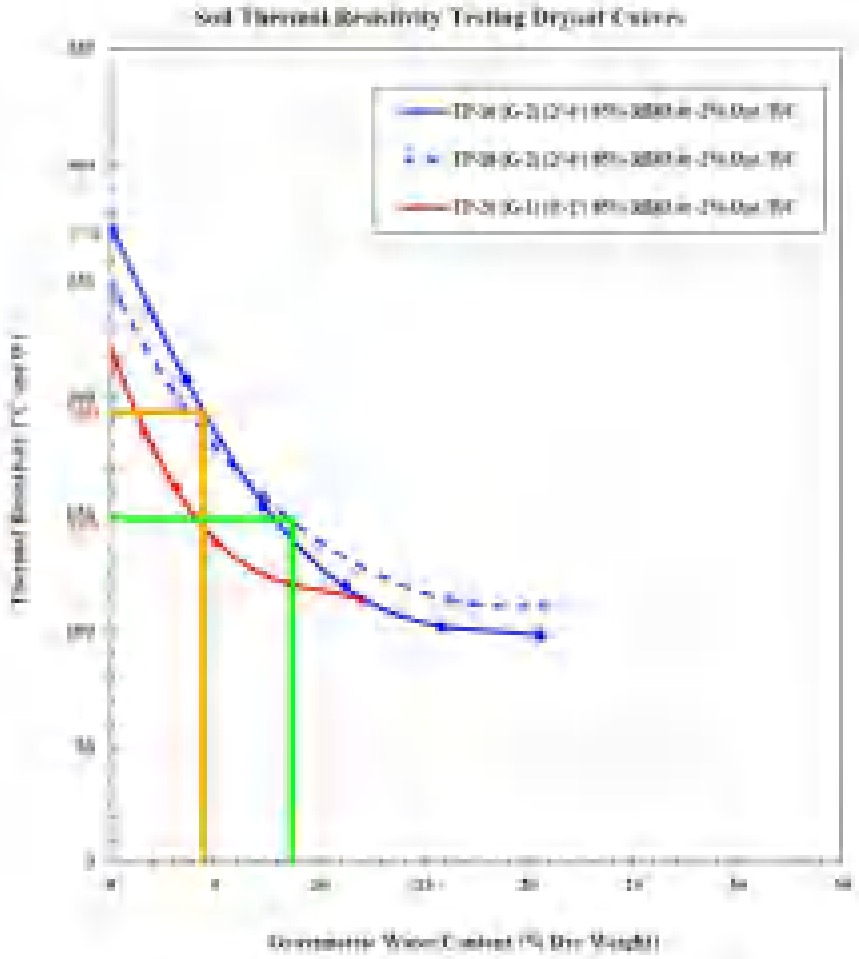


Figure 3.3.3-1; Thermal Resistivity Dry Out Curve

The curve from sample location TP-25 was chosen to represent the site conditions. Since the dry out curve for TP-25 does not extend to 18.4% moisture the maximum moisture value for the curve, 7%, will be used for native soil.

Table 3.3.3-1 shows the RHO values at those moisture levels from the graph in Figure 3.3.3-1.

Zone	Sample	Moisture Content (%)	RHO (cm°C /W)	Soil Compaction (%)
1	Composite of TP 16 & 18	8.8	149	Native
2		4.4	193	85
3		0	276	85

Table 3.3.3-1; RHO Values and Soil Compaction

Refer to Appendix B and the geotechnical report for additional information regarding the dry out curves and boring locations.

3.4 ANALYSIS MODEL

3.4.1 Steady State with Cyclic Load & Transient Analysis

The transient analysis will be used to validate the cyclic cF at values less than 0.7 as described in section 2.3.3.

The BESS system transient analysis shape is constructed to represent a charge and discharge cycle. A 4-hour charge and 4-hour discharge cycle is used to size the MV feeders to allow for future transition of the system from 2-hour to 4-hour and an increase in storage capacity.

The load profile has been modeled in CYMCAP as shown in Figure 3.4.1-1.

Figure 3.4.1-1; Transient Load Profile

3.5 FEEDER MODELS

3.5.1 Above Ground Conductor Sizing

Above ground conductor sizing is performed in accordance with NEC conductor sizing requirements. The conductor sizes are shown in the electrical design drawing package referenced in section 3.1 of this study.

3.5.2 MV AC Cable Sizing

MV AC cables run between the MV transformers and the substation. The transformers are connected in parallel, and each cable may carry the current from more than one inverter/transformer. Trench details are in the Trench Details sheet in the design drawings referenced in Section 3.1. The following cases were evaluated.

Case 1: Single circuit in individual trench, direct buried, 36" below grade

Case 2: Six circuits in parallel – multi-feeder in individual trenches, direct buried, 36" below grade, 96" on center spacing, same feeder size.

Case 3: Two circuits in parallel, multi feeder in individual trenches, direct buried, 36" below grade, 48" on center spacing, same feeder size.

Locations of cases other than Case 1 are shown in Appendix A.

All conductors are modeled with 100% TR-XLPE insulation with concentric neutrals grounded on both ends. The circuits are evaluated for ampacity at a maximum temperature of 90°C and a LF of 0.64.

Element	Value	Reference
Soil Ambient Temperature [°C]	32.2	Section 3.3.1
Soil thermal Resistivity [cm°C/W]	Zone 1: 149 cm°C /W	Table 3.3.3-1
	Zone 2: 193 cm°C /W	
	Zone 3: 274 cm°C /W	

Table 3.5.2-1: Soil Analysis Parameter Summary

The results of the analysis are shown in Table 3.5.3-2, indicating each case number, cable size, and the maximum allowable ampacity. The maximum design current comes from the worst-case cable loading for the cases in the design drawings referenced in Section 3.1. CYMCAP analysis reports are in Appendix C.

The transient load shape used for the MV cable is a four-hour battery load with a single eight-hour charge-discharge cycle in 24 hours.

Case	Conductor Size	Concentric Neutral Size	Max Allowed Ampacity (A)	Design Current (A)	Loading (%)
MVC1	500 MCM	1/3	381.8	344.1	90.1
	1000 MCM	1/6	541.7	430.1	79.4
	1250 MCM	1/6	602.5	516.1	85.7
MVC2	1250 MCM	1/6	570.8	516.1	90.4
MVC3	1250 MCM	1/6	570	516.1	90.5

Table 3.5.3-2; Analysis Results for MV Cables

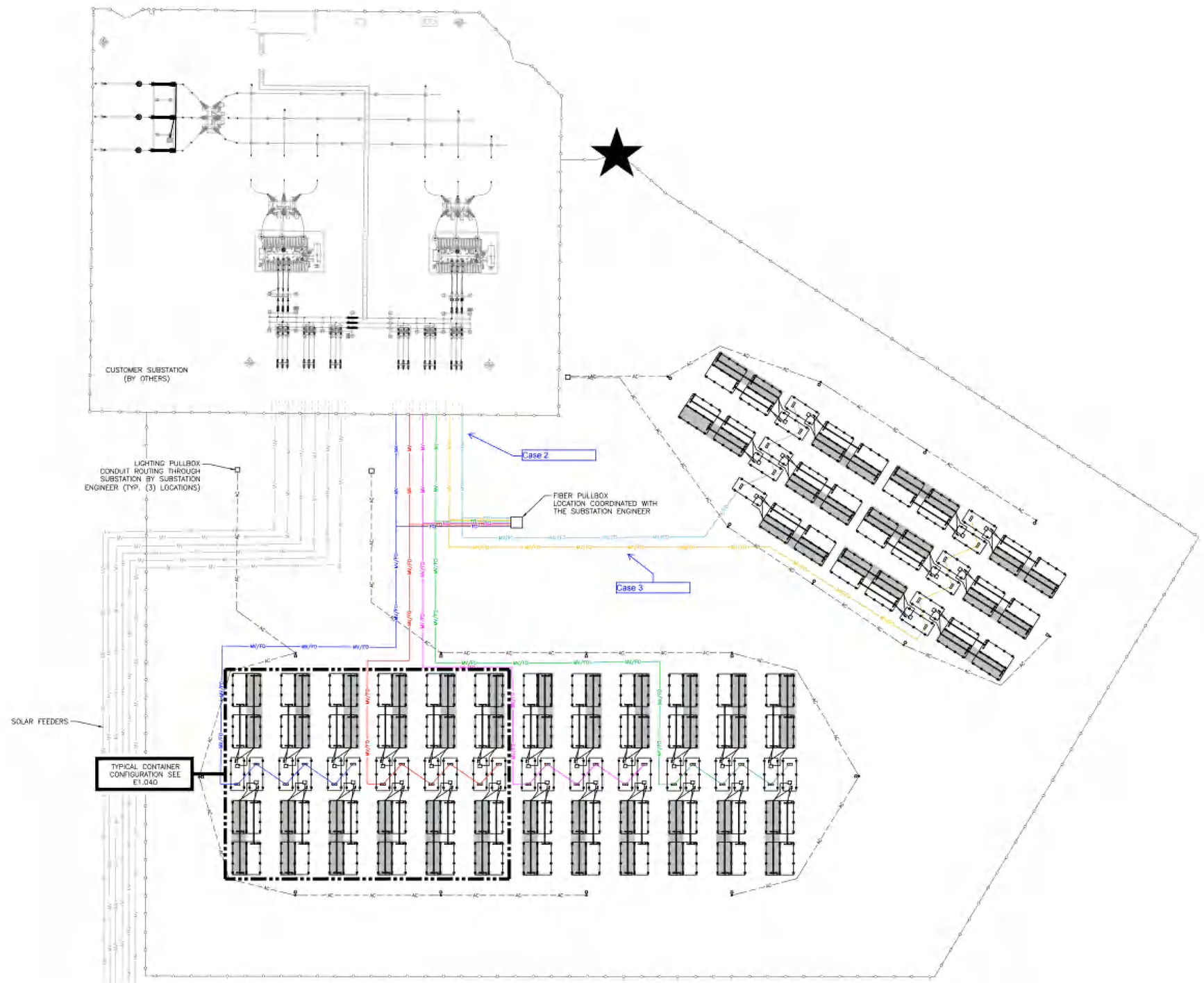
PRELIMINARY

4 STUDY RESULTS

The results of the thermal ampacity cable and conductor sizing study demonstrate that the cables and conductors specified are adequately sized based on the information available at the time of this study.

PRELIMINARY

APPENDIX A – CASE LOCATION PLAN



LINETYPE LEGEND

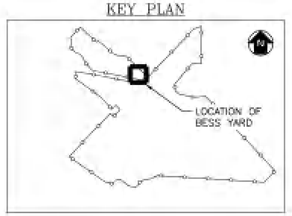
- MV FEEDER B 100
- MV FEEDER B 200
- MV FEEDER B 300
- MV FEEDER B 400
- MV FEEDER B 500
- MV FEEDER B 600
- MV FEEDER PV
- FENCE
- ACCESS ROAD
- MV FEEDER (SUBSTATION ENTRANCE)
- FIBER (SUBSTATION ENTRANCE)
- LOW VOLTAGE AC
- ETHERNET (CAT 6)
- AC BATTERY COLLECTION

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- SITE ACCESS POINT
- PULLBOX

1 OVERALL ELECTRICAL PLAN
SCALE: 1" = 30'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN

DRAWING #: E1.000

PM	ENG	DATE	REVISION DESCRIPTION
		08/01/2025	60% ELECTRICAL DESIGN
BA	AR	11/20/2025	30% ELECTRICAL DESIGN
BA	AR		

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT
CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

RULER IN INCHES

APPENDIX B – GEOTECHNICAL DATA

Alpine Engineering Services, LLC
108 Tradesman Drive, Suite B
Hutto, TX 78634
Tel: (512) 887-1282

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M

Soil Samples & Testing Summary

No.	Boring	Depth	Max. Dry Density	ASTM D698		LL	PL	PI	USCS
				Optimum WC	Minus 200 Sieve				
		ft	pcf	%	%				
1	Bulk-2	0-4	112.4	14.2	63.9	27	13	14	Sandy lean clay (CL)
2	Bulk-4	0-4	97.4	22.8	87.1	43	17	26	Lean clay (CL)
3	Bulk-5	0-4	112.9	13.6	62.5	25	13	12	Sandy lean clay (CL)

Cheng-Wei Chen, Ph.D. 03/13/25
Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the reproduced damages are essential as shown.

Alpine Engineering Services, LLC
195 Diamond Pass, Suite B
Boerne, TX 78006
(p) (512) 997-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 5201023101)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M.

"Remolded" Soil Thermal Resistivity Testing Summary

No.	Boring	Depth	Remolded Dry Unit Weight	Remolded Dry Unit Weight	Thermal Resistivity at Wet (ASTM D5334)	Thermal Resistivity at Dry (ASTM D5334)
		ft	%	pcf	°C-cm/W	°C-cm/W
1[1]	TP-3 (G-1)	0-2	20.6	82.6	91.3	240.2
2[1]	TP-6 (G-1)	0-2	11.7	96.1	78.5	206.3
3[1]	TP-7 (G-1)	0-2	11.6	96.5	86.2	215.0
4[1]	TP-11 (G-1)	0-2	12.4	95.6	79.9	199.5
5[1]	TP-13 (G-1)	0-2	12.1	95.3	92.7	219.2
6[1]	TP-14 (G-1)	0-2	12.1	95.2	83.4	235.2
7[2]	TP-16 (G-2)	2-4	20.6	82.8	97.9	274.4
8[2]	TP-18 (G-2)	2-4	20.7	84.8	121.5	249.4
9[1]	TP-20 (G-1)	0-2	12.1	95.3	113.2	222.5

Note 1: Testing specimen remolded to 85% of maximum dry unit weight @ -2% below optimum water content per the request by the client.

[1] Dry Density results of Bulk #1 (0-4 ft). [2] Dry Density results of Bulk #4 (0-4 ft). [3] Dry Density results of Bulk #5 (0-4 ft).

Cheng-Wei Chen, Ph.D. 03/13/25
Reviewed By / Date

This report was performed in accordance with our scope of work. The results and conclusions presented in this report are professional opinions by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and for the purposes stated. Reproduction of this report...

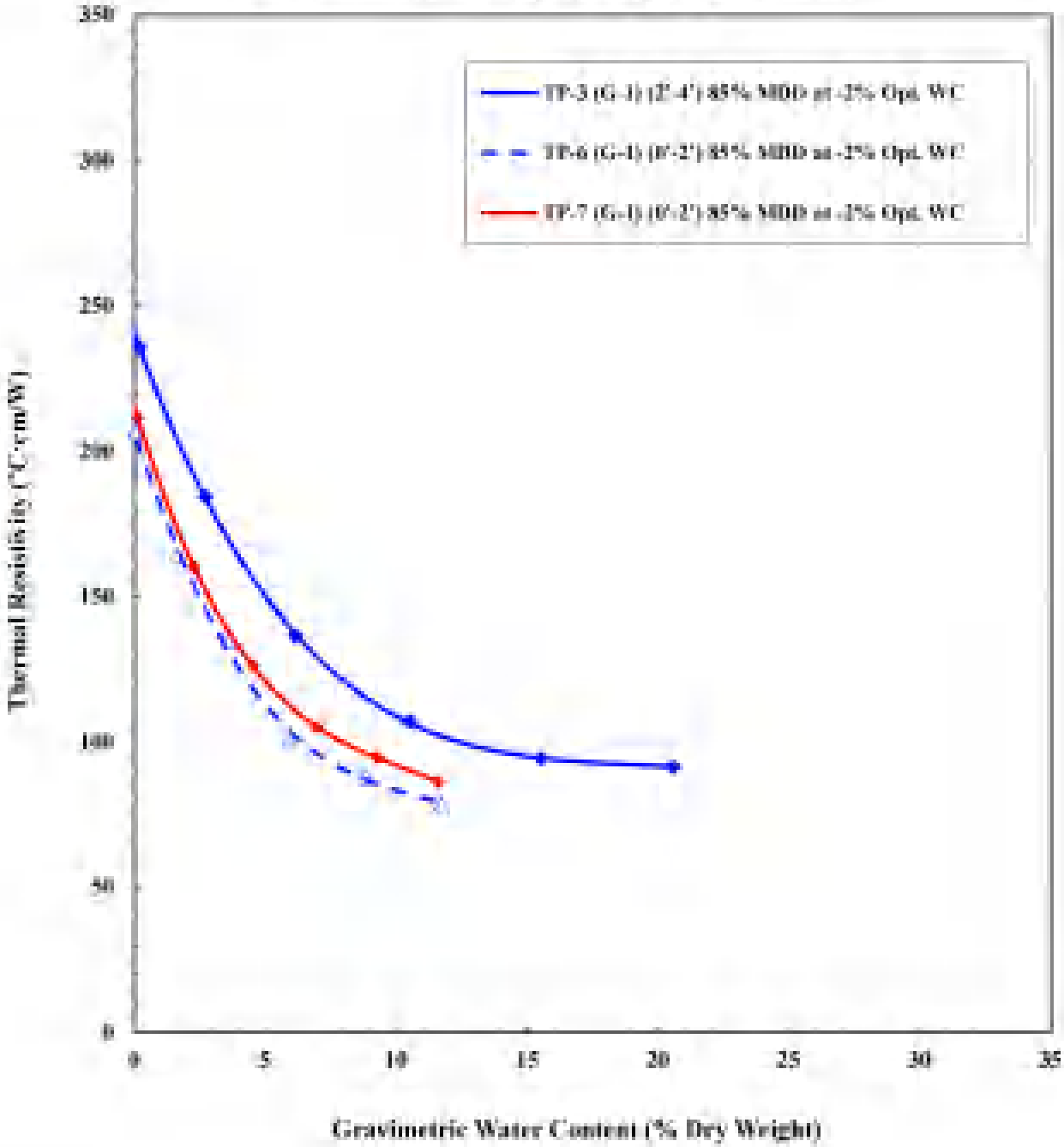
Alpine Engineering Services, LLC
105 Timberwalk Drive, Suite B
Hutto, TX 78634
tel: (512) 365-1585

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No: 2500117
Test Date: 05/08/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

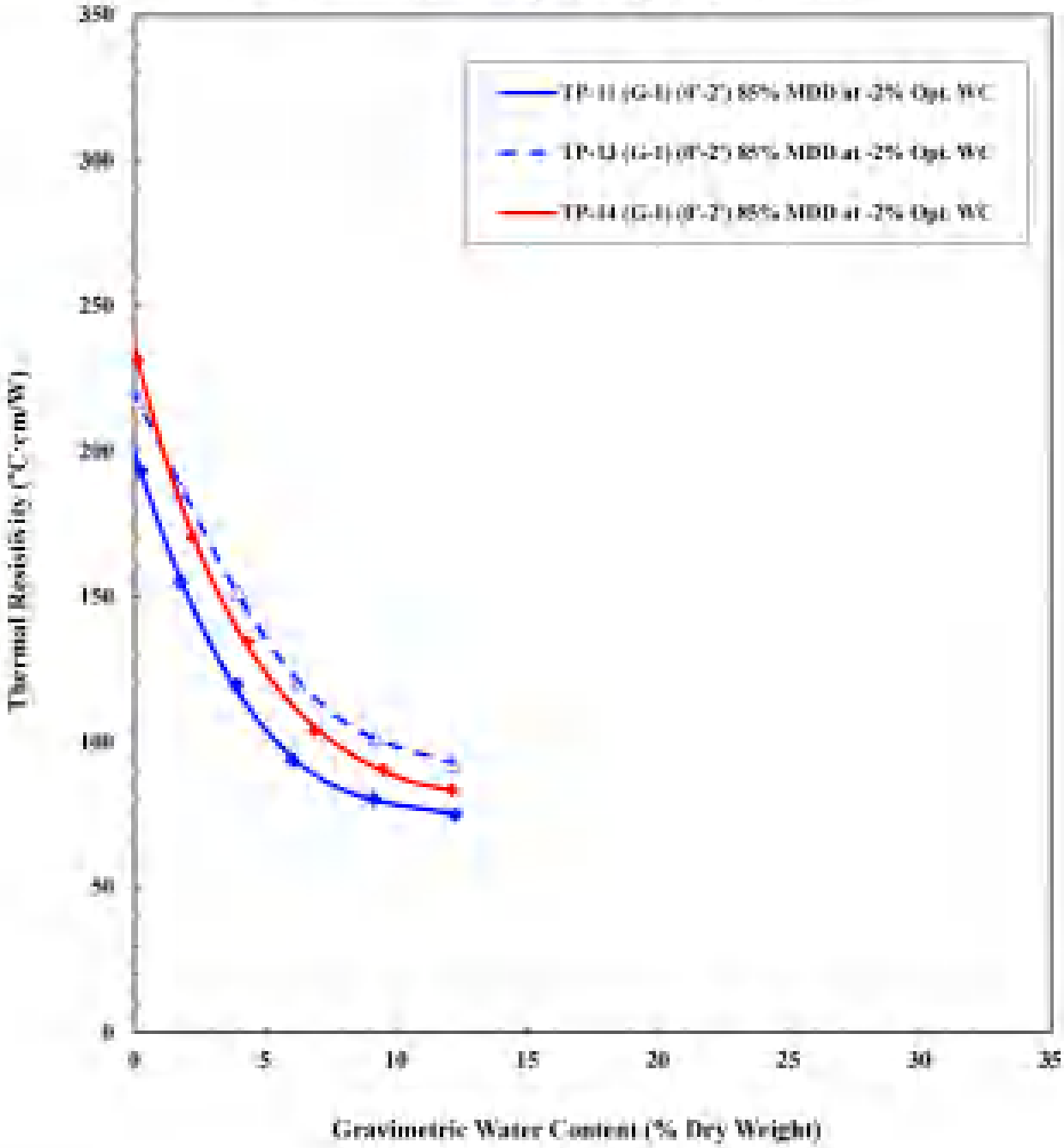
Alpine Engineering Services, LLC
105 Timberwalk Drive, Suite B
Boerne, TX 78006
Tel: (512) 507-1585

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2500117
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

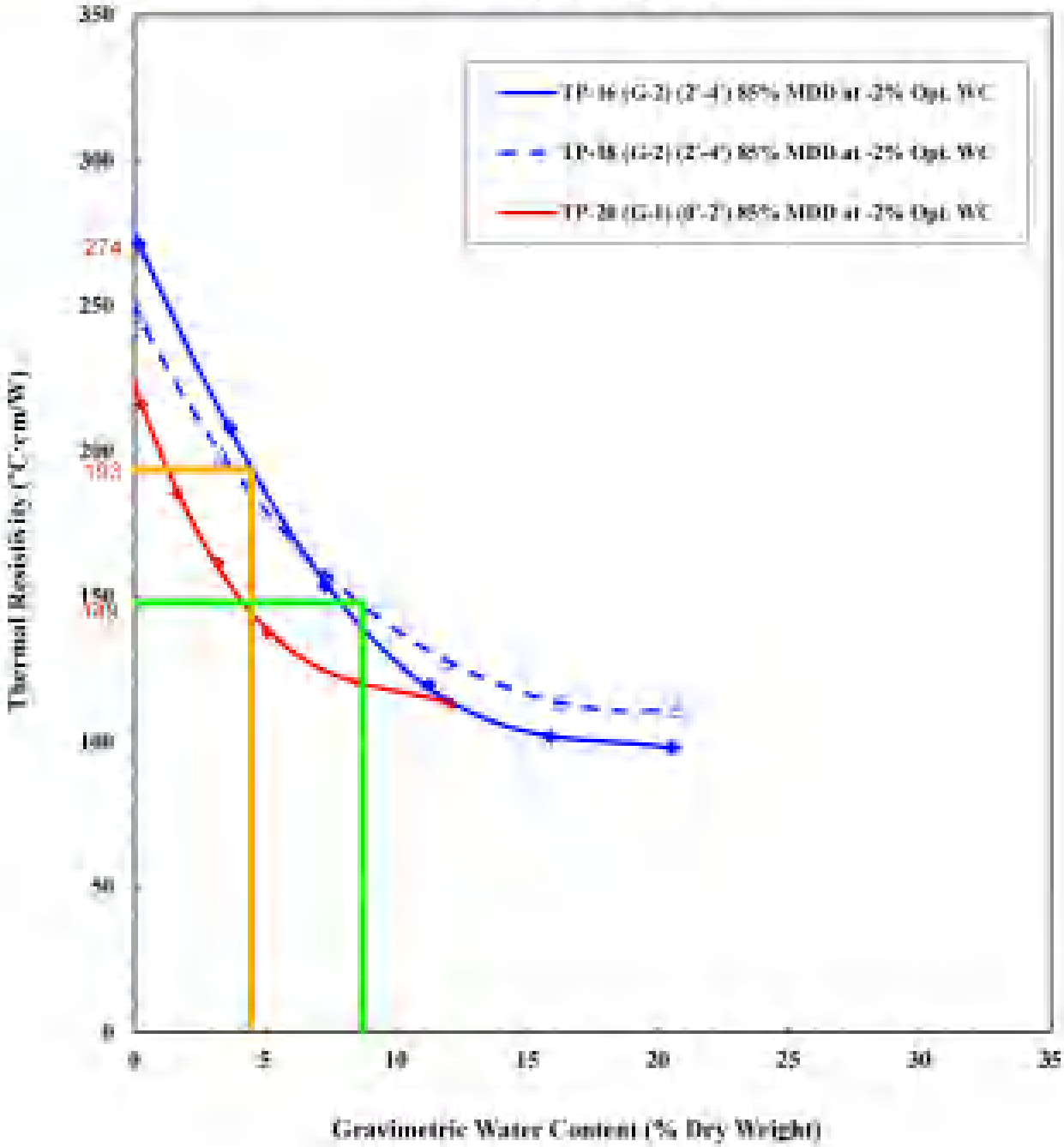
Alpine Engineering Services, LLC
103 Trailwood Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1589

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

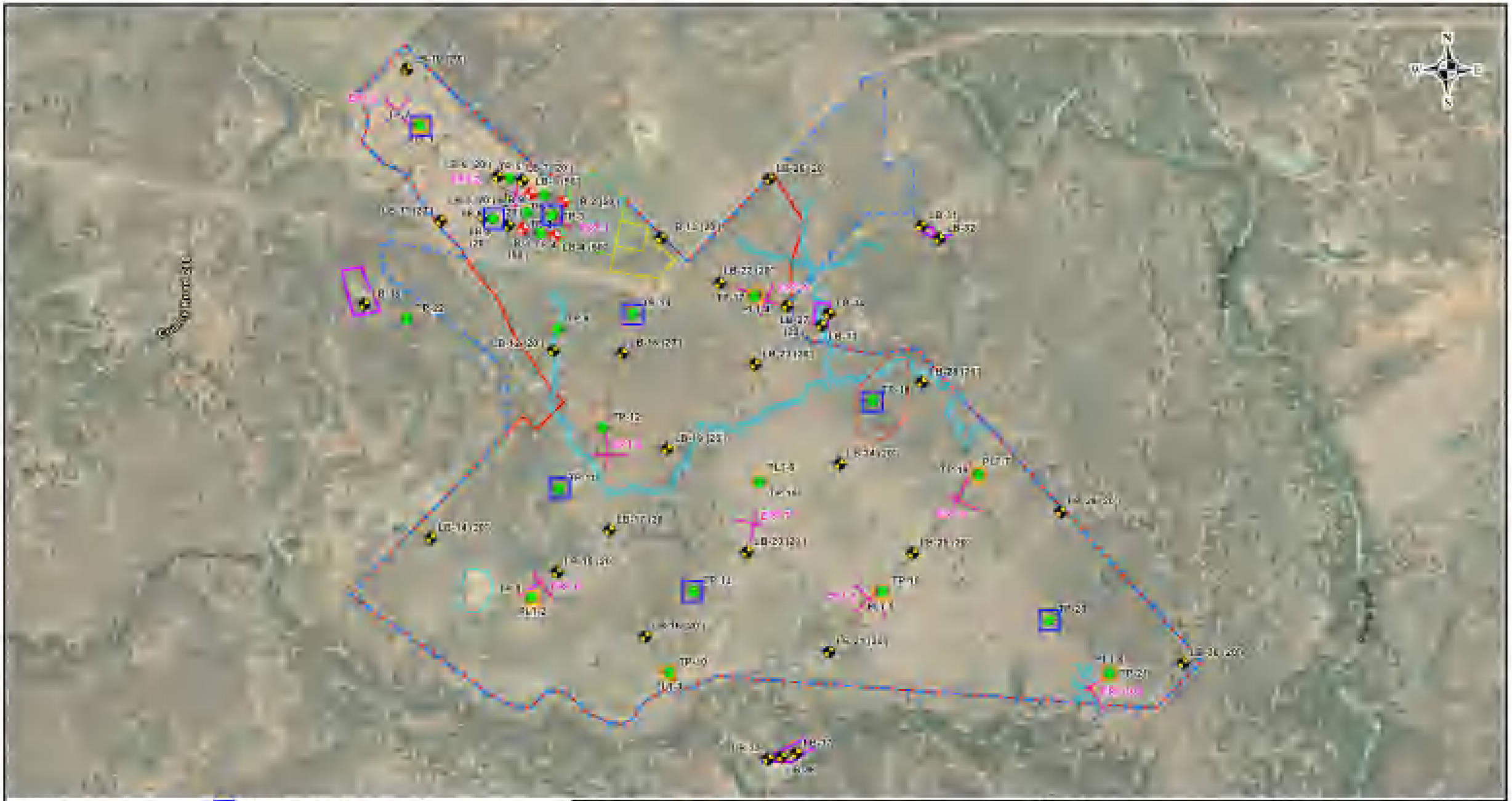
Client: Langan Engineering
Project Name: RRCE - Chesmc
(PN: 520102301)

Alpine Project No.: 25010117
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and for the agreed-upon design professional purposes.



Legend

- Initial Lease Boundary
- Upstream Lease Boundary
- Onsite Substation Footprint
- Proposed Substation and BESS Footprint
- Wetland Boundary
- Thermal Resistivity Test
- ERT Line
- Boring Location - 20'
- Boring Location - 50'
- Pile Load Test
- Test Pit

Notes

1. Aerial imagery sourced through Langan's third-party software subscription and dated [illegible].
2. All features shown are approximate.

1,000 0 1,000
SCALE IN FEET

LANGAN

Langan Engineering and Environmental Services, LLC

1900 N. Akard Expressway, Suite 110
Austin, TX 78752

T: 737.280.7900 F: 737.280.7901 www.langan.com

Project
RRCE CHISME
ZEPHYR
WILLIS COUNTY TEXAS

Figure Title
SUBSURFACE INVESTIGATION PLAN

Project No. 520102301	Figure: 3
Date: 3/25/2025	
Scale: 1"=1,000'	
Drawn By: GS	

APPENDIX C – CYMCAP ANAYLSIS REPORTS

MV Case 1: Single 500MCM in Trench

General Summary Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Simulation Data

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Installation Type/Multiple Ductbanks/Backfills

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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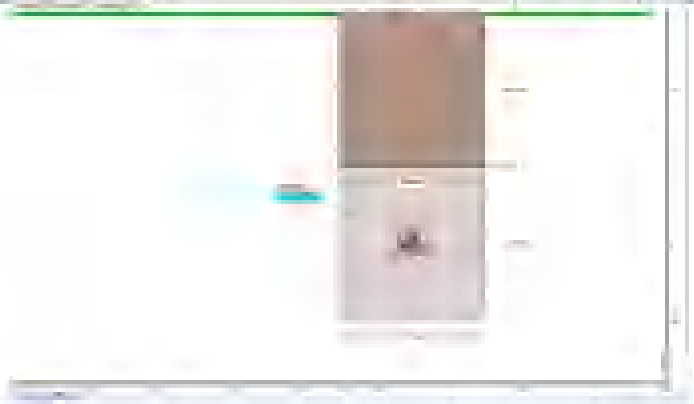


General Cable Information

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Detailed Cable Information

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

General Input Data

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Ampacity and Temperatures

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Electrical Resistance

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

1	[illegible]	0.43	0.11	0.00	0.24	0.11	2.30	0.00
2	[illegible]	0.43	0.11	0.00	0.24	0.11	2.30	0.00
3	[illegible]	0.43	0.11	0.00	0.24	0.11	2.30	0.00

Thermal Resistances

Cable	Cable ID	T1 (Km²/W)	T2 (Km²/W)	T3 (Km²/W)	T4 (Km²/W)	T5 (Km²/W)	T6 (Km²/W)	T7 (Km²/W)
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance outside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	[illegible]	0.43	0.00	0.00	n/a	n/a	2.30	2.30
2	[illegible]	0.43	0.00	0.00	n/a	n/a	2.30	2.30
3	[illegible]	0.43	0.00	0.00	n/a	n/a	2.30	2.30

Losses

Cable	Cable ID	Wc (W/m)	Wd (W/m)	Wa (W/m)	Wa (W/m)	Wt (W/m)	Ys	Yp
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor (Pipe Losses)	Total Losses	Screen Loss Factor	Armour Loss Factor = (Pipe Loss factor)
1	[illegible]	0.52	0.00	0.07	0.00	0.59	0.00	0.00
2	[illegible]	0.52	0.00	0.07	0.00	0.59	0.00	0.00
3	[illegible]	0.52	0.00	0.07	0.00	0.59	0.00	0.00

Complementary Information

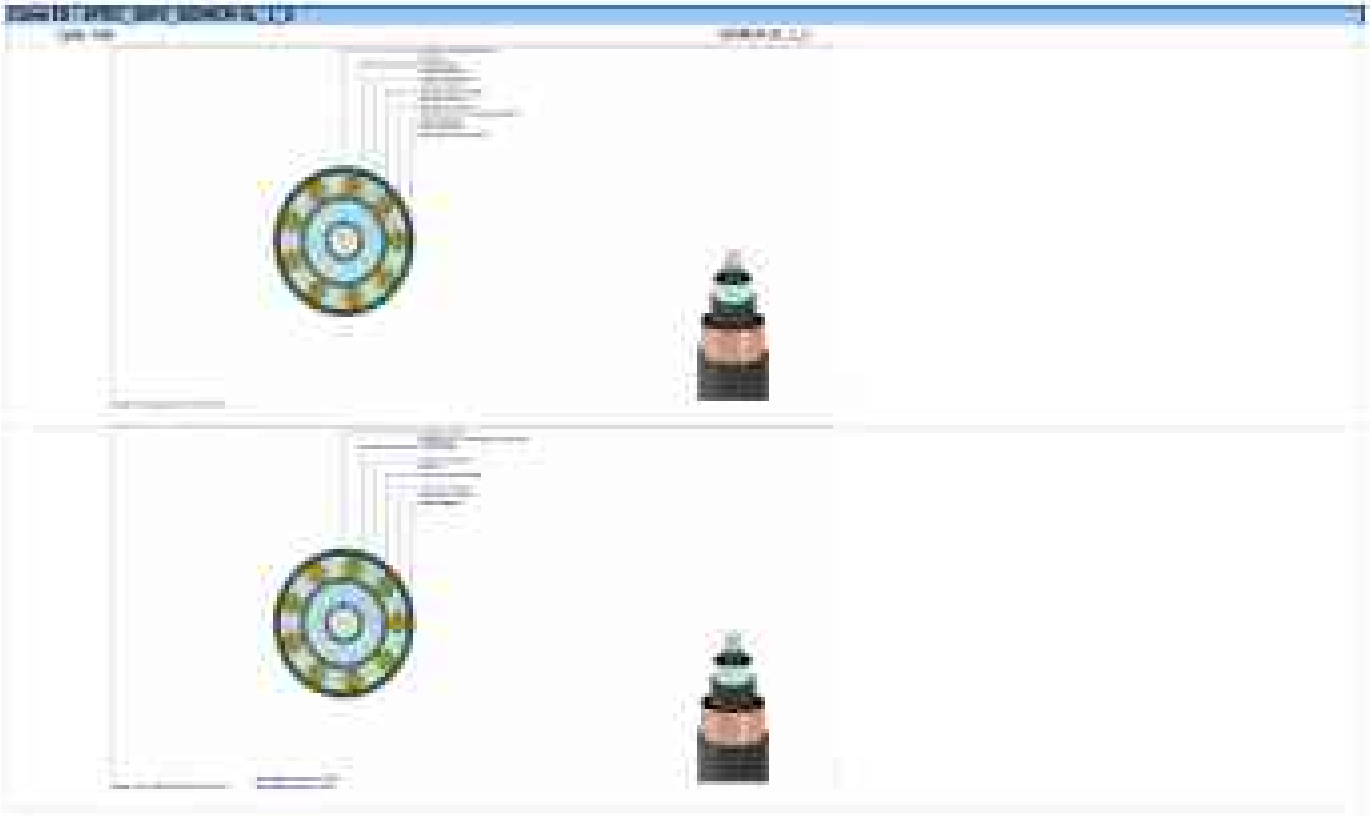
Cable	Cable ID	Δθmax (°C)	Ur (V)	Cp (nF/m/km)	Zb (Ω)	Zc (Ω/m)	Z1 (Ω/m)	Z2 (Ω/m)
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Resistance of Conductor	Resistance of Metallic Sheath	Voltage Drop for Three Phase System
1	[illegible]	0.43	11.45	0.00	0.004	0.00	0.00	0.45
2	[illegible]	0.43	11.45	0.00	0.004	0.00	0.00	0.45
3	[illegible]	0.43	11.45	0.00	0.004	0.00	0.00	0.45

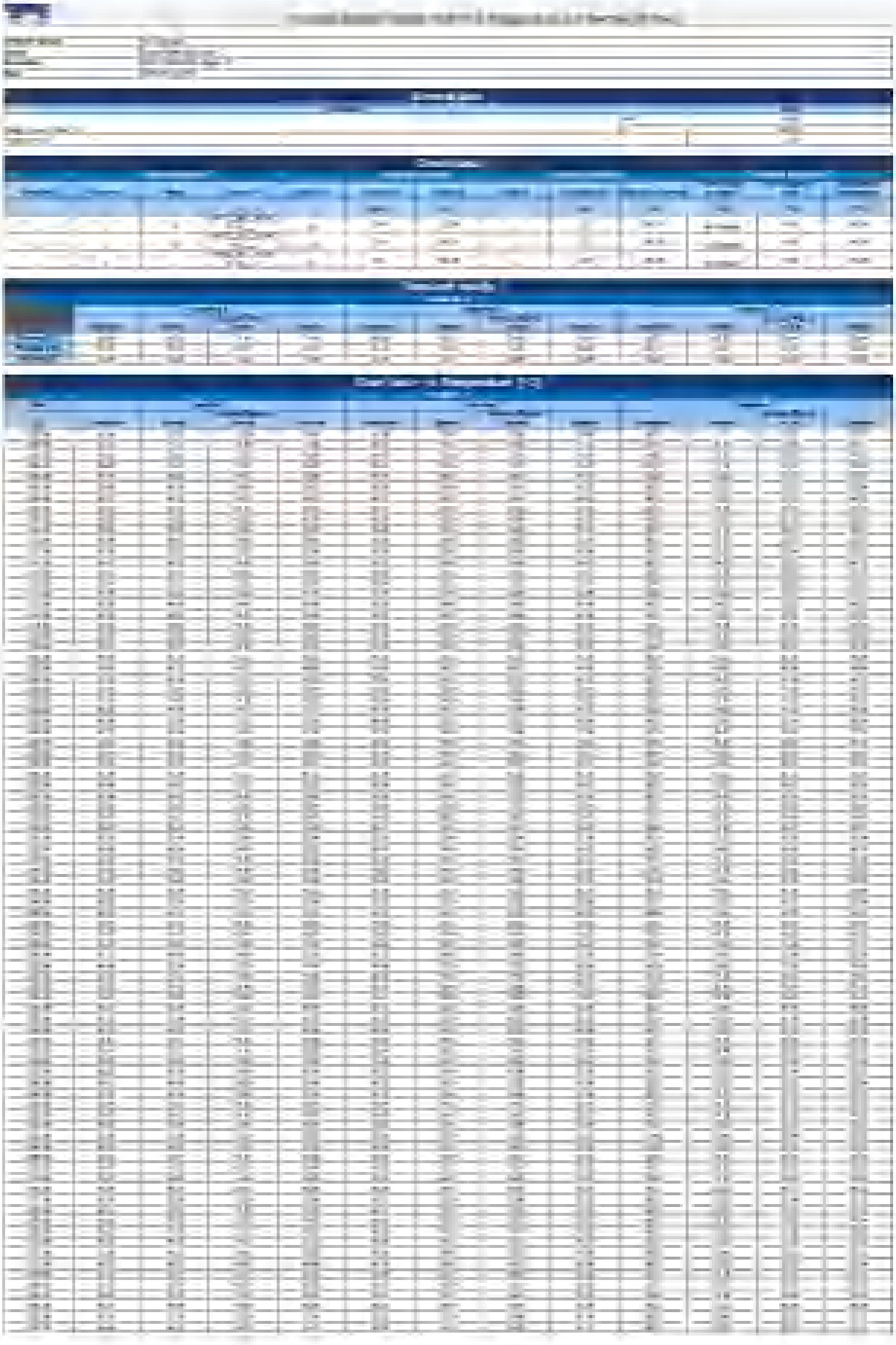
Cables Report

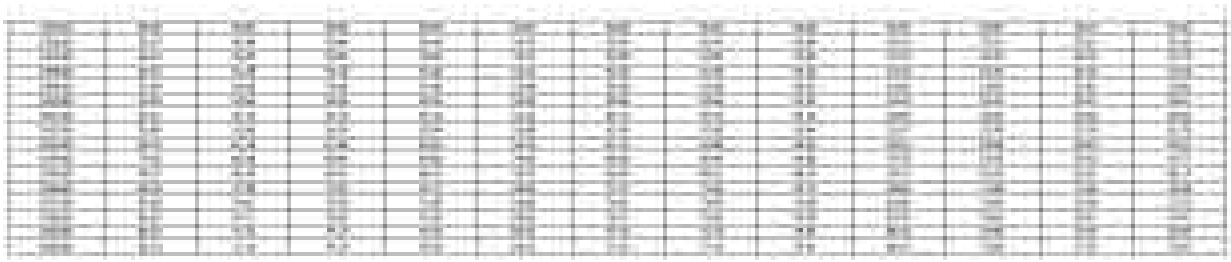
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

No.	Description	Unit	[illegible]
[illegible]			
1	[illegible]		[illegible]
2	[illegible]		[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
[illegible]			
8	[illegible]		[illegible]
9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]
13	[illegible]		[illegible]
14	[illegible]		[illegible]
15	[illegible]		[illegible]
16	[illegible]		[illegible]
17	[illegible]	[illegible]	[illegible]
[illegible]			
18	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]
[illegible]			
20	[illegible]		[illegible]
21	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]
[illegible]			
27	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]
[illegible]			
29	[illegible]		[illegible]
30	[illegible]	[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]
[illegible]			
32	[illegible]		[illegible]
33	[illegible]	[illegible]	[illegible]
34	[illegible]	[illegible]	[illegible]
35	[illegible]	[illegible]	[illegible]
36	[illegible]	[illegible]	[illegible]
37	[illegible]	[illegible]	[illegible]
38	[illegible]	[illegible]	[illegible]
39	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]
[illegible]			
41	[illegible]		[illegible]
42	[illegible]	[illegible]	[illegible]
43	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]

No.	Description	Unit	[illegible]
[illegible]			
45	[illegible]		[illegible]
46	[illegible]	[illegible]	[illegible]
47	[illegible]		[illegible]
48	[illegible]		[illegible]







MV Case 1: Single 1000MCM in Trench

General Summary Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Simulation Data

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Installation Type: Multiple Duct bank/backfills

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

General Cable Information:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Outputted Cable Information:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Conductor Typical Losses

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Ampacity and Temperature

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Electrical Resistances

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Cable Index Number	Cable Equipment ID	AC Resistance of the conductor at 20 °C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	AC Resistance of Conductor at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Thermal Resistances

Index	Cable ID	T_1 [K·m/W]	T_2 [K·m/W]	T_3 [K·m/W]	T_4 [K·m/W]	T_5 [K·m/W]	T_6 [K·m/W]	T_7 [K·m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance outside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Losses

Index	Cable ID	W_c [W/m]	W_d [W/m]	W_s [W/m]	W_{sa} [W/m]	W_a [W/m]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor Eddy Losses	Total Losses	Sheath Loss Factor	Armour Loss Factor = Eddy Loss Factor
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Complementary Information

Index	Cable ID	Alfeo [°C]	I_0 [A]	$\Delta\theta$ [K/W/m]	$\Delta\theta$ [K]	$\Delta\theta_0$ [K/W/m]	$\Delta\theta_0$ [K/W/m]	$\Delta\theta_0$ [K/W/m]
Cable Index Number	Cable Equipment ID	Temperature Increase in surrounding environment	Delivered current on Metallic Screen	Cable Capacitance	Surge Impedance	Resistance of Conductor	Resistance of Metallic Sheath	Voltage drop for Three Phase System
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

No.	Description	Unit	[illegible]
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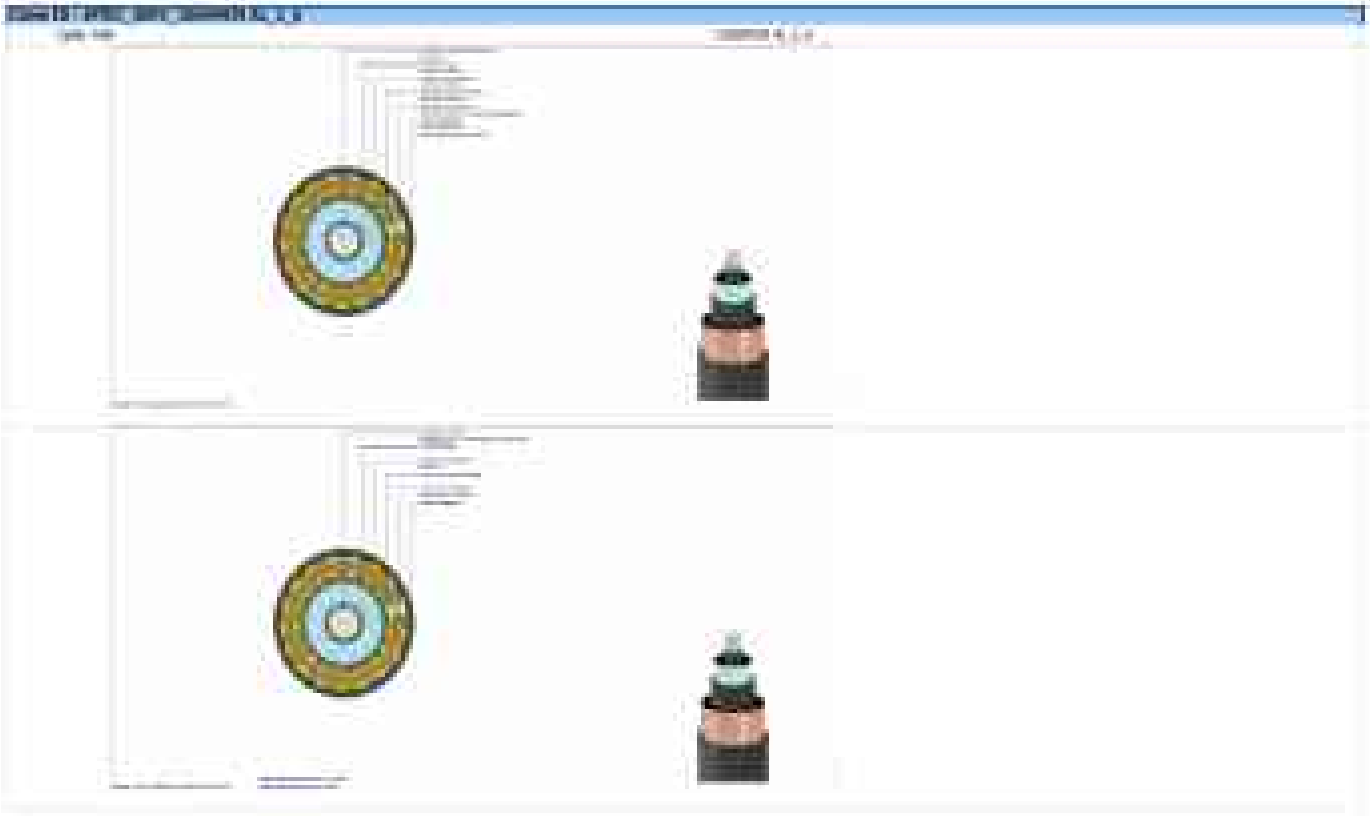
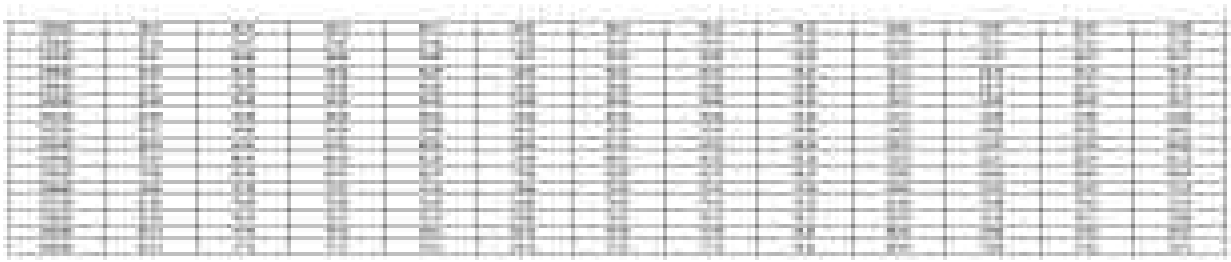


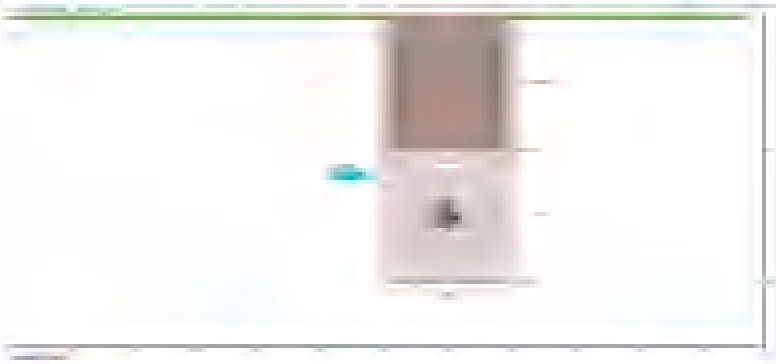


MV Case 1: Single 1250MCM in Trench

General Summary Report

Simulation Data

Installation Type:Multiple Ductbanks/Backfills



General Cable Information:

Detailed Cable Information:

General Input Data

Ampacity and Temperature

Electrical Resistance:

1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Thermal Resistances

Table	Table ID	T_1 [Km²/W]	T_2 [Km²/W]	T_3 [Km²/W]	T_4 [Km²/W]	T_5 [Km²/W]	T_6 [Km²/W]	T_7 [Km²/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance between cable and duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	[illegible]	0.54	0.00	0.00	0.00	0.00	0.00	0.54
2	[illegible]	0.54	0.00	0.00	0.00	0.00	0.00	0.54
3	[illegible]	0.54	0.00	0.00	0.00	0.00	0.00	0.54

Losses

Table	Table ID	W_d [W/m]	W_c [W/m]	W_s [W/m]	W_{ar} [W/m]	W [W/m]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Losses in screen	Metallic Screen Losses	Armour Eddy Losses	Total Losses	Screen Loss Factor	Armour Loss Factor = Eddy Loss Factor
1	[illegible]	0.63	0.00	0.00	0.00	1.00	0.00	0.00
2	[illegible]	0.63	0.00	0.00	0.00	1.00	0.00	0.00
3	[illegible]	0.63	0.00	0.00	0.00	1.00	0.00	0.00

Complementary Information

Table	Table ID	$\Delta\theta_{max}$ [°C]	I_{sc} [kA]	C_p [uF/km]	Z_s [Ω]	η_c [cyclic]	ΔV [mV]	$\Delta V_{3\phi}$ [mV]
Cable Index Number	Cable Equipment ID	Temperature Rise due to surrounding environment	Value of current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Resistance of Metallic Sheath	Voltage Drop for Three Phase System
1	[illegible]	10.00	17.32	0.40	16.58	0.23	0.00	0.00
2	[illegible]	10.00	17.32	0.40	16.58	0.23	0.00	0.00
3	[illegible]	10.00	17.32	0.40	16.58	0.23	0.00	0.00

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

No.	Description	Unit	[illegible]
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3	[illegible]	[illegible]	[illegible]
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6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
[illegible]			
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23	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]
[illegible]			
25	[illegible]		[illegible]
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42	[illegible]	[illegible]	[illegible]
43	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]

No.	Description	Unit	[illegible]
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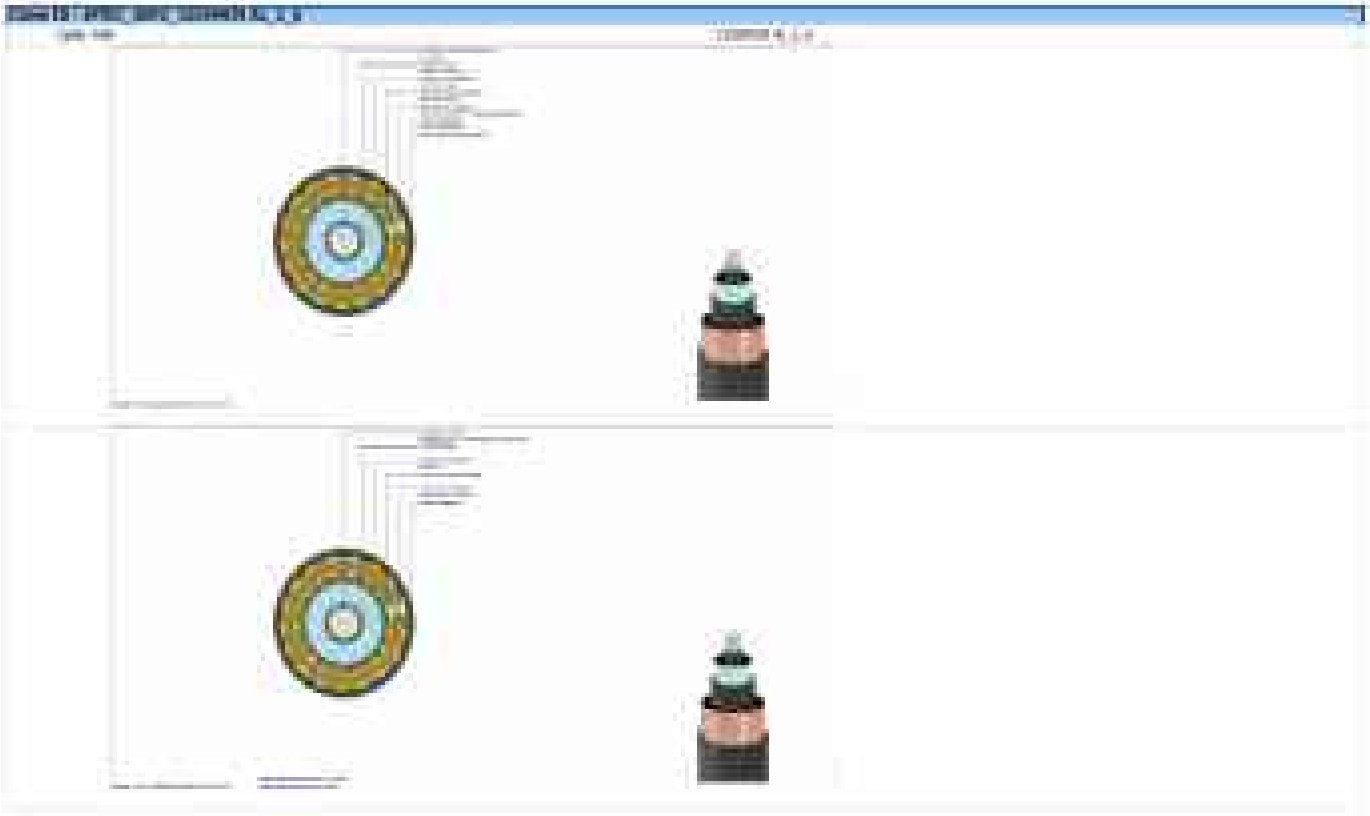

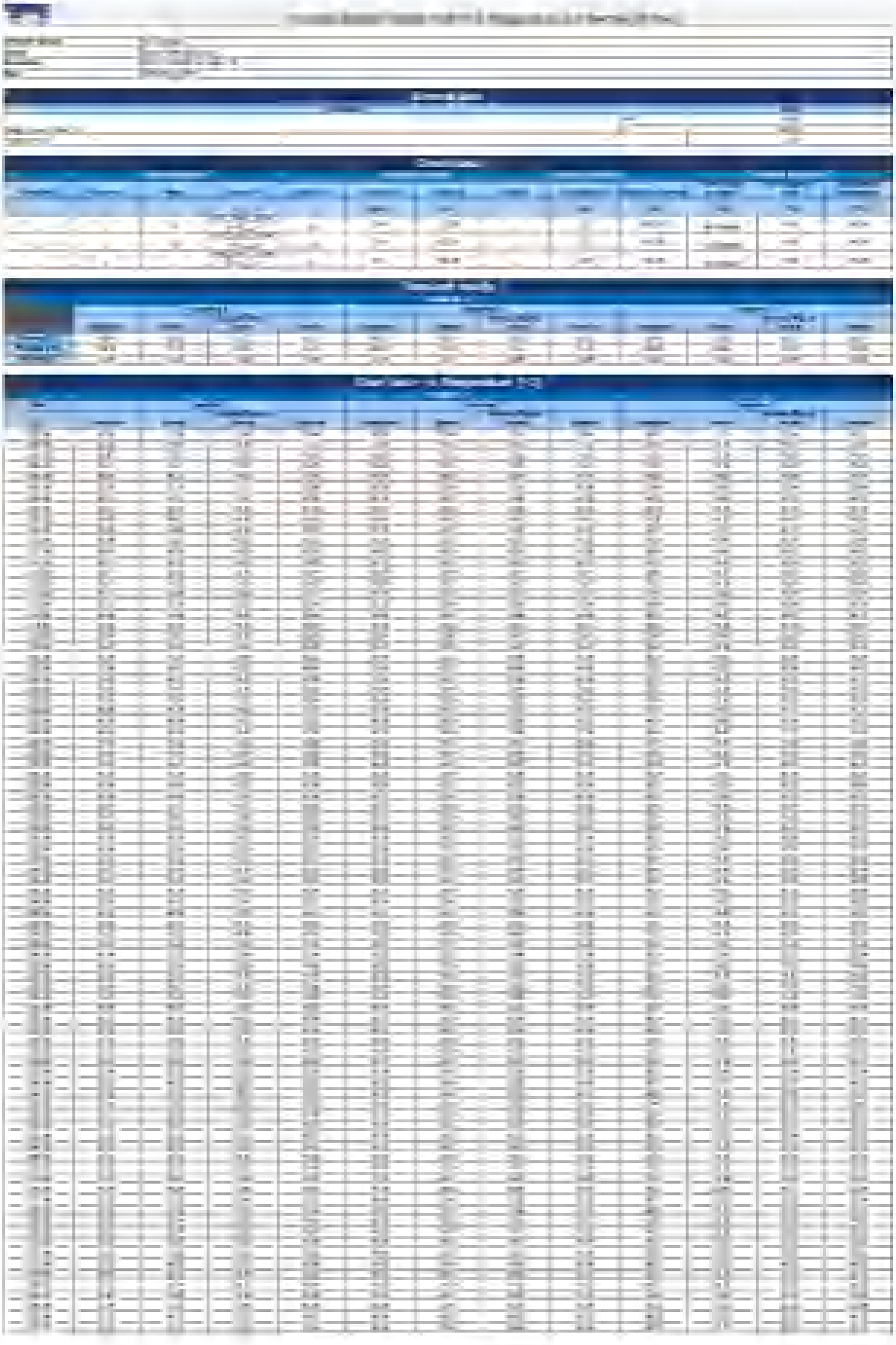

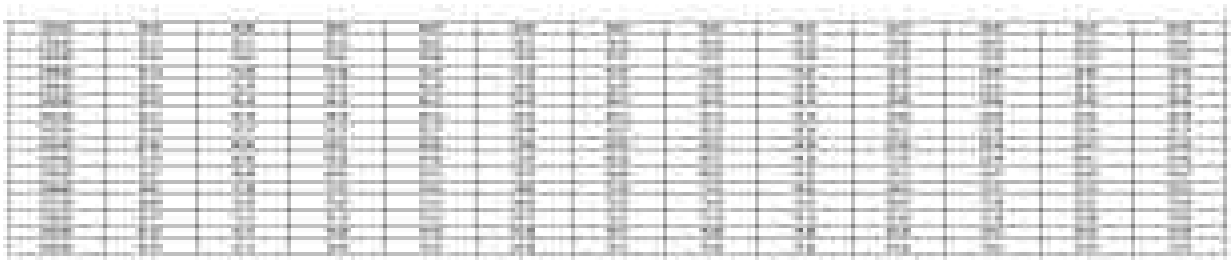

MV Case 2: Six Circuits in Parallel – Multi-Feeder in Individual Trenches, Direct Buried

General Summary Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Simulation Data

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Installation Type: Multiple Duct banks/Backfills

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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General Cable Information

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Detailed Cable Information

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

General Input Data

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
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No.	Description	Unit	[illegible]
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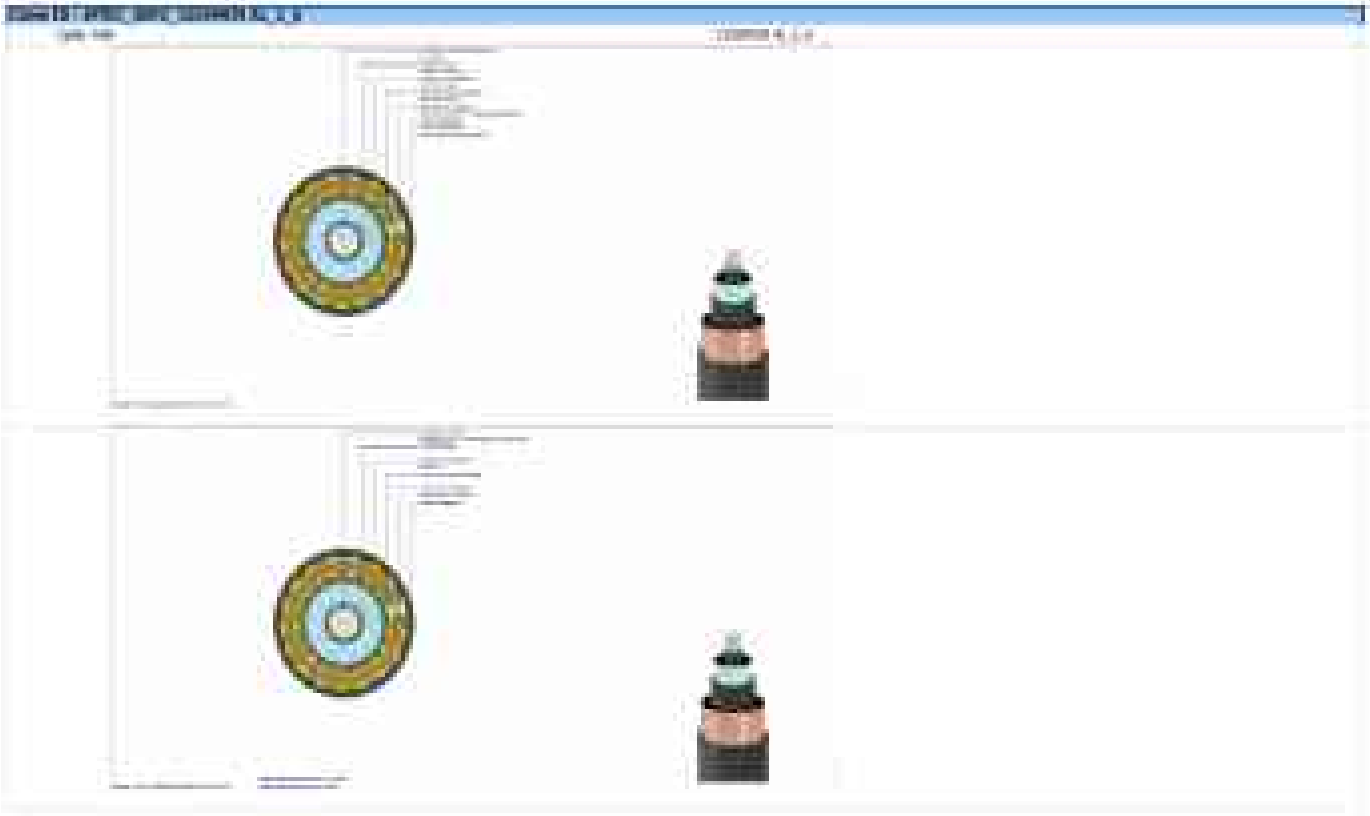

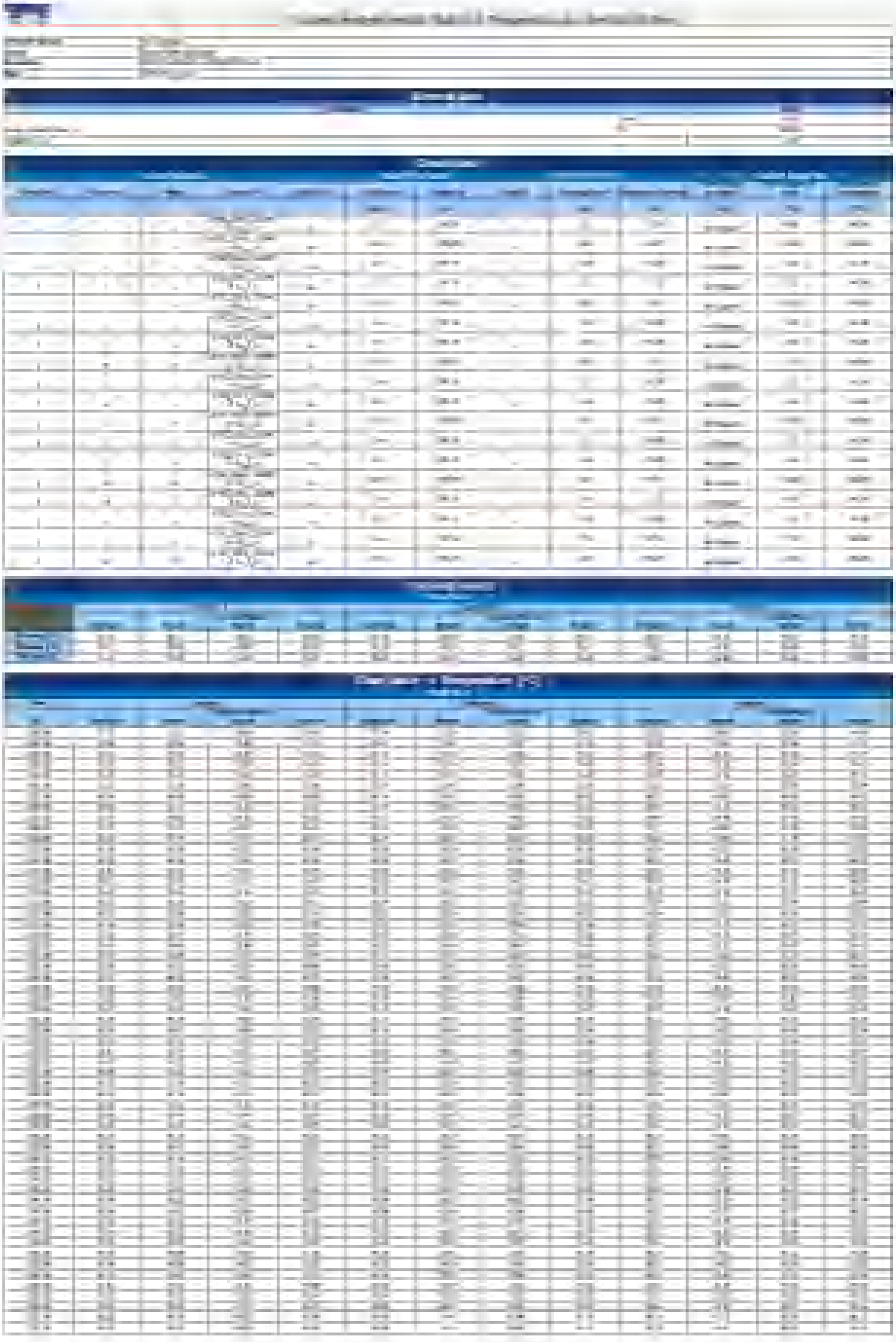

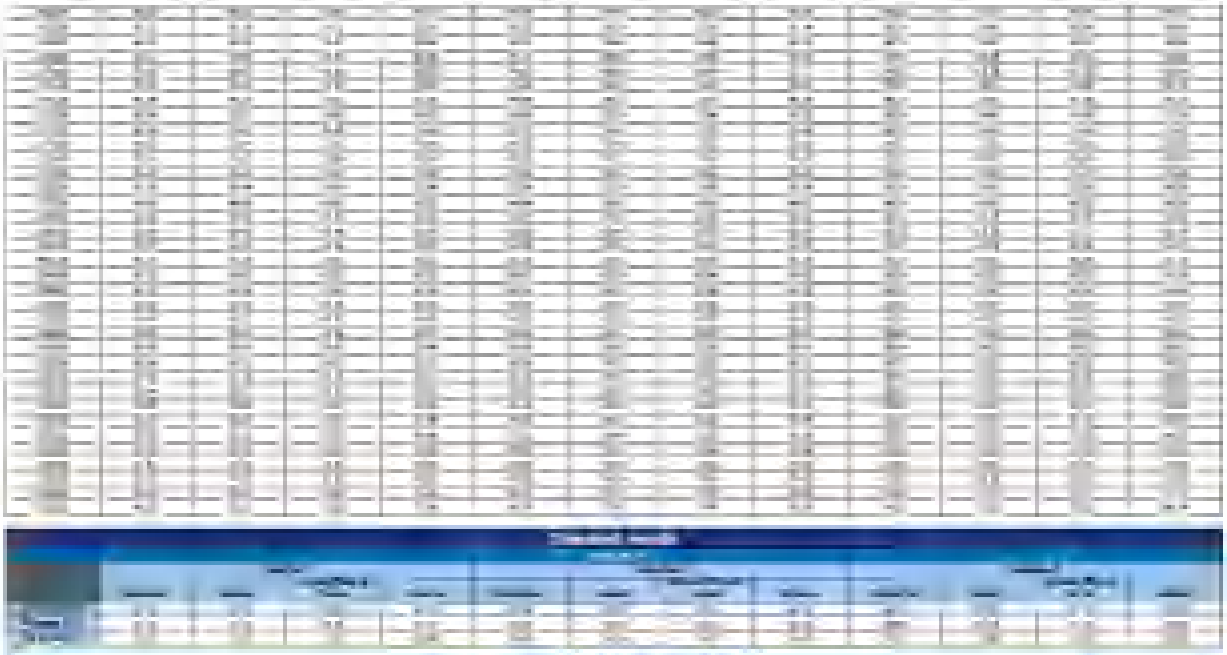

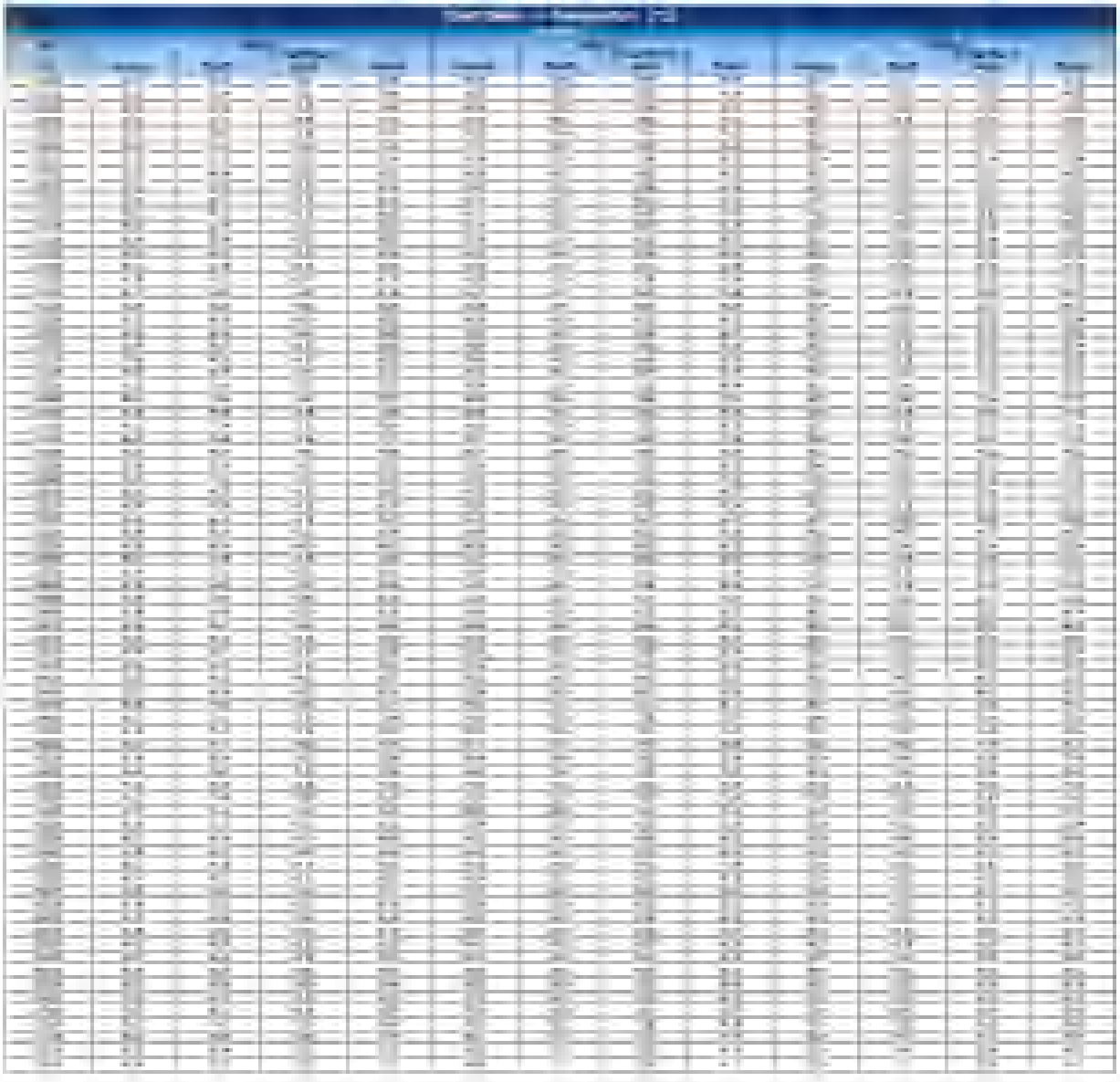

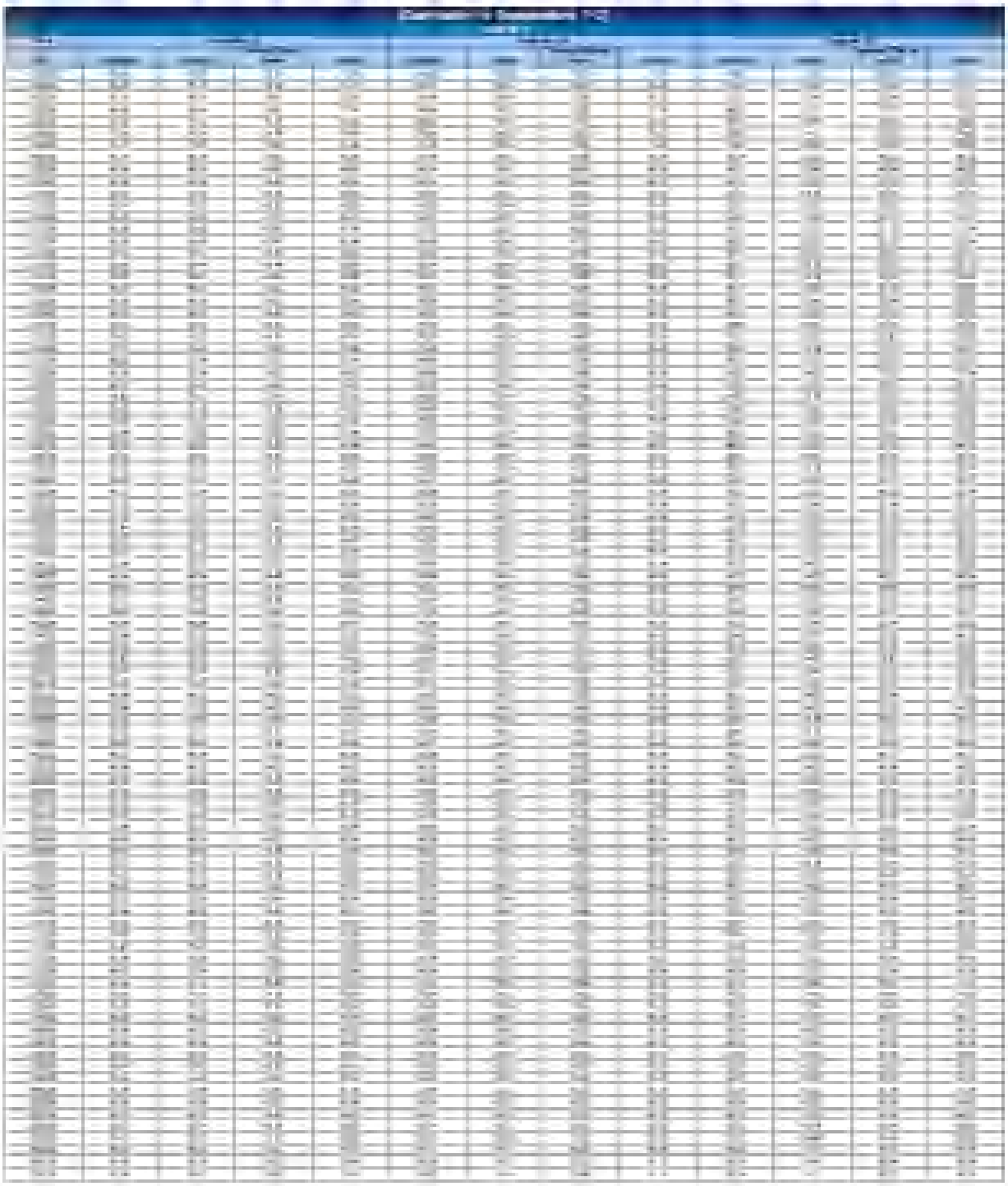

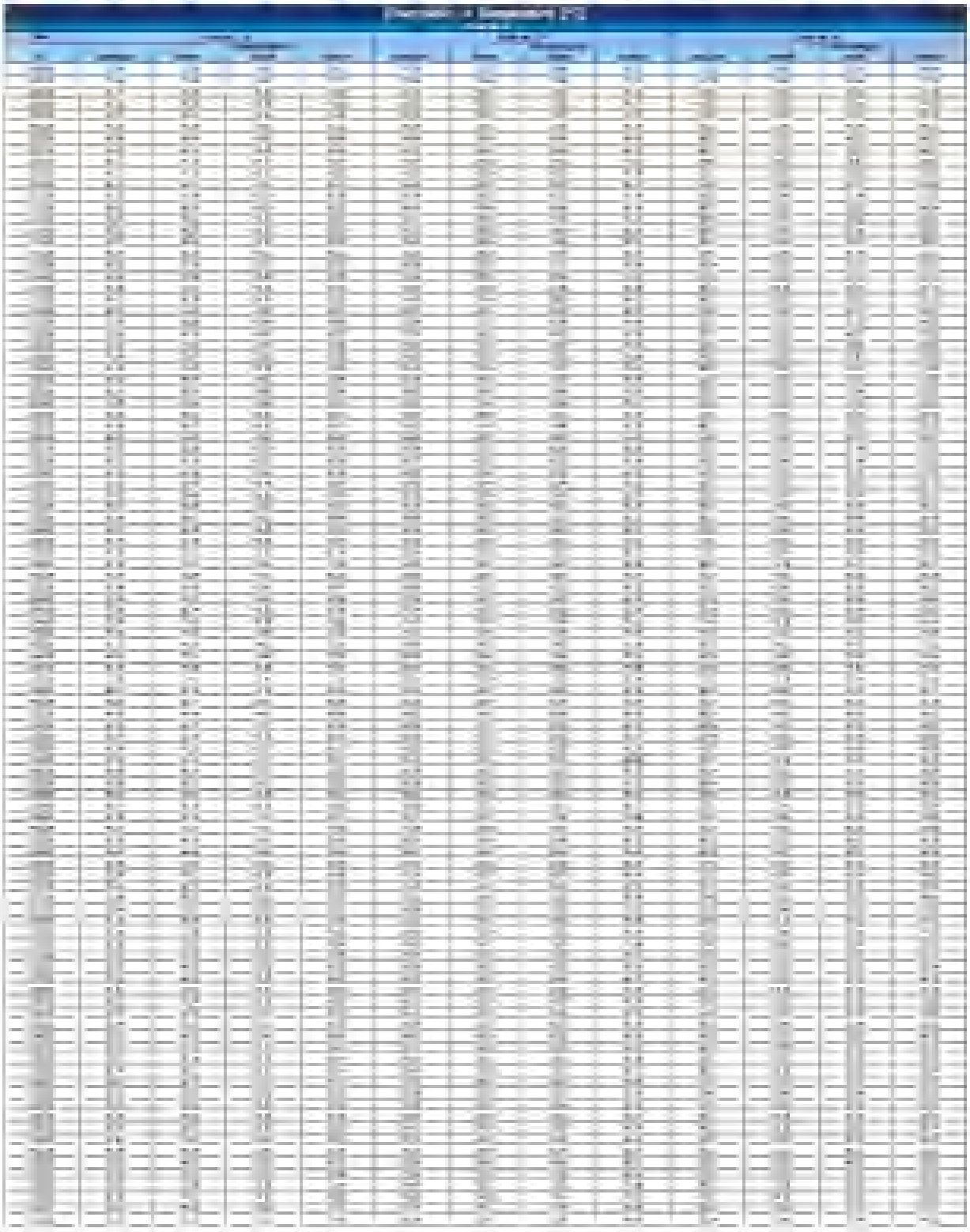

MV Case 3: Two Circuits in Parallel, Multi-Feeder in Individual Trenches, Direct Buried

General Summary Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Simulation Data

[illegible]	[illegible]
[illegible]	[illegible]
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[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Installation Type: Multiple Ductbanks/Backfills

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K-m/W]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

General Cable Information

Cable ID	Number of Cores	Conductor / Conductor Size	Voltage [kV]	Conductor Area [mm²]	Cable Physical Dimension [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Detailed Cable Information

Cable ID	Conductor	Insulation	Resistivity [Ω-m]	Conductor Diameter [in]	Thickness [in]	Diameter [in]	Thermal Resistivity [K-m/W]
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General Input Data

Index	Cable ID	Circuit No.	Phase	X [in]	Y [ft]	T [K]	OD [in]	Sheath / Shield Bonding
Display Order Number	Cable Requirement ID	Circuit No.	Cable Phase	Conductor Frequency	Load Factor	Temperature	Derate Load Factor	Bonding Type
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Ampacity and Temperatures

Index	Cable ID	I [A]	Tc [°C]	Ts [°C]	Ta [°C]	Rac [Ω/m]	Wind [°C]	Wind / Shielding [°C]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Electrical Resistance

Thermal Conductivity

Viscosity

Complementary Information

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

No.	Description	Unit	[illegible]
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37	[illegible]	[illegible]	[illegible]
38	[illegible]	[illegible]	[illegible]
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40	[illegible]	[illegible]	[illegible]
[illegible]			
41	[illegible]		[illegible]
42	[illegible]	[illegible]	[illegible]
43	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]

No.	Description	Unit	[illegible]
[illegible]			
45	[illegible]		[illegible]
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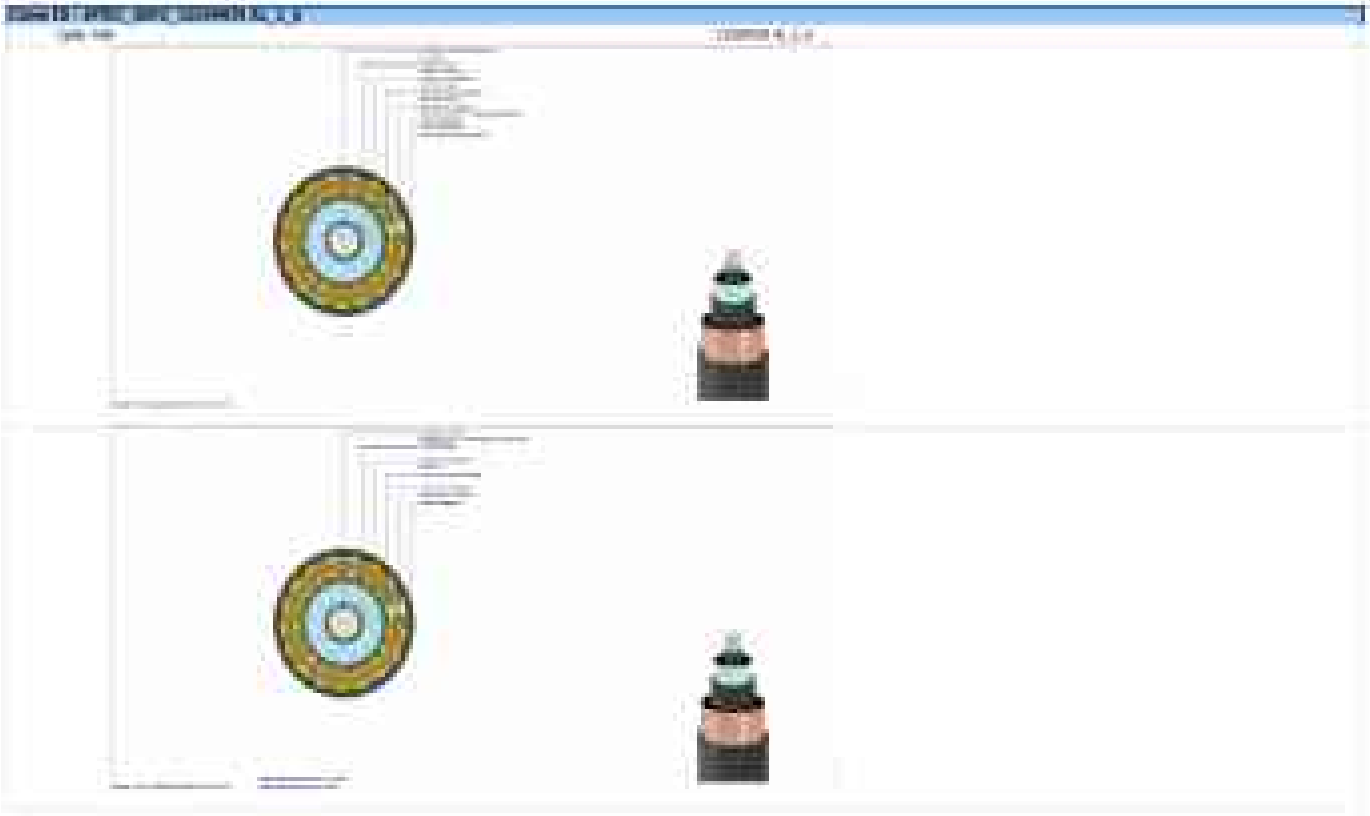
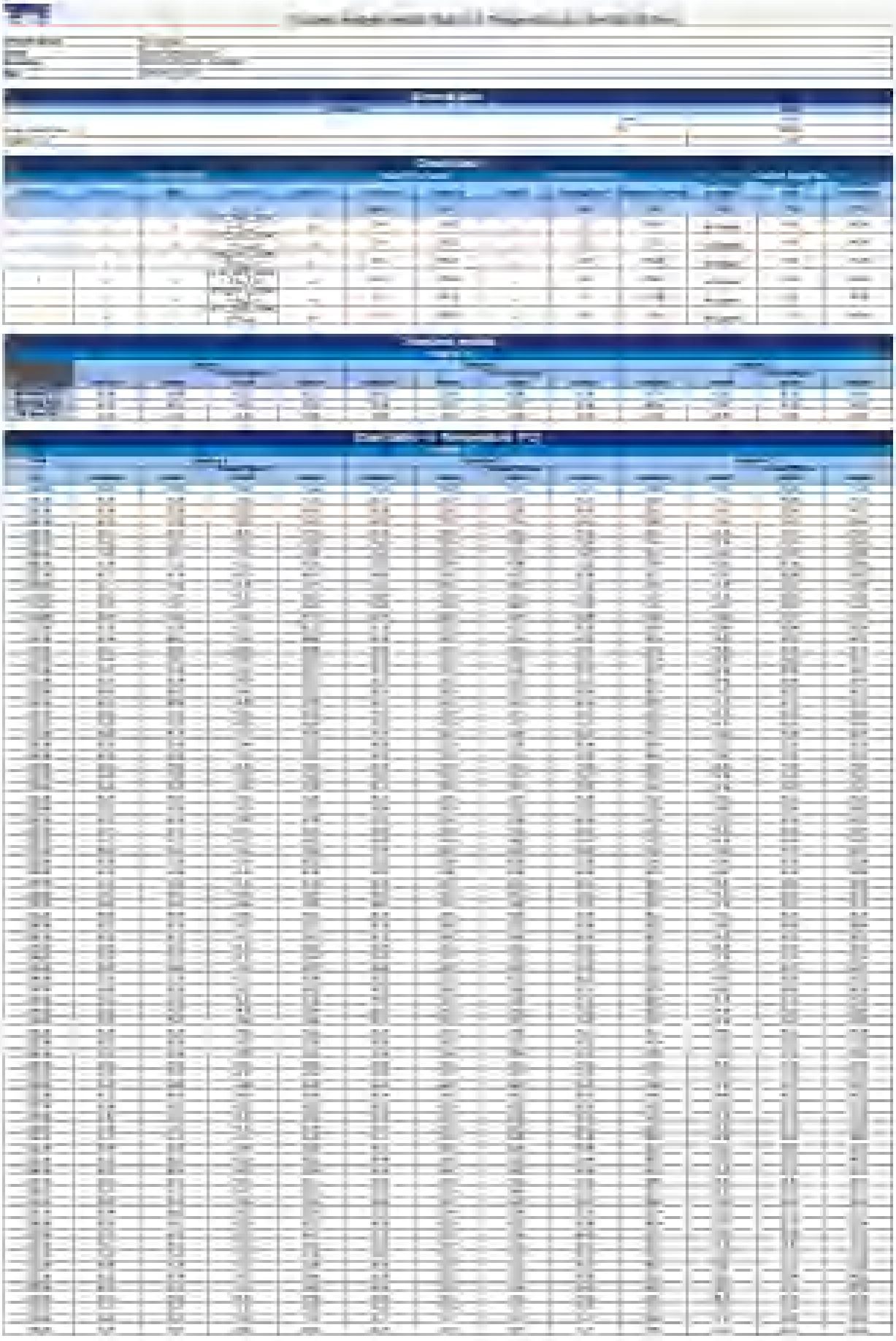
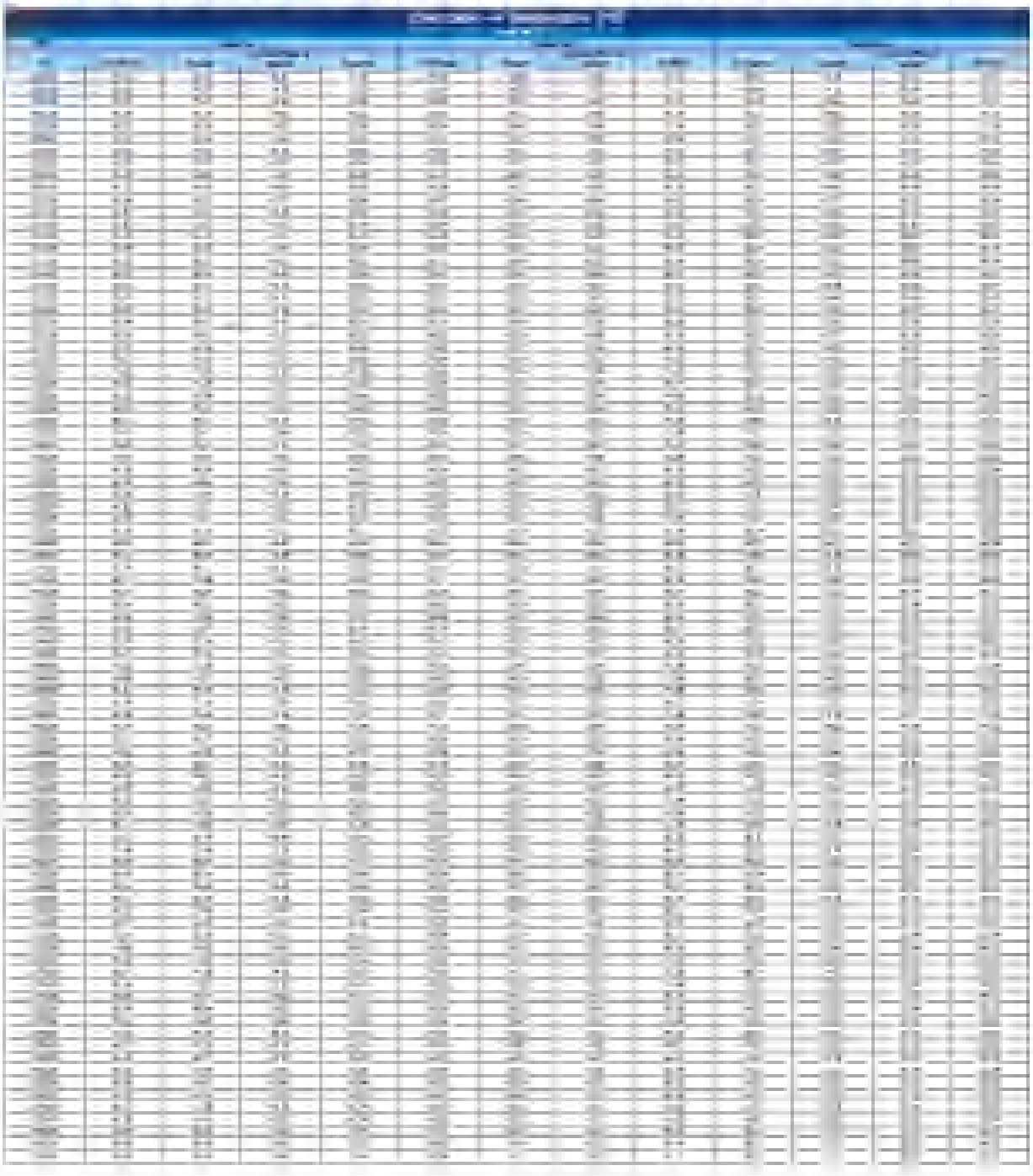
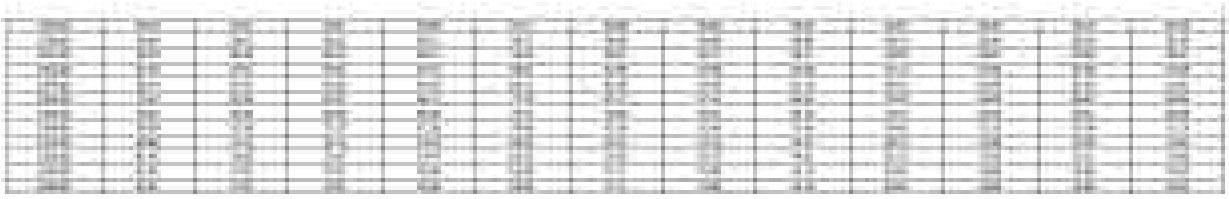








APPENDIX D – REFERENCES

1. NFPA 70: National Electrical Code (NEC), 2020 Edition.
2. CYMCAP Software version 9.0

152 MW/304 MWh ENERGY STORAGE SYSTEM AT

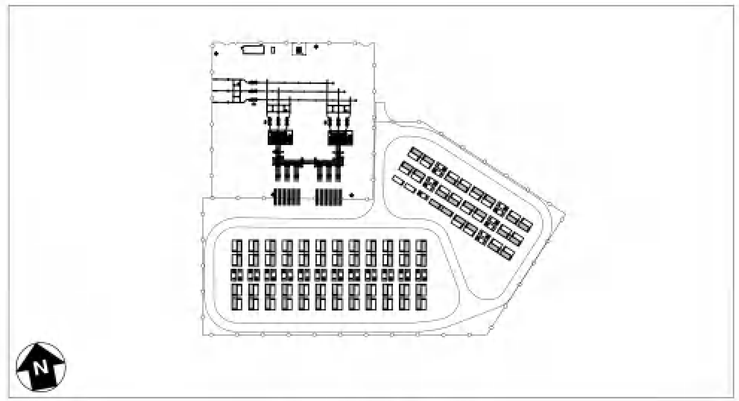
CHISME STORAGE – TX-PS-2701

BROWN AND MILLS COUNTY, TX

31.578332°, -98.834972°

LOCATION MAP
SCALE: 1" = 1000'

STATE MAP
SCALE: NONE



SYSTEM PLAN
SCALE: 1" = 125'

SYSTEM SUMMARY: CHISME STORAGE	
AC SIZE - POI LIMIT (MWAC)	146.00
AC SIZE - NAMEPLATE (MWAC)	176.40
POI CAPACITY (MWh)	292.00
NAMEPLATE CAPACITY BOL (MWh)	351.05
DISCHARGE DURATION (hr)	2
AC POI VOLTAGE (kV)	345
DC VOLTAGE (V)	1500
INVERTER OUTPUT VOLTAGE (V)	690 (INV) / 34.5k (XFMR)
(QTY) TRANSFORMER	(35) SUNGROW MVS5140-LS
(QTY) BOL BATTERY	(70) SUNGROW ST5015UX-2500kW-2h
BATTERY SPECIFICATIONS	
BATTERY CAPACITY @ BOL (kWh)	5015
BATTERY VOLTAGE RANGE (VDC)	1123.2-1497.6
NOMINAL POWER (kW)	2500
MAX VOLTAGE (VDC)	1500
AUGMENTATION STRATEGY	
(QTY) AUGMENTATION BATTERY	(70) SUNGROW ST5015UX-2500kW-4h (4h Conversion)
SITE DESIGN PARAMETERS	
NEC YEAR	2020
UTILITY	ONCOR
ASHRAE WEATHER STATION (YEAR)	BROWNWOOD, TX (WMO: 722666)
MAX TEMPERATURE (°C)	36.1
MIN TEMPERATURE (°C)	-9.9

ENGINEERED BY:

PUREPOWER ENGINEERING

111 RIVER STREET, SUITE 1110
HOBOKEN, NEW JERSEY, 07030

OWNER:

RED RIVER CLEAN ENERGY

RED RIVER CLEAN ENERGY
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NOT FOR CONSTRUCTION

DRAWING TITLE: TITLE SHEET

DRAWING #: G0.001

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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ENGINEER:

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	04/01/2025	60% ELECTRICAL DESIGN	BA	AR
2	04/25/2025	30% ELECTRICAL DESIGN	BA	AR

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PLOT DATE: 6/17/2025 8:19 PM

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PLOT DATE: 8/1/2025 9:18 PM

DRAWING INDEX

Sheet Number	Sheet Title	30% ELECTRICAL DESIGN 04/11/2025	60% ELECTRICAL DESIGN 08/01/2025
	GENERAL		
G0.001	TITLE SHEET	●	●
G0.002	SHEET INDEX	●	●
G0.003	ELECTRICAL BASIS OF DESIGN	●	●
	ELECTRICAL		
E0.001	ELECTRICAL NOTES LIST	●	●
E0.002	ELECTRICAL SYMBOLS & ABBREVIATIONS LIST	●	●
E1.000	OVERALL ELECTRICAL PLAN	●	●
E1.010	PARTIAL ELECTRICAL PLAN - WEST	●	●
E1.020	PARTIAL ELECTRICAL PLAN - SOUTH EAST	●	●
E1.030	PARTIAL ELECTRICAL PLAN - NORTH EAST	●	●
E1.040	SITE LIGHTING PLAN	●	●
E1.100	TYPICAL CONTAINER CONFIGURATION	●	●
E1.901	PCS PLAN & ELEVATION	●	●
E1.902	BATTERY CONTAINER PLAN & ELEVATION	●	●
E2.010	MV SINGLE LINE - FEEDER 100	●	●
E2.020	MV SINGLE LINE - FEEDER 200	●	●
E2.030	MV SINGLE LINE - FEEDER 300	●	●
E2.040	MV SINGLE LINE - FEEDER 400	●	●
E2.050	MV SINGLE LINE - FEEDER 500	●	●
E2.060	MV SINGLE LINE - FEEDER 600	●	●
E2.310	MV FEEDER SCHEDULES & CALCULATIONS	●	●
E2.320	MV FEEDER SCHEDULES & CALCULATIONS	●	●
E2.410	BATTERY COLLECTION SCHEDULES & CALCULATIONS	●	●
E2.420	BATTERY COLLECTION SCHEDULES & CALCULATIONS		●
E2.430	BATTERY COLLECTION SCHEDULES & CALCULATIONS		●
E2.440	BATTERY COLLECTION SCHEDULES & CALCULATIONS		●
E2.450	BATTERY COLLECTION SCHEDULES & CALCULATIONS		●
E2.460	BATTERY COLLECTION SCHEDULES & CALCULATIONS		●
E2.500	COMMUNICATIOINS SCHEDULE - FIBER		●
E2.510	COMMUNICATIOINS SCHEDULE - ETHERNET		●
E2.810	LVAC LIGHTING SCHEDULES	●	●
E3.000	GROUNDING SITE PLAN		●
E3.010	GROUNDING DETAILS		●
E3.100	ELECTRICAL DETAILS		●
E3.110	ELECTRICAL DETAILS		●
E3.210	TRENCH DETAILS	●	●
E4.000	COMMUNICATIONS SITE PLAN		●
E4.010	COMMUNICATIONS ONELINE DIAGRAM		●
E4.011	COMMUNICATIONS ONELINE DIAGRAM		●
E4.200	ILLUMINATION SITE PLAN		●
E4.201	ILLUMINATION WIRING SCHEMATICS		●
E6.000	EQUIPMENT DATA SHEET	●	●

LEGEND:

UPDATED DRAWING ISSUED	●
UNCHANGED, PREVIOUSLY ISSUED DRAWING STILL CURRENT	○
DRAWING REMOVED FROM SET	×

STUDIES INDEX

ELECTRICAL	30% ELECTRICAL DESIGN 04/28/2025	60% ELECTRICAL DESIGN 08/01/2025
CABLE AMPACITY STUDY	●	●
SHORT CIRCUIT STUDY		●

DATE	REVISION DESCRIPTION	PM	ENG CHK
08/01/2025	60% ELECTRICAL DESIGN	BA	AR EL
04/25/2025	30% ELECTRICAL DESIGN	BA	AR EL

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT
CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: SHEET INDEX

DRAWING #: G0.002

RULER IN INCHES

BESS ELECTRICAL BASIS OF DESIGN		
ITEM	**VALUE**	**UNIT**
SITE		
NAME	CHISME STORAGE - TX-PS-2701	-
LOCATION	BROWN AND MILLS COUNTY, TX	-
COORDINATES (LAT., LONG.)	31.578332°, -98.834972°	
POI LIMIT (AC)	146	MW
AC SYSTEM SIZE	176.4	MW
AC SYSTEM SIZE	351.05	MWH
UTILITY	ONCOR	-
AHJ	TBD	-
ASHRAE WEATHER STATION	BROWNWOOD, TX (WMO: 722666)	-
EXTREME LOW DB TEMPERATIRE	-9.9	°C
2% HIGH DB TEMPERATURE	36.1	°C
DESIGN FLOOD DEPTH	PER CIVIL	INCHES
SOIL TYPE	SAND/CLAY	INCHES
WET SOIL THERMAL RESISTIVITY	0.149	°C*m/W
DRY SOIL THERMAL TESISTIVITY	0.274	°C*m/W
MAIN ACCESS ROAD WIDTH	20	FEET
INTERIOR ACCESS ROAD WIDTH	20	FEET
ACCESS ROAD TURN RADIUS	70	FEET
ACCESS ROAD TO BESS OFFSET	10	FEET
FENCE TO BESS EQUIPMENT OFFSET	20	FEET
BATTERY		
MAKE/MODEL	SUNGROW ST5015UX-2500kW-2h	-
NAMEPLATE POWER	2520	W
NAMEPLATE ENERGY	5015	kWh
CYCLE TIME	2	HRS
C-RATE	0.5	-
NOMINAL OUTPUT VOLTAGE	690	V
OUTPUT VOLTAGE RANGE	607-759	V
MAXIMUM OUTPUT CURRENT	2112	A
QUANTITY BOL	70	-
QUANTITY EOL	140	-
CONTAINERS PER PCS BOL	2	-
CONTAINERS PER PCS EOL	4	-
TYPE	LITHIUM IRON PHOSPHATE	-
EQUIPMENT CLEARANCES	11.5 (FRONT) / 0.5 (REAR) / 5 (LEFT/RIGHT)	FT
PCS		
MADE/MODEL	SUNGROW MVS5140-LS	-
DESIGN TEMP	40	°C
NAMEPLATE POWER @ DESIGN TEMP	5.14	MVA
APPARENT POWER @ MAX SITE TEMP	5.14	MVA
QUANTITY BOL	35	-
QUANTITY EOL	35	-
TYPE	MV SKID	-
AC COLLECTION VOLTAGE	690	V
MVAC VOLTAGE	34.5	KV
EQUIPMENT CLEARANCES	6 (FRONT) / 1.65 (REAR) / 1.81 (LEFT/RIGHT) / 5 (LEFT/RIGHT FROM BATTERY OR PCS)	FT
MV COLLECTION		
COLLECTION CIRCUIT QUANTITY	6	-
COLLECTION VOLTAGE	34.5	KV
CABLE SPEC	ALUMINUM WITH COPPER CONCENTRIC NEUTRAL	-
INSULATION	100% INSULATION, XLPE	-
TEMPERATURE	MV-105	-
TRENCH GROUND	7#6 CCS	-
MV COLLECTION CONFIGURATION	LOOP-FEED	-
AC BATTERY COLLECTION		
STRATEGY	BESS ON PILES W/ AWM CABLE CLEATS	-
AC EGC	2AWG CU	-
POI		
POWER LIMIT	146	MW
VOLTAGE	345	KV
POWER FACTOR	±0.95	-
# OF DAILY CHARGE/DISCHARGE CYCLES	1	-
MAXIMUM SYSTEM RUN TIME	2 @ BOL / 4 @ AUGMENTATION	HRS
AUGMENTATION APPROACH		
AC OR DC	AC	-
STRATEGY	ADD 4-HR 1250kW CONTAINERS. SOFTWARE CONTROL UPDATES TO RUN BOL 2-HR CONTAINERS AS A 4-HR SYSTEM.	-
AUXILIARY SYSTEM		
DESIGN STRATEGY	SELF SUPPLIED	-
LIGHTING		
DESIGN STRATEGY	POLE MOUNTED FIXTURES, LVAC POWER FROM SUBSTATION CONTROL HOUSE	-
FIRE SUPPRESSION		
DESIGN STRATEGY	TBD	-
COMMUNICATIONS		
FIBER SPEC	12 STRAND SINGLE MODE, 1 CABLE PER CIRCUIT, COLLAPSED LOOP	-
SHIELDING	ARMORED	-
FIBER INSTALLATION	DIRECT BURIED	-
CAT CABLE SPEC	CAT 6	-
INSTALLATION		
MV CABLE TRENCH DEPTH (MIN)	36	INCHES

PLOT DATE: 8/7/2025 9:18 PM

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1	08/01/2025	60% ELECTRICAL DESIGN	BA	AR	EL
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PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL BASIS OF DESIGN

DRAWING #: G0.003

GENERAL

1. THE WORK INCLUDED SHALL CONSIST OF FURNISHING LABOR AND MATERIALS NECESSARY FOR THE COMPLETE INSTALLATION OF LIGHTING AND POWER SYSTEMS SHOWN ON THE DRAWINGS. ALL WORK SHALL BE COMPLETE AND LEFT IN OPERATING CONDITION AT COMPLETION OF CONTRACT.
2. INCLUDE ALL MATERIALS, ACCESSORIES AND OTHER ITEMS NECESSARY TO COMPLETE THE INSTALLATION.
3. SOME EQUIPMENT AND MATERIALS PROVIDED UNDER OTHER DIVISIONS MAY REQUIRE COMPOSITE WORK CREWS BECAUSE OF TRADE JURISDICTION. IT IS THE CONTRACTOR'S OR SUBCONTRACTOR'S RESPONSIBILITY TO REVIEW ALL CONTRACT DOCUMENTS TO DETERMINE WHERE THESE COMPOSITE CREWS ARE REQUIRED.
4. ALL TEMPORARY AND PERMANENT PERMITS AND LICENSES REQUIRED IN CONNECTION WITH THE DIVISION'S WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
5. INSTALLATION SHALL MEET OR EXCEED CURRENT APPLICABLE CODES, ORDINANCES AND REGULATIONS IN EFFECT AT THE SITE. IN LIEU OF COUNTY SPECIFIC REQUIREMENTS, APPLICABLE CODES DEFAULT TO STATE STANDARDS. IF A CONTRACTOR OR SUBCONTRACTOR OBSERVES THAT THE CONTRACT DOCUMENTS ARE AT VARIANCE WITH GOVERNING CODES AND REGULATIONS, CONTRACTOR SHALL PROMPTLY NOTIFY THE ENGINEER IN WRITING, WHO WILL RESPOND TO SUCH VARIANCES IN WRITING. IF THE CONTRACTOR PERFORMS WORK KNOWING IT IS NOT COMPLIANT WITH APPLICABLE CODES, AND DOES NOT NOTIFY THE ENGINEER, THE CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY AND BEAR ALL COSTS ATTRIBUTABLE TO CORRECTING THE NON-COMPLYING WORK.
6. THE REFERENCE TO CODES AND STANDARDS SHALL NOT PERMIT A LOWER GRADE OF CONSTRUCTION WHERE CONTRACT DOCUMENTS CALL FOR WORKMANSHIP AND/OR MATERIALS IN EXCESS OF THOSE REFERENCED.
7. WHERE THE TERMS "PROVIDE" OR "SHALL BE" ARE USED HEREIN OR ON THE DRAWINGS, THEY SHALL BE TAKEN TO MEAN "THE CONTRACTOR SHALL FURNISH AND INSTALL".
8. WHERE THE TERM "WHERE REQUIRED" AND "AS REQUIRED" ARE USED HEREIN OR ON THE DRAWINGS THIS VERBIAGE SHALL BE TAKEN TO MEAN "WHERE REQUIRED BY THE CONTRACT DOCUMENTS, APPLICABLE CODES, APPLICABLE STANDARDS AND UTILITY AGREEMENTS".
9. IF EQUIPMENT OR MATERIALS OTHER THAN THOSE SPECIFIED IN THE DESIGN OF THIS PROJECT ARE PROPOSED TO BE USED ON THIS PROJECT, THE CONTRACTOR AND SUPPLIER SHALL DOCUMENT DIMENSIONAL DIFFERENCES, ELECTRICAL REQUIREMENTS AND ANY OTHER POTENTIAL VARIANCES. THIS DOCUMENTED COMPARISON SHALL BE MADE FOR MANUFACTURERS SPECIFIED AS WELL AS THOSE PROPOSED PRIOR TO REQUESTING APPROVAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EXTRA COSTS INCURRED AS A RESULT OF SUBSTITUTIONS, INCLUDING THOSE OF OTHER CONTRACTORS, SUCH AS MIGHT BE DUE TO (BUT NOT LIMITED TO) DIFFERENT ELECTRICAL, MECHANICAL AND ARCHITECTURAL REQUIREMENTS.
10. SHOP DRAWINGS:
    a. CAREFULLY EXAMINE ALL SHOP DRAWINGS NOTING CAPACITY, ARRANGEMENT AND PHYSICAL DIMENSIONS AND MARK THE DRAWINGS AS BEING REVIEWED AND APPROVED PRIOR TO SUBMITTING TO THE ENGINEER. WHERE CATALOG DATA IS SUBMITTED WHICH INCLUDES ITEMS WHICH DO NOT APPLY TO THIS PROJECT, THOSE ITEMS SHALL BE CLEARLY MARKED OUT OR RELEVANT ITEMS CLEARLY NOTED. ANY DEVIATIONS FROM THE DOCUMENTS SHALL BE SO NOTED BY THE CONTRACTOR OR EQUIPMENT SUPPLIER. THE INTENT AND REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS SHALL BE ADHERED TO AT ALL TIMES AND ARE NOT WAIVED OR OVERRIDDEN IN ANY WAY BY THE SHOP DRAWING SUBMITTAL OR REVIEW.
    b. SUBMIT A MINIMUM OF (1) ELECTRONIC COPY OF SHOP DRAWINGS FOR REVIEW AND APPROVAL. CONTRACTOR SHALL RETAIN A FINAL APPROVED COPY FOR INCORPORATION IN THE OPERATION AND MAINTENANCE MANUALS.
    c. IF RETURNED SHOP DRAWINGS ARE MARKED "NO EXCEPTIONS TAKEN", NO ADDITIONAL SUBMITTAL IS REQUIRED. IF THE SHOP DRAWING IS MARKED "MAKE CORRECTIONS NOTED", THE CHANGES NOTED ON THE SHOP DRAWINGS ARE TO BE INCORPORATED, WITH NO FURTHER RESUBMITTAL REQUIRED. IF MARKED "REVISE AND RESUBMIT", CHANGES NOTED ON THE SHOP DRAWINGS ARE TO BE MADE AND THE DRAWINGS RESUBMITTED FOR REVIEW. IF MARKED "REJECTED", THE EQUIPMENT SUBMITTED IS UNACCEPTABLE AND DIFFERENT EQUIPMENT OR MATERIALS NEED TO BE SUBMITTED.
11. NO ASBESTOS OR PCB CONTAINING MATERIALS OF ANY TYPE SHALL BE USED ON THIS PROJECT.
12. CONSULT THE CONTRACT DRAWINGS AND SPECIFICATIONS OF ALL OTHER DIVISIONS AND OTHER TRADES FOR CORRELATING INFORMATION AND LAYOUT WORK SO THAT IT WILL NOT INTERFERE WITH OTHER TRADES. VERIFY ALL DIMENSIONS AND CONDITIONS. IF CONFLICTS OCCUR SUCH THAT RESOLUTION IS NOT POSSIBLE BY THE AFFECTED TRADES ON THE JOB, THE ENGINEER SHALL BE NOTIFIED AND A RESOLUTION SHALL BE WORKED OUT.
13. ELECTRICAL EQUIPMENT ENCLOSURES (SWITCHBOARDS, PANELBOARDS, TRANSFORMERS, RELAY CABINETS, SYSTEMS RACKS/CABINETS, COMBINER BOXES, ETC.) SHALL BE VACUUMED AND WIPED CLEAN PRIOR TO ENERGIZING.
14. INSTALL MATERIAL AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS, INSTRUCTIONS, AND CURRENT N.E.C.A. STANDARDS.
15. INSTALL EQUIPMENT AND MATERIALS TO PROVIDE REQUIRED ACCESS FOR SERVICING AND MAINTENANCE. COORDINATE FINAL EQUIPMENT LOCATION WITH REQUIRED ACCESS PANELS AND DOORS. ALLOW AMPLE SPACE FOR REMOVAL OF ALL PARTS THAT REQUIRE REPLACEMENT OR SERVICING.
16. RECORD DRAWINGS: THROUGHOUT CONSTRUCTION ACTIVITIES, IN A NEAT AND LEGIBLE MANNER, DOCUMENT AND RECORD ALL CHANGES FOR DEVIATIONS FROM THE CONTRACT DRAWINGS. SUBMIT RECORD DRAWINGS TO ENGINEER FOR REVIEW AT COMPLETION OF WORK AND INTERMITTENTLY IF REQUESTED BY THE ENGINEER IN WRITING. THE RECORD DRAWINGS WILL BECOME PART OF THE OPERATION AND MAINTENANCE MANUAL PACKAGE SUBMITTED TO THE OWNER AFTER THE COMPLETION OF THE PROJECT.

MATERIALS AND METHODS

1. ALL MATERIALS SHALL BE NEW, AS SPECIFIED (OR APPROVED), AND RECEIVED IN ORIGINAL PACKAGING. CATALOG NUMBERS SPECIFIED SHALL BE VERIFIED WITH VENDORS PRIOR TO ORDERING MATERIAL.
2. ALL MATERIALS SHALL BE LISTED BY A NRTL (I.E. UL, ETL, ETC.) AND HAVE AN ASSOCIATED LABEL UNLESS SPECIAL FABRICATION OF MATERIAL IS REQUIRED. SPECIAL FABRICATED MATERIAL SHALL BE FABRICATED USING LISTED COMPONENTS AND PROCEDURES.
3. ALL WORK SHALL BE TESTED IN ACCORDANCE WITH INDUSTRY ACCEPTED STANDARDS. BEFORE TESTING, A THOROUGH VISUAL INSPECTION SHALL BE MADE TO DETECT CONNECTION PROBLEMS, DAMAGED COMPONENTS, POOR WORKMANSHIP, INAPPROPRIATE OVERCURRENT PROTECTION, DEBRIS, ETC. TESTING APPARATUS SHALL BE CERTIFIED OR DEMONSTRATED TO BE ACCURATE WITHIN REASONABLE LIMITS. COMPETENT PERSONNEL FAMILIAR WITH THE TEST EQUIPMENT SHALL PERFORM ALL TESTS. IF TESTING PROCEDURES EMPLOYED ARE NOT SATISFACTORY TO THE ENGINEER, OUTSIDE TESTING WILL BE DONE AT THE CONTRACTOR'S EXPENSE.
4. ALL LOW VOLTAGE CABLES SHALL BE BUNDLED AND LABELED AS TO THEIR FUNCTION WITHIN TERMINAL CABINETS, WIREWAYS AND CABLE TRAYS.
5. BRANCH CIRCUITRY SHALL MATCH CIRCUIT NUMBERS AS SHOWN ON THE DRAWINGS AND AS SCHEDULED. NOTIFY ENGINEER IN WRITING AND RECORD ALL DEVIATIONS ON THE AS-BUILT DRAWINGS.
6. ALL OPENINGS INTO EQUIPMENT SHALL BE SEALED WITH GALVANIZED STEEL PLATES OR SCREENS TO PREVENT ENTRY OF INSECTS AND RODENTS.
7. CLEAN, DE-BURR AND RE-FINISH ALL FIELD-PERFORMED ENCLOSURE PENETRATIONS TO MATCH OR EXCEED THE MANUFACTURER'S MEANS OF WEATHERPROOFING AND CORROSION-PREVENTION. UTILIZE MATERIALS THAT MEET OR EXCEED THE PERFORMANCE OF THE MANUFACTURER'S MEANS OF CORROSION PROTECTION.

RACEWAYS

1. WHERE REQUIRED, PROVIDE CABLE SEPARI RELIEF AND GROUNDING CONNECTORS.
2. UNLESS NOTED OTHERWISE, EXPANSION FITTINGS SHALL BE UTILIZED FOR ALL PVC CONDUITS EMERGING FROM THE GROUND.
3. SCHEDULE 40 PVC SHALL BE USED FOR ALL RACEWAYS WHERE NOT RESTRICTED BY THIS SECTION OR SPECIFICALLY NOTED OTHERWISE.
4. ABOVE-GRADE PVC CONDUIT IS ONLY ALLOWED WHERE TRANSITIONING FROM BELOW GRADE AND SHALL BE UV RESISTANT TYPE SCHEDULE 80.
5. INSTALLATIONS OF UNDERGROUND WIRING SHALL BE IN TRENCH, DUCT OR CONDUIT OR BY PLOWING IN PLACE AS SPECIFIED ON THE DRAWINGS.
6. WHEN NON-METALLIC CONDUIT REQUIRES FIELD BENDING, UTILIZE A HOT-BENDING APPLIANCE. USE OF TORCHES TO BEND CONDUIT IS UNACCEPTABLE. WHERE CONDUITS TERMINATE IN HANDHOLES/VAULTS OR IN PAD MOUNTED EQUIPMENT, TERMINATE CONDUITS A MINIMUM OF 4 INCHES ABOVE BEDDING OR SLAB. WHERE ROUTED THROUGH SLABS, PROVIDE SLEEVES TO ALLOW SETTLING/HEAVING OF SLAB.
7. WHERE HDPE (HDPE/DUCT IS USED, SCHEDULE 80 PVC CONDUIT SHALL BE USED FOR TRANSITIONS TO ABOVE GRADE.
8. ALL RACEWAYS SHALL UTILIZE POLYWATER OR EQUAL FOR SEALANT. DUCT SEAL IS NOT CONSIDERED EQUAL.
9. ALL ELECTRICAL EQUIPMENT, CONDUITS, AND COMPONENTS MUST BE ADEQUATELY PROTECTED FROM DAMAGE AND VANDALISM BY THE USE OF BOLLARDS, FENCES, SHIELDS, GUARDS OR OTHER APPROVED MEANS.
10. IT IS CRITICAL TO MAINTAIN PROPER EQUIPMENT CLEARANCES. COMMON EQUIPMENT CLEARANCE REQUIREMENTS INCLUDE:
    a. NEC WORKING CLEARANCES PER NEC 110.26(A)(1) AND 110.34(A)
    b. VENDOR CLEARANCES PER VENDOR DOCUMENTATION
    c. ACCESS CLEARANCES FOR OPERATIONS AND MAINTENANCE
    d. ADDITIONAL CODES/ORDINANCES AS REQUIRED BY OWNER OR AHJ
    e. RECOMMENDATIONS PER NFPA-850. IN LIEU OF SPECIFIC REQUIREMENTS, 10'-0" IS A REASONABLE CLEARANCE BETWEEN EQUIPMENT, INCLUDING SEPARATION FROM FENCE LINE.
11. TO COMPLY WITH REQUIREMENTS OF NFPA 855, IMPACT PROTECTION SHALL BE PROVIDED AS FOLLOWS:
    a. BOLLARDS OR OTHER IMPACT PROTECTION MATERIALS SHALL BE UTILIZED TO PROTECT ALL BESS RELATED PCS EQUIPMENT LOCATIONS.
        i. MINIMUM PLACEMENT SHALL BE AT INTERSECTIONS AND ACCESS ROAD CORNERS WHERE VEHICLES COULD BE MORE LIKELY TO MAKE TURNS INTO EQUIPMENT. IMPACT PROTECTION IS NOT MANDATORY ALONG STRAIGHT ACCESS ROADS, AS THEY ARE CONSIDERED LESS OF A RISK.
    b. IF BOLLARDS ARE SELECTED, THEY SHALL COMPLY WITH THE MINIMUM REQUIREMENTS PER NFPA 855 (2020) SECTION 4.5.13.3
    c. MODULAR CONCRETE OR PLASTIC BARRIERS MAY BE CONSIDERED SUITABLE AS WELL, WITH THE BENEFIT OF ABOVE GROUND INSTALLATION.
    d. MAXIMUM GAP BETWEEN IMPACT PROTECTION SHALL BE 4'.
    e. IMPACT PROTECTION IS NOT CONSIDERED MANDATORY FOR ANCILLARY SYSTEMS SUCH AS AUXILIARY EQUIPMENT, LIGHTING POLES, ETC. UNLESS SPECIFIED BY THE OWNER OR AHJ.
12. MINIMUM CONDUCTOR INSTALLATION DEPTH SHALL BE PER NEC TABLE 300.5 FOR CIRCUITS <1000V, OR 300.15 FOR 1000V OR GREATER.
    a. DIRECT BURIED CIRCUITS:
        i. MV STANDARD DEPTH OF 36"
        ii. NON-MV STANDARD DEPTH OF 24"
    b. CIRCUITS IN CONDUIT:
        i. MV CONDUIT STANDARD DEPTH 2'-0"
        ii. NON-MV CONDUIT STANDARD DEPTH OF 18"
    c. BURIAL DEPTH MAY BE INCREASED FROM THE MINIMUM TO AVOID OTHER CABLE/CONDUIT SYSTEMS OR INFRASTRUCTURE, AND TO ACCOMMODATE CONDUIT SWEEP TANGENT LENGTHS.
13. ELECTRICAL WARNING TAPE SHALL BE LOCATED WITH 12" OF GRADE, AND NO CLOSER THAN 12" TO CONDUCTORS. ELECTRICAL WARNING TAPE SHALL BE PLACED AT A MINIMUM EVERY 2'-0" OF TRENCH WIDTH.

WIRING AND CABLE

1. WIRE:
    a. DESCRIPTION: SINGLE CONDUCTOR INSULATED WIRE.
    b. CONDUCTORS: 98% COMMERCIALLY PURE COPPER CONDUCTORS OR AA-8000 SERIES ALUMINUM ALLOY COMPACT STRANDED CONDUCTORS.
    c. INSULATION VOLTAGE RATING: 600 VOLTS (VAC) AND 2000 VOLTS (DC) ONLY.
    d. INSULATION: AWG/NFPA 70; 90°C TYPE: THHN-2/THWN-2, XHHW-2; RHW-2, USE-2, AND PV-WIRE.
    e. PROVIDE SERVICE LOOPS AT TERMINATIONS.
2. USE SUITABLE WIRE PULLING LUBRICANT FOR PULLING WIRE 4 AWG AND LARGER.
3. NEATLY TRIM AND LACE WIRING INSIDE BOXES, EQUIPMENT, ETC.
4. CLEAN CONDUCTOR SURFACES BEFORE INSTALLING LUGS AND CONNECTORS.
5. MAKE SPLICES, TAPS AND TERMINATIONS TO CARRY FULL AMPACITY OF CONDUCTORS WITH NO PERCEPTIBLE TEMPERATURE RISE. SPLICES ARE NOT ALLOWED UNLESS APPROVED IN WRITING BY PROJECT OWNER.
6. PARALLEL 3-PHASE FEEDER RUNS IN CONDUIT SHALL HAVE ALL THREE PHASE CONDUCTORS (INCLUDING NEUTRAL AND GROUND WHERE REQUIRED) INSTALLED IN EACH CONDUIT. GROUPING A SINGLE PHASE (OR TWO PHASES) IN A SINGLE CONDUIT IS NOT PERMITTED.
7. TIE WRAPS: EACH USE OF A TIE WRAP, OTHER THAN SPECIFIED IN THIS DOCUMENT, MUST BE APPROVED BY OWNER. CONTRACTOR SHALL ADHERE TO THE FOLLOWING SPECIFICATIONS WHEN USING TIE WRAPS:
    a. CONTRACTOR MAY USE TIE WRAPS TO BUNDLE WIRES TOGETHER, BUT NOT AS THE SUPPORT METHOD TO STRUCTURE.
    b. WHEN USING TIE WRAPS, CONTRACTOR SHALL AVOID PINCHING WIRE INSULATION, AND ENSURE THAT THE TIE WRAP IS PULLED TO A REASONABLE TIGHTNESS.
    c. ALL TIE WRAPS USED BY CONTRACTOR SHALL HAVE A MINIMUM WIDTH OF 0.189 INCHES.
    d. CONTRACTOR SHALL ONLY USE HEAT STABILIZED/ULTRAVIOLET RESISTANT TIE WRAPS THAT ARE UL LISTED.
8. DISTANCES PROVIDED IN SCHEDULES TABLES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR FIELD MEASUREMENTS AND TAKEOFFS.
9. PHASE RELATIONSHIP
    a. CONNECT FEEDERS TO MAINTAIN PHASE RELATIONSHIP THROUGH SYSTEM. PHASE LEGS OF FEEDERS SHALL MATCH BUS OR CABLE ARRANGEMENTS IN EQUIPMENT TO WHICH THE FEEDERS ARE CONNECTED. COLOR CODING SHALL BE AS FOLLOWS:

        208/120 VAC
        A PHASE: BLACK, B PHASE: RED, C PHASE: BLUE

        277/480 VAC, 346/600 VAC, 364/630 VAC
        A PHASE: BROWN, B PHASE: ORANGE, C PHASE: YELLOW

        1000 VDC, 1050 VDC, OR 600 VDC
        POSITIVE CONDUCTOR: RED
        NEGATIVE CONDUCTOR: BLACK

        AC AND DC SYSTEMS
        GROUNDED CONDUCTOR: WHITE
        EGC: GREEN OR MARK

        MEDIUM VOLTAGE SYSTEMS
        A PHASE: BLACK, B PHASE, RED, C PHASE: BLUE

    b. GROUNDED CONDUCTORS (NEUTRAL) AND EQUIPMENT GROUNDING CONDUCTORS SMALLER THAN #4 MUST HAVE COLOR CODED INSULATION. WHERE COLOR CODED CABLE IS NOT USED, TAPE CONDUCTOR WITH OVERLAPPED COLORED TAPE FOR A MINIMUM OF 6" IN ACCESSIBLE LOCATIONS. COLOR CODING MUST BE USED CONSISTENTLY FOR THE ENTIRE PROJECT.

MEDIUM VOLTAGE CABLES

1. CABLES FOR THE 34.5 KV SYSTEM SHALL BE UD 35 KV MV105 LISTED SINGLE CONDUCTOR, INSULATED, CONCENTRIC NEUTRAL AND JACKETED MEDIUM VOLTAGE TYPE POWER CABLE WITH 100% INSULATION LEVEL, 105° C CONTINUOUS OPERATION RATING, 130° C EMERGENCY RATING, 250° C SHORT CIRCUIT RATING.
2. CABLE SHALL HAVE ASTM B-609 ALUMINUM CONDUCTORS WITH CLASS B STRANDING IN ACCORDANCE WITH ASTM B-231, MOISTURE BLOCKED STRANDS, AN EXTRUDED SEMI-CONDUCTING SHIELD LAYER (40 MIL MIN.) OVER THE CONDUCTOR FOR STRESS CONTROL, DIRECT-BURIAL TRIPLE INSULATION (345 MILS MIN.), A CONCENTRIC COPPER NEUTRAL, AND MOISTURE/CHEMICAL/OIL/FLAME RESISTANT PVC JACKET.
3. COMPLETE INSTALLATION SHALL BE PER NATIONAL ELECTRICAL CODE ARTICLES 310 AND 328. DO NOT EXCEED MANUFACTURER'S PUBLISHED MAXIMUM PULLING TENSION OR SIDEWALL PRESSURE. PROVIDE SUFFICIENT SLACK IN CABLE, GROUND AND DRAIN WIRES TO PERMIT ELBOW CONNECTORS TO BE MOVED TO THEIR RESPECTIVE PARKING STANDS.
4. ALL CABLES SHALL BE LABELED AT EACH END AT AN ACCESSIBLE LOCATION FOR VIEWING. LABEL SHALL INDICATE CIRCUIT, PHASE, AND DESTINATION/ORIGINATION. LABELS SHALL BE CABLE ID TAGS WITH WHITE LETTERING AND SECURED WITH A MINIMUM OF (2) UV-RESISTANT ZIP TIES.
5. SPLICES ARE NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY OWNER. SPLICES AND TERMINATIONS SHALL BE MADE BY A QUALIFIED JOURNEYMAN.
6. ARRANGE PHASES AT TERMINATION POINTS, A-B-C FROM LEFT TO RIGHT OR TOP TO BOTTOM AS VIEWED FROM THE FRONT. PROVIDE ADEQUATE SLACK TO INTERCHANGE CABLES AT TERMINATION POINTS.
7. PERFORM TESTING IN ACCORDANCE WITH EPC CONTRACT.
8. 35KV CABLES SHALL BE DIRECTLY BURIED IN TRENCHES IN A TREFOIL (TRIANGULAR) CONFIGURATION (CABLE TOUCHING), UNLESS OTHERWISE NOTED.
9. WHERE BORING IS REQUIRED TO AVOID OBSTACLES, CABLES SHALL BE INSTALLED IN HDPE PIPE WITH ALL THREE PHASES IN ONE PIPE. 5" HDPE CONDUIT WITH AN SDR OF 13.5 SHALL BE USED FOR MV CABLE SIZES FROM 350KCMIL TO 1250KCMIL. 6" HDPE CONDUIT WITH AN SDR OF 13.5 SHALL BE USED FOR MV CABLE FROM 1/0 AWG TO 250KCMIL.
10. A TRENCH GROUND CONDUCTOR SHALL BE INSTALLED IN PARALLEL WITH COLLECTOR FEEDERS AND BONDED TO SUBSTATION AND BESS GROUNDING SYSTEMS.

BOXES

1. PULL AND JUNCTION BOXES SHALL BE CODE GAUGE, GASKETED, PAINTED, GALVANIZED STEEL, PVC, OR FIBERGLASS. COVERS SHALL BE SECURED WITH SCREWS.
2. OUTLET BOXES SHALL BE CAST MALLEABLE IRON WITH THREADED HUBS OR PVC AND BE OF HIGH CONDUCTIVE METAL TO MAINTAIN MAXIMUM ELECTRIC CONTINUITY.
3. ALL OUTLETS SHALL BE WEATHER RESISTANT WITH WEATHERPROOF WHILE-IN-USE COVERPLATES AND WEATHERPROOF BOXES.
4. COVERS OR PLATES FOR BOXES SHALL CONFORM SUBSTANTIALLY TO THE OUTLET OF THE BOXES WITH NO PROJECTING EDGES OR CORNERS.
5. CONDUIT FITTINGS ("LB", "T", "LL", "LR", "C") OR TYPES APPROVED FOR THE LOCATION MAY BE EMPLOYED AS REQUIRED TO FACILITATE PULLING IN CONDUCTORS.
6. PROVIDE PULL AND JUNCTION BOXES TO FACILITATE PULLING OR SPLICING OF CONDUCTORS.
7. MOUNT BOXES TO ALLOW FOR MAXIMUM FLEXIBILITY.
8. INSTALL GROUNDING BUSHINGS WITH BONDING CONDUCTOR ON ALL METALLIC FEEDER CONDUITS ENTERING BOX. GROUND BUSHINGS AND BONDING CONDUCTORS ARE NOT REQUIRED ON BRANCH CIRCUIT CONDUITS.
9. ALL GALVANIZED EQUIPMENT SHALL BE HOT DIPPED. (U ALTERNATIVE) ARE ALLOWED.

GROUNDING

1. PROVIDE COMPLETE GROUNDING SYSTEMS AS DESCRIBED HEREIN AND AS SHOWN ON THE DRAWINGS.
2. ALL GROUNDING COMPONENTS SHALL BE LISTED FOR THE PURPOSE THEY ARE INSTALLED FOR. COMPONENTS SHALL BE MANUFACTURED BY AMPACT, BURNDY, ITT BLACKBURN, LSCO, OR LINCOLN (OR EQUAL).
3. GROUND RODS SHALL BE 5/8 INCH DIAMETER BY 8 FEET LONG COPPER CLAD STEEL. CONNECTING CABLES SHALL BE COPPER, SIZE(S) AS INDICATED ON DRAWINGS. ALL GROUND CONDUCTORS EXPOSED TO THE ELEMENTS OR IN DIRECT CONTACT WITH THE EARTH SHALL BE TIN COATED OR BARE COPPER.
4. ALL METALLIC CONDUITS, SUPPORTS, CABINETS, NON-CURRENT CARRYING PARTS OF EQUIPMENT, AND METALLIC STRUCTURES SHALL BE SOLIDLY GROUNDED TO FORM A CONTINUOUS PERMANENT AND EFFECTIVE GROUNDED SYSTEM.
5. ALL WIREWAYS, METAL ENCLOSURES, CABLE TRAYS AND SIMILAR PARTS OF THE ELECTRICAL INSTALLATION DESCRIBED HEREIN SHALL BE GROUNDED.
6. ALL GROUNDING ELECTRODE CONNECTIONS SHALL BE IRREVERSIBLE CRIMP TYPE. CONNECTIONS MADE BELOW GRADE SHALL BE EXOTHERMIC WELD OR IRREVERSIBLE CRIMP TYPE.
7. BOLTED CONNECTIONS TO GROUND BUS BARS SHALL BE MADE USING: A (2) EYELET IRREVERSIBLE CRIMP CONNECTOR ON THE GROUND CONDUCTOR.
8. PAY SPECIAL ATTENTION OF THE CONTRACTOR IS CALLED TO METALLIC BUILDING COMPONENTS AND MECHANICAL PIPING WHICH MUST BE GROUNDED IN AN APPROVED MANNER ACCORDING TO THE NEC.
9. PROVIDE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR EACH SINGLE OR THREE PHASE FEEDER AND EACH BRANCH CIRCUIT WITH A THREE PHASE PROTECTIVE DEVICE. INSTALL THE REQUIRED GROUNDING CONDUCTOR IN THE COMMON CONDUIT WITH THE RELATED PHASE/HOT AND NEUTRAL CONDUCTORS. WHERE PARALLEL FEEDERS ARE INSTALLED IN MORE THAN ONE RACEWAY, PROVIDE A GREEN OR BARE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY.
10. SINGLE PHASE BRANCH CIRCUITS FOR LIGHTING, RECEPTACLES, MOTORS AND OTHER SIMILAR EQUIPMENT: PROVIDE SINGLE PHASE BRANCH CIRCUITS SERVING LIGHTING, RECEPTACLES, MOTORS, AND OTHER SIMILAR EQUIPMENT CONSISTING OF PHASE, NEUTRAL AND GREEN INSULATED EQUIPMENT GROUND CONDUCTOR INSTALLED IN A COMMON CONDUIT.

FUSES

1. FUSES SHALL BE INSTALLED SUCH THAT THE RATING IS VISIBLE WITHOUT REMOVAL.

GENERAL FACILITY CODES AND STANDARDS

1. National Electric Code (NEC)
2. National Electric Safety Code (NESC)
3. NFPA 70E Standard for Electrical Safety in the Workplace
4. NFPA 855 Standard for Installation of Stationary Energy Storage Systems
5. IEEE Std. 80, Guide for Safety in AC Substation Grounding
6. IEEE Std. 81, Guide for Measuring Earth Resistivity, Ground Impedance, and
7. Earth Surface Potentials of a Ground System
8. IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
9. UL 1741 Standard for Inverters, Converters, Controllers and Interconnection
10. System Equipment for Use with Distributed Energy Resources
11. IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems
12. UL 62109-1 Standard for Safety of Power Converters for Use in Photovoltaic Power Systems
13. UL 44 Thermoset-Insulated Wires and Cables
14. UL 854 Service Entrance Cable
15. UL 4703 Photovoltaic Wire
16. UL 9540 Energy Storage Systems
17. International Building Code (IBC)
18. State and local electric requirements to the extent required
19. Other (IEEE standard) as required.

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BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE - TX-BS-27033
8957 CR 268
BROWN AND MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL NOTES LIST

E0.001

ID NUMBERING SYSTEM

POWER CONVERSION STATION LABEL
PCS-XXX
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

BATTERY LABEL
BATT-XXX-XX
- SEQUENCE #
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

NETWORK ENCLOSURE LABEL
NET-XX-XX
- SEQUENCE #
- FEEDER IDENTIFIER
- EQUIPMENT DESIGNATION

MINI POWER CENTER LABEL
MPC-XX
- SEQUENCE #
- EQUIPMENT DESIGNATION

AUGMENTATION BATTERY LABEL
BATT-XXX-XXA
- AUGMENTATION
- SEQUENCE #
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

AUXILIARY TRANSFORMER LABEL
AUX-XFMR-XX
- SEQUENCE #
- EQUIPMENT DESIGNATION

FIRE PANEL LABEL
FIRE-XXX
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

AUXILIARY PAD LABEL
AUX-PAD-XX
- SEQUENCE #
- EQUIPMENT DESIGNATION

PANELBOARD LABEL
PANELBOARD-XX
- SEQUENCE #
- EQUIPMENT DESIGNATION

YARD LIGHTS LABEL
EP-XX
- SEQUENCE #
- EQUIPMENT DESIGNATION

LEGEND - GENERAL

SYMBOL	DESCRIPTION
———	LIGHT LINE INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
———	DARK LINE INDICATES NEW OR WITHIN THE SCOPE OF PROJECT
- - - - -	DASHED LINE INDICATES EQUIPMENT AT A DIFFERENT ELEVATION
EXISTING TEXT	LIGHT TEXT INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
NEW TEXT	DARK TEXT INDICATES NEW OR WITHIN THE SCOPE OF PROJECT

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
A	AMPERES
AF	AMPERE FRAME
A.F.G.	ABOVE FINISH GRADE
AFDI	ARC FAULT DETECTION & INTERRUPTER
AIC	AMPS INTERRUPTING CAPACITY
AL	ALUMINUM
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BKR	CIRCUIT BREAKER
C	CONDUIT
CB	COMBINER BOX
CKT	CIRCUIT
COU	CONDITIONS OF USE
CP	CONTROL PANEL
CT	CURRENT TRANSFORMER
CU	COPPER
DB	DIRECT BURIAL
DISC	DISCONNECT
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELEC	ELECTRIC, ELECTRICAL
EMERG	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EQUIP	EQUIPMENT
EV	ELECTRIC VEHICLE
EVCS	ELECTRIC VEHICLE CHARGING STATION
EXIST	EXISTING
G, GND	GROUND
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND-FAULT CIRCUIT INTERRUPTER
GFPE	GROUND-FAULT PROTECTION OF EQUIPMENT
HID	HIGH-INTENSITY DISCHARGE (LIGHTING)
HZ	HERTZ
IMC	INTERMEDIATE METAL CONDUIT
kAIC	1000 AMPS INTERRUPT CAPACITY
kCMIL	1000 CIRCULAR MILS
kVA	KILO-VOLT AMPERE
kW	KILOWATT
LA	LIGHTNING & SURGE ARRESTOR
LED	LIGHT-EMITTING DIODE
LSIG	LONG, SHORT, INSTANTANEOUS, & GROUND-FAULT
LTG	LIGHTING
MAX	MAXIMUM
MCM	1000 CIRCULAR MILS
MFG	MANUFACTURER
MIN	MINIMUM
MLO	MAIN LUGS ONLY
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NTS	NOT TO SCALE
OV	OVER VOLTAGE
P	POLE
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
POI	POINT OF INTERCONNECTION
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PWR	POWER
RAC	RIGID ALUMINUM CONDUIT
RCPT	RECEPTACLE
RGS	RIGID GALVANIZED STEEL CONDUIT
RMC	RIGID METAL CONDUIT
SA	SURGE ARRESTOR
SEC	SECONDARY
SPD	SURGE PROTECTION DEVICE
SSBJ	SUPPLY SIDE BONDING JUMPER
ST	SHUNT TRIP
STP	SHIELDED TWISTED PAIR
SW	SWITCH
TBD	TO BE DETERMINED
TP	TWISTED PAIR
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UV	UNDER VOLTAGE OR ULTRAVIOLET
V	VOLT
VA	VOLT-AMPERE
W	WATT
WR	WEATHER RESISTANT
XFMR	TRANSFORMER
ø	DIAMETER OR PHASE

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL SYMBOLS & ABBREVIATIONS LIST

DRAWING # E0.002

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE - TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT # TX-PS-2701

PREPARED FOR: LANGAN

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NO.	REVISION DESCRIPTION	DATE	DWG	CHK
1	ISSUE ELECTRICAL DESIGN	08/01/2025	BA	AR
0	30% ELECTRICAL DESIGN	04/25/2025	BA	AR

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PLOT DATE: 8/7/2025 9:14 PM

RULER IN INCHES

CUSTOMER SUBSTATION
(BY OTHERS)

LIGHTING PULLBOX
CONDUIT ROUTING THROUGH
SUBSTATION BY SUBSTATION
ENGINEER (TYP. (3) LOCATIONS)

FIBER PULLBOX
LOCATION COORDINATED WITH
THE SUBSTATION ENGINEER

SOLAR FEEDERS

TYPICAL CONTAINER
CONFIGURATION SEE
E1.040

LINETYPE LEGEND

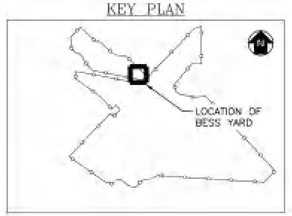
- MV/FD — MV FEEDER B 100
- MV/FD — MV FEEDER B 200
- MV/FD — MV FEEDER B 300
- MV/FD — MV FEEDER B 400
- MV/FD — MV FEEDER B 500
- MV/FD — MV FEEDER B 600
- MV — MV FEEDER PV
- FENCE
- ACCESS ROAD
- MV — MV FEEDER (SUBSTATION ENTRANCE)
- FO — FIBER (SUBSTATION ENTRANCE)
- AC — LOW VOLTAGE AC
- CAT — ETHERNET (CAT 6)
- AC — AC BATTERY COLLECTION

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- SITE ACCESS POINT
- PULLBOX

1 OVERALL ELECTRICAL PLAN
SCALE: 1" = 30'

KEY PLAN



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DRAWING TITLE: OVERALL ELECTRICAL PLAN

DRAWING #: E1.000

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT
CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	04/01/2025	60% ELECTRICAL DESIGN	BA	AR
2	04/25/2025	30% ELECTRICAL DESIGN	BA	AR

DESIGNED:

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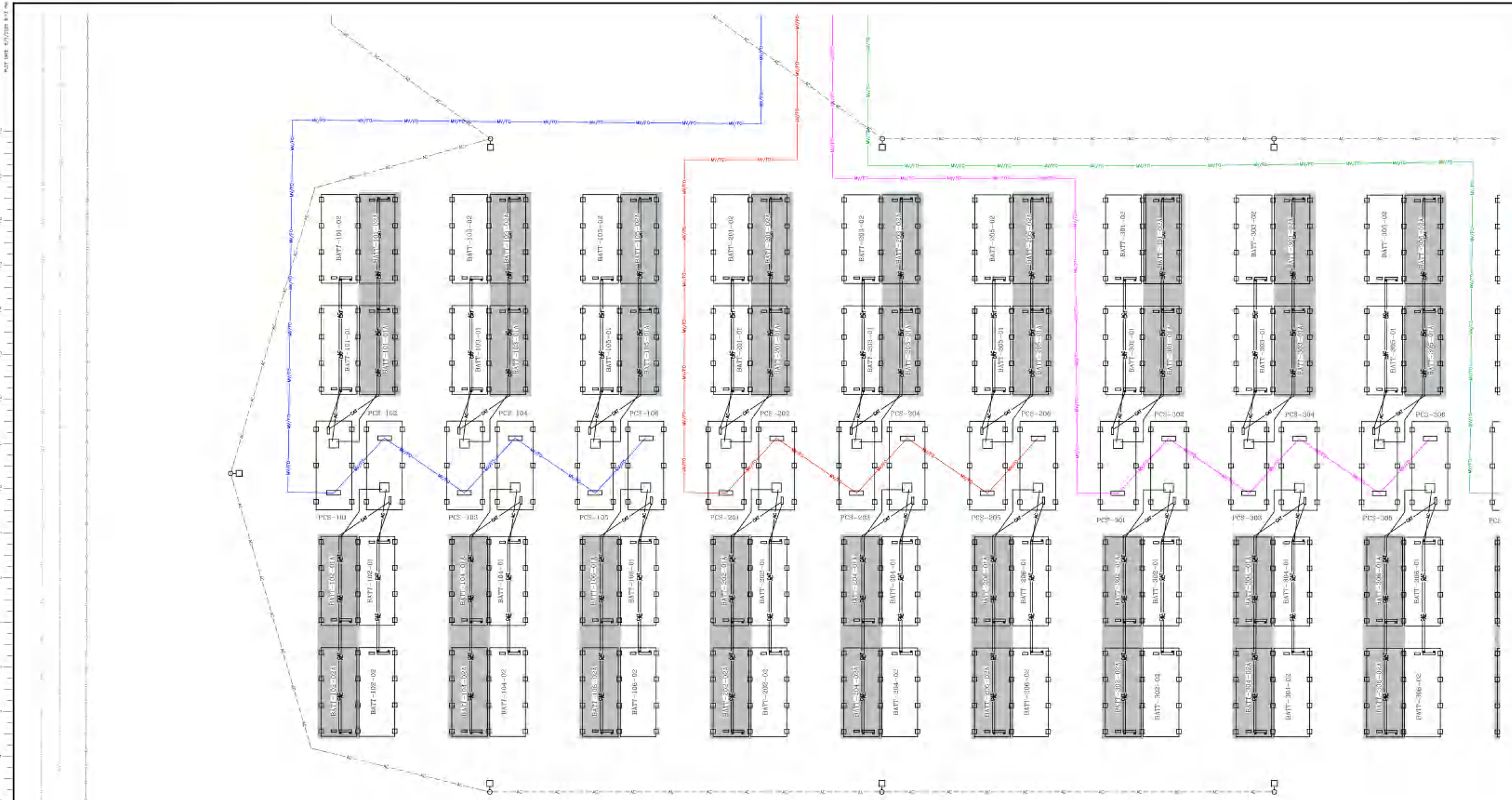

LINETYPE LEGEND

- MV FEEDER B 100
- MV FEEDER B 200
- MV FEEDER B 300
- MV FEEDER B 400
- MV FEEDER B 500
- MV FEEDER B 600
- MV FEEDER PV
- FENCE
- ACCESS ROAD
- MV FEEDER (SUBSTATION ENTRANCE)
- LOW VOLTAGE AC
- ETHERNET (CAT 6)
- AC BATTERY COLLECTION

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- PULLBOX

1 PARTIAL ELECTRICAL PLAN – WEST
SCALE: 1" = 10'

RULER IN INCHES

NO.	DATE	REVISION / DESCRIPTION	PM	DSN	CHK
1	04/21/2025	60% ELECTRICAL DESIGN	BA	AH	EJ
2	04/25/2025	30% ELECTRICAL DESIGN	BA	AH	EJ

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PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703, 8987 CR 268, BROWN AND MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – WEST

DRAWING #: E1.010

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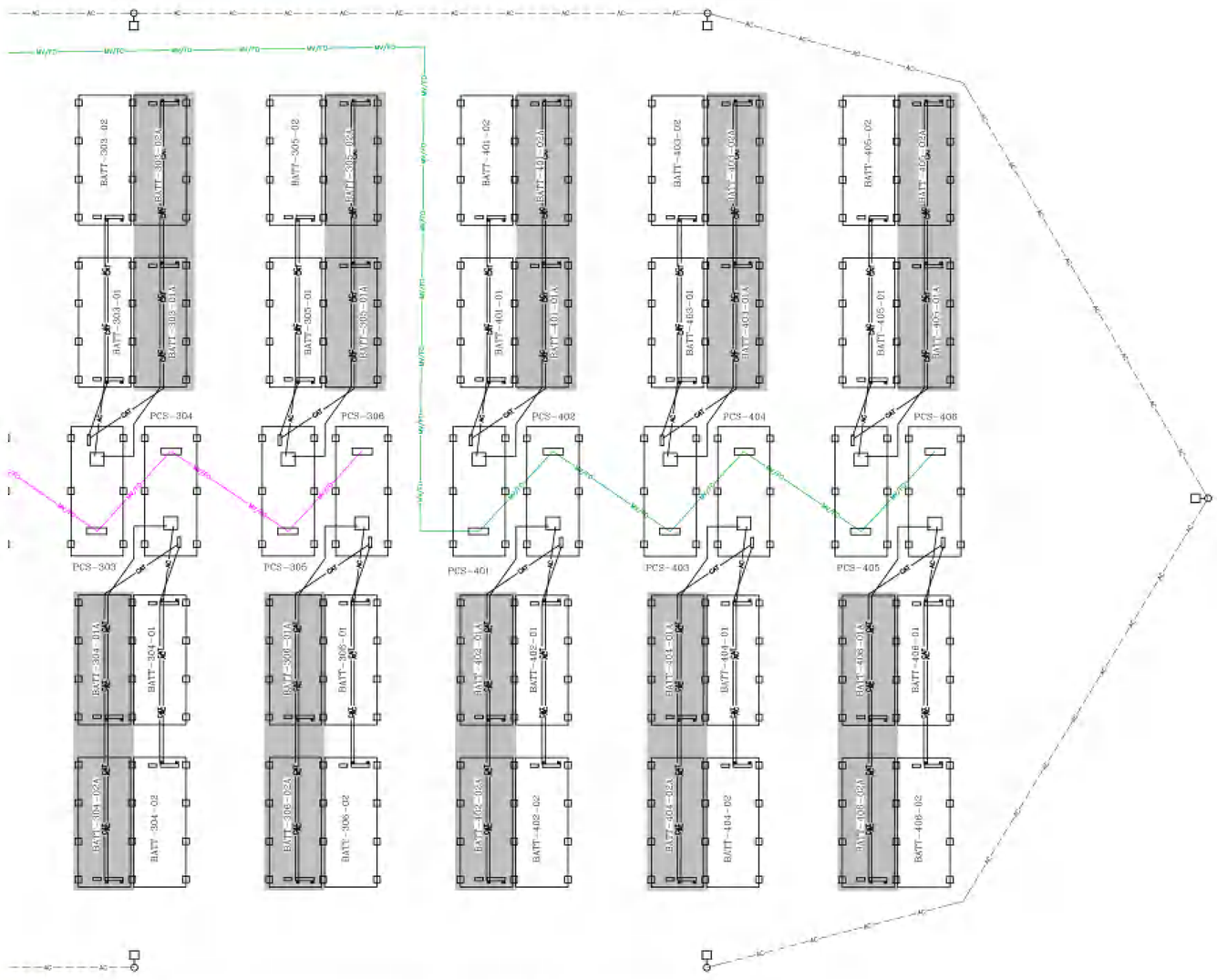

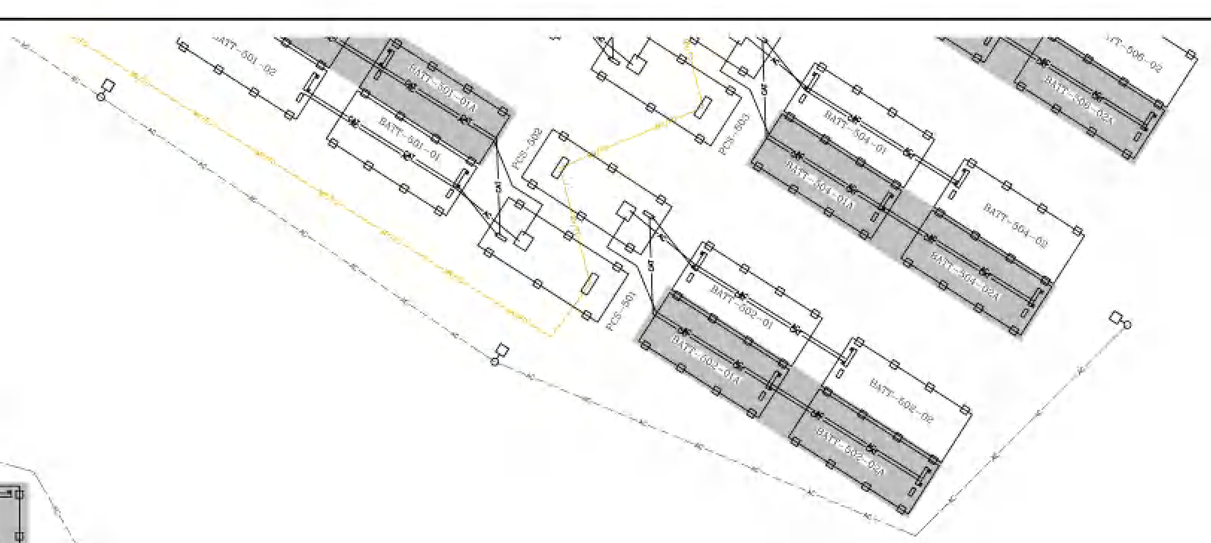

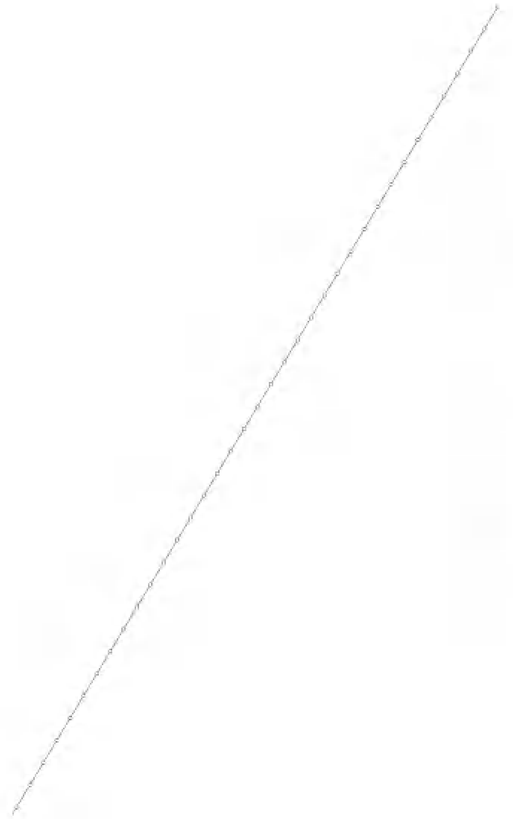

LINETYPE LEGEND

- MV/TG — MV FEEDER B 100
- MV/TG — MV FEEDER B 200
- MV/TG — MV FEEDER B 300
- MV/TG — MV FEEDER B 400
- MV/TG — MV FEEDER B 500
- MV/TG — MV FEEDER B 600
- FENCE
- ACCESS ROAD
- MV — MV FEEDER (SUBSTATION ENTRANCE)
- AC — LOW VOLTAGE AC
- CAT — ETHERNET (CAT 6)
- AC — AC BATTERY COLLECTION

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- PULLBOX

1 PARTIAL ELECTRICAL PLAN – SOUTH EAST
SCALE: 1" = 10'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – SOUTH EAST

DRAWING #: E1.020

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	08/01/2025	90% ELECTRICAL DESIGN	BA	AR
2	11/25/2025	30% ELECTRICAL DESIGN	BA	AR

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

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PLOT DATE: 8/1/2025 9:16 AM

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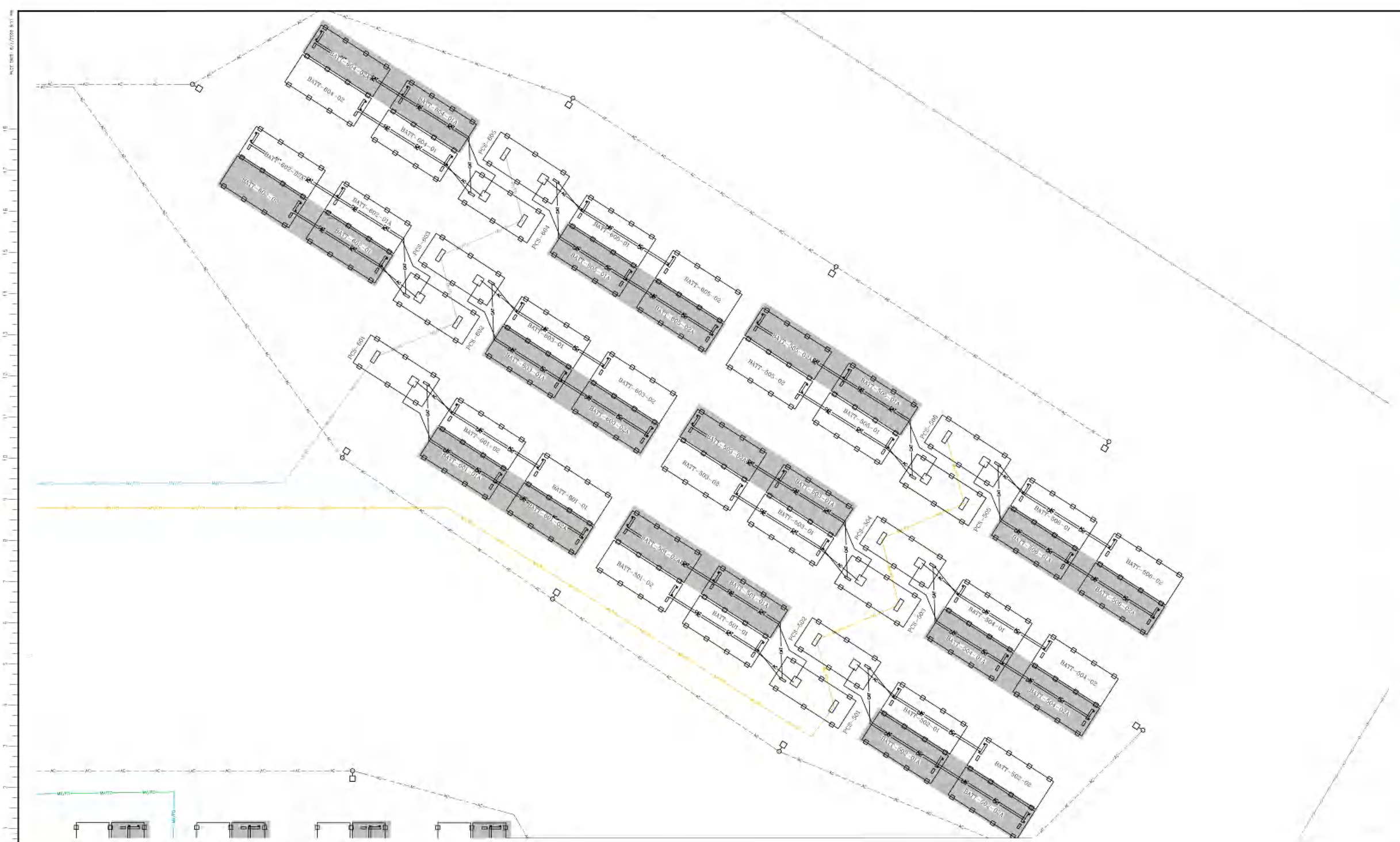

LINETYPE LEGEND

- MV FEEDER B 100
- MV FEEDER B 200
- MV FEEDER B 300
- MV FEEDER B 400
- MV FEEDER B 500
- MV FEEDER B 600
- FENCE
- ACCESS ROAD
- MV FEEDER (SUBSTATION ENTRANCE)
- LOW VOLTAGE AC
- ETHERNET (CAT 6)
- AC BATTERY COLLECTION

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- PULLBOX

1 PARTIAL ELECTRICAL PLAN – NORTH EAST
SCALE: 1" = 10'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – NORTH EAST

DRAWING #: E1.030

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

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NO.	DATE	REVISION / DESCRIPTION	PM	DRN	CHK
	04/01/2025	SITE ELECTRICAL DESIGN	BA	AH	EJ
	04/25/2025	30% ELECTRICAL DESIGN	BA	AH	EJ

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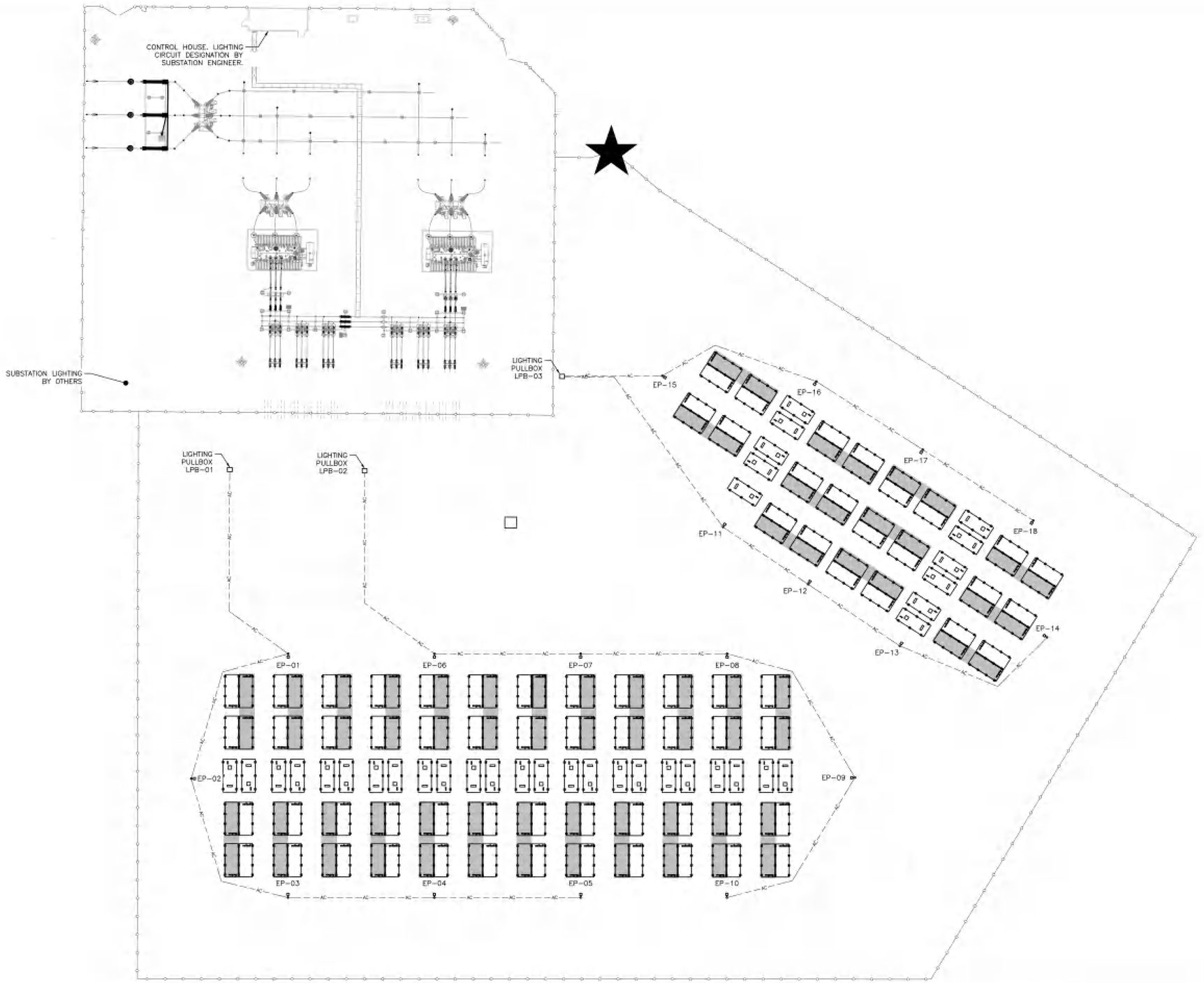

LINETYPE LEGEND

- FENCE
- ACCESS ROAD
- LOW VOLTAGE AC

SYMBOL LEGEND

- MV TRANSFORMER
- PULLBOX
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- SITE ACCESS POINT

LUMINAIRE SCHEDULE

SYMBOL	FIXTURE QUANTITY	ARRANGEMENT	LUMINAIRE QUANTITY	LLF	DESCRIPTION	VOLTAGE (V)	COLOR TEMP. (K)	POLE LENGTH (FT)	POWER (VA)	LUMENS
○□	18	SINGLE	18	0.808	LITHONIA DSX2-P6-40K-70CRI-T3M-240-SPA-PIR-DDBXD	240	4000	25	342	44,894

1 SITE LIGHTING PLAN
SCALE: 1" = 30'

NOT FOR CONSTRUCTION

DRAWING TITLE: SITE LIGHTING PLAN

DRAWING #: E1.040

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE - TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
T: 713.781.3200
WWW.LANGAN.COM

PREPARED BY:
PUREPOWER ENGINEERING
111 RYAN STREET, HUBBARD, NJ
WWW.PUREPOWER.COM
RICHARD A. IVING

NO	DATE	REVISION DESCRIPTION	PM	DWG CHK
			BA	AR EL
1	08/01/2025	60% ELECTRICAL DESIGN	BA	AR EL
2	11/25/2025	30% ELECTRICAL DESIGN	BA	AR EL

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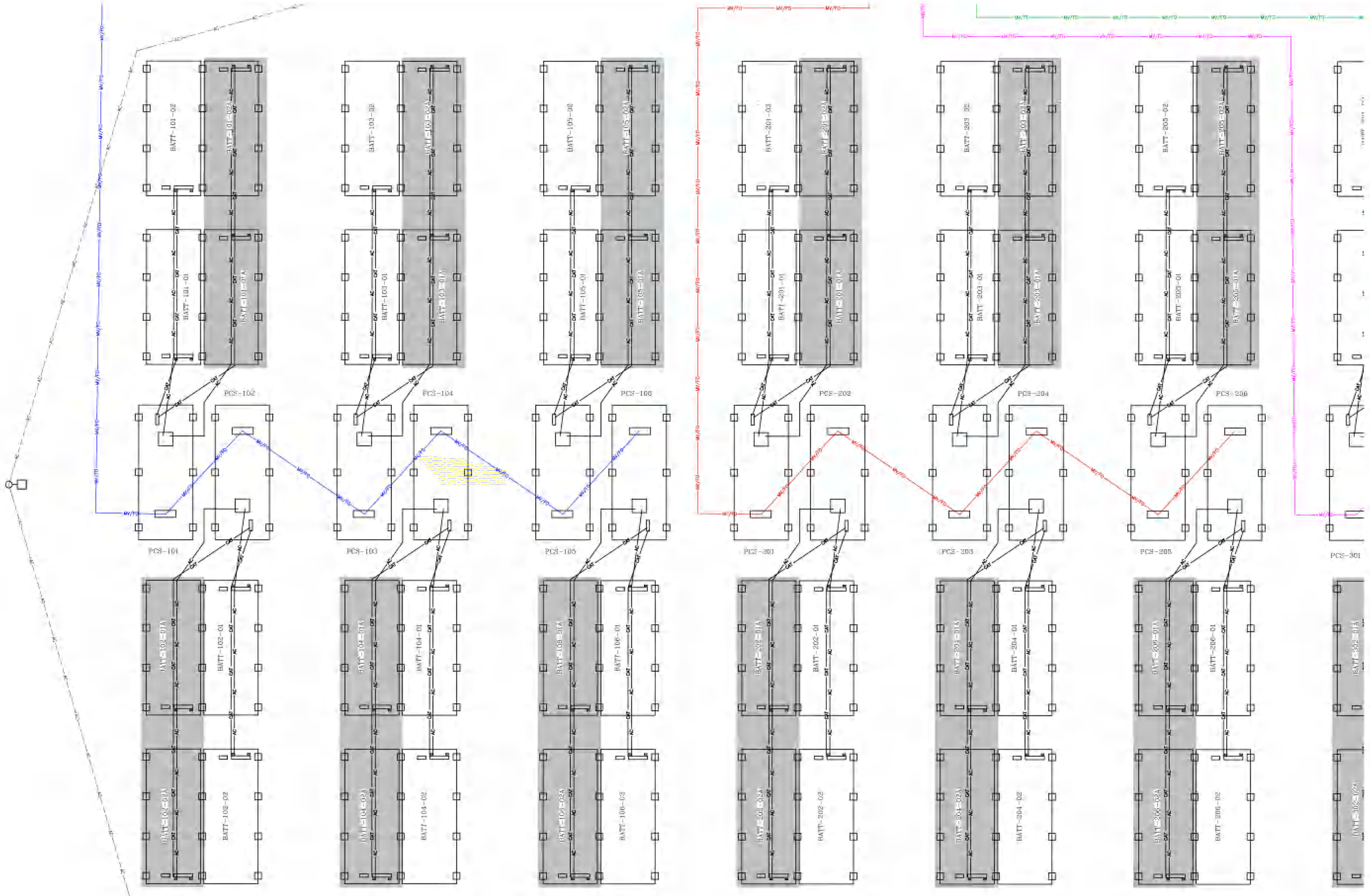

LINETYPE LEGEND

- MV/TC — MV FEEDER B 100
- MV/TC — MV FEEDER B 200
- MV/TC — MV FEEDER B 300
- MV/TC — MV FEEDER B 400
- MV/TC — MV FEEDER B 500
- MV/TC — MV FEEDER B 600
- FENCE
- ACCESS ROAD
- MV FEEDER (SUBSTATION ENTRANCE)
- LOW VOLTAGE AC
- DAT — ETHERNET (CAT 6)
- AC — AC BATTERY COLLECTION

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE

1 TYPICAL CONTAINER CONFIGURATION
SCALE: 1" = 7'

NOT FOR CONSTRUCTION

DRAWING TITLE: TYPICAL CONTAINER CONFIGURATION

DRAWING # E1.100

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	04/01/2025	ISSUE FOR ELECTRICAL DESIGN	BA	AK
2	04/25/2025	30% ELECTRICAL DESIGN	BA	AK

PREPARED FOR: LANGAN

PREPARED BY: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ 07030, (201) 222-2424, RICHARD A. IVINS

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, (832) 213-5300, WWW.LANGAN.COM

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703, 8987 CR 268, BROWN AND MILLS COUNTY, TX 76801

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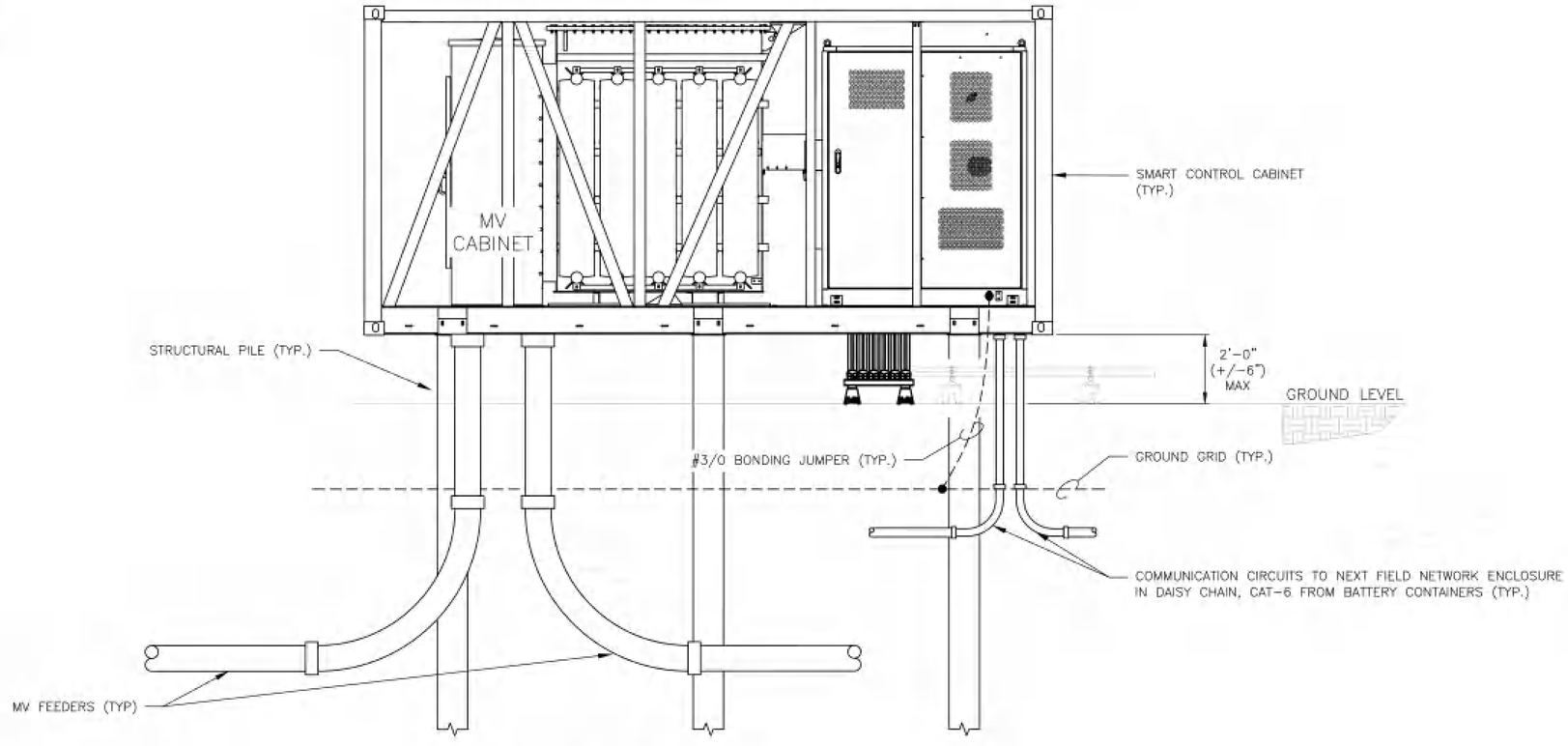
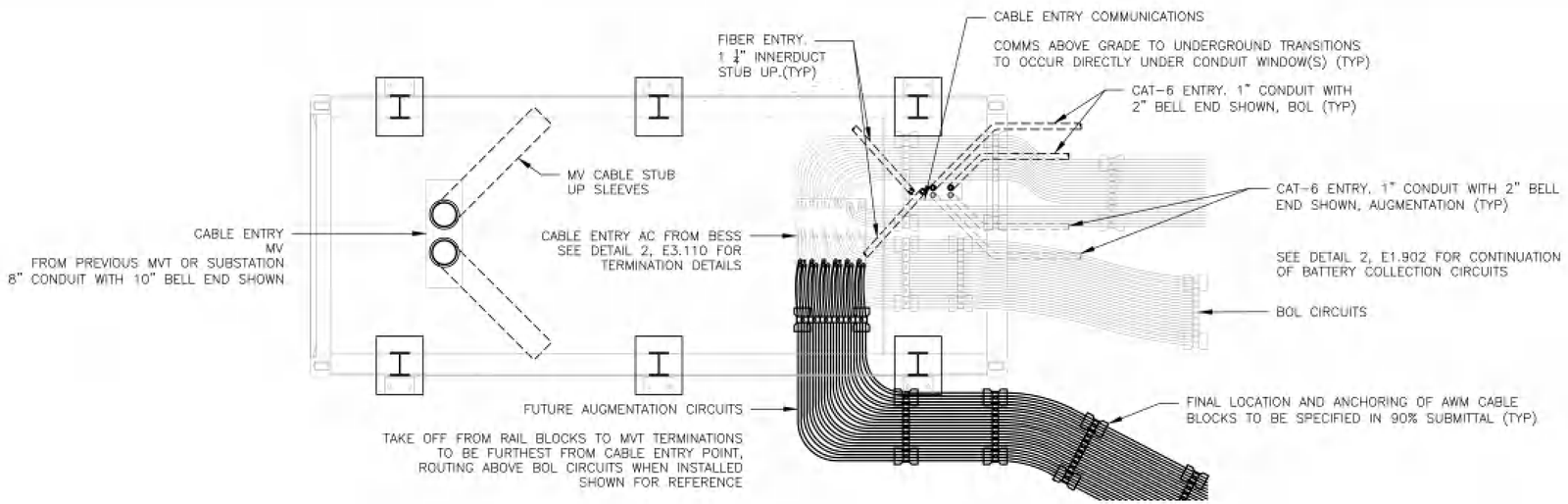
PLOT DATE: 6/17/2025 9:16 AM

RULER IN INCHES

NOTES:
1. REFER TO STRUCTURAL PLANS FOR EQUIPMENT OPENING LOCATIONS AND DIMENSIONS.
2. REFER TO CIVIL DRAWINGS FOR ALL GRADING.
3. ONLY (1) LVAC OUTPUT CIRCUITS SHALL BE IN (1) CONDUIT SLEEVE.
4. ONLY (1) MEDIUM VOLTAGE CIRCUIT SHALL BE IN (1) CONDUIT SLEEVE.
5. ALL CONDUIT SLEEVES SHALL BE SEALED BEFORE CLOSE OF CONSTRUCTION USING APPROVED CONDUIT SEALANT. APPROVED CONDUIT SEALANT NOT TO EXCEED DEPTH OF 4" FROM THE CONDUIT OPENING.
6. FILL ALL CONDUIT WINDOWS WITH GRAVEL AFTER CONDUIT AND EQUIPMENT ARE INSTALLED (TYP).
7. ABOVE GRADE CONDUIT AND FITTINGS WILL BE SCH 80. ALL BELOW GROUND WILL BE SCH 40.
8. CONTRACTOR SHALL CONFIRM CONDUIT ENTRY LOCATIONS AND EQUIPMENT DIMENSIONS PRIOR TO INSTALLATION.
9. CONDUITS SHALL BE STUBBED OUT 5' MAXIMUM FROM THE FOUNDATION FOOTPRINT.



1 TYPICAL PCS ELEVATION
SCALE: NOT TO SCALE



2 TYPICAL PCS PLAN
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: PCS PLAN & ELEVATION

DRAWING #: E1.901

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE - TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN
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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PURE POWER ENGINEERING
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WWW.PUREPOWERENG.COM
RICHARD A. IVINS

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/01/2025	60% ELECTRICAL DESIGN	BA	AR
2	11/25/2025	30% ELECTRICAL DESIGN	BA	AR

ENGINEER:

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PLOT DATE: 6/1/2026 8:13 PM

RULER IN INCHES

NOTES:
1. REFER TO STRUCTURAL PLANS FOR EQUIPMENT OPENING LOCATIONS AND DIMENSIONS.
2. REFER TO CIVIL DRAWINGS FOR ALL GRADING.
3. ONLY (1) LVAC OUTPUT CIRCUITS SHALL BE IN (1) CONDUIT SLEEVE.
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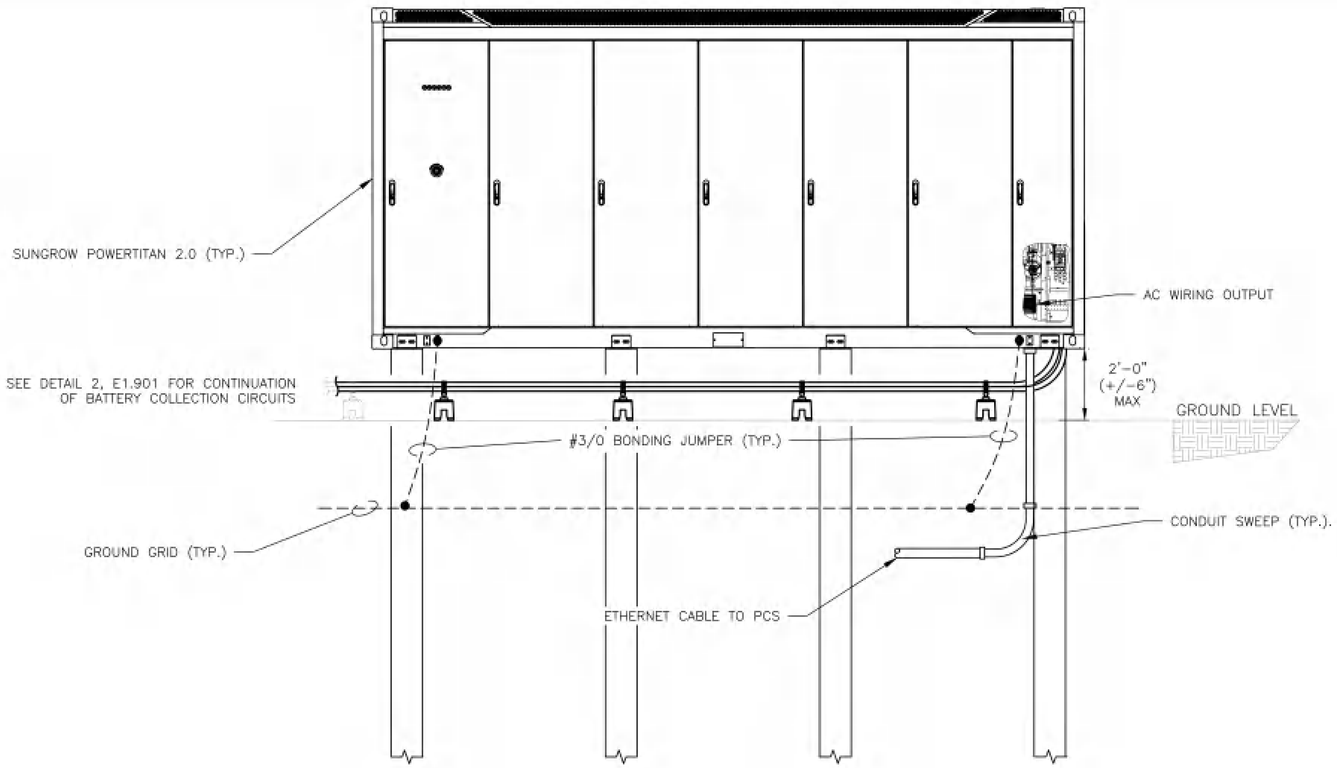
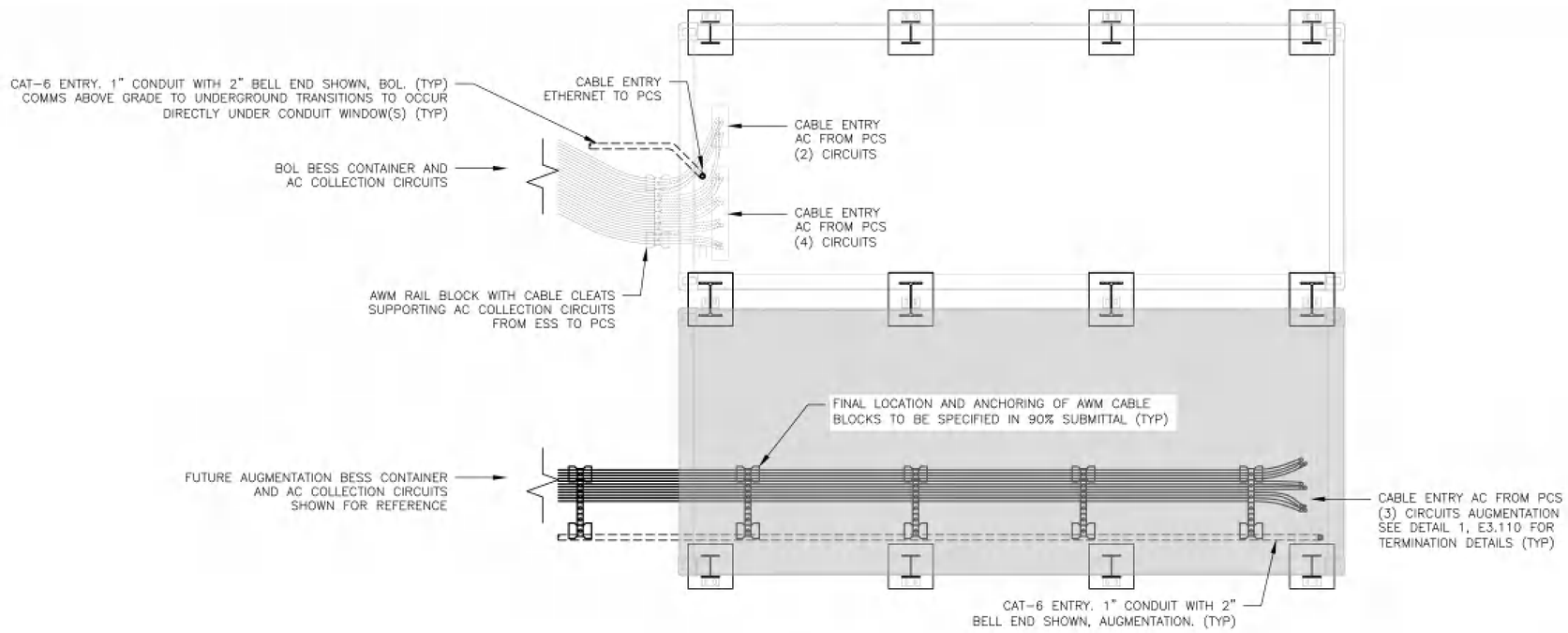


1 TYPICAL BATTERY ELEVATION
SCALE: NOT TO SCALE



2 TYPICAL BATTERY PLAN
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY CONTAINER PLAN & ELEVATION

DRAWING # E1.902

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703, 8987 CR 268, BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, P: (713) 781-3838, WWW.LANGAN.COM

NO	DATE	REVISION DESCRIPTION	BY	CHK	APP
1	08/01/2025	60% ELECTRICAL DESIGN	BA	AR	EL
2	10/25/2025	30% ELECTRICAL DESIGN	BA	AR	EL

ENGINEER: PUREPOWER ENGINEERING, 111 RYAN STREET, HUBBARD, TX 76648, 972.567.5004, RICHARD A. IVING

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RULER IN INCHES

SHEET NOTES:
1. CONTRACTOR SHALL PULL CONDUCTOR(S) THROUGH THE CONDUITS PROVIDED BY THE SUBSTATION ENGINEER. CONTRACTOR SHALL PROVIDE CABLE TERMINATIONS IN ACCORDANCE WITH THE SUBSTATION ENGINEERING SPECIFICATIONS AND TERMINATE THE CONDUCTORS AT THE LOCATION(S) PROVIDED BY THE SUBSTATION ENGINEER. SCOPE DELINEATION LINE SHALL BE THE TERMINATION LOCATION.
2. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.

SUBSTATION BY OTHERS SEE NOTE 1

52

100

200

MVF-PCS-101

MVF-PCS-102

MVF-PCS-103

MVF-PCS-104

MVF-PCS-105

MVF-PCS-106

TYPICAL PCS (PCS-101)
UNLESS NOTED OTHERWISE

LOAD-BREAK

CLF

EXP

STATIC SHIELD

BESS TRANSFORMER (PCS-101)
5140KVA,
PAD MOUNTED,
FR-3 COOLED KNAN,
PRI: 34.5kV, 3ø, 3W,
SEC: 690V, 3ø, 3W,
Z=8%
NOTES:
1. STATIC SHIELD TO BE EXTERNALLY GROUNDED IN LV CABINET
2. GROUND BAR SIZED TO ACCOMMODATE ALL TRANSFORMER GROUNDING CONDUCTORS.

SMART CONTRL CAB

FIBER OPTIC

CTRL

3200A

3200A

BATT-101-02

ETHERNET

TYPICAL SUNGROW POWERTITAN 2.0 CONTAINER

3#750MCM 2KV CU PV WIRE

1#500MCM CU EGC

SEAL INTERIOR OF CONDUIT TO PREVENT MOISTURE FROM ENTERING ENCLOSURE. POLYWATER FST OR EQUAL.

TO BATTERY SYSTEM ENCLOSURE

CTRL

OPTIONAL AUX POWER METER TO BE REQUIRED IN FINAL BUILD OF EQUIPMENT

M

465A

465A

465A

465A

465A

465A

FACTORY INSTALLED AC CONNECTION

POWERTITAN 2.0 (BATT-101-01)
SUNGROW POWERTITAN 2.0
2-HOUR RATED
690V, 2112A OUTPUT
2500kW, 2520kVA
5015kWh CAPACITY
AC & DC GFCI
NEMA 3R

BATTERY/CONVERTER MODULE (TYP)
FACTORY INSTALLED
INTEGRATED THERMAL & OVERCURRENT PROTECTION
690V INVERTER AC OUTPUT
UNGROUNDED DC SYSTEM
INTEGRATED GFCI

FACTORY INSTALLED DC CONNECTION

NOTE: CONTRACTOR IS RESPONSIBLE FOR INSTALLING SUNGROW POWERTITAN 2.0 PER INSTALLATION MANUAL

PCS-102

TO SUNGROW CONTAINERS

PCS-103

TO SUNGROW CONTAINERS

PCS-104

TO SUNGROW CONTAINERS

PCS-106

(3)5As

TO SUNGROW CONTAINERS

PCS-105

TO SUNGROW CONTAINERS

1 MV SINGLE LINE – FEEDER 100
SCALE: NOT TO SCALE

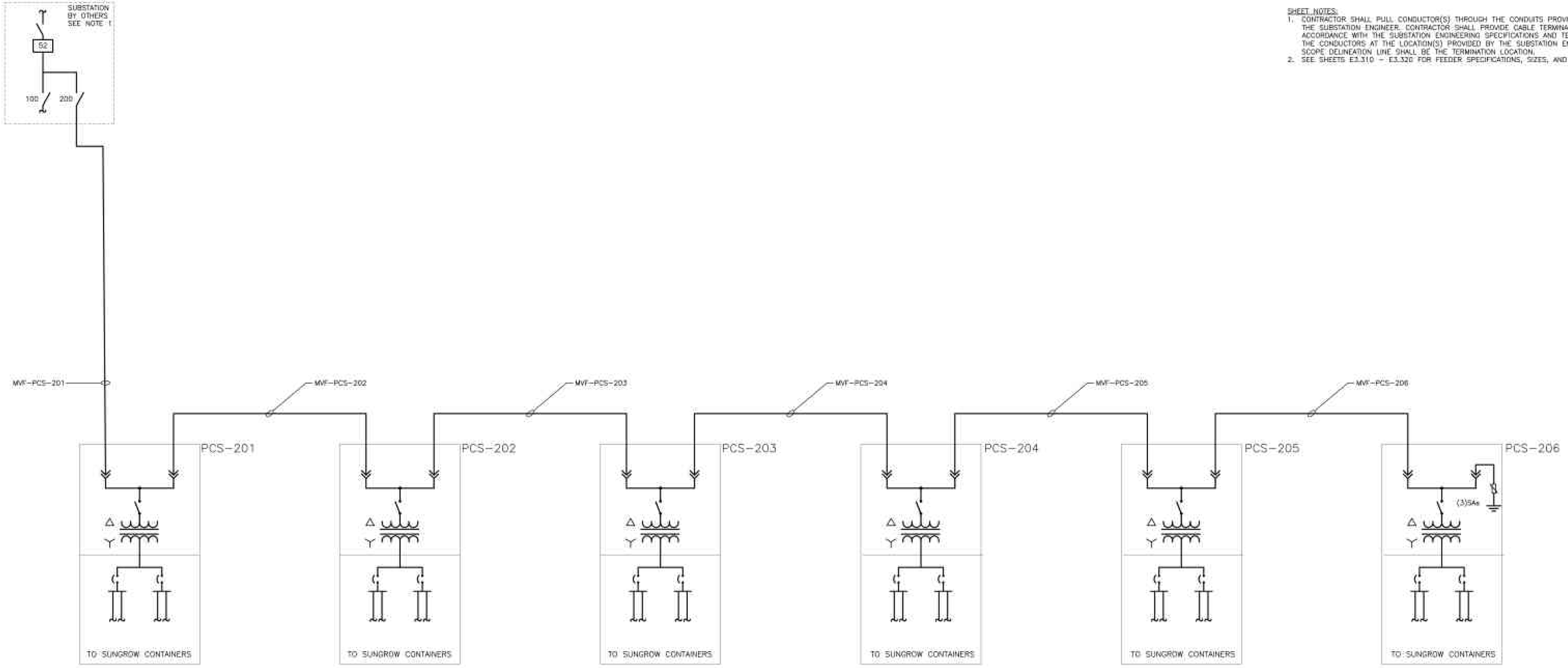
NOT FOR CONSTRUCTION

DRAWING TITLE: MV SINGLE LINE – FEEDER 100

DRAWING # E2.010

NO	DESCRIPTION	DATE	DWN	CHK

SHEET NOTES:
1. CONTRACTOR SHALL PULL CONDUCTOR(S) THROUGH THE CONDUITS PROVIDED BY THE SUBSTATION ENGINEER. CONTRACTOR SHALL PROVIDE CABLE TERMINATIONS IN ACCORDANCE WITH THE SUBSTATION ENGINEERING SPECIFICATIONS AND TERMINATE THE CONDUCTORS AT THE LOCATION(S) PROVIDED BY THE SUBSTATION ENGINEER. SCOPE DELINEATION LINE SHALL BE THE TERMINATION LOCATION.
2. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.



1 MV SINGLE LINE – FEEDER 200
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV SINGLE LINE – FEEDER 200

DRAWING #: E2.020

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/01/2025	60% ELECTRICAL DESIGN	JDS	MT
2	11/20/2025	90% ELECTRICAL DESIGN	JDS	MT

ENGINEER: PUREPOWER ENGINEERING, LLC
111 MAIN STREET, HUBBARD, TX
WWW.PUREPOWERENG.COM
RICHARD A. KING

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840 GESSNER ROAD, SUITE 740
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WWW.LANGANLLC.COM

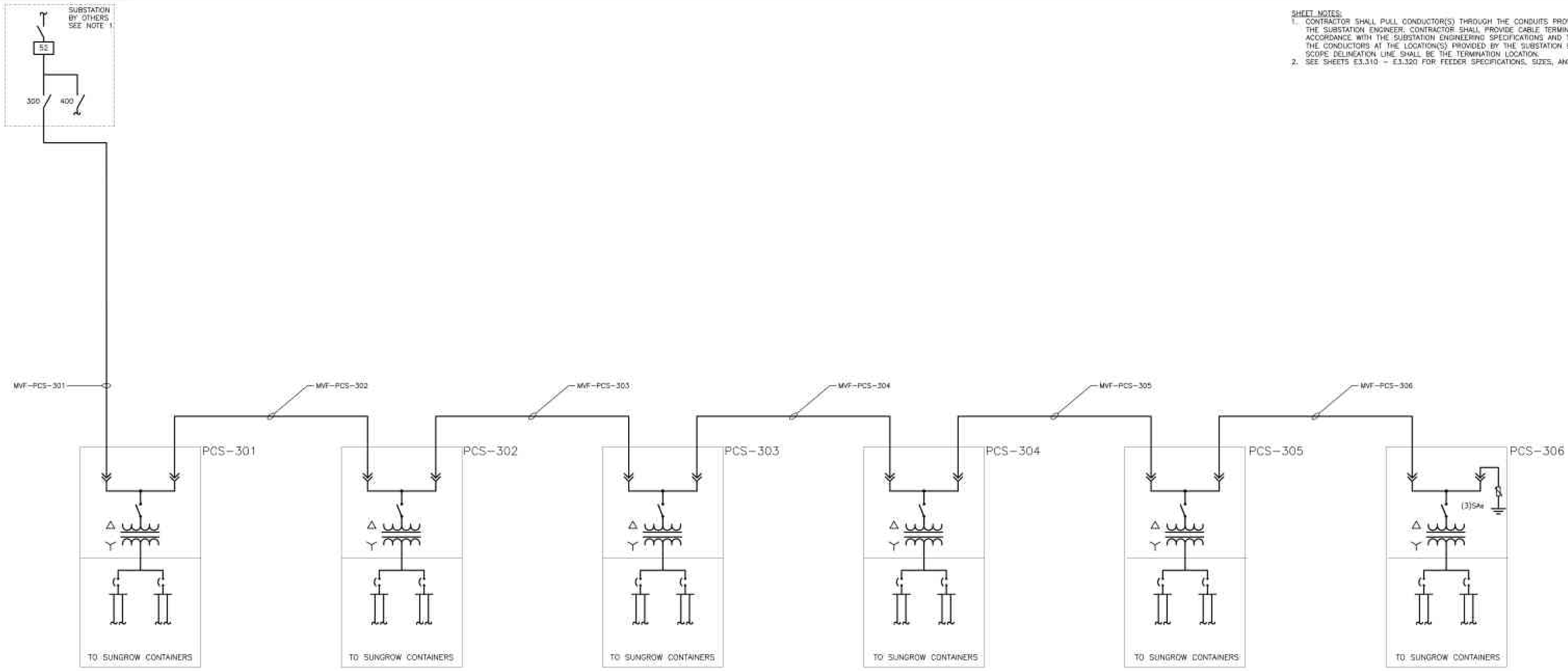
PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

RULER IN INCHES

SHEET NOTES:
1. CONTRACTOR SHALL PULL CONDUCTOR(S) THROUGH THE CONDUITS PROVIDED BY THE SUBSTATION ENGINEER. CONTRACTOR SHALL PROVIDE CABLE TERMINATIONS IN ACCORDANCE WITH THE SUBSTATION ENGINEERING SPECIFICATIONS AND TERMINATE THE CONDUCTORS AT THE LOCATION(S) PROVIDED BY THE SUBSTATION ENGINEER. SCOPE DELINEATION LINE SHALL BE THE TERMINATION LOCATION.
2. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.



1 MV SINGLE LINE – FEEDER 300
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV SINGLE LINE – FEEDER 300

DRAWING #: E2.030

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

ENGINEER: PUREPOWER ENGINEERING
111 MAIN STREET, HANOVER, NJ
WWW.PUREPOWERENG.COM
RICHARD A. KING

NO	DATE	REVISION DESCRIPTION	BY	CHK'D
1	09/01/2025	60% ELECTRICAL DESIGN	BA	MK
2	11/20/2025	90% ELECTRICAL DESIGN	BA	MK

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840 GESSNER ROAD, SUITE 140
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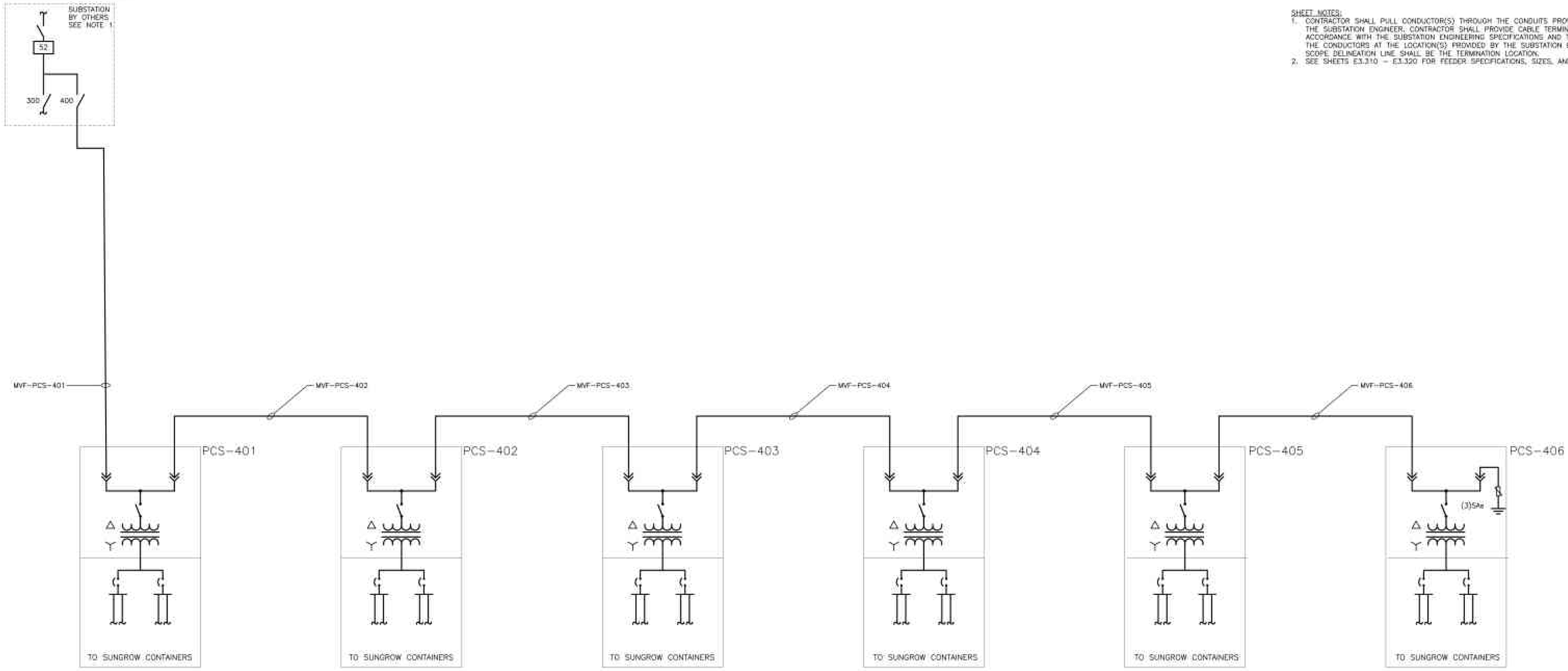
T: 713.780.2500
WWW.LANGANUS.COM

RULER IN INCHES

SHEET NOTES:
1. CONTRACTOR SHALL PULL CONDUCTOR(S) THROUGH THE CONDUITS PROVIDED BY THE SUBSTATION ENGINEER. CONTRACTOR SHALL PROVIDE CABLE TERMINATIONS IN ACCORDANCE WITH THE SUBSTATION ENGINEERING SPECIFICATIONS AND TERMINATE THE CONDUCTORS AT THE LOCATION(S) PROVIDED BY THE SUBSTATION ENGINEER. SCOPE DELINEATION LINE SHALL BE THE TERMINATION LOCATION.
2. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.



1 MV SINGLE LINE – FEEDER 400
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV SINGLE LINE – FEEDER 400

DRAWING #: E2.040

REV | DATE | REVISION DESCRIPTION | BY | CK'D
0 | 09/01/2025 | 60% ELECTRICAL DESIGN | BN | EL
1 | 11/20/2025 | 90% ELECTRICAL DESIGN | BN | EL

PREPARED FOR: LANGAN

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

ENGINEER: PUREPOWER ENGINEERING
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WWW.LANGAN.COM

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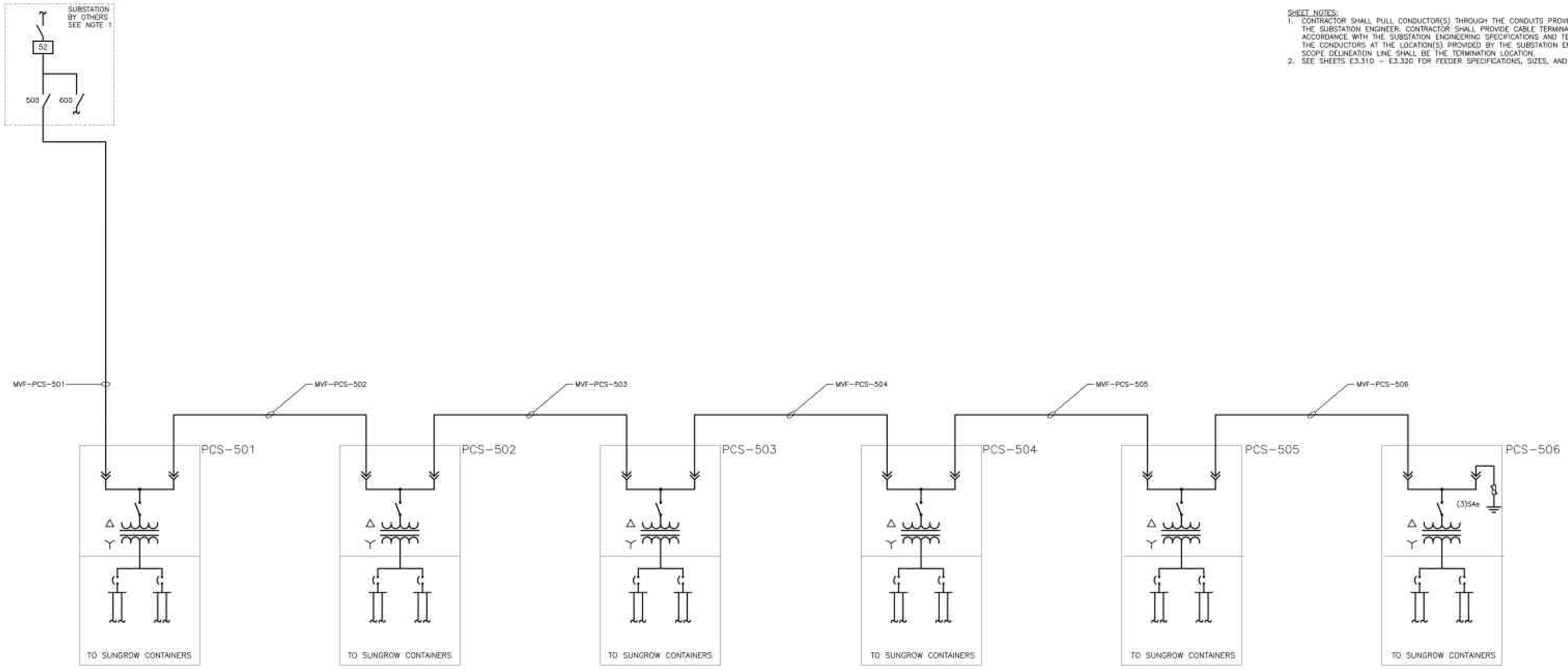
2. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.



1 MV SINGLE LINE – FEEDER 500
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV SINGLE LINE – FEEDER 500

DRAWING #: E2.050

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/01/2025	60% ELECTRICAL DESIGN	SPA	MR
2	11/20/2025	90% ELECTRICAL DESIGN	SPA	MR

ENGINEER: PUREPOWER ENGINEERING, LLC, 111 RIVER STREET, HOBOKEN, NJ 07030, WWW.PUREPOWERENGINEERING.COM, RICHARD J. KING

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

RULER IN INCHES

SUBSTATION BY OTHERS SEE NOTE 1

52

500

600

SHEET NOTES:
1. CONTRACTOR SHALL PULL CONDUCTOR(S) THROUGH THE CONDUITS PROVIDED BY THE SUBSTATION ENGINEER. CONTRACTOR SHALL PROVIDE CABLE TERMINATIONS IN ACCORDANCE WITH THE SUBSTATION ENGINEERING SPECIFICATIONS AND TERMINATE THE CONDUCTORS AT THE LOCATION(S) PROVIDED BY THE SUBSTATION ENGINEER. SCOPE DELINEATION LINE SHALL BE THE TERMINATION LOCATION.
2. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.

MVF-PCS-601

MVF-PCS-602

MVF-PCS-603

MVF-PCS-604

MVF-PCS-605

PCS-601

PCS-602

PCS-603

PCS-604

PCS-605

(3)SAs

TO SUNGROW CONTAINERS

TO SUNGROW CONTAINERS

TO SUNGROW CONTAINERS

TO SUNGROW CONTAINERS

TO SUNGROW CONTAINERS

1 MV SINGLE LINE – FEEDER 600
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV SINGLE LINE – FEEDER 600

DRAWING #: E2.060

NO	DATE	REVISION DESCRIPTION	BY	CHKD
1	09/01/2025	60% ELECTRICAL DESIGN	BPA	MR
2	11/20/2025	90% ELECTRICAL DESIGN	BPA	MR

ENGINEER: PUREPOWER ENGINEERING, LLC
111 MAIN STREET, HANOVER, NJ
WWW.PUREPOWERENGINEERING.COM
RICHARD R. KING

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PREPARED FOR: LANGAN

LANGAN, LLC
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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

TABLE 1: MV FEEDER CABLE & AMPACITY SCHEDULE				
CABLE SPEC: 35KV, AL, MV105, TRXPLE OR EPR, 100% INSULATION				
CABLE SIZE	STUDY CASE	CABLE AMPACITY [A]	MAX APPARENT POWER [MVA]	MAX # OF INVERTERS
500MCM	1	381.8	22.81	4
1000MCM	1	541.7	32.37	6
1250MCM	1	602.5	35.85	6
	2	570.8	34.11	6
	3	570.0	34.06	6
SIMULATION PARAMETERS: CABLES ARE DIRECT BURY OR BURIED IN CONDUIT IN TREFOIL CONFIGURATION. RHO = 274°C-CM/WATT AT 0% MOISTURE IN A 2'x2' DRY OUT BOX AROUND CABLE, RHO = 193°C-CM/WATT AT 4.4% MOISTURE BETWEEN DRY OUT BOX UP TO THE SURFACE, RHO = 149°C-CM/WATT AT 8.8% MOISTURE FOR ALL OTHER SOIL. AMBIENT EARTH TEMP = 30°C, 36" OF COVER. WORST CASE INSTALLATION SCENARIO. REFER TO CABLE STUDY FOR ADDITIONAL INFORMATION.				

TABLE 2: MV FEEDER STUDY CASE SCHEDULE	
CASE	DESCRIPTION
1	SINGLE CABLE IN INDIVIDUAL TRENCH, DIRECT BURIED, 36" BELOW GRADE
2	6 CIRCUITS IN PARALLEL - MULTI-FEEDER IN INDIVIDUAL TRENCHES, 36" BELOW GRADE, 96" ON CENTER SPACING, SAME FEEDER SIZE SUBSTATION ENTRANCE.
3	2 CIRCUITS IN PARALLEL - MULTI-FEEDER IN INDIVIDUAL TRENCHES, DIRECT BURIED, 36" BELOW GRADE, 48" ON CENTER SPACING, SAME FEEDER SIZES.
REFER TO CABLE AMPACITY STUDY FOR SIMULATION PARAMETERS. THE CASE APPLIED FOR EACH MV FEEDER REPRESENTS THE WORST CASE SCENARIO FOR THAT SPECIFIC FEEDER SEGMENT.	

MV FEEDER CALCULATIONS - FEEDER 100																
FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-101	PCS-101	SUBSTATION	UNDERGROUND DIRECT BURY	6	30,840	470	516.1	AL	1250MCM	2	570.8	90%	1/6	7#6 CCS	0.02%	0.02%
MVF-PCS-102	PCS-102	PCS-101	UNDERGROUND DIRECT BURY	5	25,700	80	430.1	AL	1000MCM	1	541.7	79%	1/6	7#6 CCS	0.00%	0.02%
MVF-PCS-103	PCS-103	PCS-102	UNDERGROUND DIRECT BURY	4	20,560	85	344.1	AL	500MCM	1	381.8	90%	1/3	7#6 CCS	0.01%	0.03%
MVF-PCS-104	PCS-104	PCS-103	UNDERGROUND DIRECT BURY	3	15,420	80	258.1	AL	500MCM	1	381.8	68%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-105	PCS-105	PCS-104	UNDERGROUND DIRECT BURY	2	10,280	85	172.0	AL	500MCM	1	381.8	45%	1/3	7#6 CCS	0.00%	0.04%
MVF-PCS-106	PCS-106	PCS-105	UNDERGROUND DIRECT BURY	1	5,140	80	86.0	AL	500MCM	1	381.8	23%	1/3	7#6 CCS	0.00%	0.04%

MV FEEDER CALCULATIONS - FEEDER 200																
FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-201	PCS-201	SUBSTATION	UNDERGROUND DIRECT BURY	6	30,840	390	516.1	AL	1250MCM	2	570.8	90%	1/6	7#6 CCS	0.01%	0.01%
MVF-PCS-202	PCS-202	PCS-201	UNDERGROUND DIRECT BURY	5	25,700	80	430.1	AL	1000MCM	1	541.7	79%	1/6	7#6 CCS	0.00%	0.02%
MVF-PCS-203	PCS-203	PCS-202	UNDERGROUND DIRECT BURY	4	20,560	85	344.1	AL	500MCM	1	381.8	90%	1/3	7#6 CCS	0.01%	0.03%
MVF-PCS-204	PCS-204	PCS-203	UNDERGROUND DIRECT BURY	3	15,420	80	258.1	AL	500MCM	1	381.8	68%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-205	PCS-205	PCS-204	UNDERGROUND DIRECT BURY	2	10,280	85	172.0	AL	500MCM	1	381.8	45%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-206	PCS-206	PCS-205	UNDERGROUND DIRECT BURY	1	5,140	80	86.0	AL	500MCM	1	381.8	23%	1/3	7#6 CCS	0.00%	0.03%

1 MV FEEDER SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV FEEDER SCHEDULES & CALCULATIONS

DRAWING # E2.310

PLOT DATE: 8/7/2025 8:19 PM

RULER IN INCHES

NO	DATE	REVISION DESCRIPTION	PM	DWG CHK
1	08/01/2025	60% ELECTRICAL DESIGN	BA	AR EL
2	08/25/2025	30% ELECTRICAL DESIGN	BA	AR EL

ENGINEER: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWERENG.COM, RICHARD A. IVING

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE - TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

MV FEEDER CALCULATIONS - FEEDER 300

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-301	PCS-301	SUBSTATION	UNDERGROUND DIRECT BURY	6	30,840	420	516.1	AL	1250MCM	2	570.8	90%	1/6	7#6 CCS	0.02%	0.02%
MVF-PCS-302	PCS-302	PCS-301	UNDERGROUND DIRECT BURY	5	25,700	80	430.1	AL	1000MCM	1	541.7	79%	1/6	7#6 CCS	0.00%	0.02%
MVF-PCS-303	PCS-303	PCS-302	UNDERGROUND DIRECT BURY	4	20,560	85	344.1	AL	500MCM	1	381.8	90%	1/3	7#6 CCS	0.01%	0.03%
MVF-PCS-304	PCS-304	PCS-303	UNDERGROUND DIRECT BURY	3	15,420	80	258.1	AL	500MCM	1	381.8	68%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-305	PCS-305	PCS-304	UNDERGROUND DIRECT BURY	2	10,280	85	172.0	AL	500MCM	1	381.8	45%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-306	PCS-306	PCS-305	UNDERGROUND DIRECT BURY	1	5,140	80	86.0	AL	500MCM	1	381.8	23%	1/3	7#6 CCS	0.00%	0.04%

MV FEEDER CALCULATIONS - FEEDER 400

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-401	PCS-401	SUBSTATION	UNDERGROUND DIRECT BURY	6	30,840	500	516.1	AL	1250MCM	2	570.8	90%	1/6	7#6 CCS	0.02%	0.02%
MVF-PCS-402	PCS-402	PCS-401	UNDERGROUND DIRECT BURY	5	25,700	80	430.1	AL	1000MCM	1	541.7	79%	1/6	7#6 CCS	0.00%	0.02%
MVF-PCS-403	PCS-403	PCS-402	UNDERGROUND DIRECT BURY	4	20,560	85	344.1	AL	500MCM	1	381.8	90%	1/3	7#6 CCS	0.01%	0.03%
MVF-PCS-404	PCS-404	PCS-403	UNDERGROUND DIRECT BURY	3	15,420	80	258.1	AL	500MCM	1	381.8	68%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-405	PCS-405	PCS-404	UNDERGROUND DIRECT BURY	2	10,280	85	172.0	AL	500MCM	1	381.8	45%	1/3	7#6 CCS	0.00%	0.04%
MVF-PCS-406	PCS-406	PCS-405	UNDERGROUND DIRECT BURY	1	5,140	80	86.0	AL	500MCM	1	381.8	23%	1/3	7#6 CCS	0.00%	0.04%

MV FEEDER CALCULATIONS - FEEDER 500

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-501	PCS-501	SUBSTATION	UNDERGROUND DIRECT BURY	6	30,840	520	516.1	AL	1250MCM	3	570	91%	1/6	7#6 CCS	0.02%	0.02%
MVF-PCS-502	PCS-502	PCS-501	UNDERGROUND DIRECT BURY	5	25,700	80	430.1	AL	1000MCM	1	541.7	79%	1/6	7#6 CCS	0.00%	0.02%
MVF-PCS-503	PCS-503	PCS-502	UNDERGROUND DIRECT BURY	4	20,560	85	344.1	AL	500MCM	1	381.8	90%	1/3	7#6 CCS	0.01%	0.03%
MVF-PCS-504	PCS-504	PCS-503	UNDERGROUND DIRECT BURY	3	15,420	80	258.1	AL	500MCM	1	381.8	68%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-505	PCS-505	PCS-504	UNDERGROUND DIRECT BURY	2	10,280	85	172.0	AL	500MCM	1	381.8	45%	1/3	7#6 CCS	0.00%	0.04%
MVF-PCS-506	PCS-506	PCS-505	UNDERGROUND DIRECT BURY	1	5,140	80	86.0	AL	500MCM	1	381.8	23%	1/3	7#6 CCS	0.00%	0.04%

MV FEEDER CALCULATIONS - FEEDER 600

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-601	PCS-601	SUBSTATION	UNDERGROUND DIRECT BURY	5	25,700	330	430.1	AL	1250MCM	3	570	75%	1/6	7#6 CCS	0.01%	0.01%
MVF-PCS-602	PCS-602	PCS-601	UNDERGROUND DIRECT BURY	4	20,560	85	344.1	AL	500MCM	1	381.8	90%	1/3	7#6 CCS	0.01%	0.02%
MVF-PCS-603	PCS-603	PCS-602	UNDERGROUND DIRECT BURY	3	15,420	80	258.1	AL	500MCM	1	381.8	68%	1/3	7#6 CCS	0.00%	0.02%
MVF-PCS-604	PCS-604	PCS-603	UNDERGROUND DIRECT BURY	2	10,280	85	172.0	AL	500MCM	1	381.8	45%	1/3	7#6 CCS	0.00%	0.03%
MVF-PCS-605	PCS-605	PCS-604	UNDERGROUND DIRECT BURY	1	5,140	80	86.0	AL	500MCM	1	381.8	23%	1/3	7#6 CCS	0.00%	0.03%

1 MV FEEDER SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV FEEDER SCHEDULES & CALCULATIONS

DRAWING #: E2.320

NO	REVISION DESCRIPTION	DATE	DWN	CHK
1	ISSUE ELECTRICAL DESIGN	08/01/2025	BA	AR
0	ISSUE ELECTRICAL DESIGN	04/25/2025	BA	AR

ENGINEER: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, TX 76648, RICHARD A. IVING

PREPARED FOR: LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, 713.783.3300, WWW.LANGAN.COM

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703, 8987 CR 268, BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

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PLOT DATE: 8/7/2025 8:13 PM

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SHEET NOTES:
1. AMPACITY HAS BEEN DETERMINED BY NEC 310.20, 75DEGREE RATING. REFER TO AWM THERMAL STUDY FOR ADDITIONAL INFORMATION AND VALIDATION USING THE AWM CLEAT SYSTEM.

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS "FLA" (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-101-01-1	PCS-101	BATT-101-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-101-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02-1		BATT-101-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-101-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-01A-1		BATT-101-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-101-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02A-1		BATT-101-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-101-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-101-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01-1	PCS-102	BATT-102-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-102-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02-1		BATT-102-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-102-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01A-1		BATT-102-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-102-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02A-1		BATT-102-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-102-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-102-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01-1	PCS-103	BATT-103-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-103-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02-1		BATT-103-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-103-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01A-1		BATT-103-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-103-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02A-1		BATT-103-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-103-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-103-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS "FLA" (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-104-01-1	PCS-104	BATT-104-01	ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-104-01-2			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-01-3			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-01-4			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-01-5			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-01-6			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02-1		BATT-104-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-104-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-01A-1		BATT-104-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-104-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02A-1		BATT-104-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-104-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-104-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01-1	PCS-105	BATT-105-01	ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-105-01-2			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01-3			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01-4			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01-5			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01-6			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02-1		BATT-105-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-105-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01A-1		BATT-105-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-105-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02A-1		BATT-105-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-105-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-105-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01-1	PCS-106	BATT-106-01	ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-106-01-2			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01-3			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01-4			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01-5			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01-6			ABOVE GROUND USING AWM CABLE CLEATS	30	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02-1		BATT-106-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-106-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01A-1		BATT-106-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-106-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02A-1		BATT-106-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-106-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-106-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

1 BATTERY COLLECTION SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY COLLECTION SCHEDULES & CALCULATIONS

DRAWING #: E2.410

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

PREPARED BY: PURE POWER ENGINEERING
116 HIGH STREET, HUDSON, MA 01749
RICHARD A. PARIS

LANGAN, LLC
2401 FISCHER ROAD, SUITE 740
HOUSTON, TX 77004
T: 713.783.5588
WWW.LANGAN.COM

DATE: 09/03/2025 (ISSUED FOR PERMIT); 04/30/2025 (ISSUED FOR DESIGN)

SEVERN DESCRIPTION: AUTO ELECTRICAL DESIGN; 30% ELECTRICAL DESIGN

PW | TRD | CHK
BR | AP | LL
BR | AP | EL

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

BUILT IN INCHES

SHEET NOTES:
1. AMPACITY HAS BEEN DETERMINED BY NEC 310.20, 75DEGREE RATING. REFER TO AWM THERMAL STUDY FOR ADDITIONAL INFORMATION AND VALIDATION USING THE AWM CLEAT SYSTEM.

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS "FLA" (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-201-01-1	PCS-201	BATT-201-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-201-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02-1		BATT-201-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-201-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-01A-1		BATT-201-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-201-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02A-1		BATT-201-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-201-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-201-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01-1	PCS-202	BATT-202-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-202-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02-1		BATT-202-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-202-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01A-1		BATT-202-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-202-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02A-1		BATT-202-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-202-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-202-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01-1	PCS-203	BATT-203-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-203-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02-1		BATT-203-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-203-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01A-1		BATT-203-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-203-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02A-1		BATT-203-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-203-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-203-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS "FLA" (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-204-01-1	PCS-204	BATT-204-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-204-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02-1		BATT-204-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-204-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-01A-1		BATT-204-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-204-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02A-1		BATT-204-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-204-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-204-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01-1	PCS-205	BATT-205-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-205-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02-1		BATT-205-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-205-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01A-1		BATT-205-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-205-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02A-1		BATT-205-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-205-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-205-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01-1	PCS-206	BATT-206-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-206-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02-1		BATT-206-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-206-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01A-1		BATT-206-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-206-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02A-1		BATT-206-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	485
MVF-PCS-206-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485
MVF-PCS-206-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	485

1 BATTERY COLLECTION SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY COLLECTION SCHEDULES & CALCULATIONS

DRAWING #: E2.420

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8887 CR 268
BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN
LANGAN, LLC
840 DESPER ROAD, SUITE 740
HOUSTON, TX 77067
T: 713.780.2500
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PUREPOWER ENGINEERING
1111 W. MOCKINGBIRD LANE, SUITE 1111
DALLAS, TEXAS 75247
T: 214.865.2000
RICHARD A. PARKS

NO.	DATE	DESCRIPTION	BY	CHK
1	09/01/2025	60% ELECTRICAL DESIGN	AP	LL
2	11/25/2025	90% ELECTRICAL DESIGN	BA	AP
			SA	LL

DESIGNED: [illegible]

PLOT DATE: 12/1/2025 8:11:17 PM

RULER IN INCHES

SHEET NOTES:
1. AMPACITY HAS BEEN DETERMINED BY NEC 310.20, 75DEGREE RATING. REFER TO AWM THERMAL STUDY FOR ADDITIONAL INFORMATION AND VALIDATION USING THE AWM CLEAT SYSTEM.

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS FLA (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	DEPO SIZE (A)
MVF-PCS-301-01-1	PCS-301	BATT-301-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-301-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02-1		BATT-301-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-301-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-01A-1		BATT-301-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-301-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02A-1		BATT-301-02A	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-301-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-301-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01-1	PCS-302	BATT-302-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-302-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02-1		BATT-302-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-302-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01A-1		BATT-302-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-302-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02A-1		BATT-302-02A	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-302-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-302-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01-1	PCS-303	BATT-303-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-303-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02-1		BATT-303-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-303-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01A-1		BATT-303-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-303-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02A-1		BATT-303-02A	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-303-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-303-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS FLA (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	DEPO SIZE (A)
MVF-PCS-314-01-1	PCS-304	BATT-314-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-314-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02-1		BATT-314-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-314-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-01A-1		BATT-314-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-314-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02A-1		BATT-314-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-314-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-314-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01-1	PCS-305	BATT-315-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-315-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02-1		BATT-315-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-315-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01A-1		BATT-315-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-315-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02A-1		BATT-315-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-315-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-315-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01-1	PCS-306	BATT-316-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-316-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02-1		BATT-316-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-316-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01A-1		BATT-316-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-316-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02A-1		BATT-316-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-316-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-316-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

1 BATTERY COLLECTION SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY COLLECTION SCHEDULES & CALCULATIONS

DRAWING #: E2.430

NO	DATE	DESCRIPTION	BY	CK
1	09/01/2025	60% ELECTRICAL DESIGN	MP	LL
2	11/20/2025	90% ELECTRICAL DESIGN	BA	LL

PURE POWER ENGINEERING
1717 MAIN STREET, HUBBARD A, TWC
HOUSTON, TX 77002

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840 GESSNER ROAD, SUITE 140
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WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: 170101.2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8887 CR 268
BROWN AND MILLS COUNTY, TX 76801

PRC-2026-101-0 & PRC-2026-102-0 ARE ACCEPTED AS CLIENT DATA AND ARE NOT ENDORSED BY LANGAN. LANGAN IS NOT RESPONSIBLE FOR THE ACCURACY OF THE DATA PROVIDED BY THE CLIENT OR GOVERNMENT AGENCIES. © 2025 LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC. ALL RIGHTS RESERVED.

RULER IN INCHES

SHEET NOTES:
1. AMPACITY HAS BEEN DETERMINED BY NEC 310.20, 75DEGREE RATING. REFER TO AWM THERMAL STUDY FOR ADDITIONAL INFORMATION AND VALIDATION USING THE AWM CLEAT SYSTEM.

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS FLA* (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-401-01-1	PCS-401	BATT-401-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-401-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02-1		BATT-401-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-401-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-01A-1		BATT-401-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-401-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02A-1		BATT-401-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-401-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-401-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01-1	PCS-402	BATT-402-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-402-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02-1		BATT-402-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-402-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01A-1		BATT-402-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-402-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02A-1		BATT-402-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-402-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-402-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01-1	PCS-403	BATT-403-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-403-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02-1		BATT-403-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-403-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01A-1		BATT-403-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-403-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02A-1		BATT-403-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-403-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-403-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS FLA* (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-404-01-1	PCS-404	BATT-404-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-404-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02-1		BATT-404-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-404-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-01A-1		BATT-404-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-404-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02A-1		BATT-404-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-404-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-404-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01-1	PCS-405	BATT-405-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-405-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02-1		BATT-405-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-405-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01A-1		BATT-405-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-405-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02A-1		BATT-405-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-405-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-405-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01-1	PCS-406	BATT-406-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-406-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02-1		BATT-406-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-406-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01A-1		BATT-406-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-406-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02A-1		BATT-406-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-406-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-406-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

1 BATTERY COLLECTION SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY COLLECTION SCHEDULES & CALCULATIONS

DRAWING #: E2.440

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703, 8987 CR 268, BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

PREPARED BY: PURE POWER ENGINEERING, 1111 HIGH STREET, HUDSON, WI 54016

NO	DATE	DESCRIPTION	BY	CHK
1	08/01/2025	50% ELECTRICAL DESIGN	MP	LL
2	09/25/2025	90% ELECTRICAL DESIGN	BA	MP
			SA	EL

SIZE: 24" x 36" | PROJECT #: TX-PS-2703

LANGAN, LLC, 400 POYDRAS STREET, SUITE 740, NEW ORLEANS, LA 70130, PH: 504.910.1500, WWW.LANGAN.COM

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PLOT DATE: 9/17/2025 9:18 AM

RULER IN INCHES

PLOT DATE: 6/17/2025 8:16 AM

SHEET NOTES:
1. AMPACITY HAS BEEN DETERMINED BY NEC 310.20, 75DEGREE RATING. REFER TO AWM THERMAL STUDY FOR ADDITIONAL INFORMATION AND VALIDATION USING THE AWM CLEAT SYSTEM.

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS FLA (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-501-01-1	PCS-501	BATT-501-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-501-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02-1		BATT-501-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-501-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-01A-1		BATT-501-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-501-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02A-1		BATT-501-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-501-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-501-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01-1	PCS-501	BATT-502-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-502-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02-1		BATT-502-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-502-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01A-1		BATT-502-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-502-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02A-1		BATT-502-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-502-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-502-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01-1	PCS-503	BATT-503-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-503-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02-1		BATT-503-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-503-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01A-1		BATT-503-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-503-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02A-1		BATT-503-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-503-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	460
MVF-PCS-503-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	460

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS FLA (A)	CONDUCTOR MATERIAL	EGC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	OCPD SIZE (A)
MVF-PCS-504-01-1	PCS-504	BATT-504-01	ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-504-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02-1		BATT-504-02	ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-504-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-01A-1		BATT-504-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-504-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02A-1		BATT-504-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-504-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-504-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01-1	PCS-505	BATT-505-01	ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-505-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02-1		BATT-505-02	ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-505-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01A-1		BATT-505-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-505-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02A-1		BATT-505-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-505-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-505-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01-1	PCS-506	BATT-506-01	ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-506-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02-1		BATT-506-02	ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-506-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01A-1		BATT-506-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-506-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02A-1		BATT-506-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	500MCM CU	750MCM	638	55%	460
MVF-PCS-506-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	N/A	750MCM	638	55%	460
MVF-PCS-506-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	152	CU	N/A	750MCM	638	55%	460

1 BATTERY COLLECTION SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY COLLECTION SCHEDULES & CALCULATIONS

DRAWING #: E2.450

NO	DESCRIPTION	DATE	BY	CHK
1	60% ELECTRICAL DESIGN	04/30/2025	BR	LL
2	90% ELECTRICAL DESIGN	06/17/2025	BR	LL

ISSUED FOR:

PREPARED BY: PURE POWER ENGINEERING
717 HIGH STREET, HUBBARD, TX
PH: 254.576.2121
RICHARD A. LANG

PREPARED FOR: LANGAN, LLC
840 GESSNER ROAD, SUITE 140
HOUSTON, TX 77024
713.783.7788
WWW.LANGAN.COM

JOB SIZE: 36" x 24"

PROJECT #: TX-PS-2703

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8887 CR 268
BROWN AND MILLS COUNTY, TX 76801

RULER IN INCHES

SHEET NOTES:
1. AMPACITY HAS BEEN DETERMINED BY NEC 310.20, 75DEGREE RATING. REFER TO AWM THERMAL STUDY FOR ADDITIONAL INFORMATION AND VALIDATION USING THE AWM CLEAT SYSTEM.

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS I*1.4 (A)	CONDUCTOR MATERIAL	ESC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	DCPD SIZE (A)
MVF-PCS-601-01-1	PCS-601	BATT-601-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-601-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02-1		BATT-601-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-601-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-01A-1		BATT-601-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-601-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02A-1		BATT-601-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-601-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-601-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01-1	PCS-602	BATT-602-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-602-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02-1		BATT-602-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-602-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01A-1		BATT-602-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-602-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02A-1		BATT-602-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-602-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-602-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01-1	PCS-603	BATT-603-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-603-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02-1		BATT-603-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-603-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01A-1		BATT-603-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-603-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02A-1		BATT-603-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-603-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-603-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

AC BATTERY COLLECTION

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	FEEDER LENGTH (FT)	FULL LOAD AMPS I*1.4 (A)	CONDUCTOR MATERIAL	ESC SIZE	CONDUCTOR SIZE	CONDUCTOR AMPACITY (A) (NOTE 1)	CONDUCTOR LOADING	DCPD SIZE (A)
MVF-PCS-604-01-1	PCS-604	BATT-604-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-604-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02-1		BATT-604-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-604-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-01A-1		BATT-604-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-604-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02A-1		BATT-604-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-604-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-604-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01-1	PCS-605	BATT-605-01	ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-605-01-2			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01-3			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01-4			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01-5			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01-6			ABOVE GROUND USING AWM CABLE CLEATS	20	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02-1		BATT-605-02	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-605-02-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02-4			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02-5			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02-6			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01A-1		BATT-605-01A	ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-605-01A-2			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-01A-3			ABOVE GROUND USING AWM CABLE CLEATS	45	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02A-1		BATT-605-02A	ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	500MCM CU	750MCM	638	55%	465
MVF-PCS-605-02A-2			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465
MVF-PCS-605-02A-3			ABOVE GROUND USING AWM CABLE CLEATS	70	352	CU	N/A	750MCM	638	55%	465

1 BATTERY COLLECTION SCHEDULES & CALCULATIONS
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: BATTERY COLLECTION SCHEDULES & CALCULATIONS

DRAWING #: E2.460

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

PROJECT #: TX-PS-2703

PURE POWER ENGINEERING
TYE RYDER STREET, HUDSON
RICHARD A. [illegible]

LANGAN, LLC
840 DESPER ROAD, SUITE 740
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T: 713.780.2626
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NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/01/2025	60% ELECTRICAL DESIGN	MP	LL
2	11/25/2025	90% ELECTRICAL DESIGN	BA	MP
				EL

PURE POWER ENGINEERING, PLLC. 1ST FLOOR, 1000 N. LAMAR BLVD. AUSTIN, TEXAS 78703 (512) 215-7300 WWW.PUREPOWERENGINEERING.COM ©2024 PURE POWER ENGINEERING, PLLC. ALL RIGHTS RESERVED

RULER IN INCHES

FIBER COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UGF-PCS-101	PCS-101	SUBSTATION CONTROL HOUSE	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	470
UGF-PCS-102	PCS-102	PCS-101	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-103	PCS-103	PCS-102	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-104	PCS-104	PCS-103	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-105	PCS-105	PCS-104	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-106	PCS-106	PCS-105	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-201	PCS-201	SUBSTATION CONTROL HOUSE	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	390
UGF-PCS-202	PCS-202	PCS-201	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-203	PCS-203	PCS-202	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-204	PCS-204	PCS-203	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-205	PCS-205	PCS-204	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-206	PCS-206	PCS-205	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-301	PCS-301	SUBSTATION CONTROL HOUSE	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	420
UGF-PCS-302	PCS-302	PCS-301	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-303	PCS-303	PCS-302	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-304	PCS-304	PCS-303	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-305	PCS-305	PCS-304	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-306	PCS-306	PCS-305	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-401	PCS-401	SUBSTATION CONTROL HOUSE	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	500
UGF-PCS-402	PCS-402	PCS-401	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-403	PCS-403	PCS-402	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-404	PCS-404	PCS-403	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-405	PCS-405	PCS-404	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-406	PCS-406	PCS-405	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-501	PCS-501	SUBSTATION CONTROL HOUSE	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	520
UGF-PCS-502	PCS-502	PCS-501	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-503	PCS-503	PCS-502	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-504	PCS-504	PCS-503	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-505	PCS-505	PCS-504	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-506	PCS-506	PCS-505	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-601	PCS-601	SUBSTATION CONTROL HOUSE	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	390
UGF-PCS-602	PCS-602	PCS-601	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-603	PCS-603	PCS-602	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80
UGF-PCS-604	PCS-604	PCS-603	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	85
UGF-PCS-605	PCS-605	PCS-604	12 STR MM FIBER	HDPE INNERDUCT	1 1/4"	80

1 COMMUNICATIOINS SCHEDULE – FIBER
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: COMMUNICATIOINS SCHEDULE – FIBER

DRAWING #: E2.500

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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NO	DATE	REVISION / DESCRIPTION	BY	CHK'D	APP'D
1	09/01/2025	ISSUE ELECTRICAL DESIGN	BPA	WS	FL
0	04/30/2025	ISSUE ELECTRICAL DESIGN	BPA	WS	FL

ENGINEER: PUREPOWER ENGINEERING
111 MAIN STREET, HANOVER, NJ
WWW.PUREPOWERENG.COM
RICHARD A. KING

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PLOT DATE: 9/17/2025 9:11 AM

RULER IN INCHES

PLOT DATE: 6/17/2025 9:17 AM

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

ETHERNET COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	PVC CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UVE-BATT-101-01	PCS-101	BATT-101-01	CAT6	PVC	1"	20
UVE-BATT-101-02		BATT-101-02	CAT6	PVC	1"	45
UVE-BATT-101-01A		BATT-101-01A	CAT6	PVC	1"	45
UVE-BATT-101-02A		BATT-101-02A	CAT6	PVC	1"	70
UVE-BATT-102-01	PCS-102	BATT-102-01	CAT6	PVC	1"	20
UVE-BATT-102-02		BATT-102-02	CAT6	PVC	1"	45
UVE-BATT-102-01A		BATT-102-01A	CAT6	PVC	1"	45
UVE-BATT-102-02A		BATT-102-02A	CAT6	PVC	1"	70
UVE-BATT-103-01	PCS-103	BATT-103-01	CAT6	PVC	1"	20
UVE-BATT-103-02		BATT-103-02	CAT6	PVC	1"	45
UVE-BATT-103-01A		BATT-103-01A	CAT6	PVC	1"	45
UVE-BATT-103-02A		BATT-103-02A	CAT6	PVC	1"	70
UVE-BATT-104-01	PCS-104	BATT-104-01	CAT6	PVC	1"	20
UVE-BATT-104-02		BATT-104-02	CAT6	PVC	1"	45
UVE-BATT-104-01A		BATT-104-01A	CAT6	PVC	1"	45
UVE-BATT-104-02A		BATT-104-02A	CAT6	PVC	1"	70
UVE-BATT-105-01	PCS-105	BATT-105-01	CAT6	PVC	1"	20
UVE-BATT-105-02		BATT-105-02	CAT6	PVC	1"	45
UVE-BATT-105-01A		BATT-105-01A	CAT6	PVC	1"	45
UVE-BATT-105-02A		BATT-105-02A	CAT6	PVC	1"	70
UVE-BATT-106-01	PCS-106	BATT-106-01	CAT6	PVC	1"	20
UVE-BATT-106-02		BATT-106-02	CAT6	PVC	1"	45
UVE-BATT-106-01A		BATT-106-01A	CAT6	PVC	1"	45
UVE-BATT-106-02A		BATT-106-02A	CAT6	PVC	1"	70

ETHERNET COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	PVC CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UVE-BATT-201-01	PCS-201	BATT-201-01	CAT6	PVC	1"	20
UVE-BATT-201-02		BATT-201-02	CAT6	PVC	1"	45
UVE-BATT-201-01A		BATT-201-01A	CAT6	PVC	1"	45
UVE-BATT-201-02A		BATT-201-02A	CAT6	PVC	1"	70
UVE-BATT-202-01	PCS-202	BATT-202-01	CAT6	PVC	1"	20
UVE-BATT-202-02		BATT-202-02	CAT6	PVC	1"	45
UVE-BATT-202-01A		BATT-202-01A	CAT6	PVC	1"	45
UVE-BATT-202-02A		BATT-202-02A	CAT6	PVC	1"	70
UVE-BATT-203-01	PCS-203	BATT-203-01	CAT6	PVC	1"	20
UVE-BATT-203-02		BATT-203-02	CAT6	PVC	1"	45
UVE-BATT-203-01A		BATT-203-01A	CAT6	PVC	1"	45
UVE-BATT-203-02A		BATT-203-02A	CAT6	PVC	1"	70
UVE-BATT-204-01	PCS-204	BATT-204-01	CAT6	PVC	1"	20
UVE-BATT-204-02		BATT-204-02	CAT6	PVC	1"	45
UVE-BATT-204-01A		BATT-204-01A	CAT6	PVC	1"	45
UVE-BATT-204-02A		BATT-204-02A	CAT6	PVC	1"	70
UVE-BATT-205-01	PCS-205	BATT-205-01	CAT6	PVC	1"	20
UVE-BATT-205-02		BATT-205-02	CAT6	PVC	1"	45
UVE-BATT-205-01A		BATT-205-01A	CAT6	PVC	1"	45
UVE-BATT-205-02A		BATT-205-02A	CAT6	PVC	1"	70
UVE-BATT-206-01	PCS-206	BATT-206-01	CAT6	PVC	1"	20
UVE-BATT-206-02		BATT-206-02	CAT6	PVC	1"	45
UVE-BATT-206-01A		BATT-206-01A	CAT6	PVC	1"	45
UVE-BATT-206-02A		BATT-206-02A	CAT6	PVC	1"	70

ETHERNET COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	PVC CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UVE-BATT-301-01	PCS-301	BATT-301-01	CAT6	PVC	1"	20
UVE-BATT-301-02		BATT-301-02	CAT6	PVC	1"	45
UVE-BATT-301-01A		BATT-301-01A	CAT6	PVC	1"	45
UVE-BATT-301-02A		BATT-301-02A	CAT6	PVC	1"	70
UVE-BATT-302-01	PCS-302	BATT-302-01	CAT6	PVC	1"	20
UVE-BATT-302-02		BATT-302-02	CAT6	PVC	1"	45
UVE-BATT-302-01A		BATT-302-01A	CAT6	PVC	1"	45
UVE-BATT-302-02A		BATT-302-02A	CAT6	PVC	1"	70
UVE-BATT-303-01	PCS-303	BATT-303-01	CAT6	PVC	1"	20
UVE-BATT-303-02		BATT-303-02	CAT6	PVC	1"	45
UVE-BATT-303-01A		BATT-303-01A	CAT6	PVC	1"	45
UVE-BATT-303-02A		BATT-303-02A	CAT6	PVC	1"	70
UVE-BATT-304-01	PCS-304	BATT-304-01	CAT6	PVC	1"	20
UVE-BATT-304-02		BATT-304-02	CAT6	PVC	1"	45
UVE-BATT-304-01A		BATT-304-01A	CAT6	PVC	1"	45
UVE-BATT-304-02A		BATT-304-02A	CAT6	PVC	1"	70
UVE-BATT-305-01	PCS-305	BATT-305-01	CAT6	PVC	1"	20
UVE-BATT-305-02		BATT-305-02	CAT6	PVC	1"	45
UVE-BATT-305-01A		BATT-305-01A	CAT6	PVC	1"	45
UVE-BATT-305-02A		BATT-305-02A	CAT6	PVC	1"	70
UVE-BATT-306-01	PCS-306	BATT-306-01	CAT6	PVC	1"	20
UVE-BATT-306-02		BATT-306-02	CAT6	PVC	1"	45
UVE-BATT-306-01A		BATT-306-01A	CAT6	PVC	1"	45
UVE-BATT-306-02A		BATT-306-02A	CAT6	PVC	1"	70

ETHERNET COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	PVC CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UVE-BATT-401-01	PCS-401	BATT-401-01	CAT6	PVC	1"	20
UVE-BATT-401-02		BATT-401-02	CAT6	PVC	1"	45
UVE-BATT-401-01A		BATT-401-01A	CAT6	PVC	1"	45
UVE-BATT-401-02A		BATT-401-02A	CAT6	PVC	1"	70
UVE-BATT-402-01	PCS-402	BATT-402-01	CAT6	PVC	1"	20
UVE-BATT-402-02		BATT-402-02	CAT6	PVC	1"	45
UVE-BATT-402-01A		BATT-402-01A	CAT6	PVC	1"	45
UVE-BATT-402-02A		BATT-402-02A	CAT6	PVC	1"	70
UVE-BATT-403-01	PCS-403	BATT-403-01	CAT6	PVC	1"	20
UVE-BATT-403-02		BATT-403-02	CAT6	PVC	1"	45
UVE-BATT-403-01A		BATT-403-01A	CAT6	PVC	1"	45
UVE-BATT-403-02A		BATT-403-02A	CAT6	PVC	1"	70
UVE-BATT-404-01	PCS-404	BATT-404-01	CAT6	PVC	1"	20
UVE-BATT-404-02		BATT-404-02	CAT6	PVC	1"	45
UVE-BATT-404-01A		BATT-404-01A	CAT6	PVC	1"	45
UVE-BATT-404-02A		BATT-404-02A	CAT6	PVC	1"	70
UVE-BATT-405-01	PCS-405	BATT-405-01	CAT6	PVC	1"	20
UVE-BATT-405-02		BATT-405-02	CAT6	PVC	1"	45
UVE-BATT-405-01A		BATT-405-01A	CAT6	PVC	1"	45
UVE-BATT-405-02A		BATT-405-02A	CAT6	PVC	1"	70
UVE-BATT-406-01	PCS-406	BATT-406-01	CAT6	PVC	1"	20
UVE-BATT-406-02		BATT-406-02	CAT6	PVC	1"	45
UVE-BATT-406-01A		BATT-406-01A	CAT6	PVC	1"	45
UVE-BATT-406-02A		BATT-406-02A	CAT6	PVC	1"	70

ETHERNET COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	PVC CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UVE-BATT-501-01	PCS-501	BATT-501-01	CAT6	PVC	1"	20
UVE-BATT-501-02		BATT-501-02	CAT6	PVC	1"	45
UVE-BATT-501-01A		BATT-501-01A	CAT6	PVC	1"	45
UVE-BATT-501-02A		BATT-501-02A	CAT6	PVC	1"	70
UVE-BATT-502-01	PCS-502	BATT-502-01	CAT6	PVC	1"	20
UVE-BATT-502-02		BATT-502-02	CAT6	PVC	1"	45
UVE-BATT-502-01A		BATT-502-01A	CAT6	PVC	1"	45
UVE-BATT-502-02A		BATT-502-02A	CAT6	PVC	1"	70
UVE-BATT-503-01	PCS-503	BATT-503-01	CAT6	PVC	1"	20
UVE-BATT-503-02		BATT-503-02	CAT6	PVC	1"	45
UVE-BATT-503-01A		BATT-503-01A	CAT6	PVC	1"	45
UVE-BATT-503-02A		BATT-503-02A	CAT6	PVC	1"	70
UVE-BATT-504-01	PCS-504	BATT-504-01	CAT6	PVC	1"	20
UVE-BATT-504-02		BATT-504-02	CAT6	PVC	1"	45
UVE-BATT-504-01A		BATT-504-01A	CAT6	PVC	1"	45
UVE-BATT-504-02A		BATT-504-02A	CAT6	PVC	1"	70
UVE-BATT-505-01	PCS-505	BATT-505-01	CAT6	PVC	1"	20
UVE-BATT-505-02		BATT-505-02	CAT6	PVC	1"	45
UVE-BATT-505-01A		BATT-505-01A	CAT6	PVC	1"	45
UVE-BATT-505-02A		BATT-505-02A	CAT6	PVC	1"	70
UVE-BATT-506-01	PCS-506	BATT-506-01	CAT6	PVC	1"	20
UVE-BATT-506-02		BATT-506-02	CAT6	PVC	1"	45
UVE-BATT-506-01A		BATT-506-01A	CAT6	PVC	1"	45
UVE-BATT-506-02A		BATT-506-02A	CAT6	PVC	1"	70

ETHERNET COMMUNICATIONS SCHEDULE

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	WIRE TYPE	CONDUIT TYPE	PVC CONDUIT SIZE	CIRCUIT LENGTH (FEET)
UVE-BATT-601-01	PCS-601	BATT-601-01	CAT6	PVC	1"	20
UVE-BATT-601-02		BATT-601-02	CAT6	PVC	1"	45
UVE-BATT-601-01A		BATT-601-01A	CAT6	PVC	1"	45
UVE-BATT-601-02A		BATT-601-02A	CAT6	PVC	1"	70
UVE-BATT-602-01	PCS-602	BATT-602-01	CAT6	PVC	1"	20
UVE-BATT-602-02		BATT-602-02	CAT6	PVC	1"	45
UVE-BATT-602-01A		BATT-602-01A	CAT6	PVC	1"	45
UVE-BATT-602-02A		BATT-602-02A	CAT6	PVC	1"	70
UVE-BATT-603-01	PCS-603	BATT-603-01	CAT6	PVC	1"	20
UVE-BATT-603-02		BATT-603-02	CAT6	PVC	1"	45
UVE-BATT-603-01A		BATT-603-01A	CAT6	PVC	1"	45
UVE-BATT-603-02A		BATT-603-02A	CAT6	PVC	1"	70
UVE-BATT-604-01	PCS-604	BATT-604-01	CAT6	PVC	1"	20
UVE-BATT-604-02		BATT-604-02	CAT6	PVC	1"	45
UVE-BATT-604-01A		BATT-604-01A	CAT6	PVC	1"	45
UVE-BATT-604-02A		BATT-604-02A	CAT6	PVC	1"	70
UVE-BATT-605-01	PCS-605	BATT-605-01	CAT6	PVC	1"	20
UVE-BATT-605-02		BATT-605-02	CAT6	PVC	1"	45
UVE-BATT-605-01A		BATT-605-01A	CAT6	PVC	1"	45
UVE-BATT-605-02A		BATT-605-02A	CAT6	PVC	1"	70

1 COMMUNICATIOINS SCHEDULE – ETHERNET
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: COMMUNICATIOINS SCHEDULE – ETHERNET

DRAWING #: E2.510

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	04/01/2025	90% ELECTRICAL DESIGN	BA	AH
2	04/25/2025	100% ELECTRICAL DESIGN	BA	AH

PREPARED BY: PURE POWER ENGINEERING
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PAGE SIZE: 36" × 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

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RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

LIGHTING LVAC CIRCUIT SCHEDULE

LIGHTING CIRCUIT	FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS 'FLA'	PHASE	FLA x 1.25	OCPD SIZE (A)	CONDUIT TYPE	PVC CONDUIT SIZE	GROUND SIZE	CONDUCTORS PER PHASE	PHASE CONDUCTOR SIZE	NEUTRAL CONDUCTOR SIZE	75° AMPACITY	90° AMPACITY	FEEDER LENGTH (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
1	EP-01	EP-01	SUBSTATION CONTROL HOUSE	240	7.5	1PH	9	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	420	1.77%	1.77%
	EP-02	EP-02	EP-01	240	6.0	1PH	8	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	115	0.39%	2.16%
	EP-03	EP-03	EP-02	240	4.5	1PH	6	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	110	0.28%	2.44%
	EP-04	EP-04	EP-03	240	3.0	1PH	4	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	95	0.16%	2.60%
	EP-05	EP-05	EP-04	240	1.5	1PH	2	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	95	0.08%	2.68%
2	EP-06	EP-06	SUBSTATION CONTROL HOUSE	240	7.5	1PH	9	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	470	1.98%	1.98%
	EP-07	EP-07	EP-06	240	6.0	1PH	8	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	95	0.32%	2.31%
	EP-08	EP-08	EP-07	240	4.5	1PH	6	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	95	0.24%	2.55%
	EP-09	EP-09	EP-08	240	3.0	1PH	4	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	125	0.21%	2.76%
	EP-10	EP-10	EP-09	240	1.5	1PH	2	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	120	0.10%	2.86%
3	EP-11	EP-11	SUBSTATION CONTROL HOUSE	240	6.0	1PH	8	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	550	1.86%	1.86%
	EP-12	EP-12	EP-11	240	4.5	1PH	6	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	70	0.18%	2.03%
	EP-13	EP-13	EP-12	240	3.0	1PH	4	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	75	0.13%	2.16%
	EP-14	EP-14	EP-13	240	1.5	1PH	2	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	115	0.10%	2.26%
4	EP-15	EP-15	SUBSTATION CONTROL HOUSE	240	6.0	1PH	8	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	455	1.54%	1.54%
	EP-16	EP-16	EP-15	240	4.5	1PH	6	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	110	0.28%	1.82%
	EP-17	EP-17	EP-16	240	3.0	1PH	4	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	85	0.14%	1.96%
	EP-18	EP-18	EP-17	240	1.5	1PH	2	20	PVC	1"	CU #8	1	CU #8	CU #8	50	55	85	0.07%	2.03%

1 LVAC LIGHTING SCHEDULES
SCALE: NOT TO SCALE

NOT FOR CONSTRUCTION

DRAWING TITLE: LVAC LIGHTING SCHEDULES

DRAWING #: E2.810

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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ENGINEER:
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RICHARD A. IVING

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	08/01/2025	ISSUE ELECTRICAL DESIGN	BA	AR
2	09/25/2025	ISSUE ELECTRICAL DESIGN	BA	AR

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PLOT DATE: 9/17/2025 9:19 PM

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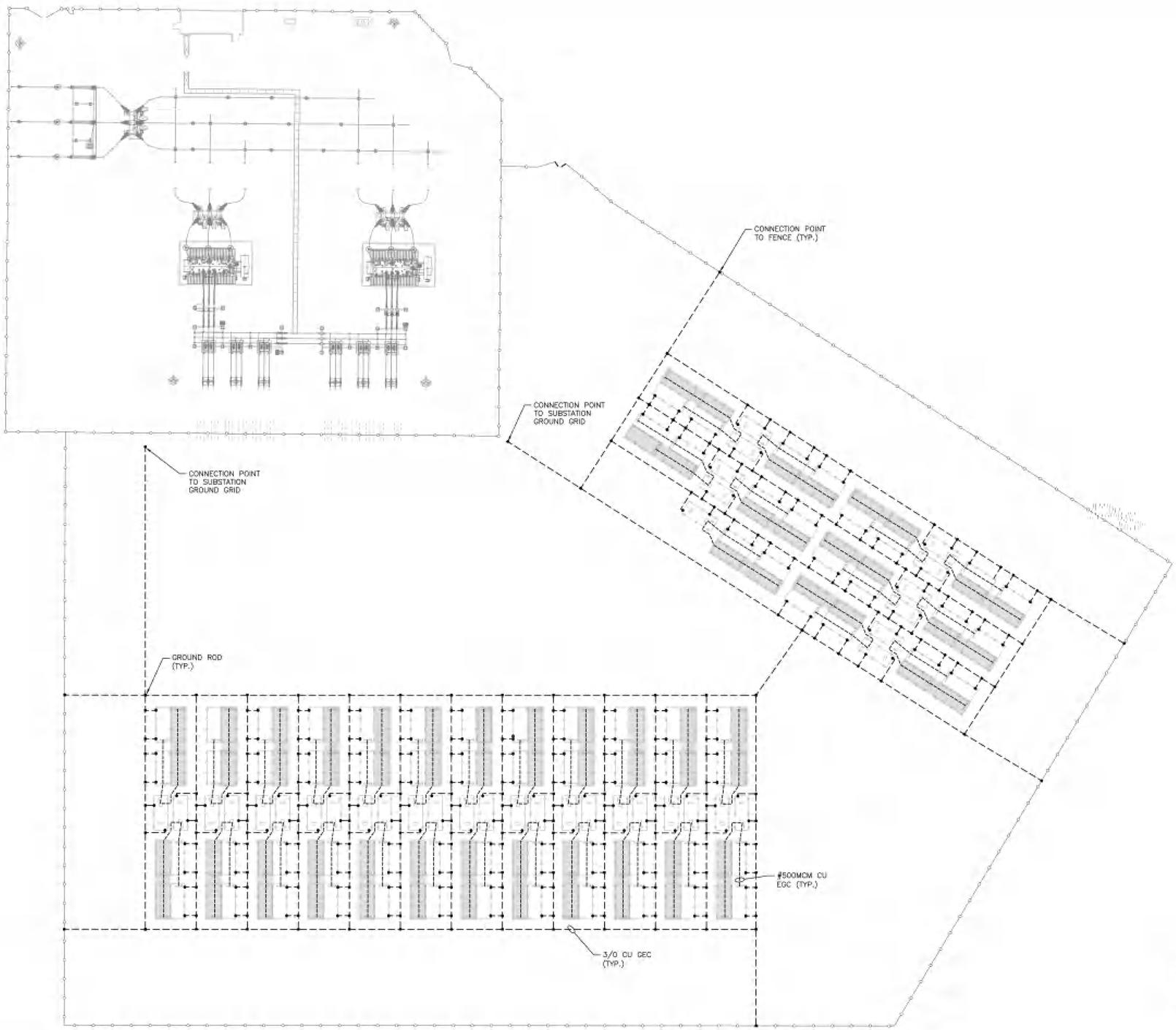

NOTES:
1. GROUND GRID SHALL BE MADE UP 3/0 BARE COPPER CABLE BURIED A MINIMUM OF 18" BELOW GRADE.
2. CONTRACTOR TO COIL GROUND LEADS OF SUFFICIENT LENGTH ON FOUNDATIONS, AS NECESSARY PER THE GROUNDING PLAN, TO GROUND EQUIPMENT AS IDENTIFIED IN THE GROUNDING DETAILS. SPLICING PIGTAILS SHALL NOT BE PERMITTED.
3. FOR EQUIPMENT CONNECTIONS, PROVIDE PIGTAILS OF ADEQUATE LENGTH TO EXTEND TO FINAL ELEVATION OF EQUIPMENT WITHOUT SPLICING TO MAKE UP APPLICABLE DETAILS.
4. PIGTAILS AND EXPOSED GROUNDING CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE DURING CONSTRUCTION.
5. DO NOT DRIVE GROUND RODS CLOSER THAN 18" FROM ANY FOOTING.

LINETYPE LEGEND
- FENCE
- ACCESS ROAD
- LOW VOLTAGE AC
- #3/0 BARE COPPER
- #500MCM CU

SYMBOL LEGEND
- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- LIGHTING PULLBOX
- IRREVERSIBLE CONNECTION
- CONNECTION TO EQUIPMENT
- GROUND ROD

1 GROUNDING SITE PLAN
SCALE: 1" = 30'

NOT FOR CONSTRUCTION

DRAWING TITLE: GROUNDING SITE PLAN

DRAWING # E3.000

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703, 8987 CR 268, BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, (713) 529-3000, WWW.LANGAN.COM

ENGINEER: PURE POWER ENGINEERING, 111 RYER STREET, HUDSON, NJ, WWW.PUREPOWER.COM, RICHARD A. IVING

NO	DATE	REVISION DESCRIPTION	PM	ENG	CHK
	08/01/2025	60% ELECTRICAL DESIGN	BA	AR	EL
	09/25/2025	30% ELECTRICAL DESIGN	BA	AR	EL

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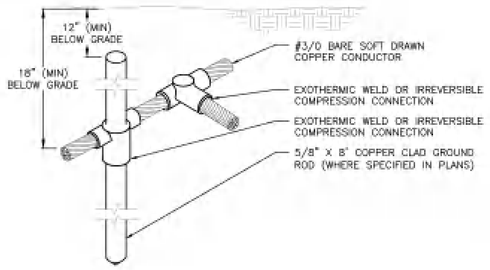
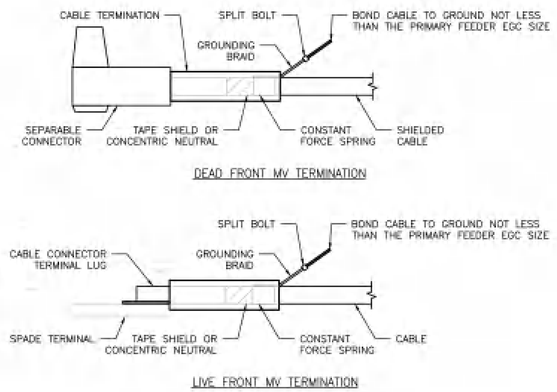
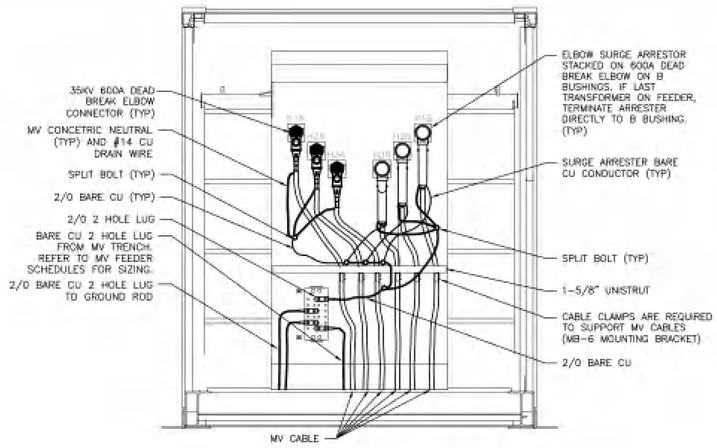


1 GROUND GRID DETAILS
SCALE: NOT TO SCALE



2 MV CABLE TERMINATION
SCALE: NOT TO SCALE



3 TYPICAL TRANSFORMER MV TERMINATION
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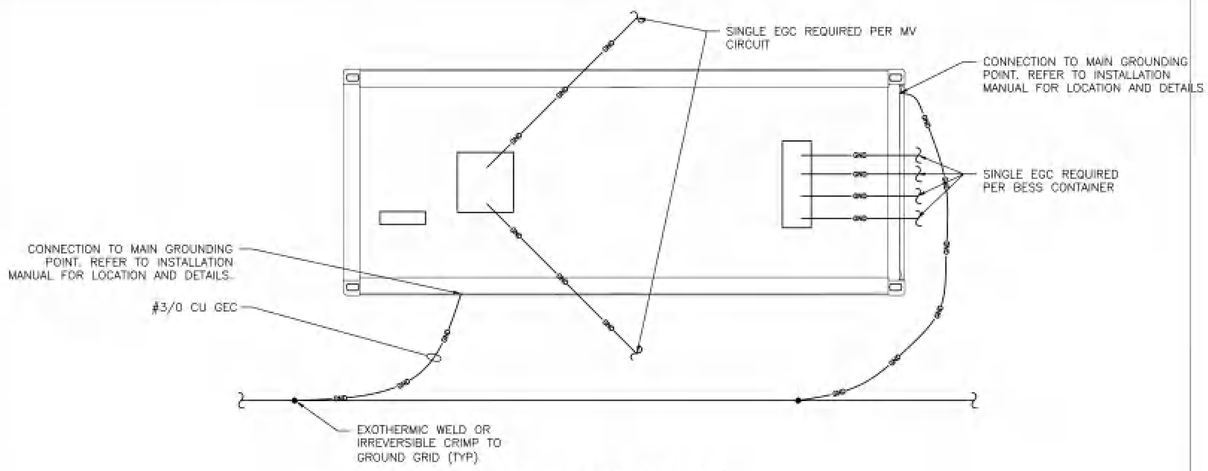

5 TYPICAL PCS GROUNDING
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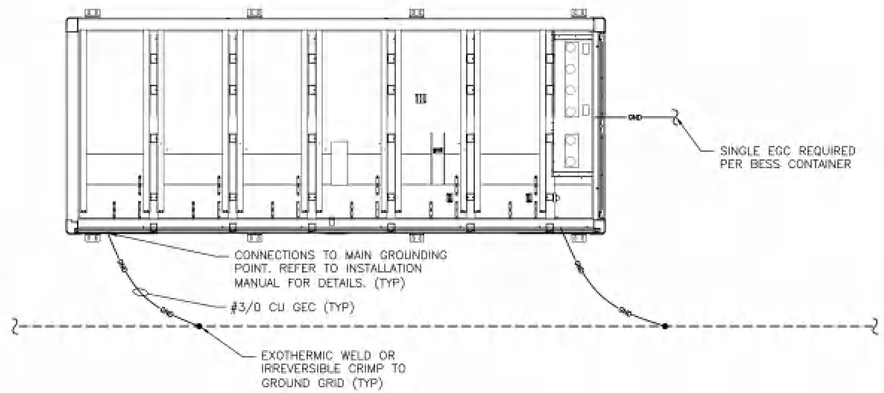

6 TYPICAL BATTERY CONTAINER GROUNDING
SCALE: NOT TO SCALE

1 GROUNDING DETAILS
SCALE: NOT TO SCALE

REVISION DESCRIPTION	DATE	PM	ENG	CHK
SIZE ELECTRICAL DESIGN	08/01/2025	BA	AR	EL
SIZE ELECTRICAL DESIGN	04/25/2025	BA	AR	EL

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(469) 855-5004
RICHARD A. IVINS

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WWW.LANGAN.COM

PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: GROUNDING DETAILS

DRAWING #: E3.010

PLOT DATE: 8/1/2025 8:12 PM

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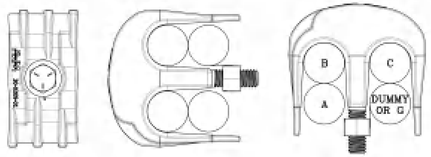
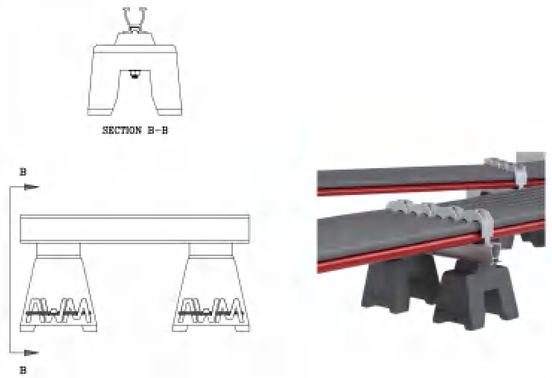
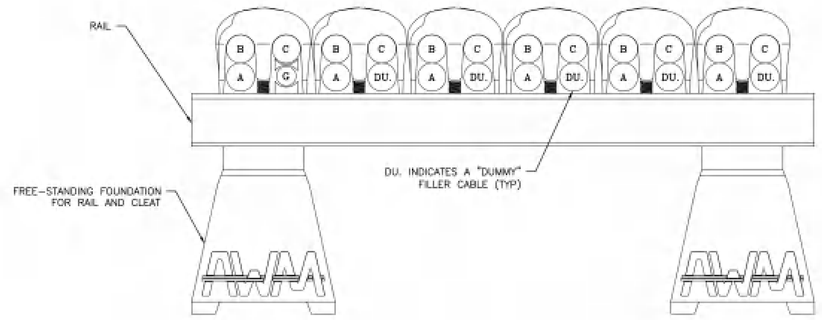


1 TYPICAL AWM CABLE CLEAT
SCALE: NOT TO SCALE



2 TYPICAL AWM RAIL BLOCK
SCALE: NOT TO SCALE



3 TYPICAL AC BATTERY COLLECTION RAIL BLOCK – ONE 2H CONTAINER
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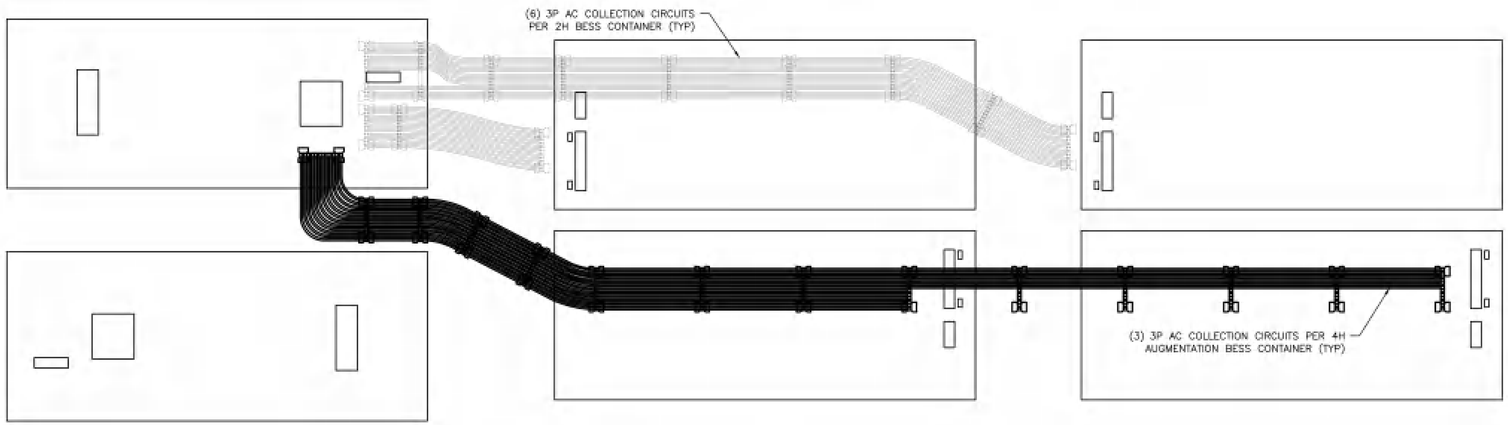
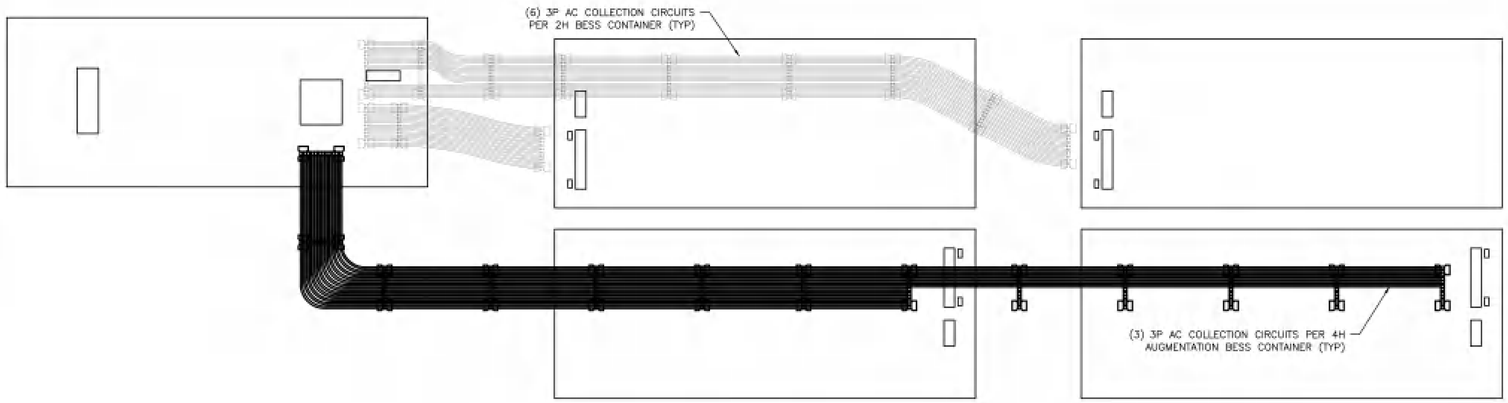


4 TYPICAL AC BATTERY COLLECTION – ONE PCS WITH AUGMENTATION
SCALE: NOT TO SCALE



5 MODIFIED AC BATTERY COLLECTION – PCS-601 WITH AUGMENTATION
SCALE: NOT TO SCALE

NO.	DATE	REVISION DESCRIPTION	ENG CHK
3	08/01/2025	60% ELECTRICAL DESIGN	BA
2	04/25/2025	30% ELECTRICAL DESIGN	BA
1			

ENGINEER:
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RICHARD A. IVING

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PREPARED FOR: LANGAN

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL DETAILS

DRAWING #: E3.100

PLOT DATE: 8/7/2025 9:11 PM

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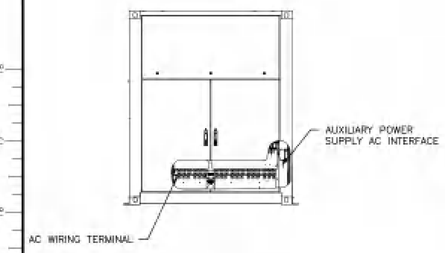
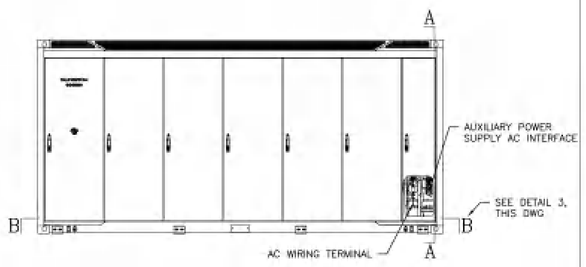
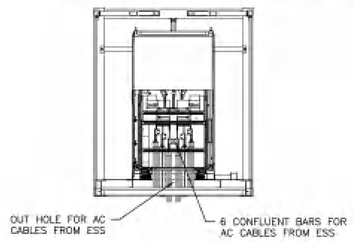


A–A

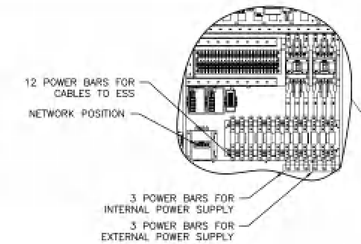


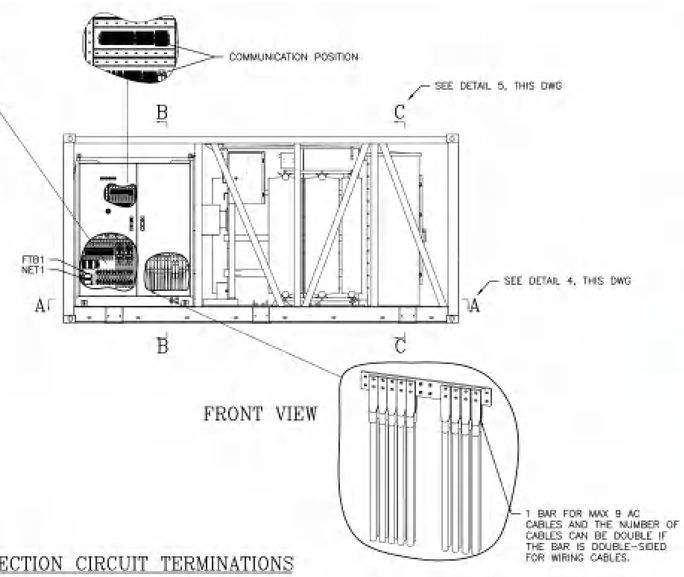
FRONT VIEW

1 SUNGROW STX5015-2H BESS CONTAINER AC COLLECTION CIRCUIT TERMINATIONS
SCALE: NOT TO SCALE



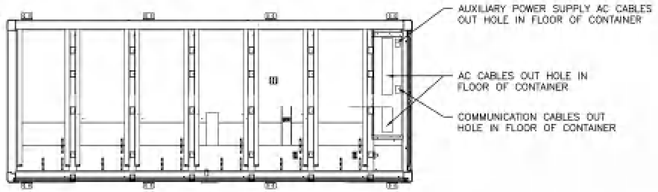
B–B





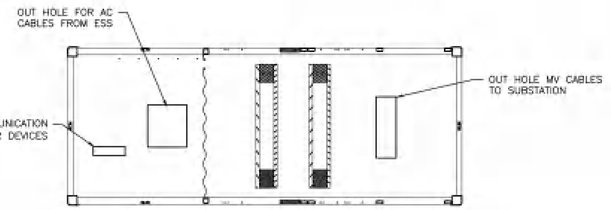
FRONT VIEW

2 SUNGROW MVS5140-LS PCS AC COLLECTION CIRCUIT TERMINATIONS
SCALE: NOT TO SCALE



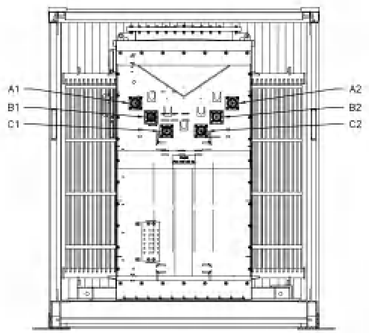
B–B
SEE DETAIL 1, THIS DWG

3 SUNGROW STX5015-2H BESS CONTAINER – BOTTOM VIEW (B–B)
SCALE: NOT TO SCALE



A–A
SEE DETAIL 2, THIS DWG

4 SUNGROW MVS5140-LS PCS – BOTTOM VIEW (A–A)
SCALE: NOT TO SCALE



C–C
SEE DETAIL 2, THIS DWG

5 SUNGROW MVS5140-LS PCS – MV CABINET VIEW (C–C)
SCALE: NOT TO SCALE

NO	DESCRIPTION	DATE	BY	CHK
1	ISSUE ELECTRICAL DESIGN	08/01/2025	BA	AR
2	30% ELECTRICAL DESIGN	11/25/2025	BA	AR

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RICHARD A. IVING

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PREPARED FOR
LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT
CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL DETAILS

DRAWING #: E3.110

PLOT DATE: 8/1/2025 8:13 PM

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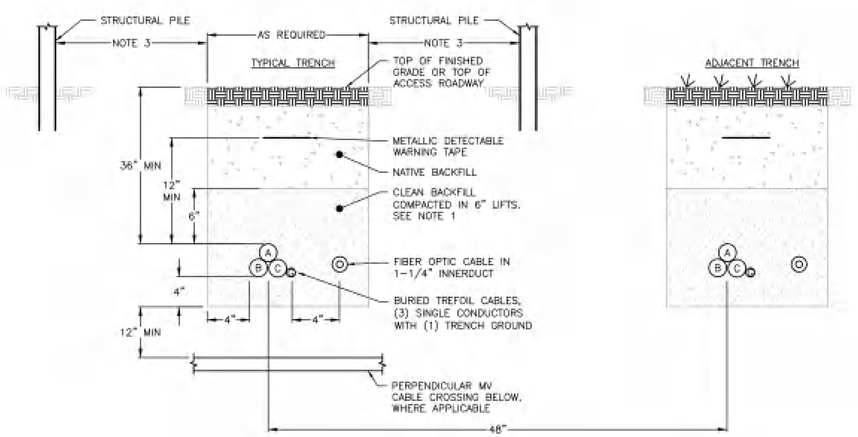
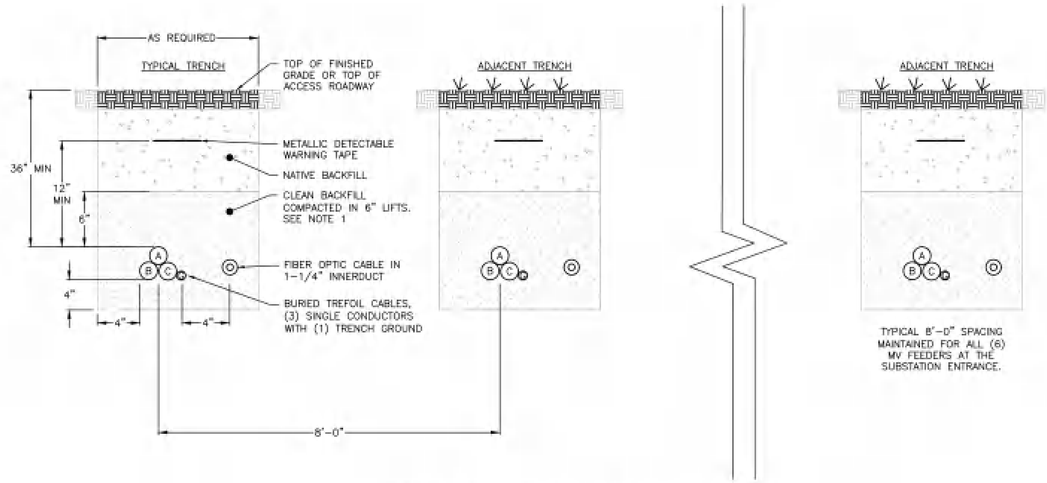


1 TYPICAL MV CONDUCTOR TRENCH
SCALE: NOT TO SCALE



2 MV CONDUCTOR SUBSTATION ENTRANCE
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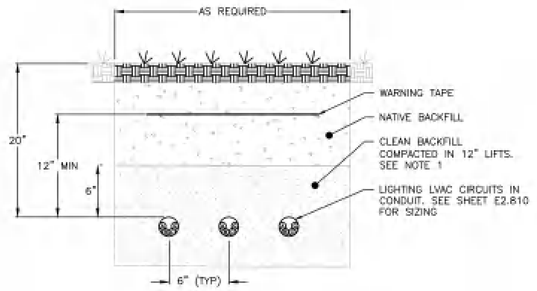

3 TYPICAL LIGHTING LVAC TRENCH
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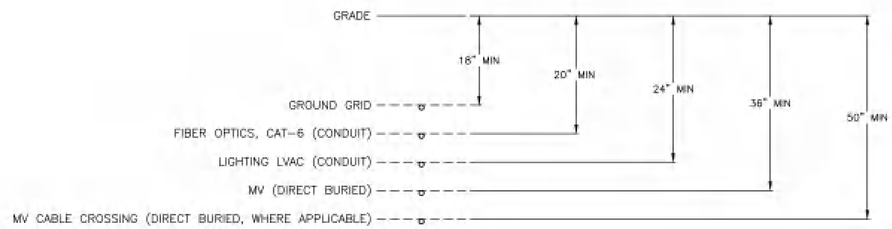

4 TYPICAL CABLE DEPTHS
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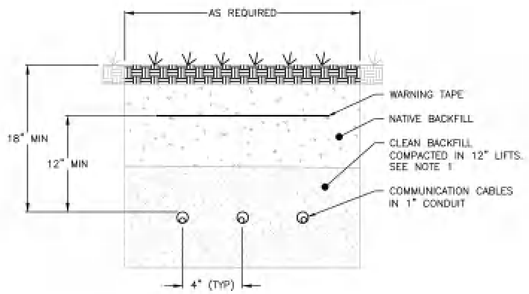

5 TYPICAL COMMS TRENCH
SCALE: NOT TO SCALE

SHEET NOTES:
1. NATIVE BACKFILL CONTAINING NO ROCKS LARGER THAN 3/4", FREE FROM SHARP ANGULAR SUBSTANCES AND ORGANIC MATERIAL. SHALL BE COMPACTED IN THE FOLLOWING MANNER:
   1.1. NON-ROADWAYS: 90% STANDARD PROCTOR
   1.2. ACCESS ROADWAYS: 95% STANDARD PROCTOR BELOW THE STABILIZED SUBGRADE. REFER TO GEOTECHICAL REPORT AND CIVIL DRAWINGS FOR ACCESS ROADWAY CONSTRUCTION REQUIREMENTS.
   1.3. AS AN ALTERNATE, PLOW INSTALLATION IS ALLOWED.
2. WHERE MV CABLE CROSSES ANOTHER OBJECT, ROUTE BELOW AS SHOWN.

NOT FOR CONSTRUCTION

DRAWING TITLE: TRENCH DETAILS

DRAWING #: E3.210

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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NO	DATE	REVISION DESCRIPTION	BY	CHK
1	08/01/2025	60% ELECTRICAL DESIGN	BA	AR
2	10/29/2025	90% ELECTRICAL DESIGN	BA	AR

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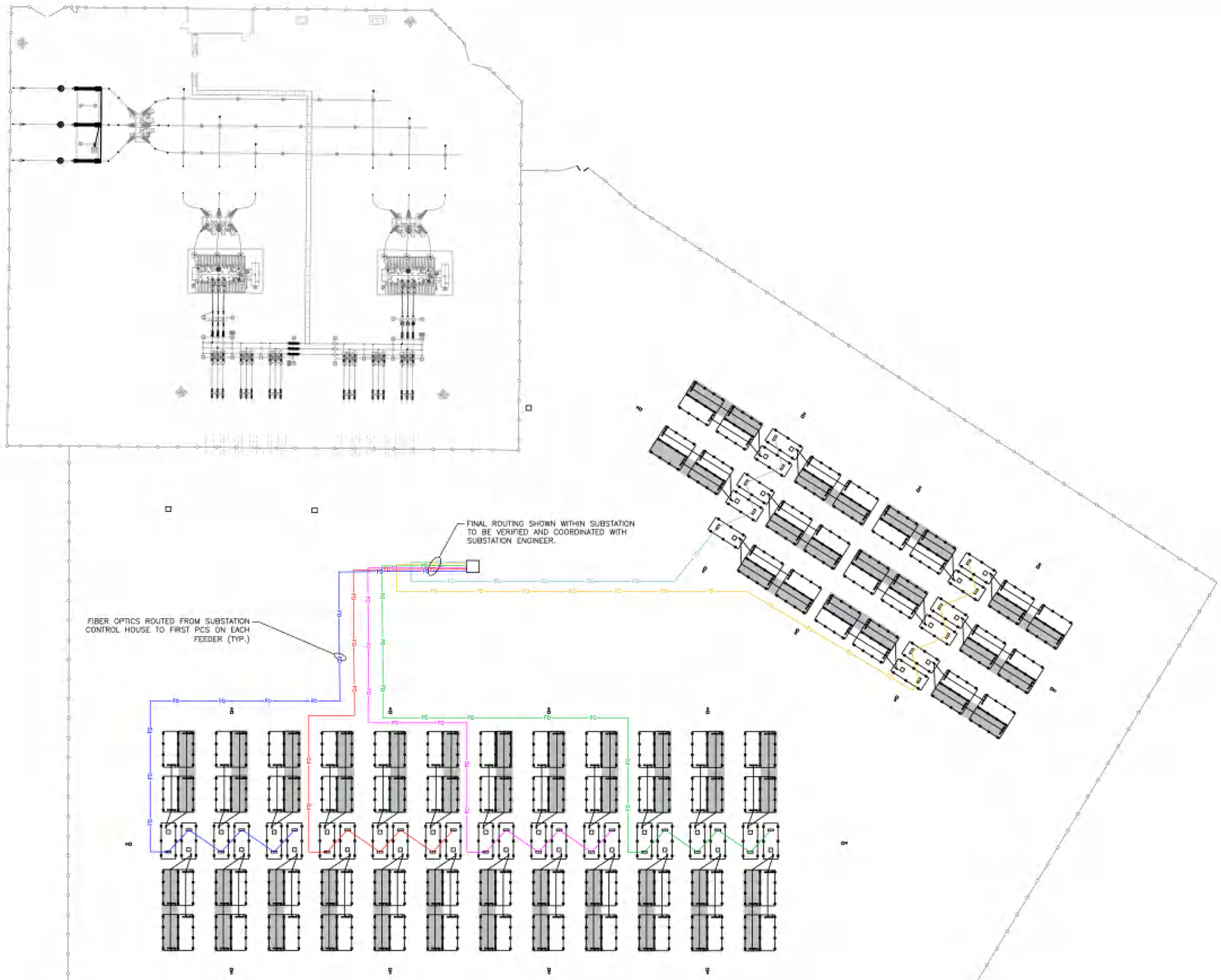

LINETYPE LEGEND

- FENCE
- ACCESS ROAD
- FO — FIBER (SUBSTATION ENTRANCE)
- CAT — ETHERNET (CAT 6)

SYMBOL LEGEND

- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- PULLBOX

1 COMMUNICATIONS SITE PLAN
SCALE: 1" = 30'

NOT FOR CONSTRUCTION

DRAWING TITLE: COMMUNICATIONS SITE PLAN

DRAWING #: E4.000

PM	DWG	CHK
BA	AR	EL
BA	AR	EL

DATE	REVISION DESCRIPTION
05/01/2025	60% ELECTRICAL DESIGN
04/25/2025	30% ELECTRICAL DESIGN

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RICHARD A. IVING

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PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE - TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

RULER IN INCHES

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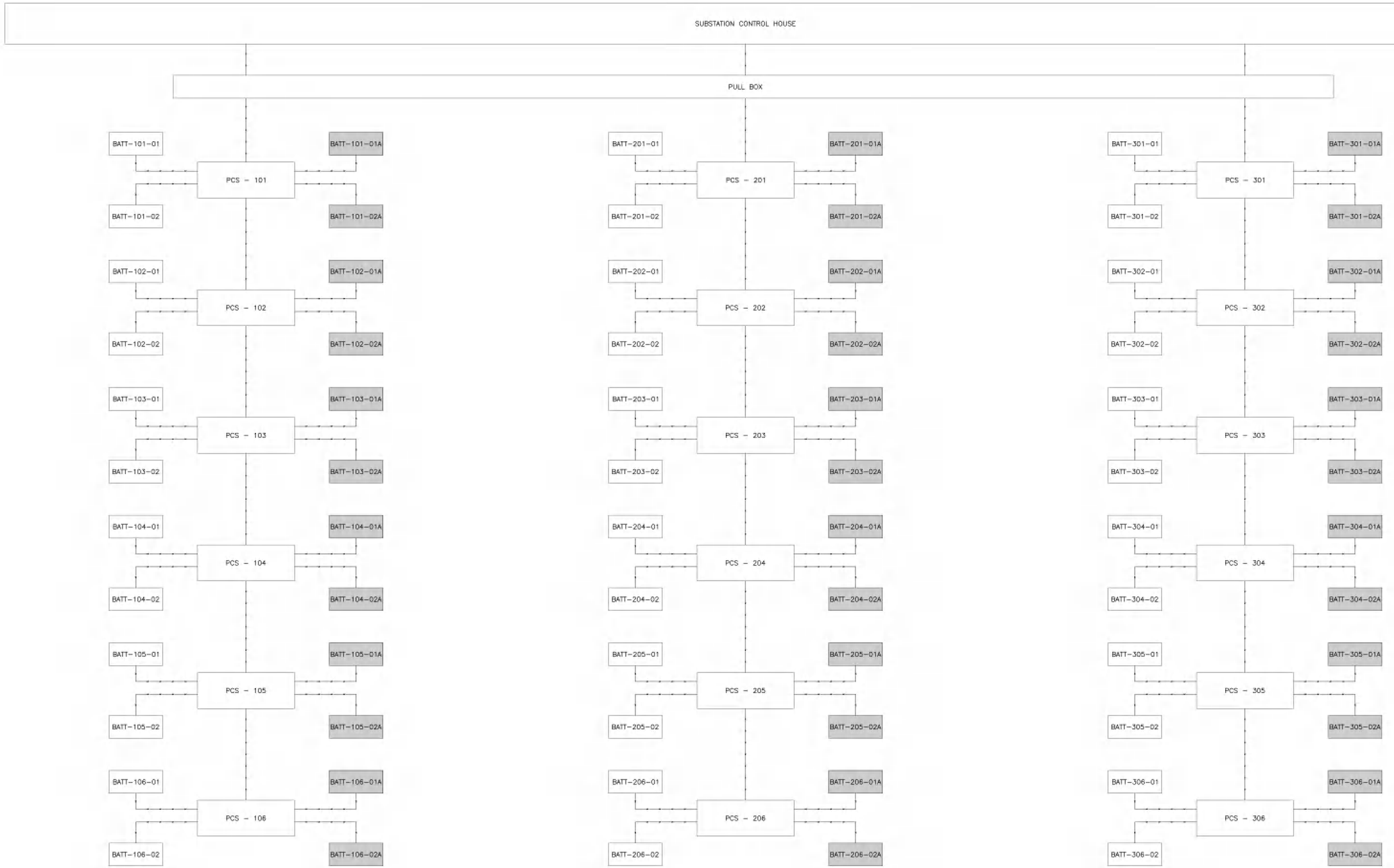

CONDUIT SCHEDULE	
CABLE TYPE	CONDUIT SIZE
FIBER OPTIC	1 1/4"
CAT6	1"

NOTES:
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SYMBOL LEGEND
AUGMENTATION BATTERY HATCHING

LINETYPE LEGEND
FIBER
ETHERNET (CAT 6)

1 COMMUNICATIONS ONELINE DIAGRAM
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DRAWING # E4.010

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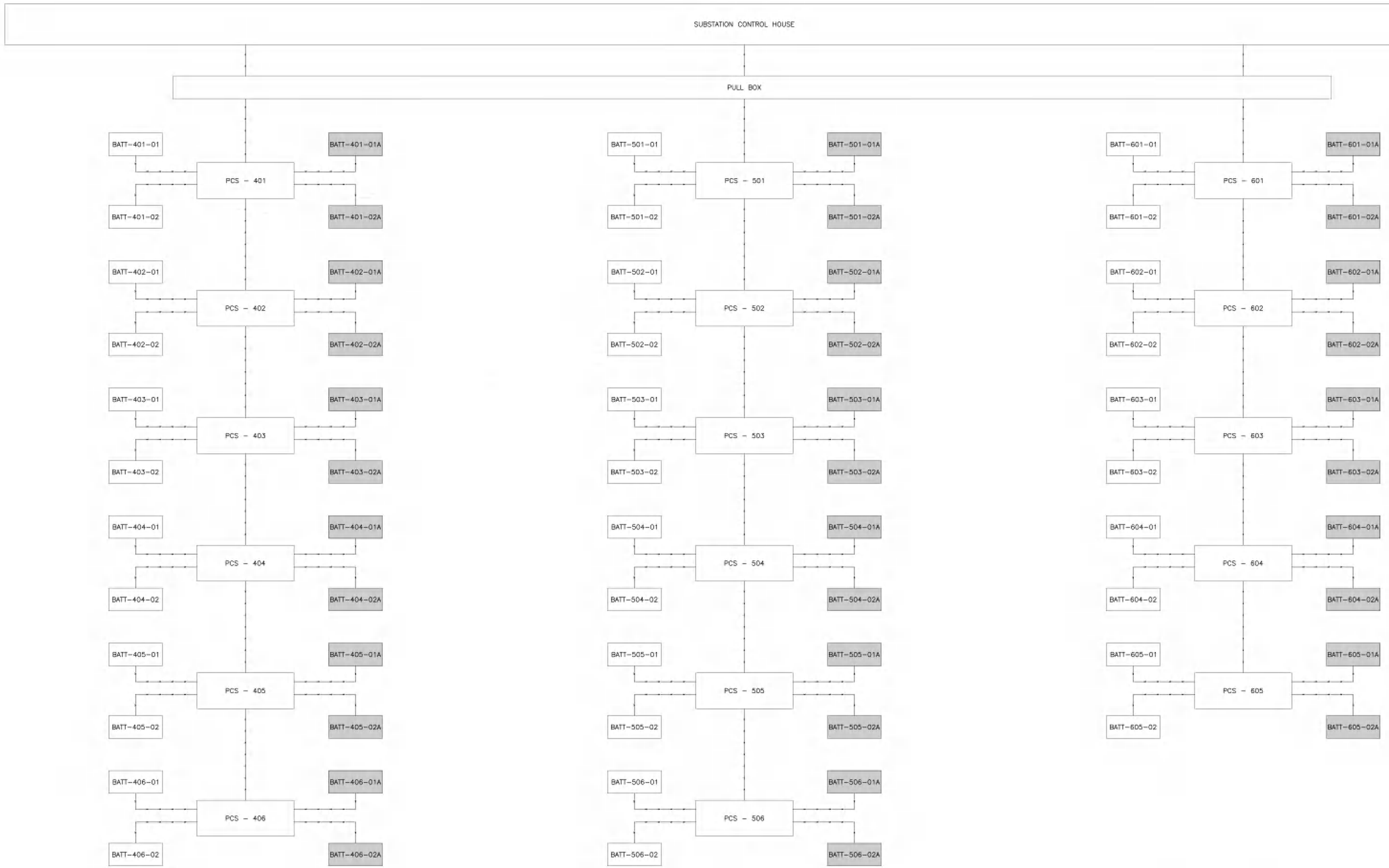

CONDUIT SCHEDULE	
CABLE TYPE	CONDUIT SIZE
FIBER OPTIC	1 1/4"
CAT6	1"

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AUGMENTATION BATTERY HATCHING

LINETYPE LEGEND
FIBER
ETHERNET (CAT 6)

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DRAWING TITLE: COMMUNICATIONS ONELINE DIAGRAM

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8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

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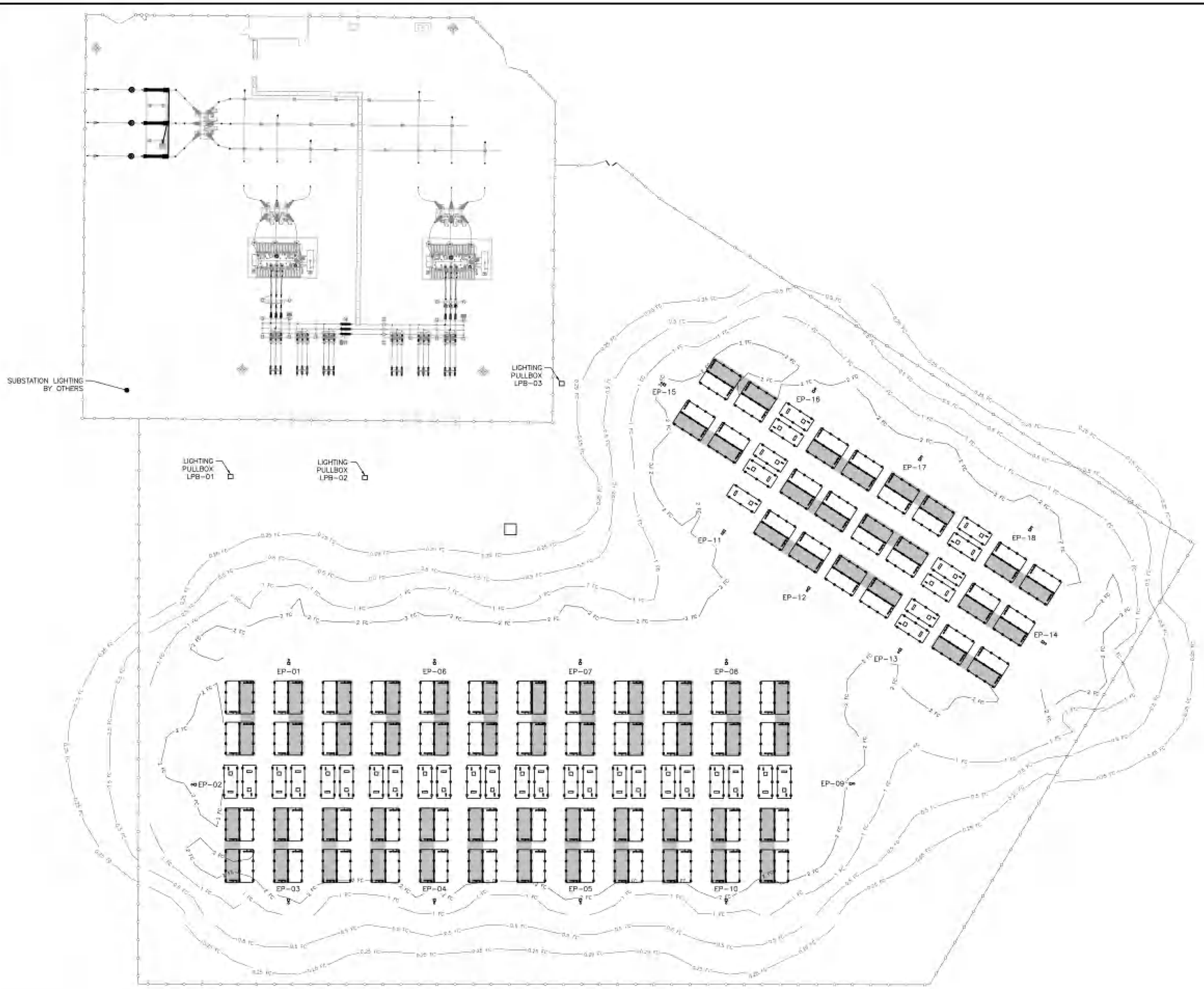

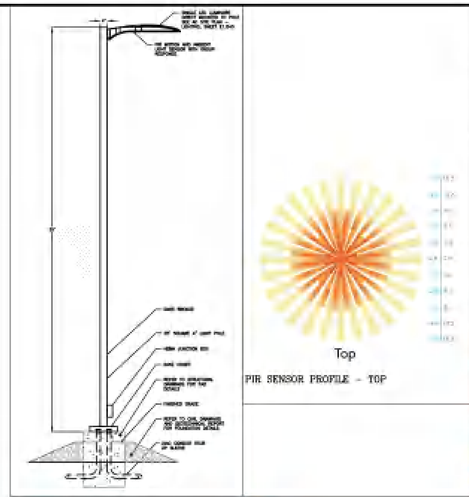

PIR SENSOR PROFILE - TOP

PIR SENSOR PROFILE - SIDE

2 ILLUMINATION EQUIPMENT DETAILS
SCALE: NONE

GENERAL NOTES
1. FOOTCANDLE ILLUMINATION RESULTS MODELED AT GRADE USING ACUITY BRANDS VISUAL LIGHTING SOFTWARE.
2. REFER TO STRUCTURAL PLANS FOR PAD DETAILS.
3. REFER TO CIVIL DRAWINGS FOR ALL GRADING.

LINETYPE LEGEND
- FENCE
- ACCESS ROAD
- xx FC CONTOUR AT XX FOOTCANDLES

SYMBOL LEGEND
- MV TRANSFORMER
- TYPICAL BATTERY CONTAINER SKID
- AUGMENTATION EQUIPMENT
- POLE MOUNTED LIGHT FIXTURE
- PULLBOX

1 ILLUMINATION SITE PLAN
SCALE: 1" = 30'

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DRAWING TITLE: ILLUMINATION SITE PLAN

DRAWING #: E4.200

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

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PROJECT #: TX-PS-2701

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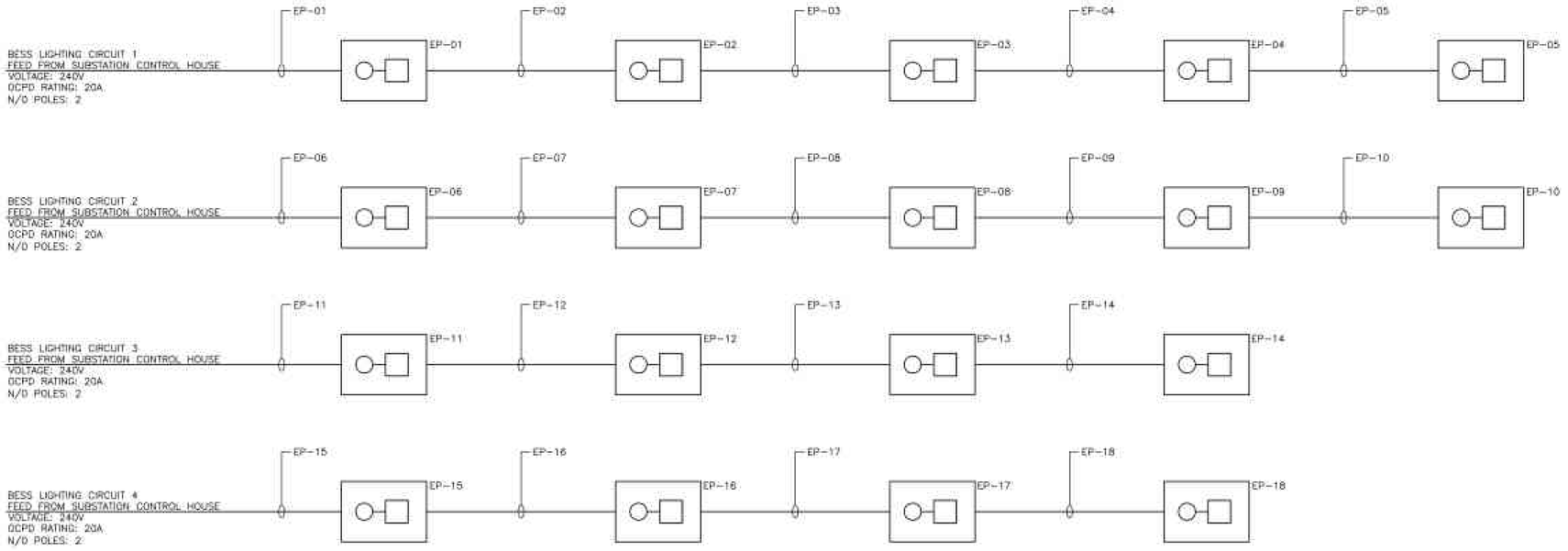

1 ILLUMINATION WIRING SCHEMATICS
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DRAWING TITLE: ILLUMINATION WIRING SCHEMATICS

DRAWING #: E4.201

PROJECT: BATTERY ENERGY STORAGE SYSTEM AT CHISME STORAGE – TX-PS-2703
8987 CR 268
BROWN AND MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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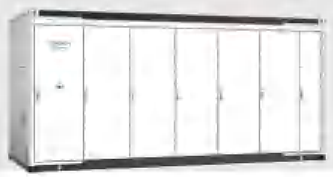
ST5015UX-2H-US
ST5015UX-4H-US

PowerTitan 2.0 Liquid Cooled Energy Storage System

NEW



OPTIMAL COST

- Increased liquid cooled temperature control system
- Maximizing energy conservation
- Pre-assembled, modular design for the entire equipment compact system

SAFE AND RELIABLE

- Each module is assessed and evaluated for its safety and reliability performance
- The electrical cabinet and battery cabinet are equipped with explosion-proof valves

EFFICIENT AND FLEXIBLE

- High efficiency and adjustable, flexible setting the grid system discharge capacity
- Multi-level fault detection design, identification, health to cell level alarms
- Function electrically limited on-site work, remote communication possible

CONVENIENT O&M

- One-click system upgrade
- Automatic pressure refilling design
- Cloud intelligent monitoring

MVS5140-LS-US

MV Turnkey Solution for PowerTitan 2.0 MVS Liquid Cooling Energy Storage System

NEW

Power Rating	5140kW/10280kWh
Battery Module	314Ah
Battery Configuration	1P52S
Battery Energy	10280kWh
Battery Cell	LFP
Battery Module Quantity	40
Battery Module Energy	257kWh
Battery Module Dimensions (W*D*H)	1300*1100*2256mm
Battery Module Weight	2800kg
Battery Rack Quantity	4
Battery Rack Energy	2570kWh
Battery Rack Dimensions (W*D*H)	1300*1100*2256mm
Battery Rack Weight	2800kg
Battery Cluster Quantity	1
Battery Cluster Energy	10280kWh
Battery Cluster Dimensions (W*D*H)	6058*2896*2438mm
Battery Cluster Weight	44000kg
Battery Cluster Protection Level	IP55
Battery Cluster Cooling Method	Liquid Cooling
Battery Cluster Fire Protection	Aerosol+Water Mist
Battery Cluster Communication	RS485/CAN
PCS Quantity	2
PCS Power	2570kW
PCS Dimensions (W*D*H)	1300*1100*2256mm
PCS Weight	2800kg
PCS Protection Level	IP55
PCS Cooling Method	Liquid Cooling
PCS Communication	RS485/CAN
MV Transformer Capacity	5140kVA
MV Transformer Dimensions (W*D*H)	6058*2896*2438mm
MV Transformer Weight	15000kg
MV Transformer Protection Level	IP55
MV Transformer Cooling Method	Liquid Cooling
MV Transformer Primary Voltage	35kV
MV Transformer Secondary Voltage	0.8kV
MV Transformer Vector Group	Dyn11
MV Transformer Impedance	8%
MV Transformer Tap Range	±2*2.5%
MV Transformer Temperature Rise	65K
MV Transformer Insulation Class	F
MV Transformer Noise	75dB
MV Transformer Efficiency	99.5%
MV Transformer Frequency	50/60Hz
MV Transformer Phase	3

PURE POWER ENGINEERING, INC.
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HOBOKEN, NJ 07030

SHORT CIRCUIT STUDY
FOR
CHISME STORAGE – TX-PS-2701
8987 CR 268
BROWN AND MILLS COUNTY, TX
31.578332°, -98.834972°
AUGUST 1, 2025

PRELIMINARY

Pure Power Engineering Project Number: 11055

Project Owner/EPC: Red River Clean Energy

Study commissioned by (Client): Langan

Revision History

Date	Revision Description	PM	ENG	CHK
08/01/2025	60% Preliminary Issuance	BA	CS	EL

PRELIMINARY

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PRELIMINARY

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Appendix B – Short Circuit Single Line Diagrams

Appendix C – Short Circuit Report

Appendix D – MV Cable Withstand Calculation

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1 INTRODUCTION

1.1 SUMMARY

The results of the short circuit analysis indicate that the MV cable capacity is suitable for the installation. The maximum 3PH fault current at the MV terminals of the PCS equipment and MV terminals of the inverters in the system is less than the rating of the PCS equipment, therefore all inverters are acceptable for use.

The Project is a 176.00 MWac/ 351.05 MWh battery energy storage system (BESS) facility with a 345.0 MVAc point of interconnection (POI) 4mH. The facility consists of the following equipment.

Major BESS System Equipment List						
Equipment	Make	Model	Quantity	Duration (Hours)	Power Output (MW)	Energy Capacity (MWh)
Battery	Sungrow	5150.15kWh-[5000.6V-2h	70	2	2.5	5.015
MV Skid	Sungrow	MVS6340-LS	35	n/a	n/a	n/a

Table 1.1

The Facility utilizes a 34.5 kV collector system with direct buried medium voltage (MV) feeders. The medium voltage transformers for each PCS are connected to the high-voltage substation via six 34.5 kV underground distribution circuits. The distribution circuits are connected to the high-voltage substation via six 34.5 kV circuit breakers.

The current model is focused solely on the BESS design. At this stage, the PV system is modeled as [illegible] power sources at each of the dedicated substation switches. This simplified representation allows for the project to progress with BESS design analysis while the detailed PV design is being finalized. Once the final PV design package is completed, the model will be updated to incorporate the full PV system. This phased approach ensures the study reflects the as-designed configuration while supporting project continuity.

Applicable electrical code: National Electrical Code (NEC) 2020 Edition

1.2 BACKGROUND AND SCOPE

The scope of this study is to identify the maximum available fault currents throughout the facility. This includes medium voltage cables, major electrical equipment, auxiliary systems*, and low voltage power distribution. This study, along with the Cable Ampacity study, identify the minimum required MV cable specifications.

The results of this study are used to ensure equipment has been selected to withstand the calculated fault current levels and to ensure that the MV cable shield and concentric neutral conductors can withstand these currents. Additionally, these results are consistent with the thermal and ampacity study.

*Ancillary or other equipment included within a skid or other assembly provided by others (ie Power Conversion Unit, PCS), is excluded from the scope of this study. Ratings for the equipment shall be provided by the manufacturer of the assembly or integrator and compared to the results of this study.

2 METHODOLOGY

This section discusses the inputs required to model the system, the source of the inputs, and how the inputs impact the results. The information in this section is for descriptive purposes only and does not reflect the inputs to the project in this report. Refer to Section 3 for details specific to this project.

2.1 SOFTWARE

The system was modeled in Etap version 24 by Operation Technology, Inc.

2.2 UTILITY FAULT CURRENT CONTRIBUTION

The basis of a short circuit study is the available fault current provided by the utility. This is usually given at the high voltage side of the substation at the utility point of common coupling (PCCC) and can be supplied by the utility or the substation engineer. It is modeled in Etap using the utility component.

2.3 HIGH-VOLTAGE SUBSTATION DESIGN

The HV substation design is by others however, key elements are included in the ETAP system model so the model needs to include all the electrical components up to the utility PCCC.

2.3.1 Fault Protection Clearing Time

The MV cable withstand evaluation is based on the fault clearing time of the HV overcurrent protective devices in the substation. This data is provided by the HV substation design engineer. Increasing the fault clearing time will result in lower cable withstand evaluations.

2.3.2 Main Power Transformer (MPT)

The substation MPT model is required for the short circuit study model. This data is provided by the HV substation design engineer.

2.3.3 Neutral Ground Reactor (NGR)

An NGR in the MPT neutral to ground bond may be recommended by the analyzer or specified by the HV engineer for a project to reduce the ground fault current.

2.4 POWER CONVERSION SYSTEMS (PCS)

2.4.1 Inverter Short Circuit Contribution

The inverter short circuit contribution may be different for the equipment evaluation and for the cable withstand evaluation. The inverter short circuit currents are provided by the manufacturer. The time the inverter requires to reach steady-state short circuit current is typically much faster than the trip time of an OCPD.

The ground fault current contribution to the MV distribution by the inverters also depends on the PCS MV transformer winding and grounding configuration as some topologies do not pass ground fault current.

2.4.2 PCS Medium Voltage Transformer (GSU)

The PCS GSU wiring configuration will determine if it will source ground fault current. The following is a summation of the possible options:

The inverter can contribute to a three-line fault on the MV side with any winding configuration.

2.5 OVERHEAD DISTRIBUTION SYSTEM

If an overhead power distribution system is part of the project the circuits are included in the model to model the fault current flow in the system. The overhead conductors may or may not be evaluated for short circuit capacity depending on the scope of the study.

2.6 MV CABLE WITHSTAND RATING

To evaluate the MV cable withstand rating the following data is required:

- Available fault current to the MV conductor
- Phase conductor and concentric neutral (CN) conductor withstand ratings
- Fault clearing time
- Split factor of the fault current between the CN and trench ground conductor current paths. If trench ground conductor is not used
- Capacity allowance to allow for a future increase in the fault current

The MV cable manufacturer provides the withstand rating values for the phase and CN conductors based on the cable size, CN size, and the fault clearing time.

The split factor is the percentage of the fault current carried by the CN during a line to ground fault. The values typically used are as follows:

- Trench ground conductor absent – 100% of the fault current on the CN
- Trench ground conductor present – 70% of the fault current on the CN, 30% on the trench ground

The capacity factor is used to add a buffer to the fault current capacity of the MV cables in anticipation of future increases in the utility fault contribution. The utility fault contribution includes a 15% growth factor to account for future system upgrades. As a result, the minimum capacity factor applied is 100%.

Etap is used to calculate the three-phase fault and single line-to-ground fault currents at each MV cable in the system. The ratio of the MV cable withstand rating (both phase conductor and CN) to the fault current needs to be equal to or greater than the chosen capacity factor for the cable to pass.

2.7 EQUIPMENT SCCR

Etap can also compute the available fault current at the terminals of equipment in the project. If the SCCR or AIC rating of the equipment is known, then the equipment can be evaluated on a pass/fail basis.

3 STUDY MODEL

3.1 ENGINEERING DESIGN INPUT

The following engineering documents are used as the basis for the Etap model in this study.

Pure Power Engineering electrical design 2025-08-01 Chisme BESS – 60% Design dated 08/01/2025

Quanta substation design: *Rio d Chisme Solar & Storage – TX PS 2701 345/34.5kV Substation* dated 12/11/2024 and 03/12/2025

Oncor short circuit study, titled *Chisme Solar & Storage Generation Interconnection Short Circuit Study – 24INR0393 & 24INR0882*, dated 02/28/2024

Note: the above referenced substation design represents the latest available version from the substation engineer, however that does not imply that the contents of the report reflect the most current design

3.2 UTILITY CONTRIBUTION

Per information provided by the utility, the following utility contribution information is used at the 345 kV point of interconnection:

- Service voltage: 345 kV
- 3 Phase short-circuit current: 12,795.1 A
- 1 Phase short-circuit current: 9,191.7 A

A growth factor of 15% is applied, resulting in the following adjusted values:

- 3 Phase short-circuit current: 14,714.4 A
- 1 Phase short-circuit current: 10,570.5 A

The X/R ratio values are as follows:

- Positive-sequence impedance X/R: 38.903
- Zero-sequence impedance X/R: 7.937

The utility contribution details shown in Appendix E.

3.3 HIGH VOLTAGE SUBSTATION DESIGN

3.3.1 Fault Protection Clearing Time

Per discussion with the substation engineer, a clearing time of 18 cycles has been assumed for this analysis. Final coordination is pending and subject to confirmation.

3.3.2 Main Power Transformer

Per the HV substation one-line diagram, there will be two 120/160/200 MVA MPTs designated as 'T1' and 'T2'.

Per information provided by the transformer manufacturer, the MPTs is modeled as shown in Figures 3.3.2-1, 3.3.2-2, and 3.3.2-3. Both MPTs are modeled the same.

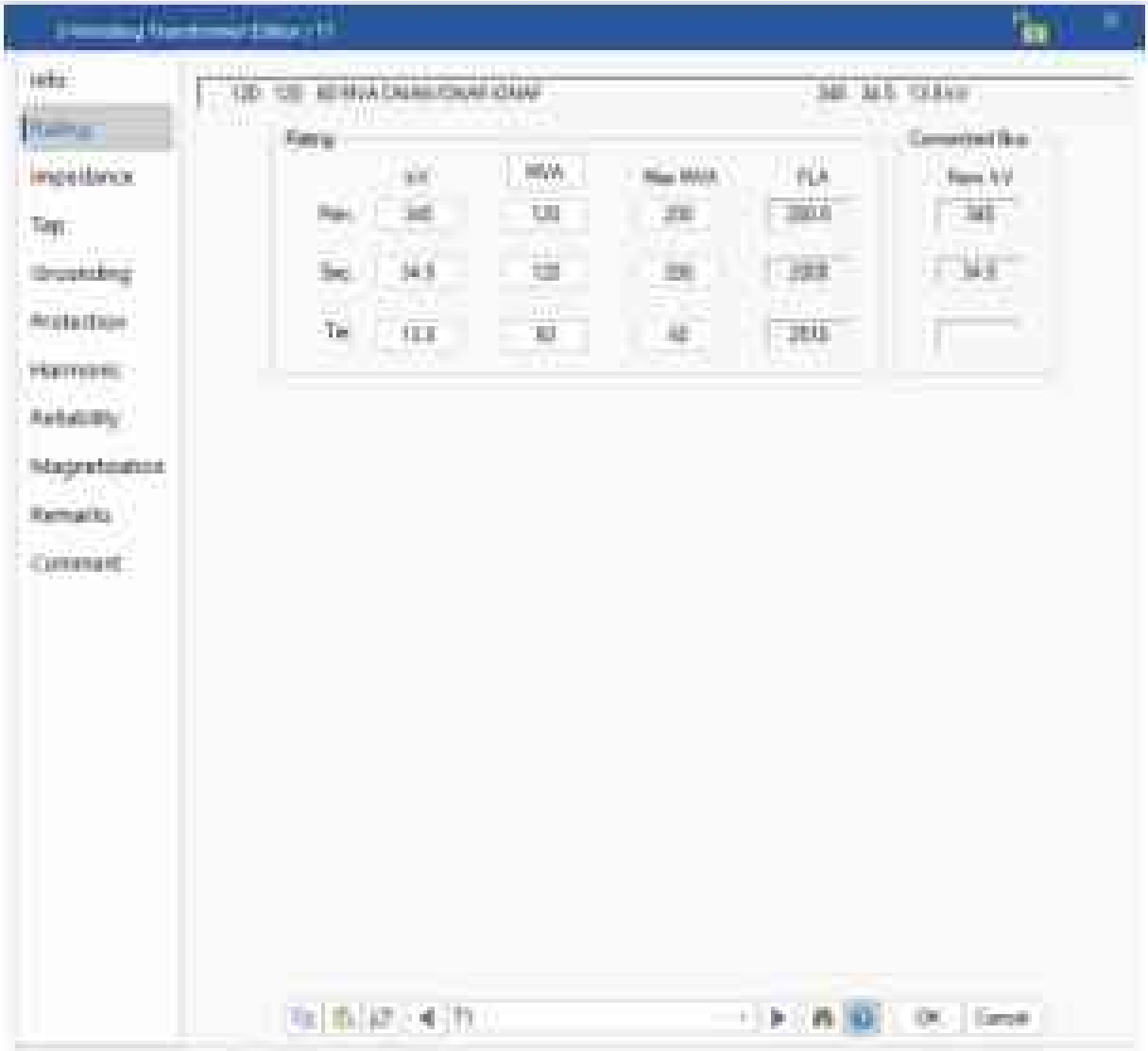


Figure 3.2.2-1: MPT Rating

PRE

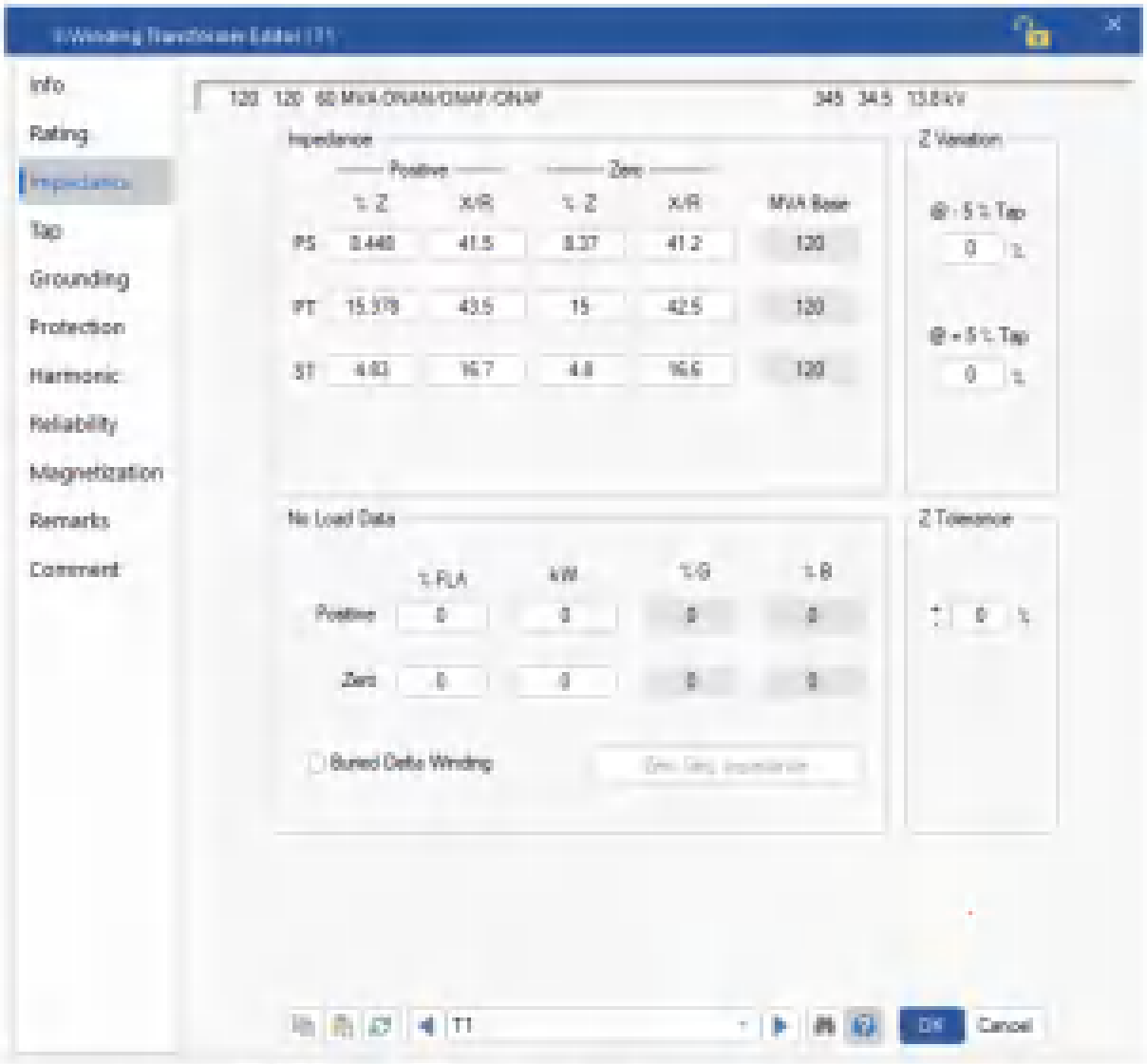


Figure 3.2.2-2: MPT Impedance

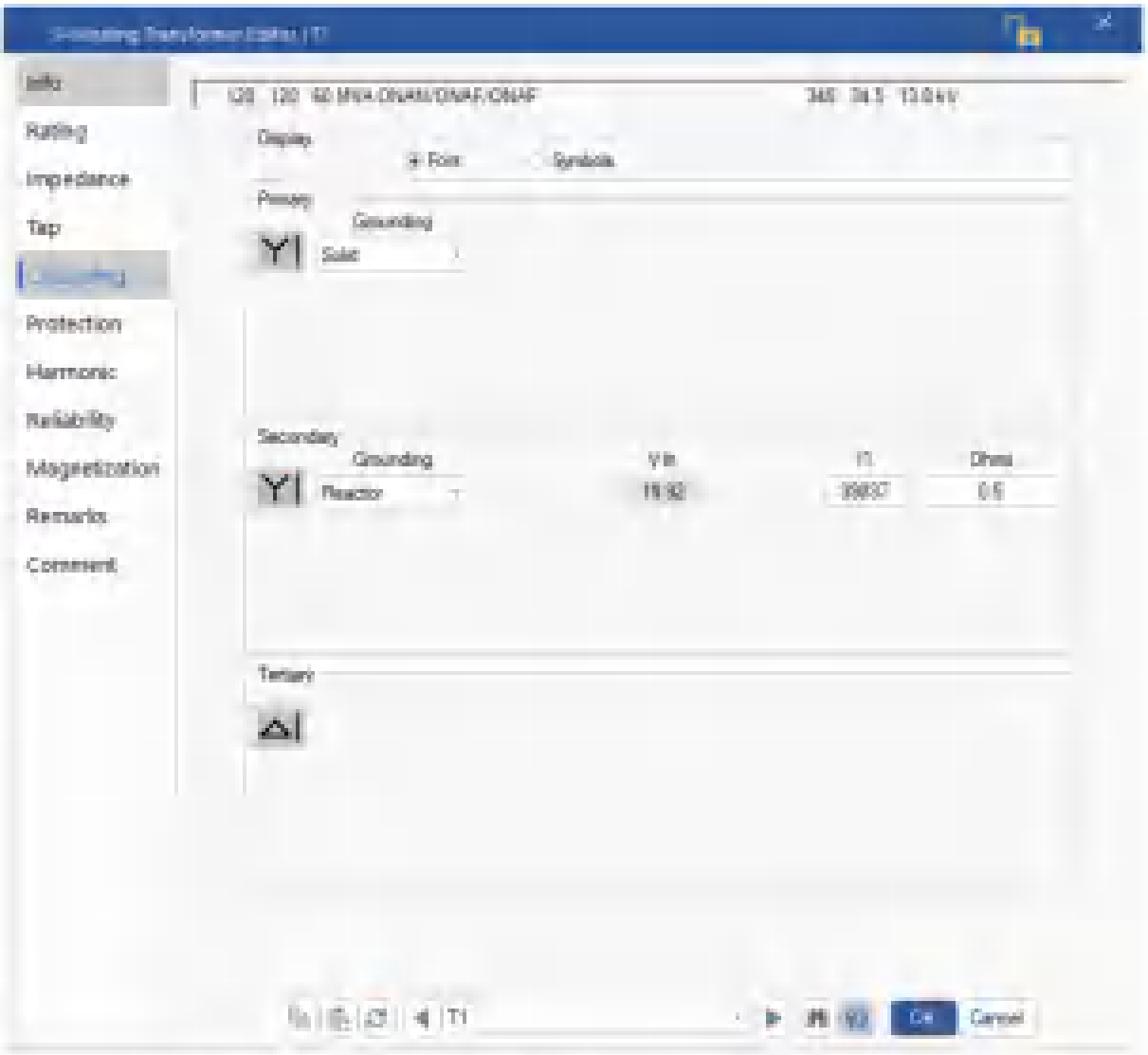


Figure 3.2.2-3: MPT Grounding with NGR

As per the Qualus document titled *34.5 kV Neutral Grounding Reactor Technical Specification 24144-01-ES-NGR*, dated 04/11/2025, a 0.5-ohm NGR is to be installed at each MPT. Therefore, NGRs have been modeled in the system as shown in Figure 3.2.2-3 above. The document also notes that the ratings are to be confirmed. Final coordination is pending and subject to confirmation.

3.4 POWER CONVERSION SYSTEMS

3.4.1 Inverter Short Circuit Contribution

The steady-state fault contribution is used for evaluating the cable withstand capability while the peak short-circuit contribution is used for the equipment evaluation. The BESS inverter short-circuit contribution values are based on the *Sungrow Short-Circuit Current SC2.0MW-US* document.

The BESS inverter's three-phase-steady-state short-circuit current is approximately 1.24 per unit (217 A per inverter). The inverter reaches this steady-state fault current in 50 ms. With 12 inverter modules in the PCS, the total modeled short-circuit current input is 2,615 A. This value is used for the inverter cable withstand evaluation, as shown in Figure 3.3.1-1.

The BESS inverter's peak short-circuit current is approximately 2.47 per unit (433 A per inverter), resulting in a total of approximately 5,196 A for the PCS. This value is used for the inverter equipment evaluation, as shown in Figure 3.3.1-2.

The PV inverter short-circuit contribution values are based on *Modeling of SUNGROW SG440CUD PV Inverter for Short Circuit Studies in Aspen OneLiner®* document. The PV inverter's three-phase steady-state short-circuit current is approximately 1.06 per unit. The inverter reaches this steady-state fault current in 70 ms. For each PCS, the total modeled short-circuit current input is 8,225 A. The inverter's peak short-circuit current is approximately 2.20 per unit, resulting in a total of approximately 8,905 A for the PCS.

The source document's used for modeling the BESS and PV inverter short-circuit contributions are provided in Appendix A.

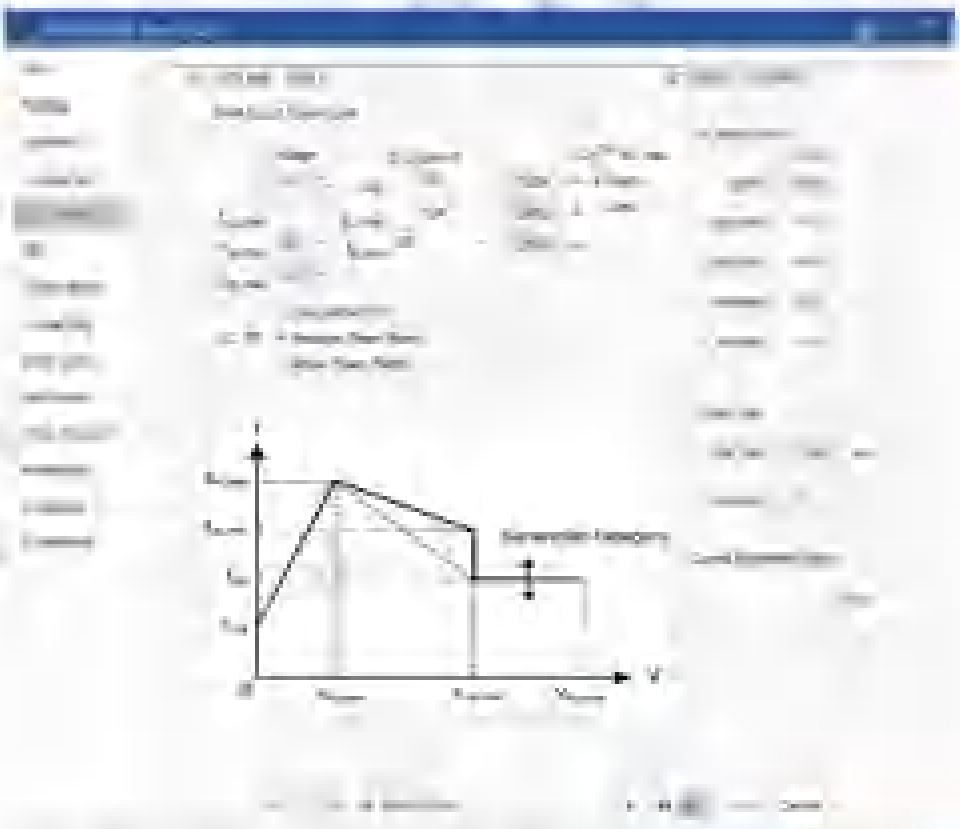


Figure 3.3.1-1: BESS Inverter Short Circuit Model, Steady State

Figure 3.3.1-2: BESS Inverter Short Circuit Model, Peak

3.4.2 PCS Medium Voltage Transformer

The impedance data provided by the inverter manufacturer was used to model all PCS GSU transformers. The positive-sequence impedance was entered directly into the model. While values are also entered for zero-sequence impedance, the transformers are configured as delta-ungrounded wye in Etap, as shown in the Impedance and Grounding tabs (Figures 3.3.2-1 and 3.3.2-2, respectively). For ungrounded transformers, the zero-sequence impedance is considered infinite. As a result, Etap blocks any data entered in the zero-sequence fields, effectively treating the zero-sequence impedance as infinite. This modeling approach is consistent with the configuration specified in the Grounding tab

Figure 3.3.2-1: GSU Impedance

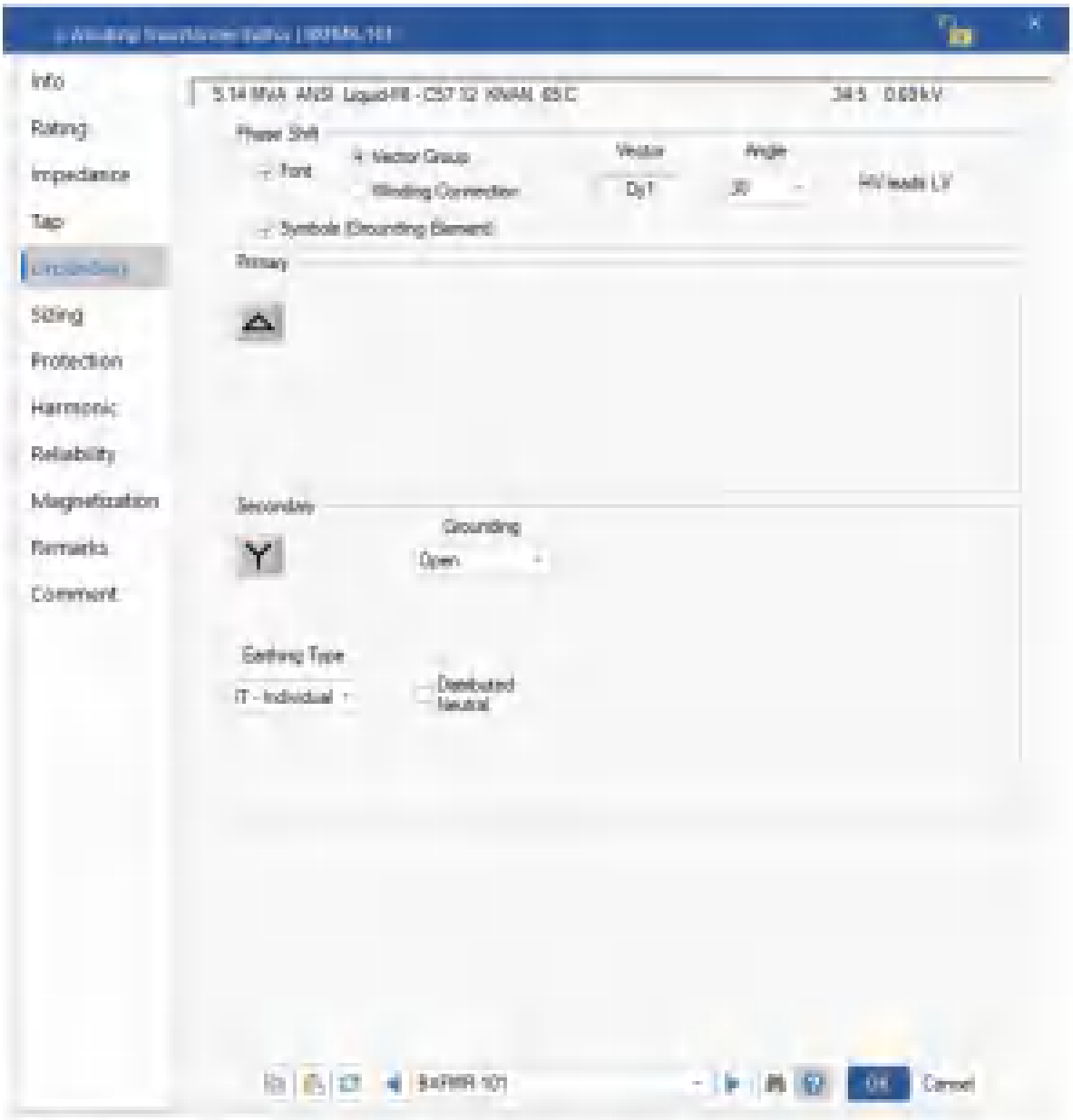


Figure 3.3.2-2: GSU Grounding

3.5 MV CABLE

The MV cable withstand data is provided by the manufacturer and shown in Appendix A. Since the L-G fault current values are in excess of the CN withstand ratings for all feeders, a trench ground is required.

3.6 EQUIPMENT SCCR

The PCS SCCR data is provided by the manufacturer and shown in Appendix A.

4 STUDY RESULTS AND CONCLUSIONS

4.1 MV CABLE WITHSTAND RATING EVALUATION

All the MV feeders pass the evaluation in the study. The results for each feeder and MV cable are shown in Appendix C.

The final determination of the MV cable vendor for this project has not been made for the time report, but the newer WTEC cables will be utilized. Refer to Appendix A for the cable datasheets.

The worst-case short-circuit currents for each cable phase and the circuit arrangement are shown in Table 4.1-1 and 4.1-2.

Cable ID	Cable Size	Concentric Neutral (CN) Size	Total Fault Clearing Time (cycles)	Cable Withstand Rating (A)	3-PH Short Circuit Current (A)
MVF-BES-40L	1250	1/0	18	109,108	13,875
MVF-BES-402	1000	1/0	18	87,287	22,351
MVF-BES-605	500	1/3	18	48,443	12,800

Table 4.1-1: Worst-Case Cable 3-Phase Short-Circuit Currents

Cable ID	Cable Size	Concentric Neutral (CN) Size	Total Fault Clearing Time (cycles)	Cable Withstand Rating (A)	L-G Short Circuit Current (A)*
MVF-BES-40L	1250	1/0	18	94,861	16,340
MVF-BES-402	1000	1/0	18	91,531	16,277
MVF-BES-502	500	1/3	18	71,671	16,226

Table 4.1-2: Worst-Case Cable L-G Short-Circuit Currents

*SLG Short Circuit Current assumes a 70/30 split factor per section 3.6 and 3.5

4.2 EQUIPMENT SCCR AND AS EVALUATION

The maximum three-phase fault current at any MV terminal in the system is 24.130 kA at 34.5 kV (PCS-8801) which is less than the 25 kA SCCR of the PCS equipment skid. As the maximum peak current is less than the rating provided by the inverter manufacturer, the inverters are acceptable for use.

The maximum calculated peak current is close to the maximum allowance of 25 kA. The following items will need to be monitored to ensure the fault current at PCS-8801 does not exceed this limit:

- Initial MPT impedance. This will be surveyed via the FAT. The FAT report should be reviewed to verify the value that was used.
- Utility fault current. For coordination a 15% power factor is being utilized. Any future increase in fault current from the utility beyond this allowance should be communicated to the owner for evaluation throughout the life of the facility.
- Conductor installation lengths. Any deviation to the installed MV conductor lengths for the PCS system as shown in the drawings shall be submitted to the engineer for review prior to installation.

Per the inverter manufacturer's document titled *TR_ST5015UX Short Circuit Study Report for Sungrow Energy Storage System V1* dated 04/14/2024, the battery containers are protected by dedicated OCPDs. These devices are identified as Main QF1 and Main QF2 and are shown on page 17 of the report. The OCPDs have an interrupting rating of 75 kA which is represented by the identifier SCC QF1 on page 15. Based on this, it is assumed that the battery containers downstream of these OCPDs have a SCCR of 75 kA.

The maximum three-phase fault current at any of the battery containers in the system is 55.487 kA at 690 V (BATT-401-01) which is less than the 75 kA SCCR of the battery container. As the maximum peak current is less than the rating provided by the inverter manufacturer, the battery containers are acceptable for use.

4.3 CONCLUSION

This study shows that the equipment short circuit current ratings and the cable withstand ratings pass review in this study and are suitable for this project.

PRELIMINARY

Etap Modeling Note:

The current model is primarily focused on the BESS design. The PV system is currently represented as equivalent power sources at each of the dedicated switches within the substation. Upon delivery of the 60% PV design package, Pure Power Engineering will update the model to incorporate the full, detailed PV design. This approach allows the project to progress in parallel while ensuring the final model accurately reflects the as-designed PV system.

PRELIMINARY

APPENDIX A – EQUIPMENT DATA

PRELIMINARY

MPT DATA

Date: 4/1/2025
Project Name: Chisme Solar & Storage - TX-PS-2701
Project Number: PPE-11055
Client: Red River

Main Power Transformer Data

Transformer Name:	T1	
Cooling:	ONAN/ONAF/ONAF	
MVA Ratings:	120/160/200	MVA
H Winding - High Voltage:	345V Wye-G	
X Winding - Low Voltage:	34.5V Wye-G	
Y Winding - Tertiary:	13.8D	
Tertiary MVA Rating:	30	MVA
On Load Tap Changer:	+10% / -10%, 16 step	
H-X MVA Base:	200	MVA
H - X positive sequence impedance:	9.448	%
H - X positive sequence X/R value:	83.9	
H - X zero sequence impedance:	8.57	%
H - X zero sequence X/R value:	43.2	
H-X MVA Base:	200	MVA
H - Y positive sequence impedance:	15.378	%
H - Y positive sequence X/R value:	43.1	
H - Y zero sequence impedance:	15	%
H - Y zero sequence X/R value:	42.6	
Y MVA Base:	30	MVA
X - Y positive sequence impedance:	6.61	%
X - Y positive sequence X/R value:	19.7	
X - Y zero sequence impedance:	4.8	%
X - Y zero sequence X/R value:	16.8	

INVERTER GSU
TRRANSFORMER DATA

Date	4/1/2025
Project Name	**Chisme Solar & Storage - TX-PS-2701**
Project Number	**PPE-11055**
Client	**Red River**

Inverter GSU Transformer Data		
Transformer Name:	T1-BESS	
Cooling:	KNAN	
MVA Ratings:	5.14	MVA
H Winding - High Voltage:	34.5 kV Delta	
X Winding - Low Voltage:	.69GKV Wye	
Tap Changer:	+5% / -5%, 5 step	
H-X MVA Base	5.14	MVA
H - X positive sequence impedance:	8.85	%
H - X positive sequence X/R value:	10.16	
H - X zero sequence impedance:	Infinity	%
H - X zero sequence X/R value:	Infinity	

MV CABLE DATASHEETS

WTEC
Energy Innovation

SHORT CIRCUIT PERFORMANCE

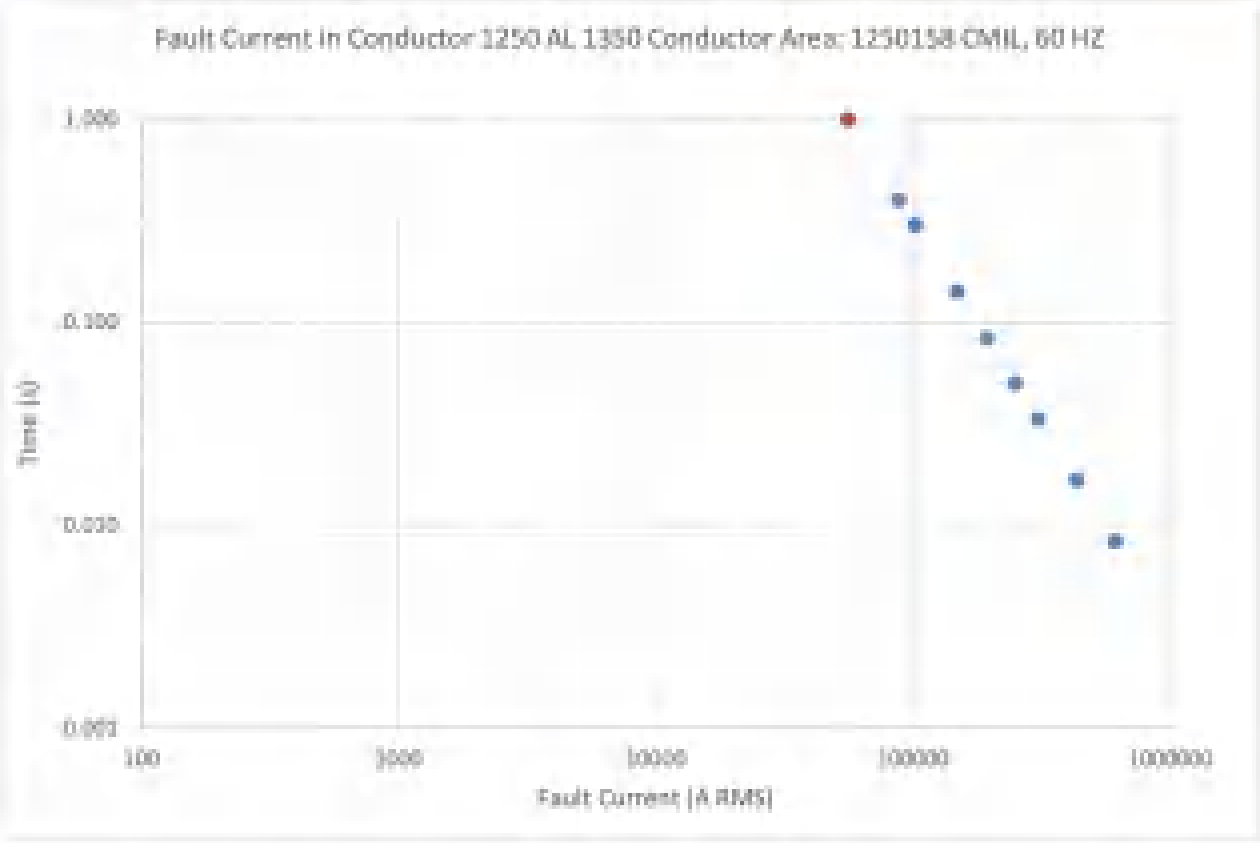
1250 KCMIL AL CABLE
345 MILS TR-XLPE (35KV 100% INSULATION LEVEL)
133X14 CONCENTRIC NEUTRAL
105PG XLPE JACKET (MV-105)

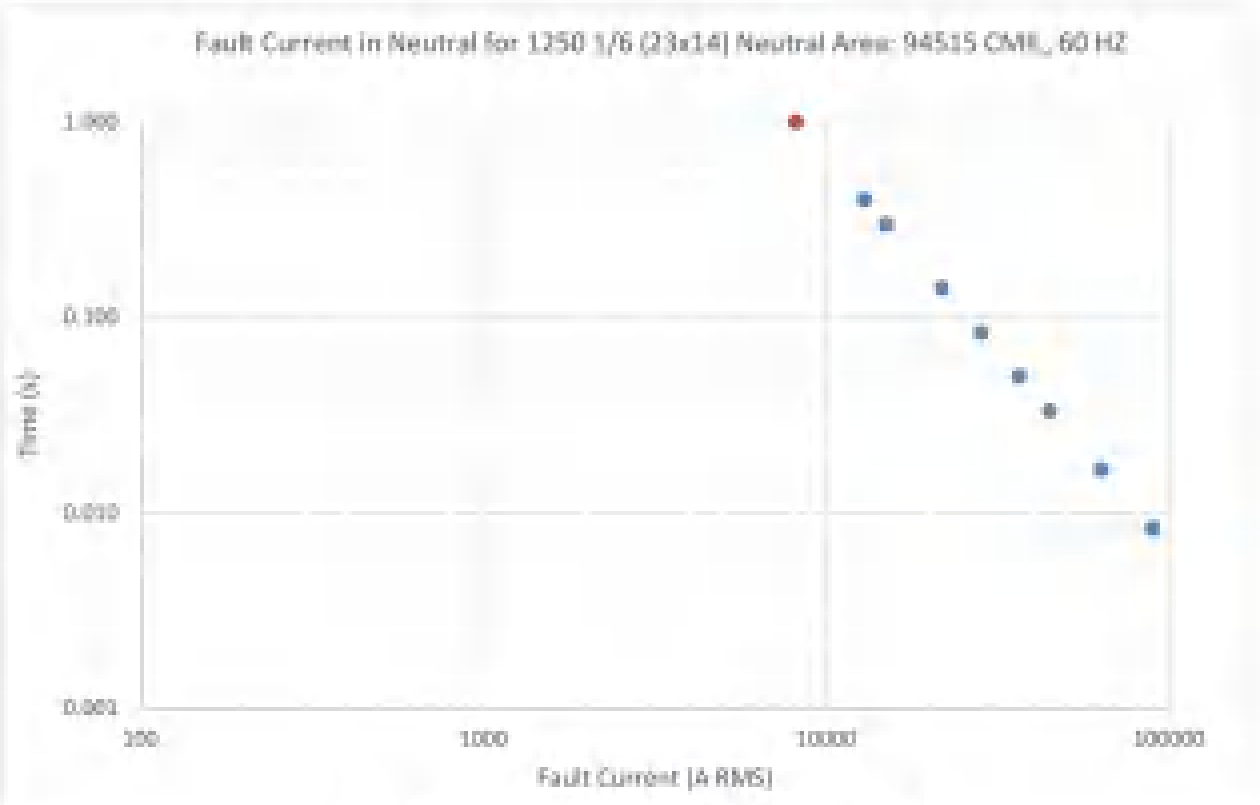
CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C:	105	95
Final Temp C:	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	5	8.3	15	24	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.0833	0.1417	0.2500	0.4000	1.0000
		Fault Current (A RMS)								
1250 KCmil	0.932	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9
Neutral Size		Cycles								
		0.5	1	2	3	5	8.3	15	24	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.0833	0.1417	0.2500	0.4000	1.0000
		Fault Current (A RMS)								
133 (0.0414)		49110.0	49110.0	49110.0	49110.0	49110.0	49110.0	49110.0	49110.0	49110.0

REVISION	DATE	DESCRIPTION	SUBMITTED BY
A4	08/17/2021		JN





REVISION	DATE	DESCRIPTION	SUBMITTED BY
A4	02/07/2022		JW

WTEC
Energy Innovation

SHORT CIRCUIT PERFORMANCE

1000 KCMIL AL CABLE
345 MILS TR-XLPE (35KV 100% INSULATION LEVEL)
18X14 CONCENTRIC NEUTRAL
105°C XLPE JACKET (MV-105)

CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C	105	95
Final Temp C	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
1000 KCMIL	0.785	465019	340373	248880	198131	140102	99065	80887	62654	44303
Neutral Size		Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
1/0 (19x4)	0.1855	135955	99544	72812	57980	40965	28944	23651	18299	12939

REVISION	DATE	DESCRIPTION	SUBMITTED BY
2	08/09/2023		JW

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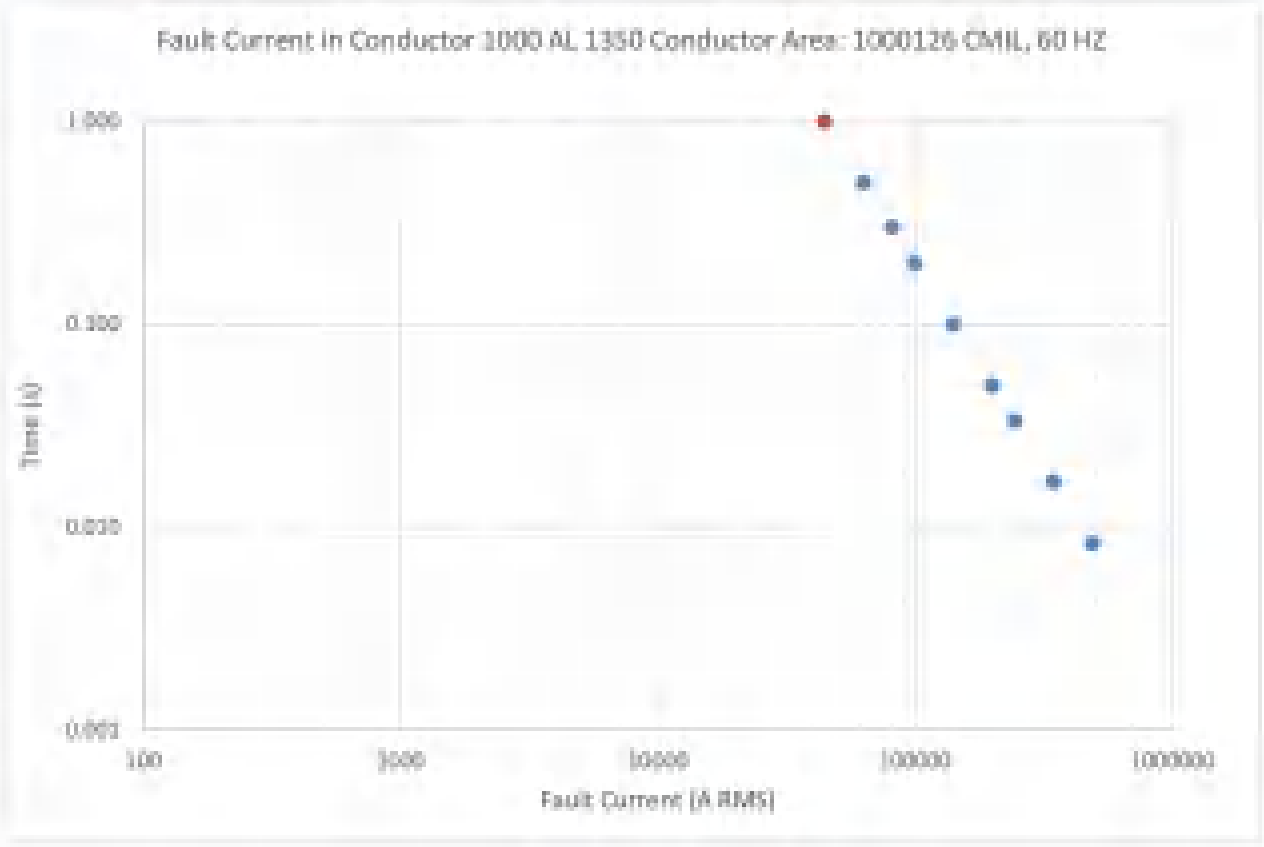

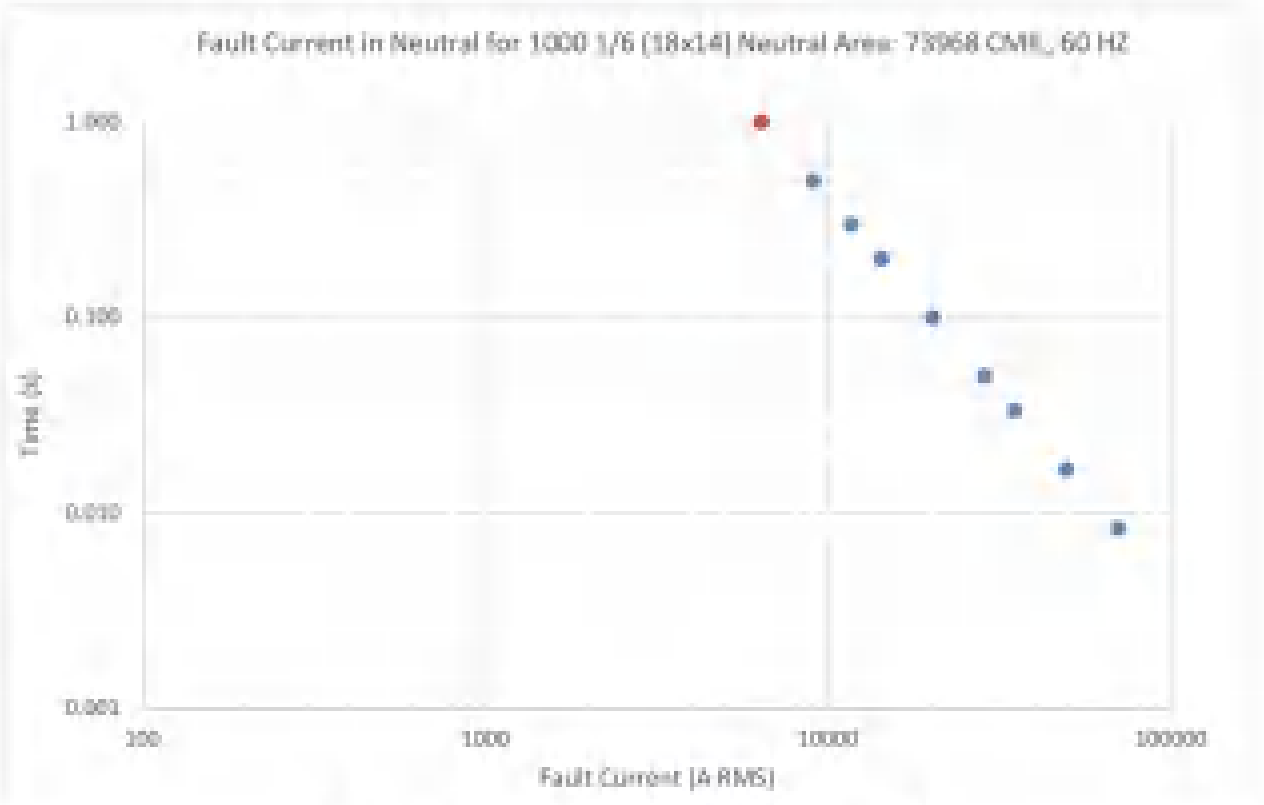

REVISION	DATE	DESCRIPTION	SUBMITTED BY
0	08/26/2024		JW

WTEC
Energy Innovation

SHORT CIRCUIT PERFORMANCE

500 KCMIL AL CABLE
345 MILS TR-XLPE (35KV, 100% INSULATION LEVEL)
18X14 CONCENTRIC NEUTRAL
105°C XLPE JACKET (MV-105)

CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C	105	95
Final Temp C	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
500 KCMIL	0.393	242640	171584	121320	99065	70104	49532	40443	31327	22152
Neutral Size		Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
1/3 (18x14)	0.1553	109755	77604	54812	44801	31685	22394	18291	14170	10017

REVISION	DATE	DESCRIPTION	SUBMITTED BY
2	08/09/2023		JW

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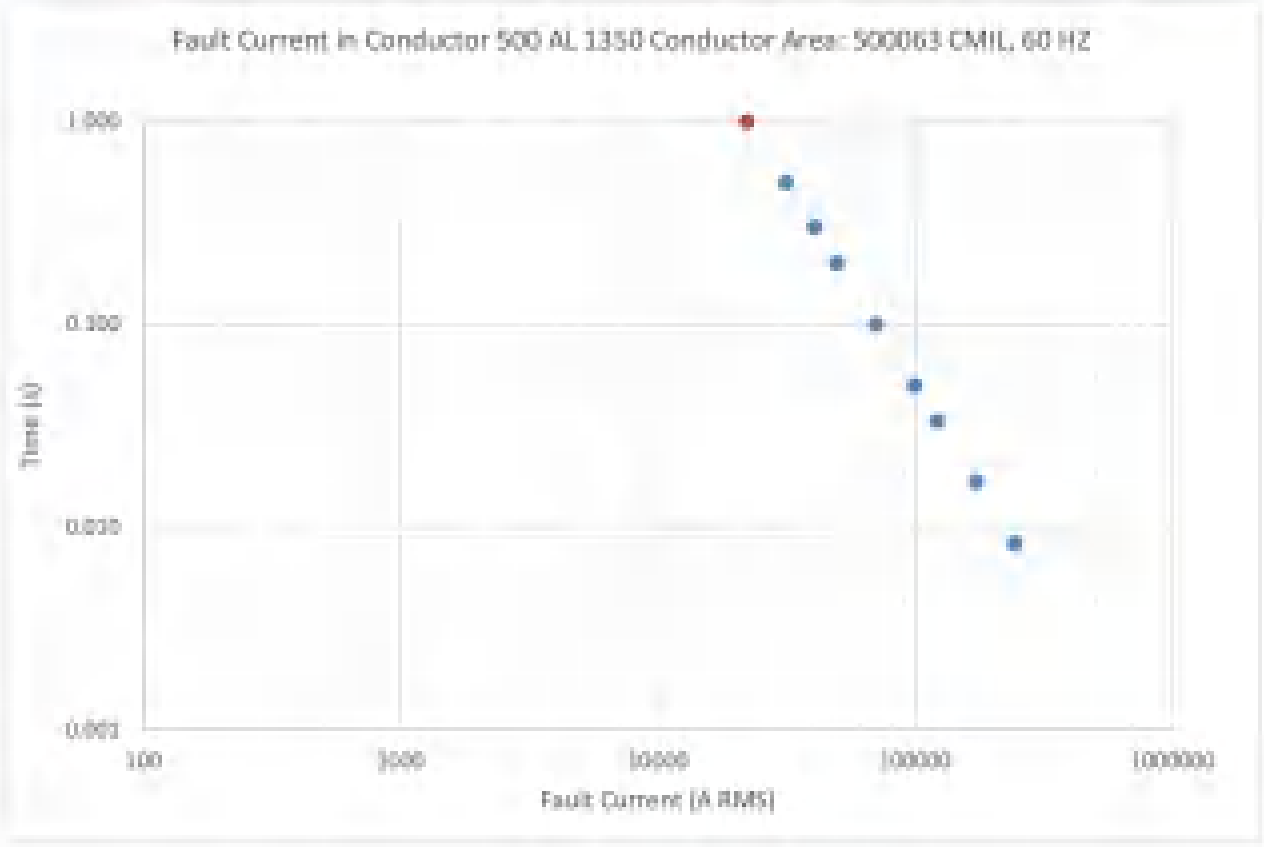

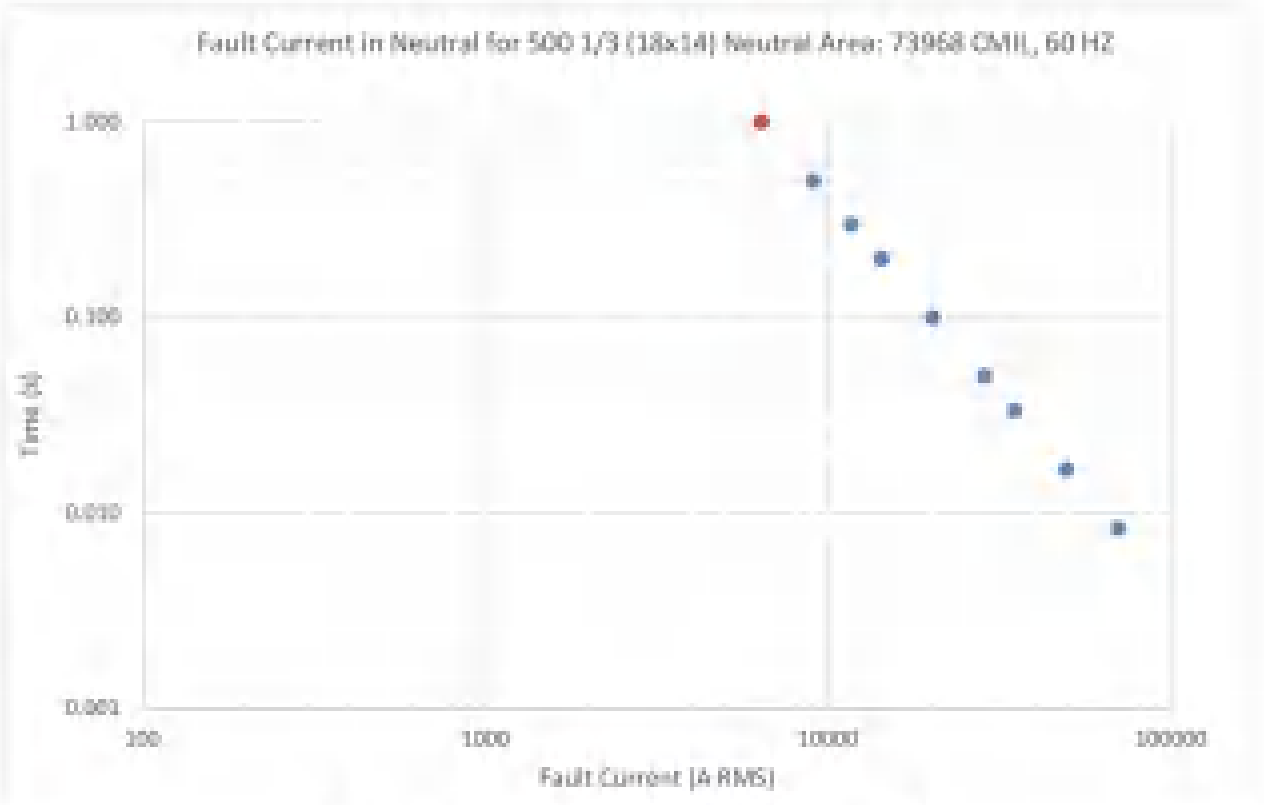

REVISION	DATE	DESCRIPTION	SUBMITTED BY
0	08/26/2024		JW

BESS INVERTER FAULT CONTRIBUTION DATA

SUNGROW

Clean power for all

Short-Circuit Current

SC210HX-US

V1

1 Introduction

This document describes the short-circuit current of SG210HX-US.

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2 Brief Description

Single-phase ground short-circuit, two-phase short-circuit, and three-phase symmetrical short-circuit of the power grid will cause the voltage drop of the power grid. Among them, the three-phase symmetrical short-circuit is the most serious one, which causes the grid voltage to drop to 0. Under this condition, the peak value of the PCS output current and the reactive power support current value surpass the values under other fault types.

When the grid voltage drops, the output current of the PCS will change accordingly. During the first 1 to 2 power frequency cycles, the output current changes abruptly due to the voltage drop, resulting in a current that is significantly higher than the rated value. Then, during the ZVRT period of grid connection, it outputs a relatively stable reactive current to support the grid.

Given the technical requirements of grid connection, such as VDE4110/4120, both peak current impact on the grid and stable reactive current support are important indicators for grid connection. Therefore, it is necessary to provide corresponding parameters when performing grid connection simulation analyses.

IEC 60909 specifies the characteristic values of short-circuit current for the PCS when a short circuit occurs on the grid: peak current I_p, initial symmetrical short-circuit current I''_k, and steady-state short-circuit current I_k, where

Peak short-circuit current I_p: the maximum peak value of instantaneous impulse current at the moment of fault.

Initial symmetrical short-circuit current I''_k: within 1 to 2 cycles after the fault, the RMS

value of the short-circuit current during dynamic adjustment.

Steady-state short-circuit current I_k: the steady value of the reactive current output after the fault is stable.

3 Test Result

When a three-phase symmetrical short-circuit occurs in the power grid, the short-circuit current test waveform of SC210HX-US is shown in the figure below.

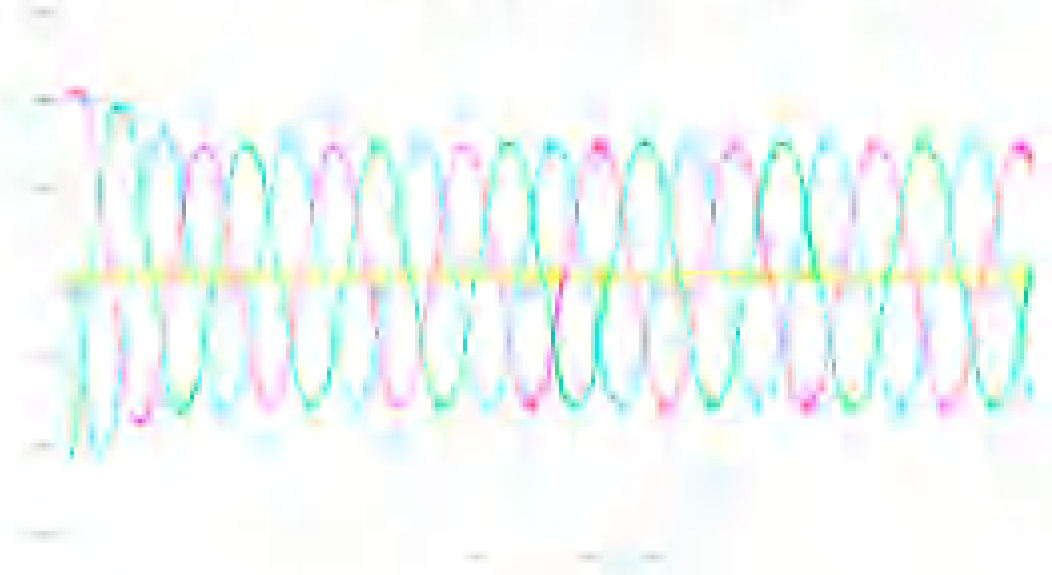

Fig. 1 Short-Circuit Current Waveform

Each characteristic value of the test waveform is shown in the table below.

Fig. 2 Characteristic Values of Short-Circuit Current

Product	Peak Short-circuit Current I_p (A)	Initial Symmetrical Short-Circuit Current I" (A)	Steady-State Short-Circuit Current I_k (A)
SC210HX-US	433A	272A	217A

For ESS composed of several SC210HX-US × 12 such as ST5015UX, each characteristic value can be calculated as N times the characteristic value of SC210HX-US.

PV INVERTER FAULT CONTRIBUTION DATA

Short Circuit Sequence Current Data

The short circuit behavior of the SUNGROW SG440HXUD inverter is analyzed for different types of fault scenarios. Three different types of faults (Line-Line-Line-Ground (3LG), Line-Line (LL) & Line-Ground (LG)) scenarios are simulated to calculate the sequence current and power factor angle values for 1, 3 and 5 cycle periods. In order to replicate the SLG fault behavior, Phase A-to-Ground is considered and for LL fault, Phase A-to-Phase B fault is considered during simulation. The fault scenarios are implemented using the voltage sag method on the SUNGROW SG440HXUD inverter model. Table 1 gives the 1st cycle, 3rd cycle, and 5th cycle short circuit data of the SUNGROW SG440HXUD inverter for the SLG fault. Similarly, Table 2 and Table 3 provide the 1st cycle, 3rd cycle, and 5th cycle short circuit data for the SLG fault and LL fault scenarios respectively.

Table 1: [illegible]

SEQUENCE CURRENT OF THE SUNGROW SG440HXUD INVERTER DURING SLG(G) FAULT				
Fault Voltage (pu)	Positive Sequence Current (p.u.)	Negative Sequence Current (p.u.)	Positive Sequence Power Factor Angle (deg)	Negative Sequence Power Factor Angle (deg)
1 Cycle Time Frame				
0.9	1.055	0.005	0.32	133.78
0.8	1.040	0.010	0.55	133.36
0.7	1.043	0.040	0.81	-68.0
0.6	1.048	0.007	0.91	-41.88
0.5	1.049	0.009	0.93	335.81
0.4	1.053	0.097	1.14	3.74
0.3	1.057	0.103	1.08	1e-32
0.2	1.063	0.116	1.21	-12.89
0.1	1.065	0.113	1.46	133.38
3 Cycle Time Frame				
0.9	1.037	0.007	0.30	207.69
0.8	1.041	0.020	0.16	18.84
0.7	0.967	0.075	-3.36	336.02
0.6	1.027	0.124	267.46	181.73
0.5	1.081	0.145	267.15	180.75
0.4	1.084	0.152	266.52	19.66
0.3	1.083	0.171	262.65	24.08
0.2	1.080	0.171	258.54	29.64
0.1	1.083	0.175	249.68	33.32
5 Cycle Time Frame				
0.9	1.107	0.012	0.04	82.15
0.8	0.930	0.005	-13.09	4.54
0.7	0.159	0.006	-51.17	27.18
0.6	1.028	0.018	268.95	84.53
0.5	1.085	0.040	268.25	94.89
0.4	1.084	0.114	85.34	96.85
0.3	1.079	0.106	268.32	168.39
0.2	1.079	0.048	261.89	170.26
0.1	1.080	0.114	252.97	242.97

SEQUENCE CURRENT OF THE SUNGROW SG4400UD INVERTER DURING SLG FAULT				
Fault Voltage (p.u.)	Positive Sequence Current (p.u.)	Negative Sequence Current (p.u.)	Positive Sequence Power Factor Angle (deg)	Negative Sequence Power Factor Angle (deg)
1 Cycle Time Frame				
0.9	1.022	0.009	0.44	-150.17
0.8	1.039	0.017	0.47	-149.07
0.7	1.053	0.026	0.59	-147.93
0.6	1.058	0.032	0.75	-148.29
0.5	1.060	0.039	0.85	-148.37
0.4	1.057	0.044	1.51	-144.62
0.3	1.054	0.049	2.37	-141.46
0.2	1.037	0.052	2.81	-138.81
0.1	1.039	0.061	3.21	-151.29
3 Cycle Time Frame				
0.9	1.041	0.009	0.16	-155.49
0.8	1.079	0.017	0.28	-155.48
0.7	1.108	0.026	0.25	-154.35
0.6	1.109	0.032	0.39	-152.62
0.5	1.061	0.039	-0.87	-147.64
0.4	1.031	0.055	-0.05	-138.07
0.3	1.014	0.071	-1.25	-131.01
0.2	0.978	0.086	-2.62	-129.89
0.1	0.946	0.104	-4.31	-127.74
5 Cycle Time Frame				
0.9	1.041	0.004	0.13	-85.53
0.8	1.079	0.006	0.25	-81.91
0.7	1.108	0.009	0.29	-80.98
0.6	1.105	0.013	0.20	-83.33
0.5	0.943	0.016	-4.00	-61.79
0.4	0.830	0.018	-13.96	-68.92
0.3	0.750	0.022	-26.39	-71.45
0.2	0.714	0.027	-41.65	-73.07
0.1	0.729	0.032	-36.92	-74.16

SEQUENCE CURRENT OF THE SUNGROW SG4400UD INVERTER DURING LL FAULT				
Fault Voltage (p.u.)	Positive Sequence Current (p.u.)	Negative Sequence Current (p.u.)	Positive Sequence Power Factor Angle (deg)	Negative Sequence Power Factor Angle (deg)
1 Cycle Time Frame				
0.9	1.043	0.011	0.20	-151.79
0.8	1.062	0.019	0.15	-149.36
0.7	1.047	0.027	1.12	-142.31
0.6	1.037	0.053	0.26	-104.82
0.5	1.041	0.072	1.52	-84.77
0.4	1.045	0.085	1.84	-92.27
0.3	1.047	0.114	2.14	-68.58
0.2	1.053	0.126	3.18	92.75
0.1	1.057	0.134	3.58	-99.09
5 Cycle Time Frame				
0.9	1.079	0.009	0.21	-152.65
0.8	1.106	0.016	0.19	-171.68
0.7	1.059	0.032	-0.45	-64.47
0.6	0.978	0.062	-1.08	-59.96
0.5	0.914	0.087	-7.26	-57.34
0.4	1.025	0.113	357.91	-149.07
0.3	1.083	0.132	358.31	-119.13
0.2	1.062	0.148	356.37	-121.6
0.1	1.08	0.163	355.23	-152.62
5 Cycle Time Frame				
0.9	1.079	0.005	0.11	-73.13
0.8	1.106	0.006	0.16	-61.43
0.7	0.83	0.010	-13.89	56.52
0.6	0.714	0.013	-41.14	-56.21
0.5	0.792	0.016	-71.38	-46.62
0.4	1.028	0.024	-89.41	-52.46
0.3	1.085	0.028	-89.29	-53.66
0.2	1.062	0.029	269.19	-54.17
0.1	1.083	0.033	269.02	-50.57

Short Circuit Parameter Calculation

The Short circuit current parameter calculation is carried out on the SUNGROW SG4400UD inverter model. The PSCAD model that has been validated is representative of the actual inverter software. Data is provided for default inverter settings. The inverter is operating at 100% real power output at the unity power factor. Presented data are based on measurements at inverter terminals.

Ip, Ik'', Ik' & Ik are calculated based on the measured inverter current waveforms of SG4400UD PV inverter for a bolted 3LG fault as per the IEC 60909 standard [1] as shown in Figure 5.

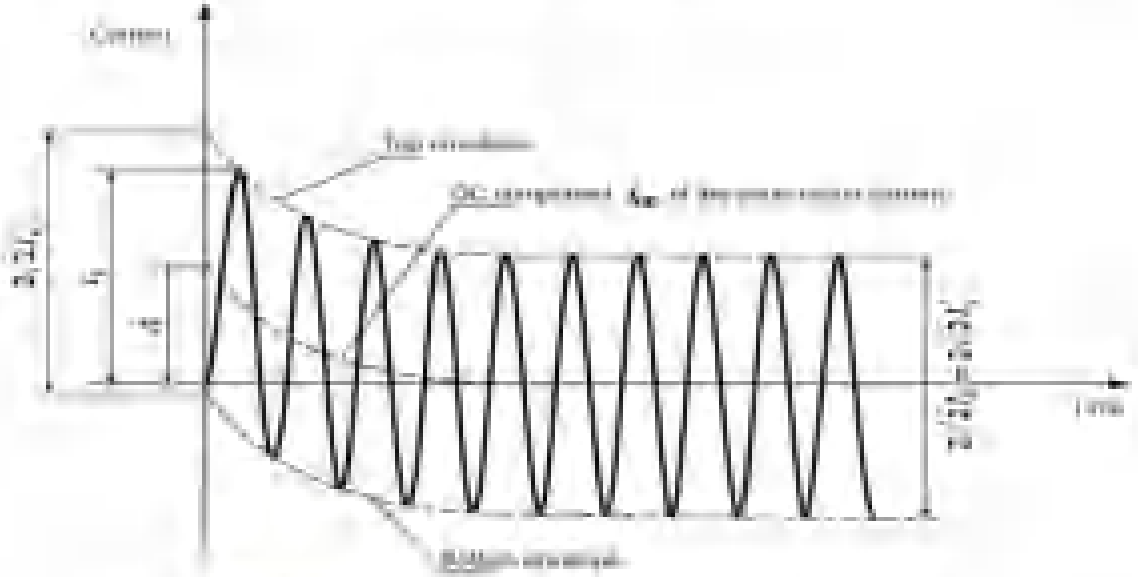

Figure 5: Balanced Current Waveform for Short Circuit Calculation [1]

The per-unit short circuit current parameter and impedance parameters of the SG4400UD PV inverter are listed in Table 7 & Table 8.

Where, Ik'', Initial Symmetrical Short circuit current

Ip, Peak short-circuit current

Ik, Steady-State short-circuit Current

I_{DC}, Decaying d.c. component of short circuit current

A, Initial value of I_{DC}

Table 7: Short Circuit Current Parameters

Short Circuit Current Parameter of SUNGROW SG4400UD PV Inverter				
Current Parameters		Value	Unit	
Ip	First Peak (Ip)	2.7007	p.u.	Peak
Ik''	Subtransient (Ik'')	1.5572	p.u.	RMS
Ik'	Transient (Ik')	1.1085	p.u.	RMS
Ik	Synchronous (Ik)	1.0585	p.u.	RMS
t	Time to reach steady state	70	ms	-

Table 8: Short Circuit Impedance Parameters

Short Circuit Impedance Parameter of SUNGROW SG4400UD Inverter				
Impedance Parameters	**Value (pu based on unit kVA)**			**Unit**
Subtransient	0.000	+j	0.64218	p.u.
Transient	0.000	+j	0.90228	p.u.
Synchronous	0.000	+j	0.94473	p.u.
Negative Sequence	9999.000	+j	9999.000	p.u.
Zero Sequence	9999.000	+j	9999.000	p.u.

BESS INVERTER
SHORT-CIRCUIT STUDY REPORT

Document Number							Rev.	Page
Project	Package	Originator	Discipline	Doc. Type	Unit n°	Serial n°	2.0	1 / 15
		ETAP	ELE	ERP				

ELECTRICAL SYSTEM SHORT CIRCUIT STUDY

SHORT CIRCUIT CALCULATION

Pages modified under this revision: -

2.0	14-April-2024	Issued For Review			
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Sections changed in last revision are identified by a vertical line in the right margin.					

HOLD's

HOLD No.	REF. §	DESCRIPTION	ACTIONS

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1. PURPOSE

The objective of this document is to verify the short circuit level for ST5015UX system, and propose rating for equipment.

The electrical power for all the facilities mentioned above shall be generated at site from an external power and distributed through substations catering to each of these facilities.

This short circuit study report is based on the available network characteristics, analyses the system performance during differential case conditions and values listed in the report.

2. REFERENCE DOCUMENTS

- ELECTRICAL SYSTEM DESIGN BASIS
- SPECIFICATION FOR TRANSFORMER
- SPECIFICATION FOR POWER AND CONTROL CABLE
- SPECIFICATION FOR ELECTRIC MOTORS
- SPECIFICATION FOR EARTHING SYSTEM
- ELECTRICAL KEY LINE DIAGRAM
- ELECTRICAL SINGLE LINE DIAGRAM FOR 35KV
- ELECTRICAL SINGLE LINE DIAGRAM FOR 0.4KV

3. ACRONYM AND DEFINITIONS

The following terms used in this document have the meaning defined below:

OWNER	Sungrow Power Supply Co.,Ltd
PROJECT	ST5015UX
SCOPE OF WORK	The scope of work to be performed and services to be rendered by CONTRACTOR under the CONTRACT in relation to the realization of the PROJECT

The acronyms used in this document have the meaning defined below:

- IEC	International Electrotechnical Commission
- ANSI	American National Standards Institute
- AC	Alternating Current
- DC	Direct Current
- SC	Short Circuit

- LG fault — Line to Ground fault
- LL fault — Line to Line fault
- LLG fault — Line to line to Ground fault

4. CODES AND STANDARDS

4.1 Applicable Codes & Standards

This report is established in accordance with the following IEC standards:

IEC 62271-100 High-voltage switchgear and controlgear – Part 100: High-voltage alternating-current circuit breakers

IEC 62271-200 High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

IEC 60282-2 High-voltage fuses – Part2: Expulsion fuses

IEC 60076-1 Power transformers – General

IEC 60909 Short-Circuit Currents in three-phase a.c. systems – Part 0: Calculation of Currents

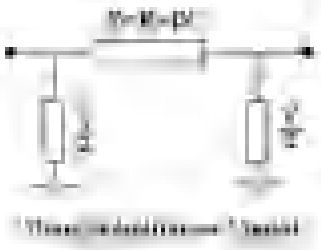
Unless otherwise specified, the latest applicable revision of codes and standards shall be considered.

4.2 General Description of AC Short Circuit Calculation Methodology

In IEC short-circuit calculations, an equivalent voltage source at the fault location replaces all voltage sources. A voltage factor c is applied to adjust the value of the equivalent voltage source for maximum and minimum current calculations.

All machines are represented by their internal impedances. Transformer taps can be set at either the nominal position or at an operating position, and different schemes are available to convert transformer impedance and system voltages if off-nominal tap setting exists. System impedances are assumed to be balanced 3-phase, and the method of symmetrical components is used for unbalanced fault calculations.

Zero sequence capacitances of transmission lines, cables and shunt admittances can be considered for unbalanced fault calculations (LG and LLG) if the option in the study case is selected to include Branch Y and static load. This means that the capacitances of static loads and branches are considered based on IEC 60909-0 2001. The basic model used to consider these shunt admittances is shown below:



Calculations consider electrical distance from the fault location to synchronous generators. For a far-from-generator fault, calculations assume that the steady-state value of the short-circuit current is equal to the initial symmetrical short-circuit current and only the DC component decays to zero. However, for a near-to-generator fault, calculations count for decaying to both AC and DC components. The equivalent R/X ratios determine the rates of decay of both components and different values are recommended for generators and motors near the fault.

Calculations also differ for meshed and unmeshed networks. The factor k, which is used to multiply the initial short-circuit current to get the peak short-circuit current, is defined differently for different system configurations and the methods selected to calculate the R/X ratios.

4.3 General Description of DC Short Circuit Calculation Methodology

In compliance with IEEE Standard 946, the DC Short Circuit calculates the total fault current, current contributions from different sources, and the rise time constant of the total fault current. It can conduct calculations on both radial and looped systems. The fault under consideration is a short circuit between the positive and the negative terminals of the fault location. The contributing sources to the short circuit current include charger/rectifier, UPS, battery, and DC motor. These sources can be modeled as a constant current source or a constant voltage source behind an impedance. For a charger/rectifier source, the AC system equivalent impedance on the AC side can also be considered.

5 DEFINITION OF TERMS

The IEC standard uses the following definitions that are described in the calculation output contained in this report.

5.1 Short Circuit

Accidental or intentional conductive path between two or more conductive parts forcing the electric potential differences between these conductive parts to be equal or close to zero.

5.2 Line-to-line Short Circuit

Accidental or intentional conductive path between two or more live conductors with or without earth connection.

5.3 Line-to-earth Short Circuit

Accidental or intentional conductive path in a solidly earthed neutral system or an impedance earthed neutral system between a line conductor and local earth.

5.4 Short Circuit Current

Over-current resulting from a short circuit in an electric system.

5.5 Initial Symmetrical Short circuit current (I"k)

This is the rms value of the AC symmetrical component of an available short-circuit current applicable at the instant of short-circuit if the impedance remains at zero time value.

5.6 Peak Short Circuit Current (ip)

This is the maximum possible instantaneous value of the available short-circuit current.

5.7 Symmetrical Short Circuit Breaking Current (Ib)

This is the rms value of an integral cycle of the symmetrical AC component of the available short-circuit current at the instant of contact separation of the first pole of a switching device.

5.8 Steady-State Short Circuit Current (Ik)

This is the rms value of the short-circuit current, which remains after the decay of the transient phenomena.

Note: It is necessary to distinguish between the short-circuit current at the short-circuit location and partial short-circuit currents in the network branches at any point of the network.

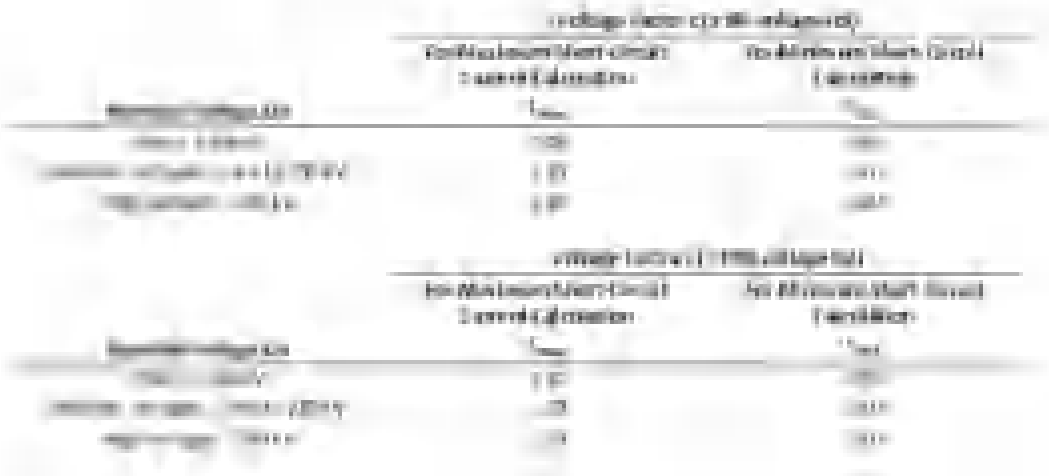
5.9 Minimum Time Delay (T_{min}) of a Circuit Breaker

This is the shortest time between the beginning of the short-circuit current and the first contact separation of one pole of the switching device.

The time delay (T_{min}) is the sum of the shortest possible operating time of an instantaneous relay and the shortest opening time of a circuit breaker. Minimum time delay does not include the adjustable time delays of tripping devices.

5.10 Voltage Factor c

This is the factor used to adjust the value of the equivalent voltage source for minimum and maximum current calculations according to the following figure.



6. CALCULATION METHORD

6.1 Initial Symmetrical Short Circuit Current Calculation

Initial symmetrical short-circuit current (I''_k) is calculated using the following formula

$$I''_k = \frac{cU_n}{\sqrt{3}Z_k}$$

Where Z_k is the equivalent impedance at the fault location

6.2 Peak Short Circuit Current Calculation

Peak short-circuit current (i_p) is calculated using the following formula

$$i_p = \sqrt{2}\kappa I''_k$$

Where κ is a function of the system R/X ratio at the fault location

IEC Standards provide three methods for calculating the κ factor:

Method C – Equivalent frequency. The value of the κ factor is calculated using a frequency-altered R/X. R/X is calculated at a lower frequency and then multiplied by a frequency-dependent multiplying factor

7. Comparison of Device Rating and Short-Circuit Duty

In the 3-phase Device Duty calculation, ETAP compares the protective device rating against bus short-current duty for the devices that are checked as complying with IEC Standard and also have device rating entered. In case the short circuit duty is greater than the device duty, ETAP will flag the device as underrated in both one-line diagram and output reports. The following table lists the device ratings and short-circuit duties used for the comparison for MVCB, LVCB, and fuses

Device Type	Device Capability	Calculated Short Circuit Duty
MVCB	Making	I_p
	AC Breaking	I_{sym}
	I_{sym} *	I_{sym}
	I_p *	
	I_{th}	I_{th}
LVCB	Making	I_p
	Breaking	I_{sym}
	I_{sym} *	I_{sym}
	I_{th}	I_{th}
Fuse	Breaking	I_{sym}
	I_{sym} *	I_{sym}

Comparison of Device Rating and Short-Current Duty

8. SYSTEM CONFIGURATION AND MODELLING

8.1 Electrical System Configuration

This report provides the system study for short circuit project configuration name ST5015UE, comprising the following electrical equipment:

- 2 nos. of battery units 5015kWH
- 12 nos. of racks per battery unit
- 4 nos. of modules per rack (4 nos. of 1P104S total 416 cells)
- 24 nos. of PCS
- 1 MV skid (MVS5000-LS) includes:
  - 1 nos. of MV transformer
  - 2 nos. of LV switchgear

8.2 Power System Study Software

Short circuit study for system conducted using ETAP ver 21.0.0.

8.3 Grid Data

Grid input data are based on the document provided by Sungrow Power Supply Co. Ltd.

No.	Description	Rated Voltage(V)	SC Max Rating
1	Aux Power	480	34.5kA
2	FSS Power Supply	230	20kVA,Single Phase
3	Power Grid	35000	31.5kA

8.4 Transformer Data

No.	Transformer Tag	Rating (kVA)	Voltage Ratio	Impedance%	Grounding	Type
1	T1	5	400V/230V	4.0	N.A	Dry
2	Box-type transformer	5140	0.69kV / 33kV	8.0	D/Y11	Oil

8.5 Load

All motors on LV switchboards are modelled as individual motors in order later relevant calculation. Other loads on LV switchboards are grouped as static load or lump load, the power factor can reference to below table:

Motor parameters are based on the typical parameters in ETAP library. The LRC for LV motor are considered as 650% and 700% of full load current. When the motors are all started by frequency converters short-circuit feedback current does not exist.

ID	Rated Capacity/W	Rated Voltage/V	Power Factor/%	VFD Ratio/%	LRC/%
LCS	27400	400	0.82	40	650
24V SMPS	9600	400	0.84	/	/
24V SMPS1	648	400	0.85	/	/
Medium Socket	100	230	/	/	/
BCP FAN	452	230	/	/	/
FRS FAN	60	230	/	/	/
SMPS4	300	230	0.84	/	/
BSP FAN	72	230	/	/	/
FACP	368	230	/	/	/
24V SMPS1	300	230	0.84	/	/
24V SMPS2	600	230	0.84	/	/
HVAC	800	230	/	/	/
FAN	800	230	/	/	/
UPS	3000	230	/	/	/
Socket	200	230	/	/	/

6.6 Cable

The parameters of cable are based on the typical parameters in ETAP library.

The power cables from the entire system are entered into ETAP software according to cable parameters provided by Sungrow power.

6.7 Circuit Breaker and Fuse

Circuit breaker and switch impedance can also be added to feeder impedance, but as this impedance is very small it has been ignored in calculations.

ID	Manufacture	Model	Rated Voltage/V	Rated Current /A	Interrupting/KA
QF3	[illegible]	NDM3-250M/4P 160A	AC400	160	50
FU1-1~FU1-3	[illegible]	RGS-A/4P 100A/690V	AC690V	100	120
QF1	[illegible]	NDM3E-125N/3P/4P C100 DC24V	AC400	100	50

Q1	[illegible]	NDB1-63 3P32A+QF1	AC400	63	4
Q2	[illegible]	NDB1-63 C32/3P+QF1	AC400	32	6
Q3	[illegible]	NDB1-63 C20/2+QF1	AC400	20	6
Q4	[illegible]	NDB1-63 C6/2P+QF1	AC400	6	6
Q5	[illegible]	NDB1-63 C6/3P+QF1	AC400	6	4
Q6	[illegible]	NDB1LE-40 C10/1PN/30mA/AC	AC400	10	6
Q7	[illegible]	NDB1-63 C10/2	AC400	10	6
[illegible]fuse	[illegible]	NH2XL3R+400/315	DC	400	150
BCP fuse	[illegible]	1BF 1200V AC/1000V DC 400A	AC1200	400	100
[illegible] fuse	[illegible]	RS30R-UGH 50/A	DC500V	500	50
Pack fuse	[illegible]	BEP8T 315A	DC1500	315	50
FU2-1~FU2-3	[illegible]	FGB A-gR 100A/690V	AC690V	100	120
FU23~FU33	[illegible]	FGB-V21E32A	AC990	20	100
SCC Q5	[illegible]	NDB1-63 C10/2	AC400	10	6
SCC Q6	[illegible]	NDB1-63 C10/2	AC400	10	6
SCC Q11	[illegible]	NDB1-63 C10/2	AC400	10	6
SCC Q12	[illegible]	NDB1-63 C10/2	AC400	10	6
SCC Q10	[illegible]	NDB1-63 C6/2P+QF1	AC400	3	6
SCC QF1	[illegible]	NDW3-400/332	AC690	3200	75

8. SHORT CIRCUIT ANALYSIS

8.1 Design Basis/Criteria

The short-circuit analysis shall be performed in accordance with IEC60909 standard and to determine maximum prospective fault levels at each bus-bar.

In this report, maximum short-circuit studies are performed for selection of equipment rating.

Circuit breakers or fuse shall have the capabilities to withstand the calculated fault i.e.

8.2 Short Circuit Study Result

The short circuit currents values on other bus have been calculated and these data are listed hereinunder.

The short circuit capacity of the Bus Power is 34 bus and Power grid is 31.5, the short circuit data are as follows:

No	Description	Voltage (kV)	Max. SC Current(kA)

CALCULATION NOTE – SHORT CIRCUIT CALCULATION

			Int Symm.kA (rms)	Peak.kA (pk)
1	33kV Power Grid Bus	33	31.94949	77.8504
2	33kV Power Grid Bus	33	31.94949	77.8504
3	AC Bus1	0.69	58.91972	147.1041
4	AC Bus2	0.69	58.91972	147.1041
5	Aux Power Bus	0.4	38.62023	75.24312
6	Bus Bar	0.4	31.02449	62.79231
7	QF1 Bus	0.4	5.870743	12.61413
8	LCS Bus	0.4	4.041405	8.082374
9	Q1 Bus	0.4	5.907712	10.39323
10	Q2 Bus	0.4	5.070582	8.448713
11	SMPS Bus	0.4	4.687356	7.924111
12	BCP FAN Bus	0.23	4.154161	2.757406
13	Bus Bar	0.4	65.77803	32.60185
14	FACP Bus	0.23	1.970355	1.360707
15	FAN Bus	0.23	2.857877	1.866066
16	FSS Power Supply Bus	0.23	0.2147148	0.08605652
17	Maint Socket Bus	0.23	2.910206	1.964157
18	Q3 Bus	0.23	4.674051	3.061178
19	Q4 Bus	0.23	3.217269	2.230168
20	Q5 Bus	0.23	3.217269	2.230168
21	Q6 Bus	0.23	0.2143913	0.08691643
22	Q7 Bus	0.23	0.1912354	0.08358942
23	Q8 Bus	0.23	0.7625625	0.5163881

No.	Description	Voltage (kV)	Max. SC Current(kA)	
			Init Symm kA (I"k)	Peak kA (Ip)
24	OP1 Bus	0.4	0.1 19931	0.103445
25	RMU Bus	0.23	0.369514	0.2598312
26	SCC FAN Bus	0.23	0.8035868	0.5428760
27	SCC HVAC Bus	0.23	0.8035868	0.5428760
28	SCC Main Socket Bus	0.23	0.8035868	0.5428760
29	SCC T1 Bus	0.23	0.6549169	0.4761747
30	SCC UPS Bus	0.23	0.8035868	0.5428760
31	SMRS-SCC Bus	0.23	0.6744086	0.4560073
32	SMPS1 Bus	0.23	0.1660532	0.08275117
33	T Bus	0.23	0.4670479	0.279875
34	UPS Power Supply Node	0.23	0.8035868	0.5428760
35	SCP Fuse Bus Max	0.69	55.0751	128.6066
36	TB Bus Max	0.69	50.52739	123.6066

3.2 DC Short Circuit Study Result

In a DC short circuit calculation, a contributing source may be represented by different models, either as a voltage source or as a current source. Even the sources that are represented as constant voltage sources may have different per unit values. This is different from the AC short circuit calculation by the IEC method, where a default voltage is specified and a circuit network is solved to find the fault current. If the DC short circuit calculation is two-step procedure is adopted that applies the superposition theorem to calculate fault current. The two steps are voltage profile calculation and short circuit current calculation.

For DC short circuit of this project, the short circuit of DC side is almost same, because the dc cables have the same size and a small deviation in length, so we take the worst short circuit value to verify the fuse capacity.

The worst short circuit current values on DC bus have been calculated and the data are listed here under.

No.	Description	Voltage (kV)	DC SC Fault Current(kA)
1	Main DC short circuit value	1.5	45

10. CONCLUSION

Based on short circuit calculate results, the minimum short circuit parameters requirement for 35KV and 0.69KV, 0.40KV, 0.23kV, 0.115KV for electrical equipment, such as breakers, fuses, contactors, busbar, are decided as listed in the following table considering. For all the study case, the LV CB rated short-circuit breaking current is characterized only by the r.m.s. value of its a.c. component (Int symm kA r.m.s). For more detailed short circuit data, please refer to the following appendix.

The following color code applies for these tables:

Black: — The rated values are above the calculated values — the equipment is sufficiently rated.

Yellow / Marginal: — The rated values are close to and above the calculated values — the equipment is sufficiently rated.

Red / Failed: — The rated values are below the calculated values — the equipment is not sufficiently rated.

System side information			
ID Description	Aux Power	HSE Power Supply	Power Grid
SC Rating	34.5kA	20MVA	31.5kA

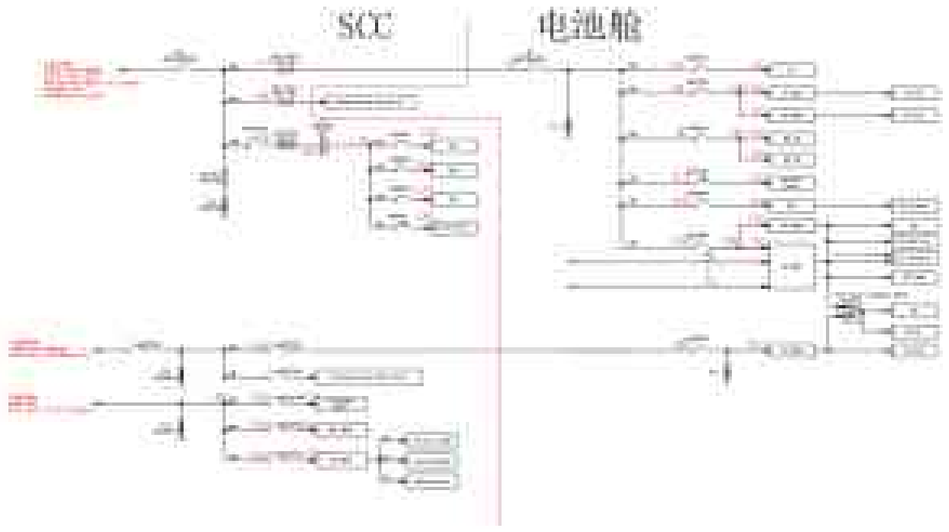
Circuit breaker and fuse information						Short-circuit current information
ID	Manufacturer	Model	Rated Voltage (V)	Rated Current (A)	Interrupting (kA)	Int Symm kA rms
DF3	CHINT	NDM3-250M/4321/C/160A	AC400	160	50	34.828
FU1-HEL1N3	HSE	FGB-A-5H 100A690V	AC690V	100	120	39.824
DF1	CHINT	NDM3E-125M/4341/C70+DC24V	AC400	100	50	5.974
Q1	CHINT	NDB1-63 C63G+DF1	AC400	63	8	5.508
Q2	CHINT	NDB1-63 D32/3P+DF1	AC400	32	8	8.071
Q3	CHINT	NDB1-63 C20/3+DF1	AC400	20	8	3.081
Q4	CHINT	NDB1-63 C6/2P+DF1	AC400	6	8	2.230

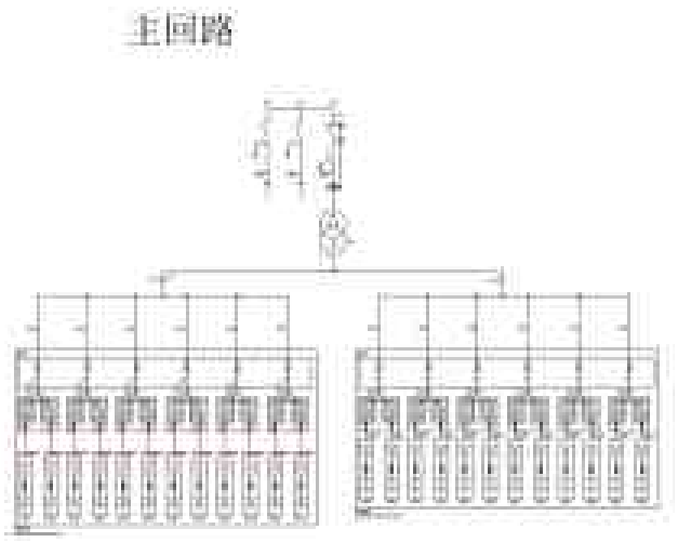
Q6	出线	NDB1-63 C6/2P+OF1	AC400	3	8	2.230
Q8	出线	NDB1LE-40 C10/1PN/30mA/AC	AC400	10	8	2.230
Q7	出线	NDB1-63 C10/2	AC400	10	8	0.084
1B fuse	HOLLYLAND	NHGXLaRF400U16C	DC	400	160	14.59
BCP fuse	电容柜	H1BF 1250V/AC/1000V DC 465A	AC1250	465	100	88.920
Pack fuse	电池	RS88R-LGH 500A	DC500V	500	50	14.59
Rack fuse	电池	BEPBT-315A	DC1500	315	50	14.59
FU2-1~FU2-3	电容	FCB-A-5H 100A690V	AC690V	100	120	31.024
FU33~FU35	电容	FCB-A-3E32A	AC690	20	100	31.024
SCC Q5	出线	NDB1-63 C10/2	AC400	10	8	0.087
SCC Q6	出线	NDB1-63 C10/2	AC400	10	8	0.087
SCC Q11	出线	NDB1-63 C10/2	AC400	10	8	0.618
SCC Q12	出线	NDB1-63 C10/2	AC400	10	8	0.618
SCC Q10	出线	NDB1-63 C6/2P+OF1	AC400	3	8	0.536
SCC QF1	出线	NDW3-40HU/32	AC690	3200	75	88.92

After the verification, it can be found that all low voltage circuit breaker are adequate to interrupt or withstand the maximum fault.

11. APPENDIX

Appendix	1	Schematic Diagram
Appendix	2	Short Circuit Calculation - One Line Diagram
Appendix	3	Short Circuit Calculation - Summary Table


SCC
电池舱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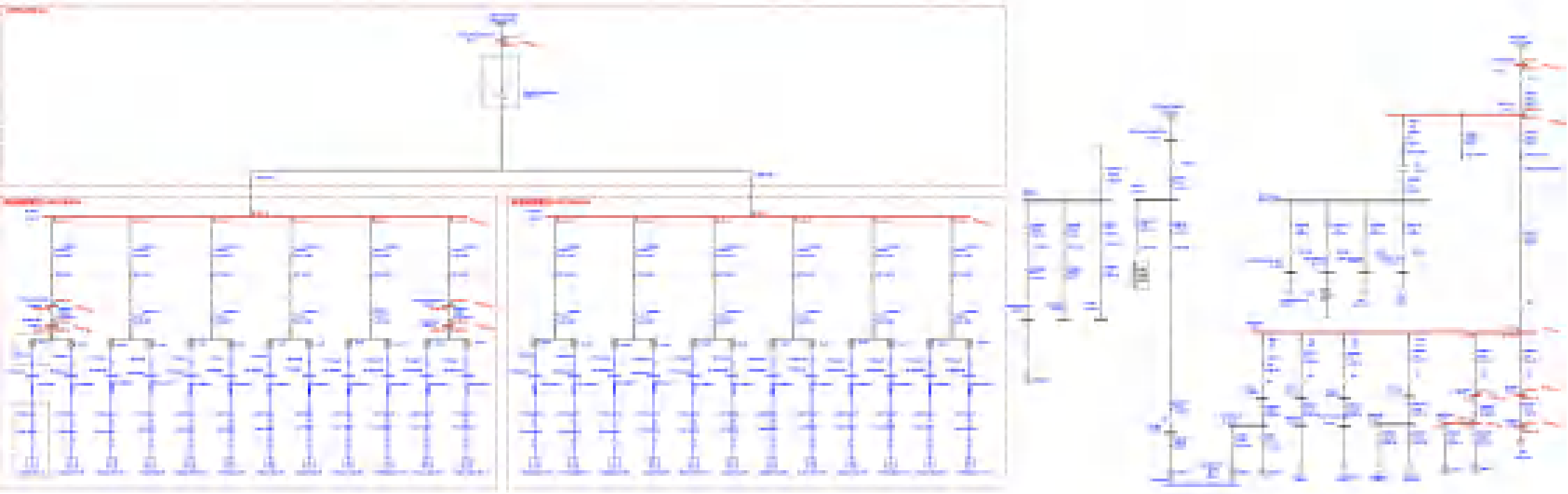
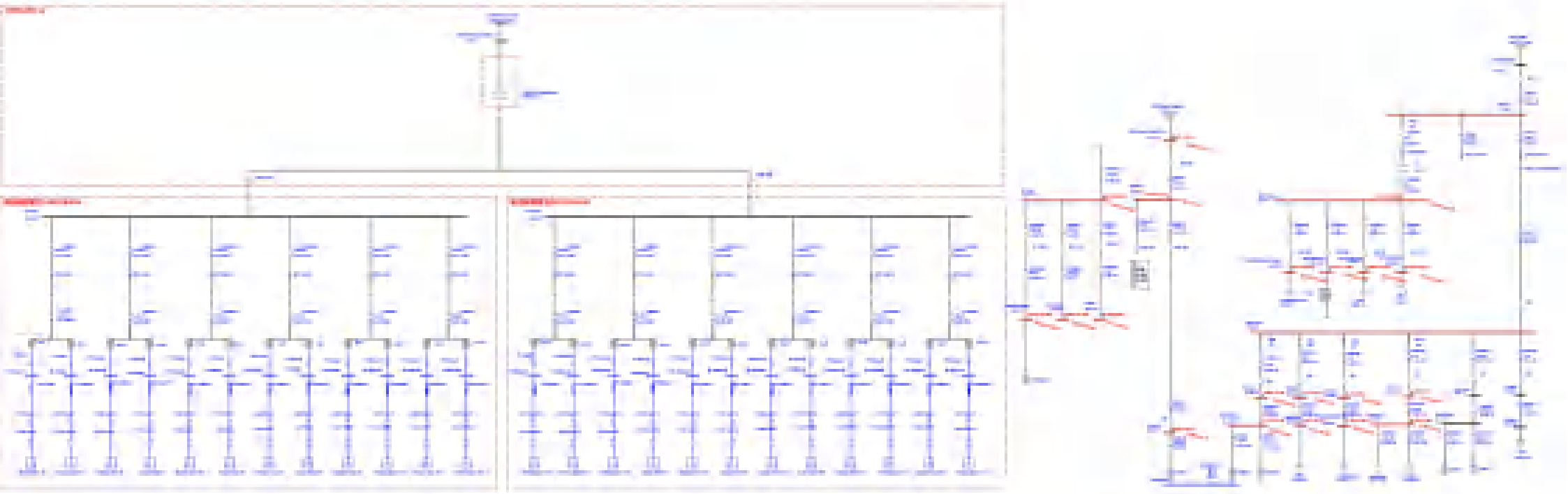
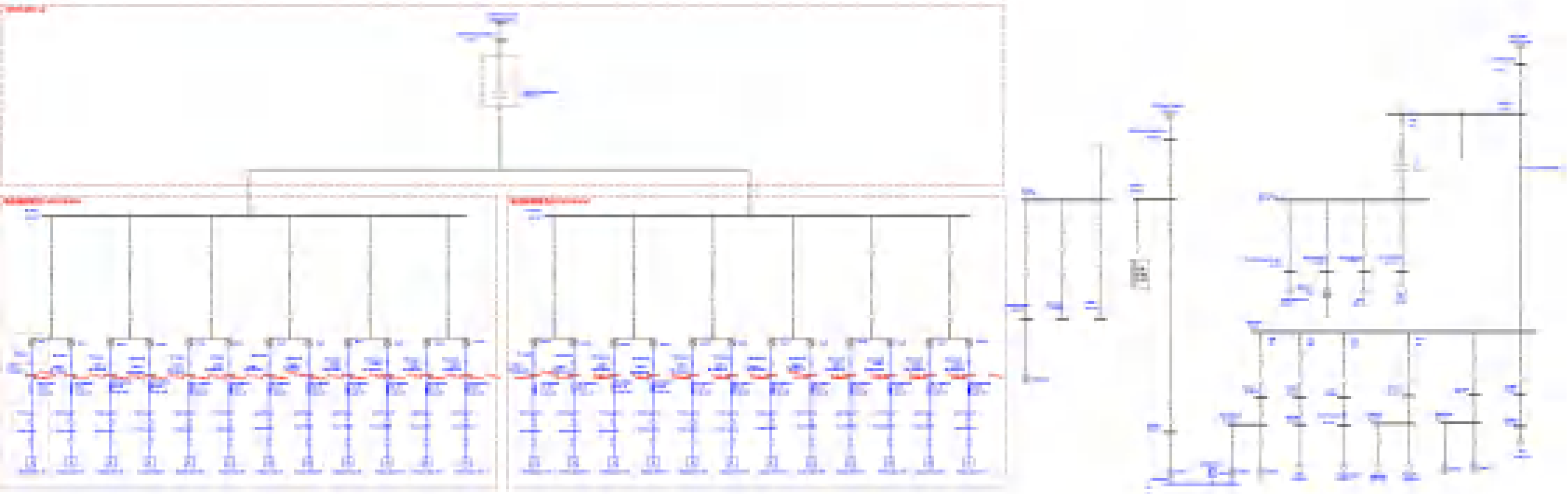




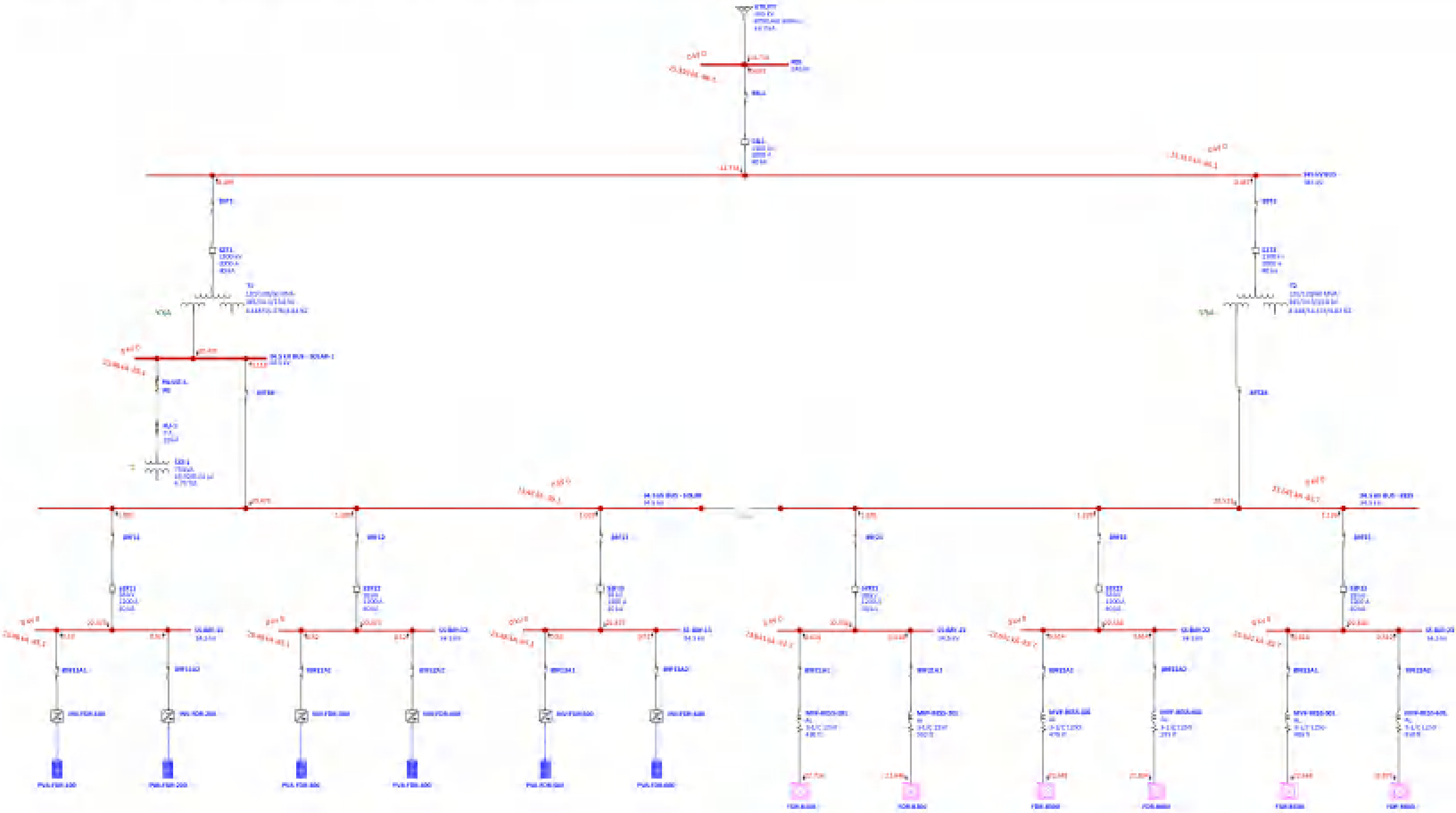


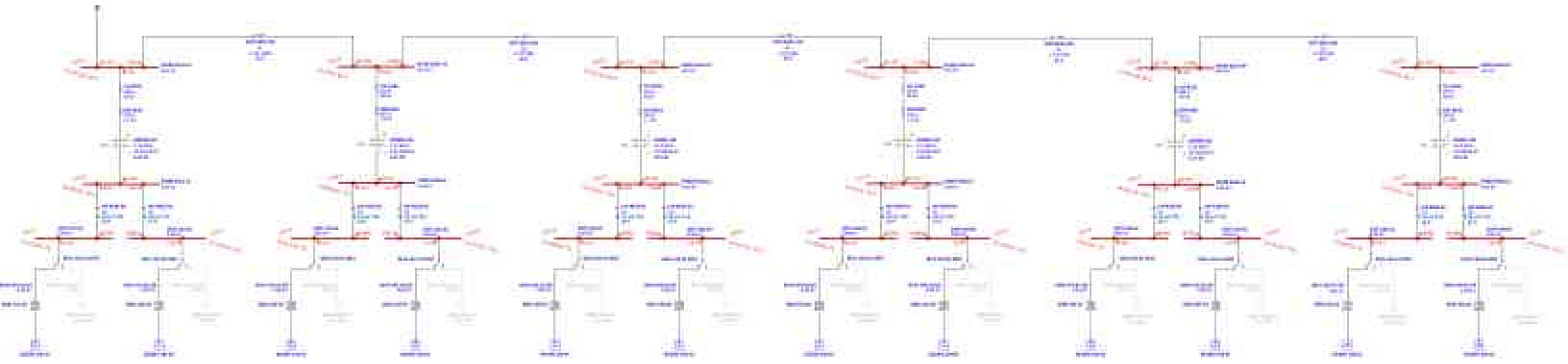
SC Rating: Aux Power=34.3kA, FSS Power Supply=22kA, Power Grid=21.5kA			
ID	Nominal kV	3-Symm kA rms	Fault kA rms
35kV Power Grid Bus	35	21.54949	77.8604
AC Bus1	0.69	38.91972	147.1041
AC Bus2	0.69	38.91972	147.1041
BCP Fuse Bus Max	0.69	55.07931	128.6266
BCP Fuse Bus Min	0.69	55.07807	128.6266
T6 Bus Max	0.69	53.52738	123.6096
T6 Bus Min	0.69	50.46807	112.0548
Aux Power Bus	0.4	34.62023	78.94312
Bus Bar	0.4	31.62449	62.78231
LCS Bus	0.4	4.841468	8.082374
D1 Bus	0.4	5.607718	10.39323
D2 Bus	0.4	5.070588	8.448713
SMPS Bus	0.4	4.887316	7.924111
BCP-FAN Bus	0.23	4.154151	2.753405
Bus Bar	0.4	65.77693	32.50185
FACP Bus	0.23	1.970355	1.380707
FAN Bus	0.23	2.857077	1.956096
FSS Power Supply Bus	0.23	0.2197148	0.08595972
Main Socket Bus	0.23	3.301038	1.964157
Q3 Bus	0.23	4.674251	3.061175
Q4 Bus	0.23	3.317266	2.230168
Q5 Bus	0.23	3.317266	2.230168
Q6 Bus	0.23	0.2143613	0.08691642
Q7 Bus	0.23	0.1912354	0.08353942
Q8 Bus	0.23	0.7825625	0.5103281
QF1 Bus	0.4	13.19801	6.159445
RMU Bus	0.23	0.368514	0.2536312
SCC FAN Bus	0.23	0.8035865	0.5425703
SCC HVAC Bus	0.23	0.8035865	0.5425703
SCC Maint Socket Bus	0.23	0.8035865	0.5425703
SCC T1 Bus	0.23	0.8549169	0.5751747
SCC UPS Bus	0.23	0.8035865	0.5425703
SMPS-SCC Bus	0.23	0.6744095	0.4560073
SMPS1 Bus	0.23	0.1860532	0.08275117
T Bus	0.23	0.4070476	0.278875
UPS Power Supply Node	0.23	0.8035865	0.5425703

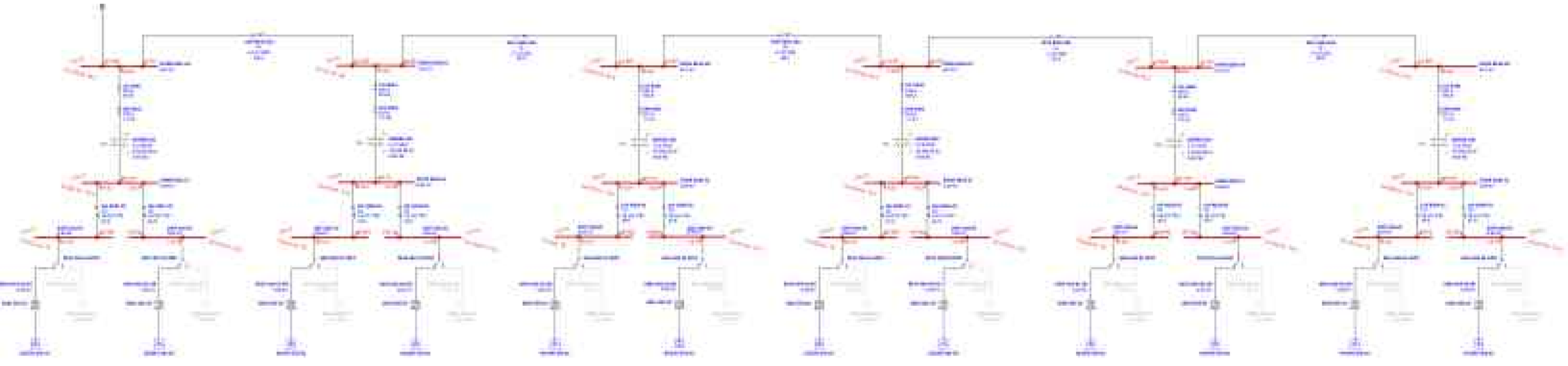
APPENDIX B – SHORT CIRCUIT SINGLE LINE DIAGRAMS

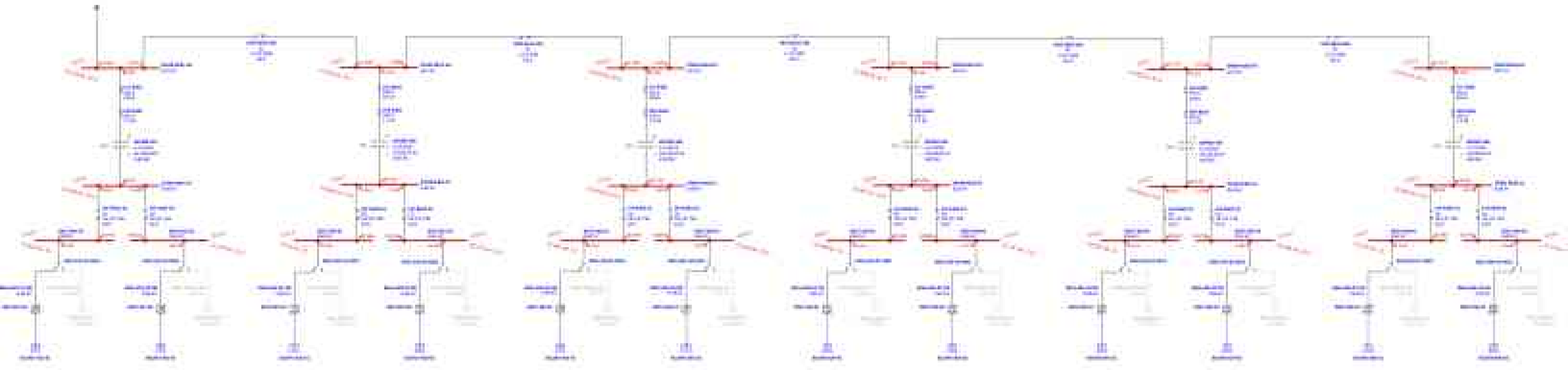
PRELIMINARY

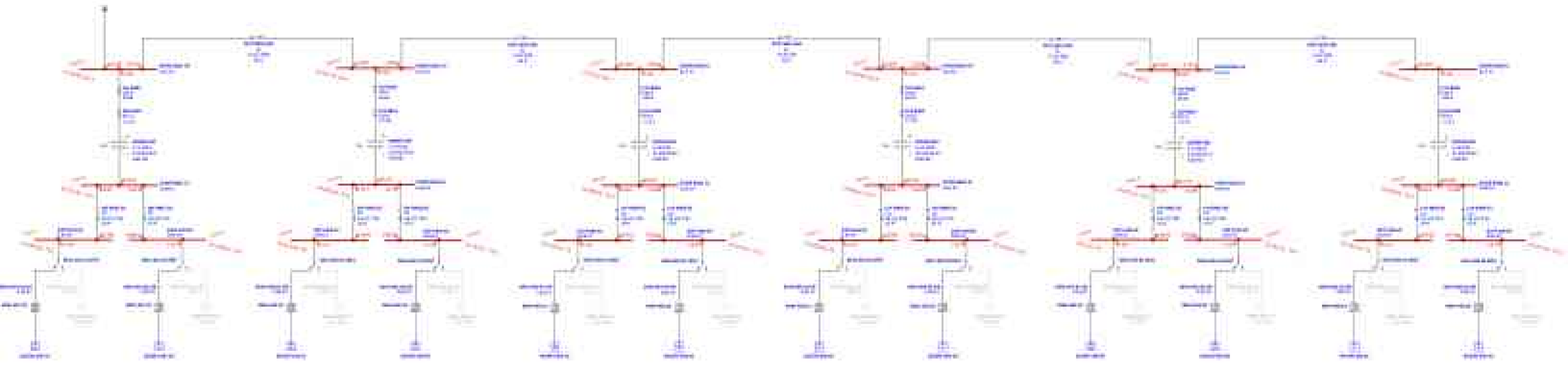
Steady-State 3-Ph Fault Short-Circuit SLDs

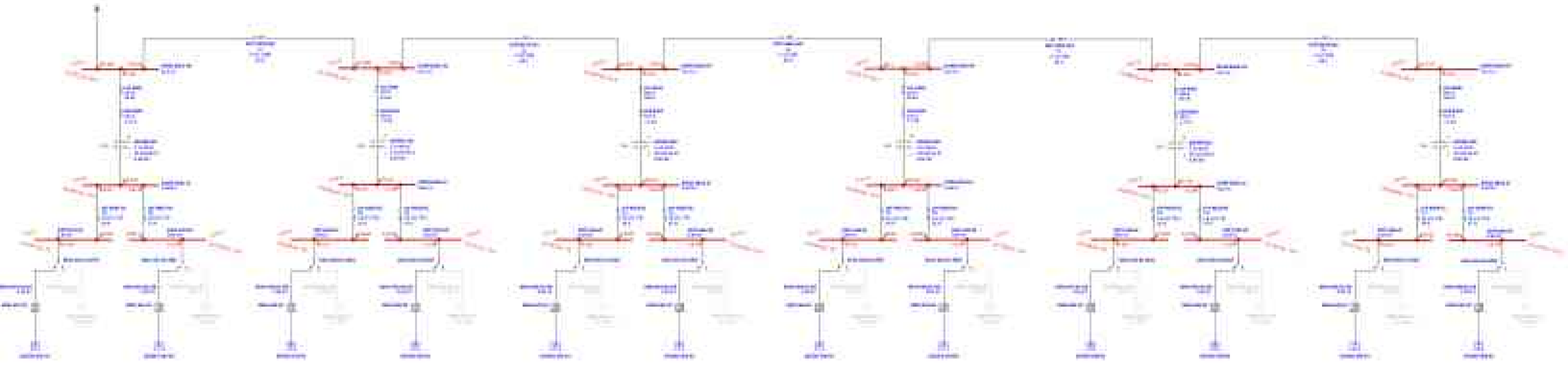


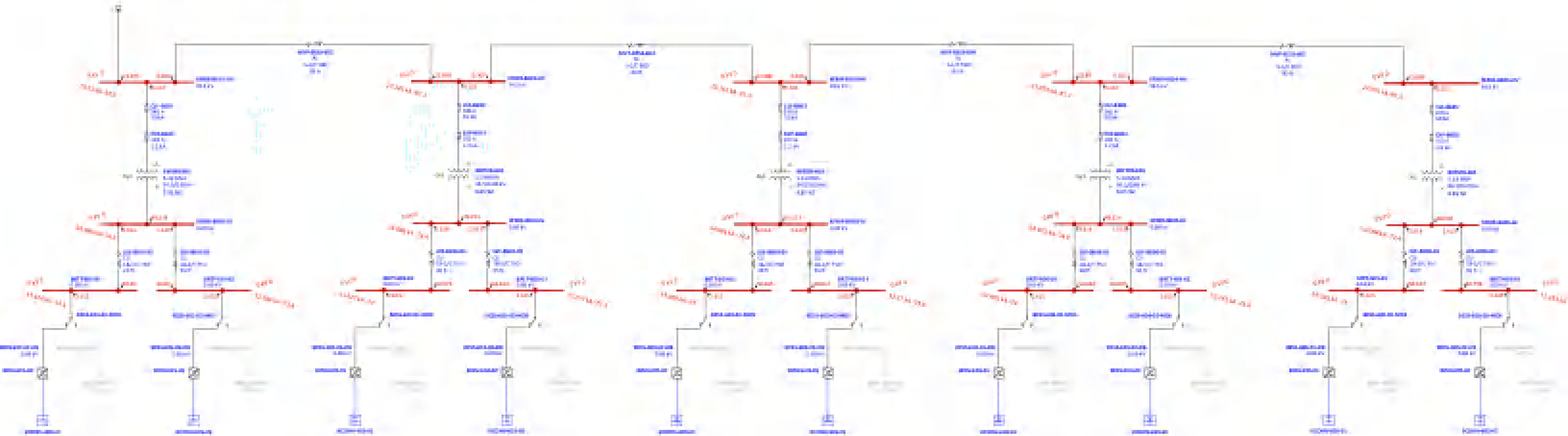




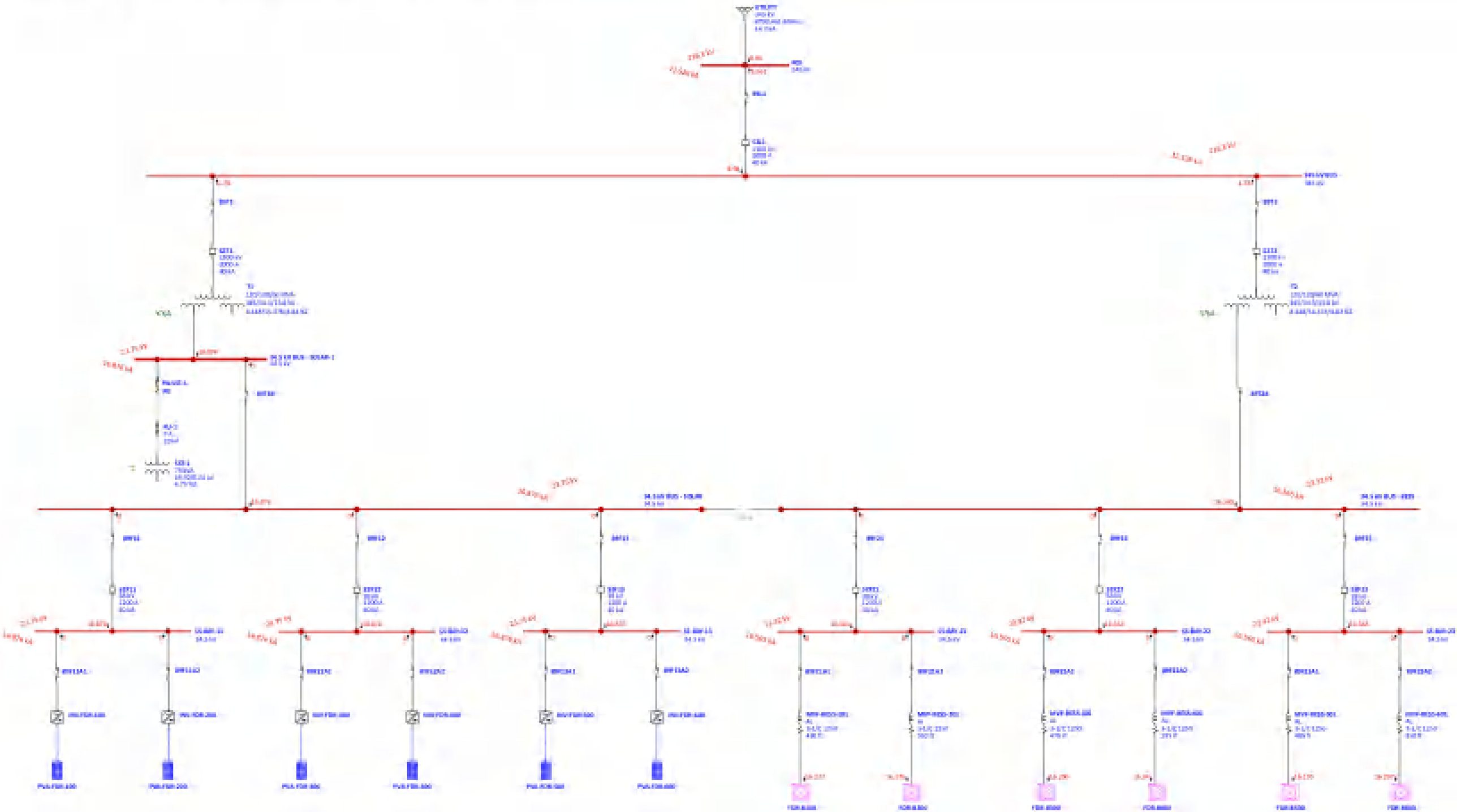


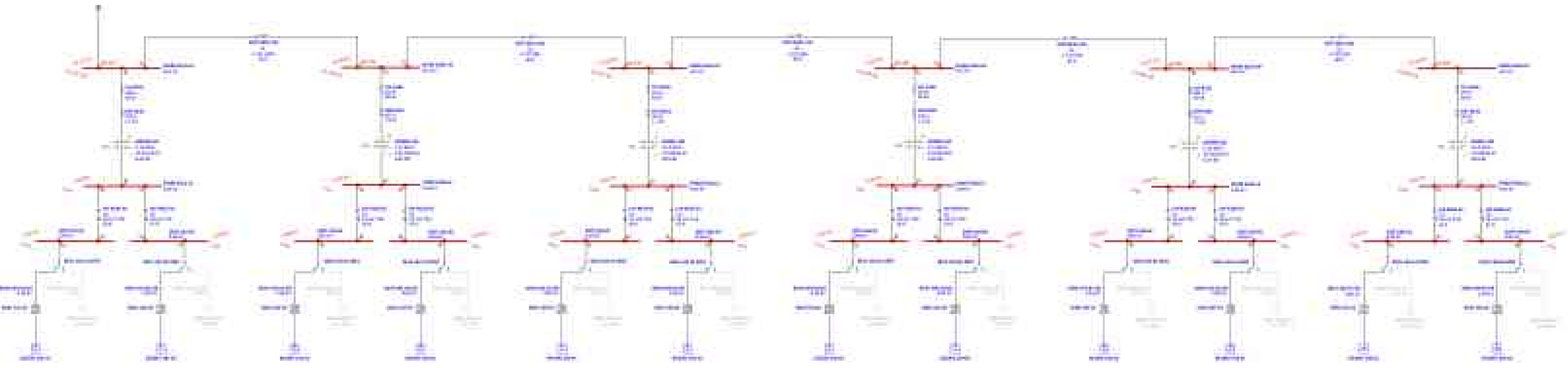


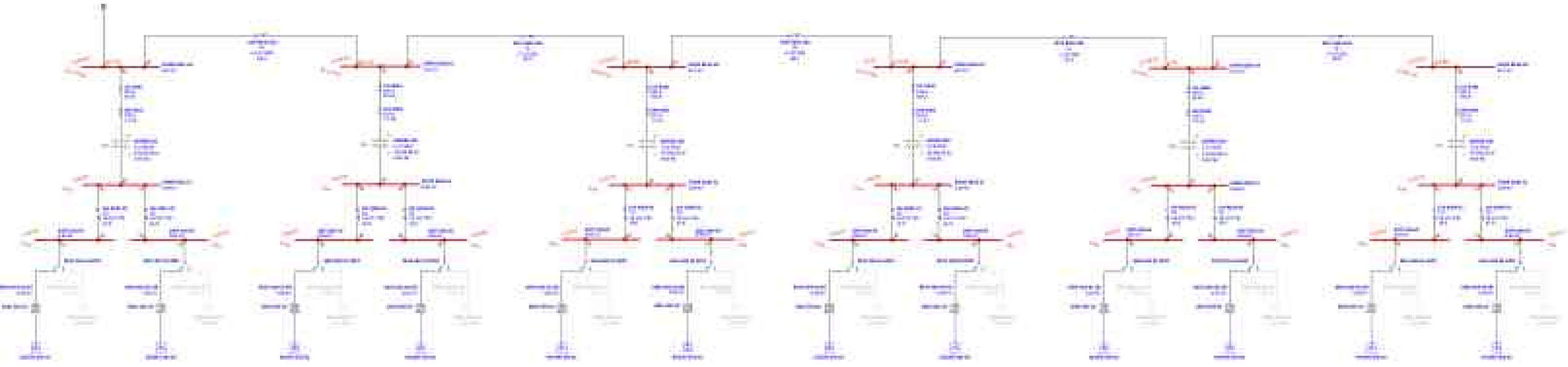


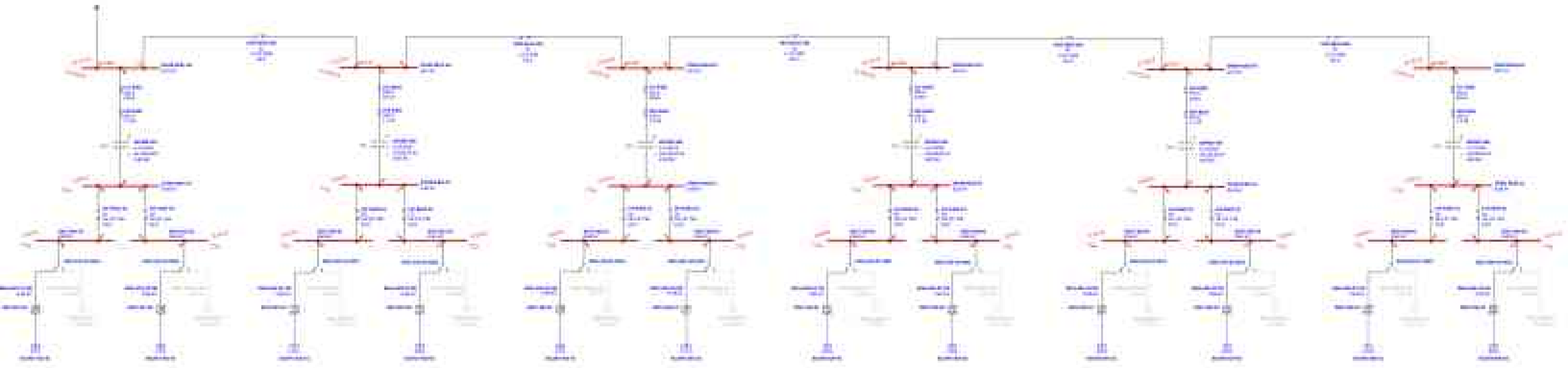


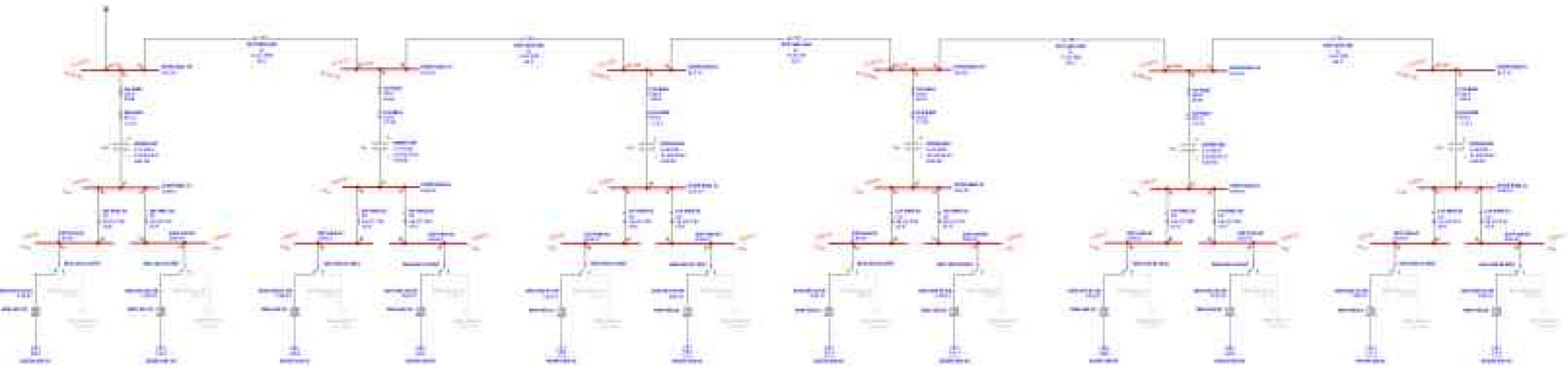
Steady-State L-G Fault Short-Circuit SLDs

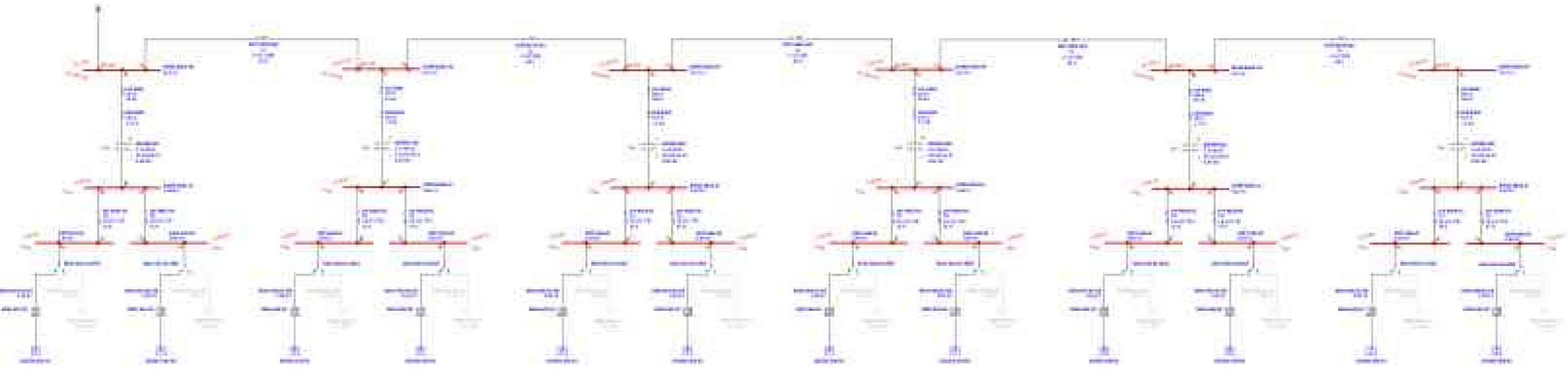


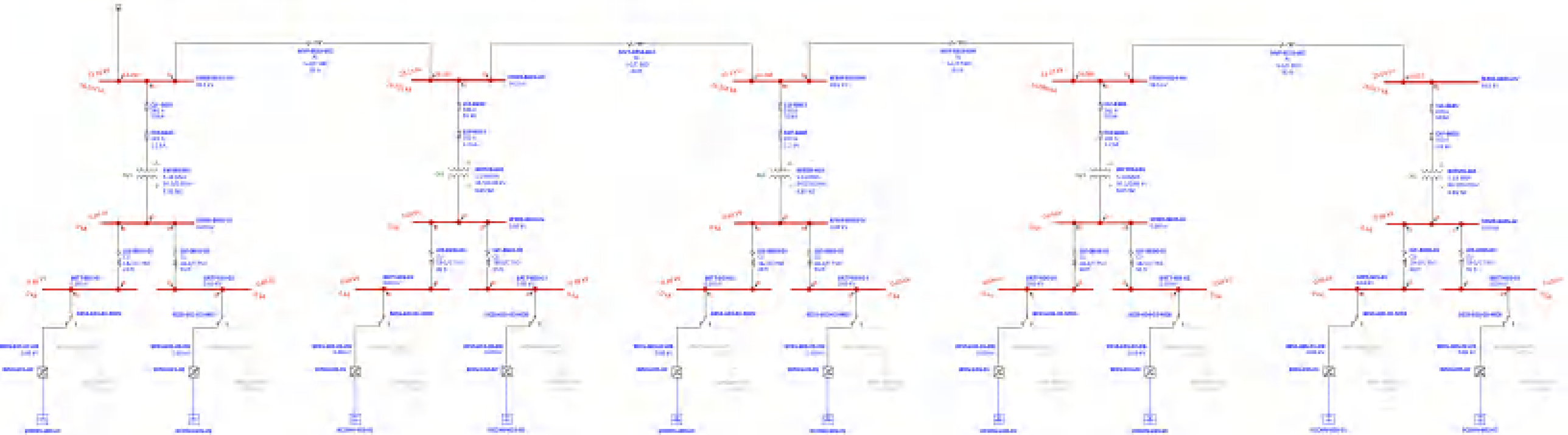




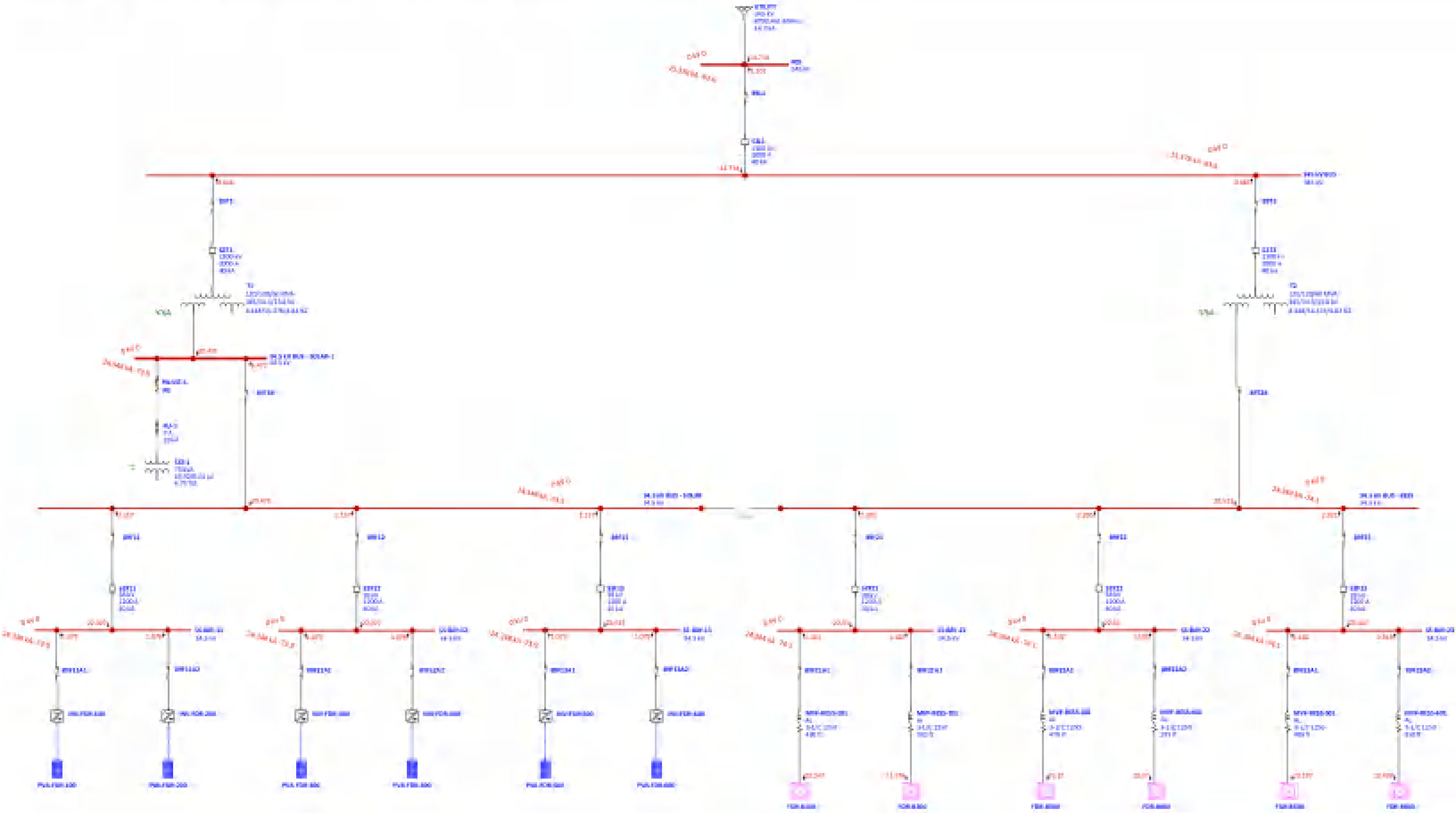


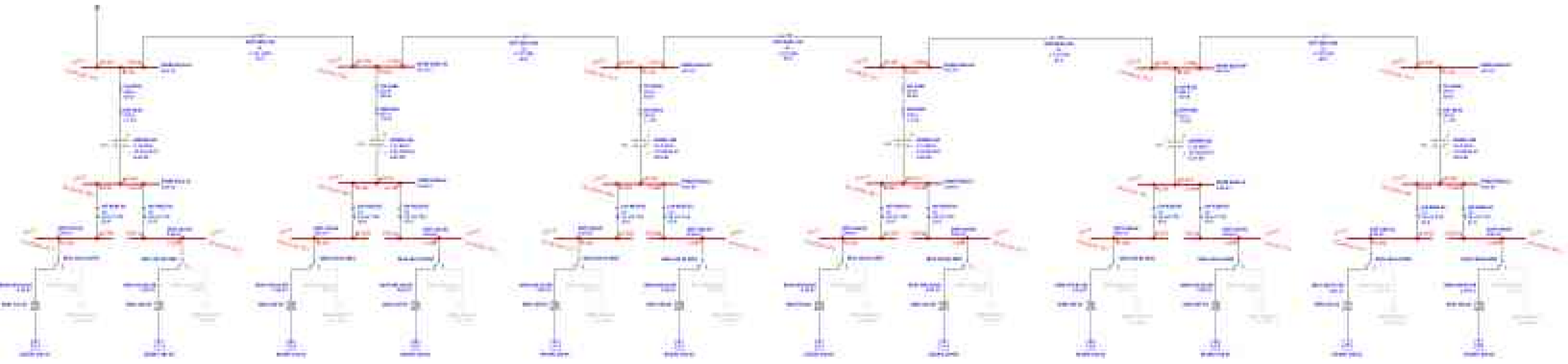


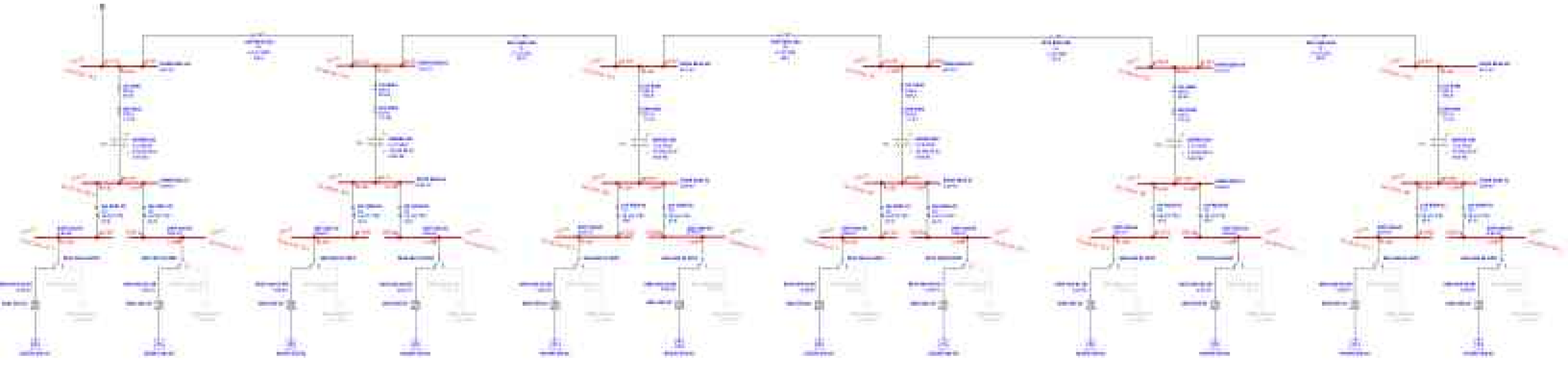


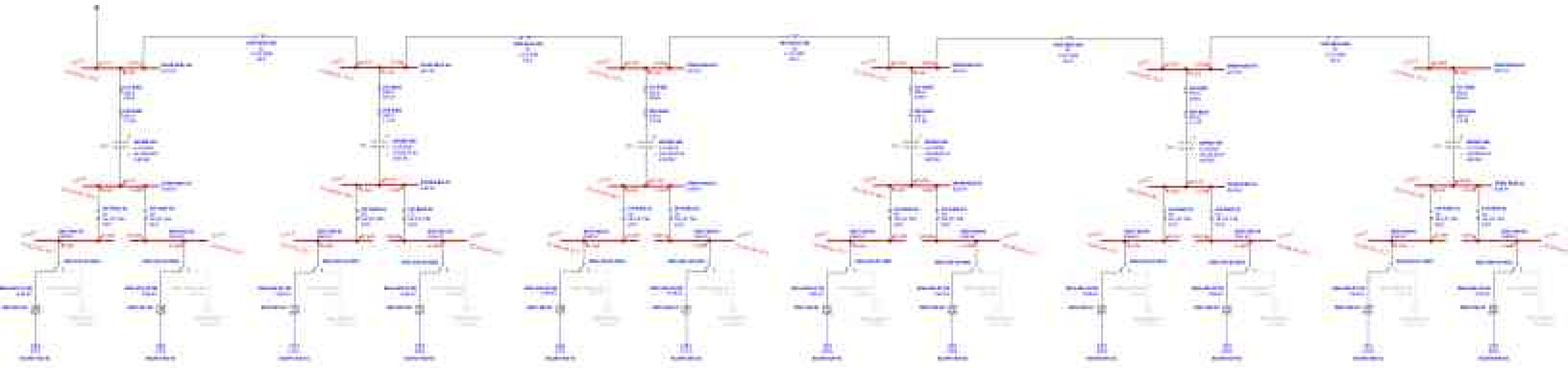


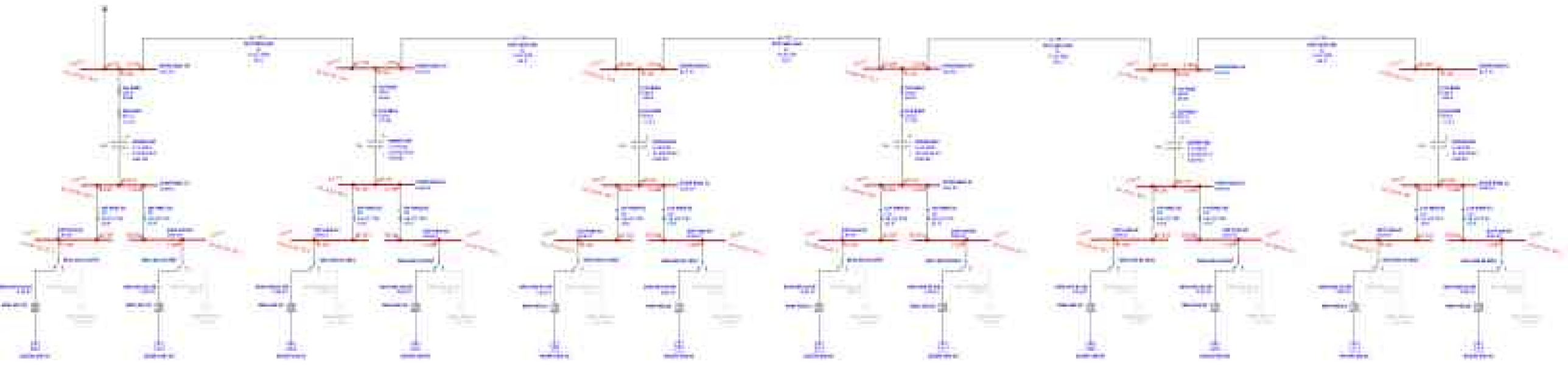
Peak 3-Ph Fault
Short-Circuit SLDs

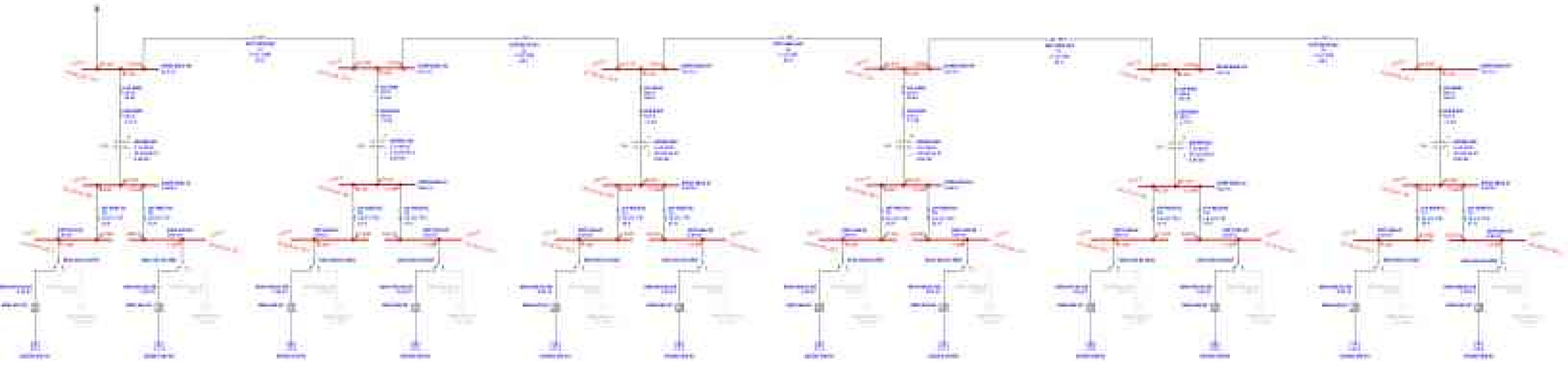




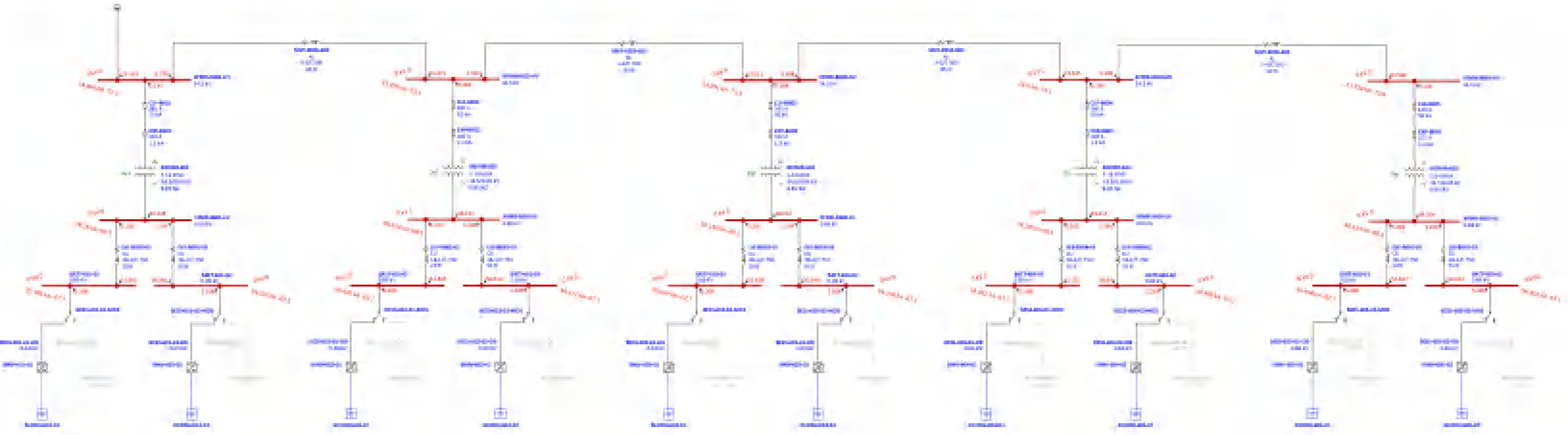




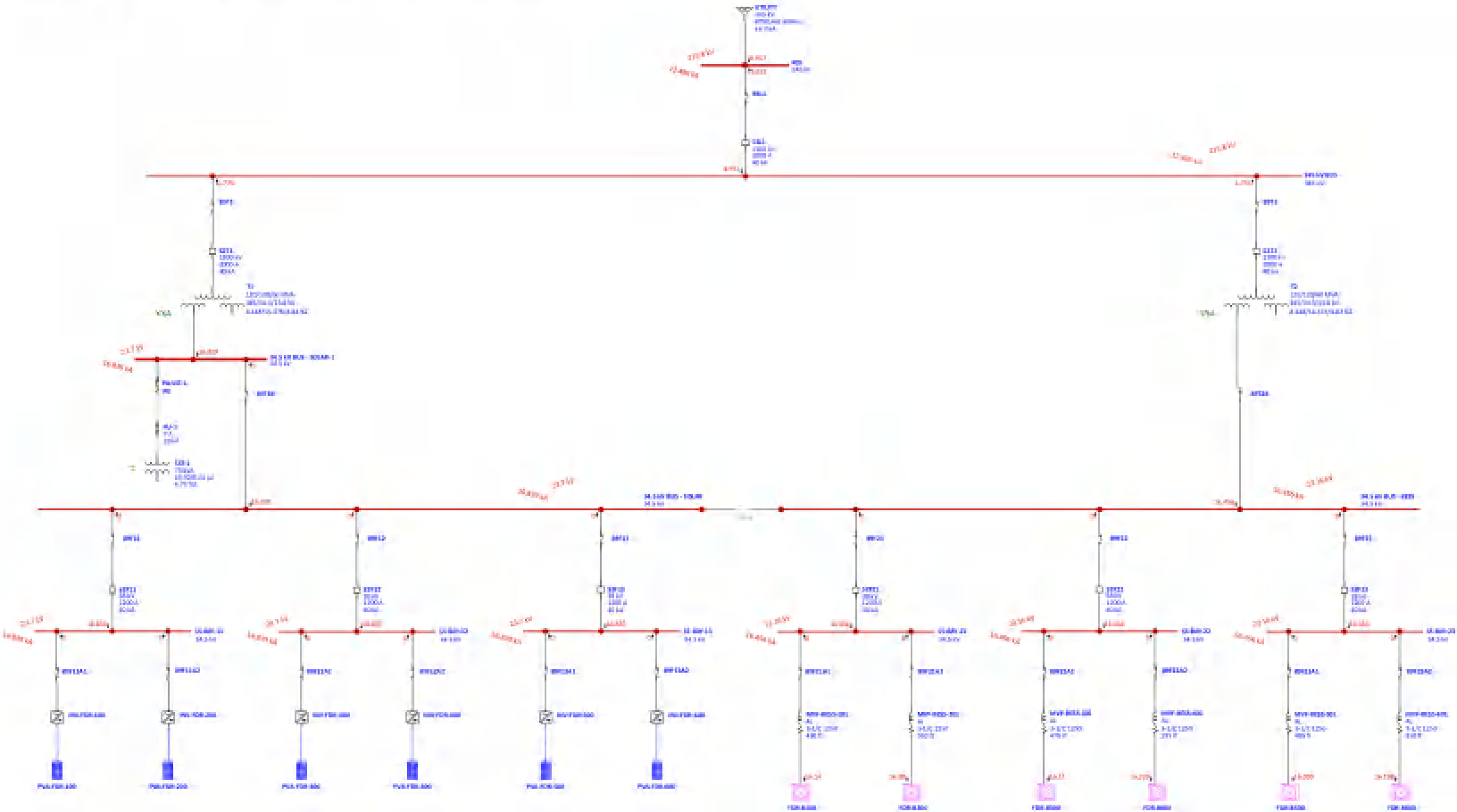


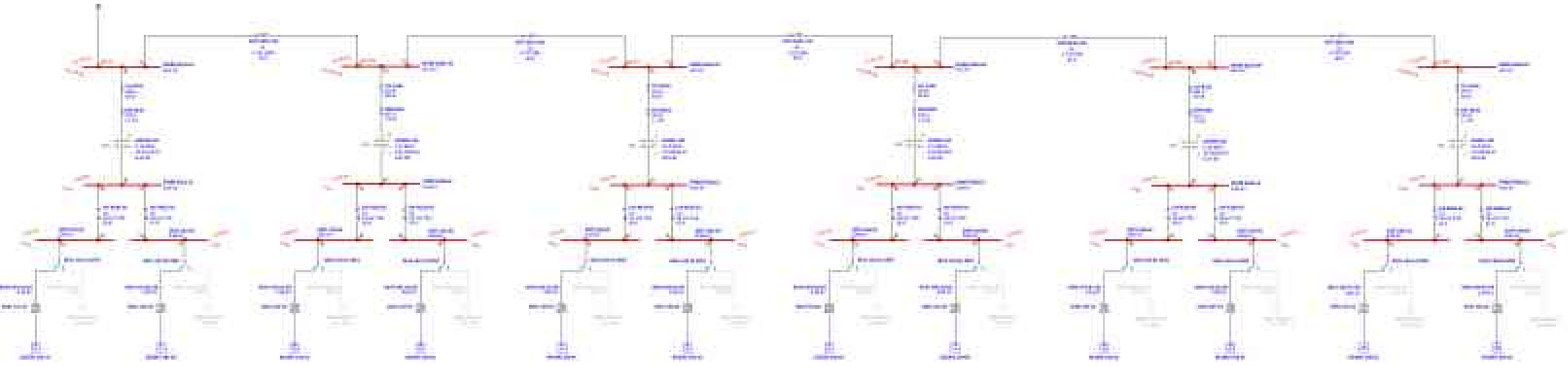


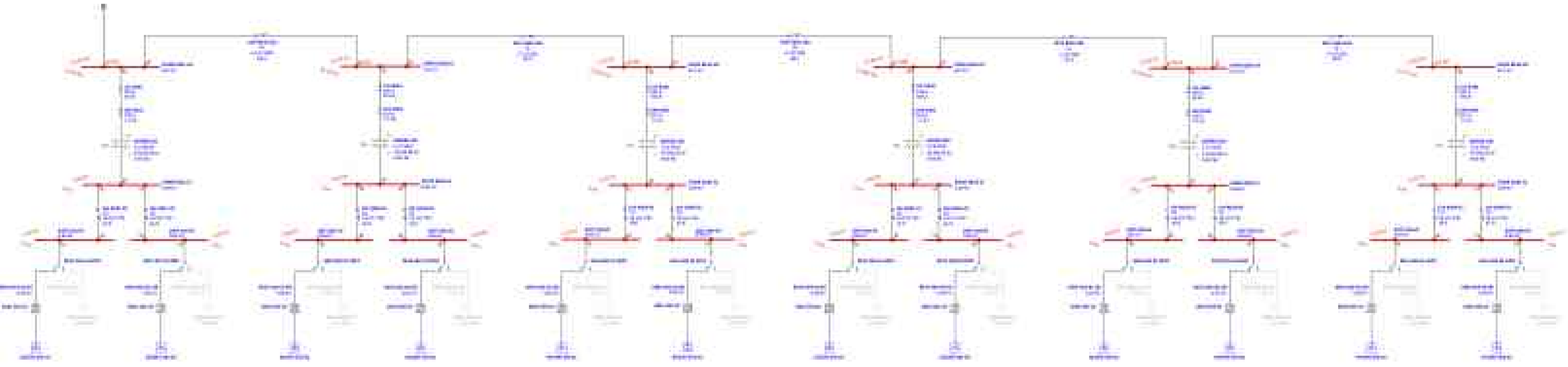
One-Line Diagram - SS->FDR-B600 | Short-Circuit Analysis | SC-Unity PF

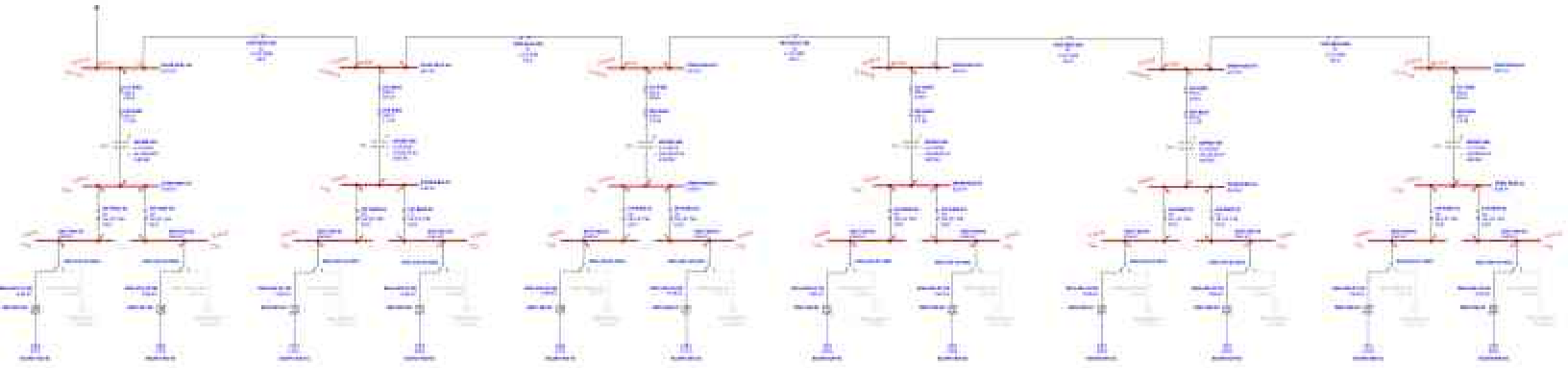


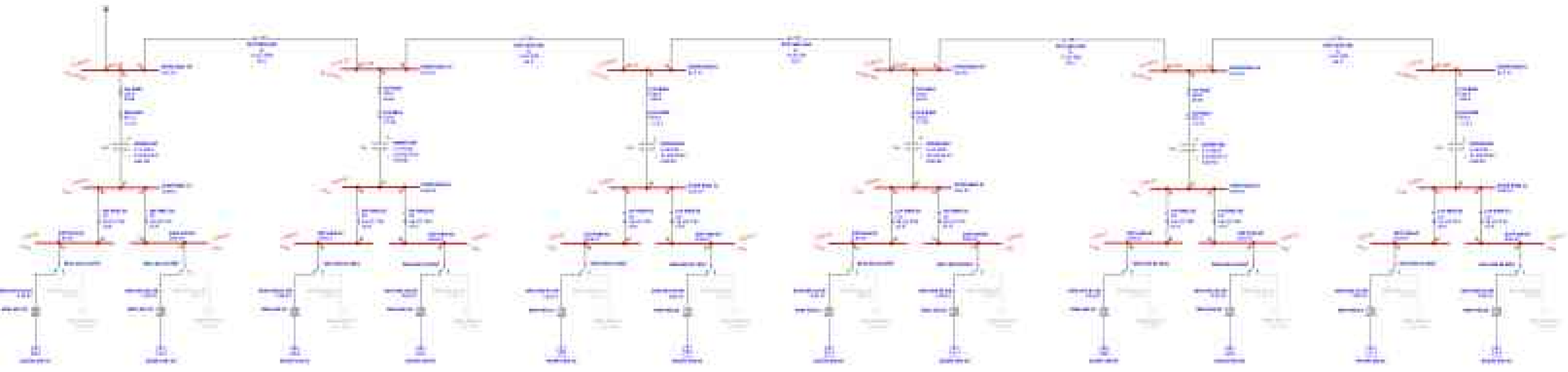
Peak L-G Fault
Short-Circuit SLDs

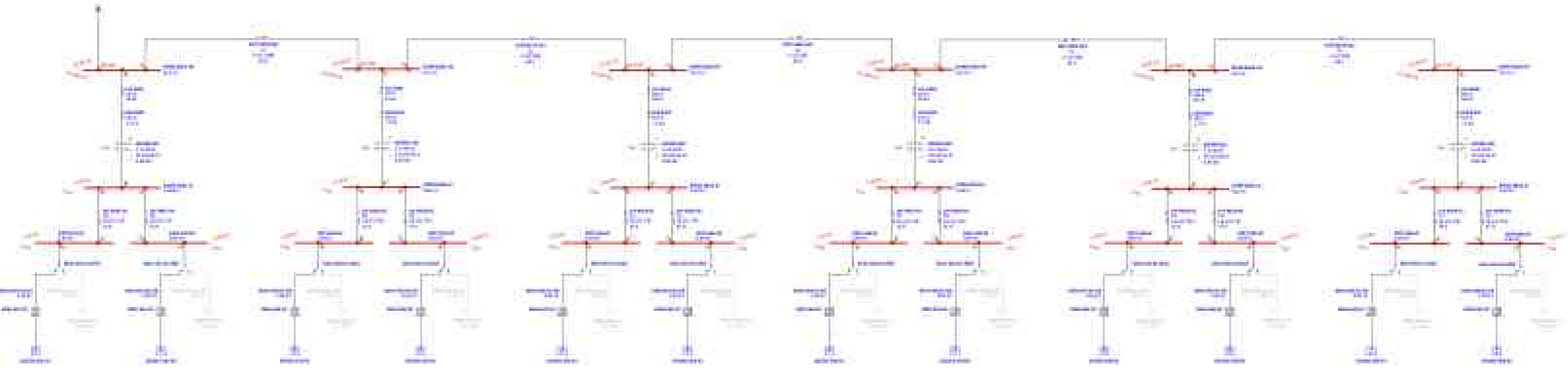


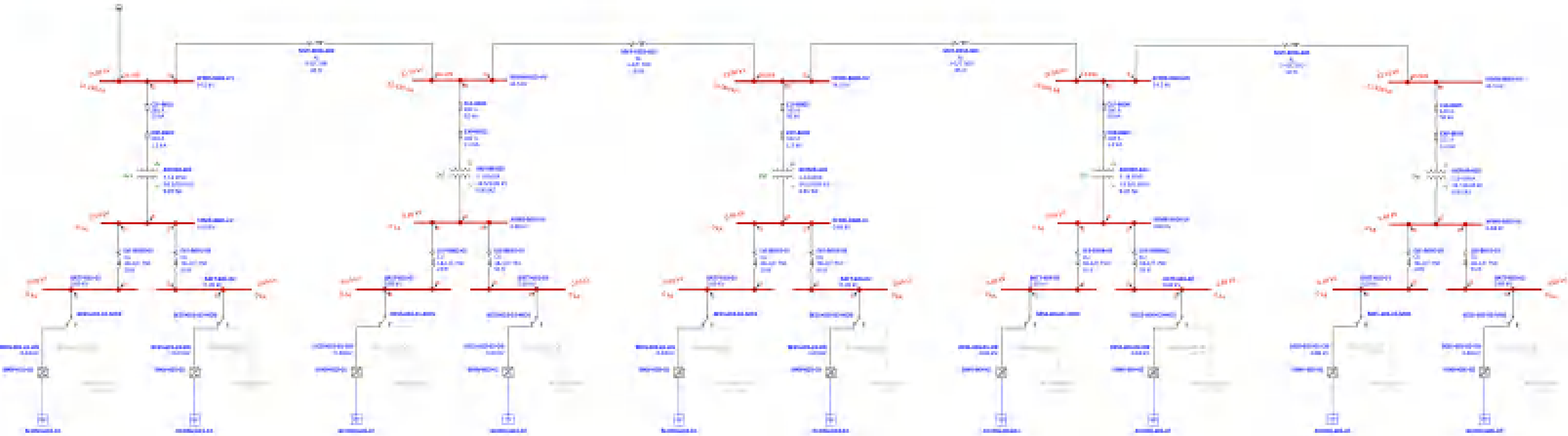












APPENDIX C – SHORT CIRCUIT REPORT

PRELIMINARY

Steady-State
Short-Circuit Report

Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, 1-Ø, L-L, & L-G Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total
Number of Buses:	1	0	1053	1054

	35 MCC	27 MCC	Bus tie	Load Center Transformer	Transformer	Tie FU	Total
Number of Branches:	35	1	0	141	4	76	257

	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machine	Lumped Load	Inverter	Total
Number of Machines:	0	1	0	4	0	76	77

System Frequency:	60.00
Unit System:	English
Project Filename:	ctp25_Chevron
Output Filename:	C:\Etap\Data - Real Power Engineering, Inc\Campus - 14.0\1 REI's - Chevron\1 Chevron\ETAP\ETAP\Power Station\Impedance\Model\SC Comp\Study Data\1.sa1

Adjustments

Indicators	Apply Adjustments	Individual Adjustment	Percent
[illegible]	No	Individual	
[illegible]	No	Individual	
[illegible]	No		
[illegible]	No		
[illegible]	No		

Temperature Corrections	Apply Adjustments	Individual System	Degrees C
[illegible]	No	Individual	
[illegible]	No	Individual	

Bus Input Data

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Subsys	%Mag.	Ang.
M-1161BUS - BUS6	Load	34.500	34.500	1	100.00	0.00
M-1161BUS - SOLAR	Load	34.500	34.500	1	100.00	0.00
M-1161BUS - SOLAR-1	Load	34.500	34.500	1	100.00	0.00
M1161BUS	Load	345.000	345.000	1	100.00	0.00
BATT-01G1	Load	0.690	0.690	1	100.00	-30.00
BATT-01G2	Load	0.690	0.690	1	100.00	-24.00
BATT-02G1	Load	0.690	0.690	1	100.00	-24.00
BATT-02G2	Load	0.690	0.690	1	100.00	-30.00
BATT-03G1	Load	0.690	0.690	1	100.00	-30.00
BATT-03G2	Load	0.690	0.690	1	100.00	-24.00
BATT-04G1	Load	0.690	0.690	1	100.00	-24.00
BATT-04G2	Load	0.690	0.690	1	100.00	-30.00
BATT-05G1	Load	0.690	0.690	1	100.00	-30.00
BATT-05G2	Load	0.690	0.690	1	100.00	-24.00
BATT-06G1	Load	0.690	0.690	1	100.00	-24.00
BATT-06G2	Load	0.690	0.690	1	100.00	-30.00
BATT-07G1	Load	0.690	0.690	1	100.00	-30.00
BATT-07G2	Load	0.690	0.690	1	100.00	-24.00
BATT-08G1	Load	0.690	0.690	1	100.00	-24.00
BATT-08G2	Load	0.690	0.690	1	100.00	-30.00
BATT-09G1	Load	0.690	0.690	1	100.00	-30.00
BATT-09G2	Load	0.690	0.690	1	100.00	-24.00
BATT-10G1	Load	0.690	0.690	1	100.00	-24.00
BATT-10G2	Load	0.690	0.690	1	100.00	-30.00
BATT-11G1	Load	0.690	0.690	1	100.00	-30.00
BATT-11G2	Load	0.690	0.690	1	100.00	-24.00
BATT-12G1	Load	0.690	0.690	1	100.00	-24.00
BATT-12G2	Load	0.690	0.690	1	100.00	-30.00
BATT-13G1	Load	0.690	0.690	1	100.00	-30.00
BATT-13G2	Load	0.690	0.690	1	100.00	-24.00
BATT-14G1	Load	0.690	0.690	1	100.00	-24.00
BATT-14G2	Load	0.690	0.690	1	100.00	-30.00
BATT-15G1	Load	0.690	0.690	1	100.00	-30.00
BATT-15G2	Load	0.690	0.690	1	100.00	-24.00
BATT-16G1	Load	0.690	0.690	1	100.00	-24.00
BATT-16G2	Load	0.690	0.690	1	100.00	-30.00
BATT-17G1	Load	0.690	0.690	1	100.00	-30.00
BATT-17G2	Load	0.690	0.690	1	100.00	-24.00
BATT-18G1	Load	0.690	0.690	1	100.00	-24.00
BATT-18G2	Load	0.690	0.690	1	100.00	-30.00
BATT-19G1	Load	0.690	0.690	1	100.00	-30.00
BATT-19G2	Load	0.690	0.690	1	100.00	-24.00
BATT-20G1	Load	0.690	0.690	1	100.00	-24.00
BATT-20G2	Load	0.690	0.690	1	100.00	-30.00
BATT-21G1	Load	0.690	0.690	1	100.00	-30.00
BATT-21G2	Load	0.690	0.690	1	100.00	-24.00
BATT-22G1	Load	0.690	0.690	1	100.00	-24.00
BATT-22G2	Load	0.690	0.690	1	100.00	-30.00
BATT-23G1	Load	0.690	0.690	1	100.00	-30.00
BATT-23G2	Load	0.690	0.690	1	100.00	-24.00
BATT-24G1	Load	0.690	0.690	1	100.00	-24.00
BATT-24G2	Load	0.690	0.690	1	100.00	-30.00
BATT-25G1	Load	0.690	0.690	1	100.00	-30.00
BATT-25G2	Load	0.690	0.690	1	100.00	-24.00
BATT-26G1	Load	0.690	0.690	1	100.00	-24.00
BATT-26G2	Load	0.690	0.690	1	100.00	-30.00
BATT-27G1	Load	0.690	0.690	1	100.00	-30.00
BATT-27G2	Load	0.690	0.690	1	100.00	-24.00
BATT-28G1	Load	0.690	0.690	1	100.00	-24.00
BATT-28G2	Load	0.690	0.690	1	100.00	-30.00
BATT-29G1	Load	0.690	0.690	1	100.00	-30.00
BATT-29G2	Load	0.690	0.690	1	100.00	-24.00
BATT-30G1	Load	0.690	0.690	1	100.00	-24.00
BATT-30G2	Load	0.690	0.690	1	100.00	-30.00
BATT-31G1	Load	0.690	0.690	1	100.00	-30.00
BATT-31G2	Load	0.690	0.690	1	100.00	-24.00
BATT-32G1	Load	0.690	0.690	1	100.00	-24.00
BATT-32G2	Load	0.690	0.690	1	100.00	-30.00
BATT-33G1	Load	0.690	0.690	1	100.00	-30.00
BATT-33G2	Load	0.690	0.690	1	100.00	-24.00
BATT-34G1	Load	0.690	0.690	1	100.00	-24.00
BATT-34G2	Load	0.690	0.690	1	100.00	-30.00
BATT-35G1	Load	0.690	0.690	1	100.00	-30.00
BATT-35G2	Load	0.690	0.690	1	100.00	-24.00
BATT-36G1	Load	0.690	0.690	1	100.00	-24.00
BATT-36G2	Load	0.690	0.690	1	100.00	-30.00
BATT-37G1	Load	0.690	0.690	1	100.00	-30.00
BATT-37G2	Load	0.690	0.690	1	100.00	-24.00
BATT-38G1	Load	0.690	0.690	1	100.00	-24.00
BATT-38G2	Load	0.690	0.690	1	100.00	-30.00
BATT-39G1	Load	0.690	0.690	1	100.00	-30.00
BATT-39G2	Load	0.690	0.690	1	100.00	-24.00
BATT-40G1	Load	0.690	0.690	1	100.00	-24.00

		Bus			Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BAT1-40345	Load	0.690	0.690	1	100.00	-30.00
BAT1-40341	Load	0.690	0.690	1	100.00	-120.00
BAT1-40343	Load	0.690	0.690	1	100.00	-270.00
BAT1-40345	Load	0.690	0.690	1	100.00	-30.00
BAT1-40342	Load	0.690	0.690	1	100.00	-150.00
BAT1-40441	Load	0.690	0.690	1	100.00	-120.00
BAT1-40442	Load	0.690	0.690	1	100.00	-120.00
BAT1-40545	Load	0.690	0.690	1	100.00	-30.00
BAT1-40543	Load	0.690	0.690	1	100.00	-150.00
BAT1-40641	Load	0.690	0.690	1	100.00	-120.00
BAT1-40643	Load	0.690	0.690	1	100.00	-270.00
BAT1-40741	Load	0.690	0.690	1	100.00	-30.00
BAT1-40743	Load	0.690	0.690	1	100.00	-150.00
BAT1-50345	Load	0.690	0.690	1	100.00	-150.00
BAT1-50341	Load	0.690	0.690	1	100.00	-120.00
BAT1-50343	Load	0.690	0.690	1	100.00	-270.00
BAT1-50441	Load	0.690	0.690	1	100.00	-120.00
BAT1-50442	Load	0.690	0.690	1	100.00	-120.00
BAT1-50541	Load	0.690	0.690	1	100.00	-30.00
BAT1-50542	Load	0.690	0.690	1	100.00	-150.00
BAT1-50641	Load	0.690	0.690	1	100.00	-120.00
BAT1-50643	Load	0.690	0.690	1	100.00	-270.00
BAT1-60345	Load	0.690	0.690	1	100.00	-150.00
BAT1-60341	Load	0.690	0.690	1	100.00	-120.00
BAT1-60343	Load	0.690	0.690	1	100.00	-270.00
BAT1-60441	Load	0.690	0.690	1	100.00	-120.00
BAT1-60442	Load	0.690	0.690	1	100.00	-120.00
BAT1-60541	Load	0.690	0.690	1	100.00	-30.00
BAT1-60542	Load	0.690	0.690	1	100.00	-150.00
BR08-103-01-001	Load	0.690	0.690	1	100.00	-30.00
BR09-103-02-001	Load	0.690	0.690	1	100.00	-150.00
BR58-103-01-001	Load	0.690	0.690	1	100.00	-120.00
BR59-103-02-001	Load	0.690	0.690	1	100.00	-270.00
BR08-104-01-001	Load	0.690	0.690	1	100.00	-30.00
BR09-104-02-001	Load	0.690	0.690	1	100.00	-150.00
BR58-104-01-001	Load	0.690	0.690	1	100.00	-120.00
BR59-104-02-001	Load	0.690	0.690	1	100.00	-270.00
BR08-105-01-001	Load	0.690	0.690	1	100.00	-30.00
BR09-105-02-001	Load	0.690	0.690	1	100.00	-150.00

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BR08-106-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR56-106-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-201-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-201-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-202-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-202-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-203-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-203-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-204-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-204-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-205-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-205-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-206-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-206-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-301-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-301-02HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-302-01HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-303-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-303-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-303-02HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-304-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-304-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-305-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-305-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR56-306-01HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-306-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-401-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-401-02HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-402-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-402-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-403-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-403-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-404-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-404-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-405-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-405-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-406-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-406-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-501-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR56-501-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-502-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-502-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-503-01HB1	Load	0.600	0.600	1	100.00	-150.00

ID	Type	Nom. kV	Base kV	Sub-sys	Initial Voltage	
					%Mag.	Ang.
BR08-B08-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B08-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B08-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B06-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B06-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B03-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B03-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B02-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B02-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B01-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B01-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-02-HH	Load	0.600	0.600	1	100.00	-30.00
PH1	SWNG	345.000	345.000	1	100.00	0.00
XX-BAT-11	Load	34.000	34.500	1	100.00	0.00
XX-BAT-12	Load	34.000	34.500	1	100.00	0.00
XX-BAT-13	Load	34.500	34.500	1	100.00	0.00
XX-BAT-21	Load	34.500	34.500	1	100.00	0.00
XX-BAT-22	Load	34.000	34.500	1	100.00	0.00
XX-BAT-23	Load	34.000	34.500	1	100.00	0.00
XFMR-B101-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B101-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B102-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B102-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B103-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B103-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B104-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B104-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B105-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B105-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B106-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B106-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B201-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B201-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B202-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B202-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B203-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B203-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B204-HV	Load	34.500	34.500	1	103.24	-4.68

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-BUS4-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS5-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS5-LV	Load	0.690	0.690	1	100.06	-30.09
XFMR-BUS6-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS6-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS7-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS7-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS8-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS8-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS9-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS9-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS10-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS10-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS11-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS11-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS12-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS12-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS13-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS13-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS14-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS14-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS15-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS15-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS16-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS16-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS17-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS17-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS18-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS18-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS19-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS19-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS20-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS20-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS21-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS21-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS22-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS22-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS23-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS23-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS24-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS24-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS25-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS25-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS26-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS26-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS27-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS27-LV	Load	0.690	0.690	1	100.00	-30.00

ID	Type	Rated kV	Base kV	Sub-sys	Nominal kV Voltage	Mag.
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
T1-3	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
T1-1	Load	[illegible]	[illegible]	1	[illegible]	[illegible]

111 Bus(s) Total

All voltages reported by ETAP are in % of bus nominal kV.
Bus kV values of buses not considered will mark unavailable for ETAP.

Project:	Chisos	ETAP		Page:	10
Location:	Brown and Mills County, TX	20.0.2C		Date:	05/01/2023
Contract:	03-49-1281			SN:	19102-RAD622
Engineer:	Pure Power Engineering	Study Case: SC Comp PF		Revision:	Base
Filename:	chp14_Chisos			Config.:	Normal

Line/Cable/Busway Input Data

Values in parenthesis (per 1000 ft (per 1 conductor) if cable) or (per Phase if Line/Busway)

Line/Cable/Busway			Length									
ID	Library	Size	Adj. (ft)	% Adj.	#/Phase	T (°C)	R1	X1	Z1	R0	X0	Z0
LV1-BUS1-01	1000CTNG	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS1-02	1000CUAL	500	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS2-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS2-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS3-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS3-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS4-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS4-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS5-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS5-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS6-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS6-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS7-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS7-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS8-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS8-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS9-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS9-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS10-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS10-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS11-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS11-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS12-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS12-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS13-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS13-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS14-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS14-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS15-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS15-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS16-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS16-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS17-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS17-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS18-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS18-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS19-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS19-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS20-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS20-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	ehp14_Chisos			Config.:	Normal

Branch connections (per 1000 ft per Conductor) (Cable) or per Phase (Line/Busway)

Line/Cable/Busway ID	Type	Size	Length (ft)	[illegible]	[illegible]	T (°C)	R (Ω)	X (Ω)	Y (S)	Z (Ω)	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Project:	Chisme	ETAP		Page:	11
Location:	Brown and Mills County, TX	20.0.2C		Date:	05/01/2023
Contract:	TX-99-1701			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisme			Config.:	Normal

Phase or Conductor per 3000 ft (per Conductor if Cable) or per Phase (Line/Bus/Duty)

Line/Cable/Branch ID	Length											
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R1	X1	Y1	R0	X0	Y0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

2-Winding Transformer Input Data

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	%Z	X/R	+ Tol	- Tol	%Tol	Prim	Sec	%Z	Type	Angle
BSTM0-01	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-02	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-03	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-04	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-05	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-06	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-07	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-08	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-09	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-10	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-11	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-12	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-13	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-14	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-15	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-16	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-17	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-18	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-19	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-20	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-21	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-22	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-23	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-24	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-25	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-26	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-27	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-28	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-29	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-30	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-31	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-32	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-33	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-34	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-35	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-36	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-37	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-38	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-39	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-40	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-41	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-42	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-43	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-44	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-45	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-46	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-47	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-48	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-49	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-50	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-51	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-52	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-53	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-54	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-55	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-56	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-57	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-58	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-59	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-60	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
BSTMB-005	5.140	34.500	0.600	8.00	20.00	0	5	-5.5	0	0	8.19	Dy	30.00

2 Winding Transformer Grounding Input Data

Transformer	Rating			Grounding								
				Conn.	Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
BSTMB-001	5.140	34.500	0.600	DY					Open			
BSTMB-002	5.140	34.500	0.600	DY					Open			
BSTMB-003	5.140	34.500	0.600	DY					Open			
BSTMB-004	5.140	34.500	0.600	DY					Open			
BSTMB-005	5.140	34.500	0.600	DY					Open			
BSTMB-006	5.140	34.500	0.600	DY					Open			
BSTMB-007	5.140	34.500	0.600	DY					Open			
BSTMB-008	5.140	34.500	0.600	DY					Open			
BSTMB-009	5.140	34.500	0.600	DY					Open			
BSTMB-010	5.140	34.500	0.600	DY					Open			
BSTMB-011	5.140	34.500	0.600	DY					Open			
BSTMB-012	5.140	34.500	0.600	DY					Open			
BSTMB-013	5.140	34.500	0.600	DY					Open			
BSTMB-014	5.140	34.500	0.600	DY					Open			
BSTMB-015	5.140	34.500	0.600	DY					Open			
BSTMB-016	5.140	34.500	0.600	DY					Open			
BSTMB-017	5.140	34.500	0.600	DY					Open			
BSTMB-018	5.140	34.500	0.600	DY					Open			
BSTMB-019	5.140	34.500	0.600	DY					Open			
BSTMB-020	5.140	34.500	0.600	DY					Open			
BSTMB-021	5.140	34.500	0.600	DY					Open			
BSTMB-022	5.140	34.500	0.600	DY					Open			
BSTMB-023	5.140	34.500	0.600	DY					Open			
BSTMB-024	5.140	34.500	0.600	DY					Open			
BSTMB-025	5.140	34.500	0.600	DY					Open			
BSTMB-026	5.140	34.500	0.600	DY					Open			
BSTMB-027	5.140	34.500	0.600	DY					Open			
BSTMB-028	5.140	34.500	0.600	DY					Open			
BSTMB-029	5.140	34.500	0.600	DY					Open			
BSTMB-030	5.140	34.500	0.600	DY					Open			
BSTMB-031	5.140	34.500	0.600	DY					Open			
BSTMB-032	5.140	34.500	0.600	DY					Open			
BSTMB-033	5.140	34.500	0.600	DY					Open			
BSTMB-034	5.140	34.500	0.600	DY					Open			
BSTMB-035	5.140	34.500	0.600	DY					Open			
BSTMB-036	5.140	34.500	0.600	DY					Open			
BSTMB-037	5.140	34.500	0.600	DY					Open			
BSTMB-038	5.140	34.500	0.600	DY					Open			
BSTMB-039	5.140	34.500	0.600	DY					Open			
BSTMB-040	5.140	34.500	0.600	DY					Open			
BSTMB-041	5.140	34.500	0.600	DY					Open			
BSTMB-042	5.140	34.500	0.600	DY					Open			
BSTMB-043	5.140	34.500	0.600	DY					Open			
BSTMB-044	5.140	34.500	0.600	DY					Open			
BSTMB-045	5.140	34.500	0.600	DY					Open			
BSTMB-046	5.140	34.500	0.600	DY					Open			
BSTMB-047	5.140	34.500	0.600	DY					Open			
BSTMB-048	5.140	34.500	0.600	DY					Open			

Project:	Chisme	ETAP		Page:	1x
Location:	Bowie and Mills County, TX	20.0.2C		Date:	05/01/2015
Contract:	TX-99-1701			SN:	PSSE-ROSE02
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp34_Chisme			Config.:	Normal

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim kV	Sec kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
BSTMS-S6	5.00	34.500	0.690	D/Y					Open			
BSTMS-S6	5.00	34.500	0.690	D/Y					Open			
BSTMS-01	5.00	34.500	0.690	D/Y					Open			
BSTMS-02	5.00	34.500	0.690	D/Y					Open			
BSTMS-03	5.00	34.500	0.690	D/Y					Open			
BSTMS-04	5.00	34.500	0.690	D/Y					Open			
BSTMS-05	5.00	34.500	0.690	D/Y					Open			

3-Winding Transformer Input Data

Transformer	Rating			Tap	Impedance				Z Variation		Phase Shift	
ID	Rating	MVA	kV	%	%Z	X/R	MVAb	%Tol	+5%	-5%	Type	Angle
T1	Primary	120.000	345.000	0	Zps =	8.45	41.58	120.000	0	0	0	
	Secondary	120.000	34.500	0	Zpt =	15.28	65.59	120.000	0			Std Pos. Seq.	0.0
	Tertiary	60.000	13.800	0	Zst =	4.85	16.78	120.000	0			Std Pos. Seq.	-30.0
T2	Primary	120.000	345.000	0	Zps =	8.45	41.58	120.000	0	0	0		
	Secondary	120.000	34.500	0	Zpt =	15.28	65.59	120.000	0			Std Pos. Seq.	0.0
	Tertiary	60.000	13.800	0	Zst =	4.85	16.78	120.000	0			Std Pos. Seq.	-30.0

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding				
ID	Rating	MVA	kV	Type	Type	kV	Amp	ohm
T1	Primary	120.000	345.000	Wye	Solid			
	Secondary	120.000	34.500	Wye	Resistor		399.12	4.8000
	Tertiary	60.000	13.800	Delta				
T2	Primary	120.000	345.000	Wye	Solid			
	Secondary	120.000	34.500	Wye	Resistor		399.12	4.8000
	Tertiary	60.000	13.800	Delta				

Branch Connections

CKT/Branch		Connected Bus ID		To Impedance, Pos. Seq., 100 MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	2W XFMR	[illegible]	[illegible]	1.163	138.05	138.05

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
	2W Xfmr	[illegible]	T1-1	0.24	1.67	1.68	
T2	2W Xfmr	[illegible]	[illegible]	0.30	1.62	1.65	
	2W Xfmr	[illegible]	T2-1	1.86	10.95	11.11	
	2W Xfmr	[illegible]	T3-1	0.24	1.67	1.68	
L95-A618-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L97-B819-02	Cable	[illegible]	[illegible]	3.65	9.56	4.84	0.000017
L96-A620-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A620-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B820-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A619-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A619-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B819-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A618-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A618-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B818-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A617-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A617-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B817-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A616-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A616-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B816-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A615-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A615-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B815-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A614-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A614-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B814-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A613-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A613-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B813-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A612-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A612-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B812-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A611-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A611-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B811-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Cable	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisma	ETAP		Page:	18
Location:	Brown and Mills County, TX	24.0.2C		Date:	07/31/2023
Contract:	TX-99-1701			SN:	PORT-BOA602
Engineer:	Port Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	chp24_Chisma			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
XFMR-BUS6-LV1	Cable	BUS6033-A1	XFMR-A1-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-LV2	Cable	BUS6033-B1	XFMR-B1-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-LV3	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-LV4	Cable	BUS6033-A2	XFMR-A2-PRI	0.02	0.05	0.05	0.0012500
XFMR-BUS6-TV1	Cable	BUS6033-A3	XFMR-A3-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV2	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV3	Cable	BUS6033-A4	XFMR-A4-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV4	Cable	BUS6033-B2	XFMR-B2-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV5	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV6	Cable	BUS6033-A5	XFMR-A5-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV7	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV8	Cable	BUS6033-A6	XFMR-A6-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV9	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV10	Cable	BUS6033-A7	XFMR-A7-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV11	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV12	Cable	BUS6033-A8	XFMR-A8-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV13	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV14	Cable	BUS6033-A9	XFMR-A9-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV15	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV16	Cable	BUS6033-A10	XFMR-A10-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV17	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV18	Cable	BUS6033-A11	XFMR-A11-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV19	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV20	Cable	BUS6033-A12	XFMR-A12-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV21	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV22	Cable	BUS6033-A13	XFMR-A13-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV23	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV24	Cable	BUS6033-A14	XFMR-A14-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV25	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV26	Cable	BUS6033-A15	XFMR-A15-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV27	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV28	Cable	BUS6033-A16	XFMR-A16-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV29	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV30	Cable	BUS6033-A17	XFMR-A17-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV31	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV32	Cable	BUS6033-A18	XFMR-A18-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV33	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV34	Cable	BUS6033-A19	XFMR-A19-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV35	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV36	Cable	BUS6033-A20	XFMR-A20-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV37	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV38	Cable	BUS6033-A21	XFMR-A21-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV39	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV40	Cable	BUS6033-A22	XFMR-A22-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV41	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV42	Cable	BUS6033-A23	XFMR-A23-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV43	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV44	Cable	BUS6033-A24	XFMR-A24-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV45	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV46	Cable	BUS6033-A25	XFMR-A25-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV47	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV48	Cable	BUS6033-A26	XFMR-A26-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV49	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV50	Cable	BUS6033-A27	XFMR-A27-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV51	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV52	Cable	BUS6033-A28	XFMR-A28-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV53	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV54	Cable	BUS6033-A29	XFMR-A29-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV55	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV56	Cable	BUS6033-A30	XFMR-A30-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV57	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV58	Cable	BUS6033-A31	XFMR-A31-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV59	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV60	Cable	BUS6033-A32	XFMR-A32-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV61	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV62	Cable	BUS6033-A33	XFMR-A33-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV63	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV64	Cable	BUS6033-A34	XFMR-A34-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV65	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV66	Cable	BUS6033-A35	XFMR-A35-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV67	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV68	Cable	BUS6033-A36	XFMR-A36-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV69	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV70	Cable	BUS6033-A37	XFMR-A37-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV71	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV72	Cable	BUS6033-A38	XFMR-A38-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV73	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV74	Cable	BUS6033-A39	XFMR-A39-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV75	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV76	Cable	BUS6033-A40	XFMR-A40-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV77	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV78	Cable	BUS6033-A41	XFMR-A41-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV79	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV80	Cable	BUS6033-A42	XFMR-A42-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV81	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV82	Cable	BUS6033-A43	XFMR-A43-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV83	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV84	Cable	BUS6033-A44	XFMR-A44-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV85	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV86	Cable	BUS6033-A45	XFMR-A45-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV87	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV88	Cable	BUS6033-A46	XFMR-A46-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV89	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV90	Cable	BUS6033-A47	XFMR-A47-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV91	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV92	Cable	BUS6033-A48	XFMR-A48-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV93	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV94	Cable	BUS6033-A49	XFMR-A49-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV95	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV96	Cable	BUS6033-A50	XFMR-A50-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV97	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV98	Cable	BUS6033-A51	XFMR-A51-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV99	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV100	Cable	BUS6033-A52	XFMR-A52-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV101	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV102	Cable	BUS6033-A53	XFMR-A53-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV103	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV104	Cable	BUS6033-A54	XFMR-A54-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV105	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV106	Cable	BUS6033-A55	XFMR-A55-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV107	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV108	Cable	BUS6033-A56	XFMR-A56-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV109	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV110	Cable	BUS6033-A57	XFMR-A57-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV111	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV112	Cable	BUS6033-A58	XFMR-A58-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV113	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV114	Cable	BUS6033-A59	XFMR-A59-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV115	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV116	Cable	BUS6033-A60	XFMR-A60-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV117	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV118	Cable	BUS6033-A61	XFMR-A61-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV119	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV120	Cable	BUS6033-A62	XFMR-A62-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV121	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV122	Cable	BUS6033-A63	XFMR-A63-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV123	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV124	Cable	BUS6033-A64	XFMR-A64-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV125	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV126	Cable	BUS6033-A65	XFMR-A65-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV127	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV128	Cable	BUS6033-A66	XFMR-A66-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV129	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV130	Cable	BUS6033-A67	XFMR-A67-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV131	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV132	Cable	BUS6033-A68	XFMR-A68-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV133	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV134	Cable	BUS6033-A69	XFMR-A69-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV135	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV136	Cable	BUS6033-A70	XFMR-A70-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV137	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV138	Cable	BUS6033-A71	XFMR-A71-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV139	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV140	Cable	BUS6033-A72	XFMR-A72-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV141	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV142	Cable	BUS6033-A73	XFMR-A73-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV143	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV144	Cable	BUS6033-A74	XFMR-A74-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV145	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV146	Cable	BUS6033-A75	XFMR-A75-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV147	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV148	Cable	BUS6033-A76	XFMR-A76-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV149	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV150	Cable	BUS6033-A77	XFMR-A77-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV151	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV152	Cable	BUS6033-A78	XFMR-A78-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV153	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV154	Cable	BUS6033-A79	XFMR-A79-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV155	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV156	Cable	BUS6033-A80	XFMR-A80-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV157	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV158	Cable	BUS6033-A81	XFMR-A81-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV159	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV160	Cable	BUS6033-A82	XFMR-A82-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV161	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV162	Cable	BUS6033-A83	XFMR-A83-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV163	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV164	Cable	BUS6033-A84	XFMR-A84-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV165	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV166	Cable	BUS6033-A85	XFMR-A85-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV167	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV168	Cable	BUS6033-A86	XFMR-A86-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV169	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV170	Cable	BUS6033-A87	XFMR-A87-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV171	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV172	Cable	BUS6033-A88	XFMR-A88-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV173	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV174	Cable	BUS6033-A89	XFMR-A89-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV175	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV176	Cable	BUS6033-A90	XFMR-A90-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV177	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV178	Cable	BUS6033-A91	XFMR-A91-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV179	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV180	Cable	BUS6033-A92	XFMR-A92-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV181	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV182	Cable	BUS6033-A93	XFMR-A93-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV183	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV184	Cable	BUS6033-A94	XFMR-A94-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV185	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV186	Cable	BUS6033-A95	XFMR-A95-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV187	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV188	Cable	BUS6033-A96	XFMR-A96-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV189	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV190	Cable	BUS6033-A97	XFMR-A97-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV191	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV192	Cable	BUS6033-A98	XFMR-A98-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV193	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV194	Cable	BUS6033-A99	XFMR-A99-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV195	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV196	Cable	BUS6033-A100	XFMR-A100-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV197	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV198	Cable	BUS6033-A101	XFMR-A101-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV199	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV200	Cable	BUS6033-A102	XFMR-A102-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV201	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV202	Cable	BUS6033-A103	XFMR-A103-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV203	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV204	Cable	BUS6033-A104	XFMR-A104-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV205	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV206	Cable	BUS6033-A105	XFMR-A105-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV207	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV208	Cable	BUS6033-A106	XFMR-A106-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV209	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV210	Cable	BUS6033-A107	XFMR-A107-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV211	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV212	Cable	BUS6033-A108	XFMR-A108-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV213	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV214	Cable	BUS6033-A109	XFMR-A109-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV215	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV216	Cable	BUS6033-A110	XFMR-A110-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV217	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV218	Cable	BUS6033-A111	XFMR-A111-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV219	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV220	Cable	BUS6033-A112	XFMR-A112-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV221	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV222	Cable	BUS6033-A113	XFMR-A113-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV223	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV224	Cable	BUS6033-A114	XFMR-A114-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV225	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV226	Cable	BUS6033-A115	XFMR-A115-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV227	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV228	Cable	BUS6033-A116	XFMR-A116-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV229	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV230	Cable	BUS6033-A117	XFMR-A117-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV231	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV232	Cable	BUS6033-A118	XFMR-A118-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV233	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV234	Cable	BUS6033-A119	XFMR-A119-PRI	0.01	0.03	0.03

Project:	Chisma	ETAP		Page:	12
Location:	Brown and Mills County, TX	24.0.2C		Date:	05/01/2023
Contract:	EX-99-1701			SN:	PSSE-ROAD22
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisma			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Tie Breaker	[illegible]	[illegible]			

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
BESS-402-0.48/0.8	Ty Switch	BATT-402-UI	BESS-402-0.48/0.8				
BESS-403-0.48/0.8	Ty Switch	BATT-403-UI	BESS-403-0.48/0.8				
BESS-404-0.48/0.8	Ty Switch	BATT-404-UI	BESS-404-0.48/0.8				
BESS-405-0.48/0.8	Ty Switch	BATT-405-UI	BESS-405-0.48/0.8				
BESS-406-0.48/0.8	Ty Switch	BATT-406-UI	BESS-406-0.48/0.8				
BESS-407-0.48/0.8	Ty Switch	BATT-407-UI	BESS-407-0.48/0.8				
BESS-408-0.48/0.8	Ty Switch	BATT-408-UI	BESS-408-0.48/0.8				
BESS-409-0.48/0.8	Ty Switch	BATT-409-UI	BESS-409-0.48/0.8				
BESS-410-0.48/0.8	Ty Switch	BATT-410-UI	BESS-410-0.48/0.8				
BESS-411-0.48/0.8	Ty Switch	BATT-411-UI	BESS-411-0.48/0.8				
BESS-412-0.48/0.8	Ty Switch	BATT-412-UI	BESS-412-0.48/0.8				
BESS-413-0.48/0.8	Ty Switch	BATT-413-UI	BESS-413-0.48/0.8				
BESS-414-0.48/0.8	Ty Switch	BATT-414-UI	BESS-414-0.48/0.8				
BESS-415-0.48/0.8	Ty Switch	BATT-415-UI	BESS-415-0.48/0.8				
BESS-416-0.48/0.8	Ty Switch	BATT-416-UI	BESS-416-0.48/0.8				
BESS-417-0.48/0.8	Ty Switch	BATT-417-UI	BESS-417-0.48/0.8				
BESS-418-0.48/0.8	Ty Switch	BATT-418-UI	BESS-418-0.48/0.8				
BESS-419-0.48/0.8	Ty Switch	BATT-419-UI	BESS-419-0.48/0.8				
BESS-420-0.48/0.8	Ty Switch	BATT-420-UI	BESS-420-0.48/0.8				
BESS-421-0.48/0.8	Ty Switch	BATT-421-UI	BESS-421-0.48/0.8				
BESS-422-0.48/0.8	Ty Switch	BATT-422-UI	BESS-422-0.48/0.8				
BESS-423-0.48/0.8	Ty Switch	BATT-423-UI	BESS-423-0.48/0.8				
BESS-424-0.48/0.8	Ty Switch	BATT-424-UI	BESS-424-0.48/0.8				
BESS-425-0.48/0.8	Ty Switch	BATT-425-UI	BESS-425-0.48/0.8				
BESS-426-0.48/0.8	Ty Switch	BATT-426-UI	BESS-426-0.48/0.8				
BESS-427-0.48/0.8	Ty Switch	BATT-427-UI	BESS-427-0.48/0.8				
BESS-428-0.48/0.8	Ty Switch	BATT-428-UI	BESS-428-0.48/0.8				
BESS-429-0.48/0.8	Ty Switch	BATT-429-UI	BESS-429-0.48/0.8				
BESS-430-0.48/0.8	Ty Switch	BATT-430-UI	BESS-430-0.48/0.8				
BESS-431-0.48/0.8	Ty Switch	BATT-431-UI	BESS-431-0.48/0.8				
BESS-432-0.48/0.8	Ty Switch	BATT-432-UI	BESS-432-0.48/0.8				
BESS-433-0.48/0.8	Ty Switch	BATT-433-UI	BESS-433-0.48/0.8				
BESS-434-0.48/0.8	Ty Switch	BATT-434-UI	BESS-434-0.48/0.8				
BESS-435-0.48/0.8	Ty Switch	BATT-435-UI	BESS-435-0.48/0.8				
BESS-436-0.48/0.8	Ty Switch	BATT-436-UI	BESS-436-0.48/0.8				

Power Grid Input Data

Power Grid	Connected Bus	Rating		% Positive Seq. Impedance (100 MVA Base)			Grounding	% Zero Seq. Impedance (100 MVA Base)		
ID	ID	kV	Type	R	X	Z	Type	R	X	Z
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

SHORT-CIRCUIT REPORT

Fault at bus: **34.5 kV BUS - BUS6**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - BUS6	Total	0.00	27.041	0.00	117.06	116.98	46.565	46.565	2.368+00	8.078+000	1.780+001	1.505+001
# 34.5 kV BUS	34.5 kV BUS - BUS6	86.33	23.602	60.61	99.24	99.80	41.111	41.111	4.948+00	6.582+000	1.781+002	4.068+001
# T2-1	34.5 kV BUS - BUS6	13.79	3.183	84.00	68.13	103.96	6.932	69.431 *	6.948+000	3.078+001	3.926+001	3.599+001
XFMR-BUS1-HV	SS4BAY-21	0.06	0.634	0.05	117.05	116.12	0.579	0.000	1.54E+002	2.25E+002		
XFMR-BUS1-HV	SS4BAY-21	0.04	0.532	0.05	117.08	116.11	0.431	0.000	1.85E+002	2.69E+002		
XFMR-BUS1-HV	SS4BAY-22	0.06	0.634	0.05	117.05	116.12	0.579	0.000	1.54E+002	2.25E+002		
XFMR-BUS1-HV	SS4BAY-22	0.04	0.634	0.05	117.08	116.11	0.579	0.000	1.54E+002	2.25E+002		
XFMR-BUS1-HV	SS4BAY-21	0.06	0.634	0.05	117.08	116.12	0.579	0.000	1.54E+002	2.25E+002		
XFMR-BUS1-HV	SS4BAY-21	0.07	0.634	0.06	117.05	116.13	0.579	0.000	1.54E+002	2.25E+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - SOLAR	Total	0.00	23.400	0.00	119.26	118.26	36.876	36.876	2.308E+000	8.478E+000	1.760E-001	1.930E+001
34.5 kV BUS	34.5 kV Bus - SOLAR-1	86.53	23.004	90.58	99.69	99.93	34.869	6.247	2.308E+000	8.529E+000	1.710E-002	4.065E+001
T1-1	34.5 kV Bus - SOLAR-1	19.76	5.171	83.45	66.49	166.12	1.826	30.630 *	9.110E+000	2.160E+001	8.710E-001	2.368E+001
INV-1DR-500	500-BAY-1	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-600	500-BAY-1	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-100	500-BAY-2	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-400	500-BAY-2	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-100	500-BAY-3	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-200	500-BAY-3	0.00	0.520	0.00	119.26	118.26	0.494	0.000				

\# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR-1**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - SOLAR-1	Total	0.00	23.490	0.00	119.26	118.26	36.876	36.876	2.30E+000	8.27E+000	1.76E-001	1.93E+000
4 345 kV BUS	34.5 kV Bus - SOLAR-1	86.13	23.004	90.58	99.69	99.93	14.869	6.247	3.30E+000	6.52E+000	1.73E-002	4.06E+000
571-1	34.5 kV Bus - SOLAR-1	19.78	5.171	83.45	99.49	109.12	1.820	30.630 *	9.10E+000	2.98E+001	4.73E-001	2.34E+000
INV-1DR-500	500-BAY-1	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-600	500-BAY-10	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-100	500-BAY-2	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-400	500-BAY-2	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-100	500-BAY-3	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-1DR-200	500-BAY-3	0.00	0.520	0.00	119.26	118.26	0.494	0.000				

\# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **340 kV 1R-N**

Prefault voltage = 340.000 kV = 100.00 % of nominal bus kV (340.000 kV)
= 100.00 % of Base kV (340.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC	R1	X1	R0	X0
340 kV 1R-N	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00000	0.00000	0.00000	0.00000
[illegible]	[illegible]	1.141	1.141	0.00	120.00	120.00	0.000	0.000	1.42E+000	0.00E+000	2.23E+001	6.27E+001
[illegible]	[illegible]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	0.00E+000	0.00E+000	0.00E+000	0.00E+000
[illegible]	[illegible]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	0.00E+000	0.00E+000	0.00E+000	0.00E+000
[illegible]	[illegible]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	0.00E+000	0.00E+000	0.00E+000	0.00E+000
[illegible]	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00000	0.00000	0.00000	0.00000

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	26
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B421 [0141]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			X/R Ratio		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **8421 [0140]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **84TT4824H**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	29
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: 10: Comp: 84		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **84T1 (42 kV)**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus			3I0 Symm. kA		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Ransom and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **R427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. Amp	% Voltage at From Bus 3a	3b	3c	Ia Symm. Amp	3I0	R1	X1	R0	X0
R427 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	R427 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **B427 (40 kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ip Symm. kA	% Voltage at From Bus			3I0 Symm. mag.		R1	X1	R0	X0
				3a	3b	3c	3I0	3A0				
B427 (40 kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 (4641**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	Ik Symm. rms.	% Voltage at From Bus			kA Symm. rms.		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
B427 (4641	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 (4641	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	33
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			Ik Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
B427 [illegible]	Total	[illegible]	42.286	[illegible]	111.0	170.0	[illegible]	[illegible]	1.866+j0.0	2.778+j0.0		
[illegible]	B427 [illegible]	4.47	40.991	0.00	111.0	170.0	[illegible]	[illegible]	4.111+j0.0	1.628+j0.0		
[illegible]	[illegible]	[illegible]	[illegible]	0.00	111.0	170.0	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value weighted by fault current contribution (IEC) from a generator (Unbal. Y transformer)

Project:	Chemin	**ETAP**		Page:	24
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe24_2.lfanalyz			Config:	Normal

Fault at bus: **B423-10P4H**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Ransom and Wells Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-109-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
B421-109-01	Total	[illegible]	42.221	[illegible]	111.0	170.21	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	4.47	10.191	[illegible]	111.0	170.21	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	111.0	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemic	**ETAP**		Page:	26
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 (0604)**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"									
		3-Phase Fault		Line-to-Ground Fault									
				% Voltage at From Bus									
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemtr	**ETAP**		Page:	17
Location:	Borger and Wells Counties, TX			Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PAPER
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B421 (96.0)**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Amp Sym.	I/c X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I" k Amp sym. A	I" k Amp sym. B	R1	X1	R0	X0
B421 (96.0)	Total	0.00	42.333	0.00	111.32	170.21	0.000	0.000	1.978+j0.000	1.778+j0.000		
B1008 (96.0) [L]	B421 (96.0)	0.47	40.788	0.00	111.32	170.21	0.000	0.000	1.978+j0.000	1.778+j0.000		
B999 (96.0)	B1008 (96.0) [LB]	0.00	0.000	0.00	111.32	170.21	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, motor, or utility

Project:	Chemo	**ETAP**		Page:	16
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **84T1 (84 kV)**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a0	3a1	3a2	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [0.48 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				1a	1b	1c	3I	3I0	R1	X1	R0	X0
B427 [0.48 kV]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	44
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B4T1382-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CooperBusses		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	Voltage at From Bus A	Voltage at From Bus B	Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B4T1302 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	I0	R1	X1	R0	X0
B4T1302 #2	From	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	42
Location:	Borger and Wells Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **84T1 [0.48 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus			I/c Symm. rms		R1	X1	R0	X0
				A	B	C	3I0	1I0				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Wells Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **B421 [0.0 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	44
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC181-PAPER
Engineer:	Rod Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421 [0441**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3A	R1	X1	R0	X0
B421 [0441 kV	Total	0.000	61.870	0.00	100.00	100.00	0.000	0.000	1.7780+j0.000	1.4440+j0.000		
B1508 [B1511 kV	B421 [0441 kV	0.00	61.940	0.00	100.00	100.00	0.000	0.000	0.2487+j0.000	0.2487+j0.000		
B1511 [0441 kV	Bus1511 [0441 kV	0.00	0.000	0.00	100.00	100.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	11
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Mode: Case: 10: Comp: 84		Revision:	Base
Filename:	rpg14_2.lf1wmm			Config:	Normal

Fault at bus: **B421 [84 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
B421 [84 kV]	Total	0.00	0.00	0.00	100.00	100.00	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		
B1008 [0.6 kV]	B421 [84 kV]	0.47	47.79	0.00	100.00	100.00	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		
B1009 [84 kV]	B421 [84 kV]	0.00	0.00	0.00	100.00	100.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84TT-DEAD**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			X/R Symm. ratio		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	47
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfmxm			Config:	Normal

Fault at bus: **84T1-Def-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase Symm. [kA]	ip Symm. peak [kA]	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A [kA]	3I0 Symm. mag. B [kA]	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

d - Indicates that a zero sequence contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution [3I0] from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [B6-0]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus ang	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	A in From bus ang	B in From bus ang	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemin	**ETAP**		Page:	11
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B-021 [Bk-0]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.5 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CapriBanks		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [0614]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			Ik Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ib	Ic	R1	X1	R0	X0
B427 [0614]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [0614]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemk	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B4T1 2024 41**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. 3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemic	**ETAP**		Page:	33
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC181-PAPER
Engineer:	Rob Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj14_2.lfmxm			Config:	Normal

Fault at bus: **B-ST1302-02**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC kA	R1	X1	R0	X0
B-ST1302-02	Total	0.00	52.271	0.00	111.32	170.23	0.000	0.000	1.906+j0.0	2.178+j0.0		
B-ST1302-02	B-ST1302-01	0.47	49.836	0.00	111.32	170.23	0.000	0.000	1.511+j0.0	1.628+j0.0		
B-ST1302-02	B-ST1302-02-GR	0.00	0.000	0.00	111.32	170.23	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC Comp 80		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **84213040.41**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus 3I0	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfrmdb			Config:	Normal

Fault at bus: **84213430 #2**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from Bus)	kA (from bus)	% Voltage at From Bus			kA Symm. rms					
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemie	**ETAP**		Page:	16
Location:	Borger and Wells Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 38441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I/c Symm. rms A	I/c Symm. rms B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	17
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [4H 0]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00) [illegible]
= [illegible] % of Base kV (100.00) [illegible]

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	Va	Vb	Vc	Ia	R1	X1	R0	X0
B427 [4H 0]	Total	[illegible]	52.227	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [4H 0]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	26
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe2.4.2.lfanalysis			Config:	Normal

Fault at bus: **B423-3M-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	24
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421-HV-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	10
Location:	Bureau and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 (0604)**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus ang	% Voltage at From Bus A	B	C	3I0 in From Leg A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 [06.0]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm. ratio	% Voltage at From Bus			I/In Symm. ratio		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
B427 [06.0]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [06.0]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution [illegible] from a generator, Static, or Synchronous

Project:	Chemo	**ETAP**		Page:	65
Location:	Borden and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427-46141**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			I/I Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
B427-46141	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	03/20/2019
Contract:	CB-PN-2701			SN:	PCARLSON
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	cpj14_2.lfmxm			Config:	Normal

Fault at bus: **B427-4614-02**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427-4614-02	Total	0.000	42.000	0.000	111.32	111.32	0.000	0.000	1.9000+j0.0000	1.1700+j0.0000		
B1008-4xx1.1 1	B427-4xx1.02	0.47	40.000	0.000	111.32	111.32	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		
B0000-4x1.xx	B4008-4x1.xx-4x08	0.00	0.000	0.000	111.32	111.32	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84T1-402-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			I/I Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **B-ST1-402 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	Va	Vb	Ia	Ib	R1	X1	R0	X0
B-ST1-402 [2]	Total	[illegible]	42.333	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B-ST1-402 [2]	4.47	10.956	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpe2.4.2.lfanse			Config:	Normal

Fault at bus: **B427-4034**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	67
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp24_2.lfanalyz			Config:	Normal

Fault at bus: **B423 460 kV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Bus	I/c Symm. amp	% Voltage at From Bus			I/c To Grnd. amp		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
B423 460 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B423 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **B427-00441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompBusNum		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase Fault	ip	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 10		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **B421-004 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus 0.5 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Asymm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				3p0	1p0	2p0	3I0	1R0	R1	X1	R0	X0
B421-004 #2	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a grounded Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B421-405 01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B421-405-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus 3a	3b	3c	3I0 3-phase mag	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chevron	**ETAP**		Page:	55
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B427-4064-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			I/I Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	11
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rural Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **R427-4M-02**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	3I0	% Voltage at From Bus A	B	C	3I0 Symm. comp. A	B	R1	X1	R0	X0
R427-4M-02	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	R427-4M-02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	36
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421-PH-H1**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	ip From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. cmp. A	3I0 Symm. cmp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (IEC) from a generator (Unbal. F connection)

Project:	Chemic	**ETAP**		Page:	11
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **B421-PRI-B2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (1%) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	76
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B4T-PRI-41**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	77
Location:	Borger and Mid-Cont, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-PM2-02**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	Voltages at From Bus A		B	Symm. kA A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

d - Indicates that current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution [illegible] from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	78
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **84ST-MAIN**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 To From Amp A	I2 To From Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator/motor, X transformer

Project:	Chemie	**ETAP**		Page:	59
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	40
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. ang	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. mag	3I0 Symm. ang	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I" = Subtransient fault current contribution in Amps. Symm. = Symmetrical rms.
* = Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer.

Project:	Chemo	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpj14_2.lfrev			Config:	Normal

Fault at bus: **B421 [illegible] 02**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.5 ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)					
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	12.376	[illegible]	111.31	179.21	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	0.47	10.481	[illegible]	111.31	177.21	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	111.31	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	42
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B421 (Pdf 6)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase (kA)	Ik 3-phase (kA)	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (1%) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B421 [N0-0]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

CurrentBranch		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip 3-phase [illegible]	% Voltage at From Bus 3c	3b	3a	Ik 3-phase [illegible]	3R	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	49
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 49		Revision:	Base
Filename:	rpg14_2.lfmdb			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 Symm Amp A	I2 Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	40
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PCAB1-PLPQ2
Engineer:	Real Power Engineering	Study Case: SC1 Comp 4H		Revision:	Base
Filename:	cgi2-4_2.lfanalyzer			Config:	Normal

Fault at bus: **B421 [Mv-6]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus 6.9 (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus 3I0	V1	V2	3I0 kA Symm. rms	ip	R1	X1	R0	X0
B421 [Mv-6]	Total	0.00	0.00	0.00	100.00	0.00	0.000	0.000	1.978+j0.000	1.778+j0.000		
B1006 [Mv-6.9 kV]	B421 [Mv-6]	0.07	0.184	0.00	100.00	0.00	0.000	0.000	1.528+j0.000	1.528+j0.000		
B1010 [Mv-6.9 kV]	B421 [Mv-6]	0.00	0.000	0.00	100.00	0.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	46
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **B427 6KI 01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (.[illegible] kV)
= [illegible] % of Base kV (.[illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Crest Amp	Ia	Ib	Ic	3I0 Symm. Amp	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

* - Indicates fault current contribution is from three-winding transformers

\# - Indicates a zero sequence fault current contribution from a grounded Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	17
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
B427 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I" - Subtransient fault current contribution at time 0 sec. Symmetrical rms value.
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y transformer.

Project:	Chemie	**ETAP**		Page:	68
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **B4T1-HV2-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A	3I0 Symm. mag. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	49
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 49		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427-69240**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemir	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lamine			Config:	Normal

Fault at bus: **B427 69.0 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **B427 6KV 4U**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427 6KV 4U	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	42
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfanalyz			Config:	Normal

Fault at bus: **B423-00441**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	B	C	3I0 Symm. kA A	B	R1	X1	R0	X0
B423-00441	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	1.7788+j0.000	1.4496+j0.000		
B7008-B44111	B423-00441	0.00	0.000	0.00	0.00	0.00	0.000	0.000	0.2487+j0.000	0.2487+j0.000		
B8999-B99149	B8999-B99149	0.00	0.000	0.00	0.00	0.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421-004 #2**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0 V ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	56
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-600 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxml			Config:	Normal

Fault at bus: **84T1-HS-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus ang	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemic	**ETAP**		Page:	46
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PLPQ2
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lamine			Config:	Normal

Fault at bus: **PCB**

Prefault voltage = 240.000 kV = 100.00 % of nominal bus kV (240.000 kV)
= 100.00 % of Base kV (240.000 kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm. kA A	B	R1	X1	R0	X0
PCB	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	WA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

# Indicates that current flows in from, None implies transformers
^ Indicates a DC component that's present in the first cycle (50% Peak, symmetrical RMS) Ref. ANSI Standard

Fault at bus: **SS-BAY-11**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BAY-11	Total	0.00	23.490	0.00	119.26	118.26	36.876	36.876	2.308+000	8.378+000	1.760-001	1.930+001
INV-FDR-1-09	SS-BAY-11	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-2-09	SS-BAY-11	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
T-345 kV BUS	34.5 kV BUS - SOLAR-1	86.03	20.464	90.38	99.69	99.93	34.865	6.247	3.268-000	6.420+000	1.710-002	3.000+001
T-33-1	34.5 kV BUS - SOLAR-1	10.76	0.171	63.45	96.69	106.12	1.026	30.630 *	6.120+000	3.080+001	4.210-001	2.190+001
INV-FDR-1-08	SS-BAY-11	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-1-07	SS-BAY-11	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-2-08	SS-BAY-12	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-2-07	SS-BAY-12	0.00	0.520	0.00	119.26	118.26	0.494	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **SS-BAY-12**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BAY-12	Total	0.00	23.490	0.00	119.26	118.26	36.876	36.876	2.308+000	8.378+000	1.760+001	1.930+001
INV-FDR-209	SS-BAY-12	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-109	SS-BAY-12	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
T-345 kV BUS	M-1 kV BUS - SOLAR-1	86.03	20.464	90.38	99.69	99.93	34.865	6.247	1.268+000	6.020+000	1.710+001	1.900+001
T-13-1	M-1 kV BUS - SOLAR-1	10.76	0.171	63.45	96.69	106.12	1.026	30.630 *	6.120+000	3.080+001	4.210+001	2.190+001
INV-FDR-109	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-609	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-109	SS-BAY-3	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-209	SS-BAY-3	0.00	0.520	0.00	119.26	118.26	0.494	0.000				

\# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BAY-13**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Va	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BAY-13	Total	0.00	23.490	0.00	119.26	118.26	36.876	36.876	2.308e-008	8.278e-009	1.760e-001	1.930e-001
INV-FDR-509	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-609	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
0.345 kV BUS	34.5 kV BUS - SOLAR-1	86.53	20.464	90.38	99.69	99.93	34.865	6.247	1.268e-008	6.420e-009	1.710e-001	2.000e-001
0.33 kV	34.5 kV BUS - SOLAR-1	10.76	0.171	63.45	66.69	106.12	1.026	30.630 *	6.120e-009	1.080e-001	4.210e-001	2.190e-001
INV-FDR-109	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-409	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-109	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				
INV-FDR-209	SS-BAY-13	0.00	0.520	0.00	119.26	118.26	0.494	0.000				

\# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-21**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-21	Total	0.00	23.043	0.00	117.06	116.98	36.263	36.263	2.388+003	8.078+000	1.760+001	1.938+001
XFMR-B101-HV	SS-BAY-21	0.06	0.634	0.05	117.08	116.12	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B201-HV	SS-BAY-21	0.07	0.634	0.06	117.09	116.13	0.519	0.000	1.54E+002	2.25E+002		
# 345 kV BUS	34.5 kV BUS - BB01	66.93	20.402	90.63	99.36	99.88	10.931	6.132	2.36E+000	6.08E+000	1.73E+001	1.90E+001
# T2-3	34.5 kV BUS - BB01	16.79	5.101	64.00	65.13	100.96	6.932	30.413 *	6.86E+000	3.17E+001	4.51E+001	2.39E+001
XFMR-B301-HV	SS-BAY-23	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B601-HV	SS-BAY-23	0.04	0.532	0.05	117.08	116.33	0.433	0.000	1.82E+002	2.66E+002		
XFMR-B501-HV	SS-BAY-22	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B401-HV	SS-BAY-22	0.04	0.634	0.05	117.08	116.33	0.519	0.000	1.54E+002	2.25E+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-12**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-12	Total	0.00	23.043	0.00	117.06	116.98	36.263	36.263	2.388+000	8.078+000	1.760+001	1.908+001
XFMR-BUS14-HV	SS-BUS-22	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.548+002	2.258+002		
XFMR-BUS1-HV	SS-BUS-22	0.04	0.634	0.05	117.09	116.11	0.519	0.000	1.548+002	2.258+002		
# SS-HV BUS	SS-HV BUS - BUS1	66.33	20.462	90.61	99.34	99.86	16.931	6.132	2.568-006	6.988+000	1.760-002	1.908-001
# T2-3	SS-LV BUS - BUS3	16.79	5.981	64.00	65.13	150.96	6.932	30.413 *	6.868+000	3.978+001	4.240-001	2.268+001
XFMR-BUS14-HV	SS-BUS-23	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.548+002	2.258+002		
XFMR-BUS1-HV	SS-BUS-23	0.04	0.632	0.05	117.08	116.11	0.433	0.000	1.802+002	2.668+002		
XFMR-BUS14-HV	SS-BUS-21	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.548+002	2.258+002		
XFMR-BUS1-HV	SS-BUS-21	0.07	0.634	0.06	117.09	116.13	0.519	0.000	1.548+002	2.258+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-13**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-13	Total	0.00	23.043	0.00	117.36	116.98	36.263	36.263	2.308+000	8.078+000	1.760+001	1.938+001
XFMR-BUS14-HV	SS4BAY-23	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B003-HV	SS4BAY-23	0.04	0.312	0.03	117.08	116.11	0.511	0.000	1.55E+002	2.69E+002		
# 345 kV BUS	34.5 kV BUS - BUS6	66.33	20.462	90.61	99.34	99.86	16.151	6.132	2.56E-006	6.48E+000	1.74E-002	3.06E-001
# T2-3	34.5 kV BUS - BUS6	16.79	5.181	64.00	65.13	150.96	6.932	30.413 *	6.66E+000	3.17E+001	4.51E-001	2.36E+001
XFMR-B001-HV	SS4BAY-22	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B4014-HV	SS4BAY-22	0.04	0.634	0.05	117.08	116.11	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B101-HV	SS4BAY-21	0.06	0.634	0.05	117.09	116.12	0.519	0.000	1.54E+002	2.25E+002		
XFMR-B201-HV	SS4BAY-21	0.07	0.634	0.06	117.09	116.13	0.519	0.000	1.54E+002	2.25E+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **LP909 0446.01V**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (24.000 kV)
= 100.00 % of Base kV (24.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm kA	I/c Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC kA	R1	X1	R0	X0
LP909 0446.01V	Total	0.00	22.000	0.00	114.99	117.53	91.277	91.277	2.1888+000	8.1732+000	9.1880+001	1.1881+002
LP909 0446.01V	LP1901 0446.01W	0.00	22.000	0.00	114.99	117.53	91.277	91.277	2.1888+000	8.1732+000	9.1880+001	1.1881+002
LP909 0446.01W	LP1901 0446.01W	0.00	0.000	0.00	100.00	100.00	0.000	0.000				
LP909 0446.01X	LP1901 0446.01W	0.00	0.000	0.00	100.00	100.00	0.000	0.000				

Bus contributes more than 1% to total fault current for this fault
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	101
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **EP909-B480.1.V**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (480.1 kV)
= [illegible] % of Base kV (480.1 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I sc Symm. rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
EP909-B480.1.V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	EP909-B480.1.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	EP909-B480.1.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP909-B480.1.V	EP909-B480.1.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	191
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CB-PS-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxmx			Config:	Normal

Fault at bus: **XF909-B402-01Y**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedances on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	170
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF909-B402-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

									Positive & Zero Sequence Impedances Looking into "From Bus"			
Contributions		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	kA Symm. rms	X/R	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0
				A	B	C	A	B				
XF909-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF909-B402-LV	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence to the fault current.
* Bus has a positive sequence contribution only. Bus has a grounded-Wye-Delta transformer.

Project:	Chemin	**ETAP**		Page:	1/7
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC-MG-PP-PETE
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg2-4_2.lfanalyz			Config:	Normal

Fault at bus: **LF909-9100-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. ang	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. mag Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	108
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **EP909-9100 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus EP_1 (9100 LV)
= [illegible] % of Base kV (9100 LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	3/8
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-97x-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3/8		Revision:	Base
Filename:	rpg14_2.lfmdb			Config:	Normal

Fault at bus: **XFMR-B104-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	R1	X1	R0	X0
XFMR-B104-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B104-LV1	XFMR-B104-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B104-MV	XFMR-B104-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B104-LV2	XFMR-B104-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied three-winding transformer
* Indicates a zero impedance fault current contribution (Zero sequence [illegible] Ohms)

Project:	Chemie	**ETAP**		Page:	113
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	CK-PN-2781			SN:	PC-001-PP-PPXL
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpp14_2.lf36mx			Config:	Normal

Fault at bus: **XFMR-B104-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	Ia Symm. kA	Ia Real	Ia Imag	Ia Angle	3I0 kA	R1	X1	R0	X0
XFMR-B104-LV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.648+j0.000	12.870+j0.000		
B-117-138-LV	XFMR-B104-LV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.648+j0.000	12.870+j0.000		
B-117-138-LV	XFMR-B104-LV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.648+j0.000	12.870+j0.000		
XFMR-B104-LV	XFMR-B104-LV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.648+j0.000	12.870+j0.000		

Bus contributes more than one-half of total fault current
* Indicates a zero or negative fault current contribution (120 Cycle symmetrical/Decay Y Admittance)

Project:	Chemie	**ETAP**		Page:	11
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF900-B400-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	% Impedance on 100 MVA base R1	X1	R0	X0
XF900-B4CP1-3	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		
B-CT1-CP1-A1	XF900-B4CP1-3A	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		
B-CT1-CP1-B1	XF900-B4CP1-3B	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		
XF900-B4CP1-3T	XF900-B4CP1-3C	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		

* Indicates fault current contribution is from three-winding transformers
# Indicates a zero sequence fault current contribution (XFMR from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kiel Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi[illegible]			Config:	Normal

Fault at bus: **XFMR-0106-01Y**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF909-9106-LV**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF909-9106-LV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.614+j0.000	12.903+j0.000		
BUS1-9106-LV	XF909-9106-LV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.614+j0.000	12.903+j0.000		
BUS2-9106-LV	XF909-9106-LV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.614+j0.000	12.903+j0.000		
XF909-9106-LV	MF909-9106-LV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.614+j0.000	12.903+j0.000		

Bus contributes more than one percent of fault current
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **XF908 (KB4-H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	Ia	Ib	Ic	3I0 Real comp	3I0 Imag comp	R1	X1	R0	X0
XF908 (KB4-H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900 (Kbv-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (kbv-LV)
= [illegible] % of Base kV (kbv-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF900 (Kbv-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	117
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XF908-B3G-415**

Prefault voltage = [illegible] V = [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm Amp A	3I0 Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus is being faulted.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Fault at bus: **XF900-B50 4.1V**

Prefault voltage = 4.160 kV = 100.00 % of nominal bus kV (4.160 kV)
= 100.00 % of Base kV (4.160 kV)

		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
				% Voltage at From Bus								
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	3Ø	A	B	C	Ib	R1	X1	R0	X0
XF900-B50 4.1V	Total	0.000	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-117 (0.0 kV)	XF900-B50 4.1V	0.000	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-117 (0.0 kV)	XF900-B50 4.1V	0.00	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
XF900-B50 4.1V	XF900-B50 4.1V	10.00	10.000	100.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		

Bus with the highest fault current in the study (including equipment contribution)
* Indicates a zero or negative Zero sequence impedance (Z0) from a grounded (Delta, Y-Ungrounded)

Project:	Chemo	**ETAP**		Page:	119
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	CB-PS-2781			SN:	PGBG-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmmx			Config:	Normal

Fault at bus: **XFMR-H20-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm amp	% Voltage at From Bus Va	Vb	Vc	Ia Symm. amp Ia	Ib	R1	X1	R0	X0
XFMR-H20-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-H20-HV	XFMR-H20-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-H20-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-H20-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF908 (R)0.4 kV**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	Ia	Ib	Ic	3I0 Symm. kA	3I0 Asymm. kA	R1	X1	R0	X0
XF908 (R)0.4 kV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.#INF+0.000i	1.#INF+0.000i		
BUS1 (0.4 kV)	XF908 (R)0.4 kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.#INF+0.000i	1.#INF+0.000i		
BUS2 (0.4 kV)	XF908 (R)0.4 kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.#INF+0.000i	1.#INF+0.000i		
XF908 (R)0.4 kV	MCC1 (0.4 kV)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.#INF+0.000i	1.#INF+0.000i		

a Indicates that current source is from fully contributing source(s).
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye X-transformer.

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfimm			Config:	Normal

Fault at bus: **XF908 (Z04-01)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I*E Symm. Bus kA	I*E Symm. mult.	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I*E Symm. mult. A	I*E Symm. mult. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 (Z04-01)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 (Z04-01)	XF908 (Z04-01)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 (Z04-01)	XF908 (Z04-01)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 (Z04-01)	XF908 (Z04-01)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	12
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfimmr			Config:	Normal

Fault at bus: **XF900 (Z004-LV**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia kA	Ib kA	Ic kA	3I0 kA	3I0 Angle deg	R1	X1	R0	X0
XF900 (Z004-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS7 (Z004-LV)	XF900 (Z004-LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS7 (Z004-LV)	XF900 (Z004-LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 (Z004-LV)	MCC (Z004-LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence to the fault current.
* Indicates a zero sequence fault current contribution (3I0 from a grounded-Wye-Y transformer)

Project:	Chemie	**ETAP**		Page:	(2)
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **LF908 (8208 4H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompositeBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I kA Nom Bus	% Voltage at From Bus A	B	C	I A Symm. mag. A	B	R1	X1	R0	X0
LF908 (8208 4H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LF908 (8208 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LF908 (8208 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
LF908 (8208 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Sum of bus contributions.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded (Delta, Y-Grounded

Fault at bus: **EP908 (8269.4) V**

Prefault voltage = [illegible]
= [illegible]% of nominal bus EP_1 (8269.4) V
= [illegible]% of Base kV (8269.4) V

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	A-B Symm. Amp Ia	A-B Symm. Amp Ib	R1	X1	R0	X0
EP908 (8269.4) V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus [illegible] has only one branch. Assumed to be Xfmr. Bump existing impedances.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-[illegible] transformer)

Project:	Chemtr	**ETAP**		Page:	(2)
Location:	Ransom and Wells Corporate, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **UP908 (Z06-11)**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
UP908 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UP908 [illegible]	UP[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UP908 [illegible]	UP[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Symmetrical fault current is from "Bus" before closing transformer.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y transformer

Fault at bus: **XF900 (Elbw-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC kA	R1	X1	R0	X0
XF900 (Elbw-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS7 (Elbw-LV	XF900 (Elbw-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS7 (Elbw-LV	XF900 (Elbw-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 (Elbw-LV	XF900 (Elbw-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Bus is missing impedance data.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	125
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-BUS-41V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908-BUS-41V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from Bus being studied.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Fault at bus: **EP908 (kV) 4.5**

Prefault voltage = 4.600 kV = [illegible] % of nominal bus EP_1 (4.600 kV)
= [illegible] % of Base kV (4.600) kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I/c Nominal kA	% Voltage at From Bus			I/c Nominal kA		% Impedance on 100 MVA base			
				A	B	C	A	3I0	R1	X1	R0	X0
EP908 (kV) 4.5	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemin	**ETAP**		Page:	129
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF908-BS02-01Y**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF908-BS02-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BS02-01Y	XF908-BS02-02Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BS02-02Y	XF908-BS02-03Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BS02-03Y	XF908-BS02-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	19
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900 (Bus2 kV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I+3 Nom Amp	% Voltage at From Bus A	B	C	3I0 Nom Amp A	B	R1	X1	R0	X0
XF900 Bus2 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 Bus2 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 Bus2 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 Bus2 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	13
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxml			Config:	Normal

Fault at bus: **XF908-BX0-01Y**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I_k Symm. rms	% Voltage at From Bus Va	Vb	Vc	3I_0 Symm. rms Ia	Ib	R1	X1	R0	X0
XF908-BX0-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BX0-01Y	XF945-BX0-01Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BX0-01Y	XF945-BX0-02Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BX0-01Y	XF945-BX0-03Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a grounded-Wye transformer with neutral connected to ground

Project:	Chemo	**ETAP**		Page:	121
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxml			Config:	Normal

Fault at bus: **LP900 (LI01-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (LP900 LV)
= [illegible] % of Base kV (LP900 LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Utility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	111
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PCARL-PLPOTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp2-4_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-HV4-115**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-HV4-115	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV3-115	XFMR-HV4-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV4-HV	XFMR-HV4-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-HV4-LV	XFMR-HV4-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	134
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lf36one			Config:	Normal

Fault at bus: **XF900 (kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (kV)
= [illegible] % of Base kV (kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
XF900 (kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (XFMR from a grounded-Wye to A substation)

Fault at bus: **XF908-BSW-41V**

Prefault voltage = [illegible] kV
= [illegible] % of nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	A-B Symm. cmp. A	A-B Symm. cmp. B	R1	X1	R0	X0
XF908-BSW-41V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BSW-41V	XF908-BSW-34V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BSW-34V	XF908-BSW-34V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BSW-41V	XF908-BSW-34V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Sum of starting impedances.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded (Delta-Y) transformer.

Project:	Chemo	**ETAP**		Page:	19
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-HAM-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (nominal bus kV)
= [illegible] % of Base kV (Base kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Kvolt Real	I" k Kvolt Imag	Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
XF900-HAM-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-HAM-LV	XF900-HAM-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2-HAM-LV	XF900-HAM-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-HAM-LV	MCC-HAM-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus (mixing impedances)
* Indicates a zero sequence fault current contribution (XFMR Conn. e.g. Grounded-Wye, Y-Impedance)

Fault at bus: **XF908 (Z908-HV)**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. kA Ia	Ib	R1	X1	R0	X0
XF908-HV-1-(1)	Total	0.00	0.00	0.00	111.97	-118.99	0.000	0.000	0.000+j0.000	0.000+j0.000	0.000+j0.000	0.000+j0.000
XF908-HV-1-(2)	XF908-MAIN-HV	0.76	0.77	0.00	111.97	-118.99	0.000	0.000	0.000+j0.000	0.000+j0.000	0.000+j0.000	0.000+j0.000
XF908-MAIN-S	XF908-MAIN-HV	0.76	0.77	99.99	-50.97	-50.97	0.000	0.000	0.000+j0.000	0.000+j0.000		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y-ungrounded

Fault at bus: **EP908 (Elec-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus EP_1 (0.600 kV)
= [illegible]% of Base kV (0.600 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. kA	3I0 Symm. comp. deg.	% Impedance on 100 MVA base R1	X1	R0	X0
EP908 (Elec-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1 (Elec-LV	SP560_Bus1 (Elec-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2 (Elec-LV	SP560_Bus2 (Elec-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908 (Elec-LV)	SP560_Bus (Elec-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	139
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Prefault	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	191
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900-B400-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (1000 kV)
= [illegible] % of Base kV (1000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. ang	% Voltage at From Bus A	B	C	3I0 Symm. mag A	B	R1	X1	R0	X0
XF900-B400-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B400-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B400-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B400-HV	XF900-B400-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus voltage drops under fault are from Base voltage locations

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	141
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus
* Indicates a zero sequence fault current contribution (XFMR from a grounded-Delta or Y-Ungrounded)

Project:	Chemo	**ETAP**		Page:	101
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC181-PC9132
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **EP909-B402-LV**

Prefault voltage = 0.480 kV = 100.00 % of nominal bus EP_1 (0.480 kV)
= 100.00 % of Base kV (0.480 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	Voltage at From Bus %			3I0 Symm. comp. kA		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
EP909-B402-LV	Total	0.000	0.000	0.00	120.00	-120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-117-B-LV	EP909-B402-LV	0.000	0.000	0.00	120.00	-120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-117-B-LV	EP909-B402-LV	0.000	0.000	0.00	120.00	-120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
EP909-B402-LV	EP909-B402-LV	0.000	0.000	0.00	120.00	-120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		

a - Indicates that current source is from Unit or Static Grounding Transformer
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	151
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg24_2.lfmxmx			Config:	Normal

Fault at bus: **XFMR-R4KD-41V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-ph Symm Amp	I/X 3-ph Symm ratio	% Voltage at From Bus Va	Vb	Vc	3-I0 Symm. amp Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	141
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **EP908-B403-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I/c From Bus	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
EP908-B403-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP[illegible]-B403-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP[illegible]-B403-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP[illegible]-B403-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	191
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XFMR-B4414H**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. Rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I/c Symm. Rms A	I/c Symm. Rms B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-B4414H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B4414H	XFMR-B4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B4414H	XFMR-B4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B4414H	XFMR-B4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus
* Indicates a zero sequence fault current contribution (XFMR Zero sequence/Delta/Y Substation)

Project:	Chemo	**ETAP**		Page:	146
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalysis			Config:	Normal

Fault at bus: **XF900-B4414.V**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA From bus A	kA From bus B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900-B4414.V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B4414-B4415	XF900-B4414.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B4414-B4416	XF900-B4414.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B4414.V	XF900-B4414.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	191
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CB-PS-2781			SN:	PCAB1-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-B480-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault Current	ip Peak Current	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault Current A	3I0 Symm. Fault Current B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	148
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PC9132
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi2.4.2.lemew			Config:	Normal

Fault at bus: **XF900-B400-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF900-B4CF1-3	Total	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.#IO+000	1.#IO+000		
B-117-4kV-1	XF900-B400-LV	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.#IO+000	1.#IO+000		
B-117-4kV-2	XF900-B400-LV	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.#IO+000	1.#IO+000		
XF900-B4CF1-LV	XF900-B400-LV	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.#IO+000	1.#IO+000		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta or Y-Ungrounded)

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	kA (from bus)	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Fault at bus: **EP908-B446-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia kA	Ib kA	Ic kA	3I0 Real kA	3I0 Imag kA	R1	X1	R0	X0
EP908-B446-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CB-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **EP909-4H90-41V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
EP909-4H90-41V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP909-4H90-41V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP909-4H90-41V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	121
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **LP909-B90-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus LV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. kA	3I0 Symm. comp. deg	% Impedance on 100 MVA base R1	X1	R0	X0
LP909-B90-LV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-LV1-T1-LV	SP960-B90-LV1-LV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-LV1-T2-LV	SP960-B90-LV2-LV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
LP909-B90-LV	SP960-B90-LV-LV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		

A - Indicates fault current contribution from Synchronous Motor
* - Indicates a zero impedance fault current contribution (100 Ohm grounding impedance)

Project:	Chemie	**ETAP**		Page:	111
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompBusNo		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase fault	ip 3 Phase fault	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus
* Indicates a zero impedance fault current contribution (Zero sequence Z0=Max Y Admittance)

Project:	Chemin	**ETAP**		Page:	154
Location:	Ransom and Mills-Cravens, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **XF900-B502-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			X/R Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF900-B502-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B502-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B502-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900-B502-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution from faulted bus. Sum of all contributions.
* - Indicates a zero or negative fault current contribution. (IEC Does not consider Ik"min. for contributions)

Fault at bus: **EP908-BUS-01V**

Prefault voltage = [illegible] kV
= [illegible] % of nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. kA	3I0 Symm. comp. kA	% Impedance on 100 MVA base R1	X1	R0	X0
EP908-BUS-01V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP908-BUS-01V	EP908-BUS-02V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP908-BUS-01V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908-BUS-01V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	19
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **EP908-BUS1-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (EP908-LV)
= [illegible] % of Base kV (EP908-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I_0 Symm. Amp Ia	Ib	R1	X1	R0	X0
EP908-BUS1-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	13
Location:	Borger and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip 3-phase [illegible]	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	Ik A [illegible]	Ik B [illegible]	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	19
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus [illegible] ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I sc Nom unit	% Voltage at From Bus			X/R Ratio		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	139
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ngd14_2.lexone			Config:	Normal

Fault at bus: **LF909-4160-11Y**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV (4.160 kV)
= [illegible] % of Base kV (4.160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	191
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lf36mx			Config:	Normal

Fault at bus: **EP909-B569-LV**

Prefault voltage = [illegible]

= [illegible]% of Nominal bus EP_1 (0.909 kV)
= [illegible]% of Base kV (0.909 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia kA	Ib kA	Ic kA	3I0 kA	3I0 kA	R1	X1	R0	X0
EP909-B4CP1-3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	EP909-B569-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	EP909-B4CP1-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909-B4CP1-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	101
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kiel Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ngd14_2.lfmxm			Config:	Normal

Fault at bus: **LF909 (69kV, 0)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	52
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ntp24_2.lfmxml			Config:	Normal

Fault at bus: **LP909 4160kV**

Prefault voltage = 4160.00 kV = 100.00 % of nominal bus LP_1 4160 kV
= 100.00 % of Base kV (4160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	Ia	Ib	Ic	3I0 Real comp	3I0 Imag comp	R1	X1	R0	X0
LP909 4160 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence to the fault current.
* Indicates a zero sequence fault current contribution. (IEC from symmetrical Ohms, X Substitution)

Project:	Chemie	**ETAP**		Page:	101
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfmdw			Config:	Normal

Fault at bus: **LF900 4kV 41V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Sum of rotating machine contributions.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	101
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **EP900 4600 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus EP_1 4600 LV)
= [illegible] % of Base kV (4.600) LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	Ia Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates fault current contribution from bus being analyzed.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	101
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **XF908 [660] 41V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			I/I Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution. (XFMR Conn: a=grounded-Wye, Y=ungrounded-Wye)

Project:	Chemo	**ETAP**		Page:	100
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC181-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp2-4_2.lfanalyz			Config:	Normal

Fault at bus: **EP900-B602.4 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus EP_1 (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Ground kA	3I0 Ground Angle	R1	X1	R0	X0
EP900-B602.4 kV	Total	0.000	0.000	0.000	120.000	120.000	0.000	0.000	1.000+j0.000	0.000+j0.000		
B-1171-V02.4 kV	EP900-B602.4 kV	0.000	0.000	0.000	120.000	120.000	0.000	0.000	1.000+j0.000	0.000+j0.000		
B-1177-V02.4 kV	EP900-B602.4 kV	0.000	0.000	0.000	120.000	120.000	0.000	0.000	1.000+j0.000	0.000+j0.000		
EP900-B602.4 kV	EP900-B602.4 kV	0.000	0.000	0.000	120.000	120.000	0.000	0.000	1.000+j0.000	0.000+j0.000		

a - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	101
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR 0603 41V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XFMR 0603 41V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 0603 41V	XFMR 0603 69V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 0603 69V	XFMR 0603 69V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR 0603 69V	XFMR 0603 69V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **EP008 8600.0 kV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (8600 kV)
= [illegible]% of Base kV (8600 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
EP008 8600.0 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	105
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg24_2.lfmxmx			Config:	Normal

Fault at bus: **XF908 [illegible]**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of Base kV (34.500 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 [illegible]	Total	0.00	22.975	0.00	111.30	110.57	56.000	60.000	1.978+j0.000	8.378+j0.000	2.150+j0.000	2.150+j0.000
XF908 [illegible]	XF908 [illegible]	5.63	22.966	0.00	111.30	110.57	56.000	60.000	1.978+j0.000	8.378+j0.000	2.150+j0.000	2.150+j0.000
XF908 [illegible]	XF908 [illegible]	0.00	0.000	0.00	111.30	110.57	56.000	60.000	0.000+j0.000	0.000+j0.000		
XF908 [illegible]	XF908 [illegible]	0.00	0.000	0.00	111.30	110.57	56.000	60.000	0.000+j0.000	0.000+j0.000		

A - Individual fault current contribution from bus exceeding threshold value

* - Individual current contribution from source exceeding 1.0% of total symmetrical fault current

Fault at bus: **XF900 [illegible] kV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900 [illegible] kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	17
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus 3I0	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]
[illegible]
[illegible]
[

Fault at bus: **EP004 [bus9] LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1 [bus9] kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	% Impedance on 100 MVA base R1	X1	R0	X0
EP008-MCC1-3	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.6e+004	1.2e+004		
[illegible]	[illegible]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.6e+004	1.2e+004		
[illegible]	[illegible]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.6e+004	1.2e+004		
[illegible]	[illegible]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.6e+004	1.2e+004		

[illegible]
[illegible]

Project:	Chisme	ETAP		Page:	172
Location:	Brown and Mills County, TX	20.0.2C		Date:	05/01/2023
Contract:	TX-99-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	ehp14_Chisme			Config.:	Normal

Short-Circuit Summary Report

3-Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Nominal Bus Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisos	ETAP		Page:	176
Location:	Brown and Mills County, TX	20.0.2C		Date:	03/30/2023
Contract:	03-456-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	chp14_Chisos			Config.:	Normal

AC Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	ehp14_Chrome			Config.:	Normal

[illegible]

[illegible]

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ang.	Mag.	Ikss	Ang.	Mag.	Ikss	Ang.	Mag.	Ikss	Ang.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	etp14_Chisos			Config.:	Normal

[illegible]

[illegible]

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisma	ETAP		Page:	177
Location:	Brown and Mills County, TX	24.0.2C		Date:	05/01/2023
Contract:	EX-99-1701			SN:	PEBD-BOA602
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	chp54_Chisma			Config.:	Normal

1/2 Cycle - 3-Phase, 60 Hz, Unbalanced Line-to-Ground Fault Currents

Prefault Voltage = 100 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			*Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
XFMR-69/34.5kV	34.500	5.266	-22.824	23.426	3.552	-15.661	16.065	-19.838	-1.550	19.911	-28.555	4.481	30.900
XFMR-69/69-LV	0.600	13.562	-92.878	93.875	0.000	0.000	0.000	-80.393	-11.641	81.182	-94.393	-12.643	95.180
XFMR-69/69-HV	34.500	5.339	-22.732	23.355	3.648	-15.577	15.993	-19.731	-1.457	19.806	-28.528	3.993	29.913
XFMR-69/69-LV	0.600	13.578	-92.866	93.864	0.000	0.000	0.000	-80.386	-11.630	81.171	-94.386	-12.630	95.157
XFMR-69/69-HV	34.500	5.404	-22.834	23.468	3.738	-15.673	16.109	-19.847	-1.447	19.779	-28.498	3.886	29.862
XFMR-69/69-LV	0.600	13.577	-92.833	93.817	0.000	0.000	0.000	-80.336	-11.697	81.148	-94.336	-12.697	95.148
XFMR-69/69-HV	34.500	5.479	-22.743	23.406	3.827	-15.581	15.969	-19.850	-1.532	19.795	-28.468	3.771	29.847
XFMR-69/69-LV	0.600	14.594	-92.844	93.855	0.000	0.000	0.000	-80.393	-12.692	81.138	-94.393	-13.692	95.138
XFMR-69/69-HV	34.500	5.536	-22.921	23.630	3.263	-15.967	16.291	-19.858	-1.220	19.143	-28.629	4.481	31.093
XFMR-69/69-LV	0.600	14.536	-92.146	93.936	0.000	0.000	0.000	-80.423	-12.619	81.181	-94.423	-12.619	95.181
XFMR-69/69-HV	34.500	5.593	-22.924	23.593	3.355	-15.853	16.206	-19.796	-1.284	19.075	-28.603	4.293	31.045
XFMR-69/69-LV	0.600	14.598	-92.898	94.089	0.000	0.000	0.000	-80.434	-12.628	81.179	-94.434	-12.628	95.179
XFMR-69/69-HV	34.500	5.263	-22.930	23.541	3.441	-15.783	16.172	-19.796	-1.382	19.092	-28.579	4.184	31.000
XFMR-69/69-LV	0.600	14.554	-92.886	93.943	0.000	0.000	0.000	-80.404	-12.653	81.157	-94.404	-12.653	95.157
XFMR-69/69-HV	34.500	5.327	-22.831	23.573	3.446	-15.847	16.206	-19.821	-1.474	19.929	-28.552	3.989	30.981
XFMR-69/69-LV	0.600	14.593	-92.870	93.871	0.000	0.000	0.000	-80.399	-12.642	81.150	-94.399	-12.642	95.150
XFMR-69/69-HV	34.500	5.404	-22.737	23.393	3.656	-15.595	16.017	-19.748	-1.450	18.986	-28.525	3.990	30.900
XFMR-69/69-LV	0.600	14.568	-92.864	93.864	0.000	0.000	0.000	-80.393	-12.647	81.152	-94.393	-12.647	95.152

All bus voltages are symmetrical (1/2 Cycle) values in rms kV.

* Line-to-Line-to-Ground fault current is the sum of the two individual line currents.

Project:	Chisme	ETAP		Page:	178
Location:	Brown and Mills County, TX	20.0.2C		Date:	03/31/2023
Contract:	EX-99-1701			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisme			Config.:	Normal

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohms)			Negative Seq. Imp. (ohms)			Zero Seq. Imp. (ohms)			Fault Z (ohms)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chrome	ETAP		Page:	17
Location:	Brown and Mills Canyon, TX	20.0.2C		Date:	07/31/2023
Contract:	ES-49c-1281			SN:	59385-RAD622
Engineer:	Pure Power Engineering	Study Case: SC Cases 3P		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Tools 3T (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	1
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pace Power Engineering			Revision:	Base
Filename:	[illegible]			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault-ZT (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault ZF (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
XFMR-B505-LV	0.600	0.00076	0.00792	0.00796	0.00095	0.00795	0.00798				0.00000	0.00000	0.00000
XFMR-B506-HV	34.500	0.05207	1.00792	1.00947	0.05597	1.00792	1.00947	0.22446	1.07815	1.10154	0.00000	0.00000	0.00000
XFMR-B506-LV	0.600	0.00077	0.00793	0.00799	0.00097	0.00795	0.00799				0.00000	0.00000	0.00000
XFMR-B603-HV	34.500	0.05492	0.98304	0.98643	0.05492	0.98304	0.98643	0.09677	1.02417	1.02859	0.00000	0.00000	0.00000
XFMR-B603-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B605-HV	34.500	0.05994	0.98943	0.99032	0.05994	0.98943	0.99032	0.13757	1.03277	1.03953	0.00000	0.00000	0.00000
XFMR-B605-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B606-HV	34.500	0.06293	0.99284	0.99577	0.06293	0.99284	0.99577	0.13714	1.04586	1.04765	0.00000	0.00000	0.00000
XFMR-B608-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B604-HV	34.500	0.06550	0.99643	0.99936	0.06550	0.99643	0.99936	0.13794	1.04943	1.05143	0.00000	0.00000	0.00000
XFMR-B604-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B607-HV	34.500	0.06993	0.99943	1.00313	0.06993	0.99943	1.00313	0.13731	1.05334	1.06604	0.00000	0.00000	0.00000
XFMR-B607-LV	0.600	0.00076	0.00795	0.00798	0.00095	0.00795	0.00798				0.00000	0.00000	0.00000

Peak
Short-Circuit Report

Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, 1-Ø, L-L, & L-G Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total
Number of Buses:	1	0	[illegible]	[illegible]

	[illegible]	[illegible]	Reactor	Load/Lumped Element	Impedance	Tie PD	Total
Number of Branches:	[illegible]	1	0	[illegible]	0	76	[illegible]

	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machine	Lumped Load	Inverter	Total
Number of Machines:	0	1	0	0	0	76	77

System Frequency:	60.00
Unit System:	English
Project Filename:	ctp25_Chevron
Output Filename:	C:\Users\Chevron\Real Power Engineering, Sp\Campus - 14.0\PRJ\Chevron\Chevron\ETAP\ETAP\Power Station\Impl\Models\SC Comp 04.fltr

Adjustments

Indicators	Apply Adjustments	Individual Adjustment	Percent
[illegible]	No	Individual	
[illegible]	No	Individual	
[illegible]	No		
[illegible]	No		
[illegible]	No		

Temperature Corrections	Apply Adjustments	Individual System	Degrees C
[illegible]	No	Individual	
[illegible]	No	Individual	

Bus Input Data

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Subsys	%Mag.	Ang.
M-1161BUS - BUS6	Load	34.500	34.500	1	100.00	0.00
M-1161BUS - SOLAR	Load	34.500	34.500	1	100.00	0.00
M-1161BUS - SOLAR-1	Load	34.500	34.500	1	100.00	0.00
M1161BUS	Load	345.000	345.000	1	100.00	0.00
BATT-01G1	Load	0.690	0.690	1	100.00	-30.00
BATT-01G2	Load	0.690	0.690	1	100.00	-24.00
BATT-02G1	Load	0.690	0.690	1	100.00	-24.00
BATT-02G2	Load	0.690	0.690	1	100.00	-30.00
BATT-03G1	Load	0.690	0.690	1	100.00	-30.00
BATT-03G2	Load	0.690	0.690	1	100.00	-24.00
BATT-04G1	Load	0.690	0.690	1	100.00	-24.00
BATT-04G2	Load	0.690	0.690	1	100.00	-30.00
BATT-05G1	Load	0.690	0.690	1	100.00	-30.00
BATT-05G2	Load	0.690	0.690	1	100.00	-24.00
BATT-06G1	Load	0.690	0.690	1	100.00	-24.00
BATT-06G2	Load	0.690	0.690	1	100.00	-30.00
BATT-07G1	Load	0.690	0.690	1	100.00	-30.00
BATT-07G2	Load	0.690	0.690	1	100.00	-24.00
BATT-08G1	Load	0.690	0.690	1	100.00	-24.00
BATT-08G2	Load	0.690	0.690	1	100.00	-30.00
BATT-09G1	Load	0.690	0.690	1	100.00	-30.00
BATT-09G2	Load	0.690	0.690	1	100.00	-24.00
BATT-10G1	Load	0.690	0.690	1	100.00	-24.00
BATT-10G2	Load	0.690	0.690	1	100.00	-30.00
BATT-11G1	Load	0.690	0.690	1	100.00	-30.00
BATT-11G2	Load	0.690	0.690	1	100.00	-24.00
BATT-12G1	Load	0.690	0.690	1	100.00	-24.00
BATT-12G2	Load	0.690	0.690	1	100.00	-30.00
BATT-13G1	Load	0.690	0.690	1	100.00	-30.00
BATT-13G2	Load	0.690	0.690	1	100.00	-24.00
BATT-14G1	Load	0.690	0.690	1	100.00	-24.00
BATT-14G2	Load	0.690	0.690	1	100.00	-30.00
BATT-15G1	Load	0.690	0.690	1	100.00	-30.00
BATT-15G2	Load	0.690	0.690	1	100.00	-24.00
BATT-16G1	Load	0.690	0.690	1	100.00	-24.00
BATT-16G2	Load	0.690	0.690	1	100.00	-30.00
BATT-17G1	Load	0.690	0.690	1	100.00	-30.00
BATT-17G2	Load	0.690	0.690	1	100.00	-24.00
BATT-18G1	Load	0.690	0.690	1	100.00	-24.00
BATT-18G2	Load	0.690	0.690	1	100.00	-30.00
BATT-19G1	Load	0.690	0.690	1	100.00	-30.00
BATT-19G2	Load	0.690	0.690	1	100.00	-24.00
BATT-20G1	Load	0.690	0.690	1	100.00	-24.00
BATT-20G2	Load	0.690	0.690	1	100.00	-30.00
BATT-21G1	Load	0.690	0.690	1	100.00	-30.00
BATT-21G2	Load	0.690	0.690	1	100.00	-24.00
BATT-22G1	Load	0.690	0.690	1	100.00	-24.00
BATT-22G2	Load	0.690	0.690	1	100.00	-30.00
BATT-23G1	Load	0.690	0.690	1	100.00	-30.00
BATT-23G2	Load	0.690	0.690	1	100.00	-24.00
BATT-24G1	Load	0.690	0.690	1	100.00	-24.00
BATT-24G2	Load	0.690	0.690	1	100.00	-30.00
BATT-25G1	Load	0.690	0.690	1	100.00	-30.00
BATT-25G2	Load	0.690	0.690	1	100.00	-24.00
BATT-26G1	Load	0.690	0.690	1	100.00	-24.00
BATT-26G2	Load	0.690	0.690	1	100.00	-30.00
BATT-27G1	Load	0.690	0.690	1	100.00	-30.00
BATT-27G2	Load	0.690	0.690	1	100.00	-24.00
BATT-28G1	Load	0.690	0.690	1	100.00	-24.00
BATT-28G2	Load	0.690	0.690	1	100.00	-30.00
BATT-29G1	Load	0.690	0.690	1	100.00	-30.00
BATT-29G2	Load	0.690	0.690	1	100.00	-24.00
BATT-30G1	Load	0.690	0.690	1	100.00	-24.00
BATT-30G2	Load	0.690	0.690	1	100.00	-30.00
BATT-31G1	Load	0.690	0.690	1	100.00	-30.00
BATT-31G2	Load	0.690	0.690	1	100.00	-24.00
BATT-32G1	Load	0.690	0.690	1	100.00	-24.00
BATT-32G2	Load	0.690	0.690	1	100.00	-30.00
BATT-33G1	Load	0.690	0.690	1	100.00	-30.00
BATT-33G2	Load	0.690	0.690	1	100.00	-24.00
BATT-34G1	Load	0.690	0.690	1	100.00	-24.00
BATT-34G2	Load	0.690	0.690	1	100.00	-30.00
BATT-35G1	Load	0.690	0.690	1	100.00	-30.00
BATT-35G2	Load	0.690	0.690	1	100.00	-24.00
BATT-36G1	Load	0.690	0.690	1	100.00	-24.00
BATT-36G2	Load	0.690	0.690	1	100.00	-30.00
BATT-37G1	Load	0.690	0.690	1	100.00	-30.00
BATT-37G2	Load	0.690	0.690	1	100.00	-24.00
BATT-38G1	Load	0.690	0.690	1	100.00	-24.00
BATT-38G2	Load	0.690	0.690	1	100.00	-30.00
BATT-39G1	Load	0.690	0.690	1	100.00	-30.00
BATT-39G2	Load	0.690	0.690	1	100.00	-24.00
BATT-40G1	Load	0.690	0.690	1	100.00	-24.00

		Bus			Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BAT1-40345	Load	0.690	0.690	1	100.00	-30.00
BAT1-40341	Load	0.690	0.690	1	100.00	-120.00
BAT1-40343	Load	0.690	0.690	1	100.00	-270.00
BAT1-40345	Load	0.690	0.690	1	100.00	-30.00
BAT1-40342	Load	0.690	0.690	1	100.00	-150.00
BAT1-40441	Load	0.690	0.690	1	100.00	-120.00
BAT1-40442	Load	0.690	0.690	1	100.00	-120.00
BAT1-40545	Load	0.690	0.690	1	100.00	-30.00
BAT1-40543	Load	0.690	0.690	1	100.00	-150.00
BAT1-40641	Load	0.690	0.690	1	100.00	-120.00
BAT1-40643	Load	0.690	0.690	1	100.00	-270.00
BAT1-40741	Load	0.690	0.690	1	100.00	-30.00
BAT1-40743	Load	0.690	0.690	1	100.00	-150.00
BAT1-50345	Load	0.690	0.690	1	100.00	-150.00
BAT1-50341	Load	0.690	0.690	1	100.00	-120.00
BAT1-50343	Load	0.690	0.690	1	100.00	-270.00
BAT1-50441	Load	0.690	0.690	1	100.00	-120.00
BAT1-50442	Load	0.690	0.690	1	100.00	-120.00
BAT1-50541	Load	0.690	0.690	1	100.00	-30.00
BAT1-50542	Load	0.690	0.690	1	100.00	-150.00
BAT1-50641	Load	0.690	0.690	1	100.00	-120.00
BAT1-50643	Load	0.690	0.690	1	100.00	-270.00
BAT1-60345	Load	0.690	0.690	1	100.00	-150.00
BAT1-60341	Load	0.690	0.690	1	100.00	-120.00
BAT1-60343	Load	0.690	0.690	1	100.00	-270.00
BAT1-60441	Load	0.690	0.690	1	100.00	-120.00
BAT1-60442	Load	0.690	0.690	1	100.00	-120.00
BAT1-60541	Load	0.690	0.690	1	100.00	-30.00
BAT1-60542	Load	0.690	0.690	1	100.00	-150.00
BR08-103-01-001	Load	0.690	0.690	1	100.00	-30.00
BR09-103-02-001	Load	0.690	0.690	1	100.00	-150.00
BR58-103-01-001	Load	0.690	0.690	1	100.00	-120.00
BR59-103-02-001	Load	0.690	0.690	1	100.00	-270.00
BR08-104-01-001	Load	0.690	0.690	1	100.00	-30.00
BR09-104-02-001	Load	0.690	0.690	1	100.00	-150.00
BR58-104-01-001	Load	0.690	0.690	1	100.00	-120.00
BR59-104-02-001	Load	0.690	0.690	1	100.00	-270.00
BR08-105-01-001	Load	0.690	0.690	1	100.00	-30.00
BR09-105-02-001	Load	0.690	0.690	1	100.00	-150.00

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BR08-106-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR56-106-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-201-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-201-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-202-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-202-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-203-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-203-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-204-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-204-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-205-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-205-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-206-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-206-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-301-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-301-02HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-302-01HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-303-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-303-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-303-02HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-304-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-304-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-305-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-305-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR56-306-01HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-306-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-401-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-401-02HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-402-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-402-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-403-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-403-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-404-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-404-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-405-01HB1	Load	0.600	0.600	1	100.00	-150.00
BR56-405-02HB1	Load	0.600	0.600	1	100.00	-240.00
BR56-406-01HB1	Load	0.600	0.600	1	100.00	-240.00
BR08-406-02HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-501-01HB1	Load	0.600	0.600	1	100.00	-30.00
BR56-501-02HB1	Load	0.600	0.600	1	100.00	-120.00
BR56-502-01HB1	Load	0.600	0.600	1	100.00	-270.00
BR08-502-02HB1	Load	0.600	0.600	1	100.00	-30.00
BR08-503-01HB1	Load	0.600	0.600	1	100.00	-150.00

ID	Type	Nom. kV	Base kV	Sub-sys	Initial Voltage	
					%Mag.	Ang.
BR08-B08-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B08-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B08-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B06-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B06-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B03-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B03-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B02-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B02-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B01-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B01-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-02-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-01-HH	Load	0.600	0.600	1	100.00	-30.00
BR08-B04-02-HH	Load	0.600	0.600	1	100.00	-30.00
PH1	SWNG	345.000	345.000	1	100.00	0.00
XX-BAT-11	Load	34.000	34.500	1	100.00	0.00
XX-BAT-12	Load	34.000	34.500	1	100.00	0.00
XX-BAT-13	Load	34.500	34.500	1	100.00	0.00
XX-BAT-21	Load	34.500	34.500	1	100.00	0.00
XX-BAT-22	Load	34.000	34.500	1	100.00	0.00
XX-BAT-23	Load	34.000	34.500	1	100.00	0.00
XFMR-B101-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B101-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B102-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B102-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B103-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B103-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B104-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B104-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B105-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B105-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B106-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B106-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B201-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B201-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B202-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B202-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B203-HV	Load	34.500	34.500	1	103.24	-4.68
XFMR-B203-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-B204-HV	Load	34.500	34.500	1	103.24	-4.68

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-BUS4-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS5-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS5-LV	Load	0.690	0.690	1	100.06	-30.09
XFMR-BUS6-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS6-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS7-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS7-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS8-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS8-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS9-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS9-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS10-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS10-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS11-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS11-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS12-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS12-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS13-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS13-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS14-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS14-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS15-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS15-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS16-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS16-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS17-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS17-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS18-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS18-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS19-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS19-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS20-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS20-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS21-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS21-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS22-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS22-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS23-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS23-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS24-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS24-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS25-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS25-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS26-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS26-LV	Load	0.690	0.690	1	100.00	-30.00
XFMR-BUS27-HV	Load	34.500	34.500	1	100.24	-0.65
XFMR-BUS27-LV	Load	0.690	0.690	1	100.00	-30.00

ID	Type	Rated kV	Base kV	Sub-sys	Nominal kV Voltage	Mag.
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
T1-3	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
T1-1	Load	[illegible]	[illegible]	1	[illegible]	[illegible]

111 Bus(s) Total

All voltages reported by ETAP are in % of bus nominal kV.
Bus kV values of buses not considered will mark unavailable for ETAP.

Project:	Chisos	ETAP		Page:	10
Location:	Brown and Mills County, TX	20.0.2C		Date:	05/01/2023
Contract:	03-49-1281			SN:	19102-RAD622
Engineer:	Pure Power Engineering	Study Case: SC Comp PF		Revision:	Base
Filename:	chp14_Chisos			Config.:	Normal

Line/Cable/Busway Input Data

Values in parenthesis (per 1000 ft (per 1 conductor) if cable) or (per Phase if Line/Busway)

Line/Cable/Busway			Length									
ID	Library	Size	Adj. (ft)	% Adj.	#/Phase	T (°C)	R1	X1	Z1	R0	X0	Z0
LV1-BUS1-01	1000CTNG	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS1-02	1000CUAL	500	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS2-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS2-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS3-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS3-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS4-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS4-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS5-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS5-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS6-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS6-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS7-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS7-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS8-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS8-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS9-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS9-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS10-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS10-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS11-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS11-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS12-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS12-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS13-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS13-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS14-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS14-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS15-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS15-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS16-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS16-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS17-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS17-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS18-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS18-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS19-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS19-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971
LV1-BUS20-01	1000CUAL	750	20.0	0.0	1	75	0.0149334	0.0060000	0.0160827	0.0161327	0.0120000	0.0201271
LV1-BUS20-02	1000CTNG	750	45.0	0.0	1	75	0.0349334	0.0060000	0.0354387	0.0376327	0.0120000	0.0383971

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	ehp14_Chisos			Config.:	Normal

Branch connections (per 1000 ft per Conductor) (Cable) or per Phase (Line/Busway)

Line/Cable/Busway ID	Type	Size	Length (ft)	[illegible]	[illegible]	T (°C)	R (Ω)	X (Ω)	Y (S)	Z (Ω)	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Project:	Chisme	ETAP		Page:	11
Location:	Brown and Mills County, TX	20.0.2C		Date:	05/01/2023
Contract:	TX-99-1701			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisme			Config.:	Normal

Phase or Conductor per 3000 ft (per Conductor if Cable) or per Phase (Line/Bus/Duty)

Line/Cable/Branch ID	Length											
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R1	X1	Y1	R0	X0	Y0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

2-Winding Transformer Input Data

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	%Z	X/R	+ Tol	- Tol	%Tol	Prim	Sec	%Z	Type	Angle
BSTM0-01	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-02	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-03	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-04	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-05	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-06	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-07	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-08	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-09	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-10	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-11	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-12	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-13	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-14	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-15	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-16	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-17	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-18	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-19	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-20	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-21	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-22	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-23	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-24	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-25	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-26	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-27	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-28	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-29	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-30	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-31	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-32	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-33	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-34	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-35	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-36	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-37	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-38	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-39	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-40	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-41	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-42	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-43	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-44	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-45	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-46	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-47	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-48	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-49	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-50	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-51	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-52	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-53	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-54	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-55	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-56	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-57	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-58	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-59	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-60	3.140	34.500	0.660	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
BSTMB-005	5.140	34.500	0.600	8.00	20.00	0	5	-5.5	0	0	8.19	Dy	30.00

2 Winding Transformer Grounding Input Data

Transformer	Rating			Grounding								
				Conn.	Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
BSTMB-001	5.140	34.500	0.600	DY					Open			
BSTMB-002	5.140	34.500	0.600	DY					Open			
BSTMB-003	5.140	34.500	0.600	DY					Open			
BSTMB-004	5.140	34.500	0.600	DY					Open			
BSTMB-005	5.140	34.500	0.600	DY					Open			
BSTMB-006	5.140	34.500	0.600	DY					Open			
BSTMB-007	5.140	34.500	0.600	DY					Open			
BSTMB-008	5.140	34.500	0.600	DY					Open			
BSTMB-009	5.140	34.500	0.600	DY					Open			
BSTMB-010	5.140	34.500	0.600	DY					Open			
BSTMB-011	5.140	34.500	0.600	DY					Open			
BSTMB-012	5.140	34.500	0.600	DY					Open			
BSTMB-013	5.140	34.500	0.600	DY					Open			
BSTMB-014	5.140	34.500	0.600	DY					Open			
BSTMB-015	5.140	34.500	0.600	DY					Open			
BSTMB-016	5.140	34.500	0.600	DY					Open			
BSTMB-017	5.140	34.500	0.600	DY					Open			
BSTMB-018	5.140	34.500	0.600	DY					Open			
BSTMB-019	5.140	34.500	0.600	DY					Open			
BSTMB-020	5.140	34.500	0.600	DY					Open			
BSTMB-021	5.140	34.500	0.600	DY					Open			
BSTMB-022	5.140	34.500	0.600	DY					Open			
BSTMB-023	5.140	34.500	0.600	DY					Open			
BSTMB-024	5.140	34.500	0.600	DY					Open			
BSTMB-025	5.140	34.500	0.600	DY					Open			
BSTMB-026	5.140	34.500	0.600	DY					Open			
BSTMB-027	5.140	34.500	0.600	DY					Open			
BSTMB-028	5.140	34.500	0.600	DY					Open			
BSTMB-029	5.140	34.500	0.600	DY					Open			
BSTMB-030	5.140	34.500	0.600	DY					Open			
BSTMB-031	5.140	34.500	0.600	DY					Open			
BSTMB-032	5.140	34.500	0.600	DY					Open			
BSTMB-033	5.140	34.500	0.600	DY					Open			
BSTMB-034	5.140	34.500	0.600	DY					Open			
BSTMB-035	5.140	34.500	0.600	DY					Open			
BSTMB-036	5.140	34.500	0.600	DY					Open			
BSTMB-037	5.140	34.500	0.600	DY					Open			
BSTMB-038	5.140	34.500	0.600	DY					Open			
BSTMB-039	5.140	34.500	0.600	DY					Open			
BSTMB-040	5.140	34.500	0.600	DY					Open			
BSTMB-041	5.140	34.500	0.600	DY					Open			
BSTMB-042	5.140	34.500	0.600	DY					Open			
BSTMB-043	5.140	34.500	0.600	DY					Open			
BSTMB-044	5.140	34.500	0.600	DY					Open			
BSTMB-045	5.140	34.500	0.600	DY					Open			
BSTMB-046	5.140	34.500	0.600	DY					Open			
BSTMB-047	5.140	34.500	0.600	DY					Open			
BSTMB-048	5.140	34.500	0.600	DY					Open			

Project:	Chisme	ETAP		Page:	1x
Location:	Bowie and Mills County, TX	20.0.2C		Date:	05/01/2015
Contract:	TX-99-1701			SN:	PSSE-ROSE02
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp34_Chisme			Config.:	Normal

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim kV	Sec kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
BSTMS-S6	5.00	34.500	0.690	D/Y					Open			
BSTMS-S6	5.00	34.500	0.690	D/Y					Open			
BSTMS-01	5.00	34.500	0.690	D/Y					Open			
BSTMS-02	5.00	34.500	0.690	D/Y					Open			
BSTMS-03	5.00	34.500	0.690	D/Y					Open			
BSTMS-04	5.00	34.500	0.690	D/Y					Open			
BSTMS-05	5.00	34.500	0.690	D/Y					Open			

3-Winding Transformer Input Data

Transformer	Rating			Tap	Impedance				Z Variation		Phase Shift	
ID	Rating	MVA	kV	%	%Z	X/R	MVAb	%Tol	+5%	-5%	Type	Angle
T1	Primary	120.000	345.000	0	Zps =	8.45	41.58	120.000	0	0	0	
	Secondary	120.000	34.500	0	Zpt =	15.28	65.59	120.000	0			Std Pos. Seq.	0.0
	Tertiary	60.000	13.800	0	Zst =	4.85	16.78	120.000	0			Std Pos. Seq.	-30.0
T2	Primary	120.000	345.000	0	Zps =	8.45	41.58	120.000	0	0	0		
	Secondary	120.000	34.500	0	Zpt =	15.28	65.59	120.000	0			Std Pos. Seq.	0.0
	Tertiary	60.000	13.800	0	Zst =	4.85	16.78	120.000	0			Std Pos. Seq.	-30.0

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding				
ID	Rating	MVA	kV	Type	Type	kV	Amp	ohm
T1	Primary	120.000	345.000	Wye	Solid			
	Secondary	120.000	34.500	Wye	Resistor		399.12	4.8000
	Tertiary	60.000	13.800	Delta				
T2	Primary	120.000	345.000	Wye	Solid			
	Secondary	120.000	34.500	Wye	Resistor		399.12	4.8000
	Tertiary	60.000	13.800	Delta				

Branch Connections

CKT/Branch		Connected Bus ID		To Impedance, Pos. Seq., 100 MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	2W XFMR	[illegible]	[illegible]	1.163	138.05	138.05

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
	2W Xfmr	[illegible]	T1-1	0.24	1.67	1.68	
T2	2W Xfmr	[illegible]	[illegible]	0.30	1.62	1.65	
	2W Xfmr	[illegible]	T2-1	1.86	10.95	11.11	
	2W Xfmr	[illegible]	T3-1	0.24	1.67	1.68	
L95-A618-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L97-B819-02	Cable	[illegible]	[illegible]	3.65	9.56	4.84	0.000017
L96-A620-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A620-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B820-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A619-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A619-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B819-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A618-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A618-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B818-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A617-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A617-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B817-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A616-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A616-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B816-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A615-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A615-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B815-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A614-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A614-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B814-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A613-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A613-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B813-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A612-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A612-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B812-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000
L96-A611-01	Cable	[illegible]	[illegible]	1.24	3.14	2.44	0.000005
L95-A611-01	Cable	[illegible]	[illegible]	2.65	1.79	9.84	0.000017
L97-B811-01	Cable	[illegible]	[illegible]	1.35	2.19	7.86	0.000000

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Cable	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisma	ETAP		Page:	18
Location:	Brown and Mills County, TX	24.0.2C		Date:	07/31/2023
Contract:	TX-99-1701			SN:	PORT-BOA602
Engineer:	Port Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	chp24_Chisma			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
XFMR-BUS6-LV1	Cable	BUS6033-A1	XFMR-A1-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-LV2	Cable	BUS6033-B1	XFMR-B1-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-LV3	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-LV4	Cable	BUS6033-A2	XFMR-A2-PRI	0.02	0.05	0.05	0.0012500
XFMR-BUS6-TV1	Cable	BUS6033-A3	XFMR-A3-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV2	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV3	Cable	BUS6033-A4	XFMR-A4-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV4	Cable	BUS6033-B2	XFMR-B2-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV5	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV6	Cable	BUS6033-A5	XFMR-A5-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV7	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV8	Cable	BUS6033-A6	XFMR-A6-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV9	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV10	Cable	BUS6033-A7	XFMR-A7-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV11	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV12	Cable	BUS6033-A8	XFMR-A8-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV13	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV14	Cable	BUS6033-A9	XFMR-A9-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV15	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV16	Cable	BUS6033-A10	XFMR-A10-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV17	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV18	Cable	BUS6033-A11	XFMR-A11-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV19	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV20	Cable	BUS6033-A12	XFMR-A12-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV21	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV22	Cable	BUS6033-A13	XFMR-A13-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV23	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV24	Cable	BUS6033-A14	XFMR-A14-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV25	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV26	Cable	BUS6033-A15	XFMR-A15-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV27	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV28	Cable	BUS6033-A16	XFMR-A16-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV29	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV30	Cable	BUS6033-A17	XFMR-A17-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV31	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV32	Cable	BUS6033-A18	XFMR-A18-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV33	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV34	Cable	BUS6033-A19	XFMR-A19-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV35	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV36	Cable	BUS6033-A20	XFMR-A20-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV37	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV38	Cable	BUS6033-A21	XFMR-A21-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV39	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV40	Cable	BUS6033-A22	XFMR-A22-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV41	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV42	Cable	BUS6033-A23	XFMR-A23-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV43	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV44	Cable	BUS6033-A24	XFMR-A24-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV45	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV46	Cable	BUS6033-A25	XFMR-A25-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV47	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV48	Cable	BUS6033-A26	XFMR-A26-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV49	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV50	Cable	BUS6033-A27	XFMR-A27-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV51	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV52	Cable	BUS6033-A28	XFMR-A28-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV53	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV54	Cable	BUS6033-A29	XFMR-A29-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV55	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV56	Cable	BUS6033-A30	XFMR-A30-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV57	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV58	Cable	BUS6033-A31	XFMR-A31-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV59	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV60	Cable	BUS6033-A32	XFMR-A32-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV61	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV62	Cable	BUS6033-A33	XFMR-A33-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV63	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV64	Cable	BUS6033-A34	XFMR-A34-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV65	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV66	Cable	BUS6033-A35	XFMR-A35-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV67	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV68	Cable	BUS6033-A36	XFMR-A36-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV69	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV70	Cable	BUS6033-A37	XFMR-A37-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV71	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV72	Cable	BUS6033-A38	XFMR-A38-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV73	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV74	Cable	BUS6033-A39	XFMR-A39-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV75	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV76	Cable	BUS6033-A40	XFMR-A40-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV77	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV78	Cable	BUS6033-A41	XFMR-A41-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV79	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV80	Cable	BUS6033-A42	XFMR-A42-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV81	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV82	Cable	BUS6033-A43	XFMR-A43-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV83	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV84	Cable	BUS6033-A44	XFMR-A44-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV85	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV86	Cable	BUS6033-A45	XFMR-A45-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV87	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV88	Cable	BUS6033-A46	XFMR-A46-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV89	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV90	Cable	BUS6033-A47	XFMR-A47-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV91	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV92	Cable	BUS6033-A48	XFMR-A48-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV93	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV94	Cable	BUS6033-A49	XFMR-A49-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV95	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV96	Cable	BUS6033-A50	XFMR-A50-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV97	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV98	Cable	BUS6033-A51	XFMR-A51-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV99	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV100	Cable	BUS6033-A52	XFMR-A52-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV101	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV102	Cable	BUS6033-A53	XFMR-A53-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV103	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV104	Cable	BUS6033-A54	XFMR-A54-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV105	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV106	Cable	BUS6033-A55	XFMR-A55-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV107	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV108	Cable	BUS6033-A56	XFMR-A56-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV109	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV110	Cable	BUS6033-A57	XFMR-A57-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV111	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV112	Cable	BUS6033-A58	XFMR-A58-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV113	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV114	Cable	BUS6033-A59	XFMR-A59-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV115	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV116	Cable	BUS6033-A60	XFMR-A60-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV117	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV118	Cable	BUS6033-A61	XFMR-A61-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV119	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV120	Cable	BUS6033-A62	XFMR-A62-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV121	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV122	Cable	BUS6033-A63	XFMR-A63-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV123	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV124	Cable	BUS6033-A64	XFMR-A64-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV125	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV126	Cable	BUS6033-A65	XFMR-A65-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV127	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV128	Cable	BUS6033-A66	XFMR-A66-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV129	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV130	Cable	BUS6033-A67	XFMR-A67-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV131	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV132	Cable	BUS6033-A68	XFMR-A68-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV133	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV134	Cable	BUS6033-A69	XFMR-A69-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV135	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV136	Cable	BUS6033-A70	XFMR-A70-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV137	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV138	Cable	BUS6033-A71	XFMR-A71-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV139	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV140	Cable	BUS6033-A72	XFMR-A72-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV141	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV142	Cable	BUS6033-A73	XFMR-A73-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV143	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV144	Cable	BUS6033-A74	XFMR-A74-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV145	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV146	Cable	BUS6033-A75	XFMR-A75-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV147	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV148	Cable	BUS6033-A76	XFMR-A76-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV149	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV150	Cable	BUS6033-A77	XFMR-A77-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV151	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV152	Cable	BUS6033-A78	XFMR-A78-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV153	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV154	Cable	BUS6033-A79	XFMR-A79-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV155	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV156	Cable	BUS6033-A80	XFMR-A80-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV157	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV158	Cable	BUS6033-A81	XFMR-A81-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV159	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV160	Cable	BUS6033-A82	XFMR-A82-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV161	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV162	Cable	BUS6033-A83	XFMR-A83-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV163	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV164	Cable	BUS6033-A84	XFMR-A84-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV165	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV166	Cable	BUS6033-A85	XFMR-A85-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV167	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV168	Cable	BUS6033-A86	XFMR-A86-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV169	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV170	Cable	BUS6033-A87	XFMR-A87-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV171	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV172	Cable	BUS6033-A88	XFMR-A88-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV173	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV174	Cable	BUS6033-A89	XFMR-A89-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV175	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV176	Cable	BUS6033-A90	XFMR-A90-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV177	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV178	Cable	BUS6033-A91	XFMR-A91-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV179	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV180	Cable	BUS6033-A92	XFMR-A92-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV181	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV182	Cable	BUS6033-A93	XFMR-A93-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV183	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV184	Cable	BUS6033-A94	XFMR-A94-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV185	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV186	Cable	BUS6033-A95	XFMR-A95-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV187	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV188	Cable	BUS6033-A96	XFMR-A96-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV189	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV190	Cable	BUS6033-A97	XFMR-A97-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV191	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV192	Cable	BUS6033-A98	XFMR-A98-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV193	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV194	Cable	BUS6033-A99	XFMR-A99-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV195	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV196	Cable	BUS6033-A100	XFMR-A100-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV197	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV198	Cable	BUS6033-A101	XFMR-A101-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV199	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV200	Cable	BUS6033-A102	XFMR-A102-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV201	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV202	Cable	BUS6033-A103	XFMR-A103-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV203	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV204	Cable	BUS6033-A104	XFMR-A104-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV205	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV206	Cable	BUS6033-A105	XFMR-A105-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV207	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV208	Cable	BUS6033-A106	XFMR-A106-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV209	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV210	Cable	BUS6033-A107	XFMR-A107-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV211	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV212	Cable	BUS6033-A108	XFMR-A108-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV213	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV214	Cable	BUS6033-A109	XFMR-A109-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV215	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV216	Cable	BUS6033-A110	XFMR-A110-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV217	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV218	Cable	BUS6033-A111	XFMR-A111-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV219	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV220	Cable	BUS6033-A112	XFMR-A112-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV221	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV222	Cable	BUS6033-A113	XFMR-A113-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV223	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV224	Cable	BUS6033-A114	XFMR-A114-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV225	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV226	Cable	BUS6033-A115	XFMR-A115-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV227	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV228	Cable	BUS6033-A116	XFMR-A116-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV229	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV230	Cable	BUS6033-A117	XFMR-A117-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV231	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV232	Cable	BUS6033-A118	XFMR-A118-PRI	0.01	0.03	0.03	0.0025000
XFMR-BUS6-TV233	Cable	XFMR-PRI	BUS6033	0.09	0.26	0.28	0.0250000
XFMR-BUS6-TV234	Cable	BUS6033-A119	XFMR-A119-PRI	0.01	0.03	0.03

Project:	Chisma	ETAP		Page:	12
Location:	Brown and Mills County, TX	24.0.2C		Date:	05/01/2023
Contract:	EX-99-1701			SN:	PSSE-ROAD22
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisma			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Tie Breaker	[illegible]	[illegible]			

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
BESS-402-0.48/0.8	Ty Switch	BATT-402-UI	BESS-402-0.48/0.8				
BESS-403-0.48/0.8	Ty Switch	BATT-403-UI	BESS-403-0.48/0.8				
BESS-404-0.48/0.8	Ty Switch	BATT-404-UI	BESS-404-0.48/0.8				
BESS-405-0.48/0.8	Ty Switch	BATT-405-UI	BESS-405-0.48/0.8				
BESS-406-0.48/0.8	Ty Switch	BATT-406-UI	BESS-406-0.48/0.8				
BESS-407-0.48/0.8	Ty Switch	BATT-407-UI	BESS-407-0.48/0.8				
BESS-408-0.48/0.8	Ty Switch	BATT-408-UI	BESS-408-0.48/0.8				
BESS-409-0.48/0.8	Ty Switch	BATT-409-UI	BESS-409-0.48/0.8				
BESS-410-0.48/0.8	Ty Switch	BATT-410-UI	BESS-410-0.48/0.8				
BESS-411-0.48/0.8	Ty Switch	BATT-411-UI	BESS-411-0.48/0.8				
BESS-412-0.48/0.8	Ty Switch	BATT-412-UI	BESS-412-0.48/0.8				
BESS-413-0.48/0.8	Ty Switch	BATT-413-UI	BESS-413-0.48/0.8				
BESS-414-0.48/0.8	Ty Switch	BATT-414-UI	BESS-414-0.48/0.8				
BESS-415-0.48/0.8	Ty Switch	BATT-415-UI	BESS-415-0.48/0.8				
BESS-416-0.48/0.8	Ty Switch	BATT-416-UI	BESS-416-0.48/0.8				
BESS-417-0.48/0.8	Ty Switch	BATT-417-UI	BESS-417-0.48/0.8				
BESS-418-0.48/0.8	Ty Switch	BATT-418-UI	BESS-418-0.48/0.8				
BESS-419-0.48/0.8	Ty Switch	BATT-419-UI	BESS-419-0.48/0.8				
BESS-420-0.48/0.8	Ty Switch	BATT-420-UI	BESS-420-0.48/0.8				
BESS-421-0.48/0.8	Ty Switch	BATT-421-UI	BESS-421-0.48/0.8				
BESS-422-0.48/0.8	Ty Switch	BATT-422-UI	BESS-422-0.48/0.8				
BESS-423-0.48/0.8	Ty Switch	BATT-423-UI	BESS-423-0.48/0.8				
BESS-424-0.48/0.8	Ty Switch	BATT-424-UI	BESS-424-0.48/0.8				
BESS-425-0.48/0.8	Ty Switch	BATT-425-UI	BESS-425-0.48/0.8				
BESS-426-0.48/0.8	Ty Switch	BATT-426-UI	BESS-426-0.48/0.8				
BESS-427-0.48/0.8	Ty Switch	BATT-427-UI	BESS-427-0.48/0.8				
BESS-428-0.48/0.8	Ty Switch	BATT-428-UI	BESS-428-0.48/0.8				
BESS-429-0.48/0.8	Ty Switch	BATT-429-UI	BESS-429-0.48/0.8				
BESS-430-0.48/0.8	Ty Switch	BATT-430-UI	BESS-430-0.48/0.8				
BESS-431-0.48/0.8	Ty Switch	BATT-431-UI	BESS-431-0.48/0.8				
BESS-432-0.48/0.8	Ty Switch	BATT-432-UI	BESS-432-0.48/0.8				
BESS-433-0.48/0.8	Ty Switch	BATT-433-UI	BESS-433-0.48/0.8				
BESS-434-0.48/0.8	Ty Switch	BATT-434-UI	BESS-434-0.48/0.8				
BESS-435-0.48/0.8	Ty Switch	BATT-435-UI	BESS-435-0.48/0.8				
BESS-436-0.48/0.8	Ty Switch	BATT-436-UI	BESS-436-0.48/0.8				

Power Grid Input Data

Power Grid	Connected Bus	Rating		% Positive Seq. Impedance (100 MVA Base)			Grounding	% Zero Seq. Impedance (100 MVA Base)		
ID	ID	kV	Type	R	X	Z	Type	R	X	Z
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

SHORT-CIRCUIT REPORT

Fault at bus: **34.5 kV BUS - BUS6**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
34.5 kV BUS - BUS6	Total	0.00	24.384	0.00	165.29	115.32	16.456	16.456	1.368+000	8.178E+000	1.788+001	1.50E+001
# 34.5 kV BUS	34.5 kV BUS - BUS6	86.33	25.602	90.56	99.19	89.58	15.263	0.092	4.94E+000	6.59E+000	1.73E+002	4.00E+001
# T2-1	34.5 kV BUS - BUS6	13.79	4.103	63.43	68.79	103.22	6.949	16.363 *	6.96E+000	3.47E+001	3.93E+001	3.59E+001
XFMR-BUS1-HV	SS4BAY-23	0.02	1.802	0.06	166.32	115.37	0.587	0.000	1.39E+002	8.57E+001		
XFMR-BUS1-HV	SS4BAY-23	0.07	0.939	0.04	166.18	115.35	0.490	0.000	1.62E+002	8.96E+001		
XFMR-BUS1-HV	SS4BAY-22	0.01	1.802	0.06	166.32	115.37	0.587	0.000	1.39E+002	8.57E+001		
XFMR-BUS1-HV	SS4BAY-22	0.07	1.803	0.04	166.31	115.36	0.587	0.000	1.39E+002	8.96E+001		
XFMR-BUS1-HV	SS4BAY-21	0.01	1.803	0.05	166.32	115.36	0.587	0.000	1.39E+002	8.97E+001		
XFMR-BUS1-HV	SS4BAY-21	0.02	1.802	0.06	166.32	115.37	0.587	0.000	1.39E+002	8.57E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Va	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - SOLAR	Total	0.00	24.348	0.00	118.99	118.99	36.839	36.839	2.30E+000	8.47E+000	1.76E-001	1.93E+001
0.345 kV BUS	34.5 kV Bus - SOLAR-1	86.33	25.004	90.35	99.40	99.50	68.964	6.231	5.91E+000	6.52E+000	1.71E-002	4.06E+001
XT1-L	34.5 kV Bus - SOLAR-1	19.76	5.171	63.19	66.66	105.88	1.000	10.000 *	9.10E+000	3.36E+001	4.71E-001	2.50E+001
INV-EDR-509	SOLBAY-13	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-EDR-608	SOLBAY-13	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-EDR-108	SOLBAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-EDR-408	SOLBAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-EDR-108	SOLBAY-11	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-EDR-209	SOLBAY-11	0.00	1.079	0.00	118.99	118.99	0.578	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR-1**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
34.5 kV BUS - SOLAR-1	Total	0.00	24.348	0.00	118.99	118.99	36.839	36.839	2.30E+000	8.47E+000	1.76E-001	1.93E+001
0.345 kV BUS	34.5 kV Bus - SOLAR-1	86.33	25.004	90.35	99.40	99.98	68.964	6.231	5.81E+000	6.52E+000	1.73E-002	4.06E+001
XFL-1	34.5 kV Bus - SOLAR-1	19.78	5.171	85.19	66.66	105.88	1.000	30.606 *	6.10E+000	3.16E+001	4.73E-001	2.36E+001
INV-1DR-500	500-BAY-1	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-1DR-600	500-BAY-1	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-1DR-100	500-BAY-2	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-1DR-400	500-BAY-2	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-1DR-100	500-BAY-3	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-1DR-200	500-BAY-3	0.00	1.079	0.00	118.99	118.99	0.578	0.000				

\# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **340 kV 1B-N**

Prefault voltage = 340.000 kV = [illegible] % of nominal bus kV (340.000 kV)
= [illegible] % of Base kV (340.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)		% Impedance on 100 MVA base			
				1a	1b	1c	3I0	3I0	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chemic	**ETAP**		Page:	26
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfanalyz			Config:	Normal

Fault at bus: **B421 [0141]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B421 [0141]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.00	1.7000+j0.0000	1.4000+j0.0000		
B1008 [0421] [1]	B421 [0141]	1.700	0.000	0.00	120.00	120.00	0.000	0.00	1.7000+j0.0000	1.4000+j0.0000		
B1009 [0421] [2]	B1008 [0421] [1]	0.000	0.000	0.00	120.00	120.00	0.000	0.00				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemic	**ETAP**		Page:	23
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B423 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			X/R Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
B423 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B423 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **84TT4824H**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	29
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: 10: Comp: 84		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **84T1 (0.2 kV)**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**	Page: 10
Location:	Bowie and Mills County, TX		Date: [illegible]
Contract:	CR-PN-2701		SN: [illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04	Revision: Base
Filename:	rpg2.4.2.lmone		Config: Normal

Fault at bus: **84ST 69.0 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
84ST 69.0 kV	Total	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.7280+j0.0000	1.4400+j0.0000		
83SUB 69/13.8 kV	83ST 69 kV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		
83ST 69 kV	83SUB 69/13.8 kV	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **B427 (40 kV)**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/X Symm ratio	% Voltage at From Bus 3a	3b	3c	I" k Symm amp 3a	3b	R1	X1	R0	X0
B427 (40 kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 (40 kV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427 (0.48 kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (0.480 kV)
= [illegible] % of Base kV (0.480 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	33
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp2-4_2.lfanalyz			Config:	Normal

Fault at bus: **B427 [0.48 kV]**

Prefault voltage = 0.480 kV = 100.00 % of nominal bus kV (0.480 kV)
= 100.00 % of Base kV (0.480 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427 [0.48 kV]	Total	0.000	34.849	0.00	120.00	120.00	0.000	0.00	1.000+j0.000	0.000+j0.000		
B1008 [0.48 kV]	B427 [0.48 kV]	0.00	34.849	0.00	120.00	120.00	0.000	0.00	1.000+j0.000	0.000+j0.000		
B1009 [0.48 kV]	B1008 [0.48 kV]	0.00	0.000	0.00	120.00	120.00	0.000	0.00				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	24
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B421-10P41**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-105-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	26
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxw			Config:	Normal

Fault at bus: **B427 (0604)**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	17
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 (4W-H)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	I0	R1	X1	R0	X0
B427 (4W-H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 (4W-H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	16
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **84T1 (84 kV)**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
84T1 (84 kV)	Total	0.00	0.00 (*)	0.00	100.00	100.00	0.000	0.000	1.7500+j0.0000	1.4000+j0.0000		
84T1 (84 kV)	84T1 (Bus1)	1.74	0.00 (*)	0.00	100.00	100.00	0.000	0.000	1.7500+j0.0000	1.4000+j0.0000		
84T1 (84 kV)	84T1 (Bus1) 84T1 (84 kV)	0.00	0.00 (*)	0.00	100.00	100.00	0.000	0.000				

(*) - Indicates fault current contribution is zero. (Non-existing sequence)
(*) - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [0.0 kV]**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I/c Symm. Amp A	I/c Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
B427 [0.0 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B1008 [0.0 kV]	B427 [0.0 kV]	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B1009 [0.0 kV]	B1008 [0.0 kV]	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **84T138 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault Current	ip Asymm. Peak Current	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault Current A	3I0 Symm. Fault Current B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (1%) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	11
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B4T138 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3I0	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemin	**ETAP**		Page:	42
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B421 [0.0 kV]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault	Ik Symm. Fault	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault A	3I0 Symm. Fault B	% Impedances on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B421 [10 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	ip From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemic	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421 [0441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus 3a	3b	3c	3I0 3-phase [illegible]	3I0 [illegible]	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**	Page: 11
Location:	Bowie and Mills County, TX	[illegible]	Date: [illegible]
Contract:	CR-PN-2701		SN: [illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04	Revision: Base
Filename:	rpg2.4.2.lfmxm		Config: Normal

Fault at bus: **B421 [04 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A	3I0 Symm. mag. B	% Impedance on 100 MVA base R1	X1	R0	X0
B421 [04 kV]	Total	0.000	19.856	0.00	120.00	120.00	0.000	0.000	1.978+j0.000	1.978+j0.000		
B1008 [0.5 kV]	B421 [04 kV]	0.00	19.856	0.00	120.00	120.00	0.000	0.000	1.980+j0.000	1.980+j0.000		
B1009 [04 kV]	B421 [04 kV]	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current interrupting rating (100.0% for low voltage, 0% for medium voltage)

Project:	Chemie	**ETAP**		Page:	44
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **B4T1-Def 41**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	3I0	V1	V2	3I0	V0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	47
Location:	Bowie and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84T1-Def-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Bus kV (100% kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **B427 [B6-H]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00) [V]
= [illegible] % of Base kV (100.00) [V]

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	ip Peak	Va	Vb	Vc	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg14_2.lfrev			Config:	Normal

Fault at bus: **B4T1 (Bus 4)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **B427 [B14]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	B	C	3I0 From Bus A	B	R1	X1	R0	X0
B427 [B14 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7500+j0.000	1.4000+j0.000		
B1008 [B14.4 kV]	B427 [B14]	1.750	0.000	0.00	120.00	120.00	0.000	0.000	1.7500+j0.000	1.4000+j0.000		
B1009 [B14 kV]	B1008 [B14.4 kV]	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a grounded Delta-Y transformer

Fault at bus: **B421 [84 0]**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase (kA)	Ik 3-phase (kA)	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84T13824 41**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm kA	3I0 DC kA	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Delta, Y-transformer)

Project:	Chemic	**ETAP**		Page:	33
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfanalyz			Config:	Normal

Fault at bus: **B4T1302 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
B3T1 0.48 TC	Total	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B3T1 0.48 TC 1	B3T1 #2 TC	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B4T1 #2 TC	B4T1 0.48 TC 1	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current interrupting rating (100) from a generator (Unbal. F) contribution

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	PC181-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 80		Revision:	Base
Filename:	rpp2-4-2.lfmdw			Config:	Normal

Fault at bus: **84213040-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	B	C	3I0 From Bus A	B	R1	X1	R0	X0
84213040-01	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7700+j0.0000	1.4400+j0.0000		
84213040-01	84213040-01 A	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7700+j0.0000	1.4400+j0.0000		
84213040-01	84213040-01 B	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

I": Subtransient fault current contribution at time 0 sec. Ik: Steady-state fault current

*: Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	CR-PN-2701			SN:	PCARLSON-PC02
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp2-4-2.lfmdw			Config:	Normal

Fault at bus: **B421303-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase (kA)	Ik 3-phase (kA)	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
B421303-01	Total	0.000	0.000	0.00	120.00	-120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B7008-B421303-1	B421303-01	0.00	0.000	0.00	120.00	-120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B8000-B421303	B8000-B421303-B2	0.00	0.000	0.00	120.00	-120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	16
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **BUS 38441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3A	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	17
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B427 [illegible] 0**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.5 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CapitalOne		3 Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	3-ph Fault Current	LG Fault Current	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	LG Fault Current A	LG Fault Current B	% Impedance on 100 MVA base R1	X1	R0	X0
B427 [illegible]	Load	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

D - Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	26
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	ogi14_2.lfmxm			Config:	Normal

Fault at bus: **84[illegible]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus 3I0	3I1	3I2	Ia kA	3I0 kA	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	24
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **84251-HV-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemtr	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [0604]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	Ik Symm. rms.	% Voltage at From Bus			3I0 Symm. rms.		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
B427 [0604]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [0604]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current interrupting rating (100) from a generator (Gen, T transformer)

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 [406.0]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Peak Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
B427 [406.0]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [406.0]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	65
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **84271-46141**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Asymm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				3a0	3a1	3a2	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

0 - Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	CR-PN-2701			SN:	PGIBG-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxw			Config:	Normal

Fault at bus: **B427-4614-02**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase (kA)	Ik 3-phase (kA)	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
B427-4614-02	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.998+j0.000	1.778+j0.000		
B427-4614-02	B427-4614-01	0.00	0.000	0.000	0.000	0.000	0.000	0.000	1.728+j0.000	1.588+j0.000		
B427-4614-01	B427-4614-02	0.00	0.000	0.000	0.000	0.000	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **84T1-402-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				3a0	3a1	3a2	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (3I0) from a grounded (Wye, 3-wire) transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **84T1-402 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a0	3a1	3a2	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: 10: Comp: 10		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B427-4034-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
				% Voltage at From Bus								
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	3I0	V0	V2	3I0	V0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemic	**ETAP**		Page:	67
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxw			Config:	Normal

Fault at bus: **B427-403 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
B427-403 #2	Total	0.00	31.833	0.00	120.00	120.00	0.000	0.000	1.906+j0.000	1.778+j0.000		
B427-403 #2	B427-403 #2	0.00	31.833	0.00	120.00	120.00	0.000	0.000	1.728+j0.000	1.600+j0.000		
B427-403 #2	B427-403 #2 Infeed	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpe2.4.2.lfanse			Config:	Normal

Fault at bus: **84214844-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3Io	1Io	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I" = Maximum fault current contribution of all sources, shown on one-line diagram, used for interrupting capability of circuit breakers.
* = Indicates a value exceeding fault current interrupting capability of bus. Value shown is symmetrical interrupting capability of bus.

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 10		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **84[illegible]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	% Voltage at From Bus A	% Voltage at From Bus B	3I0 Angle - deg A	3I0 Angle - deg B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	10
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **B421-405 01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **B421-405-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
B421-404-01	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	55
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **R427-4kV-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (4160) kV
= [illegible] % of Base kV (4160) kV

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemin	**ETAP**		Page:	33
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **B427-4W-02**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I" k Symm Amp A	I" k Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (1%) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	36
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-PH-H1**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a value exceeding fault current contribution [illegible] from a generator, Power Grid, or motor

Project:	Chemic	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lexus			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	76
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-002-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

0 - Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	77
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe2.4.2.lemew			Config:	Normal

Fault at bus: **B427-PRI-02**

Prefault voltage = [illegible] = [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	78
Location:	Bureau and Mills Courses, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

0 - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	70
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3A	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I" - Subtransient fault current contribution in Symm. Bus rms amps and kA rms

* - Indicates a value exceeding fault current contribution (100) from a generator, Utility, or Motor

Project:	Chemic	**ETAP**		Page:	40
Location:	Ransom and Wells Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B421 [9441]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a grounded Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfrev			Config:	Normal

Fault at bus: **B421 [illegible] 02**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.5 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I,k Nominal kA	% Voltage at From Bus			I,k Symm. kA		% Impedance on 100 MVA base			
				3p	1ph	2p	3p	1ph	R1	X1	R0	X0
B421 [illegible] 02	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	42
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B421 (Pdf 6)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from Bus)	I (from unit)	% Voltage at From Bus			I (from unit)		R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	cpj14_2.lfrev			Config:	Normal

Fault at bus: **B421 [N0-0]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.5 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I*Z From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I*Z Angle - deg A	I*Z Angle - deg B	% Impedance on 100 MVA base R1	X1	R0	X0
B421 [N0-0]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	49
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 49		Revision:	Base
Filename:	rpe2.4.2.lfxmx			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfrpmx			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus 421 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Asymm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				3p0	1p0	2p0	3p	1p	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	46
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 6461 01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC kA	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	97
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B42T440 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase Ampere	ip Peak Ampere	Ia	Ib	Ic	3I0 Real	3I0 Imag	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	68
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **R417-69241**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
R417-69241	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or synchronous

Project:	Chemo	**ETAP**		Page:	89
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 89		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B427-69240**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
B427-69240	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	10
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **B427-69.4 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus, mA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A, mA	I in From Bus 3I0, mA	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfimm			Config:	Normal

Fault at bus: **B427-6KV-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			X/R Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
B427-6KV-01	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (1%) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	42
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfxmx			Config:	Normal

Fault at bus: **B423-00441**

Prefault voltage = [illegible] = [illegible] % of nominal bus 423 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3A	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible] fault current contribution of less than [illegible] cycle(s) omitted
* [illegible] is an [illegible] fault current contribution [illegible] from a [illegible] bus

Project:	Chemo	**ETAP**		Page:	55
Location:	Bowen and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **B421-004 #2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus 3a	3b	3c	I/I Symm. Amp 3a	3b	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	56
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B427-600 kV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CurrentBalance		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase Fault	ip Peak Fault	3I0	Va	Vb	Ia	Ib	R1	X1	R0	X0
B427-600 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rob Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B417-600-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	46
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **4W**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	% Voltage at From Bus			3I0 Symm. kA		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
4W	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	4W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chisme	ETAP		Page:	97
Location:	Brown and Mills County, TX	24.0.2C		Date:	05/06/2015
Contract:	EX-99-1701			SN:	PURE-PC6402
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisme			Config.:	Normal

Fault at bus: **SS-BAY-11**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BAY-11	Total	0.00	24.348	0.00	118.99	118.99	36.839	36.839	2.308e-008	8.378e-009	1.760e-001	1.930e-001
INV-FDR-1-09	SS-BAY-11	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-FDR-2-09	SS-BAY-11	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
T-345 kV BUS	M-1-LV BUS-1	86.03	20.464	90.35	99.05	99.98	34.964	6.231	3.863e-008	6.420e-009	1.710e-002	3.000e-003
T-11-1	SOLAR-1 M-1-LV BUS-1	10.76	0.171	63.19	96.66	109.88	1.060	10.606 *	6.620e-003	1.080e-001	4.210e-001	2.190e-001
INV-FDR-1-08	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-FDR-2-08	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-FDR-1-09	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-FDR-2-09	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.570	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-12**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-12	Total	0.00	24.848	0.00	118.99	118.99	36.839	36.839	2.308e-008	8.378e-009	1.760e-001	1.930e-001
INV-FDR-209	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-FDR-109	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
# 345 kV BUS	34.5 kV BUS - SOLAR-1	86.03	20.464	90.35	99.05	99.96	34.964	6.231	3.863e-008	6.420e-009	1.710e-002	3.000e-001
# 13.8 kV BUS	34.5 kV BUS - SOLAR-1	10.76	0.171	63.19	66.66	109.88	1.046	30.606 *	6.620e-008	5.080e-001	4.210e-001	2.190e-001
INV-FDR-109	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-FDR-309	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-FDR-109	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				
INV-FDR-209	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.578	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chrome	ETAP		Page:	99
Location:	Brown and Mills County, TX	24.0.2C		Date:	05/06/2015
Contract:	EX-99-1701			SN:	PURE-PC6102
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chrome			Config.:	Normal

Fault at bus: **SS-BAY-15**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BAY-15	Total	0.00	24.348	0.00	118.99	118.99	36.839	36.839	2.308+000	8.378+000	1.760+001	1.938+001
INV-EDR-509	SS-BAY-13	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-EDR-609	SS-BAY-13	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
0.345 kV BUS	34.5 kV BUS - SOLAR-1	86.03	20.464	90.35	99.05	99.98	34.964	6.211	3.863+000	6.920+000	1.710+002	3.000+001
0.23-1	34.5 kV BUS - SOLAR-1	10.76	0.171	63.19	66.64	109.88	1.060	10.404 *	6.920+000	1.080+001	4.210+001	2.190+001
INV-EDR-109	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-EDR-409	SS-BAY-12	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-EDR-109	SS-BAY-13	0.00	1.079	0.00	118.99	118.99	0.570	0.000				
INV-EDR-209	SS-BAY-14	0.00	1.079	0.00	118.99	118.99	0.570	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-21**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-21	Total	0.00	24.884	0.00	166.28	115.02	36.456	36.456	2.388E+000	8.478E+000	1.760E-001	1.930E-001
XFMR-B101-HV	SS-BAY-21	0.00	1.892	0.05	166.32	115.36	0.587	0.000	1.39E+002	6.97E+001		
XFMR-B201-HV	SS-BAY-21	0.02	1.892	0.06	166.32	115.37	0.587	0.000	1.39E+002	6.97E+001		
# 345 kV BUS	34.5 kV BUS - BB01	66.33	20.462	98.86	99.19	99.78	10.261	6.692	2.56E-001	6.48E+000	1.73E-002	2.06E-001
# T2 - 1	34.5 kV BUS - BB01	16.79	5.181	61.61	64.75	150.22	0.946	30.365 *	6.66E+000	3.17E+001	4.21E-001	2.29E+001
XFMR-B301-HV	SS-BAY-21	0.02	1.892	0.06	166.32	115.37	0.587	0.000	1.39E+002	6.97E+001		
XFMR-B601-HV	SS-BAY-21	0.07	0.939	0.08	166.36	115.39	0.490	0.000	1.62E+002	8.36E+001		
XFMR-B501-HV	SS-BAY-22	0.01	1.892	0.06	166.32	115.37	0.587	0.000	1.39E+002	6.97E+001		
XFMR-B401-HV	SS-BAY-22	0.07	1.891	0.08	166.41	115.39	0.587	0.000	1.39E+002	6.96E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-12**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	Ib	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BUS-12	Total	0.00	24.884	0.00	166.28	113.02	36.456	36.456	2.388+008	8.278+009	1.760+001	1.938+004
XFMR-BX014V	SS4BAY-22	0.11	1.862	0.06	166.32	115.37	0.587	0.000	1.35E+002	6.97E+001		
XFMR-BX014V	SS4BAY-22	0.07	1.303	0.04	166.18	114.95	0.585	0.000	1.35E+002	6.96E+001		
# 345 kV BUS	34.5 kV BUS - BR006	66.93	20.462	98.86	99.19	99.78	10.261	6.092	2.56E+008	6.88E+009	1.73E+002	2.00E+004
# T2-3	34.5 kV BUS - BR006	16.79	5.181	61.61	64.75	150.22	0.946	30.365 *	6.66E+008	3.17E+001	4.51E+001	2.39E+004
XFMR-BX014V	SS4BAY-23	0.12	1.862	0.06	166.32	115.37	0.587	0.000	1.35E+002	6.97E+001		
XFMR-BX014V	SS4BAY-23	0.07	0.939	0.04	166.24	115.35	0.490	0.000	1.62E+002	8.36E+001		
XFMR-BX014V	SS4BAY-21	0.10	1.863	0.06	166.32	115.26	0.587	0.000	1.35E+002	6.97E+001		
XFMR-BX014V	SS4BAY-21	0.12	1.862	0.06	166.32	115.37	0.587	0.000	1.35E+002	6.97E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Project:	Chisme	ETAP		Page:	92
Location:	Brown and Mills County, TX	24.0.2C		Date:	05/06/2015
Contract:	EX-99-1701			SN:	PUBD-POWER2
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisme			Config.:	Normal

Fault at bus: **SS-BUS-13**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BUS-13	Total	0.00	24.884	0.00	166.28	113.02	36.456	36.456	2.388+002	8.278+000	1.760+001	1.938+001
XFMR-BX014-HV	SS4BAY-23	0.02	1.862	0.06	166.32	113.37	0.587	0.000	1.35E+002	6.97E+001		
XFMR-BX03-HV	SS4BAY-23	0.07	0.939	0.04	166.18	113.05	0.490	0.000	1.62E+002	8.36E+001		
# SS13-LV BUS	SS-13A BUS - BUS6	66.93	20.662	98.86	99.19	99.78	10.261	6.092	2.36E+000	6.08E+000	1.73E-002	2.00E-002
# T2-3	SS-13A BUS - BUS6	16.79	5.181	61.61	64.75	150.22	0.946	30.365 *	6.86E+000	3.17E+001	4.51E-001	2.30E-002
XFMR-BX014-HV	SS4BAY-22	0.01	1.862	0.06	166.32	113.37	0.587	0.000	1.35E+002	6.97E+001		
XFMR-BX04-HV	SS4BAY-22	0.07	1.013	0.04	166.26	113.35	0.587	0.000	1.35E+002	6.96E+001		
XFMR-BX014-HV	SS4BAY-21	0.01	1.863	0.06	166.32	113.26	0.587	0.000	1.35E+002	6.97E+001		
XFMR-BX04-HV	SS4BAY-21	0.02	1.862	0.06	166.32	113.37	0.587	0.000	1.35E+002	6.97E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	1/1
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-B4H-HV**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. kA	I/c Symm. kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XFMR-B4H-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	101
Location:	Borden and Milk Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **EP908-B480.1.V**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (EP908-B480.1.V)
= [illegible] % of Base kV (EP908-B480.1.V)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Nom. Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. Inj. A	kA Symm. Inj. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	191
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpp24_2.lf36mm			Config:	Normal

Fault at bus: **XFMR-BUS3-HV**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of Base kV (34.500 kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"								
		3-Phase Fault		Line-to-Ground Fault								
CKT/Branch ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
XFMR-BUS3-HV	Total	0.961	2.500	0.00	111.00	111.11	0.000	0.000	2.324+j0.000	8.126+j0.000	2.324+j0.000	2.324+j0.000
XFMR-BUS3-MV	XFMR-BUS3-MV	5.84	21.555	0.00	111.00	111.11	0.000	0.000	1.162+j0.000	4.063+j0.000	1.162+j0.000	1.162+j0.000
XFMR-BUS4-MV	XFMR-BUS4-MV	0.00	0.000	0.00	111.00	111.11	0.000	0.000	2.324+j0.000	8.126+j0.000		
XFMR-BUS5-LV	XFMR-BUS5-MV	17.94	0.000	00.00	111.00	111.11	0.000	0.000	0.581+j0.000	2.032+j0.000		

# Indicates fault current contribution from adjacent Bus, Bus coupling transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	170
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF909-B402-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF909-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF909-B402-LV	M-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus, Delta or Generator
* Indicates a zero sequence fault current contribution. (XFMR Conn.=Grounded/Delta, Y-Solidly Grounded)

Project:	Chevron	**ETAP**		Page:	1/7
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-B100-HV**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Ø Symm. Rms	I" 3-Ø Symm. Angle	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3-Ø Symm. Amp A	3-Ø Symm. Amp B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	108
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF900-9100 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (1900 kV)
= [illegible] % of Base kV (1900 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	19
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-BUS4-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	ip From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-BUS4-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BUS1(1)(2)	SF6(6)-BUS1-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BUS1(3)(4)	SF6(6)-BUS1-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-BUS2(1)(2)	SF6(6)-BUS2-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **EP909 0104 LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1 0104 LV (-)
= [illegible]% of Base kV (0.000 LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedances on 100 MVA base R1	X1	R0	X0
[illegible]	Fuse	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates that current contribution is from fuse melting calculation
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	CB-09x2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi2.4.2.lemew			Config:	Normal

Fault at bus: **EP909-B409-01V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus		kA Symm. rms			% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **EP908-B408-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1408-LV1
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
EP908-B4CP1-3	Fault	0.00	34.111	0.00	177.32	177.32	0.000	0.000	1.648+j0.000	12.95+j0.000		
B4TT-1H-01	EP908-B4A1-LV	0.32	7.263	0.00	177.32	177.32	0.000	0.000	1.879+j0.000	6.122+j0.000		
B4TT-1H-02	EP908-B4A2-LV	0.00	5.788	0.00	177.32	177.32	0.000	0.000	1.879+j0.000	6.248+j0.000		
B4SUB-Bus1-LV1	EP908-B4A3-LV	80.07	20.862	120.00	148.66	148.66	0.000	0.000	1.879+j0.000	7.248+j0.000		

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	111
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **EP909-B106-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (EP909-LV)
= [illegible] % of Base kV (EP909-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
EP909-B106-LV-S	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	111
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **UP908 (Kiln 4H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus Va	Vb	Vc	kA Symm. rms Ia	Ib	R1	X1	R0	X0
UP908 (Kiln 4H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UP908 (Kiln 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
UP908 (Kiln 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Sum of starting equipment.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta T, autotransformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900 (Kbb-LV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (Nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	3I0	R1	X1	R0	X0
XF900 (Kbb-LV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence to the fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemie	**ETAP**		Page:	117
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF908-B3G-415**

Prefault voltage = [illegible] V = [illegible] % of nominal bus 415 V ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus			I in Prefix -ang		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF908-B3G-415	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B3G-415	XF908-B3G-T4W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B3G-415	XF908-B3G-4W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B3G-T4W	XF908-B3G-4W	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus is being isolated.
* Indicates a zero sequence fault current contribution. (XFR Conn: a=primary/Delta, b=secondary/Wye, g=grounded)

Project:	Chemo	**ETAP**		Page:	11
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC-001-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalysis			Config:	Normal

Fault at bus: **XF900-B50 4.1V**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus 4.1V (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			X/R Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF900-B50 4.1V	Total	0.00	0.00	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-117 (0.0 kV)	XF900-B50 4.1V	0.00	0.00	0.00	100.00	100.00	0.000	0.000	1.479+j0.000	6.522+j0.000		
B-117 (0.0 kV)	XF900-B50 4.1V	0.00	0.00	0.00	100.00	100.00	0.000	0.000	1.479+j0.000	6.522+j0.000		
XF900-B50 4.1V	XF900-B50 4.1V	0.00	0.00	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta or Y-Ungrounded)

Project:	Chemie	**ETAP**		Page:	119
Location:	Bayou and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PGIBG-PC-PDTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmdw			Config:	Normal

Fault at bus: **XFMR-H20-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Delta-connected transformer
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye X-transformer

Fault at bus: **XF900 (R)(0.4 kV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 (R)(0.4 V	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
BUS1 (0.4 kV)	XF900 (R)(0.4 kV)	0.00	0.000	0.000	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
BUS2 (0.4 kV)	XF900 (R)(0.4 kV)	0.00	0.000	0.000	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF900 (R)(0.4 kV)	Infinite Bus (Bus1) kV	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

* Indicates fault current contribution is from three-winding transformers
# Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	11
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908 [illegible]**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF908 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [illegible]	XF908 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [illegible]	XF908 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 [illegible]	XF908 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF908 [B264-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 [B264-LV	Utility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-117 [B-LV]	XF908 [B264-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-117 [OH-LV]	XF908 [B264-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 [B264-LV]	XF908 [B264-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus
* Indicates a zero sequence fault current contribution (XFMR Zero sequence Z0=Z1 Assumed)

Project:	Chemo	**ETAP**		Page:	(2)
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			Ik Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ib	Ic	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **EP908 (R205 4.1)**

Prefault voltage = [illegible]

= [illegible]% of nominal bus EP_1 (4160 kV)
= [illegible]% of Base kV (4160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms Ia	kA Symm. rms 3Io	R1	X1	R0	X0
EP908 (R205 4.1)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3Io) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	12
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **LV 908 (Z06-11)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I sc Symm. rms	% Voltage at From Bus A	B	C	I a Symm. rms A	B	R1	X1	R0	X0
LV 908 (Z06-11)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LV 908 (Z06-11)	LV 945 (Z04-09)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LV 908 (Z06-11)	LV 945 (Z04-09)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **EP908 (Elbo-LV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus EP_1 (0.600 kV)
= [illegible] % of Base kV (0.600 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A kA	3I0 Symm. comp. B kA	% Impedance on 100 MVA base R1	X1	R0	X0
EP908 (Elbo-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BATT (Elbo-LV	EP908 (Elbo-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BATT (Elbo-LV	EP908 (Elbo-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908 (Elbo-LV	EP908 (Elbo-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

A - Indicates fault current contribution from Bus to Bus during breaking duration (cycle).
* - Indicates a zero sequence fault current contribution (3I0) from a grounded (Delta, Y-Grounded

[illegible]

Project:	Chemie	**ETAP**		Page:	127
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **LF908-BRN-41V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Ø Symm. Rms	I/X 3-Ø Symm. ratio	3-Ø Voltage at From Bus %		1-Ø Voltage at From Bus %			% Impedance on 100 MVA base			
				3-Ø	LG	LL	LLG	1-Ø	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus
* Indicates a zero sequence fault current contribution (XFMR Conn: [illegible])

Fault at bus: **LP908-BRK-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"								
		3-Phase Fault		Line-to-Ground Fault								
				% Voltage at From Bus								
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	A	B	C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
LP908-BRK1-LV	Total	0.000	34.193	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
BUS1-34.5-LV	SP908-BRK1-LV	0.00	7.263	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.122+j0.000		
BUS2-480-LV	SP908-BRK1-LV	0.00	5.769	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.148+j0.000		
LP908-BRK1-LV	SP908-BRK1-LV	34.19	49.193	100.00	240.00	240.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

Bus is faulted, but no fault current flows in from the bus, so relay will not trip
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **XF908-BS02-01Y**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
XF908-BS02-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BS02-01Y	XF908-BS02-02Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BS02-02Y	XF908-BS02-03Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BS02-03Y	XF908-BS02-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus, flowing through transformer.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	19
Location:	Ramos and Mills Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900 (kV) 4.1V**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	13
Location:	Ransom and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe2-4-2.lfanalyz			Config:	Normal

Fault at bus: **UP908 (KV) 415**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-ph Symm Amp	I/X 3-ph Symm ratio	% Voltage at From Bus Va	Vb	Vc	3-I0 Symm. amp In	3I0	R1	X1	R0	X0
UP908 (KV) 415	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UP908 (KV) 415	UP908 (KV) 415	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UP908 (KV) 415	UP908 (KV) 415	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
UP908 (KV) 415	UP908 (KV) 415	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus. Bus voltage may be below 85%.
* Indicates a zero sequence fault current contribution. (XFMR Conn. or grounded Z) May be 3-ph fault current

Fault at bus: **XF900-BS01-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ip Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
XF900-BS01-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-BS01-LV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BUS2-BS01-LV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900-BS01-HV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

a Indicates that current contribution is from fuse limiting characteristics.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer.

Project:	Chevron	**ETAP**		Page:	133
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-BRKT-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Phase Symm. [illegible]	I" Symm. comp. [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
XFMR-BRKT-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BRKT-HV	XFMR-BRKT-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BRKT-MV	XFMR-BRKT-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-BRKT-LV	XFMR-BRKT-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus or branch.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	134
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfmdw			Config:	Normal

Fault at bus: **XF900 (kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (kV)
= [illegible] % of Base kV (kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900 (kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	131
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	CB-PN-2781			SN:	PC181-PC-PC02
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **LF908 (LSF-41)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	ip From Bus	% Voltage at From Bus			3I0 To Bus		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF900 (ESP-LV**

Prefault voltage = [illegible]

= [illegible]% of Nominal bus kV (XF900 LV)
= [illegible]% of Base kV (XF900 LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus			I in From Bus					
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF900 (ESP-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1 (0.48 kV)	XF900 (ESP-LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2 (0.48 kV)	XF900 (ESP-LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 (ESP-LV)	XF900 (ESP-LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **XF908 (Z908-HV)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0
XF908-BUS1(HV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS1(HV)	XF908-BUS1(LV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS1(LV)	XF908-BUS1(HV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	178
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900 (Elbo-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	R1	X1	R0	X0
XF900-BUS4-V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-Elbo-LV	XF900-BUS4-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2-Elbo-LV	XF900-BUS4-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-BUS4-LV	MCC-BUS5-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus
* Indicates a zero sequence fault current contribution (XFMR Conn: [illegible])

Project:	Chemin	**ETAP**		Page:	139
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus is being faulted.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	191
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF908-B400-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF908-B400-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF908-B400-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF908-B400-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B400-HV	XF908-B400-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution. (XFMR from a grounded-Wye to A substation)

Fault at bus: **XF908-B402-01Y**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Asymm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
XF908-B402-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B402-01Y	XF908-B402-02Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B402-02Y	XF908-B402-03Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B402-03Y	XF908-B402-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus, being considered separately
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	101
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-B402-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (0.600 kV)
= [illegible] % of Base kV (0.600 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms Ia	kA Symm. rms 3I0	R1	X1	R0	X0
XF900-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B402-LV	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B402-LV	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a grounded-Delta transformer (30° lead or lag) between it and the fault location.

Project:	Chemin	**ETAP**		Page:	151
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Red Prairie Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp2.4.2.lterase			Config:	Normal

Fault at bus: **XFMR-BUS-01Y**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus
* Indicates a zero impedance fault current contribution (Zero sequence Z0=Z1=Z2 Automatically)

Project:	Chemo	**ETAP**		Page:	144
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **EP998-B460-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1 998 kV
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA From bus A	kA From bus B	% Impedance on 100 MVA base R1	X1	R0	X0
EP998-B460-LV	Total	0.00	0.00	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
BUS1-B460-LV	EP998-B460-LV	0.00	0.00	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
BUS2-B460-LV	EP998-B460-LV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
EP998-B460-LV	EP998-B460-LV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	1.000+j0.000		

a - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	191
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxmx			Config:	Normal

Fault at bus: **XFMR-R4414H**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	B	C	3I0 Symm. comp. kA	3I0 DC kA	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-R4414H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-R4414H	XFMR-R4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-R4414H	XFMR-R4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-R4414H	XFMR-R4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Bus is initially unfaulted.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	146
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC181-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lf36mod			Config:	Normal

Fault at bus: **XF908-B4414.V**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC kA	R1	X1	R0	X0
XF908-B4414.V	Total	0.000	0.000	0.000	100.00	100.00	0.000	0.000	1.648+j0.000	12.876+j0.000		
B4414-B4415	XF908-B4414.V	0.00	0.000	0.000	100.00	100.00	0.000	0.000	1.479+j0.000	9.128+j0.000		
B4414-B4416	XF908-B4414.V	0.00	0.000	0.000	100.00	100.00	0.000	0.000	1.479+j0.000	9.128+j0.000		
XF908-B4414.V	XF908-B4414.V	0.00	0.000	0.000	100.00	100.00	0.000	0.000	1.648+j0.000	12.876+j0.000		

Bus contributes both zero and positive sequence to the fault current calculations.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	101
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CB-PN-2701			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi14_2.lfmdw			Config:	Normal

Fault at bus: **EP908-B405-01V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms 3I0	Ia	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from faulted bus. Sum of rotating machine contributions.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta or Y-transformer)

Fault at bus: **EP909-B469-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	% Impedance on 100 MVA base R1	X1	R0	X0
EP909-B4C3-LV	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.00	0.000+j0.000	0.000+j0.000		
B-117-A-P-LV	EP909-B469-LV	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.000+j0.000	0.000+j0.000		
B-117-P-P-LV	EP909-B469-LV	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.000+j0.000	0.000+j0.000		
EP909-B469-LV	EP909-B469-LV	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.000+j0.000	0.000+j0.000		

A - Indicates that current contribution is from fuse limiting characteristics

* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **XFMR-0446-HV**

Prefault voltage = 24.000 kV
= 100.00 % of nominal bus kV (24.000 kV)
= 100.00 % of Base kV (24.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase (kA)	ip 3-phase (kA)	3I0 (kA)	% Voltage at From Bus V0	V1	V2	3I0 (kA)	R1	X1	R0	X0
XFMR-0446-HV	Total	0.00	0.000	0.00	100.00	0.00	0.00	0.00	0.0000+0.00j	0.0000+0.00j	0.0000+0.00j	0.0000+0.00j
XFMR-0446-HV	XFMR-0446-MV	0.00	0.000	0.00	100.00	0.00	0.00	0.00	0.0000+0.00j	0.0000+0.00j	0.0000+0.00j	0.0000+0.00j
XFMR-0446-LV	XFMR-0446-MV	0.00	0.000	0.00	100.00	0.00	0.00	0.00	0.0000+0.00j	0.0000+0.00j		

Bus contributes short-circuit current to fault at From Bus, including transformers.
* Indicates a zero sequence, line-to-ground or line-to-line fault (100% of ground fault for 3-phase fault)

Fault at bus: **EP909-B446-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1 (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I/c Nominal kA	% Voltage at From Bus A	B	C	3I0 Nominal kA A	B	R1	X1	R0	X0
EP909-B446-LV	Total	0.00	32.133	0.00	120.00	120.00	0.000	0.000	1.4496+j0.0000	12.8616+j0.0000		
B_CT-446-LV	EP909-B446-LV	0.00	7.263	0.00	120.00	120.00	0.000	0.000	1.4496+j0.0000	6.1228+j0.0000		
B_CT-446-LV	EP909-B446-LV	0.00	4.769	0.00	120.00	120.00	0.000	0.000	1.4496+j0.0000	6.1228+j0.0000		
EP909-B446-LV	EP909-B446-LV	0.00	20.101	0.00	120.00	120.00	0.000	0.000	1.4496+j0.0000	12.8616+j0.0000		

Bus contributes more than one percent of fault current
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chevron	**ETAP**		Page:	1
Location:	Houston and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	121
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **EP909-B909-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus EP_1 (1909-LV)
= [illegible] % of Base kV (1909-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

* [illegible]

Project:	Chemie	**ETAP**		Page:	111
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2-4-2.lfmdw			Config:	Normal

Fault at bus: **XF908-BUS2.HV**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I_k Symm rms	% Voltage at From Bus Va	Vb	Vc	3I_0 Symm. rms Ia	Ib	R1	X1	R0	X0
XF908-BUS2.HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS2.HV	XF908-BUS2.MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS2.HV	XF908-BUS2.MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BUS2.HV	XF908-BUS2.MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution (SLG fault or unbalanced 3-Phase-to-Ground fault).

Project:	Chemo	**ETAP**		Page:	154
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpj14_2.lfmxm			Config:	Normal

Fault at bus: **XF900-B502.4.V**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (kV)
= [illegible] % of Base kV (kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	151
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **LF908-BUS-01V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus Va	Vb	Vc	Ia Symm Amp	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being initially analyzed.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	19
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **EP900-BUS-LV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (EP900-LV)
= [illegible] % of Base kV (EP900-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
EP900-BUS-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	13
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg24_2.lfmxm			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CooperBasin		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	% Voltage at From Bus R	X	Y	3I0 kA	Angle	R1	X1	R0	X0
[illegible]	Trans	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus [illegible] has only one branch connected to it. No fault calculation is performed.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **XF909-BN44-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"								
		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	I"k Symm kA	ip kA	% Voltage at From Bus			k Symm cap		% Impedance on 100 MVA base			
				3c	1c	2c	3c	1c	R1	X1	R0	X0
XF909-BN44-LV	Utility	0.000	0.000	0.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
BUS1-SUB-LV	XF909-BN44-LV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
BUS2-SUB-LV	XF909-BN44-LV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF909-BN44-LV	MCC909-Bus1-LV	0.000	0.000	0.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

a - Indicates fault current contribution from Asynchronous Motors
* - Indicates a zero impedance fault current contribution (100 Zero Impedance Faults Found)

Project:	Chemo	**ETAP**		Page:	139
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CB-09x2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **LF909-B569-01Y**

Prefault voltage = [illegible] kV = [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

Fault at bus: **EP909-B569-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus EP_1 (0.909 kV)
= [illegible]% of Base kV (0.909 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	Ia	Ib	Ic	3I0	3I0	R1	X1	R0	X0
EP909-B4CF4-3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - [illegible]
* - [illegible]

Project:	Chemin	**ETAP**		Page:	101
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lamon			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			X/R Symm. ratio		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]
[illegible]
[illegible]
[

Project:	Chemo	**ETAP**		Page:	52
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ntp[illegible]			Config:	Normal

Fault at bus: **LP909 4160kV**

Prefault voltage = 4160.0 kV = 100.00 % of nominal bus LP 1 4160 kV
= 100.00 % of Base kV (4160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in Branch	% Voltage at From Bus			I in Branch		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
LP909 4160 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	101
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfanalysis			Config:	Normal

Fault at bus: **LF900 4kV 4H**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm rms Ia	Ib	R1	X1	R0	X0
LF900 4kV 4H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus is being isolated.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta T, autotransformer)

Project:	Chemo	**ETAP**		Page:	101
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **EP900 4600 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus EP_1 4600 LV)
= [illegible] % of Base kV (4.600 LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Nom. Bus	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes more than one percent to fault, fed by existing transformers
* Bus has a generator, motor, or other contribution [illegible] % of symmetrical fault current

Project:	Chemic	**ETAP**		Page:	101
Location:	Ponce and Wells Corner, TX	[illegible]		Date:	[illegible]
Contract:	CK-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp14_2.lf1wew			Config:	Normal

Fault at bus: **XFMR-MAIN-415**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (24.000 kV)
= 100.00 % of Base kV (24.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
XFMR-MAIN-415	Total	0.00	22.975	0.00	122.00	122.00	34.500	34.500	1.000E+000	4.172E+000	0.000E+000	1.000E+000
XFMR-MAIN-415	XFMR-MAIN-2KV	0.00	22.975	0.00	122.00	122.00	34.500	34.500	1.000E+000	4.172E+000	0.000E+000	1.000E+000
XFMR-MAIN-415	XFMR-MAIN-4KV	0.00	0.000	0.00	122.00	122.00	0.000	0.000	1.000E+000	4.172E+000		
XFMR-MAIN-415	XFMR-MAIN-4KV	0.00	0.000	0.00	122.00	122.00	0.000	0.000	1.000E+000	4.172E+000		

Bus contribution is less than 1% of total fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	100
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PC-001-PP-PETE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalysis			Config:	Normal

Fault at bus: **XFMR-B602-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	Ia1	Ia2	Ia0	3I0 kA	3I0 ang	R1	X1	R0	X0
XFMR-B602-LV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000+j0.000	1.000+j0.000		
B-CT1-VZ-LV	XFMR-B602-LV	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.479+j0.000	6.120+j0.000		
B-CT2-VZ-LV	XFMR-B602-LV	0.00	0.00	0.00	0.00	0.00	0.000	0.000	1.479+j0.000	6.120+j0.000		
XFMR-B602-LV	XFMR-B602-LV	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

a - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero impedance fault current contribution (100 Ohms grounding/Ohms Y-transformer)

Project:	Chemo	**ETAP**		Page:	101
Location:	Ramos and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	PCARL-PLPOTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-MAIN-HV**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (24.000 kV)
= 100.00 % of Base kV (24.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	B	C	3I0 Symm. kA A	B	R1	X1	R0	X0
XFMR-MAIN-HV	Total	0.00	22.855	0.00	111.00	111.11	34.864	34.864	1.614+j0.000	8.196+j0.000	1.150+j0.000	1.150+j0.000
XFMR-MAIN-HV	SF6(6) 4kV1 Bus	0.00	21.111	0.00	111.00	111.11	31.000	31.000	1.614+j0.000	8.196+j0.000	1.150+j0.000	1.150+j0.000
XFMR-MAIN-HV	SF6(6) 4kV1 Bus	0.00	0.000	0.00	111.00	111.11	0.000	0.000	0.000+j0.000	0.000+j0.000		
XFMR-MAIN-HV	SF6(6) 4kV1 Bus	0.00	0.000	0.00	111.00	111.11	0.000	0.000	0.000+j0.000	0.000+j0.000		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Fault at bus: **XF900 8600 kV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF900 8600 kV	Total	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.0000	0.0000		
BUS1 8600 kV	XF900 8600 kV	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.0000	0.0000		
BUS2 8600 kV	XF900 8600 kV	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.0000	0.0000		
XF900 8600 kV	Infinite Bus	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.0000	0.0000		

a - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	105
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Fault at bus: **EP909 86044 LV**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus EP_1 0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I+3 Nom Unit	% Voltage at From Bus A	B	C	3I0 Symm. cmp. A	B	R1	X1	R0	X0
EP909 86044 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909 86044 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909 86044 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909 86044 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	17
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg24_2.lfmxm			Config:	Normal

Fault at bus: **XFMR 4kV#1 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR 4kV#1 HV	4 bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 4kV#1 HV	XFMR 4kV#1 MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 4kV#1 HV	XFMR 4kV#1 MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution exceeds 1% of bus fault current.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y transformer.

Project:	Chemo	**ETAP**		Page:	171
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfrev			Config:	Normal

Fault at bus: **EP004 [bus9] LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Asymm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				3a0	3a1	3a2	3I0	3I0	R1	X1	R0	X0
EP008-MCC1-3	bus1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chisme	ETAP		Page:	173
Location:	Brown and Mills County, TX	20.0.2C		Date:	05/01/2023
Contract:	TX-99-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Long ITI		Revision:	Base
Filename:	ofg14_Chisme			Config.:	Normal

Short-Circuit Summary Report

3-Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of the Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	34.500	3.489	-23.695	24.014	3.242	-16.135	16.456	-18.218	-4.346	18.880	16.474	11.790	20.117
[illegible]	34.500	4.791	-23.697	24.218	3.120	-16.111	16.429	-19.540	-4.658	19.775	17.966	11.697	21.431
[illegible]	34.500	4.791	-23.697	24.218	3.120	-16.111	16.429	-19.540	-4.658	19.775	17.966	11.697	21.431
[illegible]	13.800	1.387	-11.081	11.172	1.475	-17.595	17.656	-13.021	-3.107	13.387	13.764	3.887	14.305
[illegible]	0.480	5.103	-10.146	11.356	0.000	0.000	0.000	-11.658	-2.782	11.991	10.098	2.410	10.381
[illegible]	0.480	5.189	-28.836	29.304	0.000	0.000	0.000	-24.977	-5.960	25.694	21.627	5.160	22.229

Project:	Chrome	ETAP		Page:	176
Location:	Brown and Mills County, TX	20.0.2C		Date:	03/01/2023
Contract:	03-456-1281			SN:	PSSE-PAPA02
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

ANSI Code - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
Bus1010-Sub-01	0.4160	22.123	-14.610	26.511	0.000	0.000	0.000	-9.884	-12.500	15.937	11.184	-15.004	18.693
Bus1011-Sub-01	0.4160	18.948	-11.124	21.964	0.000	0.000	0.000	-8.219	-10.477	13.317	10.474	-12.971	16.670
Bus1012-Sub-02	0.4160	25.127	-16.836	30.251	0.000	0.000	0.000	-11.058	-14.175	17.973	13.966	-17.173	22.151
Bus1013-Sub-01	0.4160	20.877	-13.924	25.091	0.000	0.000	0.000	-9.210	-11.833	15.000	11.670	-14.441	18.566
Bus1014-Sub-02	0.4160	23.238	-15.628	27.994	0.000	0.000	0.000	-10.249	-13.179	16.701	12.979	-16.179	20.777
Bus1015-Sub-01	0.4160	21.603	-14.398	25.974	0.000	0.000	0.000	-9.527	-12.252	15.528	12.063	-14.969	19.228
Bus1016-Sub-02	0.4160	24.135	-16.095	29.008	0.000	0.000	0.000	-10.645	-13.685	17.345	13.480	-16.727	21.484
Bus1017-Sub-01	0.4160	19.401	-12.937	23.317	0.000	0.000	0.000	-8.557	-11.000	13.941	10.835	-13.441	17.267
Bus1018-Sub-02	0.4160	26.123	-17.415	31.403	0.000	0.000	0.000	-11.523	-14.815	18.774	14.589	-18.097	23.247
Bus1019-Sub-01	0.4160	22.547	-15.031	27.093	0.000	0.000	0.000	-9.945	-12.786	16.202	12.592	-15.617	20.069
Bus1020-Sub-02	0.4160	25.312	-16.875	30.419	0.000	0.000	0.000	-11.167	-14.356	18.189	14.137	-17.529	22.526
Bus1021-Sub-01	0.4160	20.156	-13.437	24.220	0.000	0.000	0.000	-8.892	-11.430	14.484	11.258	-13.958	17.935
Bus1022-Sub-02	0.4160	23.977	-15.985	28.810	0.000	0.000	0.000	-10.578	-13.597	17.230	13.393	-16.602	21.331
Bus1023-Sub-01	0.4160	21.734	-14.489	26.110	0.000	0.000	0.000	-9.589	-12.325	15.617	12.140	-15.048	19.331
Bus1024-Sub-02	0.4160	24.891	-16.594	29.911	0.000	0.000	0.000	-10.980	-14.113	17.883	13.902	-17.232	22.142
Bus1025-Sub-01	0.4160	19.658	-13.105	23.625	0.000	0.000	0.000	-8.673	-11.145	14.124	10.979	-13.608	17.486
Bus1026-Sub-02	0.4160	22.456	-14.971	26.987	0.000	0.000	0.000	-9.908	-12.732	16.135	12.541	-15.539	19.969
Bus1027-Sub-01	0.4160	20.987	-13.992	25.220	0.000	0.000	0.000	-9.260	-11.900	15.078	11.718	-14.518	18.658
Bus1028-Sub-02	0.4160	23.715	-15.810	28.500	0.000	0.000	0.000	-10.465	-13.448	17.042	13.245	-16.409	21.085
Bus1029-Sub-01	0.4160	21.345	-14.230	25.654	0.000	0.000	0.000	-9.420	-12.104	15.336	11.921	-14.768	18.972
Bus1030-Sub-02	0.4160	24.567	-16.378	29.523	0.000	0.000	0.000	-10.842	-13.931	17.652	13.718	-16.990	21.830
Bus1031-Sub-01	0.4160	19.912	-13.275	23.929	0.000	0.000	0.000	-8.787	-11.290	14.305	11.116	-13.773	17.695
Bus1032-Sub-02	0.4160	22.789	-15.193	27.387	0.000	0.000	0.000	-10.057	-12.919	16.368	12.720	-15.759	20.243
Bus1033-Sub-01	0.4160	20.678	-13.785	24.852	0.000	0.000	0.000	-9.126	-11.724	14.854	11.547	-14.303	18.369
Bus1034-Sub-02	0.4160	23.456	-15.637	28.191	0.000	0.000	0.000	-10.351	-13.296	16.845	13.094	-16.211	20.822
Bus1035-Sub-01	0.4160	21.089	-14.059	25.341	0.000	0.000	0.000	-9.308	-11.958	15.145	11.775	-14.594	18.736
Bus1036-Sub-02	0.4160	24.234	-16.156	29.126	0.000	0.000	0.000	-10.697	-13.741	17.406	13.531	-16.764	21.523
Bus1037-Sub-01	0.4160	19.823	-13.215	23.825	0.000	0.000	0.000	-8.749	-11.237	14.236	11.063	-13.708	17.598
Bus1038-Sub-02	0.4160	22.678	-15.119	27.252	0.000	0.000	0.000	-10.010	-12.858	16.285	12.658	-15.683	20.135
Bus1039-Sub-01	0.4160	20.534	-13.690	24.677	0.000	0.000	0.000	-9.065	-11.644	14.750	11.466	-14.199	18.232
Bus1040-Sub-02	0.4160	23.345	-15.563	28.054	0.000	0.000	0.000	-10.305	-13.236	16.764	13.035	-16.140	20.720
Bus1041-Sub-01	0.4160	21.178	-14.119	25.452	0.000	0.000	0.000	-9.349	-12.007	15.208	11.824	-14.644	18.801
Bus1042-Sub-02	0.4160	24.012	-16.008	28.852	0.000	0.000	0.000	-10.600	-13.614	17.243	13.407	-16.602	21.312
Bus1043-Sub-01	0.4160	19.767	-13.178	23.753	0.000	0.000	0.000	-8.725	-11.205	14.189	11.032	-13.658	17.535
Bus1044-Sub-02	0.4160	22.589	-15.059	27.144	0.000	0.000	0.000	-9.972	-12.806	16.217	12.608	-15.617	20.057
Bus1045-Sub-01	0.4160	20.445	-13.630	24.569	0.000	0.000	0.000	-9.026	-11.591	14.675	11.409	-14.132	18.142
Bus1046-Sub-02	0.4160	23.267	-15.511	27.959	0.000	0.000	0.000	-10.272	-13.189	16.703	12.985	-16.079	20.641
Bus1047-Sub-01	0.4160	21.001	-14.000	25.242	0.000	0.000	0.000	-9.272	-11.906	15.076	11.726	-14.526	18.648
Bus1048-Sub-02	0.4160	24.123	-16.082	28.993	0.000	0.000	0.000	-10.650	-13.674	17.320	13.466	-16.677	21.413
Bus1049-Sub-01	0.4160	19.712	-13.141	23.691	0.000	0.000	0.000	-8.701	-11.172	14.146	10.995	-13.615	17.479
Bus1050-Sub-02	0.4160	22.534	-15.022	27.078	0.000	0.000	0.000	-9.945	-12.768	16.173	12.574	-15.574	19.999
Bus1051-Sub-01	0.4160	20.389	-13.593	24.505	0.000	0.000	0.000	-9.000	-11.557	14.634	11.378	-14.091	18.091
Bus1052-Sub-02	0.4160	23.201	-15.464	27.876	0.000	0.000	0.000	-10.238	-13.145	16.645	12.930	-16.018	20.563
Bus1053-Sub-01	0.4160	21.034	-14.023	25.279	0.000	0.000	0.000	-9.283	-11.919	15.092	11.736	-14.544	18.674
Bus1054-Sub-02	0.4160	24.056	-16.037	28.907	0.000	0.000	0.000	-10.618	-13.634	17.260	13.422	-16.630	21.351
Bus1055-Sub-01	0.4160	19.801	-13.201	23.793	0.000	0.000	0.000	-8.739	-11.222	14.208	11.042	-13.677	17.563
Bus1056-Sub-02	0.4160	22.623	-15.082	27.184	0.000	0.000	0.000	-9.987	-12.824	16.236	12.615	-15.636	20.071
Bus1057-Sub-01	0.4160	20.478	-13.652	24.608	0.000	0.000	0.000	-9.040	-11.606	14.691	11.424	-14.154	18.167
Bus1058-Sub-02	0.4160	23.301	-15.534	27.999	0.000	0.000	0.000	-10.287	-13.208	16.725	13.000	-16.107	20.680
Bus1059-Sub-01	0.4160	21.134	-14.089	25.394	0.000	0.000	0.000	-9.331	-11.980	15.172	11.797	-14.617	18.764
Bus1060-Sub-02	0.4160	24.178	-16.119	29.057	0.000	0.000	0.000	-10.673	-13.705	17.348	13.494	-16.719	21.469

Project:	Chrome	ETAP		Page:	19
Location:	Brown and Mills County, TX	20.0.2C		Date:	03/01/2023
Contract:	03-456-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

1.2 Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Study Case: SC-Comp PF

XFMR Code: 3-Phase, LG, LL, 3-Ph, LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

1/2 Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			*Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
XFMR-69/34.5-ATP	34.500	1.602	-21.737	21.761	3.045	-15.499	15.801	-17.646	-4.648	18.251	-20.997	1.917	20.133
XFMR-69/69-ATP	0.690	28.979	-92.878	96.141	0.000	0.000	0.000	-83.271	-15.546	84.698	-93.574	-23.446	96.198
XFMR-69/69-HV1	34.500	6.998	-22.611	23.700	3.028	-13.431	13.984	-17.776	-4.723	18.393	-20.980	1.832	20.132
XFMR-69/69-LV1	0.690	28.963	-92.866	96.135	0.000	0.000	0.000	-83.464	-15.535	84.898	-93.261	-23.511	96.195
XFMR-69/69-HV2	34.500	6.964	-22.540	23.610	3.018	-13.383	13.871	-17.701	-4.704	18.302	-20.893	1.793	20.038
XFMR-69/69-LV2	0.690	28.951	-92.859	96.127	0.000	0.000	0.000	-83.532	-15.540	84.966	-93.032	-23.546	96.144
XFMR-69/34.5-HV	34.500	7.014	-22.435	23.518	4.095	-15.225	15.766	-17.630	-4.807	18.276	-20.643	1.586	20.084
XFMR-69/34.5-LV	0.690	28.997	-92.644	96.120	0.000	0.000	0.000	-83.331	-15.566	84.777	-92.945	-23.565	96.177
XFMR-69/69-HV3	34.500	6.747	-22.098	24.864	3.579	-15.799	16.198	-18.938	-4.598	19.550	-20.924	1.719	20.929
XFMR-69/69-LV3	0.690	28.958	-92.748	96.450	0.000	0.000	0.000	-83.663	-15.324	86.247	-93.063	-23.324	96.211
XFMR-69/69-HV4	34.500	6.825	-22.081	23.635	3.667	-15.793	16.128	-18.905	-4.646	19.500	-20.925	1.634	20.919
XFMR-69/69-LV4	0.690	28.959	-92.896	96.134	0.000	0.000	0.000	-83.999	-15.332	86.218	-93.393	-23.332	96.251
XFMR-69/69-HV5	34.500	6.839	-22.082	23.641	3.736	-15.819	16.264	-17.933	-4.689	18.506	-20.133	1.559	20.139
XFMR-69/69-LV5	0.690	28.967	-92.886	96.142	0.000	0.000	0.000	-83.984	-15.339	86.205	-93.981	-23.339	96.209
XFMR-69/69-HV6	34.500	6.929	-22.569	23.600	3.867	-16.929	16.964	-17.868	-3.751	18.474	-20.999	1.881	20.153
XFMR-69/69-LV6	0.690	28.973	-92.873	96.140	0.000	0.000	0.000	-83.932	-15.346	84.198	-93.954	-23.346	96.199
XFMR-69/69-HV7	34.500	6.982	-22.692	23.733	3.928	-15.400	15.928	-17.787	-4.775	18.416	-20.983	1.468	20.135
XFMR-69/69-LV7	0.690	28.983	-92.864	96.138	0.000	0.000	0.000	-83.965	-15.351	84.195	-93.965	-23.351	96.199

All bus voltages are symmetrical (1/2 Cycle) values in nominal kV.

* LLG fault current is the larger of the two faulted line currents.

Project:	Chisme	ETAP		Page:	178
Location:	Brown and Mills County, TX	20.0.2C		Date:	03/31/2023
Contract:	EX-99-1701			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisme			Config.:	Normal

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohms)			Negative Seq. Imp. (ohms)			Zero Seq. Imp. (ohms)			Fault Z (ohms)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chrome	ETAP		Page:	17
Location:	Brown and Mills Canyon, TX	20.0.2C		Date:	07/31/2023
Contract:	ES-49c-1281			SN:	59385-RAD622
Engineer:	Pure Power Engineering	Study Case: SC Cases 3P		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Tools 3T (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]

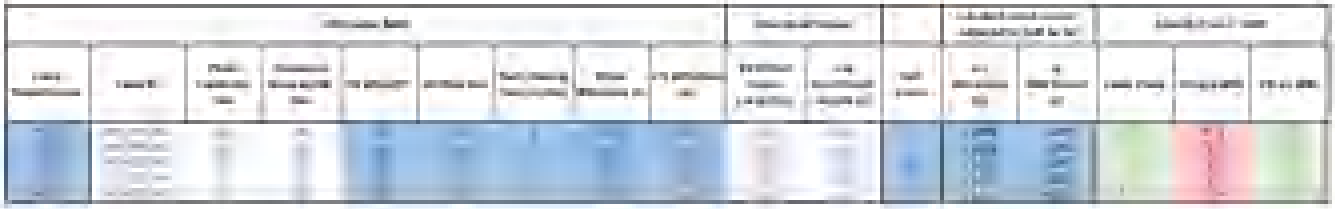
Project:	[illegible]	ETAP		Page:	1
Location:	Bowie and Mills County, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pace Power Engineering			Revision:	Base
Filename:	[illegible]			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault-ZT (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault ZF (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
XFMR-B505-LV	0.600	0.00076	0.00792	0.00796	0.00095	0.00795	0.00798				0.00000	0.00000	0.00000
XFMR-B506-HV	34.500	0.05207	1.00792	1.00947	0.05597	1.00792	1.00947	0.22446	1.07815	1.10154	0.00000	0.00000	0.00000
XFMR-B506-LV	0.600	0.00077	0.00793	0.00799	0.00097	0.00795	0.00799				0.00000	0.00000	0.00000
XFMR-B603-HV	34.500	0.05492	0.98304	0.98643	0.05492	0.98304	0.98643	0.09677	1.02417	1.02859	0.00000	0.00000	0.00000
XFMR-B603-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B605-HV	34.500	0.05994	0.98943	0.99032	0.05994	0.98943	0.99032	0.13757	1.03277	1.03953	0.00000	0.00000	0.00000
XFMR-B605-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B606-HV	34.500	0.06293	0.99284	0.99577	0.06293	0.99284	0.99577	0.13714	1.04586	1.04765	0.00000	0.00000	0.00000
XFMR-B608-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B604-HV	34.500	0.06550	0.99643	0.99936	0.06550	0.99643	0.99936	0.13794	1.04943	1.05143	0.00000	0.00000	0.00000
XFMR-B604-LV	0.600	0.00076	0.00794	0.00798	0.00095	0.00794	0.00798				0.00000	0.00000	0.00000
XFMR-B607-HV	34.500	0.06993	0.99943	1.00313	0.06993	0.99943	1.00313	0.13731	1.05334	1.06604	0.00000	0.00000	0.00000
XFMR-B607-LV	0.600	0.00076	0.00795	0.00798	0.00095	0.00795	0.00798				0.00000	0.00000	0.00000

APPENDIX D – MV CABLE WITHSTAND CALCULATION

PRELIMINARY



APPENDIX E – UTILITY CONTRIBUTION

PRELIMINARY

** -- Application Rating is available for each circuit breaker depending on the number and timing of automatic reclosures, X/R ratio, CB rating structure (symmetrical or asymmetrical), CB rated interrupting time, and contact parting time; all of which are included in the ASPEN Circuit Breaker Rating Module used for this study.

Short Circuit Data

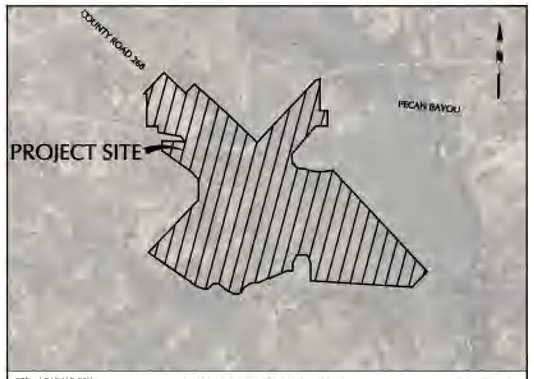
The following table lists estimated short circuit currents and system equivalent impedances:

Quantity		Fault Location and System Configuration		
		Fault at 345kV Oncor Station with [Blue Heron Solar, LLC- Online]	Fault at 345kV Oncor Station with [Blue Heron Solar, LLC- Offline]	Fault at 345kV Oncor Station with [Blue Heron Solar, LLC- Offline and the 345kV Line to Brown Switch out of service]
Three Phase	Fault Current (A)	13,772.9	12,795.1	8,650.3
	ANSI X/R	19.2372	18.9011	19.7844
Single Phase	Fault Current (A)	11,316.8	9,191.7	5,345.4
	ANSI X/R	20.3731	7.93675	12.3667
Equivalent Impedance (Ohms)	Positive Sequence	0.7598+j13.5449	0.41994+j15.4817	3.13388+j55.1189
	Zero Sequence	3.52635+j23.2861	7.04954+j33.2611	30.7764+j70.2416

Conclusion

Based on this study, there are no Oncor Electric Delivery circuit breakers that will be over-duty as a result of Generation Interconnection Request 24INR0333 & 24INR0331.

60% DESIGN DEVELOPMENT SET
FOR
CHISME SOLAR AND STORAGE
8987 CR 268
BROWN COUNTY, TX 76802
ONCOR POI: 31° 34' 35.40" N, 98° 49' 33.96" W

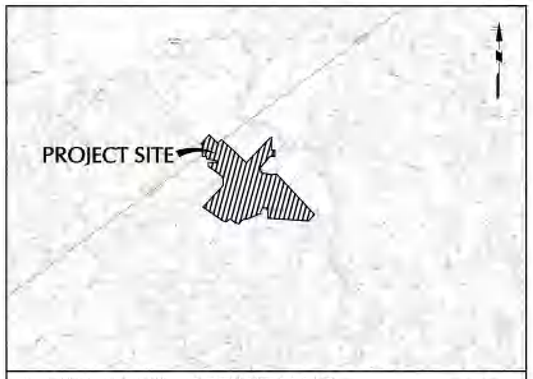


REF.: NEARMAP.COM
DATE: 05/23/2024

LOCATION MAP

SCALE: 1"=2000'

SHEET INDEX			
NUMBER	TITLE	ORIGINAL DATE	LAST REVISED
CS001	COVER SHEET	4/11/2025	9/19/2025
CS002	GENERAL NOTES I	4/11/2025	9/19/2025
CS003	GENERAL NOTES II	4/11/2025	9/19/2025
AB101	ORTHOMOSAIC & TOPOGRAPHIC SURVEY	3/20/2025	-
CD100	OVERALL DEMOLITION PLAN	4/11/2025	9/19/2025
CS100	OVERALL SITE PLAN	4/11/2025	9/19/2025
CS101	ENLARGED SITE PLAN I	9/19/2025	9/19/2025
CS102	ENLARGED SITE PLAN II	9/19/2025	9/19/2025
CS103	ENLARGED SITE PLAN III	9/19/2025	9/19/2025
CS104	ENLARGED SITE PLAN IV	9/19/2025	9/19/2025
CS105	ENLARGED SITE PLAN V	9/19/2025	9/19/2025
CS106	ENLARGED SITE PLAN VI	9/19/2025	9/19/2025
CS107	ENLARGED BESS SITE & UTILITY PLAN	9/19/2025	9/19/2025
CG100	OVERALL GRADING & DRAINAGE PLAN	4/11/2025	9/19/2025
CG101	ENLARGED GRADING & DRAINAGE PLAN I	9/19/2025	9/19/2025
CG102	ENLARGED GRADING & DRAINAGE PLAN II	9/19/2025	9/19/2025
CG103	ENLARGED GRADING & DRAINAGE PLAN III	9/19/2025	9/19/2025
CG104	ENLARGED GRADING & DRAINAGE PLAN IV	9/19/2025	9/19/2025
CG105	ENLARGED GRADING & DRAINAGE PLAN V	9/19/2025	9/19/2025
CG106	ENLARGED GRADING & DRAINAGE PLAN VI	9/19/2025	9/19/2025
CG107	ENLARGED BESS GRADING & DRAINAGE PLAN	9/19/2025	9/19/2025
CG201	DRAINAGE AREA PLAN (LAYDOWN AREA)	9/19/2025	9/19/2025
CG202	STORM CALCULATIONS	9/19/2025	9/19/2025
CG203	STORM CALCULATIONS	9/19/2025	9/19/2025
CE100	OVERALL SOIL EROSION & SEDIMENT CONTROL PLAN	4/11/2025	9/19/2025
CE101	ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN I	9/19/2025	9/19/2025
CE102	ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN II	9/19/2025	9/19/2025
CE103	ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN III	9/19/2025	9/19/2025
CE104	ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN IV	9/19/2025	9/19/2025
CE105	ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN V	9/19/2025	9/19/2025
CE106	ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN VI	9/19/2025	9/19/2025
CE501	SOIL EROSION & SEDIMENT CONTROL DETAILS I	4/11/2025	9/19/2025
CE502	SOIL EROSION & SEDIMENT CONTROL DETAILS II	4/11/2025	9/19/2025
CS501	CONSTRUCTION DETAILS I	4/11/2025	9/19/2025
CS502	CONSTRUCTION DETAILS II	4/11/2025	9/19/2025
CS503	CONSTRUCTION DETAILS III	9/19/2025	9/19/2025
CS504	CONSTRUCTION DETAILS IV	9/19/2025	9/19/2025
CS505	CONSTRUCTION DETAILS V	9/19/2025	9/19/2025



REF.: U.S. GEOLOGICAL SURVEY (USGS)
DATE: 2022

VICINITY MAP

SCALE: 1"=5000'

CHISME SOLAR & BESS ENERGY STORAGE CIVIL BILL OF MATERIALS (BOM) PV AREAS, BESS, & SUBSTATION			
	DESCRIPTION OF ITEM	QUANTITY	UNIT
Construction Items:			
I.	**SITE PREPARATION/DEMOLITION**		
A.	Clearing	757	AC
B.	Structure Removal (Utility Poles, Wells, etc.)	58	EA
C.	Fence Removal	13,000	LF
II.	**SOIL EROSION AND SEDIMENT CONTROL**		
A.	Straw Wattle	13,900	LF
B.	Silt Fence	8,700	LF
C.	Rock Check Dam	201	EA
D.	Rock Filter Outfall	1,000	LF
E.	Riprap Apron w/ Geotextile Fabric	1,700	SY
F.	Concrete Washout	2	EA
G.	Sediment Control Pond	70,000	CF
III.	**STORM DRAINAGE**		
A.	18" RCP	300	LF
B.	36" RCP	24	LF
C.	48" RCP	68	LF
D.	Multiplate Pipe Arch Structure (7'x2'-6")	40	LF
IV.	**SITE IMPROVEMENTS**		
A.	Main Access Road (24' Wide)	12,550	SY
B.	Interior Access Roads (14' Wide)	54,500	SY
C.	Perimeter Roads (18' Wide)	29,000	SY
D.	Emergency/Shared Access Road (14' Wide)	11,500	SY
E.	Cattle Pen Area	49,000	SY
F.	Substation Yard	7,550	SY
G.	Laydown Area Pad	58,700	SY
H.	Traffic/Parking Signs	3	LF
I.	8' High Chain Link Fence (BESS/Substation)	2,800	LF
J.	8' High Game Fence (PV Areas)	41,100	LF
K.	Temporary Construction Fence	8,000	LF
L.	20' Wide Gates	2	LF
M.	16' Wide Gates	2	LF
N.	14' Wide Gates	5	LF
O.	Seeding	100	AC

RRCE CHISME SOLAR & BESS EARTHWORK SUMMARY					
AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	500	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	460	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4750
TOTAL			170,950	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED.
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS.
3. PRELIMINARY IN SITU CUT AND FILL BALANCES ARE IDEALLY TARGETED TO PROVIDE A NET CUT OF 2-7% OF THE CUT/FILL TOTAL VOLUMES TO ACCOUNT FOR FIELD VARIANCES DURING CONSTRUCTION. TEMPORARY STOCKPILING OF EXCESS CUT IS A LOWER COST ALTERNATIVE TO SOURCING EITHER SUITABLE ONSITE OR OFFSITE FILL MATERIALS.

BORROW PIT NOTE:
1. FOUR SITES SITUATED OUTSIDE THE PROJECT LEASE BOUNDARY HAVE BEEN IDENTIFIED AS POTENTIAL BORROW PITS FOR SOURCING FILL MATERIALS, AS AN ALTERNATIVE TO IMPORTING FILL FROM EXTERNAL LOCATIONS. THE GEOTECHNICAL INVESTIGATION REPORT BY LANGAN ENGINEERING DELINEATES THESE FOUR BORROW PIT LOCATIONS ON THE SUBSURFACE INVESTIGATION PLAN - FIGURE 3, AND PROVIDES A DETAILED ANALYSIS OF THE SOIL TYPES IN SECTION 6.7.2. UPON COMPLETION OF THE CONSTRUCTION PHASE, AND AT THE LANDOWNER'S REQUEST, THESE BORROW PITS ARE INTENDED TO BE CONVERTED INTO PERMANENT DETENTION PONDS TO FACILITATE THE RANCHER'S ONGOING LIVESTOCK OPERATIONS.

LANGAN RECOMMENDS A COLLABORATIVE EVALUATION INVOLVING RRCE, THE CONTRACTOR, AND LANGAN TO ASSESS THE POTENTIAL COST BENEFITS AND DRAWBACKS OF UTILIZING THE BORROW PITS FOR FILL MATERIAL. THIS ASSESSMENT SHOULD INCLUDE CONSIDERATIONS SUCH AS THE POSSIBLE REDUCTION IN UXO CLEARING COSTS. THE FINAL DECISION IS ANTICIPATED TO SIGNIFICANTLY INFLUENCE THE GRADING DESIGN STRATEGY FOR THE PROJECT.

OWNER/DEVELOPER:

RED RIVER CLEAN ENERGY

107 SPRING STREET
SEATTLE, WA 98104

SURVEYOR, CIVIL AND GEOTECHNICAL ENGINEER:

LANGAN

2999 OLYMPUS BLVD, #165
DALLAS, TX 75019
(817) 328-3200
TBPE FIRM REG. #F-13709
TBPELS FIRM REG. #10194888

SUBSTATION AND GEN-TIE ELECTRIC & STRUCTURAL ENGINEER:

QUALUS

750 WOODLANDS PARKWAY, SUITE 200
RIDGELAND, MS 39157
(601) 351-3270

PV AND BESS ELECTRIC & STRUCTURAL ENGINEER:

PUREPOWER ENGINEERING

111 RIVER STREET, SUITE 1110
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TEXAS UTILITIES CODE
TITLE 5 CHAPTER 251

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER THE STATE OF TEXAS UNDERGROUND FACILITY DAMAGE PREVENTION AND SAFETY ACT, TO CONTACT THE UTILITY COMPANIES FOR MORE ACCURATE LOCATION PRIOR TO ANY EXCAVATION.

TO OBTAIN ADDITIONAL UTILITY INFORMATION OR TO ARRANGE FOR FIELD LOCATION OF EXISTING UTILITIES BEFORE EXCAVATION, CALL TEXAS 8-1-1 OR DIALING 8-1-1 FROM ANYWHERE IN THE STATE, OR BY DIALING 1-800-344-8377. THE UTILITY COMPANIES SHOWN MAY OR MAY NOT HAVE UTILITY LINES IN THE AREA.

CALL BEFORE YOU DIG !!
TEXAS LAW REQUIRES A MINIMUM OF 48 NORMAL BUSINESS HOURS (EXCLUDING WEEKENDS & LEGAL STATE HOLIDAYS) NOTICE BEFORE EXCAVATION BEGINS
TEXAS 8-1-1
1-800-344-8377

DIAL 811 BEFORE YOU DIG

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

LANGAN

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Project
CHISME SOLAR AND STORAGE
8987 CR: 268
BROWN & MILLS COUNTY TEXAS

Drawing Title
COVER SHEET

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LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
R.O.W. LINE		
FENCE TO BE REMOVED		
TO BE REMOVED/ABANDONED		
FENCE (TYP.)		
UTILITY LINE TO BE REMOVED		
WATER SERVICE		
FIRE HYDRANT FIRE DEPARTMENT CONNECTION		
WATER METER		
GATE VALVE		
OVERHEAD WIRES		
UNDERGROUND ELECTRIC		
ELECTRIC METER		
POWER POLE		
LIGHT POLE		
GUY ANCHOR		
STORM PIPE		
CONTOUR		
SPOT ELEVATION		
LIMIT OF DISTURBANCE		
SILT FENCE		
STRAW WATTLE		
RIPRAP		
POST CHECK DAM		
CONCRETE WASHOUT		
LIMITS OF GRADING		
ELECTRICAL EQUIPMENT		
ACCESS ROAD		
UV SOLAR MODULE		
CHAIN LINK FENCE		
UNIT		
XFMR PANEL		
INVERTER		
TEMPORARY DIVERSION		

ABBREVIATIONS

AHJ = AUTHORITY HAVING JURISDICTION
CMP = CORRUGATED METAL PIPE
CONC = CONCRETE
CWS = CONCRETE WASHOUT SYSTEM
EX = EXISTING
FH = FIRE HYDRANT
HP = HIGH POINT
HW = HEADWALL
LA = LANDSCAPED AREA
POR = ENGINEER OF RECORD
RE = RIVERA EFE
MH = MANHOLE
PR = PROPOSED
RCP = REINFORCED CONCRETE PIPE
ROW = RIGHT OF WAY
TYP = TYPICAL
WSE = WATER SURFACE ELEVATION
WV = WATER VALVE
BESS = BATTERY ENERGY STORAGE
MV = MEDIUM VOLTAGE
HV = HIGH VOLTAGE

GENERAL EXCAVATION REQUIREMENTS

1. EXCAVATION CONSISTS OF THE REMOVAL OF SUBSURFACE MATERIAL BELOW THE "STRIPPED" LEVEL TO THE LINES AND ELEVATIONS SHOWN ON THE DRAWINGS.
2. EXCAVATION OF EACH SOIL CATEGORY AS DEFINED HEREIN SHALL BE PERFORMED SEPARATELY SUCH THAT EARTH SOIL SUITABLE FOR USE AS EMBANKMENT MATERIAL SHALL BE EXCAVATED SEPARATELY FROM UNSUITABLE SOILS. ALL EXCAVATED SOILS THAT ARE TO BE STOCKPILED ON SITE SHALL BE FREE OF TRASH, DEBRIS, VEGETATION AND DELETERIOUS MATERIALS. ANY EXCAVATED MATERIALS CONTAINING THESE ELEMENTS SHALL BE DISPOSED OF OFF-SITE.
3. EXCAVATION SHALL BE PERFORMED IN A MANNER TO VERIFY DRAINAGE DURING THE COURSE OF THE WORK. FLOODED EXCAVATIONS SHALL BE DE-WATERED IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND ALL LOOSE AND SATURATED SOILS REMOVED BEFORE PROCEEDING WITH THE WORK. SEPARATE AREAS EXCAVATED FROM FLOODED EXCAVATIONS SHALL BE STOCKPILED SEPARATELY AS CATEGORY II GENERAL FILL AND ALLOWED TO DE-WATER PRIOR TO BEING USED AS GENERAL FILL IN ORGANIZATION IS ENCOUNTERED, THE CONTRACTOR SHALL NOT PROCEED WITH THE WORK UNTIL THEIR CONSTRUCTION METHOD IS APPROVED BY THE ENGINEER.
4. MAINTAIN EXISTING DITCHES TO VERIFY DRAINAGE AT ALL TIMES. CONSTRUCT AND MAINTAIN DITCHES AND CHANNELS TO AVOID DAMAGE TO SLOPES.
5. EXCAVATING FOR STRUCTURES AND SPREAD FOOTINGS IF CUT BELOW THE DEPTHS INDICATED WITHOUT SPECIFIC DIRECTIONS FROM THE ENGINEER, EXTEND CONCRETE TO THE BOTTOM OF THE EXCAVATIONS.
6. UNDER NO CIRCUMSTANCES SHOULD FOUNDATIONS BE ESTABLISHED UPON LOOSE OR DISTURBED EXISTING FILL OR REPLACEMENT COMPACTED FILL AND BOULDERS, CONSTRUCTION DEBRIS, FROZEN SOIL, OR WATER PONDED WATER. IF THE SOILS UPON WHICH THE FOOTINGS ARE TO BE ESTABLISHED BECOME LOOSE OR DISTURBED, THEY MUST BE RE-COMPACTED BEFORE CONCRETE IS POURED. IF UNSUITABLE MATERIALS ARE ENCOUNTERED AT FOOTING BEARINGS, THESE MATERIALS SHALLS BE REMOVED IN ITS ENTIRETY AND REPLACED WITH COMPACTED STRUCTURAL FILL.
7. EXCAVATION FOR PRODUCTS: EXCAVATE TRENCHES FOR UTILITY LINES, CABLE AND CONDUIT TRENCHES ALONG STRAIGHT LINES. WIDTH AND DEPTH OF TRENCHES SHALL BE AS INDICATED. A MINIMUM OF 6 INCHES BETWEEN THE OUTSIDE OF THE PIPE BELL OR UNDERGROUND PORTION OF THE PIPE OR COUPLING AND THE SIDES OF THE TRENCH OR BRACING SHALL BE PROVIDED.
8. FOR PIPE AND CONDUIT TRENCH EXCAVATIONS ONLY, MECHANICAL EXCAVATION, EXCEPT IN ROCK SHALL BE USED TO AT LEAST 3 INCHES ABOVE FINAL INVERT GRADE. THE REMAINDER OF THE EXCAVATION SHALL BE SHAPED AND GRADED TO PROVIDE UNIFORM BEARING ON COMPACTED SOIL IMMEDIATELY BEFORE THE PIPE OR CONDUIT IS LAID.
9. EXCAVATIONS OF UNSUITABLE MATERIAL UNDER PAVEMENTS AND EQUIPMENT: A MINIMUM OF 12 INCHES OF UNSUITABLE SHALL BE REMOVED FROM ALL AREAS OF UNSUITABLE SUBGRADE OR FOUNDATION LOCATIONS.
10. ALL UNSUITABLE MATERIAL DISCOVERED WITHIN DEPTHS ESTABLISHED BY THE GEOTECHNICAL ENGINEER, MEASURED FROM THE FINAL FINISHED GRADE OF THE PAVEMENT SHALL BE REMOVED. SURFACE MATERIAL FOUND TO BE SUITABLE MAY REMAIN IN THE AREA OF THE WORK. THE GEOTECHNICAL ENGINEER WILL DETERMINE THE SUITABILITY OF IN-PLACE MATERIAL. ANY DISTURBED MATERIAL OR SUBGRADE SOIL AND A DEPTH TWO TIMES THE DISTURBANCE SHALL BE SCARIFIED AFTER THE REMOVAL OF UNSUITABLE MATERIAL AND THE FIRST LAYER OF EMBANKMENT FILL SHALL BE COMPACTED EQUAL TO THE SCARIFIED MATERIAL.
11. THE GEOTECHNICAL ENGINEER MAY REQUIRE UNDERCUTTING IN THE PROPOSED SUBGRADE TO REMOVE CONTAMINATED, WEAK OR WATER-SATURATED SOIL. THE GEOTECHNICAL ENGINEER WILL MAKE DETERMINATION OF UNSUITABLE AREAS.
12. WHERE MATERIAL IS ENCOUNTERED BELOW THE APPROVED SUBGRADE WITHIN THE CONSTRUCTION LIMITS IT SHOULD UNDERMINE THE CONTRACTOR SHALL EXCAVATE UNSUITABLE MATERIAL AND REPLACE WITH STABLE APPROVED FILL MATERIAL, AND COMPACT TO THE SPECIFIED DENSITY.
13. EXCAVATED LIMESTONE, CLAYSTONE, SILTSTONE, SANDSTONE, OR OTHER SOIL-LIKE NON-DURABLE ROCK SHALL NOT BE PLACED AS EMBANKMENT AND SHALL BE REMOVED AND DISPOSED OF AS SPOIL OR EMBANKMENT IN ACCORDANCE WITH ITS APPLICABLE FILL CATEGORY WHEN USED AS STRUCTURAL FILL WITHIN SUBSTATION OR PV PLANT AREAS. ARGILLITE, CLAYSTONE, SILTSTONE, SANDSTONE, OR OTHER SOIL-LIKE NON-DURABLE ROCK CREATED THAN 6-INCHES IN WIDTH OR DIAMETER SHALL NOT BE PLACED IN AND IN-SITE EMBANKMENTS OR FILLS.

GENERAL NOTES

1. UNLESS SHOWN OR SPECIFIED OTHERWISE, ALL CONSTRUCTION AND MATERIALS SHALL COMPLY WITH LOCAL COUNTY AND STATE CODES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL MATERIALS AND LABOR TO CONSTRUCT THE PROPOSED IMPROVEMENTS AS SHOWN AND DESCRIBED IN THE CONSTRUCTION DOCUMENTS AND IN ACCORDANCE WITH THE APPROPRIATE APPROVING AUTHORITIES' SPECIFICATIONS AND REQUIREMENTS.
3. ALL EXISTING UTILITIES SHOWN ARE LOCATED ACCORDING TO THE INFORMATION AVAILABLE TO THE ENGINEER AT THE TIME THE DRAWINGS WERE PREPARED AND HAVE NOT BEEN INDEPENDENTLY VERIFIED, GUARANTEED IS NOT MADE THAT ALL EXISTING UNDERGROUND UTILITIES ARE SHOWN OR THAT THE LOCATION OF THOSE SHOWN ARE ACCURATE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THE ACTUAL LOCATION OF ANY EXISTING UTILITIES PRIOR TO THE COMMENCEMENT OF ANY WORK IN THE VICINITY. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE DUE TO THE CONTRACTOR'S FAILURE TO LOCATE, PRESERVE AND PROTECT ALL UTILITIES ANCHOR ADJACENT TO THE UTILITY OWNER'S REQUIREMENTS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN UP-TO-DATE AS-BUILT OPERATION FOR ALL WORK AREAS. IT IS NECESSARY TO BACK BACK OR RELOCATE ACTIVITY, THE UTILITY COMPANY SHALL BE CONTACTED BY THE CONTRACTOR TO OBTAIN PERMISSION REGARDING THE METHOD TO USE FOR SUCH WORK.
6. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTACT THE VARIOUS UTILITY COMPANIES WHICH MAY HAVE BURIED OR AERIAL UTILITIES WITHIN OR NEAR THE CONSTRUCTION AREA BEFORE COMMENCING WORK. THE CONTRACTOR SHALL PROVIDE 72 HOURS MINIMUM NOTICE TO ALL UTILITY COMPANIES PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL ALSO TAKE ALL NECESSARY SAFETY PRECAUTIONS TO AVOID CONTACT WITH OVERHEAD AND UNDERGROUND POWER LINES. THE CONTRACTOR SHALL CONTACT 811 OR TEXAS ONE CALL SYSTEM, AND MAINTAIN UP-TO-DATE ONE-CALL DESIGNATIONS THAT ALL WORK AREAS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION FIELD STAKING, TESTING AND INSTRUMENTATION UNLESS SPECIFIED.
8. ALL CONTRACTORS MUST CONFINE THEIR ACTIVITIES TO THE APPROVED LIMITS OF CONSTRUCTION WORK AREAS. ANY DAMAGE OUTSIDE THE LIMITS OF CONSTRUCTION SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR.
9. THESE PLANS DO NOT INCLUDE DESIGNS OR SYSTEMS DEPENDENT TO THE SAFETY OF THE CONTRACTOR OR ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF ALL ADEQUATE SAFETY PROCEDURES AND PROGRAMS.
10. THE CONTRACTOR SHALL OBTAIN AND COMPLY WITH TERMS OF PERMITS ISSUED BY EACH JURISDICTIONAL AGENCY. PERFORMANCE OF THIS PLAN DOES NOT RELIEVE ITS APPROVAL FROM THE APPLICABLE AGENCIES.
11. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL CONSTRUCTION DEBRIS, SURFACE AND/OR SUBSURFACE MUST BE APPROVED BY AGENCY.
12. THE CONTRACTOR SHALL RELOCATE ALL POWER LINES, SIGNS, FENCES AND OTHER OBSTRUCTIONS AS NECESSARY TO THE PLANS AND/OR AS REQUIRED TO CONSTRUCT THE PROPOSED IMPROVEMENTS.
13. THE CONTRACTOR SHALL UTILIZE TECHNIQUES AS THEY DO NOT TRESPASS WITH SITE DRAINAGE AND INTERFERE WITH, DAMAGE, OR CAUSE SEDIMENTATION TO CONSTRUCTED SEDIMENT TRANSPORT (NORMAL RAIN EVENTS).
14. IF EROSION ARE PRESENT, TEMPORARY FENCES AND GATES SHALL BE ADDED INSTALLATION OF GATES AT FENCE CROSSING AS WELL AS GATE OPENING/CLOSING PROCEDURES SHALL BE VERIFIED WITH AGRICULTURAL OPERATIONS.
15. THE PROPOSED IMPROVEMENTS SHOWN/NOTED ON THE FINAL CONSTRUCTION DRAWINGS WILL BE STAKED IN THE FIELD BY EITHER SURVEY MARKERS, SURVEYORS RIBBON, PIN FLAGS, OR SUITABLE EQUIVALENT.
16. THE BOUNDARIES OF ALL AREAS OF EXISTING TREES TO BE CLEARED AS SHOWN ON THE FINAL CONSTRUCTION DRAWINGS WILL BE MARKED IN THE FIELD BY EITHER SURVEY MARKERS, SURVEYORS RIBBON, PIN FLAGS, OR SUITABLE EQUIVALENT PRIOR TO CONSTRUCTION BY THE CONTRACTOR.
17. THE CONTRACTOR SHALL AVOID THE DESTRUCTION OF ANY EXISTING TREES THAT MAY BE IMPACTED BY PROPERTY CONSTRUCTION. TREES THAT MUST BE REMOVED AND/OR CUT WILL HAVE A TEMPORARY SAFE INSTALLED OF HEALTHY GROW SUPPLEMENTS OF CONSTRUCTION, THE FENCE WILL BE REBUILT AT A MINIMUM TO THE PRE-CONSTRUCTION CONDITION.
18. IN THE EVENT THAT ARCHAEOLOGICAL MATERIALS, HUMAN REMAINS OR EVIDENCE OF HUMAN REMAINS ARE ENCOUNTERED DURING CONSTRUCTION, ALL WORK IN THE VICINITY OF THE FIND WILL BE IMMEDIATELY HALTED AND THE PROJECT TEAM WILL BE NOTIFIED TO DETERMINE NEXT STEPS.
19. IMMEDIATELY FOLLOWING CONSTRUCTION ACTIVITY, THE WORK AREAS WILL BE THOROUGHLY AND SAFELY CLEARED OF DEBRIS WORK SHARD, WIRE, SCRAPS OF STEEL, AND OTHER ACCIDENTAL ITEMS.
20. NO EXCAVATION, GRADING OR OTHER EARTHWORK SHALL BE PERFORMED WHEN SOIL CONDITIONS (MOISTURE CONTENT) ARE UNSUITABLE AS DETERMINED BY THE GEOTECHNICAL ENGINEER OF RECORD (EOR). EARTHWORK SHALL NOT BE PERFORMED DURING OR IMMEDIATELY AFTER RAINFALL OR WHEN, IN THE OPINION OF THE EOR, OTHER WEATHER CONDITIONS PREVENT ACCEPTABLE COMPACTION AND GRADING. THE CONTRACTOR SHALL COMPLY WITH ALL RECOMMENDATIONS IN THE GEOTECHNICAL ENGINEER'S REPORT REGARDING EARTHWORK CONSTRUCTION.
21. THE PRIVATE ACCESS ROADS ARE NOT DESIGNED FOR ALL-WEATHER USE OF HIGH VOLUME, HEAVY DISTRIBUTION LOADS REQUIRE ROADWAY MAINTENANCE IS REQUIRED SUCH AS GRADING AND RESHAPING OF AGGREGATE BASE COURSE AND AFTER CONSTRUCTION AND WORKING AFTER HEAVY RAIN EVENTS.
22. UNUSABLE EXCAVATED MATERIAL AND ALL WASTE RESULTING FROM SITE CLEARING AND GRUBBING SHALL BE DISPOSED OF OFF-SITE OR BY ARRANGEMENT SUBMITTED WRITTEN DOCUMENTATION AS CONCRETE DUMPS OR DEMOLITION WASTES, WITH CLEARING WASTES OR DEBRIS WASTES IS PERMITTED WITHOUT EXPRESSED WRITTEN CONSENT OF THE GEOTECHNICAL ENGINEER.
23. THE CONTRACTOR SHALL MAINTAIN POSITIVE SITE DRAINAGE AND EXISTING DRAINAGE PATTERNS THROUGHOUT CONSTRUCTION. NO GRADING ISSUES OF THE ESTABLISHED LIMITS OF DISTURBANCE SHALL OCCUR WITHOUT PRIOR WRITTEN SUBMISSION FROM THE OWNER/EOR.
24. ALL TREES, BRUSH, STUMPS AND DEBRIS SHALL BE REMOVED BY THE CONTRACTOR IN THE CONSTRUCTION AREA. THE DISPOSAL SHALL BE DISPOSED FROM ALL ROADWAY UTILITIES AND FOUNDATION AREAS AS NEEDED AND STOCKPILED FOR LATER USE IN THE AREA THAT IS TO BE RE-VEGETATED. EXISTING ROADS, WHERE PRACTICAL, ANY EXISTING AGGREGATE SHOULD BE LEFT IN PLACE AND NOT REMOVED WITH THE TOPSOIL.
25. AFTER REMOVAL OF THE TOPSOIL, THE ROADWAY SUBGRADE SHOULD BE COMPACTED USING A SHEEPS FOOT ROLLER WHERE HIGH SLAW CEMENT SURFACE SOILS ARE PRESENT, VIBRATORY SMOOTH DRUM OR PNEUMATIC TIRE COMPACTION EQUIPMENT SHOULD BE USED WHERE CONSIDERABLE SILTY OR SANDY SURFACE SOILS ARE ENCOUNTERED. ANY SOFT, YIELDING OR UNSUITABLE SURFACES SHOULD THEN BE EXCAVATED AND CHECKED FOR FURTHER USING A MINIMUM 20-TON TWO-AXLE DUMP TRUCK OR SIMILAR VEHICLE. IF AREAS "PUMP" OR MOVE GREATER THAN 1.5 INCHES, SOFT AREA SHALLS SHOULD BE EXCAVATED AND RE-COMPACTED. THE EXCAVATED AREA SHOULD THEN BE BACKFILLED WITH APPROVED GRANULAR MATERIAL AND COMPACTED TO THE REQUIRED DENSITY. SOFT AREAS SHOULD BE EXCAVATED AND THE AREAS BACKFILLED AS NEEDED. PROOF-ROLLING SHALL BE PERFORMED IN THE PRESENCE OF THE GEOTECHNICAL ENGINEER OR QUALIFIED TECHNICIAN.
26. FILL SOILS USED TO ATTAIN GRADES IN THE PROPOSED PAVEMENT SUBGRADE AREAS MAY CONSIST OF EXCAVATED GRANULAR SOILS FREE FROM ORGANICS AND OTHER DELETERIOUS MATERIALS AND PARTICLES GREATER THAN 4 INCHES IN DIAMETER.
27. EARTHWORK SHOULD BE PERFORMED IN AREAS THE APPROVED SUBGRADE OR FILL SOILS DO NOT DRY OUT OR BECOME SATURATED PRIOR TO PLACEMENT OF ADDITIONAL FILL OR BASE MATERIAL. IF THIS OCCURS, THE EXPOSED FILL SOILS OR SUBGRADE SHOULD BE SCARIFIED, MOISTURE ADJUSTED AND RE-COMPACTED BEFORE THE PLACEMENT OF ADDITIONAL MATERIAL.
28. AGGREGATE BASE SHOULD BE PROOF-ROLLED WITH A PNEUMATIC ROLLER OR A MINIMUM 20-TON CROSS-AXLE TANDEM AXLE VEHICLE IF FLEXIBLE BASE THAN 1.5 INCHES ARE DISTORTED, SOFT AREAS SHOULD BE EXCAVATED AND RE-COMPACTED OR REPLACED. (NO RE-DISTORTED BY PROOF-ROLLING.)
29. IRON OXIDE AND MANGANESE FOR ALL DISTRICTS THE SOILS SHOULD BE AMENDED THAN JUNE UNLESS OTHERWISE SPECIFICALLY INDICATED ON THE PLANS.
30. CULVERT MARKERS SHALL BE PLACED AT ALL NEW PERMANENT CULVERT LOCATIONS WITHIN THE PUBLIC RIGHT-OF-WAY ADJACENT HIGH-TRAFFIC THE MARKERS SHALL BE PLACED ON BOTH SIDES OF ALL INVERTED ROADS AND ALONG ALL ROAD SIDEWALK DESIGNATED AS LOW WATER CROSSINGS ON THE PLANS. GRADING FOR INITIATIVE MARKERS AT LOW WATER CROSSINGS SHALL NOT EXCEED 6% LINEAR PER.
31. DURING GRADING OPERATIONS, LARGE PARTIALS EXPOSED BOULDERS MAY BE ENCOUNTERED. IF THESE BOULDERS ARE REMOVED, SECONDARY NOTE MAY REMAIN WHICH SHOULD BE REMOVED, BACK-FILLED WITH APPROPRIATE FILL TYPES FOR THE DESIGNATED AREAS AND COMPACTED. IT MAY BE MORE PRUDENT TO BREAK OFF THE EXPOSED BOULDER THAN TO REMOVE THEM ENTIRELY. BOULDERS THAT ARE NOT TO BE USED FOR USE AS GENERAL OR STRUCTURAL FILL IN ACCORDANCE WITH THE MATERIAL REQUIREMENTS HEREIN SHALL BE DISPOSED OR STOCKPILED AS DIRECTED.

STRIPPING NOTES

1. STRIPPING CONSISTS OF REMOVAL OF TOPSOIL, ORGANIC MATTER AND OTHER DELETERIOUS MATERIALS. THE DEPTH OF STRIPPING WILL TYPICALLY VARY FROM 4" TO 6" FOR ALL AREAS WITHIN THE STAKED CLEARING LIMITS, EXCEPT FOR ON-LINE PLANTS WITHIN THE LIMITS OF THE SITE UNLESS OTHERWISE INDICATED ON THE PLANS. AFTER STRIPPING THE STUMPS AND ROOTS IN EXCESS OF 1/2" IN DIAMETER, TOPSOIL SHALL BE STOCKPILED IN AREAS DESIGNATED FOR THE TEMPORARY STORAGE (GRAVEL OR TYPE) PAVEMENTS AND FOUNDATIONS STRIPPED TOPSOIL SHALL BE STOCKPILED ON SITE AS DIRECTED BY THE GEOTECHNICAL ENGINEER OR CONTRACTOR TO BE USED FOR FINAL DRESSING OF THE DEPARTMENT AREAS AND/OR AREAS REQUIRING STRIPPING.
2. THE DEPTH OF TOPSOIL STRIPPING MAY VARY WITH THE AREA BEING STRIPPED. AT A MINIMUM, STRIP ALL SURFACE SOILS CONTAINING VISIBLE ROOT STRUCTURES AND ORGANIC MATTER. WHERE TOPSOIL DEPTHS ARE NOT VISUALLY DISCERNABLE, SOILS EXHIBITING PITCH STRIPPING SHALL HAVE AN ORGANIC CONTENT OF LESS THAN 5% BY USDA APPROVED WET COMBUSTION METHOD.
3. EXCAVATE AND STOCKPILE ANY ADDITIONAL SOILS DESIGNATED BY THE GEOTECHNICAL ENGINEER TO BE UNSUITABLE AS GENERATED FOR BASES ARE STRIPPED AREAS.
4. SUBSEQUENT TO STRIPPING AND PRIOR TO PLACEMENT OF ENGINEERED FILL, PAVEMENTS AND/OR FOUNDATION BEARING, THE SUBGRADE SHOULD BE PROOF ROLLED BY PASSING A FULLY LOADED DUMP TRUCK OR SIMILAR TWO-AXLE, CONSTRUCTION EQUIPMENT DUMP TRUCK OR TRAILER'S HEAVY PNEUMATIC TIRE OVER THE SURFACE AT LEAST TWICE. SOFT OR UNSUITABLE SOILS SHOULD BE REMOVED AND REPLACED WITH STRUCTURAL FILL. IN THOSE AREAS WHERE FILL LOOSELY NEAR-SURFACE SOILS HAVE BEEN DISTURBED, THEY SHOULD BE SCARIFIED AND RE-COMPACTED PRIOR TO THE PLACEMENT OF ENGINEERED FILL, PAVEMENTS AND FLOOR SLABS.
5. EXCAVATION OF THE NEAR-SURFACE DISTURBED SOILS SHOULD BE AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER FOR THE CORRESPONDING SOIL TYPE.
6. MAINTENANCE OF TOPSOIL STOCKPILES SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP).

POTENTIAL UNEXPLODED ORDNANCE (UXO) NOTES

1. PRIOR TO THE INITIATION OF ANY CONSTRUCTION ACTIVITIES, A COMPREHENSIVE UXO SURVEY MUST BE CONDUCTED BY A CERTIFIED UXO SPECIALIST. THIS ASSESSMENT SHALL INCLUDE A GEOPHYSICAL SURVEY AND ANOMALY INVESTIGATION METHODS, TO IDENTIFY AND DEMARCATE POTENTIAL UXO LOCATIONS.
2. ALL CONSTRUCTION PERSONNEL MUST PARTICIPATE IN A SITE-SPECIFIC UXO AWARENESS TRAINING CONDUCTED BY A CERTIFIED UXO SPECIALIST. THIS EDUCATION SHALL COVER THE IDENTIFICATION OF UXO, ASSOCIATED RISKS AND EMERGENCY RESPONSE PROCEDURES.
3. A CERTIFIED UXO SPECIALIST MUST BE ON-SITE DURING ALL SUBSURFACE EXCAVATIONS, INCLUDING BUT NOT LIMITED TO EXCAVATION, DRILLING, TRENCHING AND DIGGING. THE SPECIALIST IS RESPONSIBLE FOR CONTINUOUS MONITORING AND IMMEDIATE RESPONSE TO ANY SUSPECTED OBJECTS.
4. CONTRACTOR TO ESTABLISH AND DISSEMINATE A DETAILED UXO EMERGENCY RESPONSE PLAN. THIS PLAN MUST INCLUDE IMMEDIATE CESSATION OF WORK, SITE EVACUATION PROTOCOLS, AND NOTIFICATION PROCEDURES FOR THE UXO SPECIALIST AND RELEVANT LOCAL AUTHORITIES.
5. ANY SUSPECTED UXO MUST BE CLEARLY MARKED WITH VISIBLE INDICATORS, AND ACKNOWLEDGED IMMEDIATELY TO THE UXO SPECIALIST. UNDER NO CIRCUMSTANCES SHOULD PERSONNEL ATTEMPT TO MOVE, HANDLE, OR DISTURB THE SUSPECTED UXO.
6. MAINTAIN OPEN PUBLIC COORDINATION WITH LOCAL AUTHORITIES AND MILITARY EXPLOSIVE ORDNANCE DISPOSAL (EOD) UNITS TO FACILITATE THE SAFE IDENTIFICATION, REMOVAL, AND DISPOSAL OF ANY UXO DISCOVERED ON-SITE.
7. IMPLEMENT STRINGENT PROTECTIVE MEASURES, INCLUDING THE ESTABLISHMENT OF EXCLUSION ZONES AND PHYSICAL BARRIERS, TO ENSURE THE SAFETY OF ALL PERSONNEL AND THE PUBLIC DURING UXO IDENTIFICATION AND REMEDIATION ACTIVITIES.
8. MAINTAIN COMPREHENSIVE RECORDS OF ALL UXO-RELATED ACTIVITIES, INCLUDING INITIAL SITE ASSESSMENTS, SAFETY BRIEFINGS, UXO DISCOVERIES, AND SUBSEQUENT DISPOSAL ACTIONS. THESE RECORDS MUST BE READILY AVAILABLE FOR REVIEW BY RELEVANT AUTHORITIES.
9. VERIFY FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS GOVERNING UXO MANAGEMENT.

CONTRACTOR NOTES

1. THESE PLANS REPRESENT THE OVERALL SITE-WORK IMPROVEMENTS REQUIRED FOR PROJECT CONSTRUCTION. THE CONTRACTOR SHALL FURNISH, INSTALL, TEST AND COMPLETE ALL WORK AS THE CONSTRUCTION IS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION AS SHOWN. THESE PLANS DO NOT COMPLETELY REPRESENT HOW THE SITE IS INTENDED TO REPRESENT ALL SPECIFIC INSTRUCTIONS OR DURING LOW STREAM CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONSTRUCT ALL IMPROVEMENTS DEPICTED ON THESE PLANS IN ACCORDANCE WITH ALL APPLICABLE RULES, REGULATIONS AND LAWS IN EFFECT AT THE TIME OF CONSTRUCTION.
2. THE CONTRACTOR SHALL ACCEPT THE SITE AS IS, THE CONTRACTOR SHALL ASSESS CONDITIONS, AND THE KIND, QUALITY AND QUANTITY OF WORK REQUIRED. THE OWNER MAKES NO GUARANTEE IN REGARD TO THE ACCURACY OF ANY AVAILABLE INFORMATION WHICH WAS OBTAINED DURING INVESTIGATIONS. THE CONTRACTOR SHALL MAKE A THOROUGH SITE INSPECTION IN ORDER TO FIELD VERIFY EXISTING SITE CONDITIONS, CONTRACTOR'S CONDITIONS WITH THE DRAWINGS AND MEASURE ANY POSSIBLE CONSTRUCTION CONFLICTS WITH THE PROPOSED WORK AND TRANSMIT ORDER TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL MAKE ADDITIONAL TOPOGRAPHIC SURVEYS AS DEEMS NECESSARY, PROVIDED THEY ARE COORDINATED WITH THE OWNER. ANY CONDITIONS ENCOUNTERED BY THE CONTRACTOR THAT DIFFER FROM THE INFORMATION SHOWN ON THE DRAWINGS THAT ARE NOT BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE START OF WORK SHALL NOT BE CONSIDERED GROUNDS FOR ADDITIONAL PAYMENT OR CHANGES TO THE CONTRACT DURATION, OR ANY OTHER CLAIMS AGAINST THE OWNER OR OWNER'S ENGINEER.
3. THE CONTRACTOR SHALL MAKE THEIR OWN NECESSARY, PRIVATELY WRITTEN REQUESTS FOR INFORMATION (RFIS) TO THE OWNER AND ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC ASPECTS FROM THE PLANS SHALL BE NO LATER ACCEPTABLE TO OWNER AND ENGINEER AND SHALL ALIGN FOR A MINIMUM OF TWO WORK DAYS BUT ADDITIONAL REASONABLE TIME FOR A RESPONSE BASED ON THE COMPLEXITY OF THE QUESTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION ITEMS CONSTRUCTED DIFFERENTLY THAN INTENDED OR AS DEPICTED ON THE PLANS.
4. INFORMATION RELATED TO ELEVATIONS AND PROPOSED GRADES (SUCH AS DRAINAGE GRADES, INVERT ELEVATIONS AND ELEVATIONS, CRATE ELEVATIONS, BUILDING FINISHED FLOOR ELEVATIONS, ETC.) MAY BE FOUND IN MORE THAN ONE LOCATION IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL DETERMINE BY REVIEWING ALL PLANS, PROFILES AND ANY OTHER INFORMATION IN THE CONTRACT DOCUMENTS FOR CONSTRUCTION FROM ANY DISCREPANCIES OR DISCREPANCIES THAT ARE FOUND BY THE CONTRACTOR OR HIS AGENTS SHALL BE IMMEDIATELY, BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER IN WRITING IN THE FORM OF AN RFI PRIOR TO CONSTRUCTION.
5. THERE ARE ADDITIONAL NOTES, SPECIFICATIONS AND REQUIREMENTS CONTAINED THROUGHOUT THE PLAN SET AS WELL AS REFERENCES TO SPECIFICATIONS FROM APPLICABLE GOVERNING AUTHORITIES AND INDUSTRY STANDARDS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN, REVIEW AND ADHERE TO ALL THESE DOCUMENTS.
6. CONTRACTOR IS RESPONSIBLE FOR ALL DIMENSIONAL AND VERTICAL CONTROL, REFERENCE POINTS AND CONSTRUCTION STAKING AS REQUIRED TO THE PROJECT.
7. CONTRACTOR TO FIELD VERIFY ALL SITE CONDITIONS AND NOTIFY ENGINEER PRIOR TO BEGINNING WORK.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND NOTIFICATION OF ALL AUTHORIZED INSPECTIONS, SCHEDULE INSPECTIONS OR LICENSES IN ADVANCE TO PRIVATE OR PUBLIC UTILITIES AFFECTED BY ANY OPERATIONS PRIOR TO COMMENCEMENT OF WORK.
9. CONTRACTOR TO BE RESPONSIBLE FOR PROVIDING AND MAINTAINING ALL BARRICADES, WARNING SIGNS, FLASHING LIGHTS AND TRAFFIC CONTROL DEVICES IN CONFORMANCE WITH PART VI OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD). SHALL BE TRAINED AND CERTIFIED TO MAINTAIN AND INSTALL DEVICES.
10. CONTRACTOR SHALL COMPLY WITH OSHA REGULATIONS AND STANDARDS OF TEXAS LAW CONCERNING EXCAVATION, TRENCHING AND SHORING. EXCAVATIONS OVER 5 FEET DEEP TO BE SHORED AND PROTECTED IN ACCORDANCE WITH THE TRENCH SAFETY DETAILS INCORPORATED IN THE PLANS AS REQUIRED BY STATE LAW AND DISCLOSE ANY DEVIATION FROM THE METHOD SHOWN ON THE PLANS SHALL BE DESIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS AND IN GOOD STANDING. SAID DESIGN MUST BE PRESENTED TO THE ENGINEER AND/OR THEIR HANDS AT LEAST 48 HOURS BEFORE EXCAVATION OR TRENCHING BEGINS. THE CONTRACTOR'S PERFORMANCE HEREIN WILL CONSTITUTE AGREEMENT BY THE CONTRACTOR TO ITS FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY IMPLEMENTATION OF SAFETY MEASURE THEREIN.
11. CONTRACTOR TO PROVIDE POSITIVE DRAINAGE WITHIN THE LIMITS OF DISTURBANCE AND NO PONDING.
12. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR EXACT LOCATIONS OF ALL UTILITY ENTRANCES TO BUILDING SUCH AS WATER, SEWER LATERALS, DOMESTIC WATER SERVICE, ELECTRICAL, TELEPHONE AND CABLE SERVICE, ROOF DRAINS AND ALL OTHER UTILITIES. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND TO ENSURE PROPER DEPTHS AND ADJACENT AS WELL AS COORDINATING WITH REGULATORY AGENCY AND TO LOCATION OF AND SCHEDULING OF INSPECTIONS.
13. ALL DEMOLITION DEBRIS/WORK SITE BOUNDARY SHALL COMPLY WITH CURRENT

CONSTRUCTING EMBANKMENTS AND FILLS

1. PREPARATION OF GROUND SURFACE.

a. BACK-FILL STUMP HOLES OR OTHER SMALL EXCAVATIONS WITH FILL MATERIAL AND COMPACT.

b. PLOW, STEP (BENCH), OR BREAK UP SLOPED GROUND SURFACES THAT ARE STEEPER THAN ONE VERTICAL TO FOUR HORIZONTAL ON WHICH FILL IS TO BE PLACED, SO THAT FILL MATERIAL WILL BOND WITH EXISTING SURFACE.

c. SCARIFY OR PLOW AREAS TO BE FILLED TO A DEPTH OF 3" TO 4".

d. RE-COMPACT LOOSENED MATERIAL WITH NEW MATERIAL TO THE INITIAL LIFT THICKNESS OF NEW MATERIAL TO BE COMPACTED WITH THE SCARIFIED MATERIAL SHALL NOT EXCEED 6-INCHES.

2. PROTECTION OF SUBGRADE

a. DURING CONSTRUCTION, ALL SUBGRADE SHAPED AND DRAINED, PRIOR TO ANY ANTICIPATED RAINFALL. ALL LOOSENED OR AREAS POCK-MARKED AREAS BY PAD-FOOTED COMPACTORS SHALL BE ROLLED SMOOTH WITH A PNEUMATIC-TIRED OR SMOOTH-DRUM COMPACTOR TO MINIMIZE MOISTURE ABSORPTION.

b. MAINTAIN DITCHES AND DRAINS ALONG THE SUBGRADE TO DRAIN EFFECTIVELY AT ALL TIMES.

c. NO FILL SHALL BE PLACED UNTIL SUBGRADE HAS BEEN PROPERLY PREPARED.

d. SHOULD SUBGRADE, DUE TO ANY REASON OR CAUSE, LOSE REQUIRED STABILITY, DENSITY, OR FINISH BEFORE SUCCEEDING BASE COURSE IS PLACED, RE-COMPACT AND REFINISH THE SUBGRADE.

e. PREVENT EXCESSIVE LOSS OF MOISTURE IN SUBGRADE BY SPRINKLING, SEALING, OR COVERING WITH THE SUBSEQUENT LAYER.

3. FORMATION OF EMBANKMENTS AND FILLS (STRUCTURAL AND GENERAL FILL)

a. CONSTRUCT AT LOCATIONS SHOWN ON THE DRAWINGS AND TO LINES AND GRADES INDICATED WITHIN LIMITS OF WORK.

b. FOR GRADES WITH SLOPES OF 10% OR LESS: CONSTRUCT IN LAYERS APPROXIMATELY PARALLEL TO FINISH GRADE SURFACE AND COMPACT. FOR GRADES IN EXCESS OF 10% SLOPE: BENCH THE FILL SLOPE AND COMPACT THE SOILS IN HORIZONTAL LAYERS. EXCESS FILL SHALL BE COMPACTED TO THE SPECIFIED DENSITIES ALONG EXPOSED SLOPES. SUCH THAT WHEN THE SLOPES ARE TRIMMED TO THE SPECIFIED LIES AND GRADES, THE SOIL EMPLOYED BY THE TRIMMING OPERATION MEETS THE SPECIFIED COMPACTION DENSITY.

c. CONSTRUCT IN SUCCESSIVE LAYERS FOR FULL WIDTH OF INDIVIDUAL CROSS SECTION AND TO LENGTHS AS BEST SUITED TO HANDLING AND COMPACTION METHODS USED.

d. FINAL LAYERS BY LEGAL EQUIPMENT WHICH WILL SPREAD MATERIAL AS IT IS DUMPED OR SPREAD BY BLADING OR OTHER ACCEPTABLE METHODS FROM PILES OR WINDROWS DUMPED FROM EXCAVATING OR HAULING EQUIPMENT.

e. DEPTH OF EACH LAYER SHALL NOT EXCEED LOOSE MEASUREMENT DEPTH SPECIFIED IN THE SUBSECTION ENTITLED "COMPACTION" IN THIS SECTION.

f. PRIOR TO AND IN CONJUNCTION WITH COMPACTION OPERATION, BRING EACH LAYER TO MOISTURE CONTENT AS SPECIFIED IN THE SUBSECTION ENTITLED "COMPACTION," AND KEEP LEVELED WITH SUITABLE EQUIPMENT TO ENSURE UNIFORM COMPACTION OVER THE ENTIRE LAYER.

g. PULVERIZED OR CRUSHED CLAYSTONE, SILTSTONE, SANDSTONE OR OTHER SOIL-LIKE NON-DURABLE SHALE SHALL NOT BE USED AS FILL WITHIN 2 VERTICAL FEET OF THE FINISHED GRADE.

4. ROCK FILL

a. INSTALL THE UNDERLYING GEOTEXTILES AND COARSE AGGREGATES FOR THE ROCK BEDDING LAYER AS INDICATED ON THE PLANS PRIOR TO INSTALLING THE ROCK.

b. INSTALL THE ROCK KEY AT THE TOE OF THE SLOPE AS INDICATED ON THE PLANS PRIOR TO INSTALLING ANY ROCK ON THE SLOPE.

c. ROCK FILLS SHALL BE PLACED ON EMBANKMENTS AS AN EROSION PROTECTION COVER TO THE LINES AND GRADES INDICATED IN THE PLANS.

d. PLACE THE ROCK ON THE SLOPE ADVANCING FROM THE TOE OF THE SLOPE TO THE TOP, IN THE FULL THICKNESS AS SPECIFIED ON THE PLANS.

5. ROADWAY GRAVEL PAVING

a. PLACE ROADWAY GRAVEL PAVING TO THE LINES AND GRADES INDICATED ON THE PLANS.

b. COMPACT ROADWAY GRAVEL PAVING WITH A MINIMUM OF 6 PASSES OF A SMOOTH-DRUM VIBRATORY ROLLER IN CONFORMANCE WITH THE COMPACTION SUBSECTION OF THESE PLANS.

c. PRIOR TO CONSTRUCTING THE FINAL PORTLAND CEMENT CONCRETE ROADWAY PAVEMENTS, ROADWAY GRAVEL PAVING MAY BE USED ON CONSTRUCTION ACCESS ROUTES TO PROVIDE ALL-WEATHER ACCESS. WHERE ALL-WEATHER CONSTRUCTION ACCESS ROUTES DO NOT COINCIDE WITH THE CONSTRUCTED ROADWAYS INDICATED ON THE PLANS, INSTALL ROADBASE AND ROADWAY GRAVEL PAVING AS INDICATED ON THE PLANS FOR TEMPORARY ACCESS ROUTES.

6. ROAD BASE

a. INSTALL ROAD BASE MATERIALS TO THE LINES AND GRADES INDICATED FOR ASPHALTIC OR CONCRETE PAVEMENTS OR AS REQUIRED FOR THE CONSTRUCTION OF TEMPORARY CONSTRUCTION ACCESS ROUTES.

b. ALL ROAD BASE MATERIALS SHALL BE COMPACTED WITH A PAD-FOOTED VIBRATORY ROLLER AT A MINIMUM. THE ROAD BASE SHALL BE COMPACTED WITH A SUFFICIENT NUMBER OF PASSES TO ACHIEVE COMPLETE WALK-OUT OF THE PAD FEET OF THE ROLLER.

c. AFTER ACHIEVING WALK-OUT, TRIM THE ROAD BASE WITH A ROADWAY MOTOR GRADER TO THE DESIRED LINES AND GRADES.

7. YARD GRAVEL PAVING

INSTALL THE YARD GRAVEL PAVING TO THE LINES AND GRADES INDICATED ON THE PLANS AT A MINIMUM, THE YARD GRAVEL PAVING SHALL BE COMPACTED WITH A MINIMUM OF 3 PASSES OF A SMOOTH-DRUM COMPACTOR. THE SMOOTH-DRUM COMPACTOR SHALL BE OPERATED IN NON-VIBRATORY MODE NEAR FOUNDATIONS AND RETAINING WALLS IN ACCORDANCE WITH THE COMPACTION SUBSECTION.

8. CEMENT STABILIZED SAND

CEMENT-STABILIZED SAND MAY BE USED IN AREAS WHERE ADEQUATE COMPACTION OF SHAPED AND/OR SLOPED SUBGRADES MAY NOT BE PRACTICAL (PIPE BEDDING IN TRENCHES, AREAS BETWEEN EXISTING FOUNDATIONS, ETC.). THE CEMENT STABILIZED SAND SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF 8-INCHES AND COMPACTED WITH A MINIMUM OF 3 PASSES OF MECHANICAL HAND TAMPERS. COMPACTED CEMENT STABILIZED SAND SHALL MEET THE VISUAL INSPECTION APPROVAL BUT ADDITIONAL COMPACTION TESTING SHALL NOT BE REQUIRED.

9. COMPACTION

a. COMPACT BY UNIFORM LAYERS, NOT EXCEEDING RECOMMENDED LOOSE THICKNESS AS PROVIDED IN THIS SUBSECTION, DRY OR MOISTEN AS NECESSARY TO MAINTAIN MOISTURE CONTENT OF NOT LESS THAN 2% DRY NOR MORE THAN 2% WET OF OPTIMUM MOISTURE CONTENT AND COMPACT TO DENSITY OF NOT LESS THAN THE FOLLOWING REQUIREMENTS FOR EACH SPECIFIED FILL CATEGORY:

CATEGORY I – GRANULAR STRUCTURAL FILL: 95% OF THE MAXIMUM DENSITY ACCORDING TO ASTM D 1557 (MODIFIED PROCTOR)

CATEGORY II – GENERAL FILL: 90% OF THE MAXIMUM DENSITY ACCORDING TO ASTM D 698 (STANDARD PROCTOR).

CATEGORY III – STRUCTURAL FILL: 95% OF THE MAXIMUM DENSITY ACCORDING TO ASTM D 698 (STANDARD PROCTOR).

CATEGORY IV – RIPRAP FILL: ADDITIONAL COMPACTION NOT REQUIRED; PROVIDE CEMENT STABILIZATION OR GROUTING OF THE RIPRAP AS INDICATED ON THE PLANS.

CATEGORY V – ROADWAY GRAVEL PAVING: PROCEDURAL COMPACTION AS SPECIFIED.

CATEGORY VI – ROAD BASE: 95% OF THE MAXIMUM DENSITY ACCORDING TO ASTM D 1557 (MODIFIED PROCTOR) OR CONCRETE WALK-OUT OF THE PAD-FOOTED COMPACTOR.

CATEGORY VII – YARD PAVING: PROCEDURAL COMPACTION AS SPECIFIED.

CATEGORY VIII – CEMENT STABILIZED SAND: PROCEDURAL COMPACTION AS SPECIFIED SUBJECT TO VISUAL INSPECTION.

b. EACH LAYER SHALL BE UNIFORM AS TO MATERIAL DENSITY AND MOISTURE CONTENT BEFORE COMPACTION.

c. IF MATERIAL FAILS TO MEET DENSITY SPECIFIED OR MOISTURE CONTENT IS OUTSIDE REQUIRED RANGE, REWORK LAYER TO OBTAIN SPECIFIED RESULTS AND ALTER COMPACTION METHODS OF SUBSEQUENT WORK.

d. MAXIMUM THICKNESS OF UNIFORM LAYERS (LOOSE MEASUREMENT) SHALL BE AS FOLLOWS:

MECHANICAL HAND TAMPER AND HAND COMPACTION EQUIPMENT AND PROCEDURES: 6" MAXIMUM THICKNESS OF EACH UNIFORM LAYER.

FOOTED OR SMOOTH DRUM ROLLERS: 8" MAXIMUM THICKNESS OF EACH UNIFORM LAYER FOR STRUCTURAL FILLS AND 12" MAXIMUM THICKNESS OF EACH UNIFORM LAYER FOR GENERAL FILLS.

WHEN EMBANKMENTS OR FILLS ARE CONSTRUCTED OF CLAYSTONE, SILTSTONE, SANDSTONE OR OTHER SOIL-LIKE NON-DURABLE SHALE AS IDENTIFIED ON THE PLANS OR BY THE ENGINEER, THE MATERIAL SHALL BE PULVERIZED TO A MAXIMUM DIMENSION OF 12-INCHES, PLACED IN A MAXIMUM LOOSE LAYER THICKNESS OF 12-INCHES AND WATERED TO PROMOTE SLAKING AND BREAKDOWN OF THE NON-DURABLE MATERIAL. COMPACTION OF ALL NON-DURABLE STONE MATERIALS SHALL BE WITH FOOTED VIBRATORY ROLLERS IN CONFORMANCE WITH THIS SECTION.

e. COMPACTION EQUIPMENT: THE FOLLOWING ARE THE APPLICABLE TYPES OF COMPACTION EQUIPMENT REQUIRED FOR THE PROJECT:

10. FINISHING

a. DESCRIPTION: FINISHING SHALL CONSIST OF SHAPING AND FINISHING ENTIRE SITE.

b. CONSTRUCTION METHODS:

AFTER OTHER WORK HAS BEEN COMPLETED, AS REQUIRED, DITCHES SHALL BE SMOOTHLY SHAPED BY DRAGLINE AS NECESSARY.

SLOPES SHALL CONTINUOUSLY BE MAINTAINED UNTIL ACCEPTANCE OF WORK.

11. IN-PLACE DENSITY TESTING FREQUENCY

a. IN-PLACE DENSITY TESTING SHALL BE COMPLETED BY THE CONTRACTOR VIA A 3RD PARTY TESTING AGENCY.

b. CATEGORY I, CATEGORY II, AND CATAGORY VI FILL PLACED AT AREAS DESIGNATED ON THE DRAWINGS SHALL HAVE ONE IN-PLACE DENSITY TEST PERFORMED FOR EACH LIFT COVERING AN AREA NOT TO EXCEED 5,000 SQUARE FEET. WHEN USED AS BACK-FILL, ONE IN-PLACE DENSITY TEST SHALL BE PERFORMED FOR EACH 200 CUBIC YARDS OF BACK-FILL.

c. CATEGORY V FILL AND UN-DESIGNATED AREAS OF FILL SHALL HAVE ONE IN-PLACE DENSITY TEST PERFORMED FOR EACH LIFT COVERING AN AREA NOT TO EXCEED 10,000 SQUARE FEET.

d. THE LOCATION OF FIELD TESTS SHALL BE SELECTED BASED ON ENGINEERING JUDGEMENT OF THE FOLLOWING: (1) REFLECTING THE LEAST COMPACTION ACHIEVED IN A VOLUME OF FILL PLACED, AND (2) REPRESENTING THE COMPACTION ACHIEVED IN A LARGE PART OF THAT VOLUME.

e. IF THE RESULTS OF A TEST FAIL TO MEET THE SPECIFICATIONS REQUIRED, WITH THE TEST MAY BE RE-RUN NO MORE THAN TWICE, ASSUMING AN ERROR IN THE FIRST FIELD TEST, THE RETEST WILL BE PERFORMED IN THE SAME GENERAL AREA AS THE INITIAL TEST WHICH FAILED. ENGINEERING JUDGMENT SHALL BE USED TO SELECT RETEST LOCATIONS SUSPECTED OF HAVING EQUAL OR LESS COMPACTION THAN FILL MATERIAL IN THE FIRST TEST (LOCATIONS OF THE RETESTS MEET THE SPECIFICATIONS), REQUIRED, THEN THE COMPACTION MAY BE CONSIDERED ACCEPTABLE. IF THE RESULTS OF ONE OR MORE OF THE RETESTS DO NOT MEET THE REQUIRED SPECIFICATIONS, THEN THE DEFECTIVE AREA OF COMPACTION SHALL BE REPAIRED OR REPLACED TO MEET SPECIFICATIONS.

FINAL CLEAN-UP

1. BEFORE FINAL ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT, UNUSED AND USELESS MATERIAL, RUBBISH AND TEMPORARY BUILDINGS; SHALL REPAIR OR REPLACE FENCES AND OTHER PRIVATE OR PUBLIC PROPERTY WHICH MAY HAVE BEEN DAMAGED ON ACCOUNT OF EXECUTION OF THE WORK.

2. THE CONTRACTOR SHALL FILL ALL DEPRESSIONS AND WATER POCKETS (IN ACCORDANCE WITH RAS PROCEDURE) CAUSED BY THEIR OPERATIONS.

3. THE CONTRACTOR SHALL REMOVE ALL OBSTRUCTIONS FROM WATERWAYS CAUSED BY THEIR WORK.

4. THE CONTRACTOR SHALL CLEAN ALL DRAINS AND DITCHES WITHIN AND ADJACENT TO THE SITE WHICH HAVE BEEN OBSTRUCTED BY THEIR OPERATIONS.

5. THE CONTRACTOR SHALL LEAVE THE SITE OF THE PROJECT IN A NEAT AND PRESENTABLE CONDITION WHEREVER THEIR OPERATIONS HAVE DISTURBED CONDITIONS EXISTING AT THE TIME OF STARTING THEIR WORK.

TRAFFIC CONTROL

1. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR IMPLEMENTING AN APPLICABLE TRAFFIC CONTROL PLAN PER STATE DEPARTMENT OF TRANSPORTATION STANDARDS. TRAFFIC CONTROL AND THE LOCAL MANUAL OF THE UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). CONTRACTOR IS RESPONSIBLE FOR ADAPTATION AND IMPLEMENTATION TO SUIT SITE-SPECIFIC SITUATIONS.

2. LEGAL JURISDICTION: TXDOT OR AUTHORITY HAVING JURISDICTION (AHJ) MUST BE NOTIFIED PRIOR TO CONSTRUCTION IN THE RESPECTIVE ROW OR EASEMENT AREA. CONTRACTOR SHALL FOLLOW DOT SPECIFICATIONS AND DETAILS FOR ALL WORK WITHIN THE DOT ROW. IN GENERAL, THE LATEST EDITION OF STATE DOT STANDARD SPECIFICATIONS FOR THE CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES ARE THE CONTROLLING SPECIFICATIONS.

3. ALL WORK ON OR ADJACENT TO JURISDICTIONAL ROADWAYS SHALL CONFORM TO ANY TRAFFIC CONTROL REQUIREMENTS AND THE MUTCD.

4. EQUIPMENT WILL UTILIZE THE INTERSECTION OF ACCESS ROADS AND EXISTING ROADS FOR TURNING WORK AREAS. SUCH AS SOLAR SITES AND SUBSTATION AREAS. WILL ALSO PROVIDE AREAS FOR EQUIPMENT TURNING AND PARKING IN ADDITION TO DESIGNATED TURNING LOCATIONS.

5. ALL EQUIPMENT ACCESS, STORAGE OF EQUIPMENT AND MATERIALS, AND OTHER CONSTRUCTION ACTIVITIES WILL BE CONFINED TO THE ACCESS ROADS, SOLAR SITES, SUBSTATIONS AND THE COLLECTION LINE AND TRANSMISSION LINE ROUTES AS DEPICTED ON THE FINAL CONSTRUCTION DRAWINGS.

6. DEBRIS RESULTING FROM CONSTRUCTION ACTIVITIES WILL BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICAL BY IMPLEMENTING APPROPRIATE CONTROL MEASURES. THESE MEASURES INCLUDE THE APPLICATION OF MULCH, WATER, OR "STONE" ON ACCESS ROADS, EXPOSED SOILS, STOCKPILED SOILS, OR UNPAVED PUBLIC ROADS WHEN DRY AND WINDY CONDITIONS EXIST. A WATERING VEHICLE SHALL BE AVAILABLE ON AN AS-NEEDED BASIS.

7. CONTRACTOR MUST MAINTAIN ALL EQUIPMENT IN GOOD OPERATING CONDITIONS AND ALL MUFFLERS AND ENGINES WILL BE MUFFLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS AND WILL COMPLY WITH STATE ENVIRONMENTAL LAW, SUBCHAPTER E, PART 480 (NOISE). FROM TIME TO TIME MOTOR VEHICLES AND EQUIPMENT MAY BE REPAIRED OR REPLACED. EQUIPMENT WILL NOT BE LEFT RUNNING UNNECESSARILY, AND EXISTING TALL GROWING VEGETATION WILL BE MAINTAINED, TO THE MAXIMUM EXTENT PRACTICABLE, TO SERVE AS A NOISE BUFFER.

8. CONSTRUCTION ACTIVITY WILL GENERALLY OCCUR BETWEEN THE HOURS OF 6:00 A.M. AND 8:00 P.M. MONDAY THROUGH SATURDAY, AND 8:00 A.M. TO 8:00 P.M. ON SUNDAY OR AS ALLOWED BY THE LOCAL AHJ. HOWEVER, DUE TO SAFETY OR CONTINUOUS OPERATION REQUIREMENTS, CONSTRUCTION ACTIVITIES MAY OCCUR OUTSIDE OF THESE TIMEFRAMES AND ADDITIONAL WORK HOURS MAY BE NECESSARY.

9. TO PREVENT DAMAGE TO ADJACENT AGRICULTURAL LAND, ALL VEHICLE TRAFFIC AND PARKING WILL BE CONFINED TO THE ACCESS ROADS AND DESIGNATED WORK AREAS AT THE SOLAR AND SUBSTATION FACILITY SITES AND NECESSARY BULL-DITS AND PARKING AREAS WILL BE DEVELOPED OUTSIDE OF ACTIVE AGRICULTURAL FIELDS TO THE EXTENT PRACTICAL.

10. THE FUNCTIONS SERVED BY ACTIVE FARM FENCES AND GATES AFFECTED BY THE CONSTRUCTION WILL BE TEMPORARILY SUSTAINED THROUGHOUT ALL PHASES OF CONSTRUCTION AND SUCH SEGMENTS OF AFFECTED FENCES AND GATES WILL BE REBUILT AT A MINIMUM TO ITS PRE-CONSTRUCTION CONDITION.

11. CONTRACTOR TO NOTIFY AND OBTAIN PERMISSION FROM THE DOT PRIOR TO CONSTRUCTION IN THE RESPECTIVE ROW OR EASEMENT AREA, IF APPLICABLE.

12. CONTRACTOR SHALL FOLLOW DOT RECOMMENDATIONS AND DETAILS FOR ALL WORK WITHIN THE DOT ROW, IF APPLICABLE.

SPILL PREVENTION CONTAINMENT AND COUNTERMEASURES

1. PETROLEUM PRODUCTS, HAZARDOUS OR CONTROLLED SUBSTANCES (WHICH MAY BE TEMPORARY OR PERMANENTLY LOCATED ON THE SITE SHOULD BE HANDLED AND STORED IN CONFORMANCE WITH THE US EPA OSDT OR FEDERAL REGULATIONS 40 CFR 112.

2. BULK OR STORAGE MUST BE LOCATED IN A CONTAINMENT AREA OF GREATER THAN 1,320 GALLONS AND HAVE THE CAPACITY TO HOLD THE AMOUNT OF OIL PLUS RAINFALL FROM A 50-YEAR, 24-HOUR STORM EVENT.

3. SPILL RESPONSE EQUIPMENT SUCH AS ABSORBENT MATERIALS, BERMS, AND WASTE DRUMS OR DESIGNATED CONTAINMENT SHALL BE AVAILABLE IN THE EVENT THERE IS A LEAK FROM THE WTG NACELLES, WTG TRANSFORMER, FUEL DRUMS, OR OIL DRUMS.

4. STREAMS, WETLANDS, AND STOCK PONDS MAY BE SCATTERED THROUGHOUT THE PROJECT SITE AND ARE TO BE PROTECTED FROM UNINTENDED POLLUTANT RELEASES.

5. ANY SPILLS ON LAND GREATER THAN 25 GALLONS MUST BE REPORTED TO THE ENVIRONMENTAL AUTHORITY HAVING JURISDICTION (AHJ). SPILLS IN BODIES OF WATER THAT CREATE A SHEEN SHOULD ALSO BE REPORTED. ALL SPILLS SHALL BE REPORTED TO THE CONTRACTOR IMMEDIATELY.

6. IMMEDIATE ACTION MUST BE TAKEN TO CONTROL, CONTAIN AND RECOVER THE DISCHARGED PRODUCT.

7. NO COUNTERMEASURES THAT RISK THE HEALTH OR SAFETY OF PERSONNEL SHOULD BE UNDERTAKEN.

8. THE CONTRACTOR WILL NOT LEAVE FUEL-FIRED GENERATORS RUNNING WHEN THEY ARE NOT IN ACTIVE USE.

9. A PRINTHEAD LOADER, SKID-STEER, GRADER, OR BACKHOE SHOULD BE READILY AVAILABLE TO RESPOND IN CASE OF A SPILL.

10. THE CONTRACTOR SHALL PROVIDE HANDWASHING AND SANITARY FACILITIES. THESE FACILITIES SHALL BE SERVICED REGULARLY AND PROPERLY IN ACCORDANCE WITH LOCAL, STATE AND/OR FEDERAL REQUIREMENTS.

11. THE CONTRACTOR IS RESPONSIBLE FOR THE PLACEMENT, DESIGN, APPROVAL, AND OPERATION OF CONCRETE WASHOUTS. THE CONCRETE WASHOUTS SHALL BE INSTALLED A MINIMUM OF 50 FEET AWAY FROM STORM DRAINAGE, SURFACE WATER, OR OTHER SENSITIVE AREAS. CONCRETE WASTE MATERIAL SHALL NOT BE ALLOWED TO OVERFLOW OR OTHERWISE DISCHARGE FROM THE CONCRETE WASHOUT.

12. CONSTRUCTION WASTES SHALL NOT BE BURIED ON THE PROJECT SITE AND/OR SURROUNDING LAND.

13. ALL SOLID WASTE (INCLUDING BUT NOT LIMITED TO: PLATES, CARDBOARD, PLASTIC WRAPPING, PIPES, AND WIRE WASTE AND CONCRETE WASHOUT SHALL BE PROPERLY CONTAINED AT APPROPRIATE COLLECTION POINTS AND BE PROPERLY DISPOSED OF IN A REGULAR BASIS. CARE SHOULD BE TAKEN TO AVOID THE SPREAD OF MATERIAL THAT CAN BE WIND-BLOWN FROM THE SITE AREA OR CONTAINERS.

ADDING TO BE TAKEN INCLUDE:

a. ELIMINATE POTENTIAL SPARK SOURCES.

b. BE SAFE TO DO SO, IDENTIFY AND SHUT DOWN SOURCES OF DISCHARGE AND STOP THE FLOW.

c. CONTAIN DISCHARGE WITH SORBENTS, BERMS, TRENCHES, SANDBAGS OR OTHER APPROPRIATE MATERIALS.

d. COLLECT AND PROPERLY DISPOSE OF IN ACCORDANCE WITH APPLICABLE REGULATIONS.

e. KEEP ALL RECORDS OF EVENTS AND DISPOSALS.

f. CONCRETE WASHOUT AREAS SHALL BE CONSTRUCTED ON SITE WITHIN THE AREAS SPECIFIED INDICATED IN THE PLANS. THE WASHOUT PITS SHALL BE DEEP ENOUGH TO PREVENT THE DISCHARGE OF FLUIDS.

14. RESTRICTED ACTIVITIES PERTAIN TO WATER-RELATED RESOURCES INCLUDE THE FOLLOWING RESTRICTIONS:

a. NO DEPOSITION OF BLACK MARIA IDENTIFIABLE STREAM CHANNELS OR WOOD CHIPS WITHIN 25 FEET OF WETLANDS.

b. NO UNNECESSARY REMOVAL OF WOOD VEGETATION OR DEGRADATION OF STREAM BANKS.

c. NO EQUIPMENT WASHING OR REFUELING EXCEPT AS SPECIFIED IN THE FINAL CONSTRUCTION DRAWINGS.

d. AND NO STORAGE MIXING OR HANDLING OF ANY PETROLEUM OR CHEMICAL MATERIALS IN OPEN CONTAINERS.

EXCAVATION SAFETY

1. SCOPE OF WORK: THE CONTRACTOR SHALL FURNISH A TRENCH EXCAVATION AND SHORING SAFETY PLAN, INCLUDING DETAILED PLANS FOR A TRENCH SAFETY SYSTEM AND, REQUIREMENTS FOR A SAFETY PROGRAM FOR THE TRENCH SYSTEM, AND ALL LABOR AND MATERIALS FOR INSTALLATION, INSPECTION, AND MAINTENANCE OF TRENCH SAFETY SYSTEM.

2. APPLICATION: FOR ANY TRENCH EXCAVATION AT A DEPTH OF FIVE (5) FEET OR GREATER OR WHERE SHOWN ON PLANS, THE CONTRACTOR SHALL PROVIDE A TRENCH SAFETY SYSTEM. A TRENCH SAFETY SYSTEM IS NOT REQUIRED WHEN (4) SUBCONTRACTORS GEOTECHNICAL ENGINEER DETERMINES THAT THE TRENCH EXCAVATION IS TO BE MADE IN STABLE ROCK; OR (B) EXCAVATIONS ARE LESS THAN FIVE (5) FEET IN DEPTH AND EXAMINATION OF THE GROUND BY A COMPETENT PERSON ON BEHALF OF THE SUBCONTRACTOR PROVIDES NO INDICATION THAT A CAVE-IN SHOULD BE EXPECTED. TRENCH SAFETY SYSTEM SHALL BE IN ACCORDANCE WITH DETAILS SHOWN ON SUBCONTRACTOR'S TRENCH EXCAVATION AND SHORING SAFETY PLAN.

3. QUALITY ASSURANCE: TRENCH SAFETY SYSTEM TO MEET APPROPRIATE REQUIREMENTS ESTABLISHED IN OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) SAFETY & HEALTH REGULATIONS, 29 CFR 1926, SUBPART P — EXCAVATIONS, (REVISIONS) AND SHORING, SHOULD THE APPLICABLE OSHA STANDARDS BE MODIFIED OR AMENDED, THE MORE STRINGENT STANDARDS SHALL APPLY.

4. SUBMITTALS: THE CONTRACTOR SHALL SUBMIT A PLAN, INCORPORATING DETAILED PLANS AND SPECIFICATIONS FOR TRENCH SAFETY SYSTEM CONFORMING TO OSHA STANDARDS THAT ACCOUNTS FOR PROJECT SITE CONDITIONS. SUBCONTRACTOR'S TRENCH CONSTRUCTION MEANS, METHODS, TECHNIQUES OR PROCEDURES; THE RELATIONSHIP OF SPOIL TO EDGE OF TRENCH; AND SUBCONTRACTOR'S EQUIPMENT TO BE USED IN CONSTRUCTION OF PROJECT FACILITIES REQUIRING TRENCH SYSTEM(S). SUBCONTRACTOR SHALL PROVIDE A STATEMENT SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS STATING THAT THE TRENCH EXCAVATION AND SHORING SAFETY PLAN AND THE DETAILED PLANS AND SPECIFICATIONS FOR THE TRENCH SAFETY SYSTEM ARE DESIGNED IN A GOOD AND WORKMANLIKE MANNER AND IS IN CONFORMANCE WITH APPROPRIATE OSHA STANDARDS.

5. GENERAL: THE TRENCH SAFETY SYSTEM SHALL BE CONSTRUCTED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE TRENCH EXCAVATION AND SHORING SAFETY PLAN PREPARED BY THE SUBCONTRACTOR'S REGISTERED PROFESSIONAL ENGINEER.

6. INSTALLATION:

a. TIMBER SHEETING: TIMBER SHEETING AND SIZE OF UPRIGHTS, STRINGERS (WALES), AND CROSS BRACING TO BE INSTALLED IN ACCORDANCE WITH SUBCONTRACTOR'S PLAN. PLACE CROSS BRACES & TRUE HORIZONTAL POSITION SPACED VERTICALLY AND SECURED TO PREVENT SLIDING, FALLING, OR KICKOUTS. CROSS BRACES TO BE PLACED AT EACH END OF STRINGERS (WALES), IN ADDITION TO OTHER LOCATIONS REQUIRED. CROSS BRACES AND STRINGERS (WALES) TO BE PLACED AT SPACES OF (SPACING) IN ADDITION TO OTHER LOCATIONS REQUIRED.

b. STEEL SHEET PILING: STEEL SHEET PILING OF EQUAL OR GREATER STRENGTH MAY BE USED IN LIEU OF TIMBER TRENCH SHORING SHOWN IN THE OSHA TABLES. DRIVE STEEL SHEET PILING TO A LEAST MINIMUM DEPTH BELOW TRENCH BOTTOM AS RECOMMENDED BY THE SUBCONTRACTOR'S REGISTERED PROFESSIONAL ENGINEER PROVIDING DESIGN. PLACE CROSS BRACES IN TRUE HORIZONTAL POSITION, SPACED VERTICALLY AND SECURED TO PREVENT SLIDING, FALLING, OR KICKOUTS. CROSS BRACES TO BE PLACED AT EACH END OF STRINGERS (WALES), IN ADDITION TO OTHER LOCATIONS REQUIRED.

c. TRENCH BOXES: PORTABLE TRENCH BOX MAY BE USED IN LIEU OF TIMBER TRENCH SHORING SHOWN IN THE OSHA TABLES AND SHALL BE DESIGNED TO PROVIDE EQUAL OR GREATER PROTECTION THAN TIMBER TRENCH SHORING SHOWN IN THE OSHA TABLES. IN CASES WHERE THE TOP OF THE PORTABLE TRENCH BOX WILL BE BELOW THE TOP OF TRENCH, THE TRENCH MUST BE SLOPED TO THE MAXIMUM ALLOWABLE SLOPE FOR THE SOIL CONDITIONS EXISTING ON THE PROJECT IN AREAS WHERE A SLOPED TRENCH WILL AFFECT THE INTEGRITY OF EXISTING STRUCTURES, SUBCONTRACTOR IS TO PROTECT STRUCTURES PRIOR TO SLOPING TRENCH.

d. TRENCH JACKS: WHEN TRENCH JACKS ARE USED FOR CROSS BRACING AND/OR STRINGERS (WALES) THE TRENCH JACKS SHALL PROVIDE PROTECTION GREATER THAN OR EQUAL TO THE TIMBER CROSS BRACING SHOWN IN THE OSHA TABLES. TRENCH JACKS TO BE PLACED AT EACH END OF STRINGERS (WALES) IN ADDITION TO OTHER LOCATIONS REQUIRED.

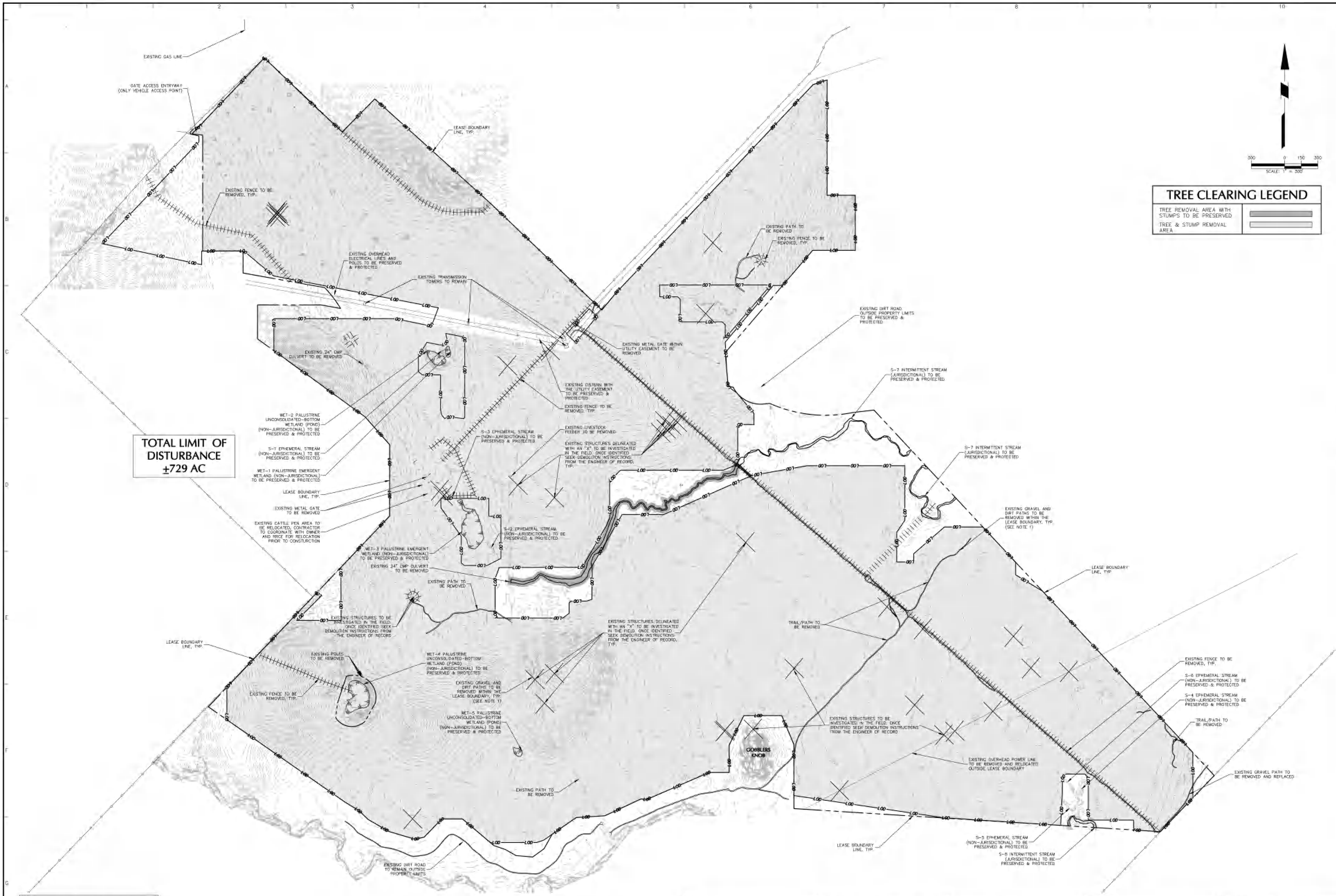
7. SUPERVISION: PROVIDE COMPETENT SUPERVISORY PERSONNEL AT EACH TRENCH WHILE WORK IS IN PROGRESS TO VERIFY SUBCONTRACTOR'S SAFETY MEANS, PROCEDURES, EQUIPMENT AND MATERIALS PERTAINING TO THE SAFETY SYSTEMS IN THIS SECTION ARE SUFFICIENT TO MEET REQUIREMENTS OF OSHA STANDARDS.

8. MAINTENANCE OF SAFETY SYSTEM: THE SAFETY SYSTEM SHALL BE MAINTAINED IN THE CONDITION AS SHOWN IN THE TRENCH EXCAVATION AND SHORING SAFETY PLAN AS DESIGNED BY THE SUBCONTRACTOR'S REGISTERED PROFESSIONAL ENGINEER. THE SUBCONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO VERIFY THE SAFETY SYSTEMS ARE NOT DAMAGED DURING THEIR USE. IF AT ANY TIME DURING THE USE A SAFETY SYSTEM IS DAMAGED, PERSONNEL SHALL BE IMMEDIATELY REMOVED FROM THE TRENCH EXCAVATION AREA AND THE SAFETY SYSTEM REPAIRED. THE SUBCONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE NO LOADS, EXCEPT THOSE PROVIDED FOR IN THE PLAN, ARE IMPOSED UPON THE TRENCH SAFETY SYSTEM.

9. INSPECTION: THE SUBCONTRACTOR SHALL MAKE DAILY INSPECTION OF TRENCH SAFETY SYSTEM TO VERIFY THAT THE SYSTEM MEETS OSHA REQUIREMENTS. DAILY INSPECTION TO BE MADE BY COMPETENT PERSONNEL. IF EVIDENCE OF POSSIBLE CAVE-INS OR SLIDES IS APPARENT, ALL WORK ON THE TRENCH SHALL CEASE UNTIL NECESSARY PRECAUTIONS HAVE BEEN TAKEN TO SAFEGUARD PERSONNEL. ENTERING TRENCH. SUBCONTRACTOR TO MAINTAIN PERMANENT RECORD OF DAILY INSPECTIONS.

10. REMOVAL: BED AND BACK-FILL PIPE AND CONDUIT TO A POINT AT LEAST ONE (1) FOOT ABOVE TOP OF THE PIPE OR OTHER EMBEDDED ITEMS PRIOR TO REMOVAL OF ANY PORTION OF THE TRENCH SAFETY SYSTEM. BEDDING AND BACK FILL TO BE IN ACCORDANCE WITH OTHER APPLICABLE SPECIFICATION ITEMS. ALL WORK ACTIVITIES ASSOCIATED WITH THE TRENCH AND REMOVAL OF TRENCH SUPPORTS SHALL BE IN ACCORDANCE WITH THE SUBCONTRACTOR'S TRENCH EXCAVATION AND SHORING SAFETY PLAN. REMOVAL OF TRENCH SAFETY SYSTEM TO BE ACCOMPLISHED IN SUCH A MANNER TO CAUSE NO DAMAGE TO PIPE, CONDUIT OR OTHER EMBEDDED ITEMS. REMOVE NO BRACES OR TRENCH SUPPORTS UNTIL ALL PERSONNEL HAS EVACUATED THE TRENCH. BACK-FILL TRENCH TO MINIMUM FIVE (5) FEET OF NATURAL GROUND PRIOR TO THE REMOVAL OF THE ENTIRE TRENCH SAFETY SYSTEM.

11. FURTHER AMENDMENT TO CONTRACT: ALL MODIFICATIONS TO THE SUB



TREE CLEARING LEGEND

TREE REMOVAL AREA WITH STUMPS TO BE PRESERVED	
TREE & STUMP REMOVAL AREA	

NOTE:
1. PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION ACTIVITIES, ALL EXISTING ROUTES WITHIN THE LEASE BOUNDARY THAT ARE SCHEDULED FOR REMOVAL MUST BE IDENTIFIED. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH BOTH THE DEVELOPER AND THE PROPERTY OWNER TO ENSURE THAT ACCESS TO THE PROPERTY OWNER'S KEY INFRASTRUCTURE IS MAINTAINED THROUGHOUT THE DEMOLITION PROCESS. KEY INFRASTRUCTURE TO BE DEFINED BY THE PROPERTY OWNER

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
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Date:9/19/2025
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: DEMOLITION PLAN

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VMSD

Drawing No.: CD101

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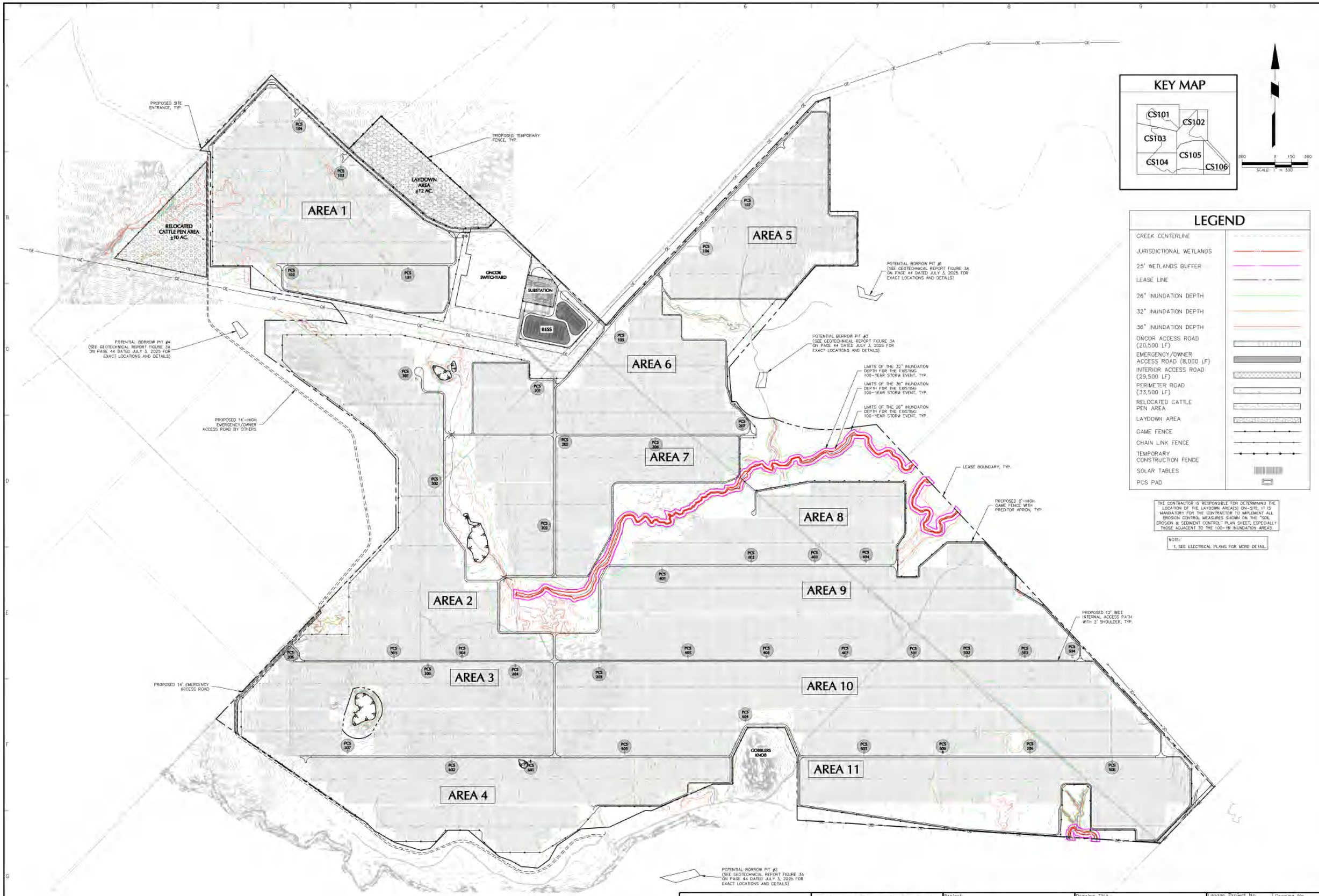
Project No. 520102301

LANGAN

Date: 9/19/2025 Time: 12:56 User: kreiter Style Table: Langan.stb Layout: CD100 Document Code: 520102301-5801-CD101-0101


PROPOSED SITE ENTRANCE, TYP.
PROPOSED TEMPORARY FENCE, TYP.
LAYDOWN AREA ±12 AC.
RELOCATED CATTLE PEN AREA ±10 AC.
AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
AREA 6
AREA 7
AREA 8
AREA 9
AREA 10
AREA 11
ONCOR SWITCHYARD
SUBSTATION
BESS
GOBBLERS KNOB
POTENTIAL BORROW PIT #1 (SEE GEOTECHNICAL REPORT FIGURE 3A ON PAGE 44 DATED JULY 3, 2025 FOR EXACT LOCATIONS AND DETAILS)
POTENTIAL BORROW PIT #2 (SEE GEOTECHNICAL REPORT FIGURE 3A ON PAGE 44 DATED JULY 3, 2025 FOR EXACT LOCATIONS AND DETAILS)
POTENTIAL BORROW PIT #3 (SEE GEOTECHNICAL REPORT FIGURE 3A ON PAGE 44 DATED JULY 3, 2025 FOR EXACT LOCATIONS AND DETAILS)
POTENTIAL BORROW PIT #4 (SEE GEOTECHNICAL REPORT FIGURE 3A ON PAGE 44 DATED JULY 3, 2025 FOR EXACT LOCATIONS AND DETAILS)
LIMITS OF THE 32" INUNDATION DEPTH FOR THE EXISTING 100-YEAR STORM EVENT, TYP.
LIMITS OF THE 36" INUNDATION DEPTH FOR THE EXISTING 100-YEAR STORM EVENT, TYP.
LIMITS OF THE 26" INUNDATION DEPTH FOR THE EXISTING 100-YEAR STORM EVENT, TYP.
LEASE BOUNDARY, TYP.
PROPOSED 8'-HIGH GAME FENCE WITH PREDITOR APRON, TYP.
PROPOSED 12' WIDE INTERNAL ACCESS PATH WITH 2' SHOULDER, TYP.
PROPOSED 14' EMERGENCY ACCESS ROAD
PROPOSED 14'-HIGH EMERGENCY/OWNER ACCESS ROAD BY OTHERS
PCS 101
PCS 102
PCS 103
PCS 104
PCS 105
PCS 106
PCS 107
PCS 201
PCS 202
PCS 203
PCS 204
PCS 205
PCS 206
PCS 207
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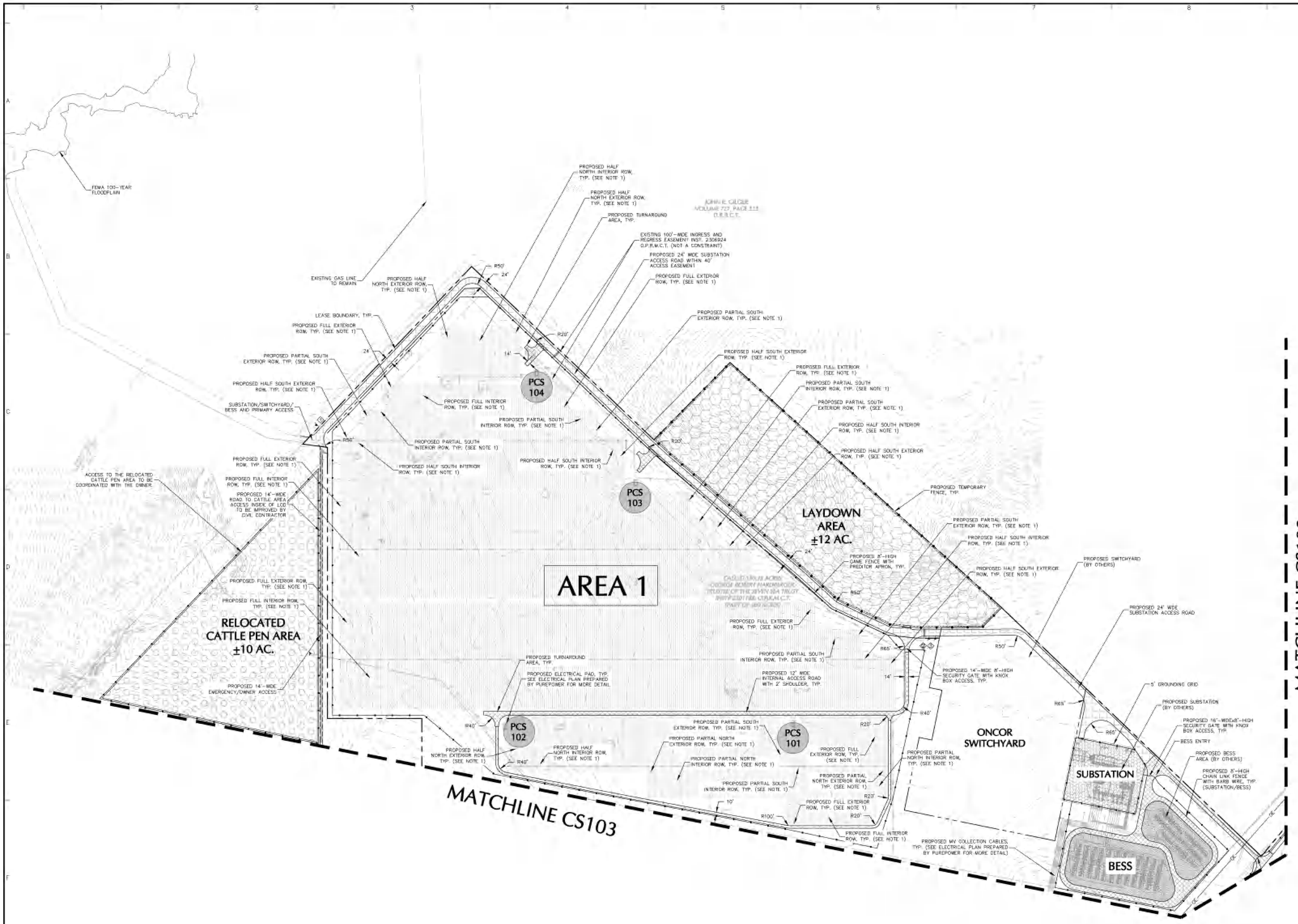
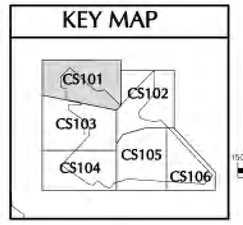


KEY MAP



150 0 50 100 150
SCALE: 1" = 150'

LEGEND

- CREEK CENTERLINE
- JURISDICTIONAL WETLANDS
- 25' WETLANDS BUFFER
- LEASE LINE
- 26" INUNDATION DEPTH
- 32" INUNDATION DEPTH
- 36" INUNDATION DEPTH
- ONCOR ACCESS ROAD (20,500 LF)
- EMERGENCY/OWNER ACCESS ROAD (8,000 LF)
- INTERIOR ACCESS ROAD (29,500 LF)
- PERIMETER ROAD (33,500 LF)
- RELOCATED CATTLE PEN AREA
- LAYDOWN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

STOP SIGN	STOP R1-1 30" X 30" ①
FIRST AID AREA	②
MUSTER AREA	③

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (BASIC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

NOTE:
1. SEE ELECTRICAL PLANS FOR MORE DETAIL

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
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Date: 9/19/2025
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SITE PLAN I

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CS101

Project No. 520102301

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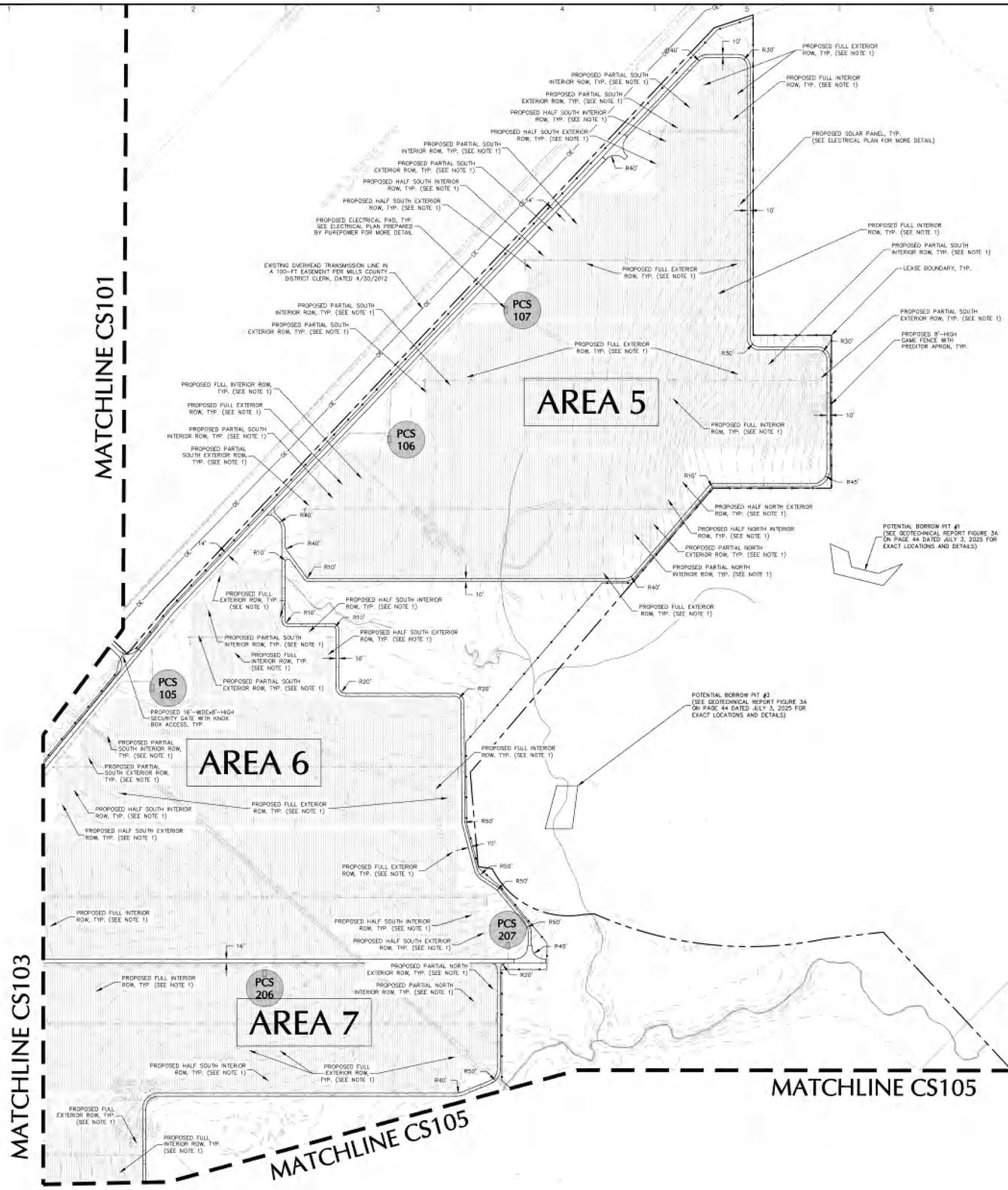
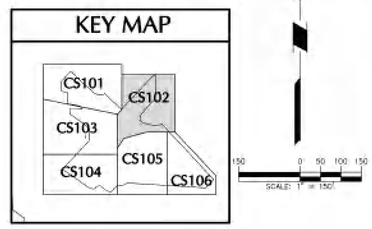
Date: 9/19/2025 Time: 15:02 User: bedek Style Table: Langan stb Layout: CS101 Document Data: 520102301-SD01-CS101-S101



KEY MAP



LEGEND

CREEK CENTERLINE	
JURISDICTIONAL WETLANDS	
25' WETLANDS BUFFER	
LEASE LINE	
26" INUNDATION DEPTH	
32" INUNDATION DEPTH	
36" INUNDATION DEPTH	
ONCOR ACCESS ROAD (20,500 LF)	
EMERGENCY/OWNER ACCESS ROAD (8,000 LF)	
INTERIOR ACCESS ROAD (29,500 LF)	
PERIMETER ROAD (33,500 LF)	
RELOCATED CATTLE PEN AREA	
LAYDOWN AREA	
GAME FENCE	
CHAIN LINK FENCE	
TEMPORARY CONSTRUCTION FENCE	
SOLAR TABLES	
PCS PAD	

SIGN LEGEND

STOP SIGN	STOP R1-1 30" X 30" (1)
FIRST AID AREA	(2)
MUSTER AREA	(3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (BASIC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

NOTE:
1. SEE ELECTRICAL PLANS FOR MORE DETAIL

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

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Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SITE PLAN II

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR.	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VPJSD

Drawing No.: CS102

Project No. 520102301

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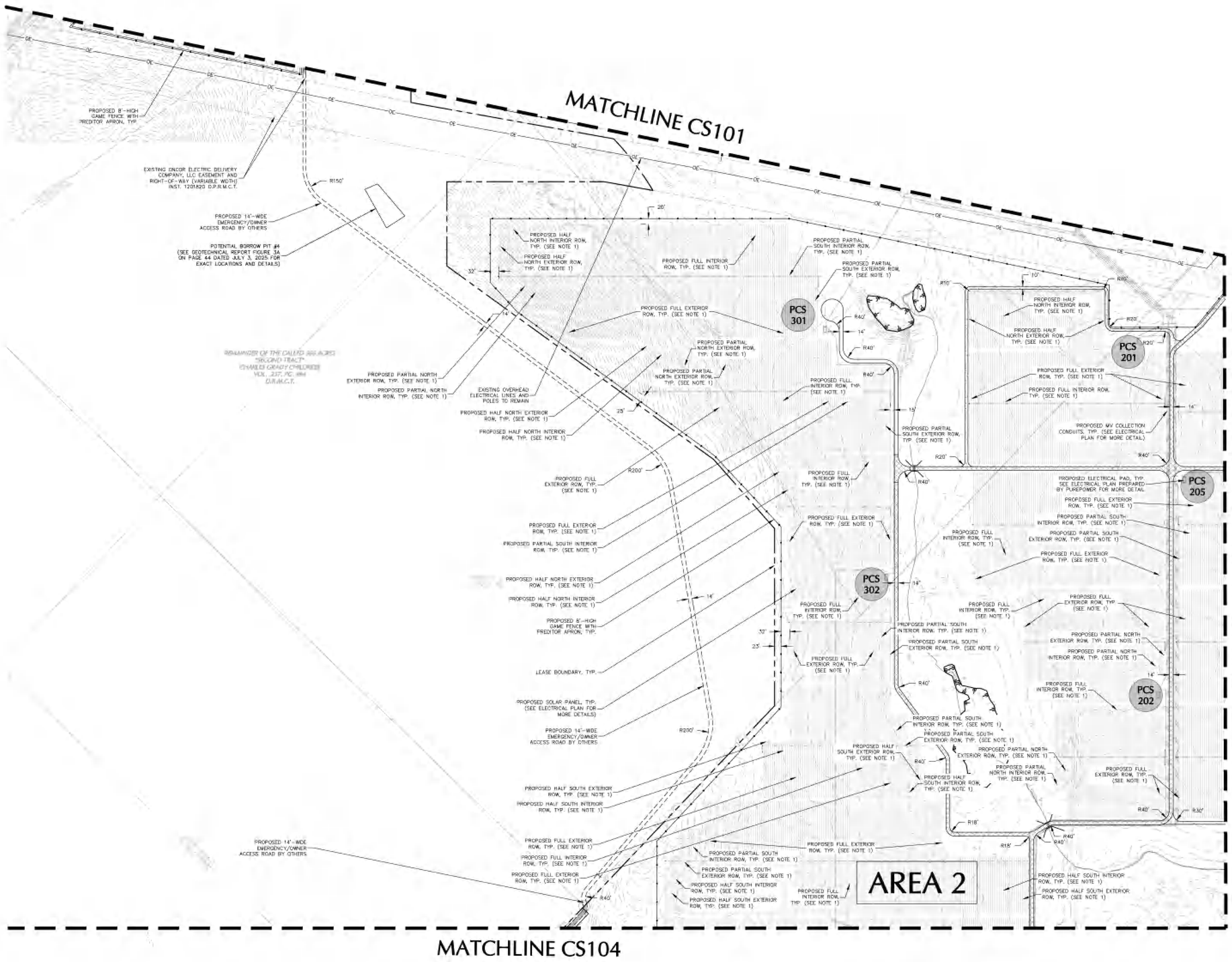
Date: 9/19/2025 Time: 15:03 User: keates Style Table: Langan.stb Layout: CS102 Document Code: 520102301-5501-CS101-0101



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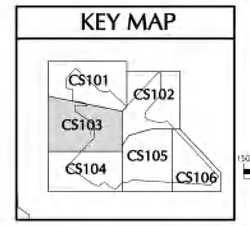

LEGEND

- CREEK CENTERLINE
- JURISDICTIONAL WETLANDS
- 25' WETLANDS BUFFER
- LEASE LINE
- 26" INUNDATION DEPTH
- 32" INUNDATION DEPTH
- 36" INUNDATION DEPTH
- ONCOR ACCESS ROAD (20,500 LF)
- EMERGENCY/OWNER ACCESS ROAD (8,000 LF)
- INTERIOR ACCESS ROAD (29,500 LF)
- PERIMETER ROAD (33,500 LF)
- RELOCATED CATTLE PEN AREA
- LAYDOWN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

- STOP SIGN — STOP, RT-1, 30" X 30"
- FIRST AID AREA
- MUSTER AREA

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

NOTE:
1. SEE ELECTRICAL PLANS FOR MORE DETAIL.

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

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Engineer: SONJ DAVID
P.E. No.: 143108
Date:9/19/2025
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SITE PLAN III

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CS103

Project No. 520102301

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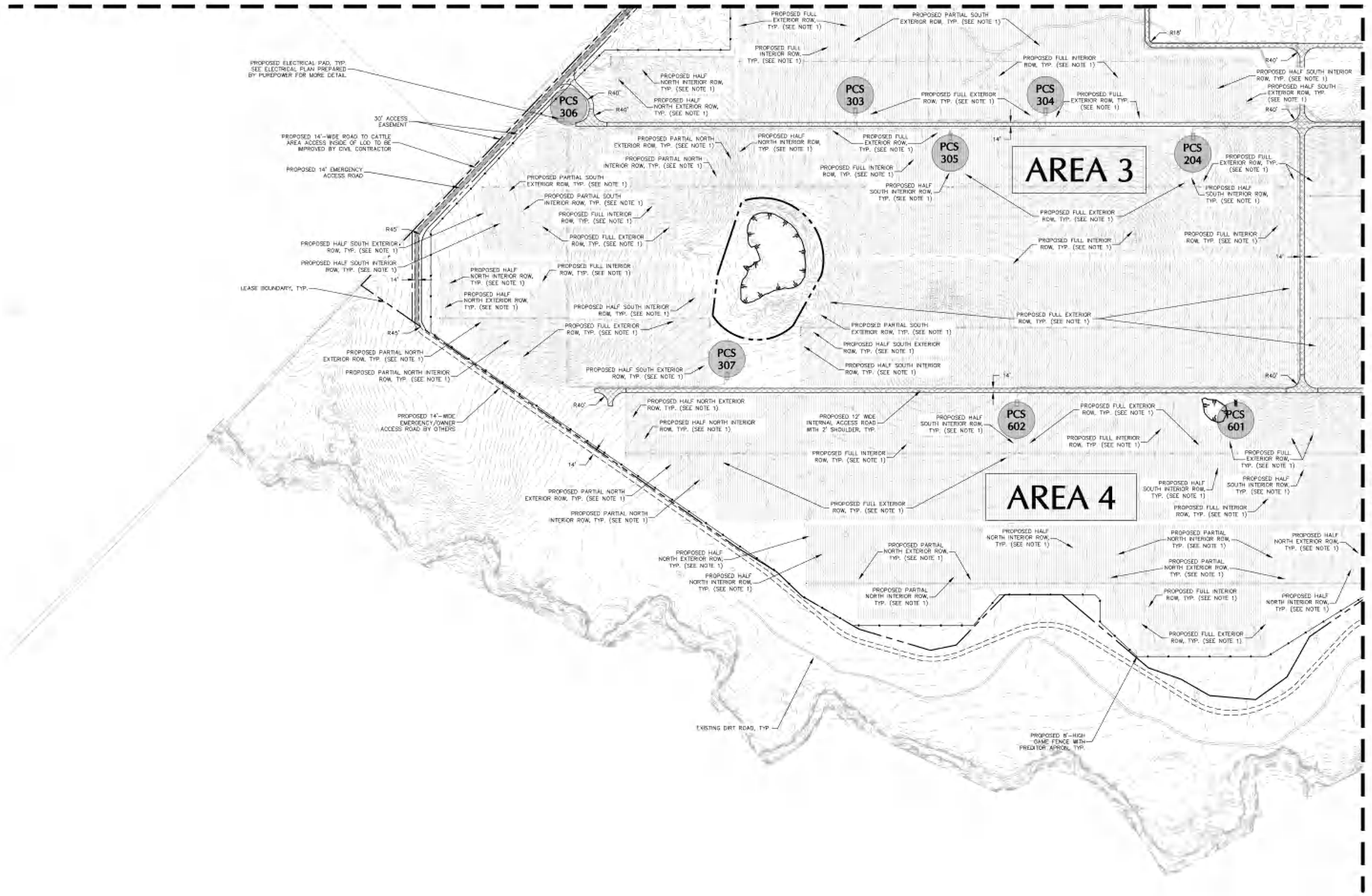
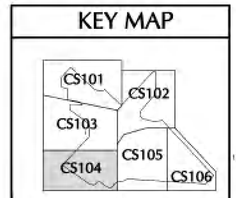
Date: 9/19/2025 Time: 15:03 User: keeles Style Table: Langan.stb Layout: CS103 Document Data: 520102301-S501-CS101-S951

MATCHLINE CS103



MATCHLINE CS105

KEY MAP



LEGEND

- CREEK CENTERLINE
- JURISDICTIONAL WETLANDS
- 25' WETLANDS BUFFER
- LEASE LINE
- 26" INUNDATION DEPTH
- 32" INUNDATION DEPTH
- 36" INUNDATION DEPTH
- ONCOR ACCESS ROAD (20,500 LF)
- EMERGENCY/OWNER ACCESS ROAD (8,000 LF)
- INTERIOR ACCESS ROAD (29,500 LF)
- PERIMETER ROAD (33,500 LF)
- RELOCATED CATTLE PEN AREA
- LAYDOWN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

- STOP SIGN — STOP, R1-1, 30" X 30", (1)
- FIRST AID AREA — (2)
- MUSTER AREA — (3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (EASC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

NOTE:
1. SEE ELECTRICAL PLANS FOR MORE DETAIL.

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

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Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENALRGED SITE PLAN IV

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CS104

Project No. 520102301

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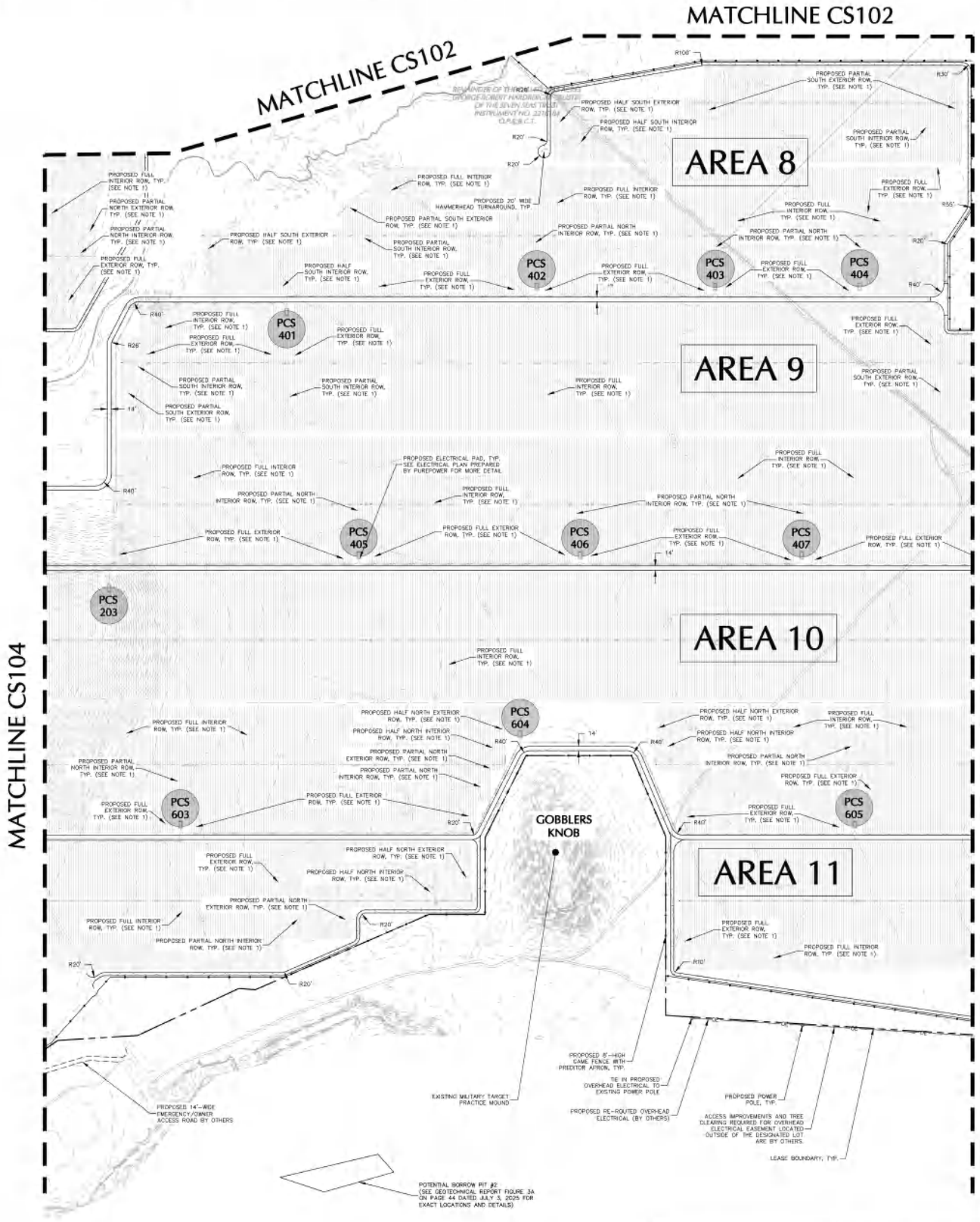
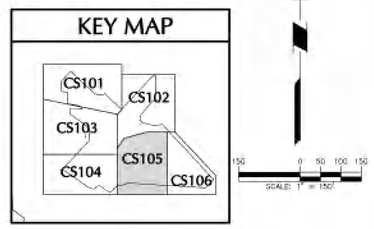
Date: 9/19/2025 Time: 15:04 User: kosteki Style Table: Langan.stb Layout: CS104 Document Code: 520102301-SS01-CS101-0101





LEGEND

CREEK CENTERLINE	
JURISDICTIONAL WETLANDS	
25' WETLANDS BUFFER	
LEASE LINE	
26" INUNDATION DEPTH	
32" INUNDATION DEPTH	
36" INUNDATION DEPTH	
ONCOR ACCESS ROAD (20,500 LF)	
EMERGENCY/OWNER ACCESS ROAD (8,000 LF)	
INTERIOR ACCESS ROAD (29,500 LF)	
PERIMETER ROAD (33,500 LF)	
RELOCATED CATTLE PEN AREA	
LAYDOWN AREA	
GAME FENCE	
CHAIN LINK FENCE	
TEMPORARY CONSTRUCTION FENCE	
SOLAR TABLES	
PCS PAD	

SIGN LEGEND

STOP SIGN	STOP R1-1 30" X 30" (1)
FIRST AID AREA	(2)
MUSTER AREA	(3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

NOTE:
1. SEE ELECTRICAL PLANS FOR MORE DETAIL

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

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Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC
TBPE Firm Registration No.:F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SITE PLAN V

Langan Project No.: 520102301
BRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VMSD

Drawing No.: CS105

Project No. 520102301

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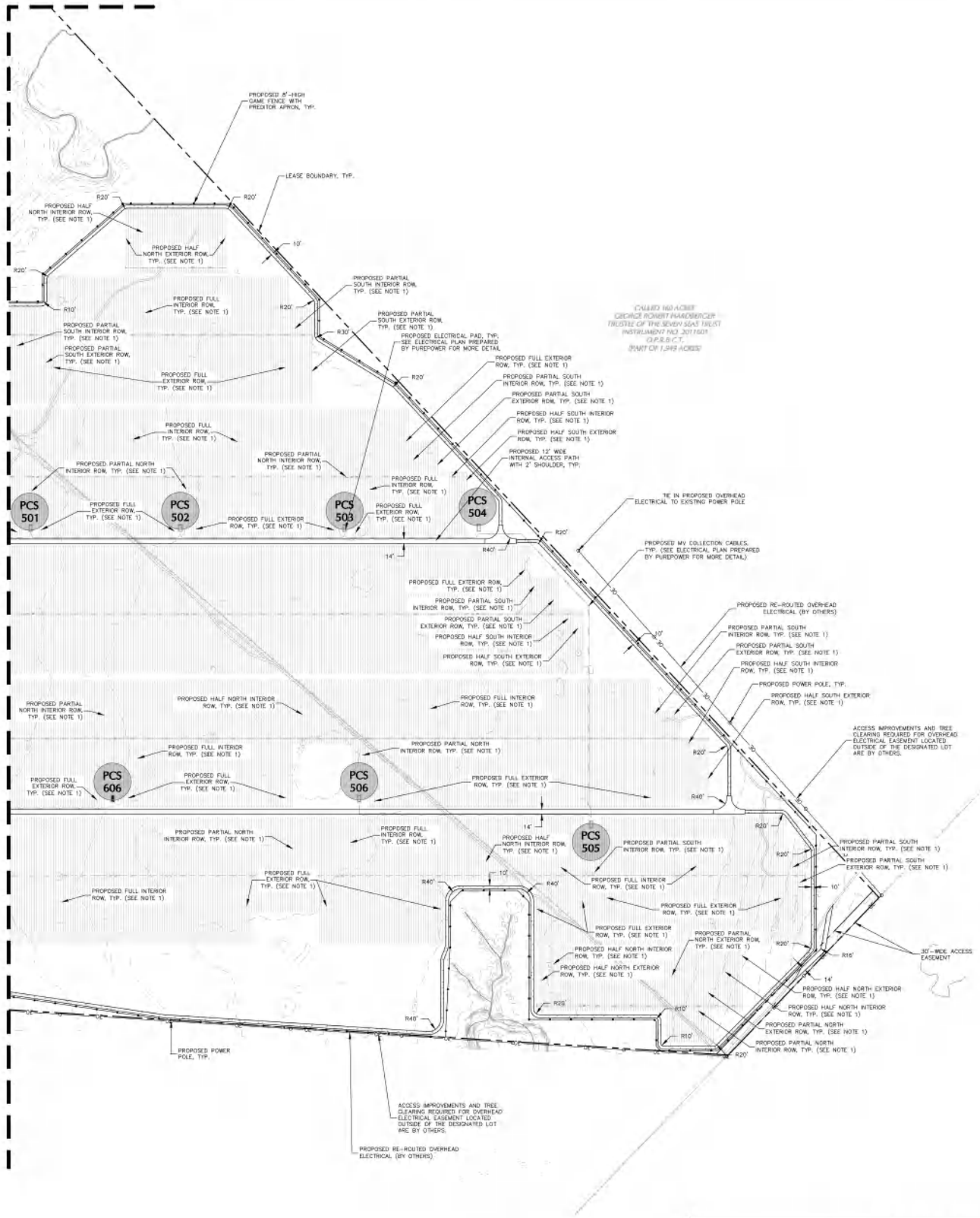
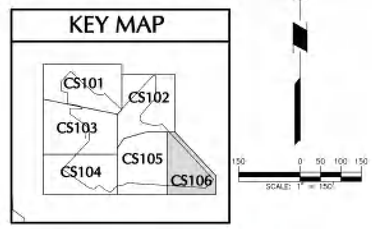
Date: 9/19/2025 Time: 15:05 User: kreiter Style Table: Langan.stb Layout: CS105 Document Data: 520102301-S501-CS101-0101

MATCHLINE CS102

MATCHLINE CS105



KEY MAP



LEGEND

CREEK CENTERLINE	
JURISDICTIONAL WETLANDS	
25' WETLANDS BUFFER	
LEASE LINE	
26" INUNDATION DEPTH	
32" INUNDATION DEPTH	
36" INUNDATION DEPTH	
ONCOR ACCESS ROAD (20,500 LF)	
EMERGENCY/OWNER ACCESS ROAD (8,000 LF)	
INTERIOR ACCESS ROAD (29,500 LF)	
PERIMETER ROAD (33,500 LF)	
RELOCATED CATTLE PEN AREA	
LAYDOWN AREA	
GAME FENCE	
CHAIN LINK FENCE	
TEMPORARY CONSTRUCTION FENCE	
SOLAR TABLES	
PCS PAD	

SIGN LEGEND

STOP SIGN	STOP R1-1 30" X 30" (1)
FIRST AID AREA	(2)
MUSTER AREA	(3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

NOTE:
1. SEE ELECTRICAL PLANS FOR MORE DETAIL.

No.	Description	Date
2	60% DD SET	09/19/2025
1	30% DD SET	04/11/2025

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
PE Lic. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SITE PLAN VI

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CS106

Project No. 520102301

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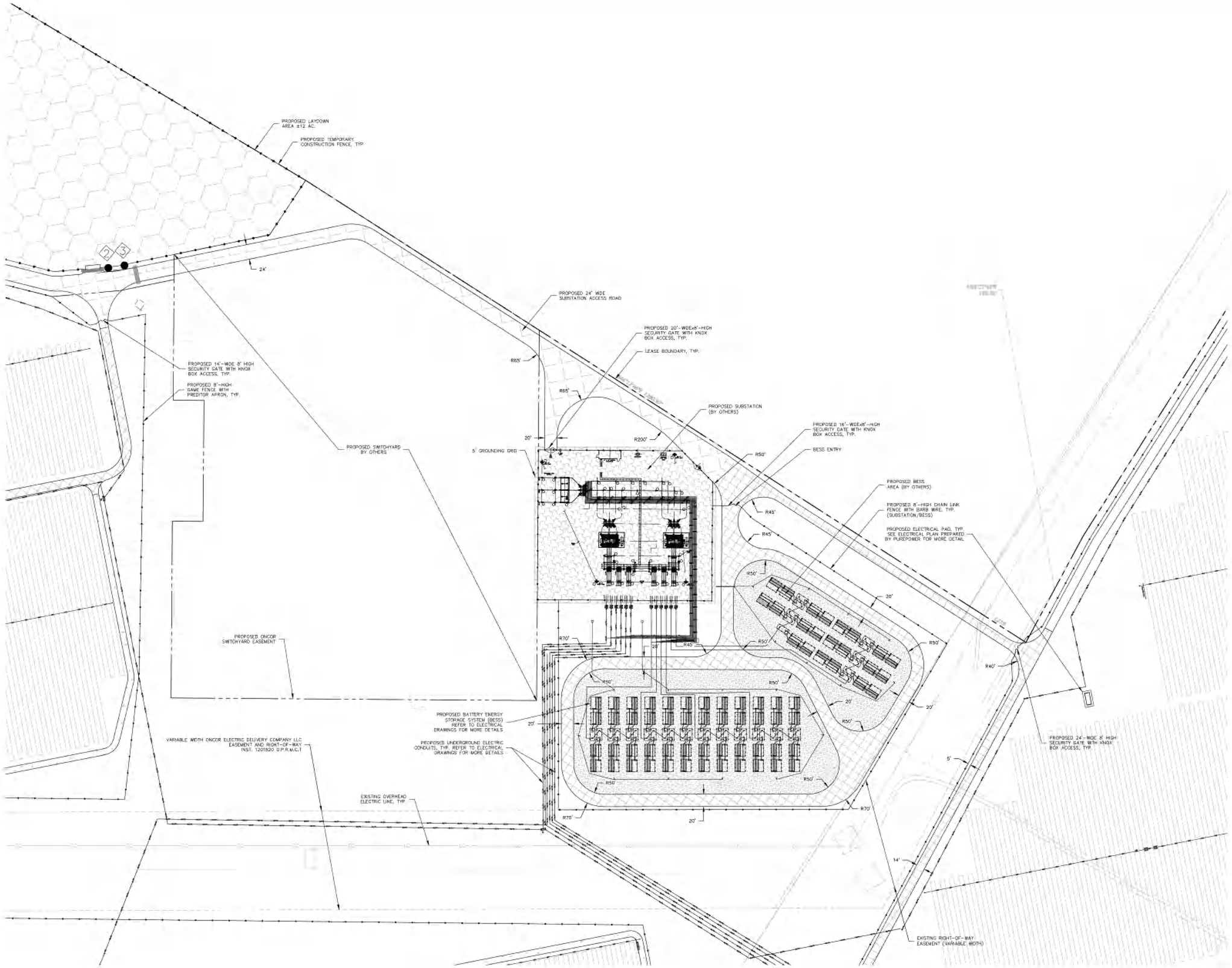
Date: 9/19/2025 Time: 15:06 User: keates Style Table: Langan.stb Layout: CS-106 Document Code: 520102301-5501-CS101-0101



PAVEMENT LEGEND

- 5" – TXDOT ITEM 247, TYPE A, GRADE 1-2
- 4" – TXDOT ITEM 247, TYPE A, GRADE 1-2 W/ GEOTEXTILE
- 9" – TXDOT ITEM 247, TYPE A, GRADE 1-2 W/ GEOTEXTILE
- 14" – TXDOT ITEM 247, TYPE A, GRADE 1-2 W/ GEOTEXTILE
- STONE TYPE AND DEPTH TO BE COORDINATED WITH THE SUBSTATION DESIGN TEAM

NOTE:
1. 8" COMPACTED SUBGRADE FOR ALL FLEXIBLE PAVEMENT PER GEOTECHNICAL REPORT.
2. AGGREGATE SURFACE PAVEMENT SECTION PER GEOTECH REPORT.

LEGEND

- LAYDOWN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

- STOP SIGN — STOP, R1-1, 30" X 30", (1)
- FIRST AID AREA — (2)
- MUSTER AREA — (3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (EASC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

No.	Date	Description
2	09/19/2025	60% DD SET
1	04/11/2025	30% DD SET

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
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TBPE Firm Registration No.:F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED BESS SITE & UTILITY PLAN

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	05/19/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CS107

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Project No. 520102301

Date: 9/19/2025 Time: 15:13 User: kestes Style Table: Langan.stb Layout: CS107 Document Data: 520102301-S502-CS101-0101

KEY MAP

LEGEND

LOW WATER CROSSING	

300 0 150 300
SCALE: 1" = 300'

ELEVATIONS TABLE

NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
1	-8.0	-4.0	12726	
2	-4.0	-2.0	84983	
3	-2.0	0.0	485283	
4	0.0	2.0	282522	
5	2.0	4.0	13224	
6	4.0	6.0	231	

RRCE CHISME SOLAR & BESS
EARTHWORK SUMMARY

AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,900	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,950	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS
3. PRELIMINARY IN SITU CUT AND FILL BALANCES ARE IDEALLY TARGETED TO PROVIDE A NET CUT OF 2-7% OF THE CUT/FILL TOTAL VOLUMES TO ACCOUNT FOR FIELD VARIANCES DURING CONSTRUCTION. TEMPORARY STOCKPILING OF EXCESS CUT IS A LOWER COST ALTERNATIVE TO SOURCING EITHER SUITABLE ONSITE OR OFFSITE FILL MATERIALS.

BORROW PIT NOTE:
1. FOUR SITES SITUATED OUTSIDE THE PROJECT LEASE BOUNDARY HAVE BEEN IDENTIFIED AS POTENTIAL BORROW PITS FOR SOURCING FILL MATERIALS, AS AN ALTERNATIVE TO IMPORTING FILL FROM EXTERNAL LOCATIONS. THE GEOTECHNICAL INVESTIGATION REPORT BY LANGAN ENGINEERING DELINEATES THESE FOUR BORROW PIT LOCATIONS ON THE SUBSURFACE INVESTIGATION PLAN - FIGURE 3, AND PROVIDES A DETAILED ANALYSIS OF THE SOIL TYPES IN SECTION 5.7.2. UPON COMPLETION OF THE CONSTRUCTION PHASE, AND AT THE LANDOWNER'S REQUEST, THESE BORROW PITS ARE INTENDED TO BE CONVERTED INTO PERMANENT DETENTION PONDS TO FACILITATE THE RANCHER'S ONGOING LIVESTOCK OPERATIONS.

LANGAN RECOMMENDS A COLLABORATIVE EVALUATION INVOLVING RRCE, THE CONTRACTOR, AND LANGAN TO ASSESS THE POTENTIAL COST BENEFITS AND DRAWBACKS OF UTILIZING THE BORROW PITS FOR FILL MATERIAL. THIS ASSESSMENT SHOULD INCLUDE CONSIDERATIONS SUCH AS THE POSSIBLE REDUCTION IN LAND CLEARING COSTS. THE FINAL DECISION IS ANTICIPATED TO SIGNIFICANTLY INFLUENCE THE GRADING DESIGN STRATEGY FOR THE PROJECT.

CUT AREAS
FILL AREAS

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: OVERALL GRADING & DRAINAGE PLAN

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VPSD

Drawing No.: CG100

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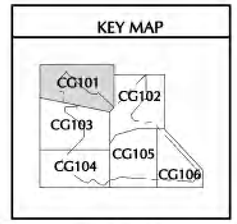
Project No. 520102301

Date: 9/19/2025 Time: 14:36 User: keates Style Table: Langan.stb Layout: CG100 Document Data: 520102301-SD01-CG100-0100

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

JOHN E. GILGER
VOLUME 727, PAGE 111
O.R.B.C.T.



LEGEND

LOW WATER CROSSING	

300 0 150 300
SCALE: 1" = 300'

MATCHLINE CG102

RRCE CHISME SOLAR & BESS

EARTHWORK SUMMARY

AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,550	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED.
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS.
3. PRELIMINARY IN SITU CUT AND FILL BALANCES ARE IDEALLY TARGETED TO PROVIDE A NET CUT OF 2.7% OF THE CUT/FILL TOTAL VOLUMES TO ACCOUNT FOR FIELD VARIANCES DURING CONSTRUCTION. TEMPORARY STOCKPILING OF EXCESS CUT IS A LOWER COST ALTERNATIVE TO SOURCING EITHER SUITABLE ONSITE OR OFFSITE FILL MATERIALS.

BORROW PIT NOTE:
1. FOUR SITES SITUATED OUTSIDE THE PROJECT LEASE BOUNDARY HAVE BEEN IDENTIFIED AS POTENTIAL BORROW PITS FOR SOURCING FILL MATERIALS, AS AN ALTERNATIVE TO IMPORTING FILL FROM EXTERNAL LOCATIONS. THE GEOTECHNICAL INVESTIGATION REPORT BY LANGAN ENGINEERING DELINEATES THESE FOUR BORROW PIT LOCATIONS ON THE SUBSURFACE INVESTIGATION PLAN - FIGURE 3, AND PROVIDES A DETAILED ANALYSIS OF THE SOIL TYPES IN SECTION 6.7.2. UPON COMPLETION OF THE CONSTRUCTION PHASE, AND AT THE LANDOWNER'S REQUEST, THESE BORROW PITS ARE INTENDED TO BE CONVERTED INTO PERMANENT DETENTION PONDS TO FACILITATE THE RANCHER'S ONGOING LIVESTOCK OPERATIONS.

LANGAN RECOMMENDS A COLLABORATIVE EVALUATION INVOLVING RRCE, THE CONTRACTOR, AND LANGAN TO ASSESS THE POTENTIAL COST BENEFITS AND DRAWBACKS OF UTILIZING THE BORROW PITS FOR FILL MATERIAL. THIS ASSESSMENT SHOULD INCLUDE CONSIDERATIONS SUCH AS THE POSSIBLE REDUCTION IN UXO CLEARING COSTS. THE FINAL DECISION IS ANTICIPATED TO SIGNIFICANTLY INFLUENCE THE GRADING DESIGN STRATEGY FOR THE PROJECT.

CUT AREAS
FILL AREAS

ELEVATIONS TABLE

NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
1	-6.0	-4.0	12728	
2	-4.0	-2.0	84983	
3	-2.0	0.0	485283	
4	0.0	2.0	282522	
5	2.0	4.0	13224	
6	4.0	6.0	231	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC
TBPE Firm Registration No.:F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED GRADING & DRAINAGE PLAN I

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	09/19/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CG101

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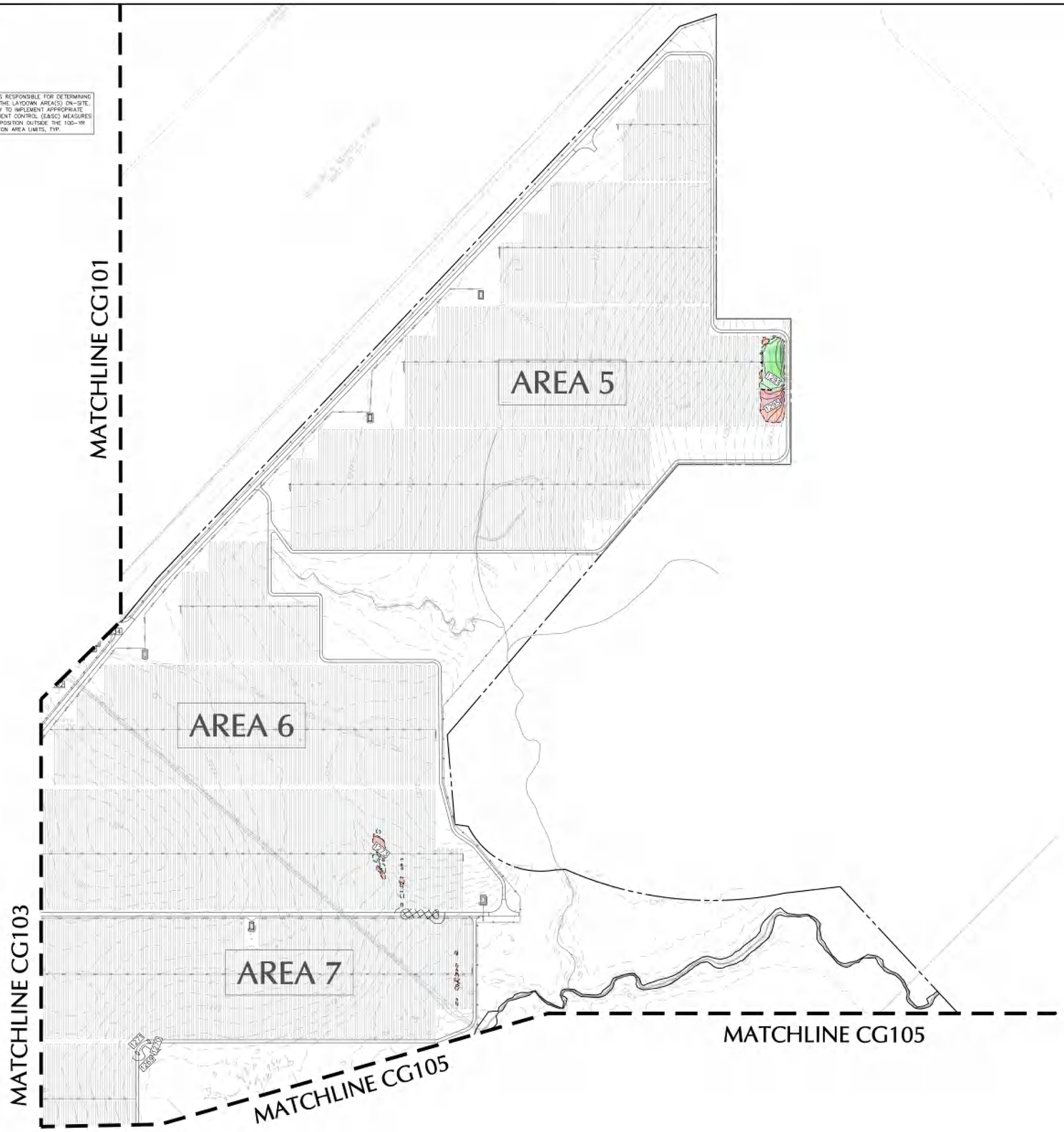
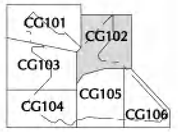
Project No. 520102301

Date: 9/19/2025 Time: 14:01 User: kostes Style Table: Langan.stb Layout: CG101 Document Code: 520102301-8501-CG101-0101

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.



KEY MAP



LEGEND

LOW WATER CROSSING	

300 0 150 300
SCALE: 1" = 300'

RRCE CHISME SOLAR & BESS
EARTHWORK SUMMARY

AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,950	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED.
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS.
3. PRELIMINARY IN SITU CUT AND FILL BALANCES ARE IDEALLY TARGETED TO PROVIDE A NET CUT OF 2-7% OF THE CUT/FILL TOTAL VOLUMES TO ACCOUNT FOR FIELD VARIANCES DURING CONSTRUCTION. TEMPORARY STOCKPILING OF EXCESS CUT IS ALOWER COST ALTERNATIVE TO SOURCING EITHER SUITABLE ONSITE OR OFFSITE FILL MATERIALS.

BORROW PIT NOTE:
1. FOUR SITES SITUATED OUTSIDE THE PROJECT LEASE BOUNDARY HAVE BEEN IDENTIFIED AS POTENTIAL BORROW PITS FOR SOURCING FILL MATERIALS, AS AN ALTERNATIVE TO IMPORTING FILL FROM EXTERNAL LOCATIONS. THE GEOTECHNICAL INVESTIGATION REPORT BY LANGAN ENGINEERING DELINEATES THESE FOUR BORROW PIT LOCATIONS ON THE SUBSURFACE INVESTIGATION PLAN - FIGURE 3, AND PROVIDES A DETAILED ANALYSIS OF THE SOIL TYPES IN SECTION 6.7.2. UPON COMPLETION OF THE CONSTRUCTION PHASE, AND AT THE LANDOWNER'S REQUEST, THESE BORROW PITS ARE INTENDED TO BE CONVERTED INTO PERMANENT DETENTION PONDS TO FACILITATE THE RANCHER'S ONGOING LIVESTOCK OPERATIONS.

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CUT AREAS
FILL AREAS

ELEVATIONS TABLE				
NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
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2	-4.0	-2.0	84983	
3	-2.0	0.0	485283	
4	0.0	2.0	282522	
5	2.0	4.0	13224	
6	4.0	6.0	231	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
PE No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED GRADING & DRAINAGE PLAN II

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 09/19/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CG102

Project No. 520102301

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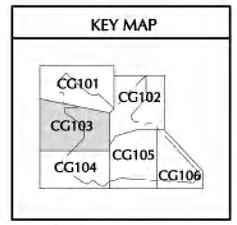
Date: 9/19/2025 Time: 14:02 User: kestes Style Table: Langan.stb Layout: CG102 Document Code: 520102301-SS01-CG101-0101

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.



LEGEND

LOW WATER CROSSING	

MATCHLINE CG101

PROPOSED 14'-HIGH EMERGENCY/OWNER ACCESS ROAD BY OTHERS

MATCHLINE CG102

AREA 2

MATCHLINE CG104

RRCE CHISME SOLAR & BESS

EARTHWORK SUMMARY

AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,950	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED.
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS.
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BORROW PIT NOTE:
1. FOUR SITES SITUATED OUTSIDE THE PROJECT LEASE BOUNDARY HAVE BEEN IDENTIFIED AS POTENTIAL BORROW PITS FOR SOURCING FILL MATERIALS, AS AN ALTERNATIVE TO IMPORTING FILL FROM EXTERNAL LOCATIONS. THE GEOTECHNICAL INVESTIGATION REPORT BY LANGAN ENGINEERING DELINEATES THESE FOUR BORROW PIT LOCATIONS ON THE SUBSURFACE INVESTIGATION PLAN - FIGURE 3, AND PROVIDES A DETAILED ANALYSIS OF THE SOIL TYPES IN SECTION 6.7.2. UPON COMPLETION OF THE CONSTRUCTION PHASE, AND AT THE LANDOWNER'S REQUEST, THESE BORROW PITS ARE INTENDED TO BE CONVERTED INTO PERMANENT DETENTION PONDS TO FACILITATE THE RANCHER'S ONGOING LIVESTOCK OPERATIONS.

LANGAN RECOMMENDS A COLLABORATIVE EVALUATION INVOLVING RRCE, THE CONTRACTOR, AND LANGAN TO ASSESS THE POTENTIAL COST BENEFITS AND DRAWBACKS OF UTILIZING THE BORROW PITS FOR FILL MATERIAL. THIS ASSESSMENT SHOULD INCLUDE CONSIDERATIONS SUCH AS THE POSSIBLE REDUCTION IN UXO CLEARING COSTS. THE FINAL DECISION IS ANTICIPATED TO SIGNIFICANTLY INFLUENCE THE GRADING DESIGN STRATEGY FOR THE PROJECT.

CUT AREAS

FILL AREAS

ELEVATIONS TABLE

NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
1	-6.0	-4.0	12728	
2	-4.0	-2.0	84983	
3	-2.0	0.0	485283	
4	0.0	2.0	282522	
5	2.0	4.0	13224	
6	4.0	6.0	231	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

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T: 817.328.3200 www.langan.com
TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED GRADING & DRAINAGE PLAN III

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 09/19/2025
Drawn By: RMS
Checked By: VPSD

Drawing No.: CG103

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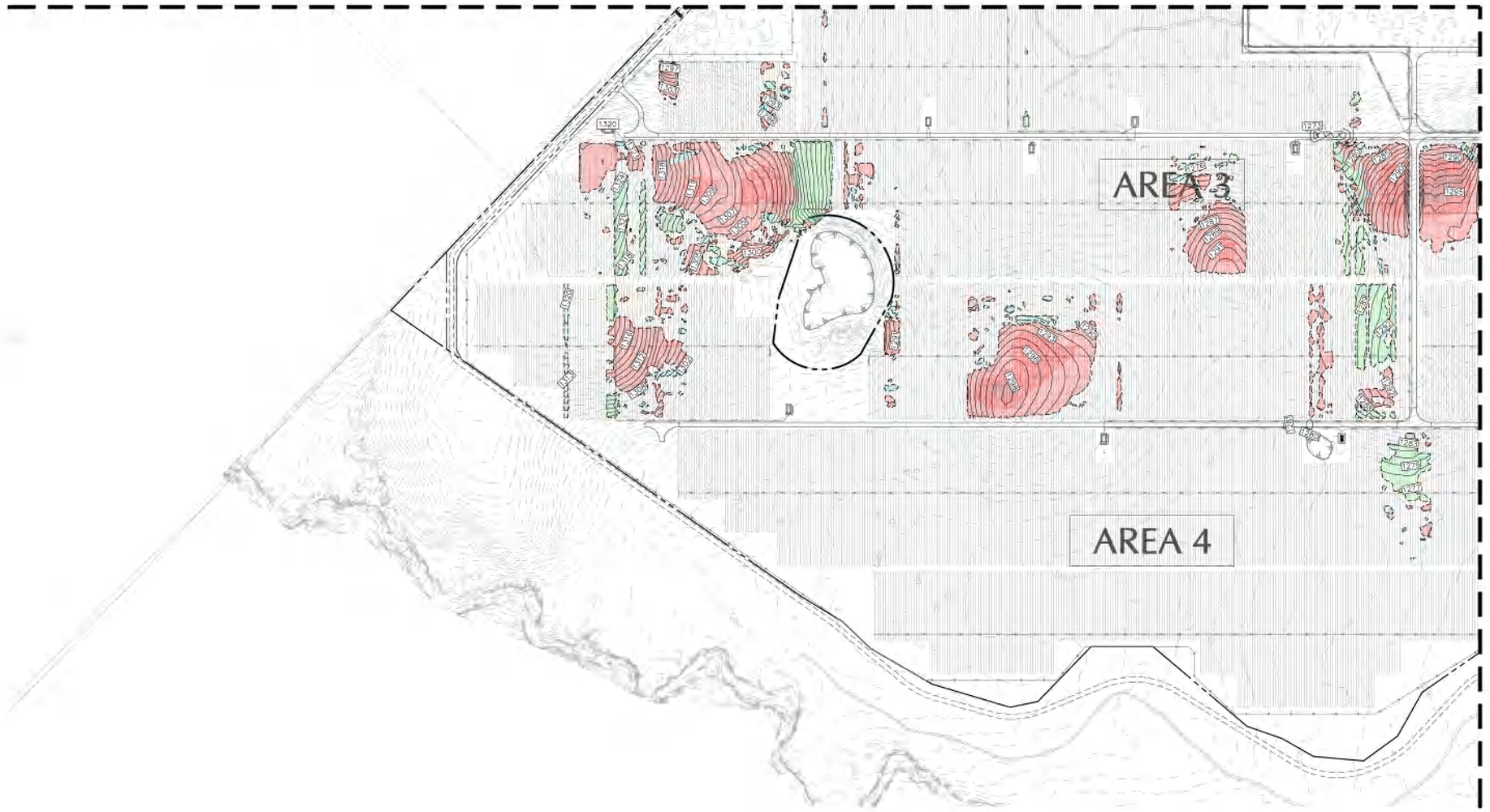
Date: 9/19/2025 Time: 14:03 User: kestes Style Table: Langan.stb Layout: CG103 Document Code: 520102301-5501-CG101-0101

LANGAN

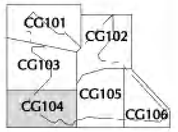
Project No. 520102301

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

MATCHLINE CG103



KEY MAP



LEGEND

LOW WATER CROSSING	

300 0 150 300
SCALE: 1" = 300'

RRCE CHISME SOLAR & BESS

EARTHWORK SUMMARY

AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,950	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED.
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS
3. PRELIMINARY IN SITU CUT AND FILL BALANCES ARE IDEALLY TARGETED TO PROVIDE A NET CUT OF 2-7% OF THE CUT/FILL TOTAL VOLUMES TO ACCOUNT FOR FIELD VARIANCES DURING CONSTRUCTION. TEMPORARY STOCKPILING OF EXCESS CUT IS A LOWER COST ALTERNATIVE TO SOURCING EITHER SUITABLE ONSITE OR OFFSITE FILL MATERIALS.

BORROW PIT NOTE:
1. FOUR SITES SITUATED OUTSIDE THE PROJECT LEASE BOUNDARY HAVE BEEN IDENTIFIED AS POTENTIAL BORROW PITS FOR SOURCING FILL MATERIALS, AS AN ALTERNATIVE TO IMPORTING FILL FROM EXTERNAL LOCATIONS. THE GEOTECHNICAL INVESTIGATION REPORT BY LANGAN ENGINEERING DELINEATES THESE FOUR BORROW PIT LOCATIONS ON THE SUBSURFACE INVESTIGATION PLAN - FIGURE 3, AND PROVIDES A DETAILED ANALYSIS OF THE SOIL TYPES IN SECTION 6.7.2. UPON COMPLETION OF THE CONSTRUCTION PHASE, AND AT THE LANDOWNER'S REQUEST, THESE BORROW PITS ARE INTENDED TO BE CONVERTED INTO PERMANENT DETENTION PONDS TO FACILITATE THE RANCHER'S ONGOING LIVESTOCK OPERATIONS.

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CUT AREAS
FILL AREAS

ELEVATIONS TABLE

NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
1	-6.0	-4.0	12728	
2	-4.0	-2.0	84983	
3	-2.0	0.0	485283	
4	0.0	2.0	282522	
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6	4.0	6.0	231	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED GRADING & DRAINAGE PLAN IV

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 09/19/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CG104

Project No. 520102301

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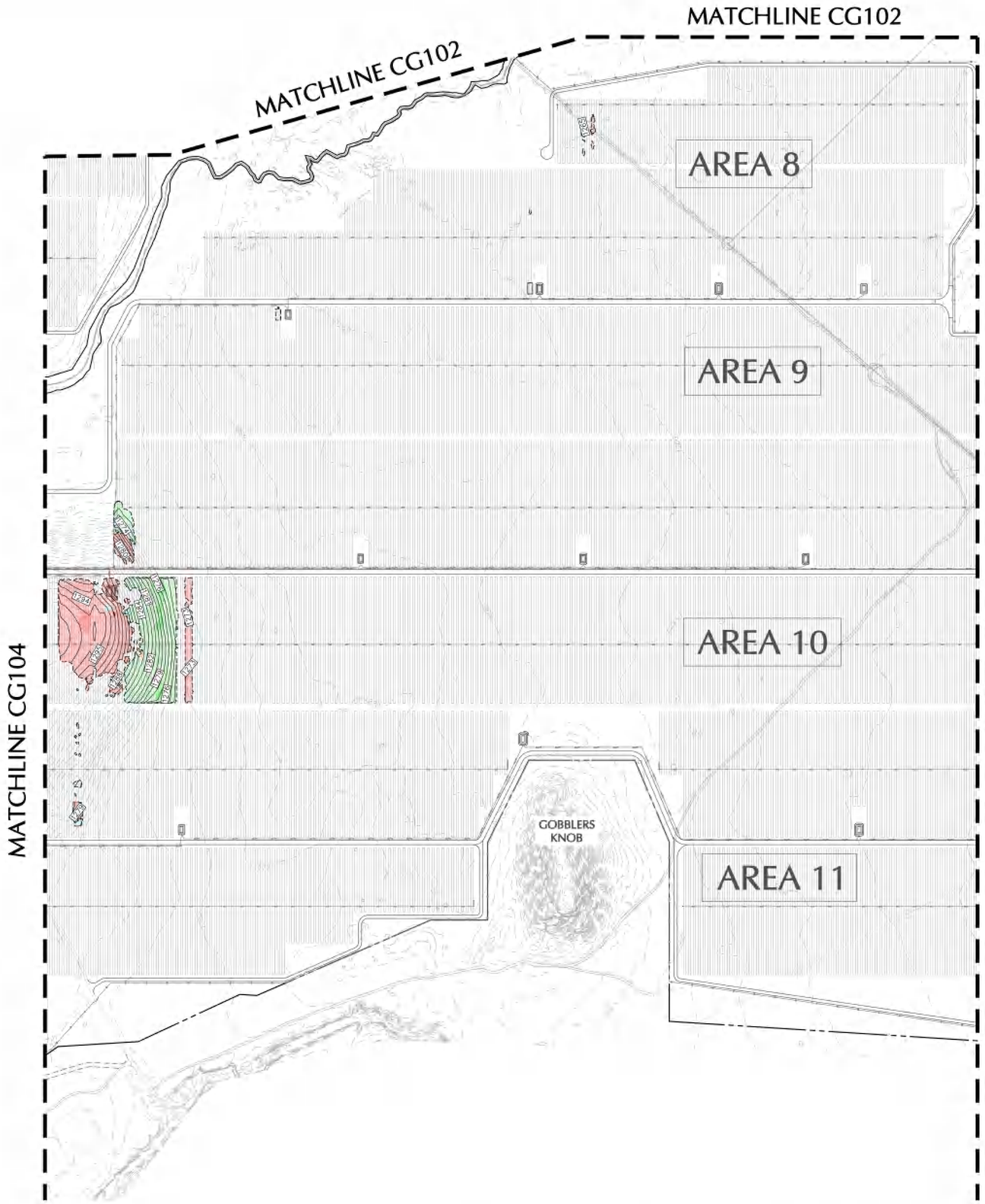
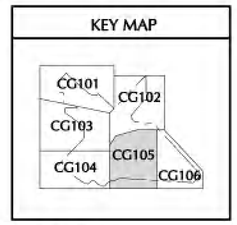
Date: 9/19/2025 Time: 14:03 User: keates Style Table: Langan.stb Layout: CG104 Document Data: 520102301-SD01-CG101-0101

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.





LEGEND

LOW WATER CROSSING	

300 0 150 300
SCALE: 1" = 300'

RRCE CHISME SOLAR & BESS EARTHWORK SUMMARY					
AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,950	92,700	-72,750

NOTES:
1. OVEREXCAVATION OF GEOTECHNICALLY UNSUITABLE MATERIALS IS NOT INCLUDED
2. CALCULATIONS DO NOT ACCOUNT FOR SHRINK/SWELL OR GEOTECHNICALLY UNSUITABLE/UNRESOLVABLE SOILS
3. PRELIMINARY IN SITU CUT AND FILL BALANCES ARE IDEALLY TARGETED TO PROVIDE A NET CUT OF 2-7% OF THE CUT/FILL TOTAL VOLUMES TO ACCOUNT FOR FIELD VARIANCES DURING CONSTRUCTION. TEMPORARY STOCKPILING OF EXCESS CUT IS A LOWER COST ALTERNATIVE TO SOURCING EITHER SUITABLE ONSITE OR OFFSITE FILL MATERIALS

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CUT AREAS
FILL AREAS

ELEVATIONS TABLE				
NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
1	-6.0	-4.0	12728	
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3	-2.0	0.0	485283	
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5	2.0	4.0	13224	
6	4.0	6.0	231	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
PE No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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Dallas, TX 75019
T: 817.328.3200 www.langan.com
TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED GRADING & DRAINAGE PLAN V

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 09/19/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CG105

Project No. 520102301

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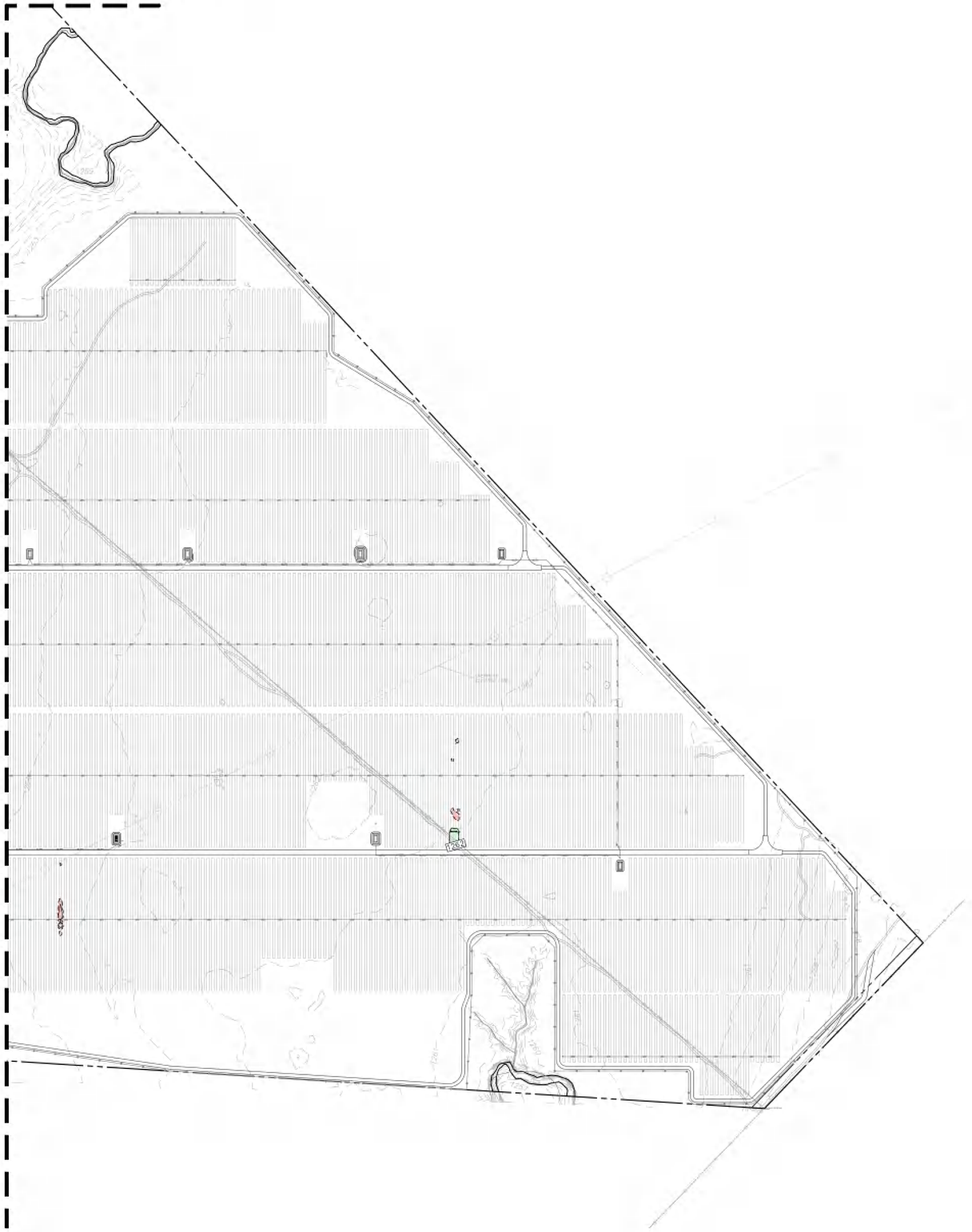
Date: 9/19/2025 Time: 14:04 User: kestes Style Table: Langan.stb Layout: CG105 Document Code: 520102301-SS01-CG101-0101

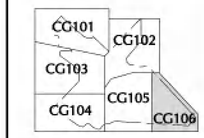
MATCHLINE CG102

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.



MATCHLINE CG105

KEY MAP



LEGEND

LOW WATER CROSSING	

300 0 150 300
SCALE: 1" = 300'

RRCE CHISME SOLAR & BESS
EARTHWORK SUMMARY

AREA	CUT FACTOR	FILL FACTOR	CUT ADJUSTED (CY)	FILL ADJUSTED (CY)	NET ADJUSTED (CY)
AREA 1	1.0	1.0	550	400	150
AREA 2	1.0	1.0	750	7,250	-6,500
AREA 3	1.0	1.0	14,400	2,100	12,300
AREA 4	1.0	1.0	50	300	-250
AREA 5	1.0	1.0	300	900	-600
AREA 6	1.0	1.0	100	100	0
AREA 7	1.0	1.0	50	250	-200
AREA 8	1.0	1.0	50	150	-100
AREA 9	1.0	1.0	50	500	-450
AREA 10	1.0	1.0	5,850	2,700	3,150
AREA 11	1.0	1.0	50	50	0
SUBSTATION/BESS YARD	1.0	1.0	2,000	72,550	70,550
LAYDOWN AREA	1.0	1.0	146,500	450	-146,050
ONCOR ACCESS ROAD	1.0	1.0	250	5,000	-4,750
TOTAL			170,950	92,700	-72,750

NOTES:
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CUT AREAS
FILL AREAS

ELEVATIONS TABLE

NUMBER	MIN. ELEVATION	MAX. ELEVATION	AREA (SF)	COLOR
1	-6.0	-4.0	12728	
2	-4.0	-2.0	84983	
3	-2.0	0.0	485283	
4	0.0	2.0	282522	
5	2.0	4.0	13224	
6	4.0	6.0	231	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142636
Date:9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

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T: 817.328.3200 www.langan.com
TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED GRADING & DRAINAGE PLAN VI

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 09/19/2025
Drawn By: RMS
Checked By: VPSD

Drawing No.: CG106

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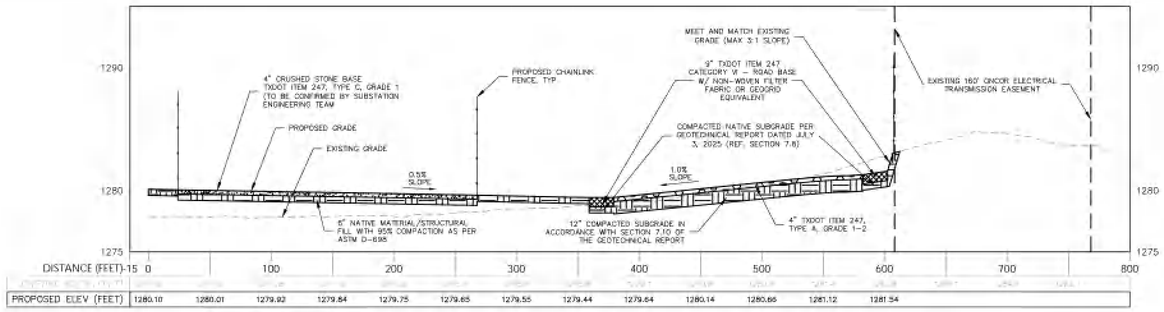
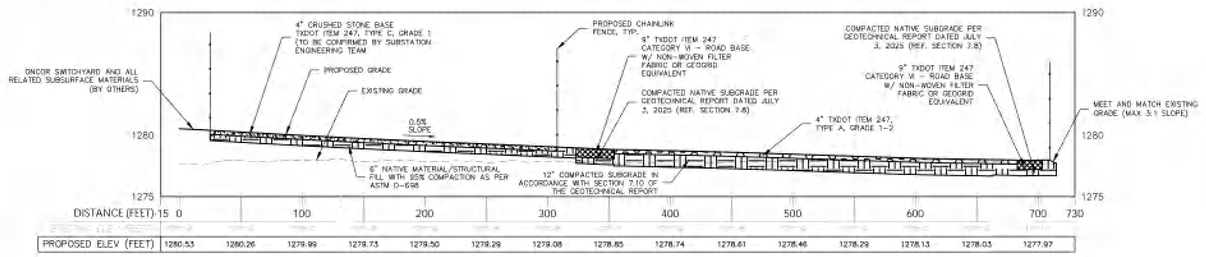
Date: 9/19/2025 Time: 14:05 User: kestes Style Table: Langan.stb Layout: CG106 Document Code: 520102301-SS01-CG101-0101

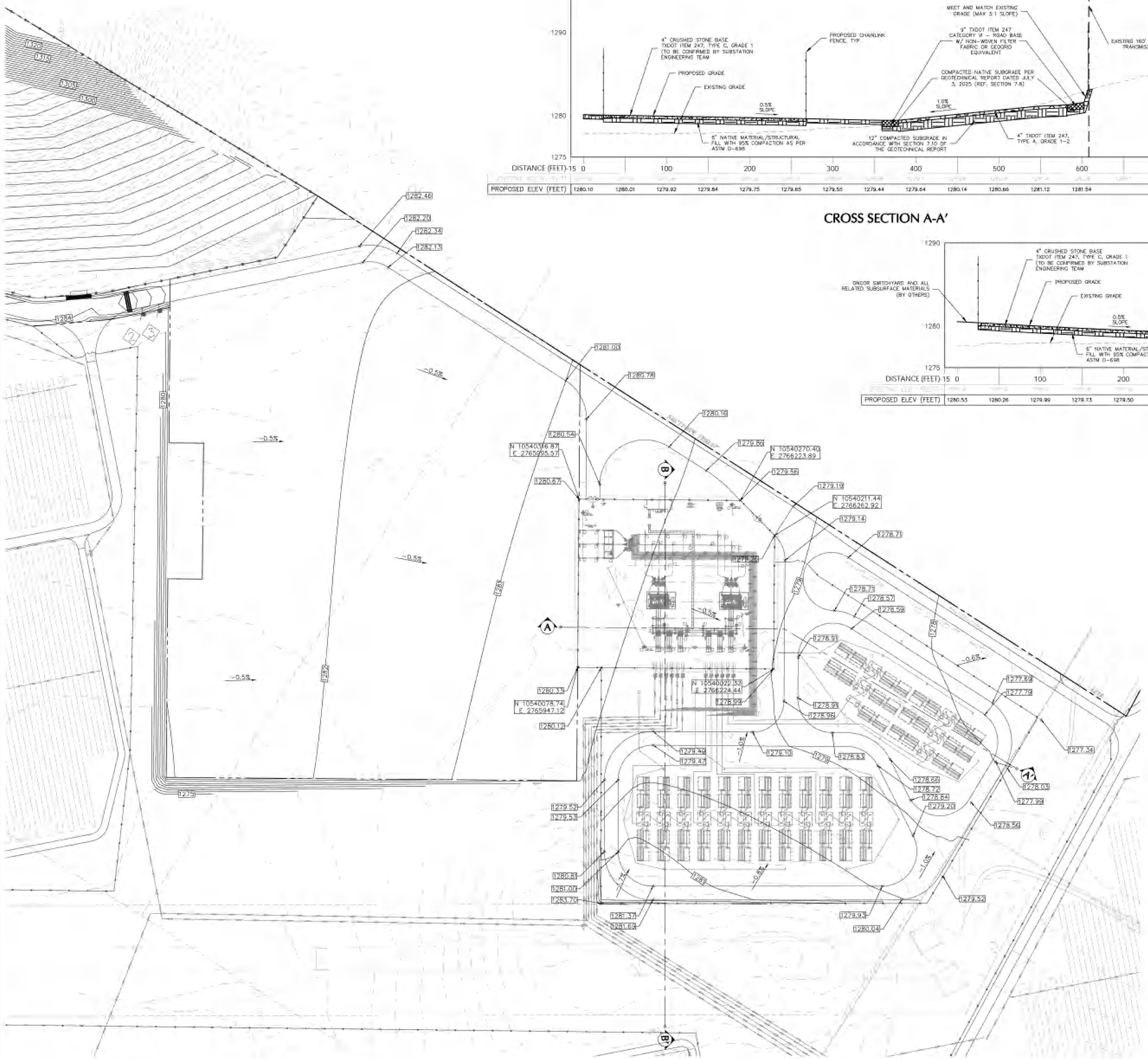
LANGAN
Project No. 520102301



CROSS SECTION A-A'



CROSS SECTION B-B'



PROFILE:

HORIZONTAL: SCALE: 1" = 50'

VERTICAL: SCALE: 1" = 10'

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL (E&SC) MEASURES AND AREA(S) IS POSITION OUTSIDE THE 100-YR INUNDATION AREA LIMITS, TYP.

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

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Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

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Dallas, TX 75019
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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED BESS GRADING & DRAINAGE PLAN

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 05/19/2025
Drawn By: RMS
Checked By: VPSD

Drawing No.: CG107

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Project No. 520102301

(3) 30 LF 18" RCP @ 0.5 SLOPE

END OF CHANNEL FLOW
ELEVATION: 1283.76

PCS
104

PCS
103

BEGIN OF SHEET FLOW
ELEVATION: 1330.24

END OF SHEET FLOW
BEGIN OF SHALLOW CONCENTRATED FLOW
ELEVATION: 1329.36

END OF SHEET FLOW
BEGIN OF SHALLOW CONCENTRATED FLOW
ELEVATION: 1329.54

PR. DA-A
AREA = 11.92 AC.
T_C = 27 MINS.
C = 0.35
Q_{100} = 25.62

PR. DA-B
AREA = 8.68 AC.
T_C = 25 MINS.
C = 0.35
Q_{100} = 18.51

END OF SHALLOW CONCENTRATED FLOW
BEGIN OF CHANNEL FLOW
ELEVATION: 1289.99

END OF SHALLOW CONCENTRATED FLOW
BEGIN OF CHANNEL FLOW
ELEVATION: 1289.35

END OF CHANNEL FLOW
ELEVATION: 1282.50

(3) 36.5 LF 18" RCP @ 0.5 SLOPE

(3) 30 LF 18" RCP @ 0.5 SLOPE

AREA 1

300 0 150 300
SCALE: 1" = 300'

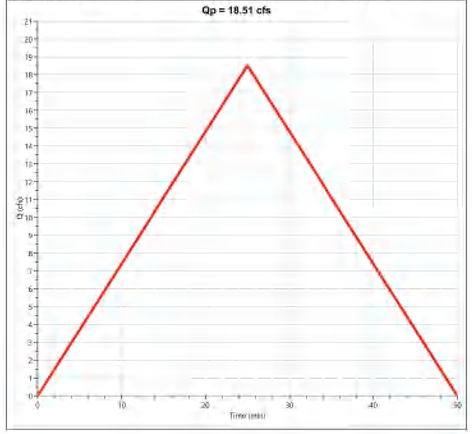
Hydrograph Report

Flat, Chisme-Laydown Area Drainage.fyp
SII 05-2025

Post DA-B **Hyd. No. 2**

Hydrograph Type	= Rational	Peak Flow	= 18.51 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.42 hrs
Time Interval	= 1 min	Runoff Volume	= 27,765 cuft
Drainage Area	= 8.68 ac	Runoff Coeff.	= 0.35
Tc Method	= User	Time of Conc. (Tc)	= 25.0 min
IDF Curve	= Chisme TX IDF.idf	Intensity	= 6.09 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1

Qp = 18.51 cfs



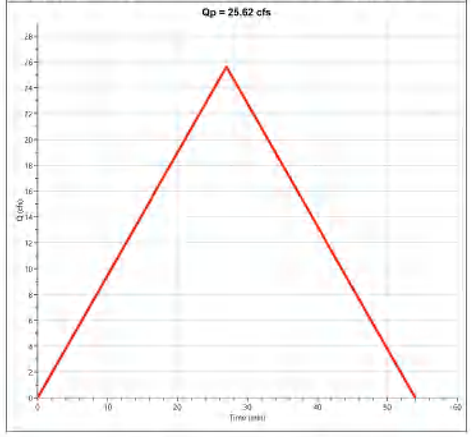
Hydrograph Report

Flat, Chisme-Laydown Area Drainage.fyp
SII 05-2025

Post DA-A **Hyd. No. 1**

Hydrograph Type	= Rational	Peak Flow	= 25.62 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.45 hrs
Time Interval	= 1 min	Runoff Volume	= 41,506 cuft
Drainage Area	= 12.54 ac	Runoff Coeff.	= 0.35
Tc Method	= User	Time of Conc. (Tc)	= 27.0 min
IDF Curve	= Chisme TX IDF.idf	Intensity	= 5.84 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1

Qp = 25.62 cfs



NOTE:
1. FOR ADDITIONAL DRAINAGE CALCULATIONS FOR CULVERT PIPE/STRUCTURE SIZING SEE SHEET C202 "STORM CALCULATIONS."

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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Project:
CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title:
DRAINAGE AREA PLAN

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR #: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CG201

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Project No. 520102301

LANGAN

Date: 9/19/2025 Time: 10:13 User: bsides Style Table: Langan.stb Layout: CG201 Document Code: 520102301.SII01.CG201.0101

Project: Chisme Solar **By:** RMS **Date:** 8/5/2025
Location: **Checked By:** VP **Date Checked:**
Circle One: Present (Developed) **Proposed DA-B**
Circle One: (T_c) T_t **through subarea**
Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1. Surface Description (NEH table 15-1)			Short Grass Prairie		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.15		
3. Flow Length, L (total L < 100 ft)		ft	100		
4. Two-year 24-hr rainfall, P_2		in	3.48		
5. Land Slope, s		ft/ft	0.007		
6. Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.238	+	+
				Sheet Flow Sub-Total	0.238 hours

Shallow Concentrated Flow		Segment ID	2		
7. Surface Description			Grassed Waterways		
8. Flow Length, L		ft	766		
9. Watercourse Slope, s		ft/ft	0.052		
10. Average Velocity, V (NEH table 15-3)		ft/s	3.70		
11. Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.058	+	+
				Shallow Conc. Flow Sub-Total	0.058 hours

Channel Flow		Segment ID	3		
12. Flow Length, L		ft	682		
13. Cross Sectional flow area, a		ft^2	58.37		
14. Wetted Perimeter, P_w		ft	87.82		
15. Hydraulic Radius, r	$r = a / P_w$	ft	0.66		
16. Channel Slope, s		ft/ft	0.005		
17. Manning's Roughness Coeff., n			0.050		
18. Velocity, V	$V = \{1.49\, r^{2/3} s^{1/2}\} / n$	ft/s	1.60		
19. Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.118	+	+
				Channel Flow Sub-Total	0.118 hours

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	0.414 hours
Total Tc (minutes) =	25 minutes

Project: Chisme Solar **By:** RMS **Date:** 8/5/2025
Location: **Checked By:** VP **Date Checked:**
Circle One: Present (Developed) **Proposed DA-A**
Circle One: (T_c) T_t **through subarea**
Include a map, schematic, or description of flow segments.

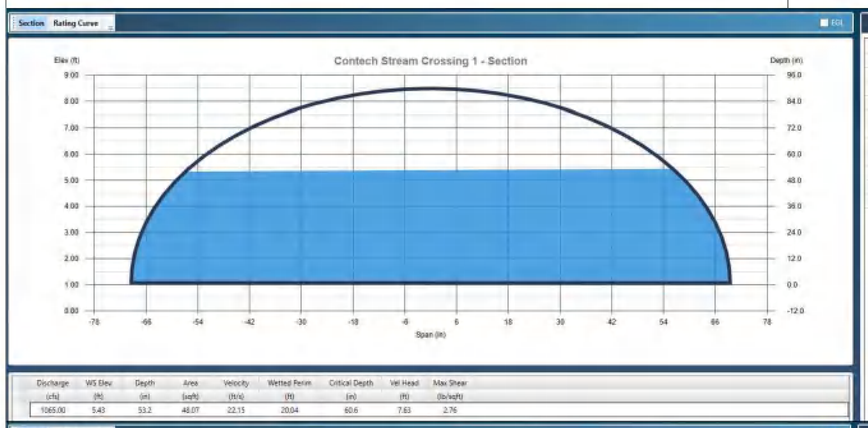
Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1. Surface Description (NEH table 15-1)			Short Grass Prairie		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.15		
3. Flow Length, L (total L < 100 ft)		ft	100		
4. Two-year 24-hr rainfall, P_2		in	3.48		
5. Land Slope, s		ft/ft	0.009		
6. Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.217	+	+
				Sheet Flow Sub-Total	0.217 hours

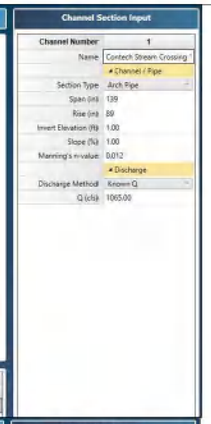
Shallow Concentrated Flow		Segment ID	2		
7. Surface Description			Grassed Waterways		
8. Flow Length, L		ft	761		
9. Watercourse Slope, s		ft/ft	0.052		
10. Average Velocity, V (NEH table 15-3)		ft/s	3.67		
11. Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.058	+	+
				Shallow Conc. Flow Sub-Total	0.058 hours

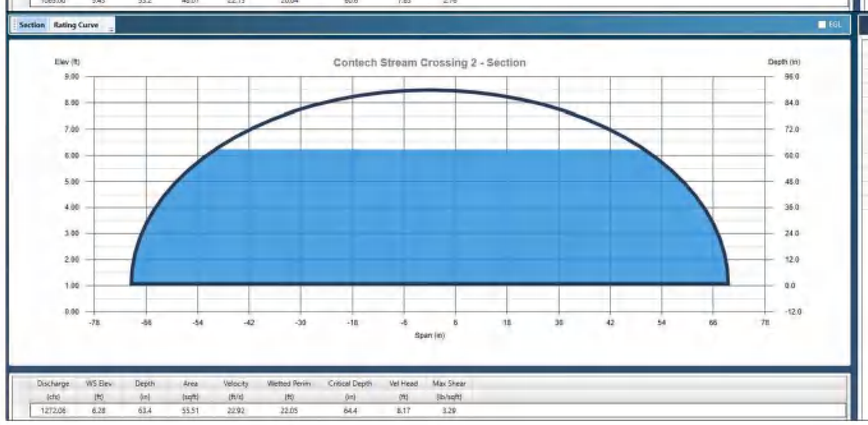
Channel Flow		Segment ID	3		
12. Flow Length, L		ft	1,050		
13. Cross Sectional flow area, a		ft^2	60.00		
14. Wetted Perimeter, P_w		ft	90.00		
15. Hydraulic Radius, r	$r = a / P_w$	ft	0.67		
16. Channel Slope, s		ft/ft	0.005		
17. Manning's Roughness Coeff., n			0.050		
18. Velocity, V	$V = \{1.49\, r^{2/3} s^{1/2}\} / n$	ft/s	1.61		
19. Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.181	+	+
				Channel Flow Sub-Total	0.181 hours

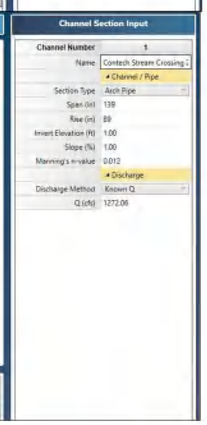
Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	0.456 hours
Total Tc (minutes) =	27 minutes









Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1
Revisions		

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Engineer: SONY DAVID P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: DRAINAGE CALCULATIONS

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CG202

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Date: 9/19/2025 Time: 13:13 User: kestes Style Table: Langan.stb Layout: CG202 Document Code: 520102301-0501-CG202-0102

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CULVERT 1

Q =	183.91 c.f.s.	W_o =	4.00 Ft.
D_o =	4.00 Ft.	q=Q/W_o =	45.98 c.f.s.
TW =	0.80 Ft.		

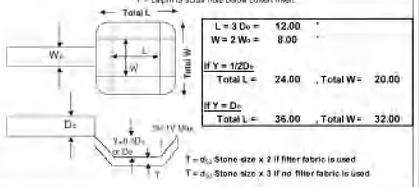
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 2.54 Ft. = 31 " Stone Calculated; 31 " Stone Used for Construction; 2.60 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 1.67 Ft. = 21 " Stone Calculated; 21 " Stone Used for Construction; 4.00 ' = Y



L = 3 D_o =	12.00 '
W = 2 W_o =	8.00 '
If Y = 1/2D_o	
Total L =	24.00 , Total W = 20.00
If Y = D_o	
Total L =	36.00 , Total W = 32.00

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CULVERT 1 Design Summary

Select Scour Hole Design	Total L =	36 '	L = 12 '
	Total W =	32 '	W = 8 '
	Depth of scour hole (Y) =		4 '
Y = Do Use Filter Fabric	d_{50} stone size =		21 "
	Thickness of riprap (T) =		42 "
	Volume of riprap (V) =		149.33 CY

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CULVERT 2

Q =	52.11 c.f.s.	W_o =	3.00 Ft.
D_o =	3.00 Ft.	q=Q/W_o =	17.37 c.f.s.
TW =	0.60 Ft.		

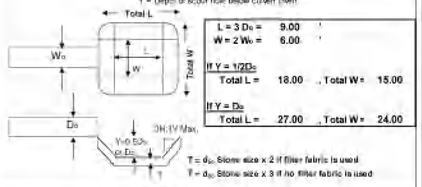
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 0.93 Ft. = 12 " Stone Calculated; 12 " Stone Used for Construction; 1.50 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 0.61 Ft. = 8 " Stone Calculated; 8 " Stone Used for Construction; 3.00 ' = Y



L = 3 D_o =	9.00 '
W = 2 W_o =	6.00 '
If Y = 1/2D_o	
Total L =	18.00 , Total W = 15.00
If Y = D_o	
Total L =	27.00 , Total W = 24.00

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CULVERT 2 Design Summary

Select Scour Hole Design	Total L =	27 '	L = 9 '
	Total W =	24 '	W = 6 '
	Depth of scour hole (Y) =		3 '
Y = Do Use Filter Fabric	d_{50} stone size =		8 "
	Thickness of riprap (T) =		16 "
	Volume of riprap (V) =		32 CY

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CULVERT 3

Q =	25.62 c.f.s.	W_o =	1.50 Ft.
D_o =	1.50 Ft.	q=Q/W_o =	17.08 c.f.s.
TW =	0.30 Ft.		

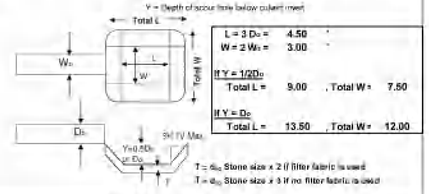
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 1.82 Ft. = 22 " Stone Calculated; 22 " Stone Used for Construction; 0.75 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 1.19 Ft. = 15 " Stone Calculated; 15 " Stone Used for Construction; 1.50 ' = Y



L = 3 D_o =	4.50 '
W = 2 W_o =	3.00 '
If Y = 1/2D_o	
Total L =	9.00 , Total W = 7.50
If Y = D_o	
Total L =	13.50 , Total W = 12.00

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CULVERT 3 Design Summary

Select Scour Hole Design	Total L =	13.5 '	L = 4.5 '
	Total W =	12 '	W = 3 '
	Depth of scour hole (Y) =		1.5 '
Y = Do Use Filter Fabric	d_{50} stone size =		18 "
	Thickness of riprap (T) =		30 "
	Volume of riprap (V) =		15 CY

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CULVERT 4

Q =	16.51 c.f.s.	W_o =	1.50 Ft.
D_o =	1.50 Ft.	q=Q/W_o =	12.34 c.f.s.
TW =	0.30 Ft.		

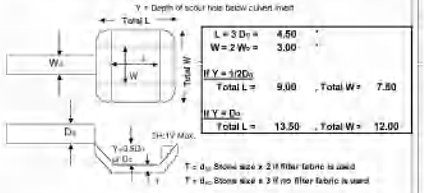
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 1.18 Ft. = 15 " Stone Calculated; 15 " Stone Used for Construction; 0.75 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 0.77 Ft. = 10 " Stone Calculated; 10 " Stone Used for Construction; 1.50 ' = Y



L = 3 D_o =	4.50 '
W = 2 W_o =	3.00 '
If Y = 1/2D_o	
Total L =	9.00 , Total W = 7.50
If Y = D_o	
Total L =	13.50 , Total W = 12.00

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CULVERT 4 Design Summary

Select Scour Hole Design	Total L =	13.5 '	L = 4.5 '
	Total W =	12 '	W = 3 '
	Depth of scour hole (Y) =		1.5 '
Y = Do Use Filter Fabric	d_{50} stone size =		10 "
	Thickness of riprap (T) =		20 "
	Volume of riprap (V) =		10 CY

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CULVERT 5

Q =	16.51 c.f.s.	W_o =	1.50 Ft.
D_o =	1.50 Ft.	q=Q/W_o =	12.34 c.f.s.
TW =	0.30 Ft.		

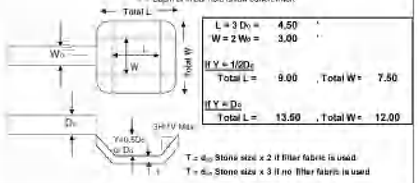
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 1.18 Ft. = 15 " Stone Calculated; 15 " Stone Used for Construction; 0.75 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 0.77 Ft. = 10 " Stone Calculated; 10 " Stone Used for Construction; 1.50 ' = Y



L = 3 D_o =	4.50 '
W = 2 W_o =	3.00 '
If Y = 1/2D_o	
Total L =	9.00 , Total W = 7.50
If Y = D_o	
Total L =	13.50 , Total W = 12.00

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CULVERT 5 Design Summary

Select Scour Hole Design	Total L =	13.5 '	L = 4.5 '
	Total W =	12 '	W = 3 '
	Depth of scour hole (Y) =		1.5 '
Y = Do Use Filter Fabric	d_{50} stone size =		10 "
	Thickness of riprap (T) =		20 "
	Volume of riprap (V) =		10 CY

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CONTECH CROSSING 1

Q =	1065.00 c.f.s.	W_o =	11.58 Ft.
D_o =	7.50 Ft.	q=Q/W_o =	91.95 c.f.s.
TW =	1.50 Ft.		

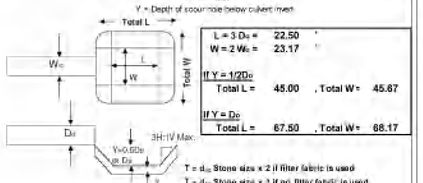
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 3.41 Ft. = 41 " Stone Calculated; 41 " Stone Used for Construction; 3.75 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 2.23 Ft. = 27 " Stone Calculated; 27 " Stone Used for Construction; 7.50 ' = Y



L = 3 D_o =	22.50 '
W = 2 W_o =	23.17 '
If Y = 1/2D_o	
Total L =	45.00 , Total W = 45.67
If Y = D_o	
Total L =	67.50 , Total W = 68.17

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CONTECH CROSSING 1 Design Summary

Select Scour Hole Design	Total L =	67.5 '	L = 22.5 '
	Total W =	68.166 '	W = 23.166 '
	Depth of scour hole (Y) =		7.5 '
Y = Do Use Filter Fabric	d_{50} stone size =		27 "
	Thickness of riprap (T) =		54 "
	Volume of riprap (V) =		766.67 CY

SCOUR HOLE CALCULATIONS

Job # 520102301
Job Name: Chisme Solar & Storage
Designed by: RMS
Checked by: VP/RH

Structure: CONTECH CROSSING 2

Q =	1272.00 c.f.s.	W_o =	11.58 Ft.
D_o =	7.50 Ft.	q=Q/W_o =	109.82 c.f.s.
TW =	1.50 Ft.		

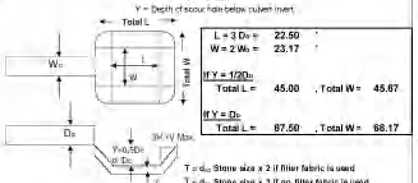
(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — When Y = 1/2 D_o

$d_{50} = 0.0125 * q^{1.33} / TW$ = 4.31 Ft. = 52 " Stone Calculated; 52 " Stone Used for Construction; 3.75 ' = Y

d_{50} Stone size formula — When Y = D_o

$d_{50} = 0.0082 * q^{1.33} / TW$ = 2.83 Ft. = 34 " Stone Calculated; 34 " Stone Used for Construction; 7.50 ' = Y



L = 3 D_o =	22.50 '
W = 2 W_o =	23.17 '
If Y = 1/2D_o	
Total L =	45.00 , Total W = 45.67
If Y = D_o	
Total L =	67.50 , Total W = 68.17

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if no filter fabric is used

Structure CONTECH CROSSING 2 Design Summary

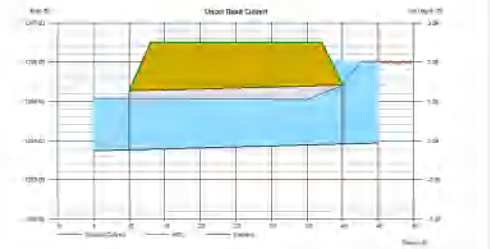
Select Scour Hole Design	Total L =	67.5 '	L = 22.5 '
	Total W =	68.166 '	W = 23.166 '
	Depth of scour hole (Y) =		7.5 '
Y = Do Use Filter Fabric	d_{50} stone size =		34 "
	Thickness of riprap (T) =		68 "
	Volume of riprap (V) =		965.69 CY

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Tuesday, Aug 5 2025

Oncor Road Culvert

Invert Elev Dn (ft)	= 1283.76	**Calculations**	
Pipe Length (ft)	= 30.00	Qmin (cfs)	= 25.62
Slope (%)	= 0.50	Qmax (cfs)	= 25.62
Invert Elev Up (ft)	= 1283.91	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 18.0	Qtotal (cfs)	= 25.62
No. Barrels	= 3	Qpipe (cfs)	= 25.62
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Corrugate Metal Pipe	Veloc Dn (ft/s)	= 5.20
Culvert Entrance	= Projecting	Veloc Up (ft/s)	= 5.98
Coeff. K,M,c,Y,k	= 0.034, 1.5, 0.0553, 0.54, 0.9	HGL Dn (ft)	= 1285.06
		HGL Up (ft)	= 1285.04
Embankment		Hw Elev (ft)	= 1286.01
Top Elevation (ft)	= 1286.50	Hw/D (ft)	= 1.40
Top Width (ft)	= 24.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 30.00		

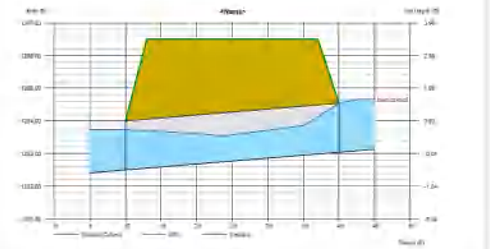


Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Tuesday, Aug 5 2025

Circular Culvert

Invert Elev Dn (ft)	= 1282.50	**Calculations**	
Pipe Length (ft)	= 30.00	Qmin (cfs)	= 16.51
Slope (%)	= 1.60	Qmax (cfs)	= 16.51
Invert Elev Up (ft)	= 1283.04	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 18.0	Qtotal (cfs)	= 16.51
No. Barrels	= 3	Qpipe (cfs)	= 16.51
n-Value	= 0.013	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Corrugate Metal Pipe	Veloc Dn (ft/s)	= 3.98
Culvert Entrance	= Projecting	Veloc Up (ft/s)	= 5.17
Coeff. K,M,c,Y,k	= 0.034, 1.5, 0.0553, 0.54, 0.9	HGL Dn (ft)	= 1283.73
		HGL Up (ft)	= 1284.00
Embankment		Hw Elev (ft)	= 1284.65
Top Elevation (ft)	= 1286.50	Hw/D (ft)	= 1.07
Top Width (ft)	= 24.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 30.00		

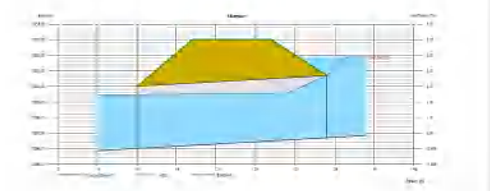


Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Monday, Aug 11 2025

Circular Culvert

Invert Elev Dn (ft)	= 1296.00	**Calculations**	
Pipe Length (ft)	= 24.00	Qmin (cfs)	= 183.91
Slope (%)	= 2.87	Qmax (cfs)	= 183.91
Invert Elev Up (ft)	= 1296.69	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 48.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 48.0	Qtotal (cfs)	= 183.91
No. Barrels	= 2	Qpipe (cfs)	= 183.91
n-Value	= 0.012	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Corrugate Metal Pipe	Veloc Dn (ft/s)	= 7.97
Culvert Entrance	= Projecting	Veloc Up (ft/s)	= 9.41
Coeff. K,M,c,Y,k	= 0.034, 1.5, 0.0553, 0.54, 0.9	HGL Dn (ft)	= 1299.45
		HGL Up (ft)	= 1299.80
Embankment		Hw Elev (ft)	= 1301.87
Top Elevation (ft)	= 1303.00	Hw/D (ft)	= 1.29
Top Width (ft)	= 10.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 24.00		

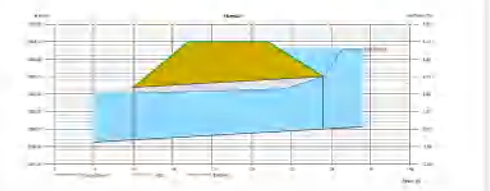


Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Monday, Aug 11 2025

Circular Culvert

Invert Elev Dn (ft)	= 1298.38	**Calculations**	
Pipe Length (ft)	= 24.00	Qmin (cfs)	= 52.11
Slope (%)	= 2.58	Qmax (cfs)	= 52.11
Invert Elev Up (ft)	= 1299.00	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 36.0		
Shape	= Circular	**Highlighted**	
Span (in)	= 36.0	Qtotal (cfs)	= 52.11
No. Barrels	= 1	Qpipe (cfs)	= 52.11
n-Value	= 0.012	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Corrugate Metal Pipe	Veloc Dn (ft/s)	= 7.94
Culvert Entrance	= Projecting	Veloc Up (ft/s)	= 8.78
Coeff. K,M,c,Y,k	= 0.034, 1.5, 0.0553, 0.54, 0.9	HGL Dn (ft)	= 1301.05
		HGL Up (ft)	= 1301.35
Embankment		Hw Elev (ft)	= 1303.59
Top Elevation (ft)	= 1304.00	Hw/D (ft)	= 1.53
Top Width (ft)	= 10.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 24.00		



09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1
Date	Description	No.
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVIS
P.E. No.: 142438
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: DRAINAGE CALCULATIONS

Langan Project No.: 520102301
PRCE Project No.: TXPS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CG203

Project No. 520102301

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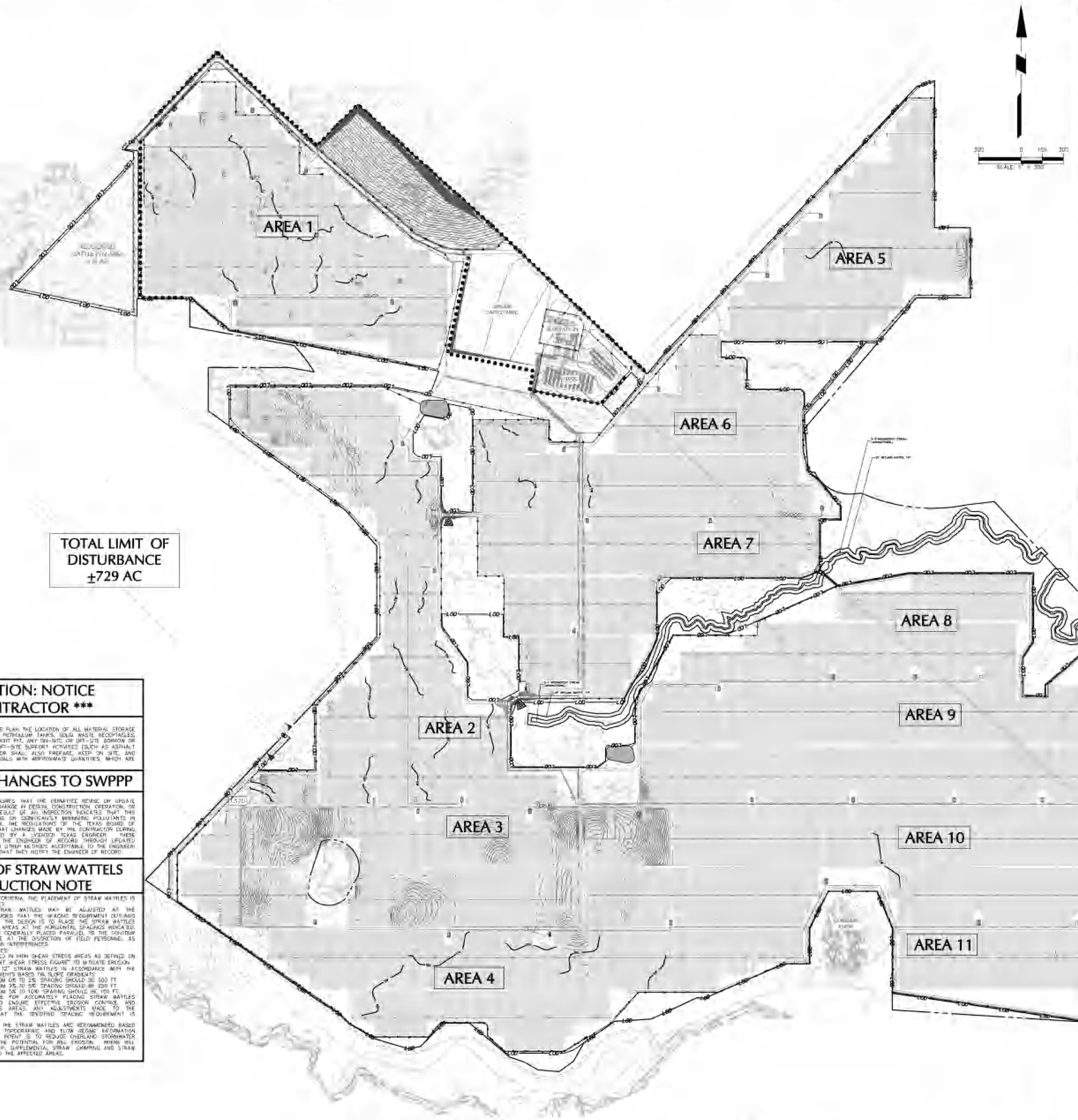


EROSION CONTROL NOTES

1. CONTRACTOR MUST COMPLETE A CONSTRUCTION SITE NOTICE, OBTAIN SIGNED COPIES OF NOI FORM FOR BOTH OWNER AND CONTRACTOR (IF APPLICABLE TO THIS SITE), AND POST THEM AT THE CONSTRUCTION SITE, IN ACCORDANCE WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES (TXR150000). THE GENERAL CONTRACTOR, (AND ALL SUBCONTRACTORS INVOLVED WITH ANY CONSTRUCTION ACTIVITY RELATED TO EARTHWORK, EROSION CONTROL, ETC., OR WHICH UTILIZE POSSIBLE POLLUTANTS AS DEFINED IN THE TPDES GENERAL PERMIT) MUST BE FAMILIAR WITH THE CONTENTS OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS WELL AS ALL THE REQUIREMENTS SET FORTH IN THE TPDES GENERAL PERMIT AND ANY APPLICABLE LOCAL PERMIT REQUIREMENTS AND SHALL COMPLY WITH ALL SUCH REQUIREMENTS DURING ALL CONSTRUCTION ACTIVITIES.
2. THE CONTRACTOR SHALL ADHERE TO THE SEQUENCE OF OPERATIONS FOR EROSION CONTROL IMPLEMENTATION SHOWN HEREON. ANY DEVIATION FROM THIS SEQUENCE DEEMED NECESSARY BY THE CONTRACTOR MAY REQUIRE THAT THE STORMWATER POLLUTION PREVENTION PLAN BE MODIFIED IN ACCORDANCE WITH THE NPDES GENERAL PERMIT GUIDELINES AND SECTION 1.01 F OF THE STORM WATER POLLUTION PREVENTION PLAN.
3. THE CONTRACTOR SHALL MODIFY THIS PLAN TO SHOW LOCATIONS OF TEMPORARY WASHDOWN AREAS, PORTABLE TOILETS, EQUIPMENT MAINTENANCE/REPAIR AREAS, STOCKPILE AREAS, FUEL STORAGE AREAS, CONCRETE WASH-OUT PITS, AND POLLUTANT CONTROLS FOR EACH, AS SOON AS POSSIBLE. THE GENERAL PERMIT AUTHORIZES THE LAND DISPOSAL OF WASH OUT WATER FROM CONCRETE TRUCKS THAT ARE ASSOCIATED WITH OFF-SITE PRODUCTION FACILITIES, AS LONG AS THE DISCHARGE IS INTO SPECIFICALLY DESIGNATED DIKED AREAS WHICH HAVE BEEN PREPARED TO PREVENT CONTACT BETWEEN THE CONCRETE AND/OR WASH OUT WATER AND STORMWATER WHICH WILL BE DISCHARGED FROM THE SITE. TO PREVENT DIRECT DISCHARGE TO SURFACE WATERS (SEE CONCRETE WASHOUT DETAIL SHOWN IN PLANS). DIRECT DISCHARGE OF CONCRETE TRUCK WASH OUT WATER TO SURFACE WATERS IN THE STATE, INCLUDING DISCHARGE TO STORM SEWERS, IS PROHIBITED BY THE GENERAL PERMIT. IF A CONCRETE PLANT IS LOCATED AT CONSTRUCTION SITE, CONTRACTOR SHALL OBTAIN COVERAGE UNDER AND COMPLY WITH GENERAL PERMIT TXG110000 OR INDIVIDUAL PERMIT.
4. THE GENERAL CONTRACTOR SHALL PERFORM ALL REQUIRED INSPECTIONS OF STORMWATER CONTROLS AND PRACTICES AT FREQUENCIES GIVEN IN THE NPDES GENERAL PERMIT, AND SHALL COMPLETE AND SIGN APPROPRIATE INSPECTION FORMS (AS PROVIDED IN THE SWPPP).
5. OIL AND GREASE ABSORBING MATERIALS SHALL BE READILY AVAILABLE ON-SITE AND SHALL BE PROMPTLY USED TO CONTAIN AND/OR CLEAN UP ALL FUEL OR CHEMICAL SPILLS OR LEAKS.
6. DUST CONTROL SHALL BE ACCOMPLISHED BY WATERING DRY, EXPOSED AREAS ON A REGULAR BASIS. SPRAYING OF PETROLEUM BASED OR TOXIC LIQUIDS FOR THIS PURPOSE IS PROHIBITED.
7. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR AT LEAST FOURTEEN DAYS SHALL BE TEMPORARILY STABILIZED WITH VEGETATION AND MULCH.
8. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED SHALL BE PERMANENTLY SEEDED WITHIN FOURTEEN DAYS PER SEEDING OR LANDSCAPING SPECIFICATIONS.
9. ALL VEHICLES SHALL BE CLEANED AT THE CONSTRUCTION EXIT POINTS ACCORDING TO NOTES SHOWN ON THE DETAIL SHEET(S). IF THE MAJORITY OF MUD OR DIRT IS NOT REMOVED FROM EXITING TRAFFIC, HOSE BIBS SHALL BE PROVIDED AT CONSTRUCTION TRAFFIC EXIT POINTS, AND VEHICLE TIRES SHALL BE WASHED BEFORE EXITING ONTO PUBLIC ROADS. SILT FROM THIS WASHING OPERATION SHALL BE INTERCEPTED AND TRAPPED BEFORE WASHWATER IS ALLOWED TO BE DISCHARGED OFF-SITE.
10. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED ONTO ADJACENT ROADWAYS BY VEHICLES EXITING THE SITE SHALL BE CLEANED OR REMOVED IMMEDIATELY.
11. CONTRACTOR SHALL PREVENT ANY SILTATION FROM ENTERING THE STORM SEWER SYSTEM. ALL INLETS AND INLET OPENINGS SHALL BE FULLY ENCIRCLED WITH APPROPRIATE INLET PROTECTION DEVICES.
12. THE CONTRACTOR SHALL REMOVE ALL ACCUMULATED SILT IN ANY TEMPORARY OR PERMANENT DETENTION PONDS, STORM SEWER INLETS AND PIPES, AND ALONG SILT FENCES, WITHIN 48 HOURS AFTER INSPECTION OF DEVICES REVEALS THE PRESENCE OF EXCESSIVE SILTATION (AS SPECIFIED IN SECTION 3.02 OF THE SWPPP).
13. SILT FENCES SHALL BE PLACED AROUND ANY STOCKPILES USED ON THIS SITE.
14. THE CONTRACTOR IS ADVISED TO CONSTRUCT TEMPORARY OR PERMANENT FENCING AROUND DETENTION PONDS AND SEDIMENT BASINS AT THE EARLIEST POSSIBLE TIME TO PREVENT ACCIDENTAL ACCESS BY PERSONS OR ANIMALS.
15. ANY ADDITIONAL EROSION CONTROL MEASURES REQUIRED TO ENSURE COMPLIANCE WITH THE TPDES GENERAL PERMIT OR LOCAL PERMIT REQUIREMENTS SHALL BE IMPLEMENTED BY THE CONTRACTOR, AT NO ADDITIONAL EXPENSE TO THE OWNER.
16. ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED AND PROPERLY DISPOSED OF OFF-SITE WITHIN THIRTY DAYS AFTER STABILIZATION OF ALL SURFACES.
17. THE CONTRACTOR SHALL ASSUME LIABILITY FOR DAMAGE TO ADJACENT PROPERTIES AND/OR PUBLIC RIGHT-OF-WAY RESULTING FROM FAILURE TO FULLY IMPLEMENT AND EXECUTE ALL EROSION CONTROL PROCEDURES SHOWN AND NOTED IN THESE PLANS.
18. WHENEVER DIRT, ROCK, OR OTHER MATERIALS ARE IMPORTED OR EXPORTED ON THE PRIMARY CONSTRUCTION SITE, CONTRACTOR SHALL ASSURE RESPONSIBILITY FOR COMPLIANCE WITH ALL TCEQ STORMWATER REQUIREMENTS FOR THE REMOTE SITE. CONTRACTOR SHALL FURNISH THE ENGINEER AND THE OWNER'S CONSTRUCTION MANAGER WITH DOCUMENTATION OF COVERAGE FOR THE BORROW OR FILL SITE UNDER A NPDES PERMIT FOR STORMWATER DISCHARGES AND OF A WRITTEN AGREEMENT WITH THE LANDOWNER OF THE REMOTE SITE INDICATING EROSION CONTROL MEASURES HAVE BEEN IMPLEMENTED THEREON. AT A MINIMUM, EROSION CONTROL MEASURES MUST CONSIST OF PERIMETER CONTROLS (SILT FENCES) ON ALL DOWN SLOPES AND SIDE SLOPE BOUNDARIES OF ANY DISTURBED AREA, PLUS PROVISIONS FOR RE-VEGETATION AFTER THE FILL MATERIALS ARE IN PLACE.
19. ALL SLOPES ON SITE WHICH ARE 3:1 OR STEEPER SHALL BE STABILIZED BY TRACK WALKING (TRAVERSING UP AND DOWN THE SLOPE WITH A TRACKED VEHICLE) FOLLOWED BY INSTALLATION OF EROSION CONTROL BLANKET INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. EROSION CONTROL BLANKET SHALL BE NORTH AMERICAN GREEN S150 OR APPROVED EQUAL.
20. DISCHARGES FROM THE DRAINING OF ACCUMULATED STORMWATER OR GROUNDWATER FROM BUILDING FOUNDATIONS, VAULTS, TRENCHES AND OTHER SIMILAR POINTS OF ACCUMULATION MUST BE MANAGED BY APPROPRIATE CONTROLS TO MINIMIZE EROSION AND SEDIMENT TRANSPORT AND MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ANY DEWATERING ACTIVITIES. THESE CONTROLS MUST BE INSPECTED DAILY WHEN A DISCHARGE IS OCCURRING, INCLUDING COMPLETION OF THE APPROPRIATE INSPECTION FORM PROVIDED IN THE SWPPP MANUAL PREPARED FOR THE JOB SITE. FURTHER INFORMATION REGARDING THE REQUIRED INSPECTIONS IS GIVEN IN SECTION 3.02.5 OF THE SWPPP MANUAL PREPARED FOR THE JOB SITE.

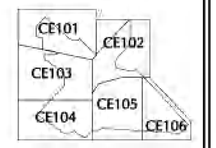
EROSION CONTROL SEQUENCES

1. INSTALL SILT FENCES AND/OR STRAW ROLL MATTRESS AROUND PERIMETER OF PROPERTY AND DISTURBED AREAS AS SHOWN.
2. CONSTRUCT TEMPORARY CONSTRUCTION ENTRANCE/EXIT.
3. COMMENCE GRUBBING AND REMOVAL OF VEGETATION IN AREA TO RECEIVE CUT OR FILL.
4. INSTALL ROCK CHECK DAMS.
5. COMPLETE SEEDING TO ACCOMPLISH STABILIZATION.
6. REMOVE TEMPORARY CONSTRUCTION EXIT, SILT FENCES AND/OR STRAW ROLL MATTRESS.

EROSION CONTROL MAINTENANCE NOTES

1. ALL MEASURES STATED ON THIS EROSION AND SEDIMENT CONTROL PLAN, AND IN THE STORM WATER POLLUTION PREVENTION PLAN, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON ON A SCHEDULE WHICH COMPLIES WITH THE GENERAL PERMIT REQUIREMENTS AND CLEANED AND REPAIRED WITHIN 48 HOURS OF THE INSPECTION IN ACCORDANCE WITH THE FOLLOWING:
   - 1.A. SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SILT FENCE.
   - 1.B THE TEMPORARY PARKING AND STORAGE AREA (IF PRESENT) SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AS CONDITIONS DEMAND.
   - 1.C MAINTENANCE PROCEDURES FOR THE EROSION AND SEDIMENTATION CONTROL SYSTEMS SPECIFIED ARE GIVEN IN SECTION 5 OF THE STORM WATER POLLUTION PREVENTION PLAN.

KEY MAP



LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK (DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

*** CAUTION: NOTICE TO CONTRACTOR ***

THE CONTRACTOR SHALL NOTE ON SITE PLAN THE LOCATION OF ALL MATERIAL STORAGE AREAS, EQUIPMENT STORAGE AREAS, PETROLEUM TANKS, SOLID WASTE RECEPTACLES, SANITARY FACILITIES, CONCRETE WASHOUT PIT, ANY ON-SITE OR OFF-SITE BORROW OR STOCKPILE AREA. ANY ON-SITE OR OFF-SITE SUPPORT ACTIVITIES (SUCH AS ASPHALT OR CONCRETE PLANTS). CONTRACTOR SHALL ALSO PREPARE, KEEP ON SITE, AND MAINTAIN CURRENT A LIST OF MATERIALS WITH APPROXIMATE QUANTITIES, WHICH ARE STORED ON SITE.

NOTES FOR CHANGES TO SWPPP

THE TXR150000 GENERAL PERMIT REQUIRES THAT THE PERMITTEE REVISE OR UPDATE THIS SWPPP WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE, OR WHENEVER THE RESULT OF AN INSPECTION INDICATES THAT THIS SWPPP IS INEFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING POLLUTANTS IN STORMWATER DISCHARGES. HOWEVER, THE REGULATIONS OF THE TEXAS BOARD OF PROFESSIONAL ENGINEERS REQUIRE THAT CHANGES MADE BY THE CONTRACTOR DURING CONSTRUCTION MUST BE AUTHORIZED BY A LICENSED TEXAS ENGINEER. THESE CHANGES MAY BE AUTHORIZED BY THE ENGINEER OF RECORD THROUGH UPDATED DRAWINGS, WORK ORDER CHANGES, OR OTHER METHODS ACCEPTABLE TO THE ENGINEER OR BY ANOTHER ENGINEER PROVIDED THAT THEY NOTIFY THE ENGINEER OF RECORD.

PLACEMENT OF STRAW WATTELS CONSTRUCTION NOTE

IN ACCORDANCE WITH THE SPECIFIED CRITERIA, THE PLACEMENT OF STRAW WATTLES IS SUBJECT TO THE FOLLOWING GUIDELINES:

1. THE PLACEMENT OF THE STRAW WATTLES MAY BE ADJUSTED AT THE CONTRACTOR'S DISCRETION, PROVIDED THAT THE SPACING REQUIREMENT OUTLINED BELOW IS MET. THE INTENT OF THE DESIGN IS TO PLACE THE STRAW WATTLES WITHIN HIGH EROSION POTENTIAL AREAS AT THE HORIZONTAL SPACINGS INDICATED. THE STRAW WATTLES SHOULD BE GENERALLY PLACED PARALLEL TO THE CONTOUR LINES BUT, PLACEMENT MAY BE AT THE DISCRETION OF FIELD PERSONNEL AS REQUIRED TO AVOID CONSTRUCTION INTERFERENCES.
2. PLACEMENT OF 12" STRAW WATTLES:
   - 2.1. STRAW WATTLES ARE REQUIRED IN HIGH SHEAR STRESS AREAS AS DEFINED ON LANGAN'S "POST-DEVELOPMENT SHEAR STRESS FIGURE" TO MITIGATE EROSION.
   - 2.2. VERIFY THE PLACEMENT OF 12" STRAW WATTLES IN ACCORDANCE WITH THE FOLLOWING SPACING REQUIREMENTS BASED ON SLOPE GRADIENTS:
     - 2.2.1. FOR SLOPES RANGING FROM 0% TO 2% SPACING SHOULD BE 500 FT.
     - 2.2.2. FOR SLOPES RANGING FROM 2% TO 5% SPACING SHOULD BE 250 FT.
     - 2.2.3. FOR SLOPES RANGING FROM 5% TO 10% SPACING SHOULD BE 150 FT.
3. CONTRACTORS ARE RESPONSIBLE FOR ACCURATELY PLACING STRAW WATTLES WITHIN THESE PARAMETERS TO ENSURE EFFECTIVE EROSION CONTROL AND STABILIZATION OF HIGH-STRESS AREAS. ANY ADJUSTMENTS MADE TO THE PLACEMENT MUST ENSURE THAT THE SPECIFIED SPACING REQUIREMENT IS MAINTAINED.
4. PLACEMENTS AND SPACINGS OF THE STRAW WATTLES ARE RECOMMENDED BASED ON THE BEST AVAILABLE SITE TOPOGRAPHIC AND FLOW REGIME INFORMATION AVAILABLE AT THE TIME. THE INTENT IS TO REDUCE OVERLAND STORMWATER FLOW VELOCITIES TO MITIGATE THE POTENTIAL FOR RILL EROSION. WHERE RILL EROSION EXCEEDS 2-INCHES DEEP, SUPPLEMENTAL STRAW CRIMPING AND STRAW WATTLING SHOULD BE APPLIED TO THE AFFECTED AREAS.

09/19/2025	ADD CO SET	2
04/11/2025	30% DD SET	1
Date	Description	No.
Revisions		

INTERIM REVIEW ONLY

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: OVERALL SOIL EROSION & SEDIMENT CONTROL PLAN

Langan Project No.	520102301
NPDES Project No.	TXR-TX-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VPSD

Drawing No.: CE100

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Project No. 520102301
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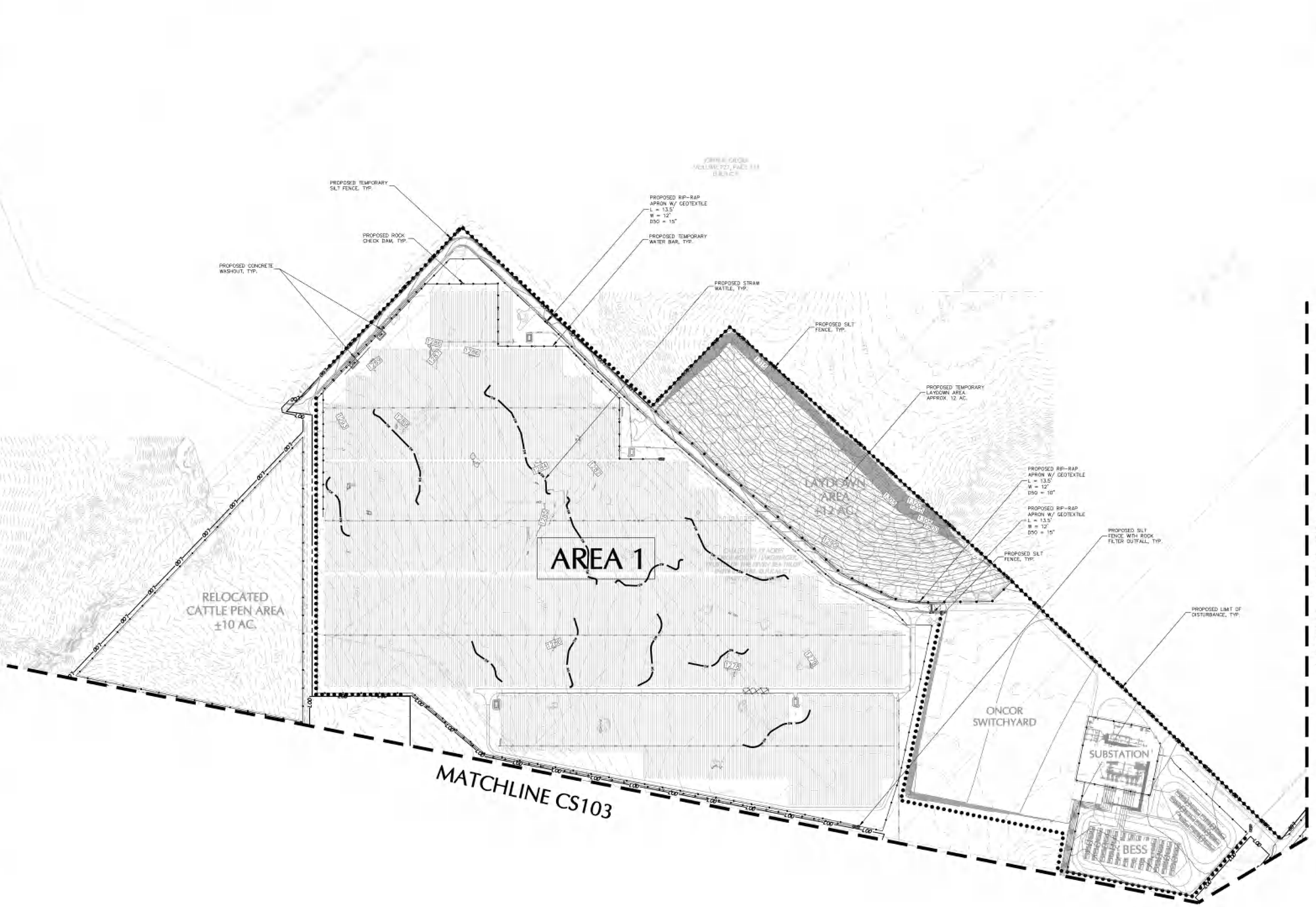
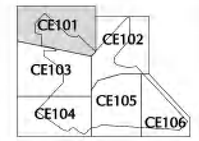


KEY MAP



150 0 50 100 150
SCALE: 1" = 150'

LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

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Date: 9/19/2025
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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN I

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR:	24INR0333/24INR0331
Date	09/18/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CE101

Project No. 520102301

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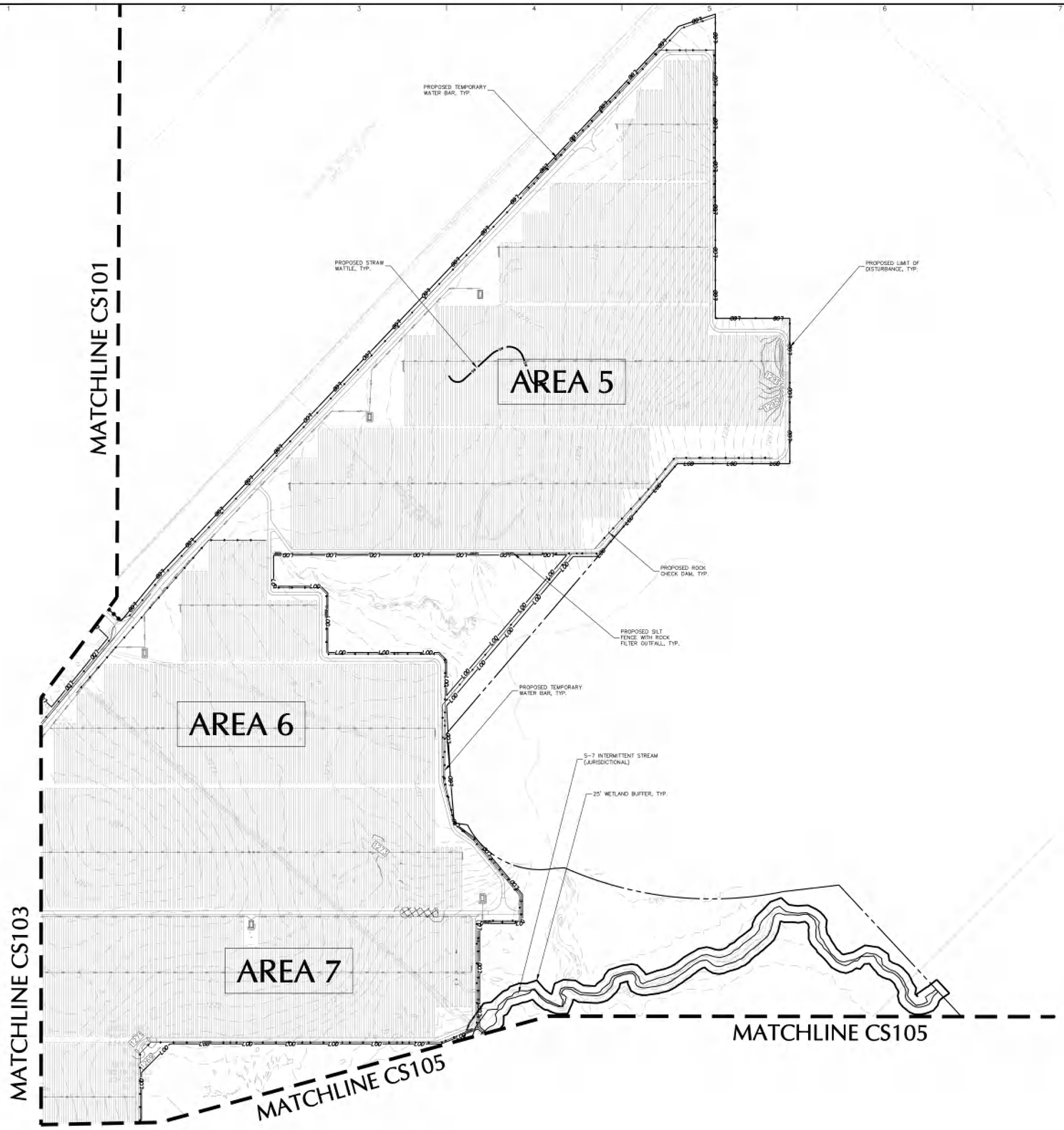

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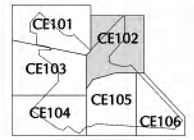

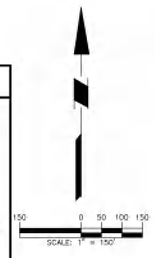

LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL; NOT INTENDED FOR CONSTRUCTION OR PERMIT
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Date:9/19/2025
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Project
CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title
ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN II

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	09/18/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.
CE102

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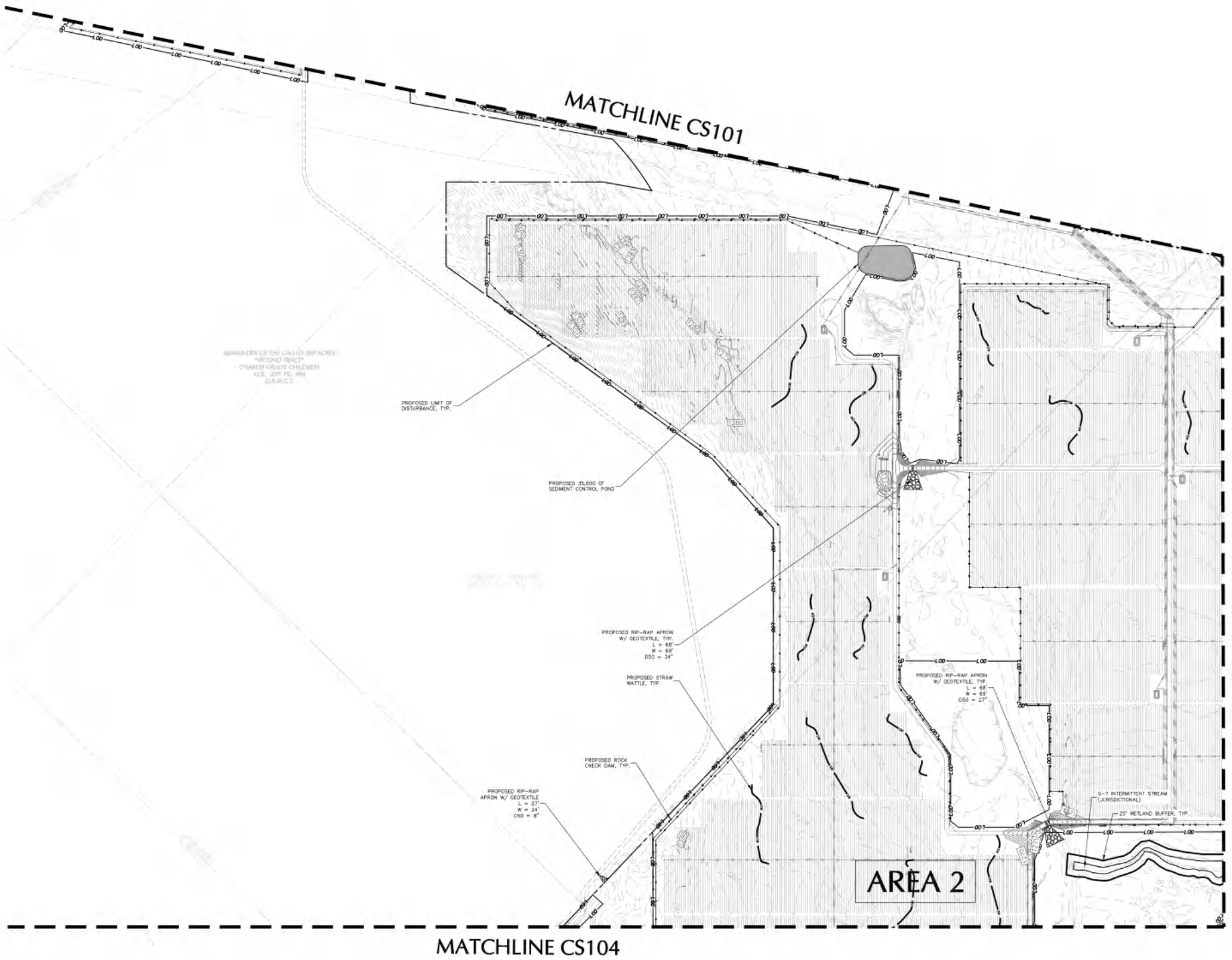
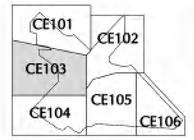
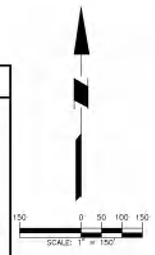
Project No. 520102301

Date: 9/19/2025 Time: 13:40 User: kostes Style Table: Langan.stb Layout: CE102 Document Code: 520102301-SS01-CE101-0101



KEY MAP





LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL; NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

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TBPE FIRM REG. #F-13709

Project
CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title
ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN III

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	09/18/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.
CE103

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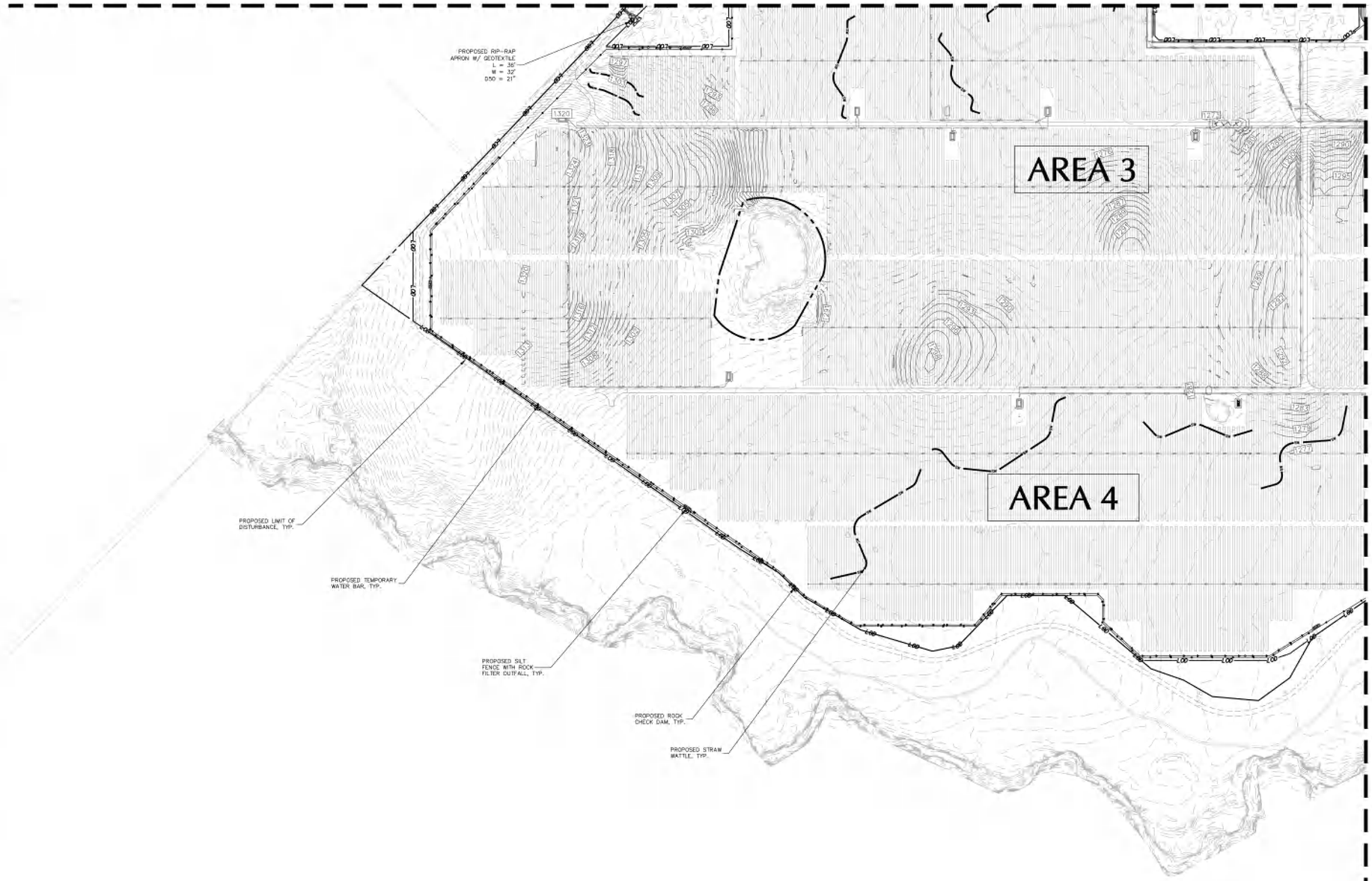
Project No. 520102301

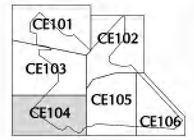
Date: 9/19/2025 Time: 13:41 User: kostes Style Table: Langan.stb Layout: CE103 Document Code: 520102301-SS01-CE101-0101

MATCHLINE CS103



MATCHLINE CS105

KEY MAP



SCALE: 1" = 150'

LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

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P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
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Project
CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title
ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN IV

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR.	24INR0333/24INR0331
Date	09/18/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.
CE104

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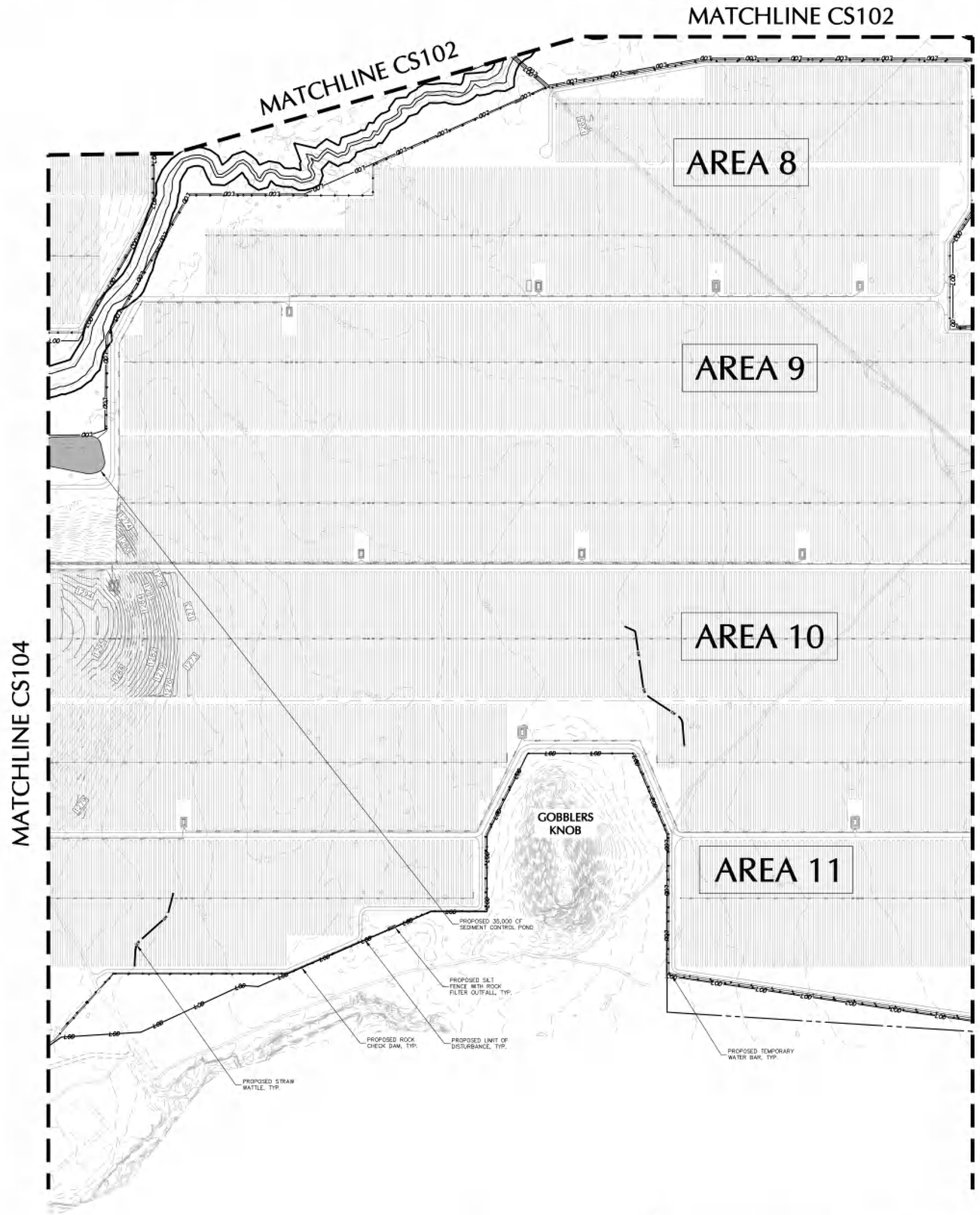
Project No. 520102301

Date: 9/19/2025 Time: 13:43 User: kostes Style Table: Langan.stb Layout: CE104 Document Code: 520102301-SS01-CE101-0101



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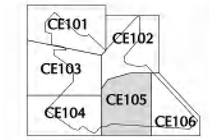

LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

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P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN V

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	09/18/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CE105

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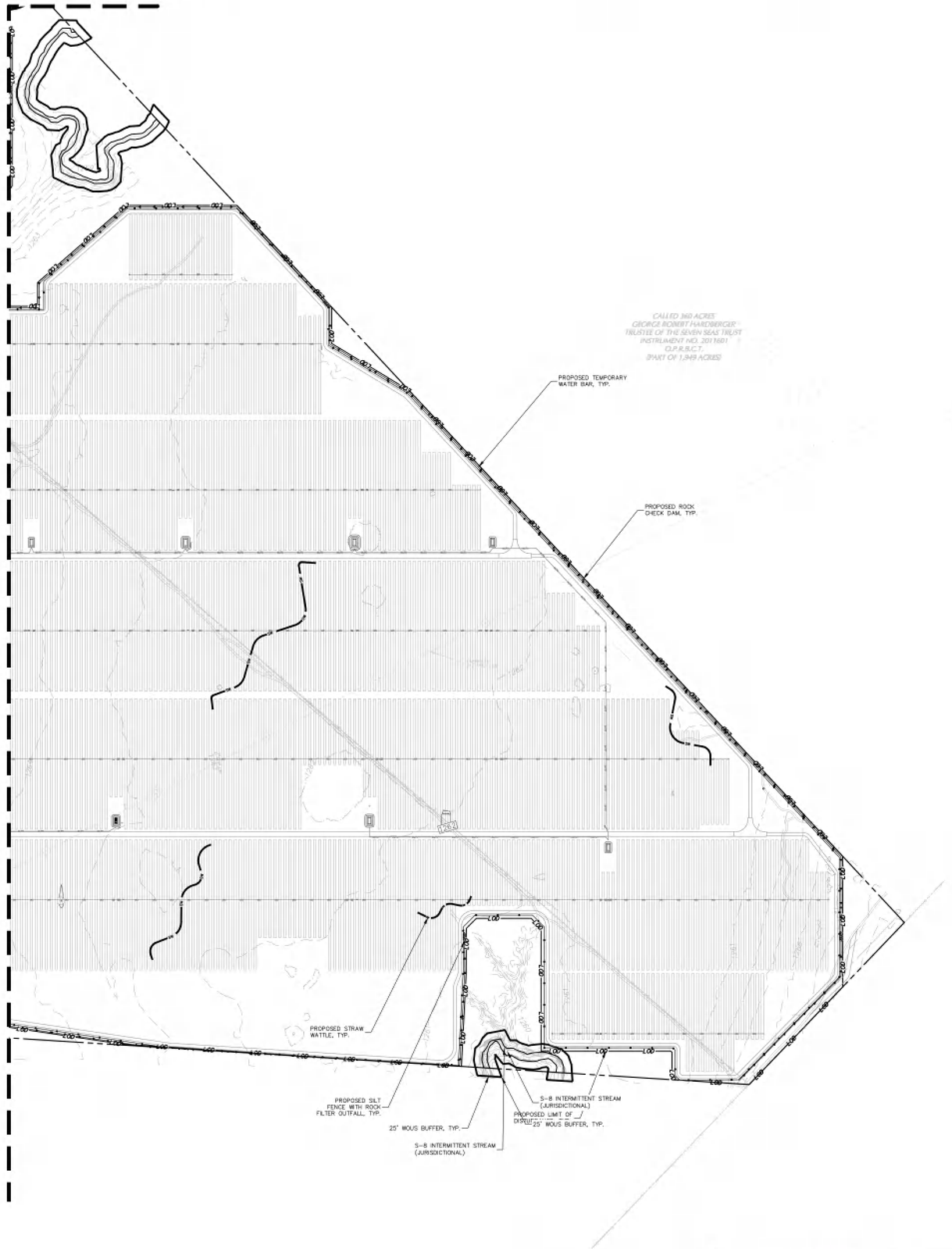
Project No. 520102301

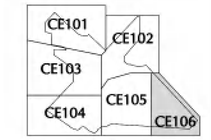
Date: 9/19/2025 Time: 13:44 User: kosles Style Table: Langan.stb Layout: CE105 Document Code: 520102301-SS01-CE101-0101

MATCHLINE CS102

MATCHLINE CS105



KEY MAP



150 0 50 100 150
SCALE: 1" = 150'

LEGEND

SILT FENCE	
LOW WATER CROSSING	
STRAW WATTLE	
ROCK CHECK DAM	
SILT FENCE WITH ROCK FILTER OUTFALL	
RIP-RAP APRON W/ GEOTEXTILE	

No.	Description	Date
2	60% DD SET	09/19/2025
1	30% DD SET	04/11/2025

Revisions

INTERIM REVIEW ONLY

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Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC
TBPE Firm Registration No.: F-13709

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: ENLARGED SOIL EROSION & SEDIMENT CONTROL PLAN VI

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 09/18/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CE106

Project No. 520102301

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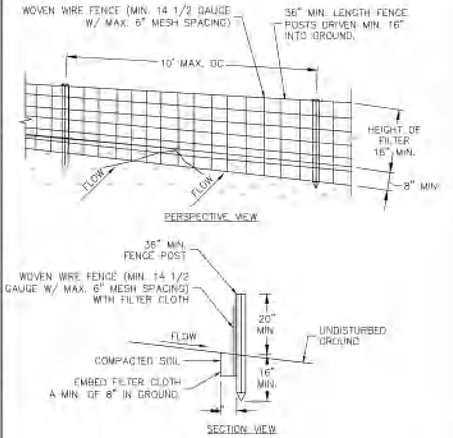
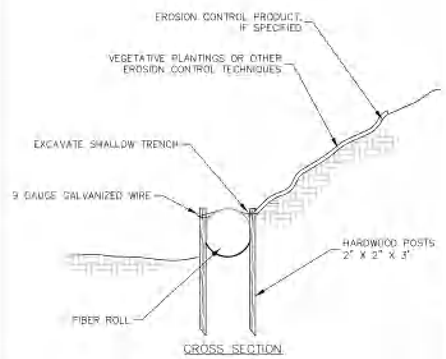
Date: 9/19/2025 Time: 13:45 User: kestes Style Table: Langan.stb Layout: CE106 Document Code: 520102301-0501-CE101-0101



CONSTRUCTION SPECIFICATIONS:

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL, EITHER "T" OR "U" TYPE, OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 14-1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

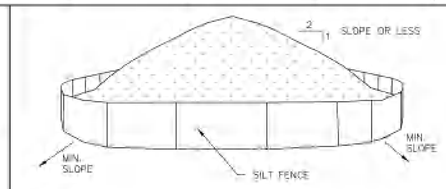
1 SILT FENCE
N.T.S



CONSTRUCTION SPECIFICATIONS:

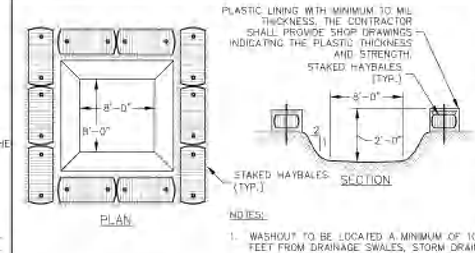
1. EXCAVATE A SHALLOW TRENCH SLIGHTLY BELOW BASEFLOW OR A 4" TRENCH ON SLOPE CONTOURS.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" X 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IN NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR ¼" DIAMETER BRAIDED NYLON ROPE.
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

2 FIBER ROLL/STRAW WATTLE
N.T.S



NOTES:
1. AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
2. MAXIMUM SLOPE OF STOCKPILE SHALL BE 1V:2H.
3. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH SILT FENCING, THEN STABILIZED WITH VEGETATION OR COVERED.
4. SEE SPECIFICATIONS FOR INSTALLATION OF SILT FENCE.
5. HAY BALES TO BE USED WHERE STOCKPILES ARE LOCATED ON PAVED AREAS.

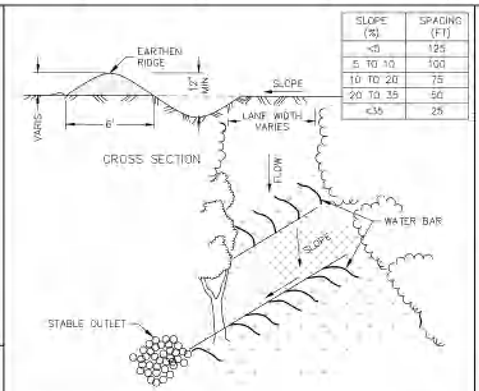
3 TEMPORARY STOCKPILE
N.T.S



NOTES:

1. WASHOUT TO BE LOCATED A MINIMUM OF 100 FEET FROM DRAINAGE SWALES, STORM DRAIN INLETS, WETLANDS, STREAMS, AND OTHER SURFACE WATERS.

4 TEMPORARY CONCRETE WASH AREA
N.T.S

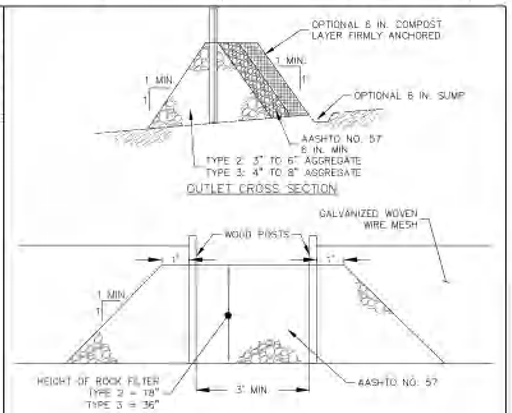


SLOPE (%)	SPACING (FT)
<5	125
5 TO 10	100
10 TO 20	75
20 TO 35	50
>35	25

CONSTRUCTION SPECIFICATIONS:

1. INSTALL THE WATER BAR AS SOON AS THE RIGHT OF WAY IS CLEARED AND GRADED.
2. DISK OR STRIP THE SOD FROM THE BASE FOR THE CONSTRUCTED RIDGE BEFORE PLACING FILL.
3. TRACK THE RIDGE TO COMPACT IT TO THE DESIGN CROSS SECTION.
4. THE OUTLET SHALL BE LOCATED ON AN UNDISTURBED AREA. FIELD SPACING WILL BE ADJUSTED TO USE THE MOST STABLE OUTLET AREAS. OUTLET PROTECTION WILL BE PROVIDED WHEN NATURAL AREAS ARE NOT ADEQUATE.
5. VEHICLE CROSSING SHALL BE STABILIZED WITH GRAVEL. EXPOSED AREAS SHALL BE IMMEDIATELY SEEDED AND MULCHED.
6. PERIODICALLY INSPECT WATER BARS FOR EROSION DAMAGE AND SEDIMENT. CHECK OUTLET AREAS AND MAKE REPAIRS AS NEEDED TO RESTORE OPERATION.

5 WATER BAR
N.T.S



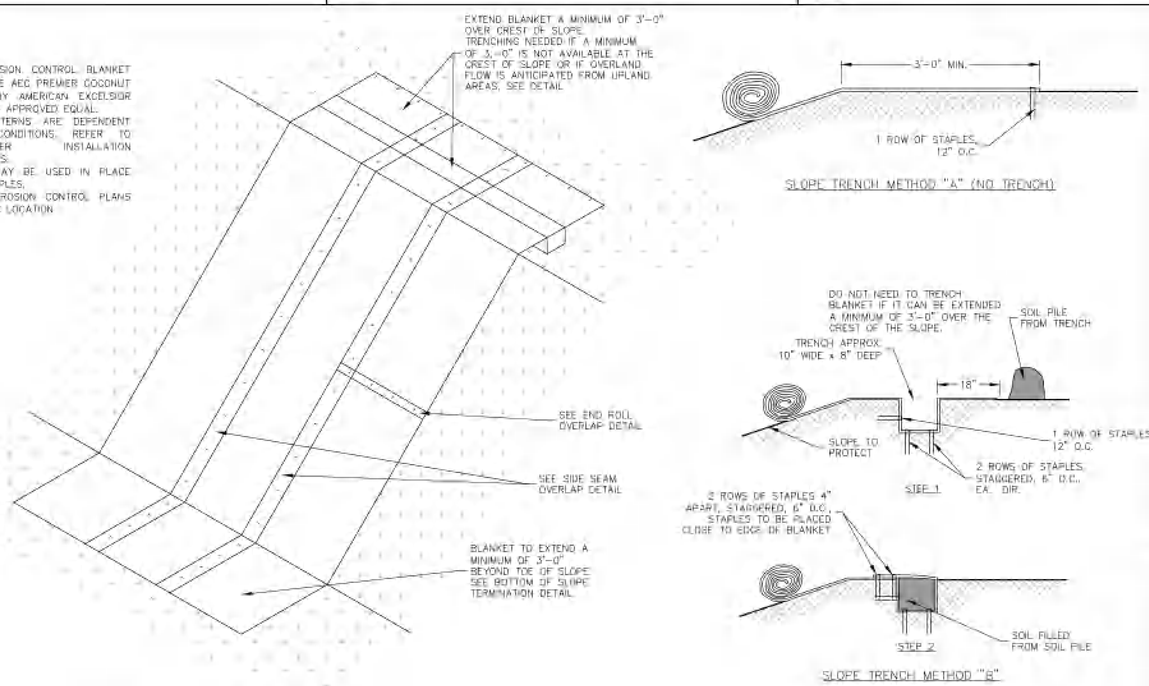
NOTES:

1. A ROCK FILTER OUTLET SHALL BE INSTALLED WHERE FAILURE OF SILT FENCE OR STRAW BALE BARRIER HAS OCCURRED DUE TO CONCENTRATED FLOW. ANCHORED COMPOST LAYER SHALL BE UPSLOPE FACE.
2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH ½ THE HEIGHT OF THE OUTLET.
3. TYPE 2 (18" HIGH WITH WIRE MESH) (3" TO 6" AGGREGATE): TYPE 2 MAY BE USED IN DITCHES AND AT DIKE OR SWALE OUTLETS.
4. TYPE 3 (36" HIGH WITH WIRE MESH) (4" TO 8" AGGREGATE): TYPE 3 MAY BE USED IN STREAM FLOW AND SHOULD BE SECURED TO THE STREAM BED.

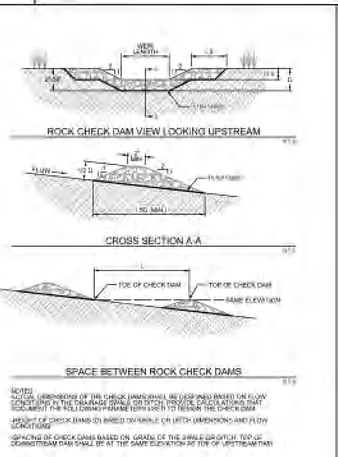
6 ROCK FILTER OUTFALL
N.T.S

NOTES:

1. ROLLED EROSION CONTROL BLANKET (RECB) TO BE AEC PREMIER COCONUT FIBERNET BY AMERICAN EXCELSIOR COMPANY OR APPROVED EQUAL.
2. STAPLE PATTERNS ARE DEPENDENT ON SITE CONDITIONS. REFER TO MANUFACTURER INSTALLATION REQUIREMENTS.
3. E-STAPLE MAY BE USED IN PLACE OF WIRE STAPLES.
4. REFER TO EROSION CONTROL PLANS FOR SPECIFIC LOCATION.

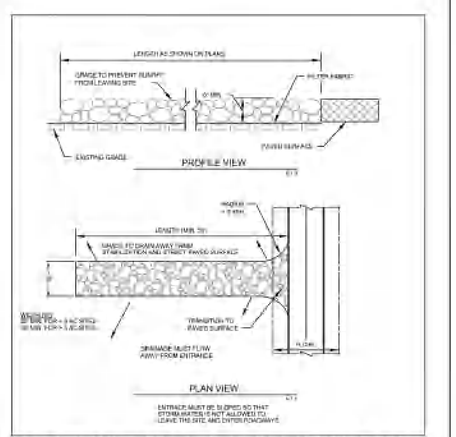


7 ROLLED EROSION CONTROL PRODUCT - SLOPE INSTALLATION
N.T.S

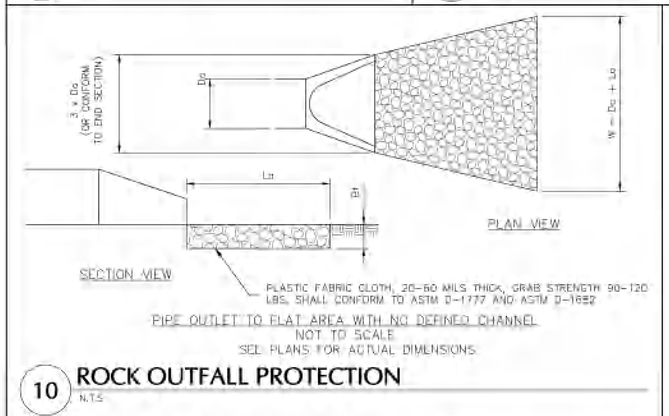


NOTES:
[illegible] DIMENSIONS OF THIS CHECK DAM DRAWING ARE LOOSELY BASED ON FLOW CONDITIONS IN THE DRAINAGE SWALE OR DITCH. PROVIDE CALCULATIONS THAT DOCUMENT THE ROLLED ENGINEERING TURN LINER TO DESIGN THE CHECK DAMS.
HEIGHT OF CHECK DAMS (IN AREAS OF A SWALE OR DITCH) DIMENSIONS AND FLOW CONDITIONS
SPACING OF CHECK DAMS BASED ON GRADE OF THE SWALE OR DITCH. TOP OF DOWNSTREAM DAM SHALL BE AT THE SAME ELEVATION AS TOP OF UPSTREAM DAM

8 STONE CHECK DAM
N.T.S



9 STABILIZED CONSTRUCTION EXIT
N.T.S



10 ROCK OUTFALL PROTECTION
N.T.S

09/19/2025	60% SD SET	2
04/11/2025	30% SD SET	1
Date	Description	No.

Revisions

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P.E. No.142436
Date: 9/19/2025
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TBPE FIRM REG'N NO. F-13178

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: SOIL EROSION & SEDIMENT CONTROL DETAILS

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CE501

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Project No. 520102301

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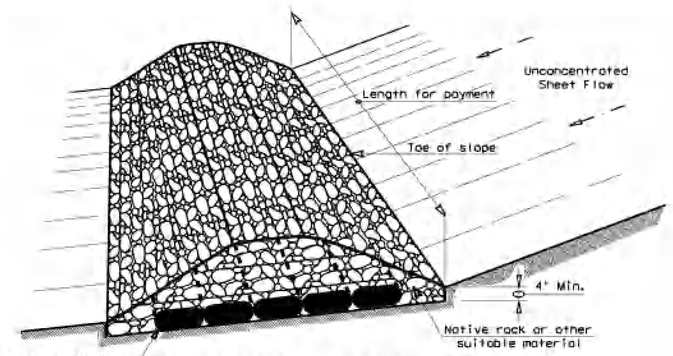
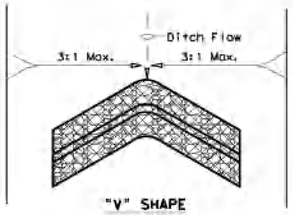
FILE: pw:\\txdot.projectwiseonline.com:TxDOT\Documents\10 . TYL\Design Projects\069702039\4 - Design\Plan Set\9. Environmental\Standards\EC(2)-16

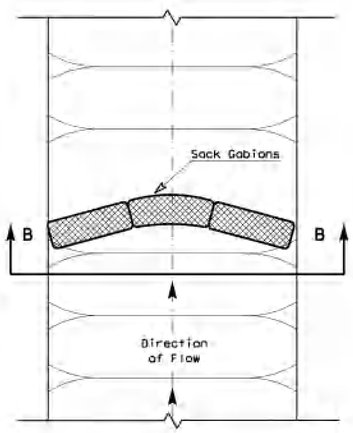


FILTER DAM AT TOE OF SLOPE

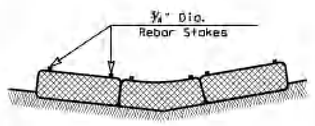
RFD1



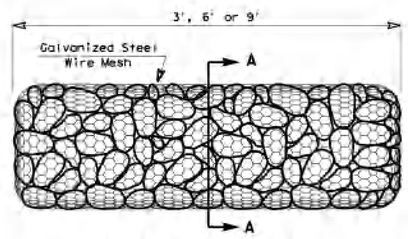
"V" SHAPE PLAN VIEW



PLAN VIEW

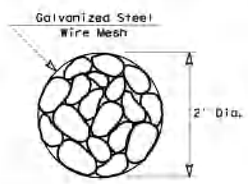


SECTION B-B

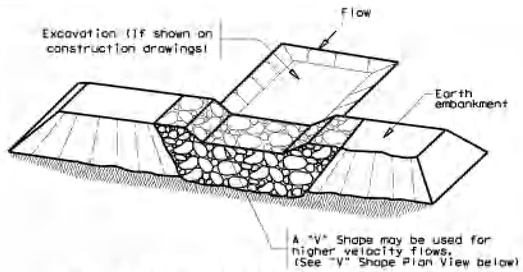


TYPE 4 (SACK GABIONS)

RFD4

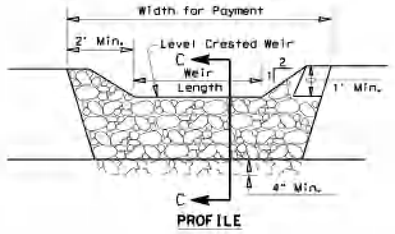


SECTION A-A

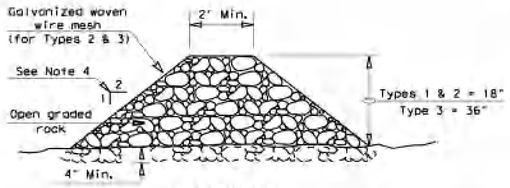


FILTER DAM AT SEDIMENT TRAP

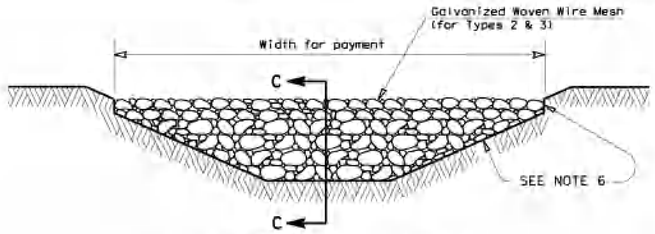
RFD1 OR RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DW: TxDOT	CK: RM	DW: VP	CK: DW/DV LS
© TxDOT: July 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0697	02	039	SH 334
	DIST	COUNTY		SHEET NO.
	TYL	HENDERSON		313

11 ROCK FILTER DAMS
U.T.S. (REF: TXDOT)

Date	Description	No.
09/19/2025	ADD ED SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142435
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-11526

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: SOIL EROSION & SEDIMENT CONTROL DETAILS

Langan Project No.	520102301
PRPC Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CE502

Project No. 520102301

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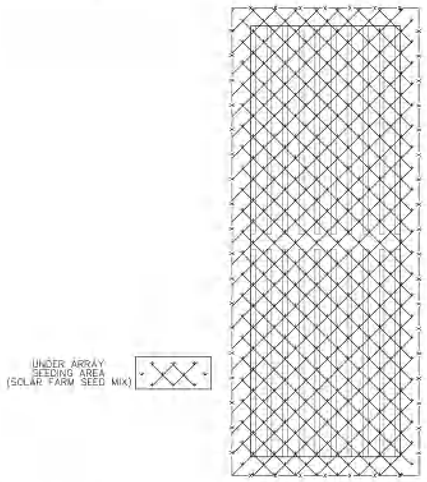
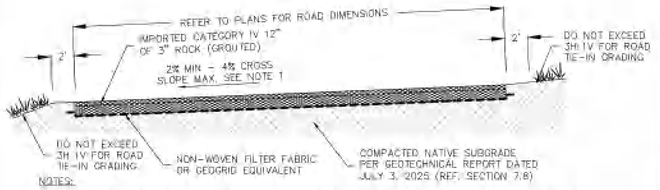


1 TYPICAL SEEDING DETAIL FOR SOLAR ARRAY AREAS
N.T.S.



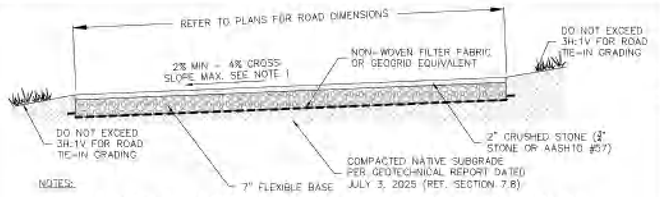
NOTES:

1 MAINTAIN EXISTING STORMWATER OVERLAND FLOW PATTERNS TO MATCH PV AREA GRADES FOR ACCESS ROADS EXCEPT AS INDICATED ON THE PLANS. GRAVEL SURFACE SHALL HAVE A MINIMUM CROSS SLOPE OF 2% AND A MAXIMUM OF 4% AS INDICATED.

2 INTERNAL ROAD SECTION FOR LOW WATER CROSSINGS
N.T.S.

NOTE:

REFER TO GEOTECHNICAL REPORT FOR MORE DETAILS/CONSTRUCTION SPEC.



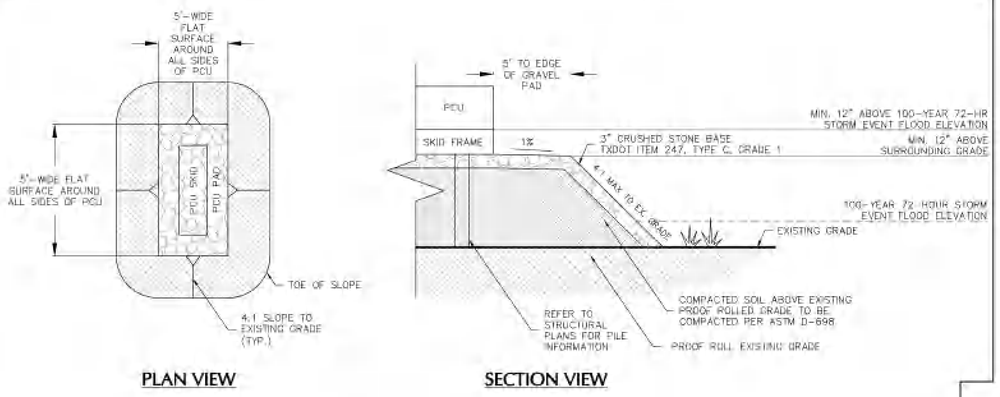
NOTES:

1 MAINTAIN EXISTING STORMWATER OVERLAND FLOW PATTERNS TO MATCH PV AREA GRADES FOR ACCESS ROADS EXCEPT AS INDICATED ON THE PLANS. ROAD SHALL HAVE A MINIMUM CROSS SLOPE OF 2% AND A MAXIMUM OF 4% AS INDICATED.

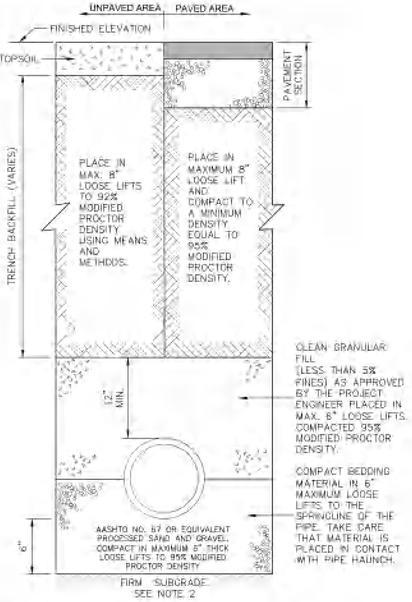
NOTE:

REFER TO GEOTECHNICAL REPORT FOR MORE DETAILS/CONSTRUCTION SPEC.

3 INTERNAL ROAD SECTION
N.T.S.



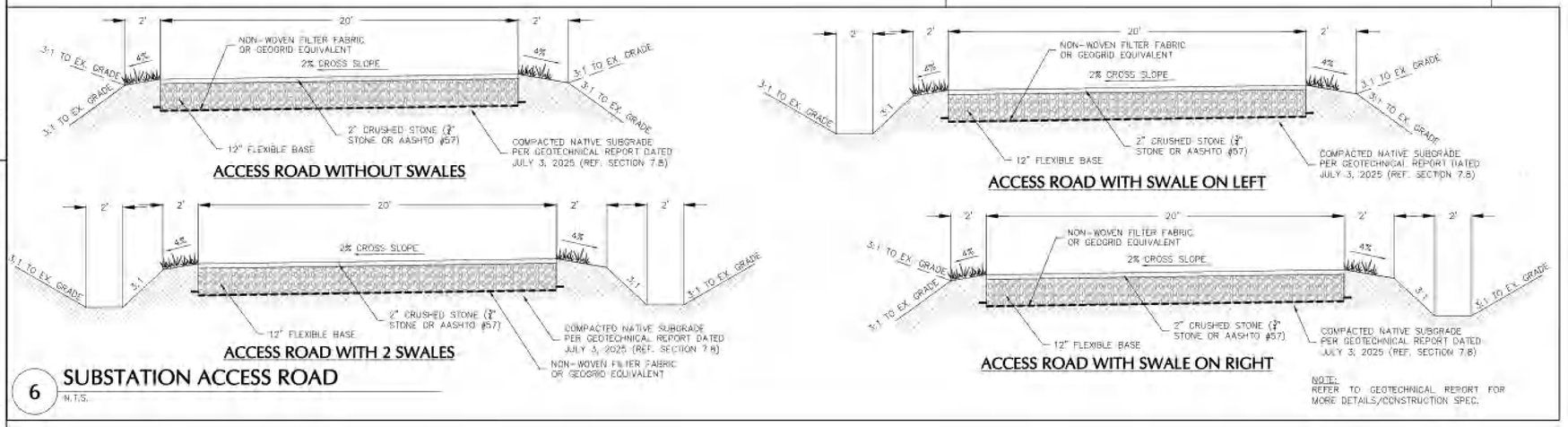
4 TYPICAL PCU PAD FOR PILE FOUNDATIONS
N.T.S.



5 STORM TRENCH DETAIL
N.T.S.

NOTES:

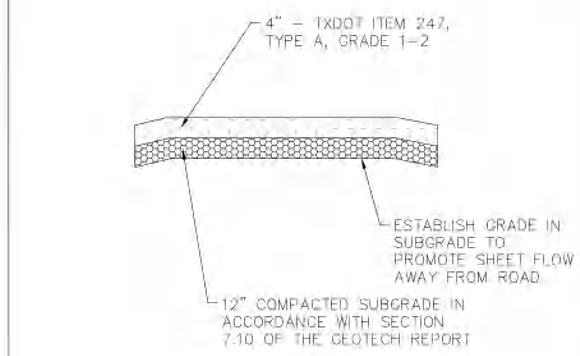
1. ALL TRENCH EXCAVATIONS ARE TO BE DONE IN COMPLIANCE WITH OSHA REGULATIONS.
2. IF SOFT SOIL IS ENCOUNTERED AT BEDDING SUBGRADE, THE SOFT SOIL IS TO BE REMOVED (TO A MAXIMUM DEPTH OF 2 FT) AND REPLACED WITH ¾" CLEAN CRUSHED STONE.
3. TRENCH BACKFILL SHALL BE PREDOMINANTLY GRANULAR FILL MATERIAL AS APPROVED BY THE PROJECT ENGINEER. MATERIAL EXCAVATED FROM THE TRENCH MAY BE USED FOR BACKFILL PROVIDED IT IS PREDOMINATELY SAND AND IS AT WATER CONTENT THAT THE MATERIAL CAN BE READILY COMPACTED TO THE DENSITY REQUIRED.
4. WITHIN PUBLIC RIGHT OF WAY BENEATH PAVEMENT, THE BACKFILL MATERIAL SHALL BE CLEAN CRUSHED STONE EQUIVALENT TO AASHTO NO. 67 OR ¾" STONE, UNLESS AUTHORITY HAVING JURISDICTION REQUIRES OTHERWISE.
5. IN AREAS WHERE THERE IS NOT SUFFICIENT WIDTH FOR A DOUBLE DRUM WALK BEHIND VIBRATORY COMPACTOR THE LIFT THICKNESS SHALL BE DECREASED AS NECESSARY TO ACHIEVE COMPACTION WITH APPROPRIATE EQUIPMENT.
6. MAXIMUM PARTICLE SIZE FOR TRENCH BACKFILL SHALL BE 4 INCHES UNLESS APPROVED OTHERWISE BY PROJECT ENGINEER.
7. BACKFILL CONTAIN NO DELETERIOUS OR CONTAMINATED MATERIAL.
8. PROVIDE MINIMUM OF TWO FEET OF SEPARATION BETWEEN CULVERTS IF MORE THAN ONE CULVERT PROPOSED.



NOTE:

REFER TO GEOTECHNICAL REPORT FOR MORE DETAILS/CONSTRUCTION SPEC.

6 SUBSTATION ACCESS ROAD
N.T.S.



ALLOW 48 HOURS TO DRY AFTER PRECIPITATION EVENT PRIOR TO DRIVING MACHINERY OVER EXPOSED SUB GRADE.

7 BESS EQUIPMENT AREA SECTION
N.T.S.

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL, NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.142439
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.F-11378

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: CONSTRUCTION DETAILS

Langan Project No.	520102301
BRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VPSD

Drawing No.: CS501

Project No. 520102301

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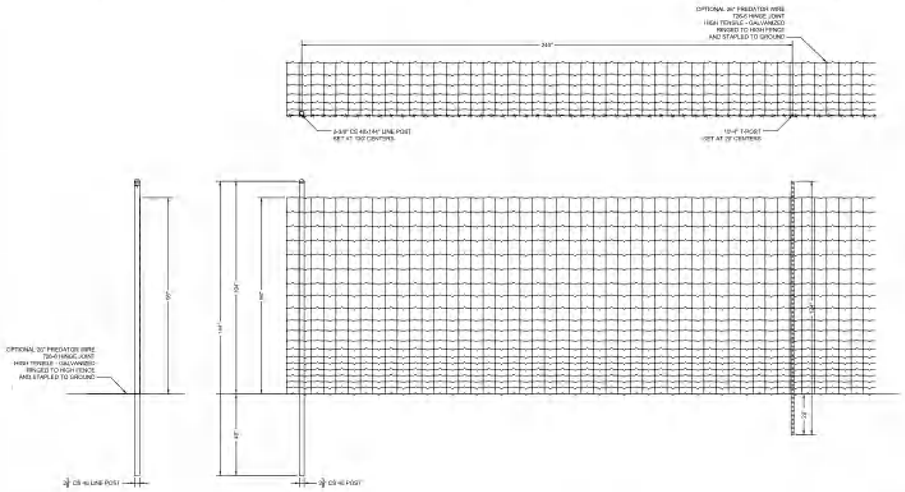
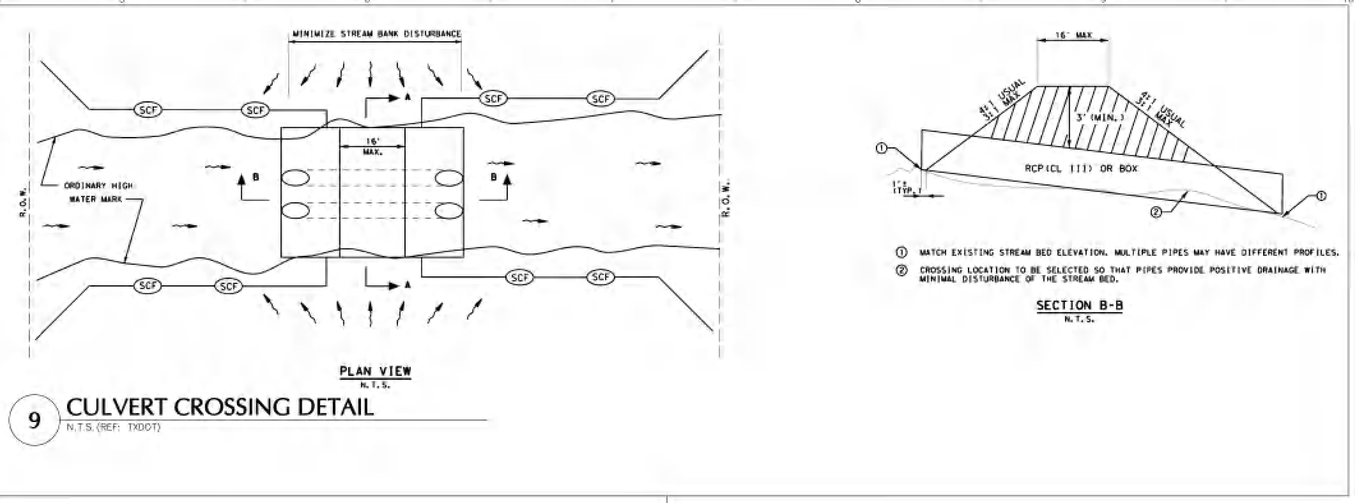


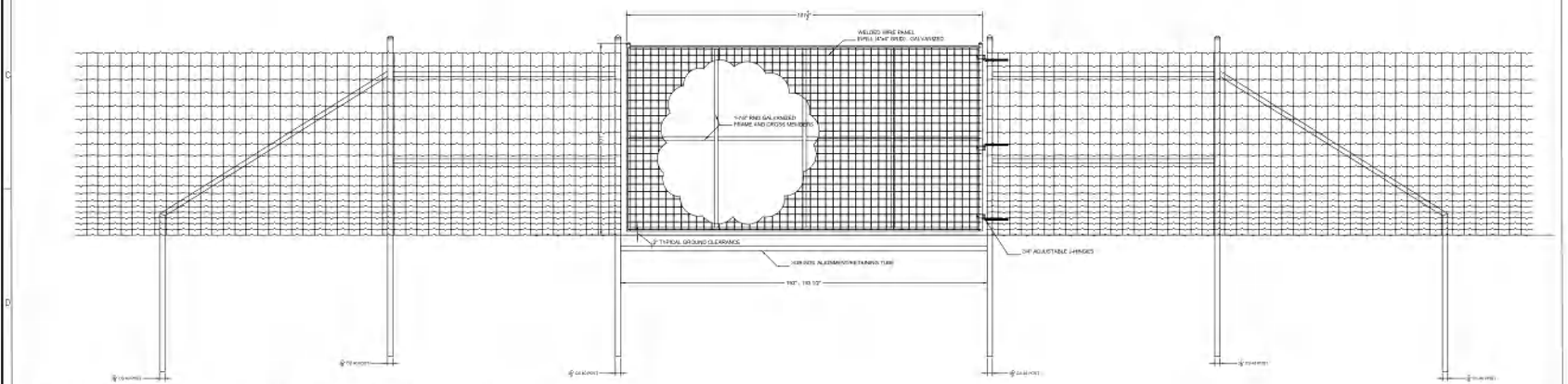
8 8' HIGH GAME FENCE & GATE (PV AREAS)

N.T.S. (REF: TEJAS RANCH & GAME FENCE)



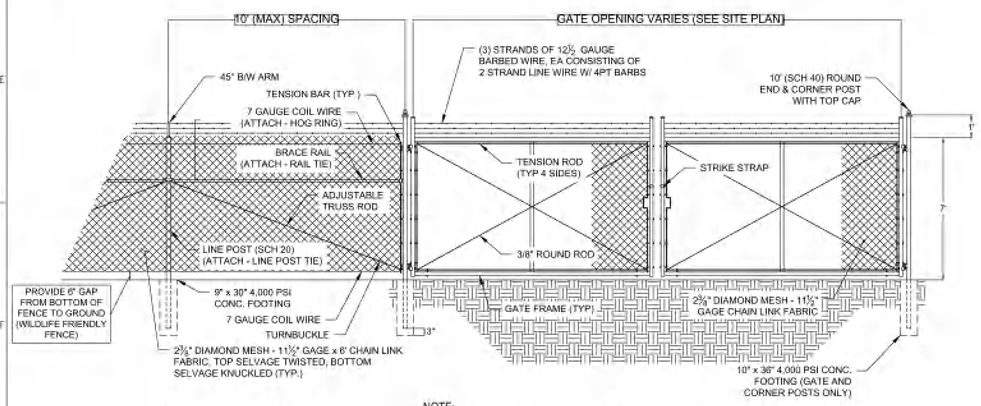
9 CULVERT CROSSING DETAIL

N.T.S. (REF: TXDOT)



8 8' HIGH GAME FENCE & GATE (PV AREAS)

N.T.S. (REF: TEJAS RANCH & GAME FENCE)



POST SCHEDULE:	(SCH 40)
TERMINAL -	2-⅜" OD
GATE -	4" OD
POST SCHEDULE:	(SCH 20)
LINE -	1-⅞" OD
BRACE RAIL -	1-⅝" OD

NOTE:
1. ALL FENCING MATERIALS TO BE GALVANIZED.

10 CHAIN LINK FENCE AND GATE W/ BARBED WIRE (SUBSTATION/BESS)

N.T.S.

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142435
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: CONSTRUCTION DETAILS

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.: CS502

LANGAN

Project No. 520102301

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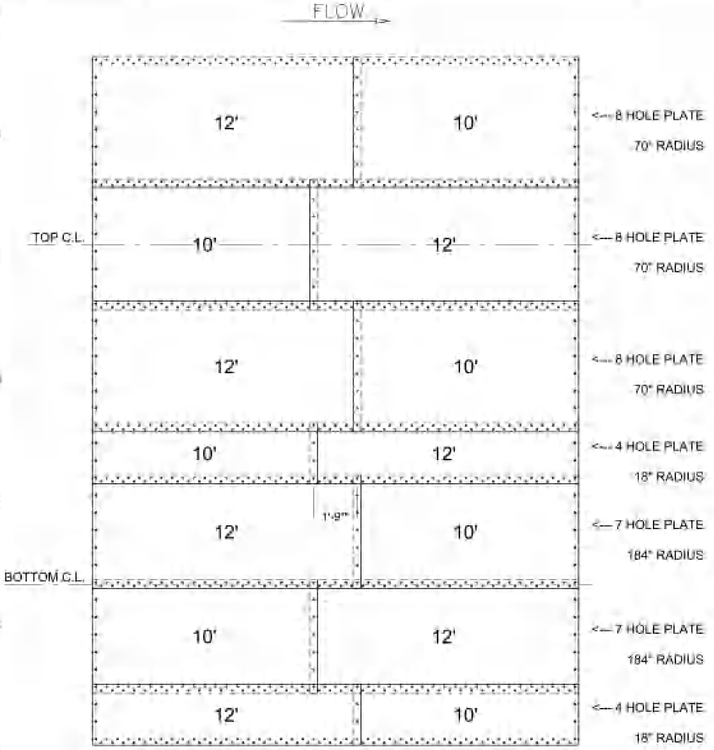
Date: 9/19/2025 Time: 13:03 User: kreiter Style Table: Langan.stb Layout: CS502 Document Code: 520102301-5801-CS501-3301



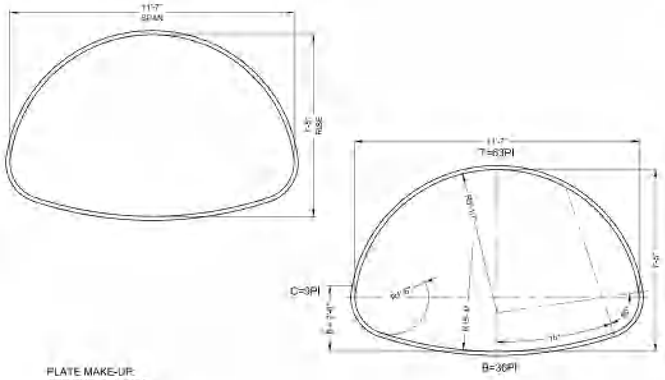


PLATE MAKE-UP:
TOP PL'S: 3 @ 21PI
CORNER PL'S: 1 @ 9PI
BOTTOM PL'S: 2 @ 18PI

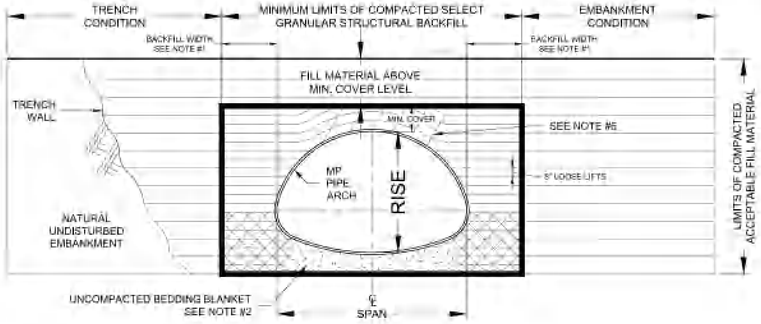
TOTAL PL'S: 2 @ 9PI, 2 @ 18PI, 3 @ 21PI

APPROX AREA = 68 SQ. FT.
STRUCTURE 117 PI

ALL DIMENSIONS ARE TO INSIDE CORRUGATION CRESTS, UNLESS OTHERWISE NOTED.
ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
"B" IS THE MEASUREMENT FROM THE INVERT TO THE TOP OF THE CORNER PLATE.

11 MULTI-PLATE PIPE ARCH

N.T.S. (REF: CONTECH)



SELECT GRANULAR STRUCTURAL BACKFILL LIMITS

CRITICAL HAUNCH AREA BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.

INITIAL LIFTS OVER THE CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH LIGHTWEIGHT (D-4 OR LIGHTER) EQUIPMENT

NOTES:

1. TRENCH WIDTH AND/OR SELECT BACKFILL WIDTH SHALL BE DETERMINED BY THE ENGINEER DEPENDING ON SITE SPECIFIC CONDITIONS. TYPICAL BACKFILL WIDTH IS 4 FEET FOR STRUCTURE SPANS 14 FEET AND LESS, AND 6 FEET FOR STRUCTURE SPANS GREATER THAN 14 FEET.
2. SHAPED BEDDING IS REQUIRED FOR A MINIMUM WIDTH OF SPAN/2. THE MINIMUM BEDDING THICKNESS SHALL BE 6 INCHES
3. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (9" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
4. COMPLETE AND REGULAR MONITORING OF THE PIPE ARCH STRUCTURE IS NECESSARY DURING THE BACKFILL PROCESS TO AT LEAST THE MINIMUM COVER LEVEL.
5. PREVENT DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
6. PLACE SELECT GRANULAR BACKFILL IN RADIAL LIFTS AT APPROXIMATELY 85% OF THE RISE OF THE PIPE ARCH STRUCTURE.

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - All standards refer to the current ASTM/AASHTO edition unless otherwise noted.

1.1.1 ASTM A761 "Corrugated Steel Structural Plate, Zinc Coated for Field-Bolted Pipe, Pipe-Arches and Arches" (AASHTO Designation M-167).

1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12: Division I - Design, AASHTO LRFD Bridge Design Specifications Section 12

1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26: Division II - Construction, AASHTO LRFD Bridge Construction Specifications - Section 26, ASTM A807, Standard Practice for Installing Corrugated Steel Structural Plate Pipe.

1.2 DEFINITIONS

1.2.1 Owner - In these specifications the word "Owner" shall mean ##########.

1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.

1.2.3 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH ENGINEERED SOLUTIONS (800-338-1122 ##########.

1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.

1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.

1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

2.1 Any installation guidance provided herein shall be endorsed by the Engineer, discrepancies herein are governed by the Engineers plans and specifications.

2.2 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas in conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.

2.3 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation: the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.

2.4 The construction shall be performed under the direction of the Engineer.

2.5 All aspects of the structure design and site layout including foundations, backfill, and treatments and necessary scour consideration shall be performed by the Engineer.

06/19/2023	ADD 20' SET	2
04/11/2023	ADD 20' SET	1
Date	Description	No.
Revisions		

ADDITIONAL SELECT GRANULAR STRUCTURAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2-4, A-2-5 OR A-3 MODIFIED. SEE THE *STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION TABLE ON THIS SHEET*. BACKFILL MUST BE PLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 9" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 95% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION. IF THE PROPOSED BACKFILL IS NOT A WELL GRADED GRANULAR MATERIAL, A NON-WOVEN GEOTEXTILE FILTER FABRIC SHALL BE PLACED BETWEEN THE SELECT BACKFILL AND THE IN SITU MATERIAL.

DURING BACKFILL, ONLY LIGHTWEIGHT TRACKED VEHICLES (D-4 OR LIGHTER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE. THE ENGINEER AND CONTRACTOR ARE CAUTIONED THAT THE MINIMUM COVER MAY NEED TO BE INCREASED TO HANDLE TEMPORARY CONSTRUCTION VEHICLE LOADS (HEAVIER THAN D-4).

STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION REFERENCE AASHTO M-145

GROUP CLASSIFICATION	A-1-a	A-1-b	A-2-4	A-2-5	A-3
Sieve Analysis Percent Passing					
No. 10 (2.000 mm)	50 max.	—	—	—	—
No. 40 (0.425 mm)	30 max.	50 max.	—	—	51 max.*
No. 200 (0.075 mm)	15 max.	25 max.	35 max.	35 max.	10 max.
Atterberg Limits for Fraction Passing No. 40 (0.425 mm)					
Liquid Limits	—	—	40 max.	41 min.	—
Plasticity Index	6 max.	6 max.	10 max.	10 min.	Non Plastic
Usual Materials	Stone Fragment, Gravel and Sand		Silty or Clayey Gravel and Sand		Coarse Sand

*Modified from AASHTO M-145.

Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 Materials should not be used.

Reference the most current version of ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), for comparable soil groups.

3.0 ASSEMBLY AND INSTALLATION

3.1 Bolts and nuts shall conform to the requirements of ASTM A449. The pipe arch structure shall be assembled in accordance with the plate layout drawings provided by the Manufacturer and per the Manufacturer's recommendations.

Bolts shall be tightened using an applied torque of between 100 and 300 ft.-lbs.

3.2 The pipe arch structure shall be installed in accordance with the plans and specifications, the Manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction/AASHTO LRFD Bridge Construction Specifications - Section 26.

3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.

3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.

3.5 The foundation shall be designed to support the radial pressures exerted by the smaller radius portions of the pipe. The principal foundation support shall be provided in the critical haunch area extending radially outward from the haunches.

3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloaded and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

3.7 The structure shall be backfilled using clean well graded granular material that meets the requirements for soil classifications A-1, A-2-4, A-2-5 or A-3 modified per AASHTO M-145. See the structural plate backfill classification table on this sheet.

Backfill must be placed symmetrically on each side of the structure in 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180.

3.8 If temporary construction vehicles are required to cross the structure, it is the Contractor's responsibility to contact the Engineer to determine the amount of additional minimum cover necessary to handle the specific loading condition.

Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.

3.9 If a metal headwall and/or wingwall system is specified, the select granular structural backfill limits shall extend past the deadman anchor system. Contact the Engineer if stiff material or rock is encountered where the wingwalls and deadmen are to be installed.

SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CONTECH® MULTI-PLATE PIPE ARCH

I - GENERAL

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - All standards refer to latest edition unless otherwise noted.

1.1.1 ASTM A-761 "Corrugated Steel Structural Plate, Zinc Coated for Field-Bolted Pipe, Pipe-Arches and Arches" (AASHTO Designation M-167).

1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12

1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26

1.2 DEFINITIONS

1.2.1 Owner - In these specifications the word "Owner" shall mean INSERT OWNER NAME OR PURCHASER.

1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.

1.2.3 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH Construction Products Inc. 800-338-1122 INSERT CONTECH LOCAL REPRESENTATIVE.

1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.

1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.

1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

2.1 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas in conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.

2.2 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation: the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.

2.3 The construction shall be performed under the direction of the Engineer.

2.4 All aspects of the structure design and site layout including foundations, backfill and treatments and necessary scour consideration shall be performed by the Engineer.

Any installation guidance provided herein shall be endorsed by the Engineer or superceded by the Engineer's plans and specifications.

II - MULTI-PLATE PIPE ARCH

1.0 GENERAL

1.1 Manufacturer shall fabricate the MultiPlate Pipe Arch (XXXFt) CULVERT as shown on the plans. Fabrication shall conform to the requirements of ASTM A-761 and shall consist of plates, fasteners, and appurtenant items.

Plate thickness, end treatment and type of invert and foundation shall be as indicated on the plans. All manufacturing processes including corrugating, punching, curving and required galvanizing shall be performed within the United States of America.

1.2 The contractor shall verify all field dimensions and conditions prior to ordering materials.

2.0 DIMENSIONS

2.1 The proposed structure shall be a pipe arch CULVERT with the following dimensions:

Span: X'-Y" Rise: X'-Y"
Gage: X

2.2 All plan dimensions on the contract drawings are measured in a true horizontal plan unless otherwise noted.

3.0 ASSEMBLY AND INSTALLATION

3.1 Bolts and nuts shall conform to the requirements of ASTM A-449. The structure shall be assembled in accordance with the plate layout drawings provided by the manufacturer and per the manufacturer's recommendations.

Bolts shall be tightened using an applied torque of between 100 and 300 ft.-lbs.

3.2 The structure shall be installed in accordance with the plans and specifications, the manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26.

3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.

3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.

3.5 Bedding shall provide a minimum of 4,000 psf bearing capacity. Foundation details for bearing capacity less than 4,000 psf shall be approved by the Engineer.

3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloading and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

When assembled on a cast in place spread footing, the structure shall be assembled in the footing starting at the upstream end. When assembled on a full invert or an flexible footing pads, the invert or footing pad shall be placed starting at the downstream end. The structure shall be assembled on the invert or footing pad starting at the inlet end. Circumferential seams shall be installed with the plate laps shingled downstream as viewed from the inside of the structure.

The structure shall be backfilled using clean well graded granular material that meets the requirements of AASHTO M-145 for soil classifications A-1, A-2 or A-3.

Backfill must be placed symmetrically on each side of the structure in 6 to 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180.

3.7 Construction loads that exceed highway load limits are not allowed to cross the structure without approval from the Engineer.

Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.

GROUP CLASSIFICATION	A-1	A-2	A-3
Sieve Analysis Percent Passing			
No. 10 (2.000 mm)	—	—	—
No. 40 (0.425 mm)	50 max.	—	51 max.
No. 200 (0.075 mm)	25 max.	35 max.	10 max.
Characteristics of Fraction			
Passing No. 40 (0.425 mm)			
Liquid Limits	—	40 max.	—
Plasticity Index	6 max.	10 max.	Non Plastic
Usual Materials	Stone Fragment, Gravel and Sand	Gravel or Sand With Silt or clay	Sand

Adapted from AASHTO M-145

* Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 material should be avoided.

INTERIM REVIEW ONLY

"CULVERT TO LOT LINE" AND "INTERIOR TOE" CONSTRUCTION OF PERMIT
Engineer: SEAN DAVID
PE ID No.: 142439
Date: 6/19/2023
Langan Engineering and Environmental Services, LLC
TBPE Firm Registration No.: F-11918

LANGAN

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2999 Olympus Blvd, Suite 165
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T: 817.328.3203 www.langan.com
New Jersey • New York • Connecticut • Pennsylvania • Washington, DC • West Virginia

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: CONSTRUCTION DETAILS

Langan Project No.	520102301
RWE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	05/19/2023
Drawn By	RMS
Checked By	VPSD

Drawing No.: CS503

Project No. 520102301

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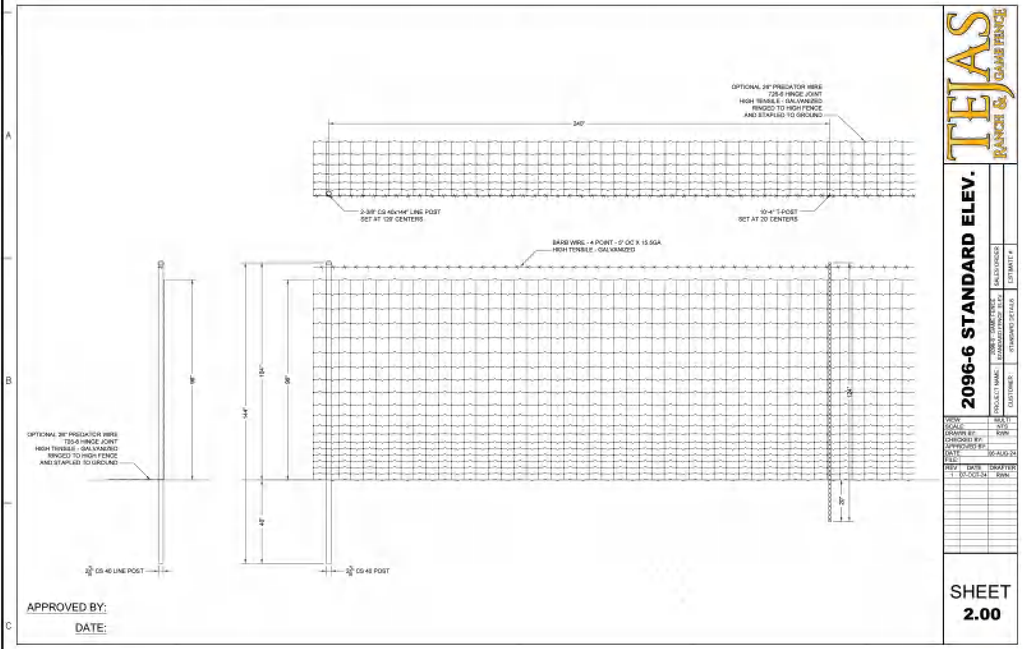
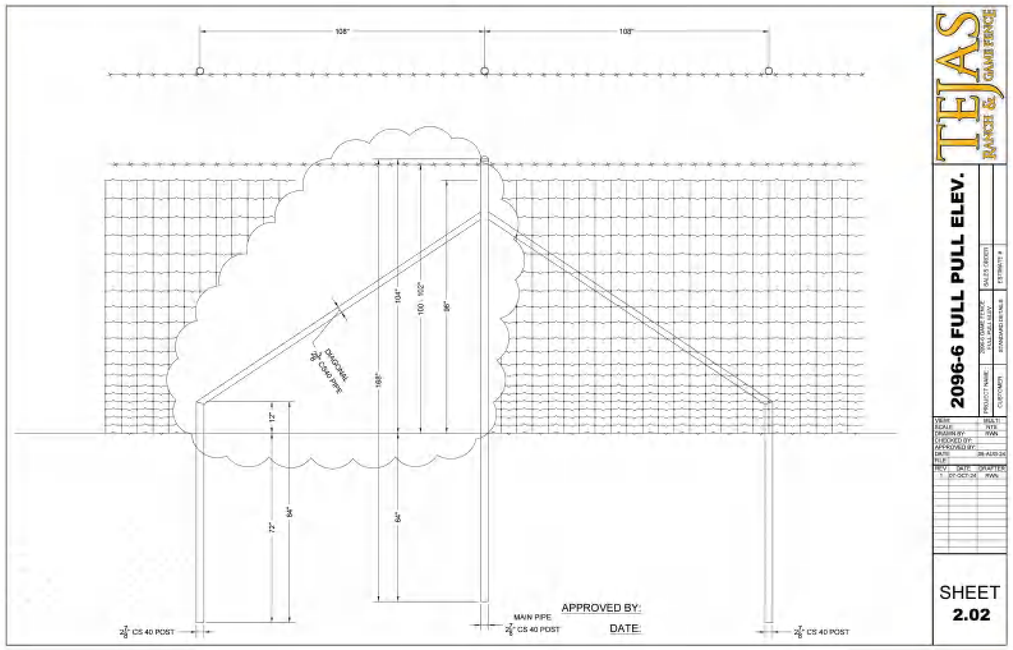
Date: 6/19/2023 Time: 11:23 User Name: Skyle Tauft Langan Mt. Laurel Color: Pressure Dependent Plot Style Table: Langan.stb Active Layout: CS503



TEJAS RANCH & GAME FENCE

2096-6 STANDARD ELEV.

SHEET 2.00



TEJAS RANCH & GAME FENCE

2096-6 FULL PULL ELEV.

SHEET 2.02

TEJAS RANCH & GAME FENCE

2096-6 HALF PULL ELEV.

SHEET 2.01

TEJAS RANCH & GAME FENCE

2096-6 "H"/CORNER ELEV.

SHEET 2.03

12 8'-HIGH GAME FENCE W/ PREDATOR APRON

N.T.S. (REF: TEXAS RANCH & GAME FENCE)

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: CONSTRUCTION DETAILS

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 05/19/2025
Drawn By: RMS
Checked By: VP/SD

Drawing No.: CS504

Project No. 520102301

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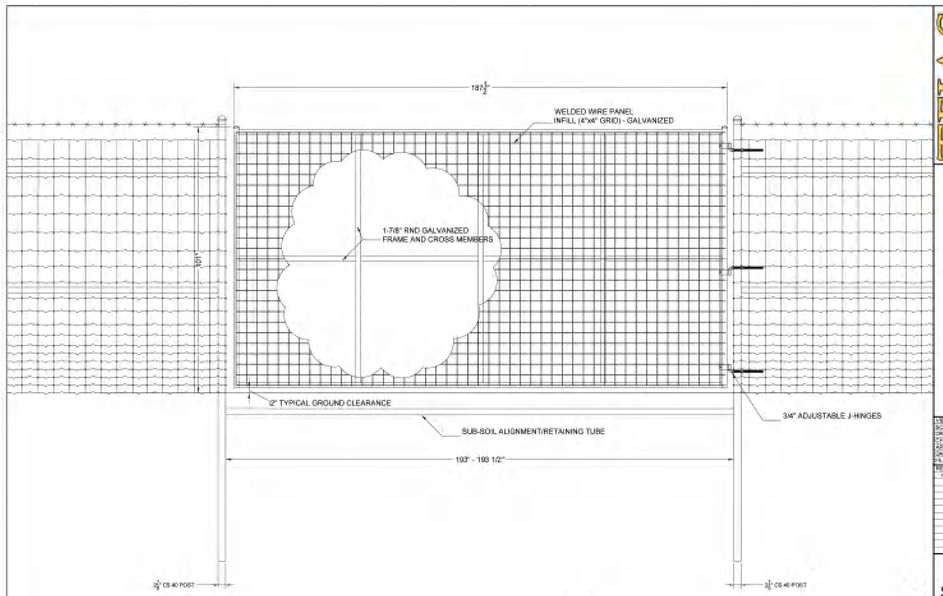
Date: 9/19/2025 Time: 13:20 User: sbakas Style Table: Langan.stb Layout: CS504 Document Code: 520102301-8801-CS801-3101

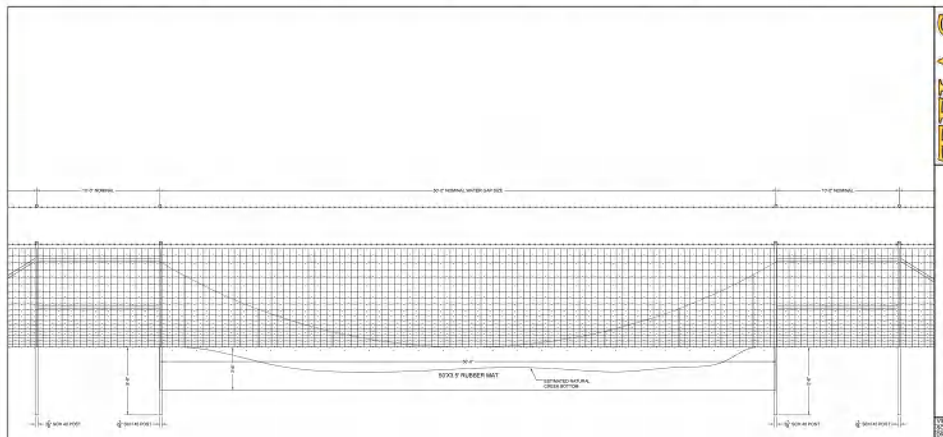


APPROVED BY:

DATE:

STANDARD 16'x8' GATE

SHEET **3.00**

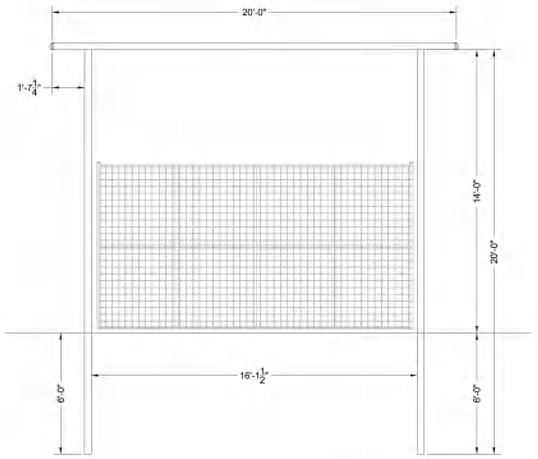


APPROVED BY:

DATE:

WATER GAP - 50'x2'

SHEET **3.02**

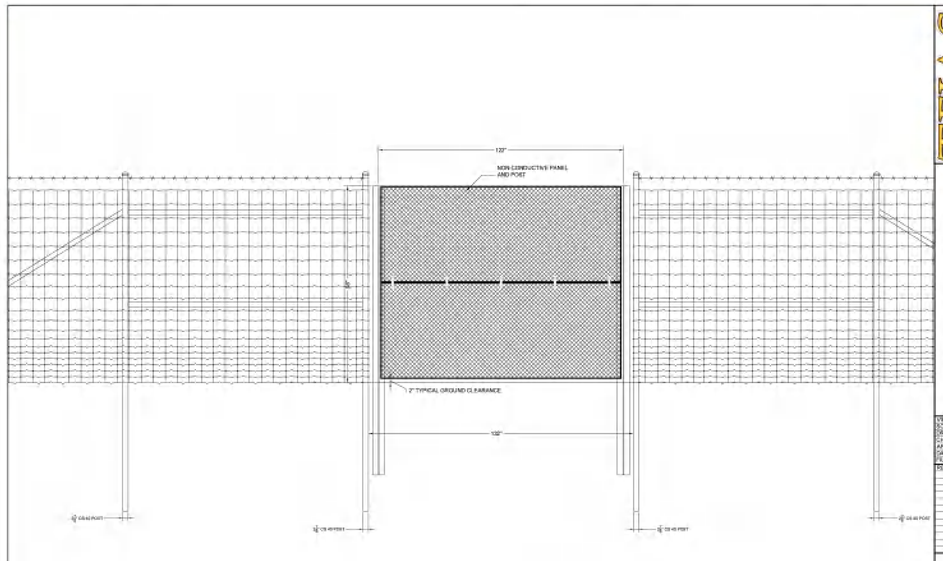


APPROVED BY:

DATE:

STANDARD 4" OVERHEAD

SHEET **3.01**



APPROVED BY:

DATE:

ISOLATION PANEL

SHEET **3.03**

13 8'-HIGH GAME FENCE W/ PREDATOR APRON

N.T.S. (REF: TEXAS RANCH & GAME FENCE)

No.	Description	Date
2	60% DD SET	09/19/2025
1	30% DD SET	04/11/2025

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL; NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142436
Date: 9/19/2025
Langan Engineering and Environmental Services, LLC
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: CONSTRUCTION DETAILS

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 05/19/2025
Drawn By: RMS
Checked By: VPSD

Drawing No.: CS505

Project No. 520102301

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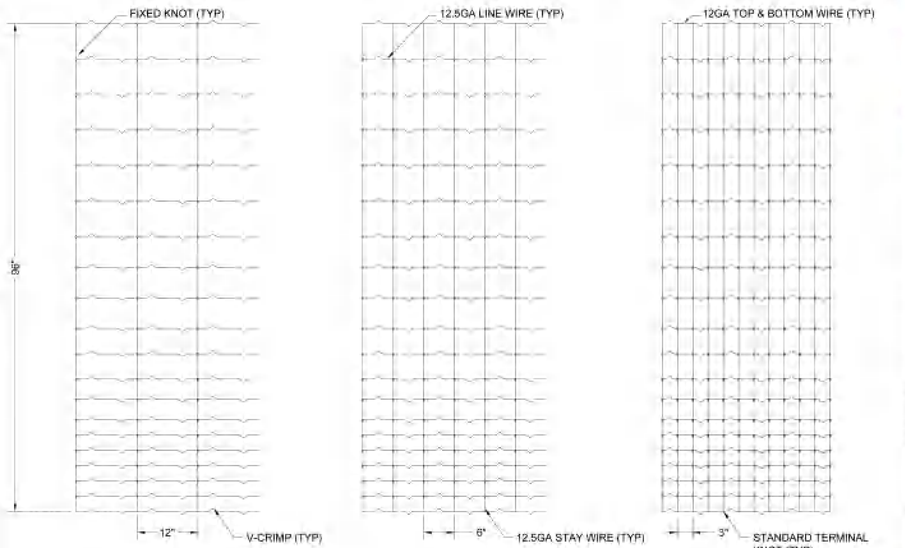
Date: 9/19/2025 Time: 13:21 User: kreales Style Table: Langan.stb Layout: CS505 Document Code: 520102301-SB01-CS501-0101

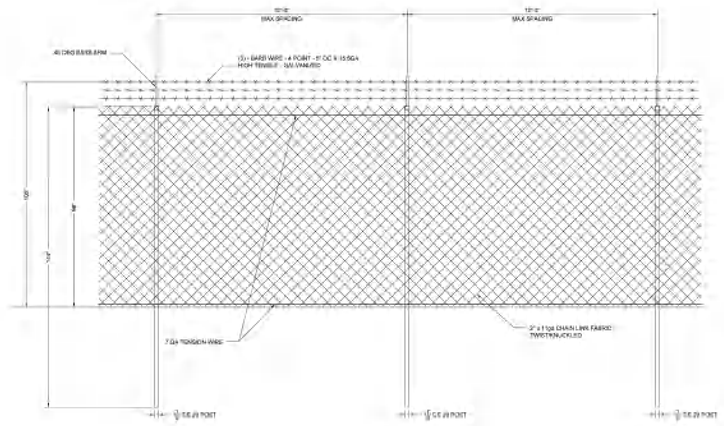


APPROVED BY:

DATE:

HIGH FENCE WIRE TYPES

SHEET 4.00



APPROVED BY:

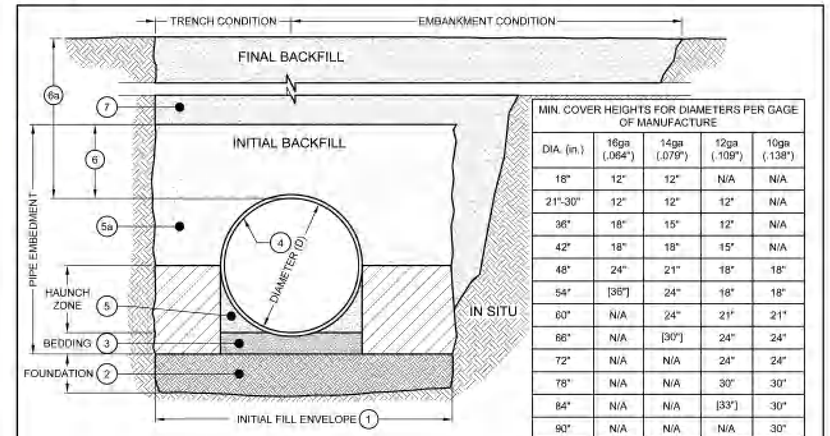
DATE:

8'+1 CHAIN LINK ELEV.

SHEET 2.00

14 8'-HIGH GAME FENCE W/ PREDATOR APRON

N.T.S. (REF: TEXAS RANCH & GAME FENCE)



MIN. COVER HEIGHTS FOR DIAMETERS PER GAGE OF MANUFACTURE

DIA. (in.)	16ga (.064")	14ga (.079")	12ga (.109")	10ga (.138")
18"	12"	12"	N/A	N/A
21"-30"	12"	12"	12"	N/A
36"	18"	15"	12"	N/A
42"	18"	18"	15"	N/A
48"	24"	21"	18"	18"
54"	[36"]	24"	18"	18"
60"	N/A	24"	21"	21"
66"	N/A	[30"]	24"	24"
72"	N/A	N/A	24"	24"
78"	N/A	N/A	30"	30"
84"	N/A	N/A	[33"]	30"
90"	N/A	N/A	N/A	30"
96"	N/A	N/A	N/A	[30"]
102"	N/A	N/A	N/A	[36"]

[ ] = TRENCH INSTALLATION (TABLE 1-4-25)

1 MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER THE PIPE..

2 THE FOUNDATION UNDER THE PIPE AND SIDE BACKFILL SHALL BE ADEQUATE TO SUPPORT THE LOADS ACTING UPON IT.

3 BEDDING MATERIAL SHALL BE RELATIVELY LOOSE MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, AND A MINIMUM OF TWICE THE CORRUGATION DEPTH IN THICKNESS, WITH THE MAXIMUM PARTICLE SIZE OF ONE-HALF OF THE CORRUGATION DEPTH.

4 CORRUGATED STEEL PIPE (CSP / ULTRA FLO), 60" DIAMETER .

5 HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION.

5a INITIAL BACKFILL SHALL BE WELL GRADED CRUSHED STONE, CONSISTING OF ¾" PARTICLE SIZES AND DOWN (PER AASHTO A-1 OR 1-2). UP TO HALFWAY ABOVE THE INVERT OF PIPE.

5b SAND BACKFILL PLACED ABOVE THE SPRINGLINE TO MEET AASHTO A-3 CLASSIFICATION, OR APPROVED EQUAL, COMPACTED TO 90% STANDARD PROCTOR (T 99), ALL LIFTS PLACED IN A CONTROLLED MANNER, IT IS RECOMMENDED THAT LIFTS NOT EXCEED AN 8" UNCOMPACTED LIFT HEIGHT TO PREVENT UNEVEN LOADING, AND THE LESSER OF 1/3 THE DIAMETER OR 24" AS THE MAXIMUM DIFFERENTIAL SIDE-TO-SIDE.

6 SAND BACKFILL (AASHTO A-3 OR APPROVED EQUAL) TO BE PLACED FROM 1/2 ABOVE INVERT OF THE PIPE TO 12" ABOVE PIPE.

6a TOTAL HEIGHT OF COMPACTED COVER FOR CONVENTIONAL HIGHWAY LOADS IS MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT.

7 FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS SHALL FOLLOW THE PROJECT PLANS AND SPECIFICATIONS PER THE ENGINEER OF RECORD.

NOTES:
- GEOTEXTILE SHOULD BE CONSIDERED FOR USE TO PREVENT SOIL MIGRATION INTO VARYING SOIL TYPES (PROJECT ENGINEER).
- FOR MULTIPLE BARREL INSTALLATIONS THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE PIPE DIA./2 BUT NO LESS THAN 12", OR 36" FOR PIPE DIAMETERS 72" AND LARGER. CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.

TYPICAL BACKFILL DETAIL
NOT TO SCALE

UF BACKFILL DETAIL-GARY YOUNG

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9100 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

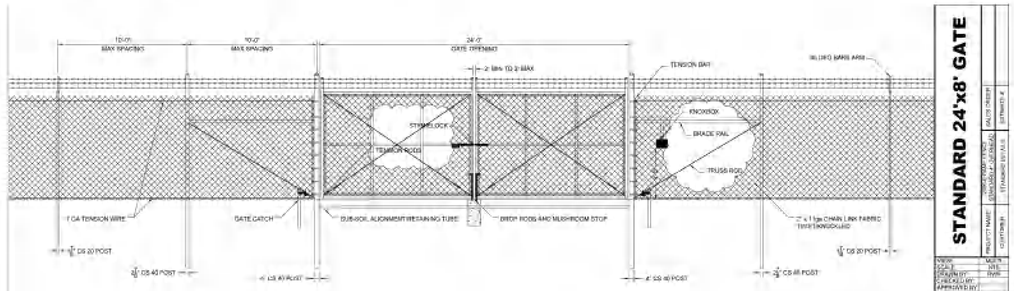
CONTECH PIPE SOLUTIONS

ULTRA FLO BACKFILL DETAIL

DATE DRAWN: 8/27/2025 | REV #: | REV DATE: | SCALE: NTS | DRAWING TYPE:

15 CONTECH CULVERT PIPE BACKFILL DETAIL

N.T.S. (REF: CONTECH)



STANDARD 24'x8' GATE

16 8'-HIGH GAME FENCE W/ PREDATOR APRON

N.T.S. (REF: TEXAS RANCH & GAME FENCE)

Date	Description	No.
09/19/2025	60% DD SET	2
04/11/2025	30% DD SET	1

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date:9/19/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

LANGAN
Langan Engineering and Environmental Services, LLC.
2999 Olympus Blvd, Suite 165
Dallas, TX 75019
T: 817.328.3200 www.langan.com
TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: CONSTRUCTION DETAILS

Langan Project No.: 520102301
RRCE Project No.: TX-PS-2701
ERCOT INR.: 24INR0333/24INR0331
Date: 05/19/2025
Drawn By: RMS
Checked By: VPSD

Drawing No.: CS506

Project No. 520102301

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Date: 9/19/2025 Time: 16:21 User: ewebb StyleTable: Langan.stb Layout: CS506 Document Date: 520102301.8801.CS501.0101

SPECIAL INSPECTIONS

TABLE 1705.6 : REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATION ARE ADEQUATE TO ACHIEVE THE DESIGN CAPACITY.	—	X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	—	X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	—	X
4. DURING FILL PLACMENT, VERIFY USE OF PROPER MATERIALS AND PROCEDURE IN ACCORDANCE WITH THE PROVISIONS OF THE APPROVED GEOTECHNICAL REPORT. VERIFY DENSITIES AND LIFT THICKNESSES DURING PLACMENT AND COMPACTION OF COMPACTED FILL.	X	—
5. PRIOR TO PLACMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY..	—	X

TABLE 1705.7 : REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. VERIFY ELEMENT MATERIALS, SIZES AND LENGTHS COMPLY WITH THE REQUIREMENTS.	X	—
2. DETERMINE CAPACITIES OF TEST ELEMENTS AND CONDUCT ADDITIONAL LOAD TESTS, AS REQUIRED.	—	X
3. INSPECT DRIVING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT.	—	X
4. VERIFY PLACMENT LOCATIONS AND PLUMBNESS, CONFIRM TYPE AND SIZE OF HAMMER, RECORD NUMBER OF BLOWS PER FOOT OF PENETRATION, DETERMINE REQUIRED PENETRATIONS TO ACHIEVE DESIGN CAPACITY, RECORD TIP AND BUTT ELEVATIONS AND DOCUMENT ANY DAMAGE TO FOUNDATION ELEMENT.	X	—

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 2015 INTERNATIONAL BUILDING CODE.
2. ALL CONSTRUCTION SHALL BE UNDER STATE SPECIAL INSPECTION REQUIREMENTS, AS REQUIRED BY 2015 INTERNATIONAL BUILDING CODE.
3. COORDINATE ALL WORK OF THESE DRAWINGS WITH WORK REQUIRED ON ELECTRICAL AND/OR MECHANICAL DRAWINGS.

DESIGN CRITERIA

1. RISK CATEGORY: (II)
2. FOUNDATION DESIGN LIFE: 50 YEARS.
3. GROUND SNOW LOAD, Pg = 5 psf
4. WIND CRITERIA:
   - BASIC WIND SPEED = 120 MPH
   - WIND IMPORTANCE FACTOR, Iw = 1.15
   - EXPOSURE CATEGORY = C
5. EARTHQUAKE DESIGN DATA:
   - SEISMIC USE GROUP = II
   - SEISMIC IMPORTANCE FACTOR, Ie = 1.00
   - MAPPED SPECTRAL ACCELERATION FOR SHORT PERIOD, Ss = 0.058 g
   - MAPPED SPECTRAL ACCELERATION FOR 1 SECOND PERIOD, S1 = 0.035 g
   - SITE CLASS = C
   - SPECTRAL RESPONSE COEFFICIENTS: SDs = 0.047 g, SD1 = 0.039 g
   - SEISMIC DESIGN CATEGORY = A

ALLOWABLE BEARING CAPACITY: 2500 PSF AS PER THE GEOTECHNICAL REPORT No: 520102301 DATED APRIL 10TH 2025 AND PREPARED BY LANGAN

MATERIAL SPECIFICATIONS:

STEEL/PILES:

1. ALL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC.
2. ALL STEEL SHALL BE GRADE 50.
3. FOR SOIL PREPARATION PLEASE REFER TO GEOTECHNICAL REPORT NO: 520102301 DATED APRIL 10TH 2025 AND PREPARED BY LANGAN
4. LBD & AUX RACKING CONNECTIONS ,USE ⅜"ø HIGH-STRENGTH BOLTS AT UNISTRUT MEMBER CONNECTIONS U.O.N.
5. FOR UNISTRUT MEMBER SIZES REFER TO DETAILS ON PLAN, USE UNISTRUT MANUFACTURER MATERIAL OR OWNER APPROVED EQUIVALENT.
6. ALL STEEL AND UNISTRUT HARDWARE SHALL BE COATED WITH MIN. 3MIL ZINC COATING OR GALVANIZED TO RESIST CORROSION.
7. WIDE FLANGE SECTIONS: MUST BE A992 STEEL COVERED WITH WITH 3 MIL MIN. ZINC COATING – HOT DIPPED GALVANIZED PER ASTM A123.
8. FOR THE EXPANSIVE SOIL HEAVE PROTECTION ONE OF THE FOLLOWING TWO RECOMMENDATIONS MUST BE IMPLEMENTED TO MINIMIZE THE AMOUNT OF EXPANSIVE SOIL HEAVE FORCES ON DRIVEN PILES.
   A. EACH PILE LOCATION SHOULD BE PRE-DRILLED TO THE DEPTH OF FROST PENETRATION. THE DIAMETER OF THE HOLE SHOULD BE 2 INCHES GREATER THAN THE LARGEST DIAGONAL DIMENSION OF THE PILE. THE ANNULUS SHOULD BE FILLED WITH PEA GRAVEL AND WELL COMPACTED, AFTER COMPLETION. PROCEED WITH DRIVING THE PILE.
   B. ALL PILES SHALL RECEIVE A YELLOW JACKET OR SLICKCOAT, WHICH EXTENDS TO THE EXPANSIVE SOIL DEPTH BELOW GRADE AND 6" ABOVE GRADE.
   - (FOR EXPANSIVE SOIL DEPTH REFER TO NOTE #3 ON DESIGN CRITERIA).
9. NOTE THAT POST LOCATIONS MAY BE MOVED ACCORDINGLY AS LONG AS SPACING BETWEEN TWO CONSECUTIVE POSTS IS KEPT AT A MAXIMUM OF 15'-7". POST SPACING MUST BE KEPT CONSTANT AND EQUAL FROM BOTH SIDES OF EACH PILE FOR ALL SPANS BETWEEN ANY GIVEN DEAD END POSTS. POST LOCATION TOLERANCE IS +/- 1'-0". NOTE THAT POST LOCATIONS MARKED IN PLAN ARE FOR REFERENCE ONLY AND DO NOT REPRESENT EXACT LOCATION OR NUMBER OF POSTS.
10. PILE FOUNDATIONS AND DRILLED PIER INSTALLATION. A SPECIAL INSPECTOR SHALL BE PRESENT WHEN PILE FOUNDATIONS ARE BEING INSTALLED AND DURING TESTS. THE SPECIAL INSPECTOR SHALL MAKE AND SUBMIT TO THE COMMISSIONER RECORDS OF THE INSTALLATION OF EACH PILE AND RESULTS OF LOAD TESTS.

NOT FOR CONSTRUCTION
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DRAWING TITLE
GENERAL NOTES, DESIGN CRITERIA & SPECIAL INSPECTION

DRAWING #
S001

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE 36" x 24"
PROJECT # TX-PS-2701

PREPARED FOR LANGAN

LANGAN, LLC
300 KIMBAL DRIVE
PARSIPPANY, NJ 07054
WWW.LANGAN.COM

DATE	REVISION DESCRIPTION	PM	ENG CHK
09/05/2025	60% STRUCTURAL DESIGN	AY	AY

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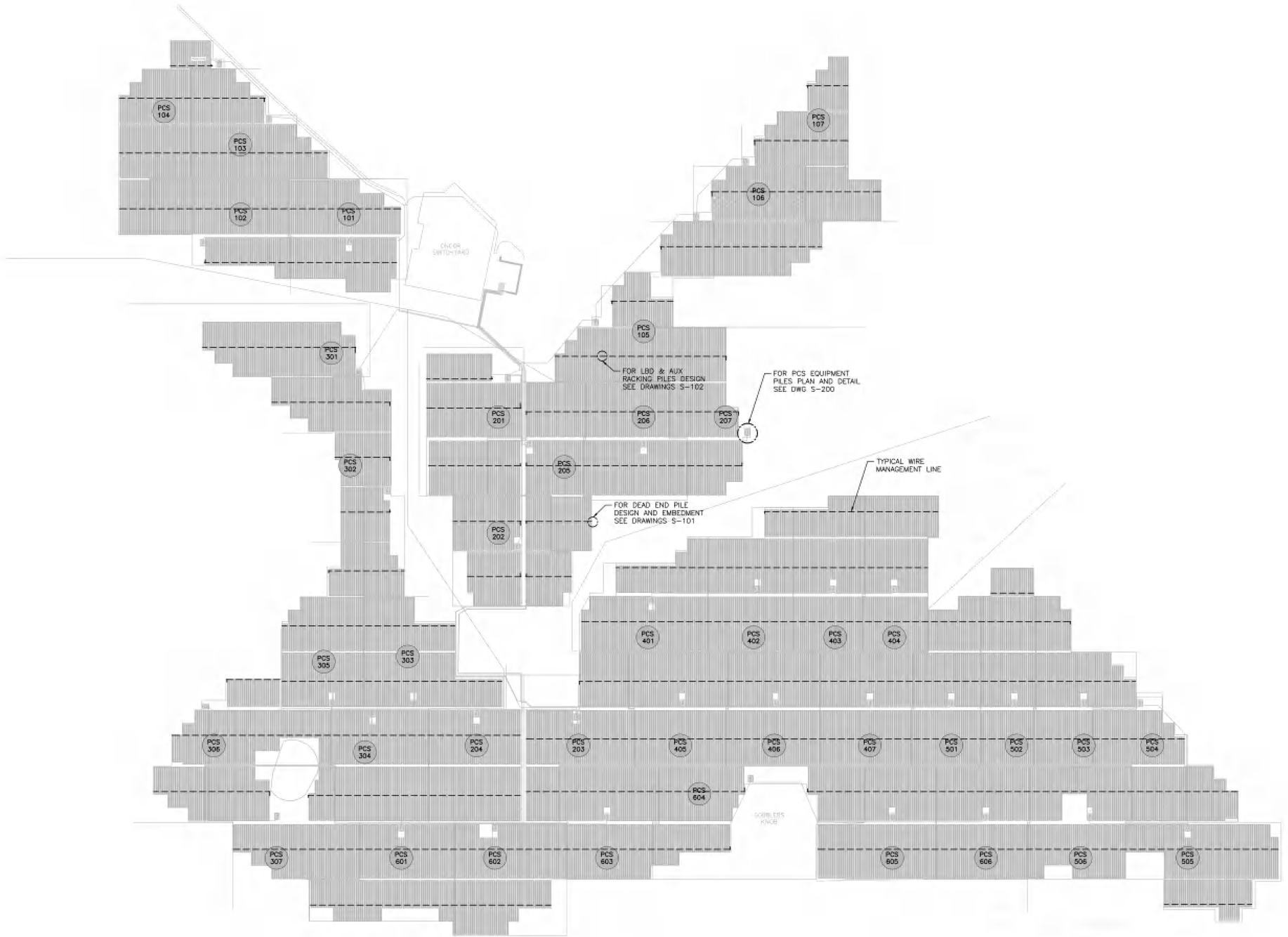

1 S-100 WIRE MANAGEMENT & PCS EQUIPMENT LOCATION – PLAN VIEW
SCALE: 1/32" = 1'-0"

N

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DRAWING TITLE
WIRE MANAGEMENT & PCS EQUIPMENT PLAN VIEW

DRAWING #
S100

PROJECT
SOLAR GENERATION SYSTEM AT
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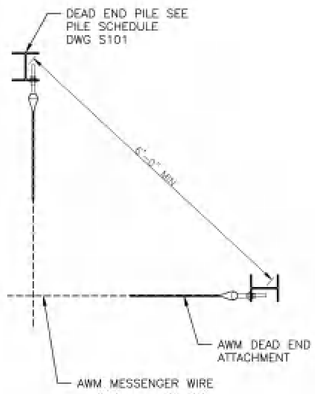
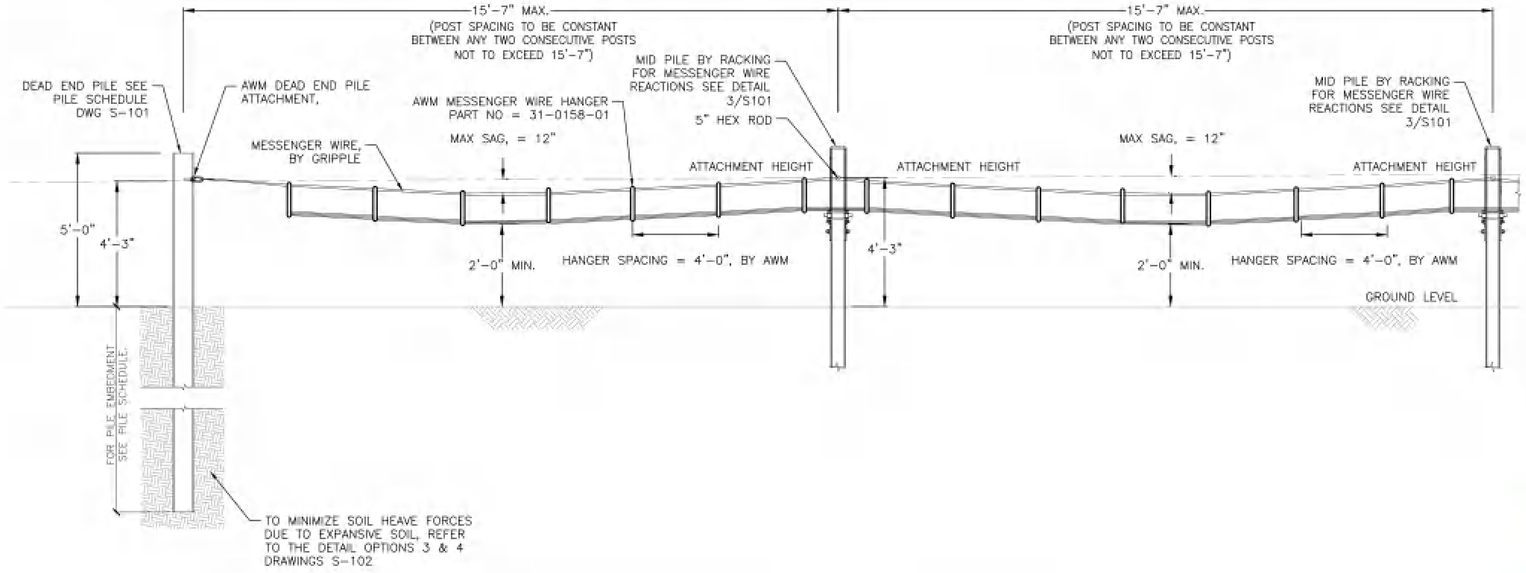


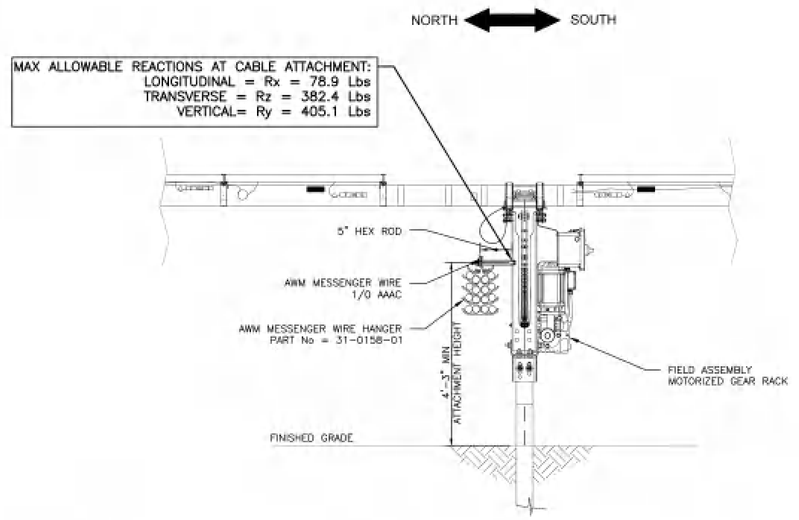
1 S-101 DEAD END PILES – CORNER DETAIL PLAN
SCALE: NONE



2 S-101 TYPICAL MESSENGER WIRE DETAIL AT DEAD END AND MID PILE – ELEVATION TYPICAL VIEW
SCALE: NONE

PILES SCHEDULE						
PILE TYPE	SECTION SIZE	GALVANIZATION	HEAVE PROTECTION	EMBEDMENT	REVEAL HEIGHT	TOTAL LENGTH
DEAD END PILE	W6X15	3 MILS	SEE OPTION A OR B DWGS S-102	7FT	5FT	12FT
MID PILE	BY OTHERS					
LBD PILE	W6X9	3 MILS	SEE OPTION A OR B DWGS S-102	6FT	6.5 FT	12.5 FT
AUX RACK PILE	W6X9	3 MILS	SEE OPTION A OR B DWGS S-102	6FT	6.5 FT	12.5 FT

3 S-101 MESSENGER WIRE, LBD & AUX RACK PILES – SCHEDULE



4 S-101 MESSENGER WIRE REACTION AT MID PILE & ATTACHMENT – TYPICAL DETAIL
SCALE: NONE

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DRAWING TITLE
WIRE MESSENGER PILE PLAN
& DETAILS

DRAWING #
S101

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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1	09/05/2025	ISSUE STRUCTURAL DESIGN	AY	AY	AY

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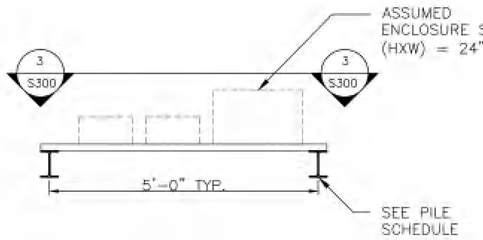
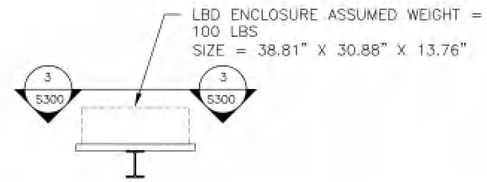


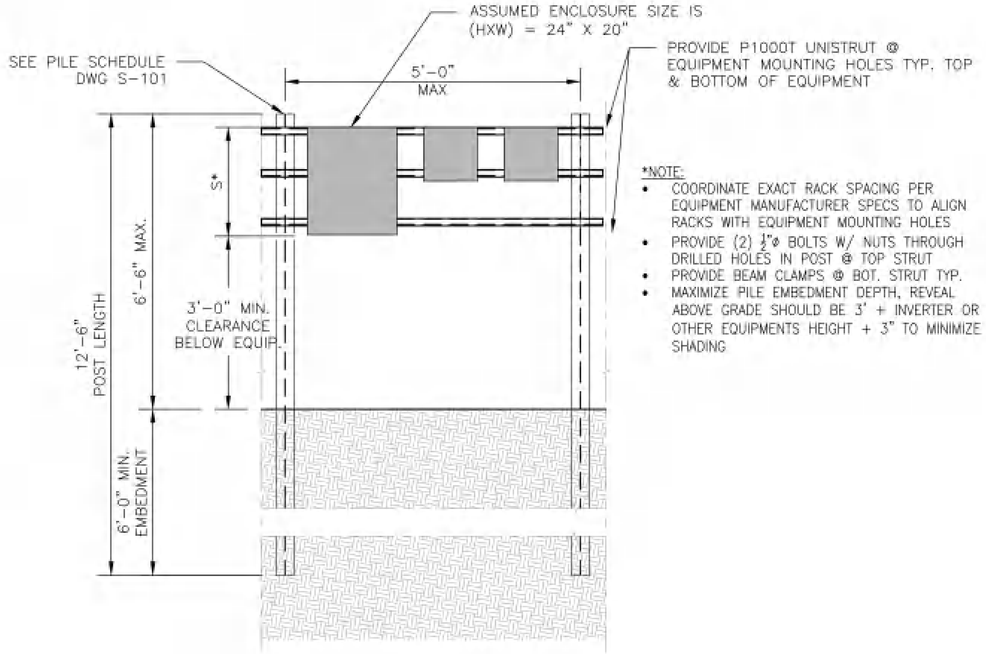
2 AUXILIARY RACK PLAN
S-102 NOT TO SCALE

- REEFER TO ELECTRICAL DRAWINGS FOR QUANTITIES AND LOCATION AT AUXILIARY RACK EQUIPMENTS.



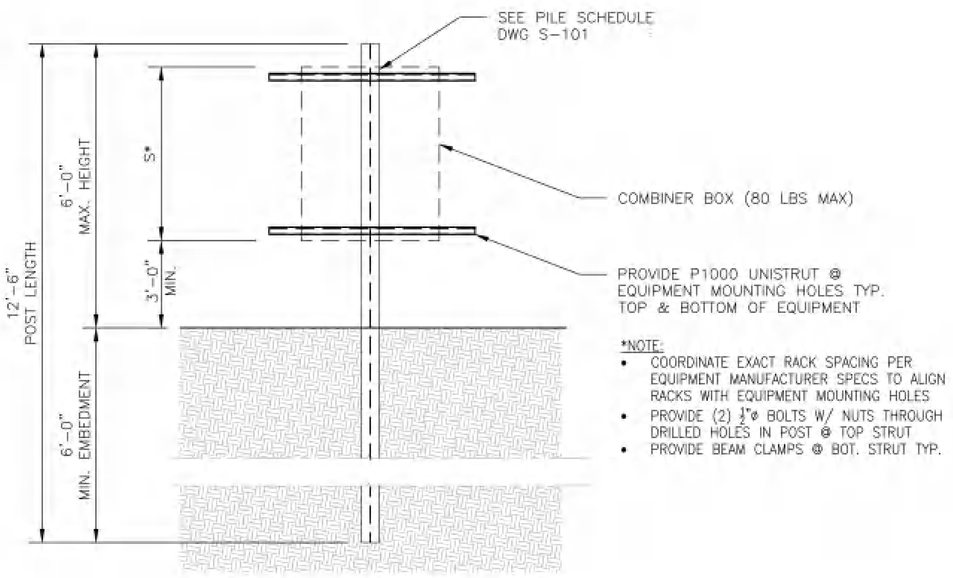
1 LBD ENCLOSURE PILE PLAN
S-102 NOT TO SCALE

- REEFER TO ELECTRICAL DRAWINGS FOR QUANTITIES AND LOCATION AT LBD EQUIPMENT.



4 AUXILIARY RACK PILE DETAIL
S300 SCALE: 1/2" = 1'-0"

NOTE:
- FOR UNISTRUT MEMBER CONNECTIONS USE ⅜"ø HIGH – STRENGTH BOLTS U.O.N
- ALL UNISTRUT, CONNECTIONS, BOLTS, AND HARDWARE MUST BE HOT-DIPPED GALVANIZED OR COMPLY WITH MANUFACTURER'S STANDARDS AND SPECIFICATIONS.



3 TYP. LBD ENCLOSURE PILE DETAIL
S300 SCALE: 1/2" = 1'-0"

NOTE:
- FOR UNISTRUT MEMBER CONNECTIONS USE ⅜"ø HIGH – STRENGTH BOLTS U.O.N
- ALL UNISTRUT, CONNECTIONS, BOLTS, AND HARDWARE MUST BE HOT-DIPPED GALVANIZED OR COMPLY WITH MANUFACTURER'S STANDARDS AND SPECIFICATIONS.

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DRAWING TITLE
LBD & AUXILIARY RACK
PLANS AND DETAILS

DRAWING #
S102

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PROJECT # TX-PS-2701

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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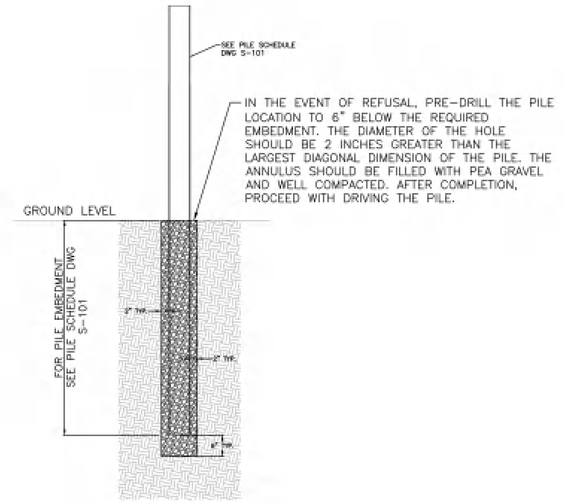
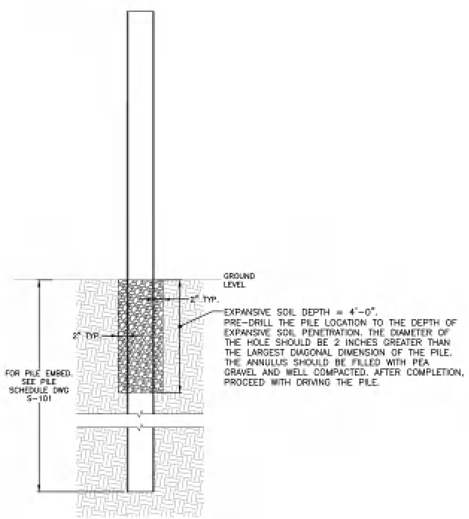
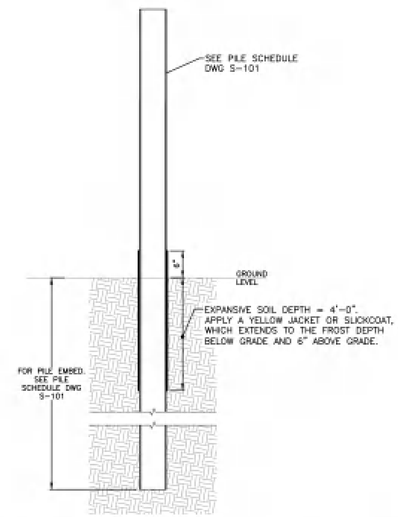


1 S-103 PILE REFUSAL REMEDIATION – TYPICAL DETAIL
SCALE: NONE



2 S-103 EXPANSIVE SOIL HEAVE PROTECTION DETAIL – OPTION A
SCALE: NONE



3 S-103 EXPANSIVE SOIL HEAVE PROTECTION DETAIL – OPTION B
SCALE: NONE

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DRAWING TITLE
TYPICAL DETAIL

DRAWING #
S103

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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PROJECT # TX-PS-2701

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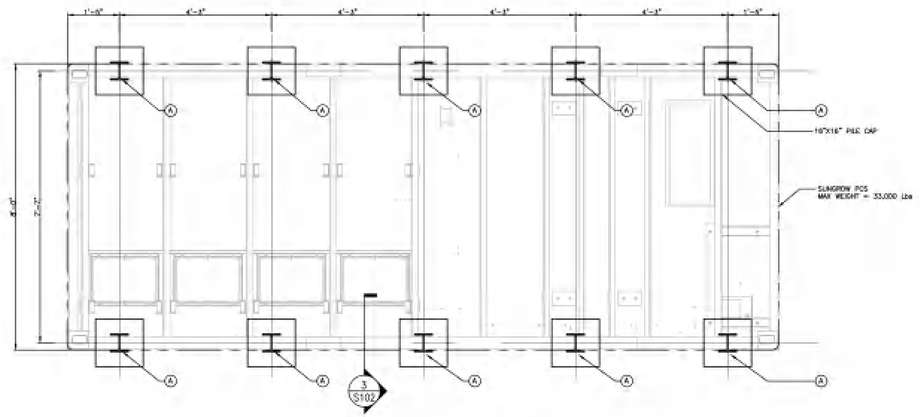


1 S-200 PCS PILE LAYOUT

SCALE: 1/2" = 1'-0"

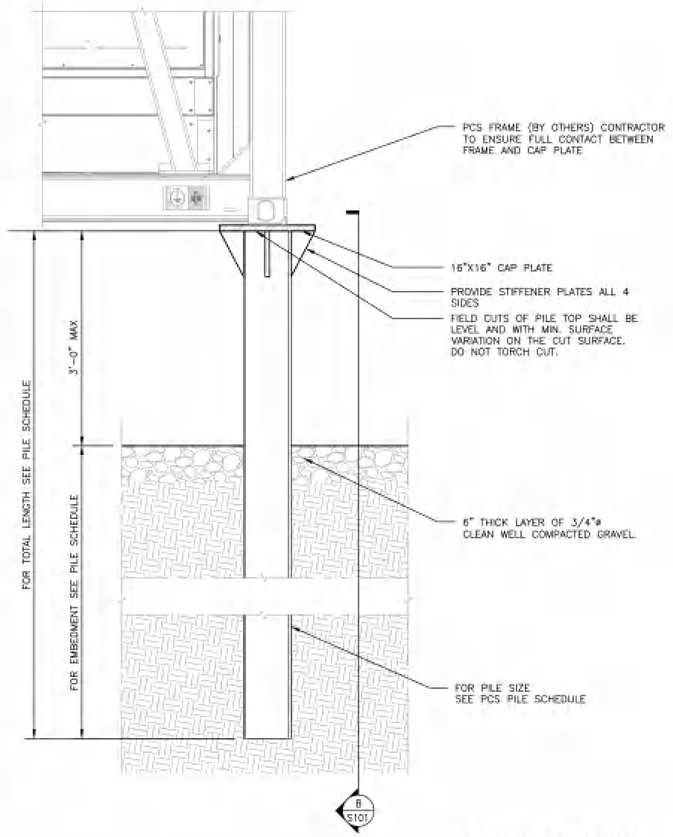
NOTES

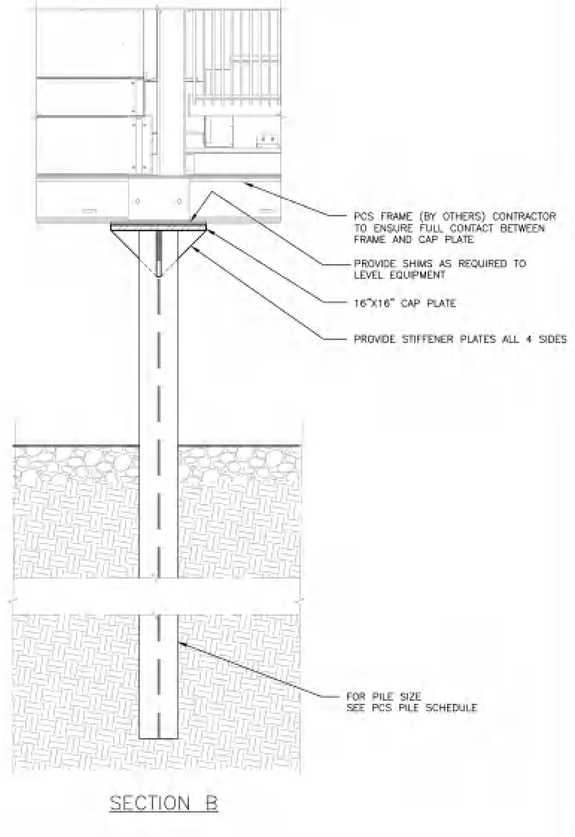
1. PILES SHALL BE PLACED DIRECTLY UNDER THE CENTER OF THE PCS FRAME. SEE SUNGROW STRUCTURAL DRAWING PAGE 6 FOR MORE INFORMATION. CONTRACTOR TO FIELD VERIFY DIMENSION.
2. TOP OF THE PILES ELEVATIONS SHALL BE AT THE SAME ELEVATION.

PCS - PILE SCHEDULE

PCS UNIT	PILE TAG	SIZE	QUANTITY PER EACH PCS	EMBEDMENT	REVEAL LENGTH	TOTAL LENGTH
PCS 102, 503, 506 ,604	A (TYP)	W6X15	10	9FT	3FT MAX	12FT MAX
PCS 502 605 606	A (TYP)	W6X15	10	9FT	2'-4" MAX	11'-4" MAX
PCS 101, 104, 204 401 403 404 406 407 504 505 603	A (TYP)	W6X15	10	9FT	1'-10" MAX	10'-10" MAX
PCS 303, 304 402 405 501	A (TYP)	W6X15	10	9FT	1'-4" MAX	10'-4" MAX
PCS 103 105 106 107 201 202 203 205 206 207 301 302 305 306 307 601 602	A (TYP)	W6X15	10	9FT	1'-0" MAX	10'-0" MAX

2 S-200 PCS PILE SCHEDULE





SECTION B

3 S-200 PCS FRAME MOUNTING DETAIL

SCALE: 1" = 1'-0"

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DRAWING TITLE
PCS FOUNDATION PLAN AND ELEVATION DETAIL

DRAWING #
S200

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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Structural Analysis of PCS Equipment & Wire Managment Foundation Design

For The Project:

Chisme PV - TX-PS-2703

8987 CR 268 , Brown & Mills County, TX 76801

Presented to:

LANGAN

2999 Olympus Blvd, #165
Dallas, TX 75019

Presented by:

PURE POWER ENGINEERING
Pure Power Engineering, Inc.
111 River Street - Suite 1110
Hoboken, NJ 07030
www.PurePower.com
(201) 687-9975

PPE Project No. PPE-11055.01

STATE OF TEXAS
Ahmed Youssef
REGISTERED

Ahmed Youssef, PE

Ibrahim Hini

September 5, 2025

Codes and References

- 2015 International Building Code
- Minimum Design Loads for Buildings and Other Structures, ASCE 7-10
- Building Code Requirements for Structural Concrete, ACI 318-14

Design Criteria

Snow Load (Service)

Ground Snow Load:	5 psf
Risk Category:	II
Snow Exposure: C_e:	1.0
Snow Load Important Factor I_s:	1.0
Thermal Factor C_t:	1.2
Flat Snow Load:	4.2 psf
Rain Over Snow Surcharge	5.0 psf
Total Snow Load =	**9.2 psf**

Wind Load

Risk Category:	II
Ultimate Wind Speed:	115 mph
Exposure Category:	C

Seismic Load

Risk Category:	II
I_e, Seismic Importance Factor:	1.00
Site Class:	C
S_S, Mapped spectral response acceleration at short periods:	0.058
S_{DS}, Design spectral response acceleration at short periods:	0.047
S_1, Mapped spectral response acceleration at 1s period:	0.035
S_{D1}, Design spectral response acceleration at 1s period:	0.039
Seismic Design Category:	A

PURE POWER ENGINEERING
Pure Power Engineering, LLC
5 Marine View Plaza, Suite 305
Hoboken, NJ 07030

Client:	Langan	Date:	9/5/2025
Site Name:	Cheshire PV	Prepared By:	JH
446 No.	PPE 11088.01	Checked By:	AY
Subject:	PCS	Page:	1

DESIGN CRITERIA

Basic Site Criteria:

Equipment Height: h = 9.67 ft

Structure Type: Square

Equipment Dimensions:

Depth: D = 8.00 ft Width: 19.00 ft

Equipment Weight: W_e = 83.00 kip (Per specs)

Total Equipment Weight: W_t = 83.00 kip

Wind Design Parameters:

Risk Category:	II	
Ultimate Wind Speed:	V_{ult} = 135	mph
Exposure Category:	C	
Topographic Category:	2	
Topographic Factor:	K_{zt} = 1.00	
Gust Effect Factor:	G_f = 0.85	
Wind Directionality Factor:	K_d = 0.90	
Velocity Pressure Coefficient:	K_z = 0.85	
External Pressure Coefficient:	C_f (vertical) = 1.32	
	C_f (horizontal) = 1.32	

Wind Design Load:

Wind Velocity Pressure: q_z = 25.87 psf $q_z = 0.00256\ K_z K_{zt} K_d V^2$

Vertical Wind Projected Area: A_v = 169.99 ft²

Horizontal Wind Load: F_h = 47.32 kip $F_h = q_z G C_f A$ $Moment_{wind}$ = 378.53 kip-ft

Horizontal Wind Projected Area: A_h = 228.01 ft²

Vertical Wind Load: F_v = 0.00 kip $F_v = q_z G C_f A$

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Pure Power Engineering, Inc.
5 Marine View Plaza, Suite 301
Hoboken, NJ 07030

Client:	Langan	Date:	9/5/2025
Site Name:	Chrome PV	Prepared By:	IH
Job No:	PPE-11359.01	Checked By:	AY
Subject:	PCS	Page:	2

DESIGN CRITERIA (Continued)

Seismic Design Parameters:

Site Class:		C		
Seismic Importance Factor:	I_e	1.00		(Section 11.5.1)
Mapped spectral response acceleration at short periods:	S_s	0.058		
Design spectral response acceleration at short periods:	S_{ms}	0.067		
Mapped spectral response acceleration at 1s period:	S_1	0.035		
Design spectral response acceleration at 1s period:	S_{m1}	0.039		
Long Period Transition Period:	T_L	12	s	
Response Modification Coefficient:	R	1.25		(Table 15.4-2)
Overstength Factor:	Ω	2.00		(Table 15.4-2)
Deflection Amplification Factor:	C_d	2.50		(Table 15.4-2)
Building Period Coefficient:	C_t	0.02		(Table 12.8-2)
	x	0.75		(Table 12.8-2)
Building Fundamental Period:	T	0.329	s	(Section 12.8.2.1)
	C_u	0.00		$C_u = \frac{S_{m1}}{0.1 S_{ms}}$
	$C_{u,min}$	0.29		$C_{u,min} = \frac{S_{m1}}{0.1 S_{ms}} \geq 1.1$ $C_{u,max} = \frac{S_{m1}}{0.1 S_{ms}} \leq 1.4$
	C_{min}	0.02		$C_{min} = 0.0466 (22.5')^{0.9}$ $C_{max} = \frac{0.9 S_{ms}}{R/I_e}$ $\geq S_{m1}/2$
				0.4g
Seismic Response Coefficient:	C_s	0.04		(Equations: 12.8-2, 12.8-3, 12.8-4, 15.4-1, 15.4-2)

Seismic Design Load:

Is the structure considered a Rigid Nonbuilding Structure?		Yes		
Seismic Base Shear:	V	0.47	kip	(Equation 12.8-1 or 15.4-5)
				$V = C_s W$ or $V = 0.5 S_{m1} W / R_s$
	$Moment_{seismic}$	2.23	kip-ft	

PURE POWER ENGINEERING

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5 Mariner View Place, Suite 6B
Hoboken, NJ 07030

Client:	Liegal	Date:	8/3/2015
Site Name:	Chamo PV	Prepared By:	IH
Job No.:	PPE-11085.01	Checked By:	KY
Subject:	PDS	Page:	3

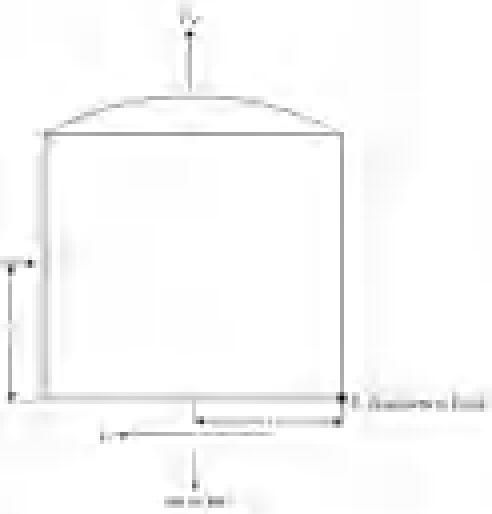
I. OVERTURNING MOMENT CHECK:

Condition 1: Equipment + Wind Load

Wind Load Factor:		1.00	
Overturning Moment From Wind:	M_O	20.31	kip-ft
Resisting Moment:	M_R	132.80	kip-ft
Overturning Check:		Pass	
Safety Factor:		6.54	

Condition 2: Equipment + Seismic Load

Seismic Load Factor:		1.00	
Overturning Moment From Seismic:	M_O	3.98	kip-ft
Resisting Moment:	M_R	132.80	kip-ft
Overturning Check:		Pass	
Safety Factor:		33.38	



II. SLIDING CHECK:

Condition 1: Equipment + Wind Load

Wind Load Factor:		1.00	
Friction Coefficient:	μ	0.60	Conservative
Sliding From Wind:	F_s	6.32	kip
Resisting Friction:	F_R	13.84	kip
Sliding Check:		Pass	
Safety Factor:		2.19	

Condition 2: Equipment + Seismic Load

Seismic Load Factor:		1.00	
Friction Coefficient:	μ	0.60	
Sliding Force From Seismic:	F_s	0.93	kip
Resisting Friction:	F_R	16.50	kip
Sliding Check:		Pass	
Safety Factor:		17.71	

REQUIRED ANCHOR DESIGN STRENGTH:

solar

Anchor Spacing:		7.83	ft
Required Tension Design Strength:		6.00	kip
Required Shear Design Strength:		6.32	kip

(Per Zone)

(Per 4 Chan

The above loads required design strengths are based on safety factor of 2. Consult manufacturer design criteria for

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Pure Power Engineering

Project:				Job No:	
Section:				Sheet no./rev.	
Calc. by:	Date:	Check by:	Date:	Appvd by:	Date:

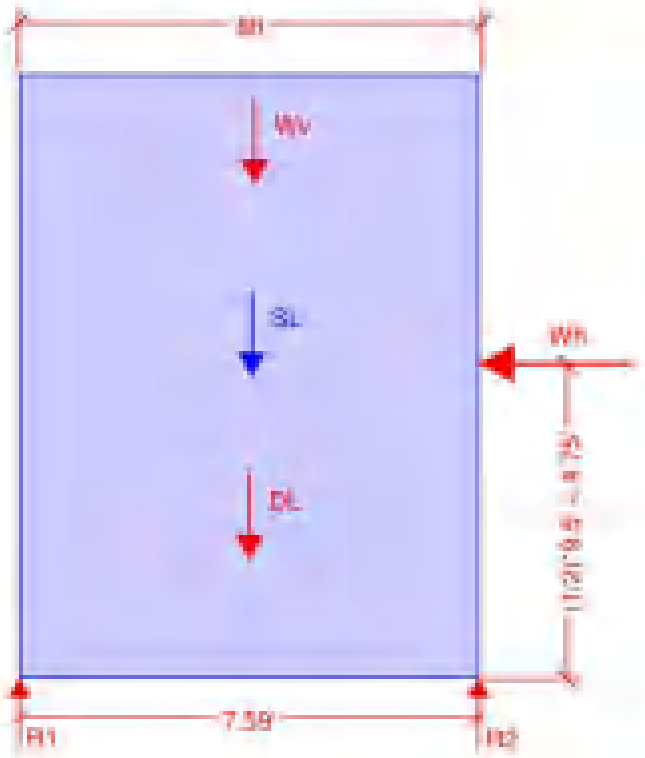
PCS Equipment Pile Design

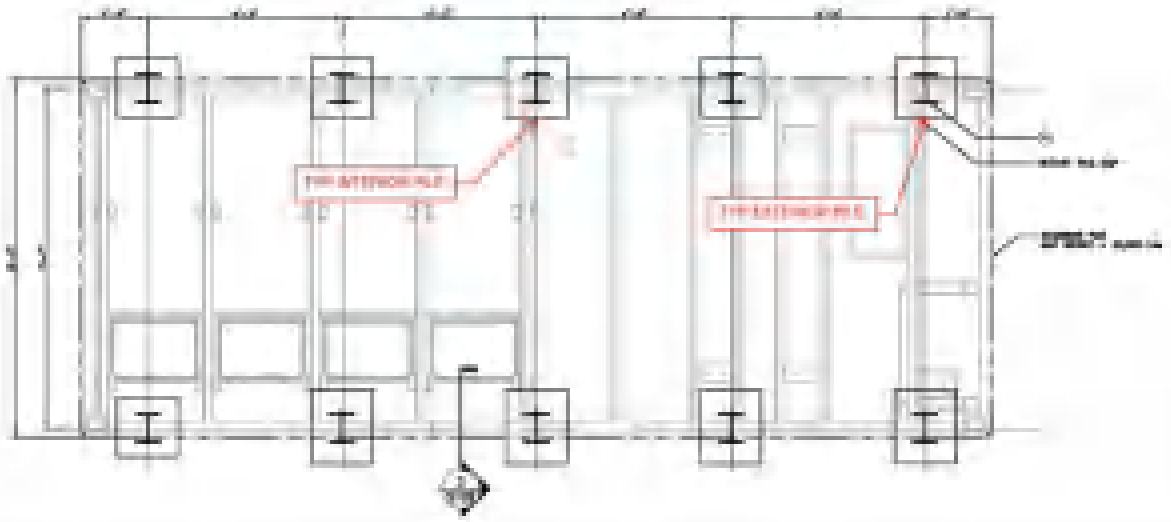
PURE POWER ENGINEERING Pure Power Engineering	Project:				Job Ref:	
	Section:				Sheet no./rev.	
	Calc. by	Date	Chkd by	Date	Appd by	Date

1 - Reactions from Equipment:

PCS Pile Foundation Design

See following sheets for skid load calculations





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PCS Pile Foundation Design

See following sheets for skid load calculations

Total DL =	55.00	kip
Total SL =	1.91	kip
Total Wh =	6.32	kip
Total Wv =	1.31	kip

Storm Load = 9.2 psf

Load Combination (ASD)

LC1: D + 0.6W

LC2: D+0.75(0.6W)+0.75S

LC3: 0.6D+0.6W

Notes:

* Interior Pile Trib = 22% from Total equipment Trib.
* Exterior Pile Trib = 14% from total equipment Trib.

* Design Will Be performed on the Interior Pile which represent Worst case scenario

Pile Forces (ASD)

LC1: D + 0.6W (Vertical)

R1 = (D+0.6Wv)/2 + (0.6Wh x 4.75/7.5) = 4.52 kip

R2 = (D+0.6Wv)/2 - (0.6Wh x 4.75/7.5) = 3.44 kip

(Lateral) V = 0.6Wh /10

V = 0.42 kip

LC2: D + 0.75(0.6W)+0.75L (Vertical)

R1 = (D + 0.75*0.6*Wv +0.75 SL)/2 + (0.6Wh x 4.75/7.5) = 4.54 kip

R2 = (D + 0.75*0.6*Wv +0.75 SL)/2 - (0.6Wh x 4.75/7.5) = 3.46 kip

(Lateral) V = 0.75*0.6Wh /10

V = 0.31 kip

LC3: 0.6D + 0.6W (Vertical)

R1 = (0.6*DL + 0.75*0.6*Wv +0.75 SL)/2 + (0.6Wh x 4.75/7.5) = 3.09 kip

R2 = (0.6* DL + 0.75*0.6*Wv +0.75*SL)/2 - (0.6Wh x 4.75/7.5) = 2.01 kip

(Lateral) V = 0.6Wh /10

V = 0.42 kip

Controlling Pile Load

Downward =	4.54	kip
Uplift =	0.00	kip
Lateral =	0.42	kip

Lateral check and bending of the pile are minimal because the maximum pile reveal is 2'-6" max, however see the calculation below for verification.

2 - Flood Load – Worst Case Scenario Elevation

A – Hydrodynamic Pressure:

- Base Flood elevation (BFE) *100yr 72hr peak stage (ft. NGVD29)* = 1264.73 ft
- Grade Elevation (GE) = 1261.79 ft

- $d_s = 0.65(BEF - GE) = 0.65*(1264.73ft - 1261.79ft) = 1.911$ ft
- $V_{max} = \frac{d_s}{1\,s} = \frac{1.92\ ft}{1\,s} = 1.92$ ft/s
- $V_{min} = d_s/1s = 1.911$ ft/s
- g = 32.2 ft/s
- $V_{max} = \sqrt{g d_s} = \sqrt{32.2\ ft/s^2 \times 1.92 ft} = 7.87$ ft/s

Since the $V_{max} < 10\ \frac{ft}{s}$ *we do not need to consider hydrodynamic Loads*

B – Hydrostatic Pressure

Since the PCS equipment foundation consists of piles (an open structure), the floodwater lable will equalize on all sides of the piles during inundation. As a result, hydrostatic pressures balance out and effectively cancel each other.

2 – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion. The post that will be used is the W8x24.
- Per the Geotech report, the corrosion characteristics are as follows

8.3 Soil Corrosivity and Resistivity

Field electrical resistivity test values generally ranged from about 1,150 to 9,050 Ω-cm, except for ERT-3, which exhibited resistivity test values ranging from about 5,500 to 34,500 Ω-cm. Resistivity values generally decreased as probe spacing increased to about 30 feet. Based on guidelines presented in Corrosion Basics: An Introduction, 2nd Ed (2006), the results of most field resistivity tests generally indicate [illegible] corrosivity potential. ERT results are summarized in Attachment C.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

PROJECT NAME:	Ontario Solar and Storage		
PROJECT NUMBER:	[illegible]	INSPECTOR:	Sydney Mckenzie
DATE:	3/5/2024	TIME:	10:00 AM
TEST LOCATION:	[illegible]	TEMP:	[illegible]

DIRECTION = NE-SW

ELECTRODE SPACING 'a' (ft)	(m)	BASIC PENETRATION (0.1a) (ft)	ACTUAL PENETRATION (ft)	(m)	RESISTANCE (ohm)	RESISTIVITY (2πaR) (ohm-cm)
2	0.61	1.2	1	0.1905	[illegible]	[illegible]
5	1.52	3	3	0.9525	[illegible]	[illegible]
10	3.05	6	4	1.1430	[illegible]	[illegible]
15	4.57	9	5	1.5240	[illegible]	[illegible]
20	6.10	12	7	2.1336	[illegible]	[illegible]
30	9.14	18	8	2.4384	[illegible]	[illegible]
50	15.24	30	9	2.7432	[illegible]	[illegible]
100	30.48	60	10	3.0480	[illegible]	[illegible]

(Maximum) = 1184

= 1184

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a 3-mil of zinc on wide flange shapes and a 50-year project life.

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Table 8 – Estimated Corrosion Rates

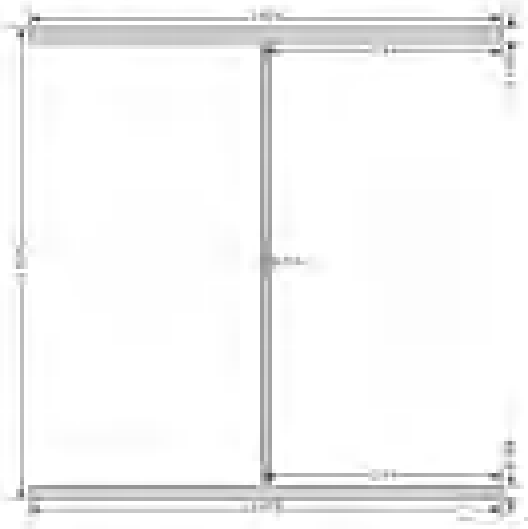
Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.53	2.5
1250 – 3000	0.39	2.2

Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in

W6X15

	Original Dims. [in]	Reduced Dims. [in]
t_w =	0.230	0.119
t_f =	0.280	0.169
d =	5.990	5.879
b_f =	5.990	5.879

CALCULATION OF SECTION PROPERTIES



Area:

A = 2.65 in²

2nd moment of area:

I_x = 12.5 in⁴ I_y = 5.72 in⁴ I_{xy} = 12.5 in⁴ I_y = 5.73 in⁴

Radius of gyration:

r_x = 2.06 in r_y = 1.47 in r_{xy} = 2.60 in r_y = 1.47 in

Plastic section modulus (only shapes with all rectangles at 90 degs):

Z_x = 5.56 in³ Z_y = 2.94 in³

Distance to combined centroid:

X_c = 3.00 in Y_c = 6.80 in

Distance to equal axis area (only shapes with all rectangles at 90 degs):

X_c = 3.00 in Y_c = 6.80 in

Elastic section modulus:

S_x = 4.00 in³ S_y = 1.91 in³

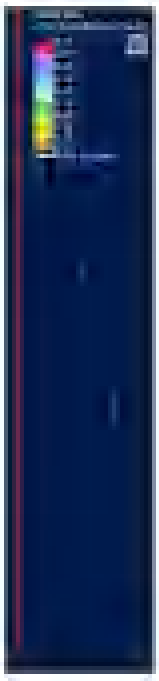
3 - Post design using RAM Element

The pile reveal is 3 ft. According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judgment, the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 5 feet.

Ram Model

Loading

Reactions



Utilisation

UTILIZATION = 0.19 < 1.00 a W8X24 OK !

RAM Elements

Steel Code Check

Summary - Group by description

Description	Section	Member	Ctrl Eq	Ratio	Status	Reference
	W8X24 - W / CORROSION	1				

4- Axial Check:

W8x24 reduced section due to corrosion:

perimeter = $2(b_f + d') + 4\,[(b_f - t_w)/2]$ = 2(5.83ft + 5.67ft) + 4(5.83ft-0.31ft)/2) = 25.02ft*12 = **2.919 ft**

Area = $2*b_f * t_f + (d - 2\,t_f) * t_w$ = 2*5.83/9*0.160) + (5.83/9-2*0.160)*0.210 = 2.88 in²/144 = **0.0218 ft²**

The axial load P = **4,550 lbs**, according to the worst case combination load analysis: LC2 = Ds + 0.75SL + 0.45 WL

The allowable skin friction, as mentioned in the geotechnical report, is as follows:

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (ft)	Allowable End-Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4	–	–	–
Stratum 2	4 – 20 4 – 12	20,000	750	525
Stratum 3	8 – 20	22,000	350	245
Stratum 4	12 – 20	24,000	1,050	735

Notes:
1) [illegible]
2) [illegible]
3) [illegible]

Pile surface area = 2.919' x 5' (based on # total embedment & ignoring the upper 4.0') = 14.595 ft²

- **Allowable Friction force:**

Stratum 1: from 0 – 4 ft = .0 lbs

Stratum 2: from 4 – 8ft (Conservatil Height) = 750 psf x 4ft x 2.919ft = **8,757 lbs**

Stratum 3: from 8 – 9ft = 350 psf x 1ft x 2.919ft = **1,021.65 lbs**

Allowable End Bearing: 20,000 psf (Pile to Bear Within stratum 2)

Net bearing Resisting Force = 22,000 psf X 0.0218ft² (Section Area) = **396 lbs**

Total resistance = 8,757 + 1,021 + 396 = **10,174 lbs = 4,550 lbs → Ratio 45 %** **OK**

Therefore, the **W6x15** pile with **5ft** embedment is performing adequately for the axial load check.

5- Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summarized below:

Skin friction in the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative skin friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 2.919ft = 11.676 ft^2

Soil Heave Uplift force = 750 psf X 11.676 ft^2 = **8,757 lbs**

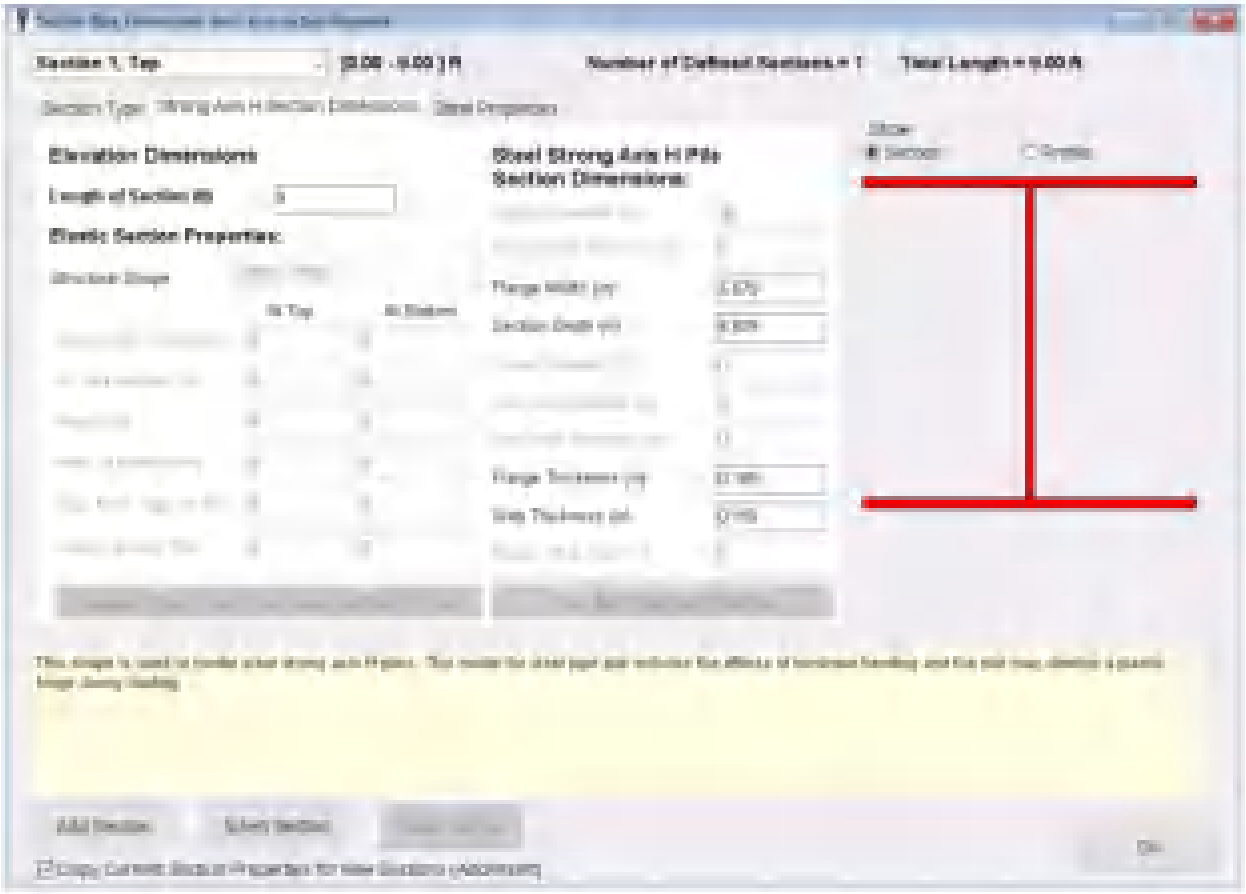
Skin Friction Resistance Force = 8,757 + 1,021 lbs = **9,778 lbs**

Skin Friction Resistance Force = 8,757 lbs < 9,778 Lbs ⇒ 89.55% OK

6- W6x15 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) - L-Pile Inputs:

- W8x24 reduced section due to corrosion
- 5ft embedment.

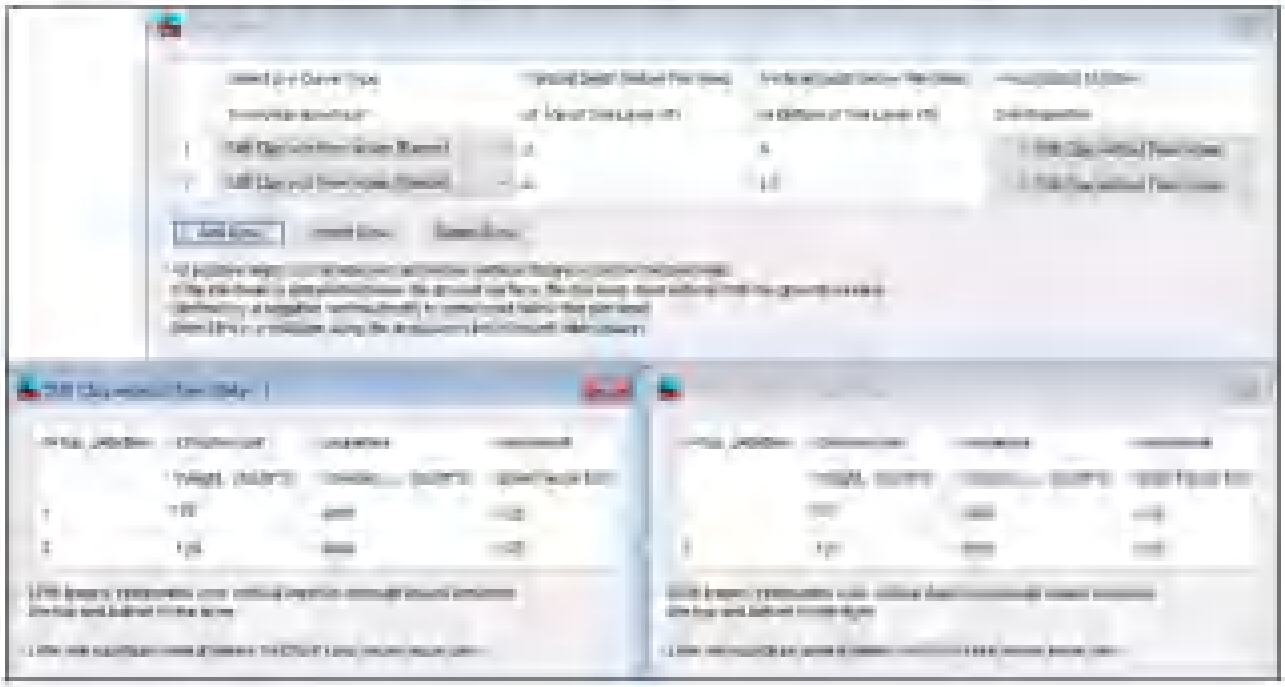


B) Soil Parameter:

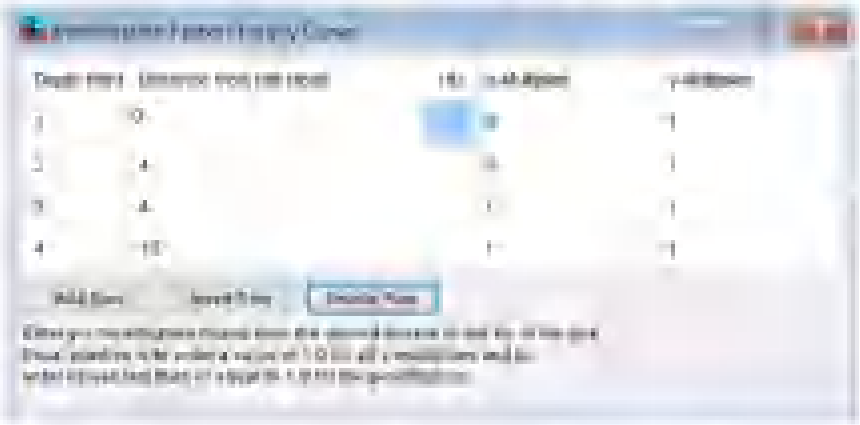
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor e50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	132	Stiff Clay w/o Free Water	4,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.



C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

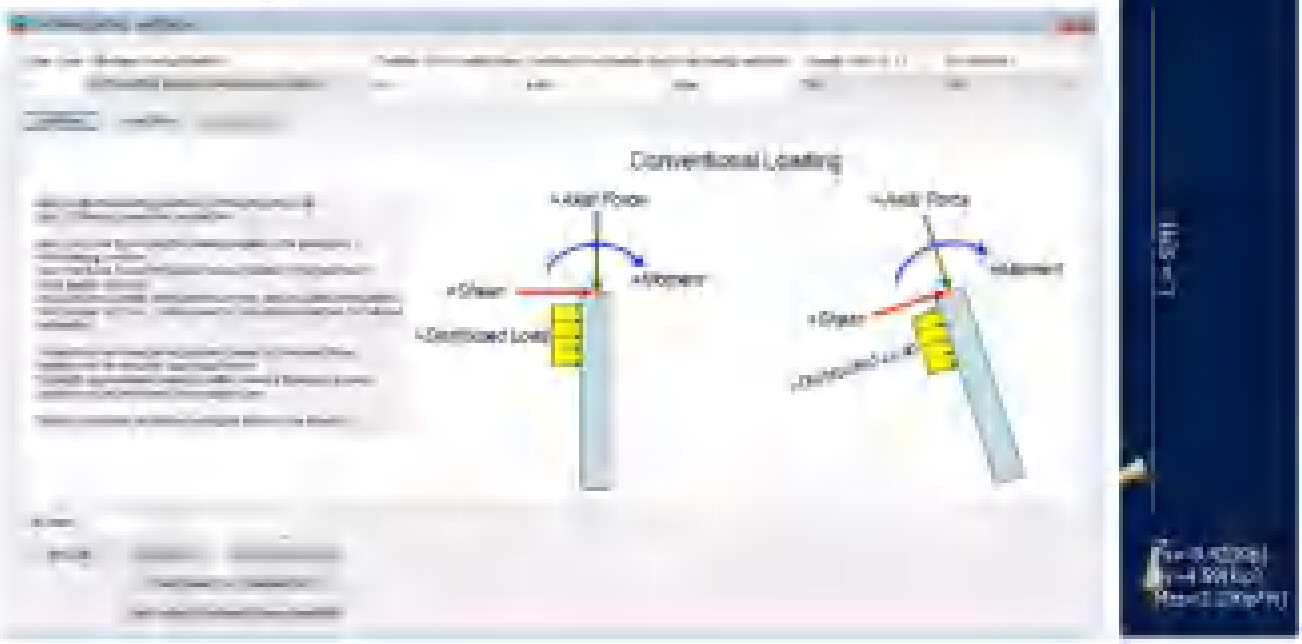
The Governing load combination is: **LC2 = DL + 0.75SL + 0.45 WL**

Axial: **4,590 lb**

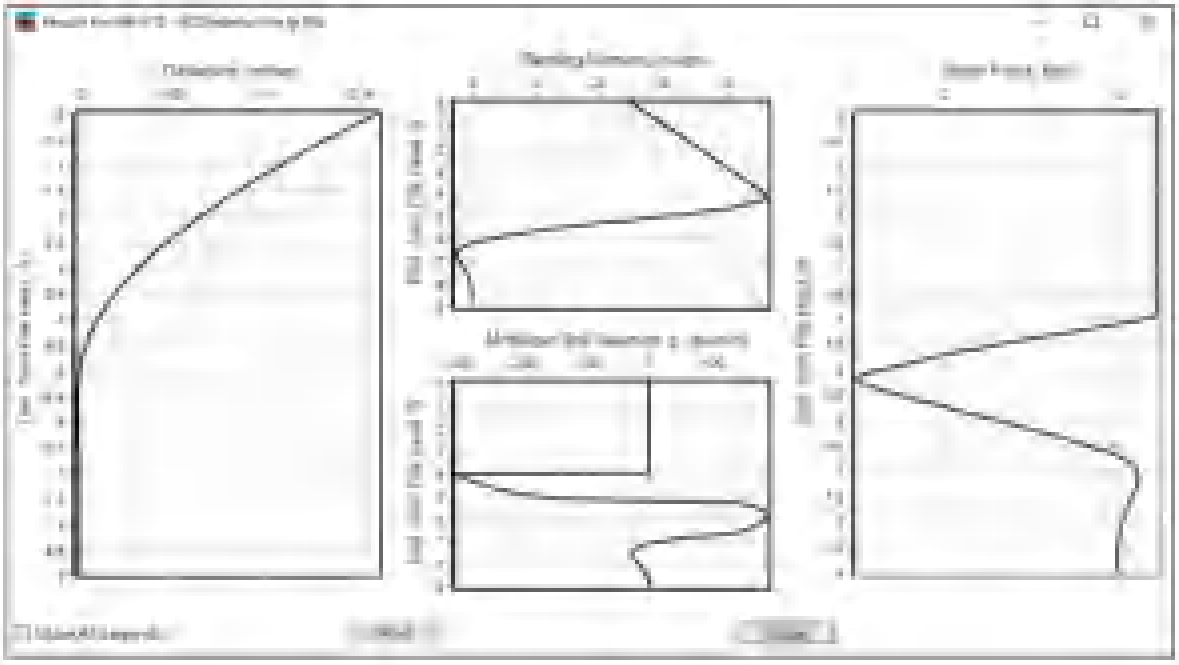
Shear = **420 lb**

Moment = 2.1kips-ft = 2,100 lb-ft = **25,200 lbs-in**

Load L-pile Inputs



D) L-Pile Result:



Shear force at pile head	=	420.0 lbs
Applied moment at pile head	=	25200.0 in-lbs
Axial thrust load on pile head	=	4590.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	S radians	Slope Stress psi*	Total Stiffness lb-in^2	Bending p lb/inch	Soil Res. Es*H lb/inch	Soil Spr. Distrib. Lat. Load lb/inch
0.00	0.1595	25200.	420.0000	0.00460	5875.	5.18E+08	0.00	0.00	0.00

Deflection = 0.16" < 0.50" W6X15 W/9ft Embedment min.

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E) Moment capacity check:

Mn/Ω =(50 Ksi)*(6.09 in^3)/1.67 = 182.33 Kip-in > 46.257 Kip-in OK!

Pile-head deflection	=	0.15947366 inches
Computed slope at pile head	=	-0.0046035 radians
Maximum bending moment	=	46408. inch-lbs
Maximum shear force	=	-2930. lbs
Depth of maximum bending moment	=	4.14000000 feet below pile head
Depth of maximum shear force	=	5.22000000 feet below pile head
Number of iterations	=	16
Number of zero deflection points	=	3

CALCULATION OF SECTION PROPERTIES

Area

A = 3.65 in²

2nd moment of area

I_{xx} = 17.8 in⁴ I_{yy} = 5.72 in⁴ I_{xx} = 17.8 in⁴ I_{yy} = 5.72 in⁴

Radius of gyration

r_{xx} = 2.80 in r_{yy} = 1.47 in r_{xx} = 2.80 in r_{yy} = 1.97 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 6.56 in³ Z_{yy} = 2.64 in³

Distance for combined centroid

X_c = 5.80 in Y_c = 8.08 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

X_{eq} = 5.80 in Y_{eq} = 8.08 in

Elastic section modulus

S_{xx} = 6.56 in³ S_{yy} = 1.85 in³

MESSENGER WIRE FOUNDATION DESIGN

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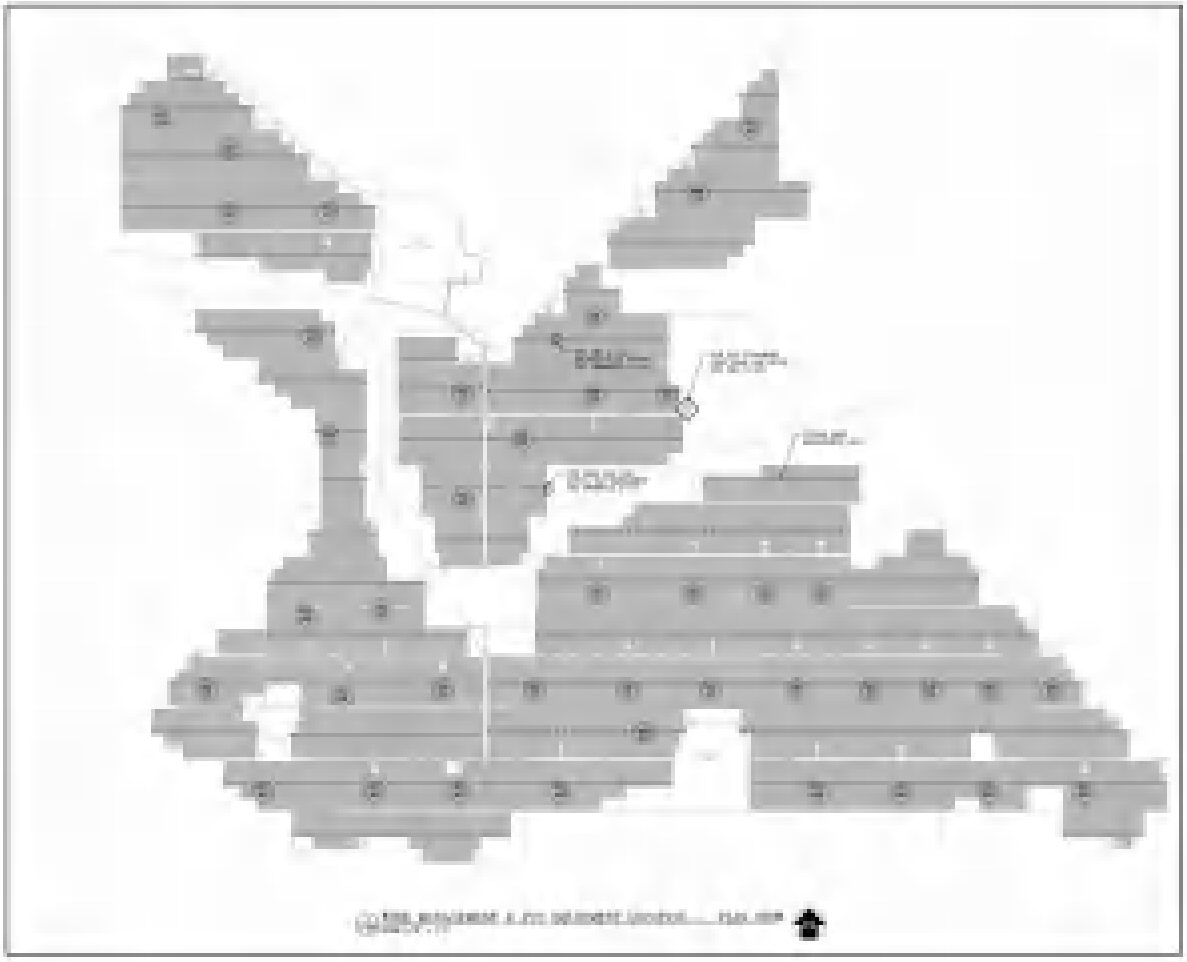
1) Layout Plan:



- **Mid-Post Max Span = 15'-7"**
- **End-Post Max Span = 15'-7"**

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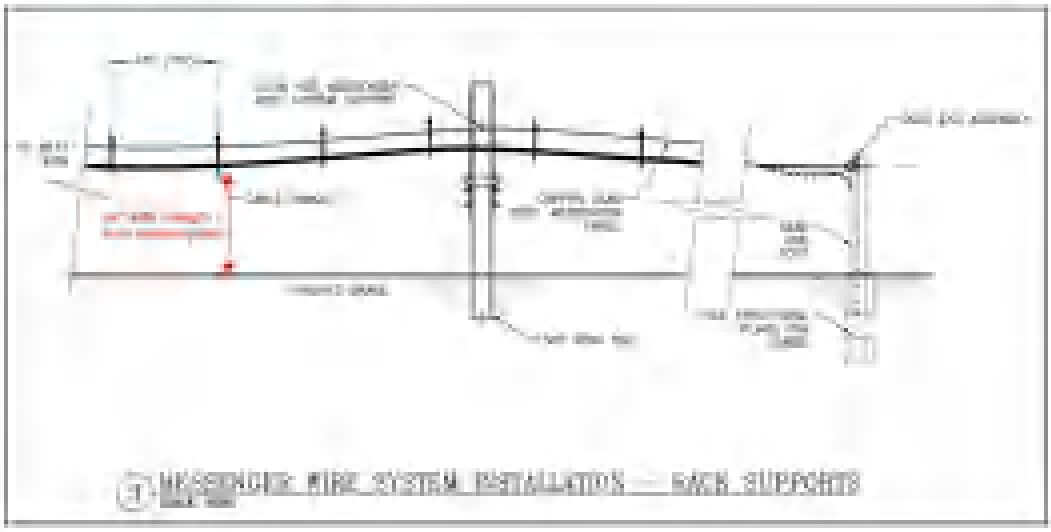
2) Calculating Attachment Height:



Mid - Piles

Min. Clearance	24	in	*From Elec.
Max Sag	12	in	
Hanger Height	12.3	in	*From Hanger Cut Sheet
L-Bracket Height	0	in	*From Cut Sheet
Min. Attachment Height	**48.3**	**in**	
	4.03	**ft**	

End- Piles

Min. Clearance	24	in	*From Elec.
Max Sag	12	in	
Hanger Height	12.3	in	*From Hanger Cut Sheet
L-Bracket Height	0	in	*From Cut Sheet
Min. Attachment Height	**48.3**	**in**	
	4.03	**ft**	

Minimum cable attachment will be considered at **4'-3"** height. For a maximum SAG of **12"**

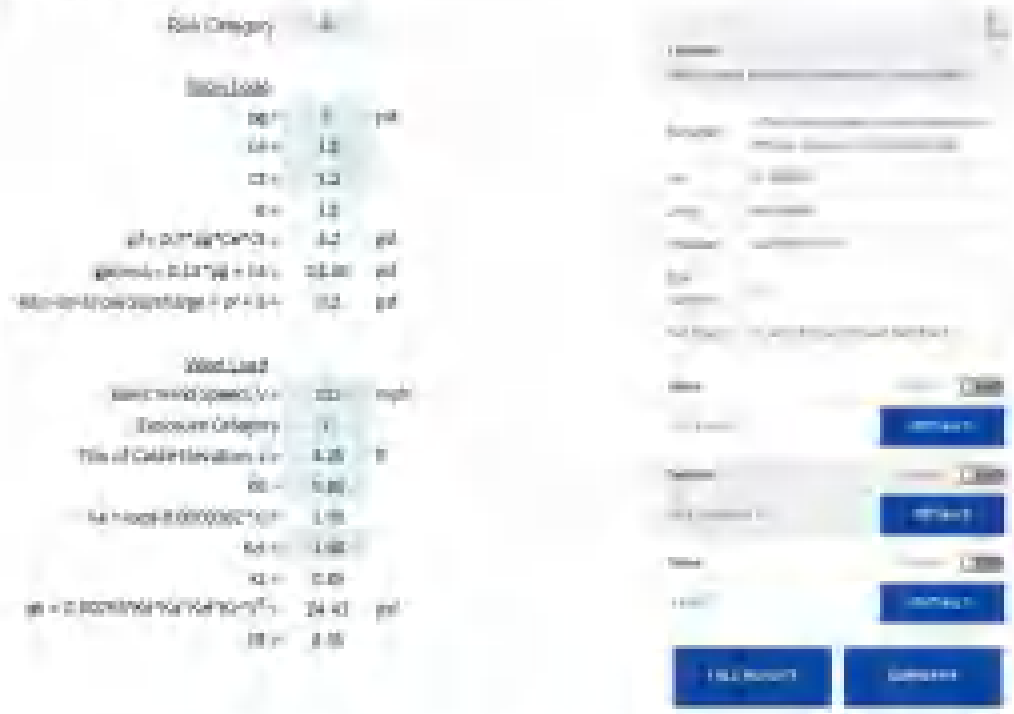
3) Calculating AWM Loads:

a) Dead Loads:

The design will be performed based on the worst-case scenario load

- **PV Wires weight** = 20.25 plf
- **Hanger Weight (using AWM Hanger Part No = 31-9158-01)** = 0.04 lb each 4ft = 0.0125plf
- **Max Dead Loads** = 20.5 plf (will be considered **21 plf**)

b) Snow & Wind Forces:



Type	Hanger width		Cable weight		Cable weight
	D [in]	[ft]	[in]	[ft]	[lb]
1	63	5.34	1.01	1.61	19.91

Type	Dead Load	Snow Load	Wind Load		ASCE Eqn: 7-5	ASCE Eqn: 7-5
	W [plf]	SL = Roof Snow Load *B [plf]	Cf	WL = [0.00256*Kz*Kzt*V^2*I] [plf]	Gravity Load [plf]	Lateral Load [plf]
1	21	5.34	1.00	46.41	31.68	24.26

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	Section:				Sheet no./rev.	
	Calc. by	Date	Chk'd by	Date	Appr'd by	Date

Cable Reactions

Gravity Load (Long. + Axial)

Distributed load, q_g =	25.36	plf
post spacing, L =	15.50	ft
sag, h =	12	in
Cable Length, $s = L + 8h^2/3L$ =	15.8	ft
Reaction Longitudinal Dir. Long - $R_H = q_g L^2/8h$ =	3936.4	lb
Reaction Vertical Dir. Axial - $R_V = q_g L/2$ =	2632.5	lb

Lateral Load - Trans

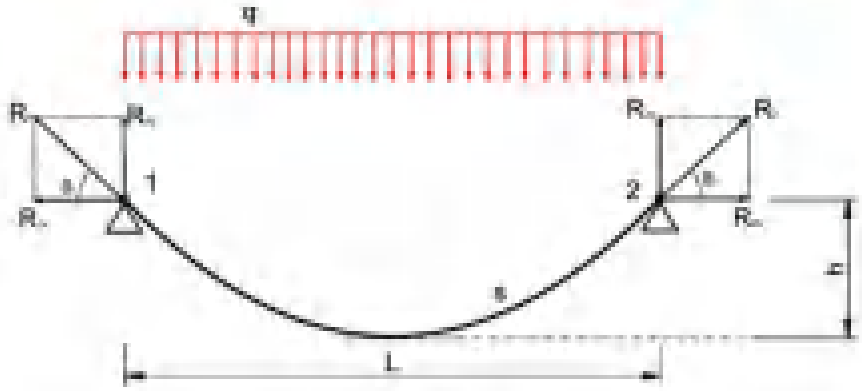
Distributed load, q_w =	24.20	plf
post spacing, L =	15.50	ft
sag, h =	12	in
Cable Length, $s = L + 8h^2/3L$ =	15.8	ft
Reaction Transverse Dir. $R_H = q_w L/2$ =	251.1	lb

Messenger Cable Strength

Max Cable Force, $R = \sqrt{(q_g L s/2)^2 + (q_g^2 L^2/8)^2}$ =	817.1	lb
Messenger Wire Type:	3/8 EHS	
Breaking Strength =	6270.0	lb
Allowable Strength =	2562.0	lb
Utilization =	0.32	

Hex Rod Strength

Max Rod Force, $R = 2 * R_V$ =	405.1	lb
Rod Type:	5" Hex Rod	
Yielding Load =	8760.0	lb
Allowable Strength =	3650.0	lb
Utilization =	0.19	

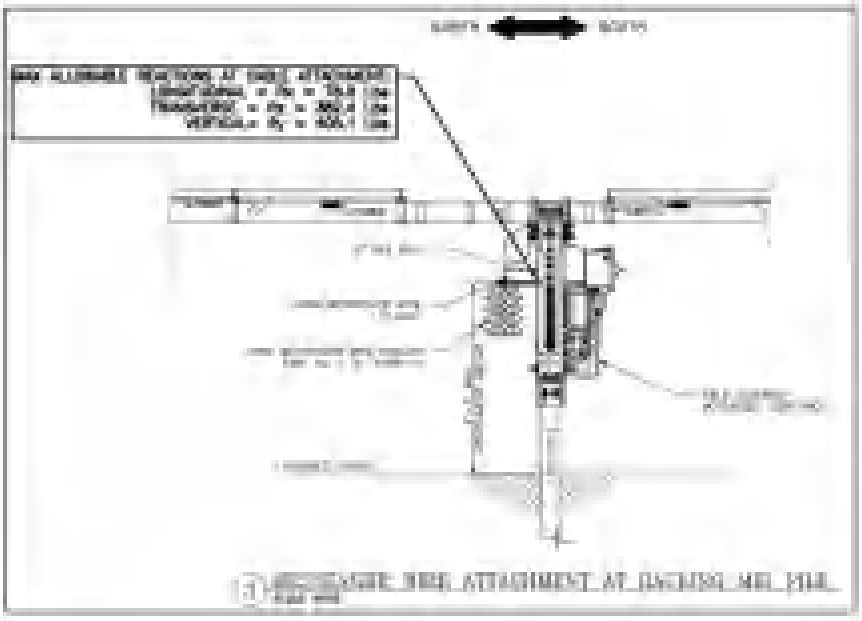


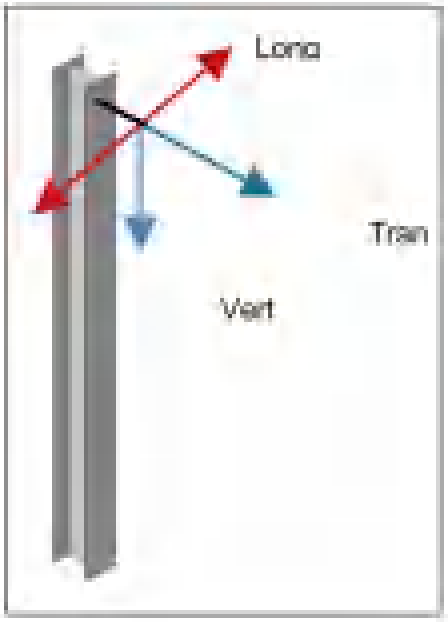
4) Mid Post Design:

The mid posts supporting the messenger wire are the racking posts. Therefore, the following reaction forces should be incorporated into the structural design of the racking posts to ensure proper load handling and system integrity.

Max Allowable Cable Loads at Mid Piks

Longitudinal = Rx =	78.9	lb	*assume 10% of Dead End Post for unequal post spacing
Transverse = Ry =	362.4	lb	
Vertical = Rz =	465.1	lb	





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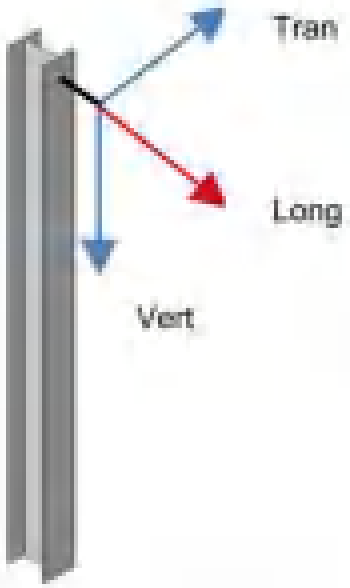
5) Dead End Post Design:



Cable Loads

Longitudinal = Rx =	789.4	lb
Transverse = Rz =	191.2	lb
Vertical = Ry =	262.5	lb

Cable Force Location

Height of Force =	4.3	ft
Eccentricity of Force =	0.250	ft (Dist from Flange to Pile CL)

Additional Loading

Transverse = Lateral Loads =	0.0	lb
Vertical = Gravity Loads =	0.0	lb

Additional Force Location

Height of Force =	0.0	ft	
Eccentricity of Force =	0.0	ft	*assumed

Base Reactions Forces

Axial =	262.5	lb	
Transverse =	191.2	lb	Weak Axis
Longitudinal =	789.4	lb	Strong Axis

Base Reactions Moments

Transverse =	812.5	lb-ft	Weak Axis
Longitudinal =	3405.6	lb-ft	Strong Axis

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a) Flood Load – Worst Case Scenario Elevation

1 – Hydrodynamic Pressure:

- Base Flood elevation (BFE) *100yr 72hr peak stage (ft. NGVD29)* = 1264.73 ft
- Grade Elevation (GE) = 1261.79 ft

- $d_s = 0.65(BEF - GE) = 0.65*[1264.73ft - 1261.79ft) = 1.911$ ft
- $V_{max} = \frac{d_s}{1\,s} = \frac{1.92\ ft}{1\,s} = 1.92$ ft/s
- $V_{min} = d_s/1s = 1.911$ ft/s
- g = 32.2 ft/s
- $V_{max} = \sqrt{gd_s} = \sqrt{32.2\ ft/s^2\ x\ 1.92 ft} = 7.87$ ft/s

Since the $V_{max} < 10\frac{ft}{s}$ *we do not need to consider hydrodynamic Loads*

2 – Hydrostatic Pressure

Since the piles is an open structure, the floodwater table will equalize on all sides of the piles during inundation. As a result, hydrostatic pressures balance out and effectively cancel each other.

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b) – Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion.
- The post that will be used is the W6x15
- Per the Geotech report, the corrosion characteristics are as follows

6.5 Soil Corrosivity and Resistivity

Field electrical resistivity test values generally ranged from about 5,600 to 9,500 Ω-cm. Resistivity values generally increased with probe spacing and soil layer. Based on guidelines presented in Caltrans Basis, An Engineering Service to Advertise Surface Electrical [illegible] values generally increased with probe spacing and soil layer. Based on guidelines presented in Caltrans Basis, An Engineering Service to Advertise Surface Electrical [illegible] the results of these test resistivity tests generally indicate a moderately corrosive to extremely corrosive environment. ERI results are provided in Attachment C.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-ELECTRODE METHOD

PROJECT NAME:			
PROJECT NUMBER:		INSPECTOR:	
DATE:		TIME:	
TEST LOCATION:		TEMP:	

ELECTRODE SPACING "a" (ft)	(m)	MULTIPLIER (3Pi a) (ft)	ACTUAL PENETRATION (in)	(cm)	RESISTANCE (ohms)	RESISTIVITY (ohm-cm)
2	0.61	12	3	7.62	11	4,150
5	1.52	30	3	7.62	11	10,361
10	3.05	60	3	7.62	11	20,722
20	6.10	120	3	7.62	11	41,444
30	9.14	180	3	7.62	11	62,166
40	12.19	240	3	7.62	11	82,888
50	15.24	300	3	7.62	11	103,610
100	30.48	600	3	7.62	11	207,220

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates:

Assume a **3-mill of zinc on wide flange shapes and a 50-year** project life.

Table 3 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.50	4.5
1250 – 3000	0.39	2.2

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Project Life	50	years
Zinc Corrosion Rate	0.85	mils/year
Zinc Thickness	5	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	3.0	mils/year
Total Steel Loss	132.9	mils
Total Steel Loss (in.)	0.1329	in.

W6X15

	Original Dims. [in]	Reduced Dims. [in]
t_w =	0.230	0.119
t_f =	0.280	0.169
d =	5.990	5.879
b_f =	5.990	5.879

CALCULATION OF SECTION PROPERTIES

Area

A = 2.90 in²

2nd moment of area

I_{xx} = 17.3 in⁴ I_{yy} = 5.72 in⁴ I_{xx} = 17.3 in⁴ I_{yy} = 5.72 in⁴

Radius of gyration

r_{xx} = 2.68 in r_{yy} = 1.47 in r_{xx} = 2.68 in r_{yy} = 1.47 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 5.59 in³ Z_{yy} = 2.84 in³

Distance to combined centroid

x_c = 0.00 in Y_c = 5.80 in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

x_{ea} = 0.00 in Y_{ea} = 5.80 in

Plastic section modulus

S_{xx} = 5.59 in³ S_{yy} = 1.86 in³

C - Post design using RAM Element

The pile reveal is 5 ft. and the attachment will be at 4'-3" and According to the geotechnical report, skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judgment, the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 7 feet.

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Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.62 < 1.00 à W6X15 OK !

RAM Elements

Steel Code Check

Summary - Group by description

Description	Section	Member	Crit Eq.	Ratio	Status	Reference
	W6X15 --W / (0)W6X15	1	LC1 at 0.0ft	0.62	OK	

4- Axial Check:

W6x15 reduced section due to corrosion:

perimeter = 2(b$_f$ + d) + 4 [(b$_f$ − t$_w$)/2] = 2(5.879 + 5.879)+ 4(5.879-0.119)/2] = 35.036"/12 = **2.919 ft**

Area = 2*b_f* t_f +(d - 2 t_f)* t_w = 2*5.875*0.169 + (5.875-2*0.169)*0.119 = 2.65 in²/144 = 0.018 ft²

The axial load P = 280 lbs, according to the worst-case combination load analysis: **LC2 = DL + 0.75SL + 0.45 WL**

- The allowable skin friction, as mentioned in the geotechnical report, is as follows.

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (feet)	Allowable End Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
1	0 – 4			
2	4 – 20	20,000	750	375
	4 – 12*			
3	8 – 20	30,000	1,500	750
4	12 – 20*	40,000	2,000	1,000

Notes:
1) Geotechnical engineering judgement required. A factor of safety of 2.0 was used for skin friction and end bearing. Allowable uplift capacity may be limited by pullout of steel pile from concrete or by allowable tensile stress in steel section. Allowable capacities are calculated by the geotechnical engineer.
2) Minimum pile penetration depth is the lesser of the depth required to develop the full allowable axial capacity or the depth required to attain a pile tip elevation of 4 feet above the bedrock surface. Refusal is defined as 10 blows per inch of penetration or less.
3) Pile spacing should be checked to avoid group reduction considerations. Reduction may be necessary when piles are installed within a group. Group reduction considerations are the responsibility of the engineer of record.

Pile vertical area = 2.919' x 3' (based on 5' total embedment & ignoring the upper 4.0') = 8.757 ft²

- **Allowable Friction force:**

Stratum 1: from 0 – 4 ft = **0 lbs**

Stratum 2: from 4 – 7ft (Conservative Height) = 750 psf x [ft] x 2.919[ft] = **6,567 lbs**

- **Allowable End Bearing: 20,000 psf** (Pile at Base Within stratum 2)

Net bearing Resisting Force = [1,000 psf X 0.018ft²] (Section Area) = **396 lbs**

Total resistance = 6,567 + 396 = **6,964 lbs > 280 lbs → Ratio: 40.2%. OK!**

Therefore, the W6x15 pile with 7ft embedment is performing adequately for the axial load check.

5- Expansive Soil :

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Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summarized below.

Solar Reduce ++ the upper 4 feet of the base ground be replaced to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative skin friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 2.919ft = 11.676 ft²

Soil Heave Uplift force = 750 psf X 11.676 ft² = **8,757 lbs**

Skin Friction Resistance Force = **8,567 lbs**

Skin Friction Resistance Force = **8,567 lbs** < 8,757 lbs → 199% [illegible]

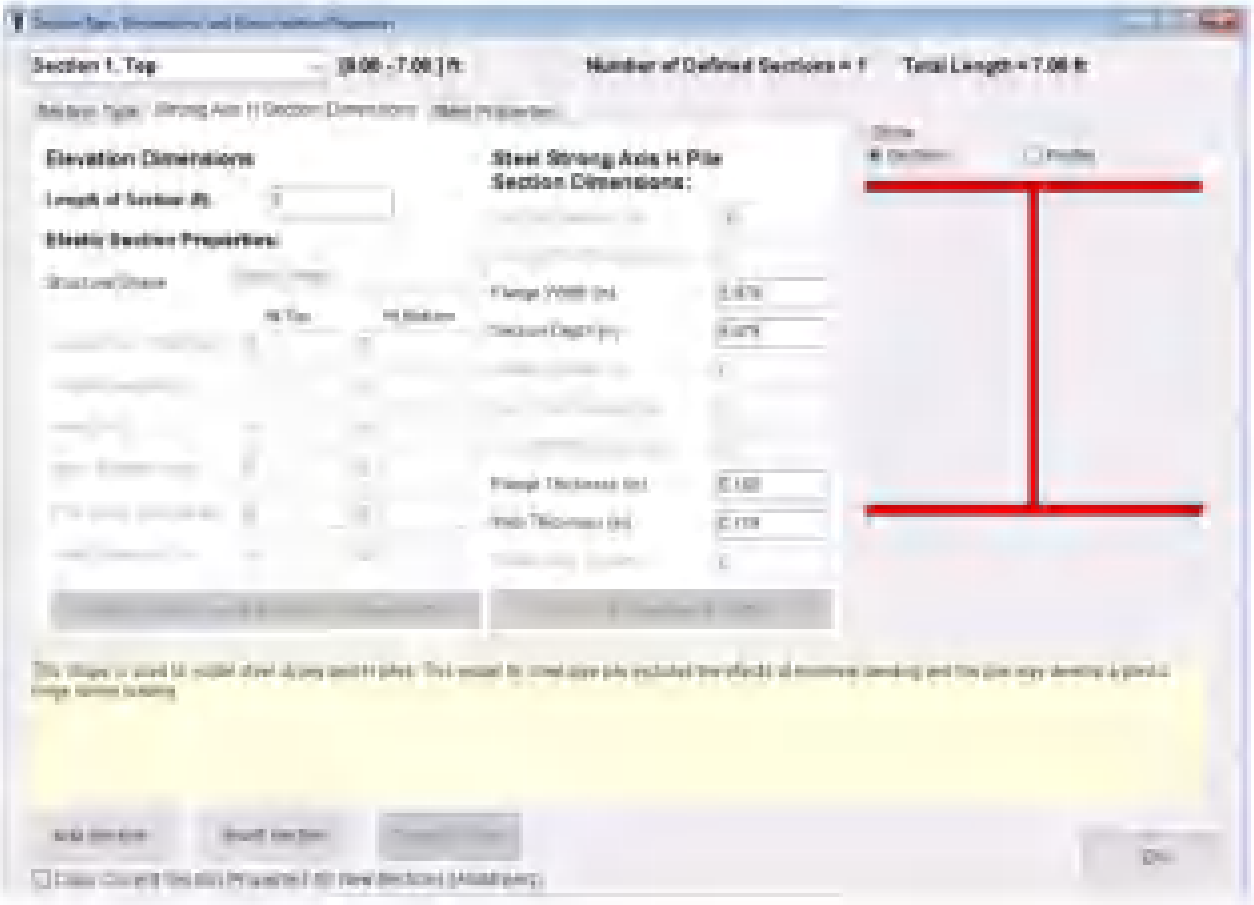
To address the uplift force resulting from expansive soil movement—and recognizing the limited skin friction resistance available along the pile—preventive measures are essential. Several strategies have been proposed to reduce uplift and mitigate these effects:

- Apply Silkcoat in the top **4 ft & 6 inches** above ground
- Apply yellow jacket friction reduction in the top **4 ft & 6 inches** above ground.
  Pre-drill the top **4 ft** and replace the soil with compacted washed ¾" clean gravel
- Or increasing the pile embedment to **9ft**

6- W6x15 Pile Embedment Design for Lateral Loads Using L-Pile Software:

A) –L-Pile Inputs: Design along - Strong Axis:

- W6x15 reduced section due to corrosion
- **7ft** embedment:

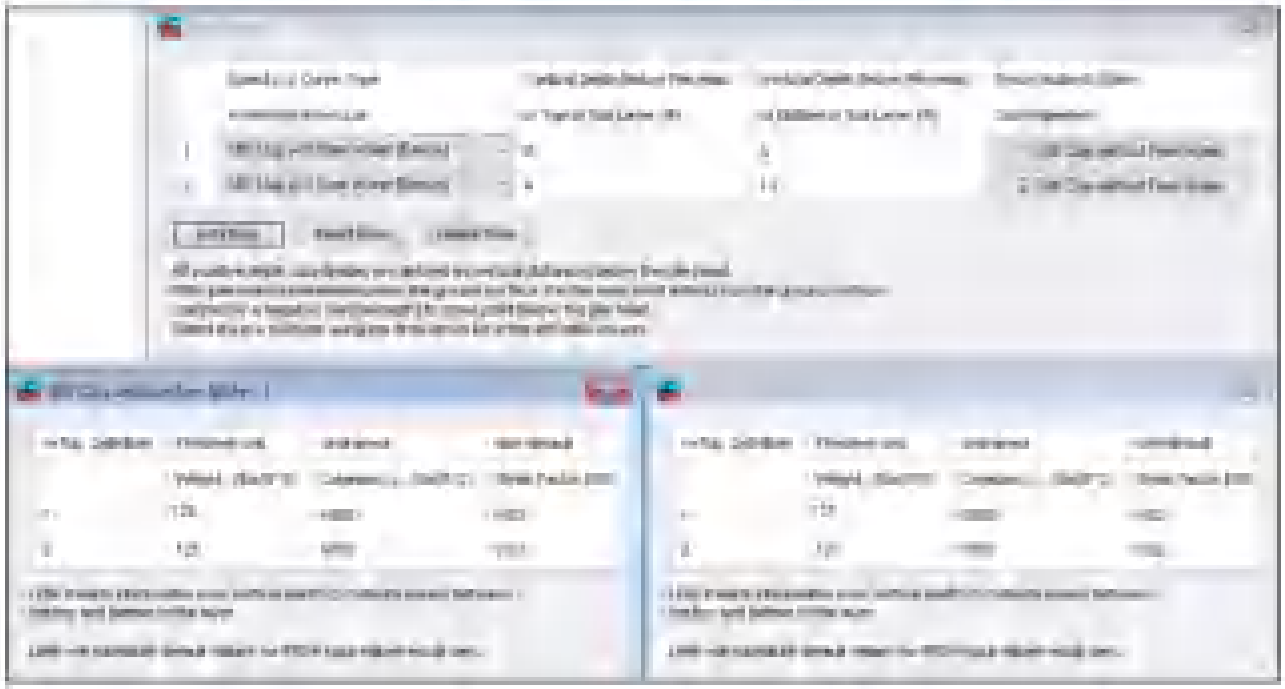


B) Soil Parameter:

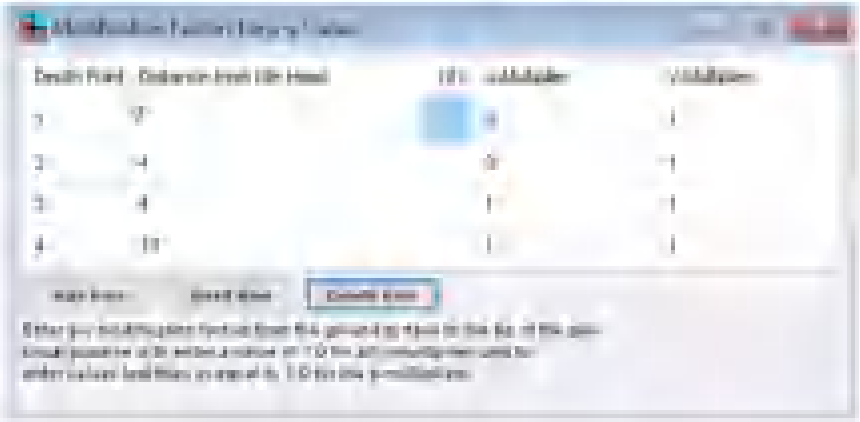
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	8,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations

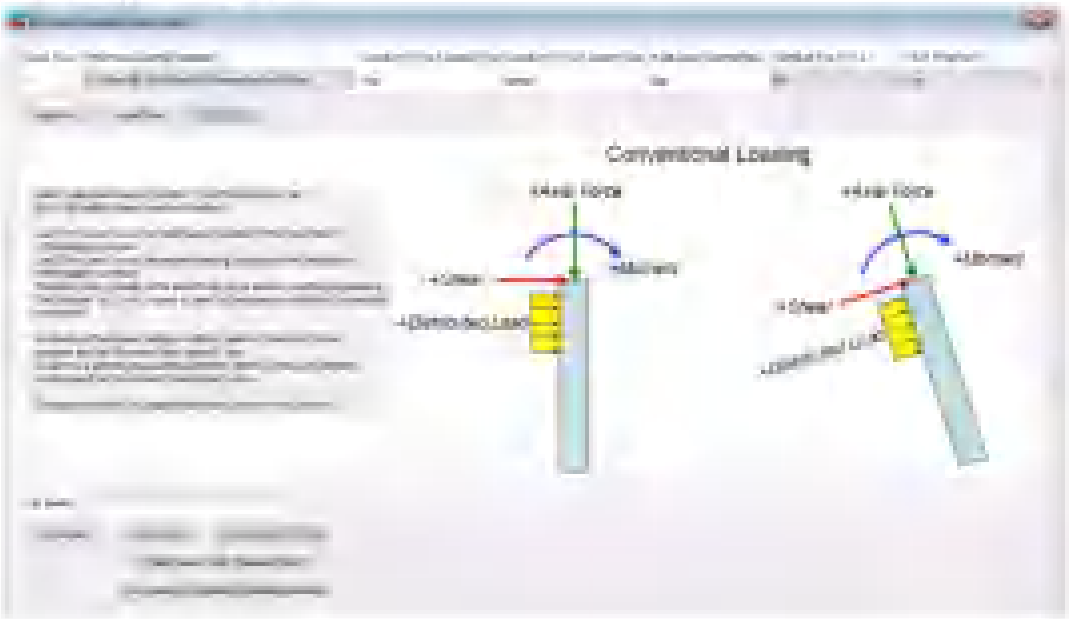


C) Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

Axial: **266 lb**
Shear = **790 lb**
Moment = 5.07 kips-ft = 5070 lb-ft = **60,840 lbs-in**

Load L-pile Inputs



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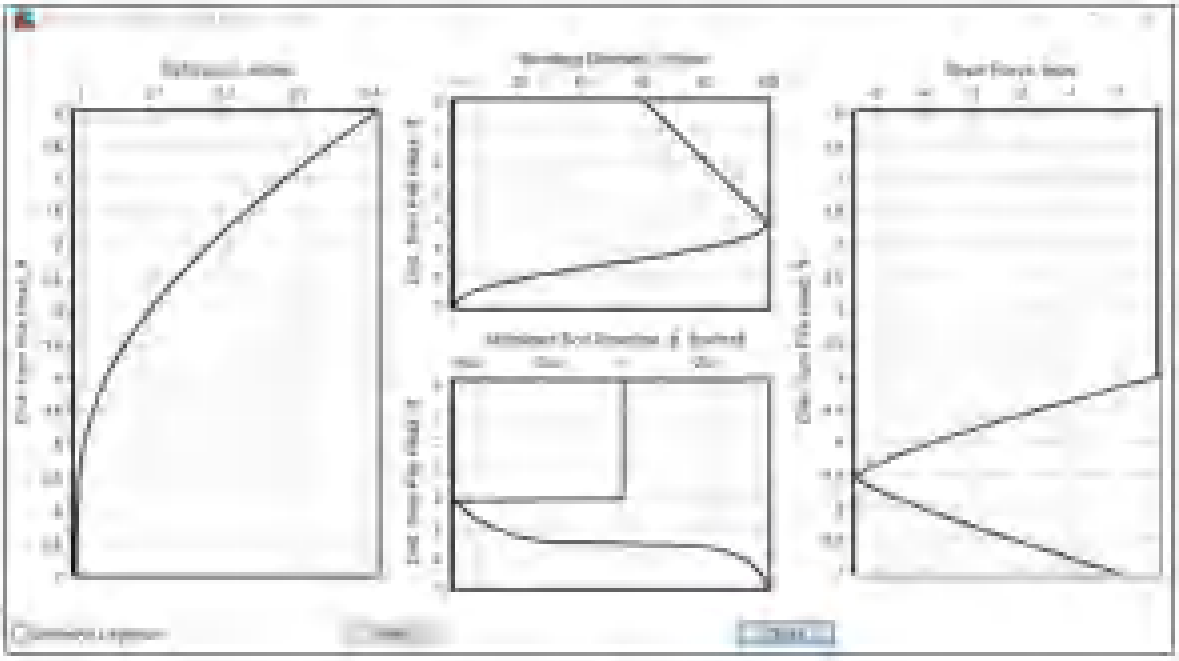
D) L-Pile Result:



Shear force at pile head	=	290.0 lbs
Applied moment at pile head	=	60840.0 in-lbs
Axial thrust load on pile head	=	266.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat. Load lb/inch
0.00	0.4086	60840.	290.0000	-0.01112	10098.	5.18E+08	0.00	0.00	0.00

Deflection = 0.40" < 0.50" W6X15 W/7ft Embedment min.

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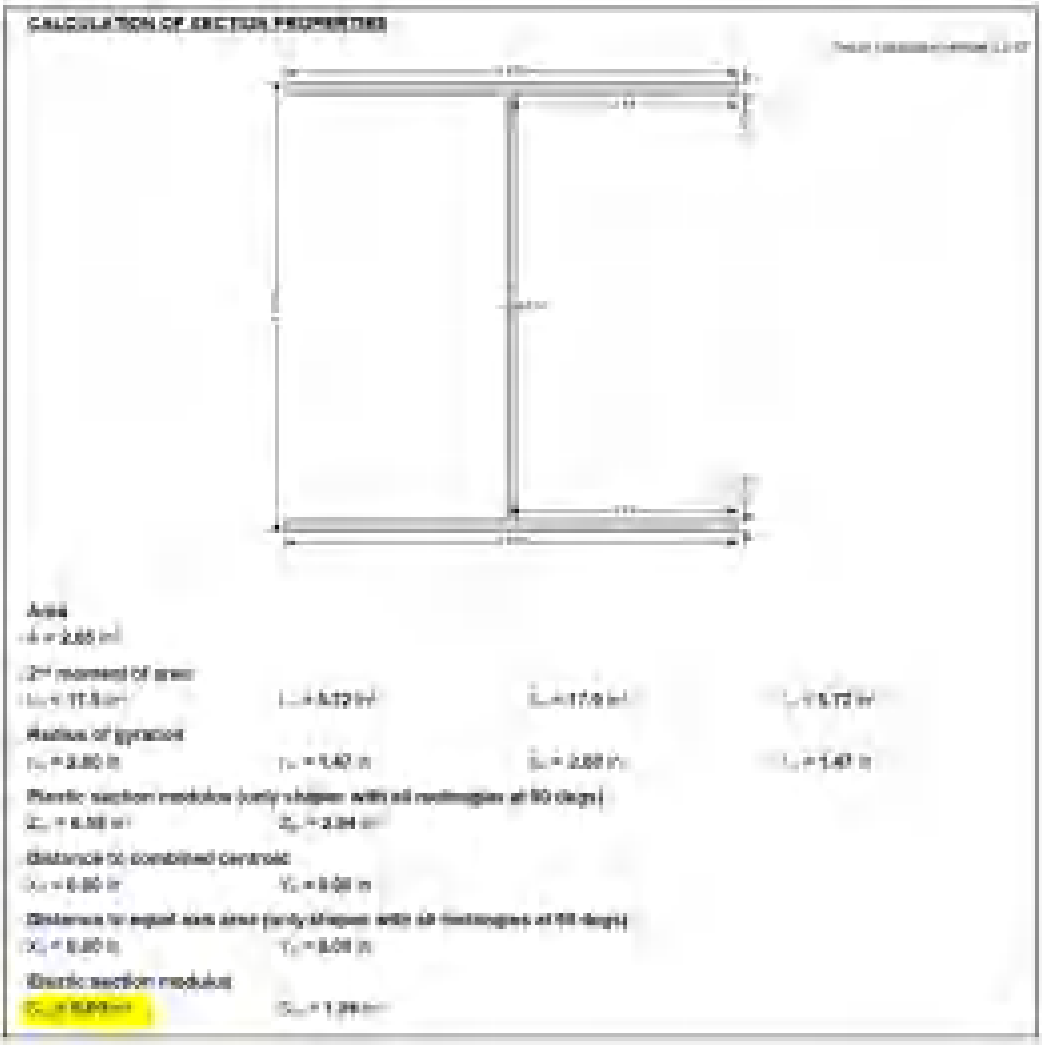
E) Moment capacity check:

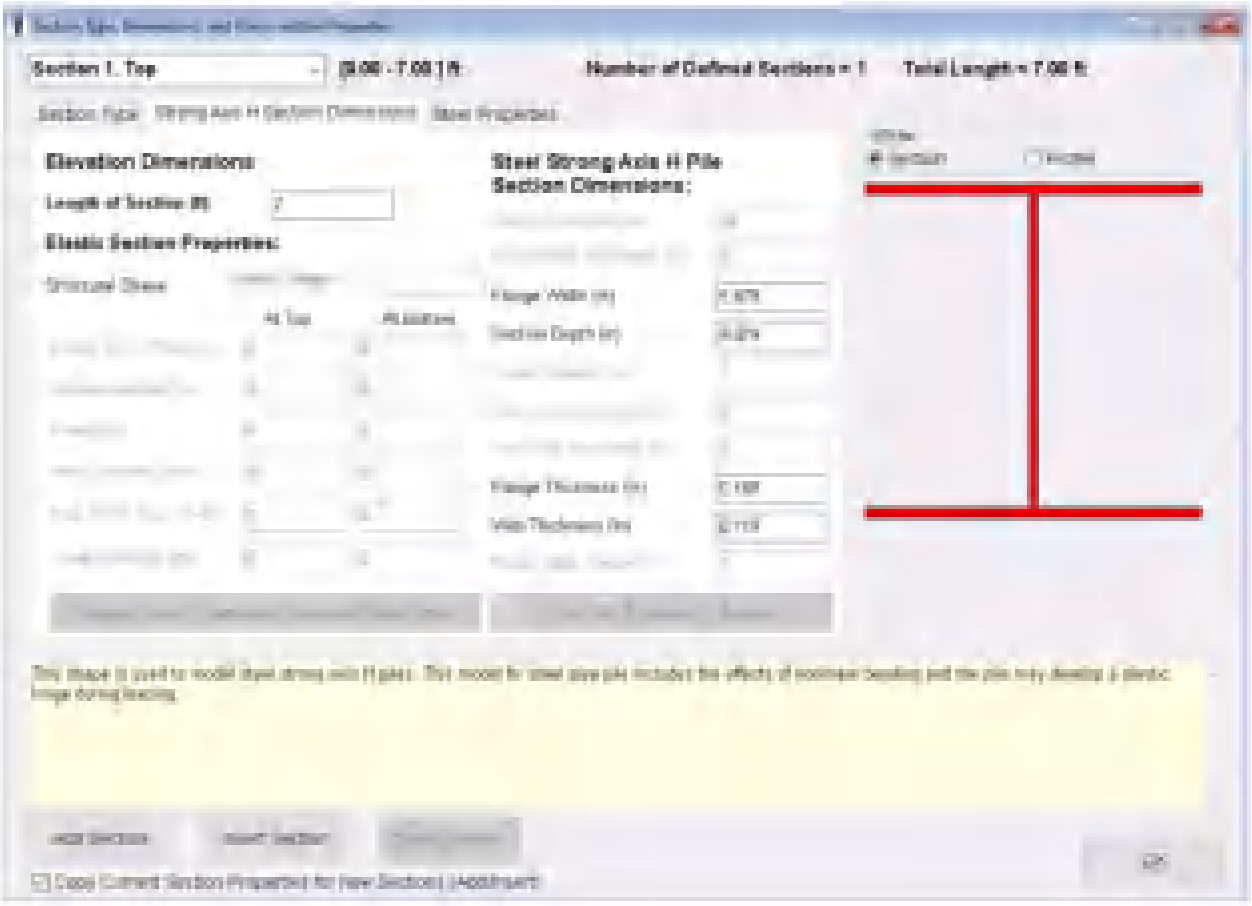
Mn/Ω =(50 Ksi)*(6.09 in^3)/1.67 = 182.33 Kip-in > 99.865 Kip-in OK!

Pile head deflection	=	0.40861600 inches
Computed slope at pile head	=	-0.0111214 radians
Maximum bending moment	=	99865. inch-lbs
Maximum shear force	=	-5291. lbs
Depth of maximum bending moment	=	4.20000000 feet below pile head
Depth of maximum shear force	=	5.53000000 feet below pile head
Number of iterations	=	31
Number of zero deflection points	=	1



F) - L-Pile Inputs: Design along - Week Axis:

- W6x15 reduced section due to corrosion
- **7ft** embedment.

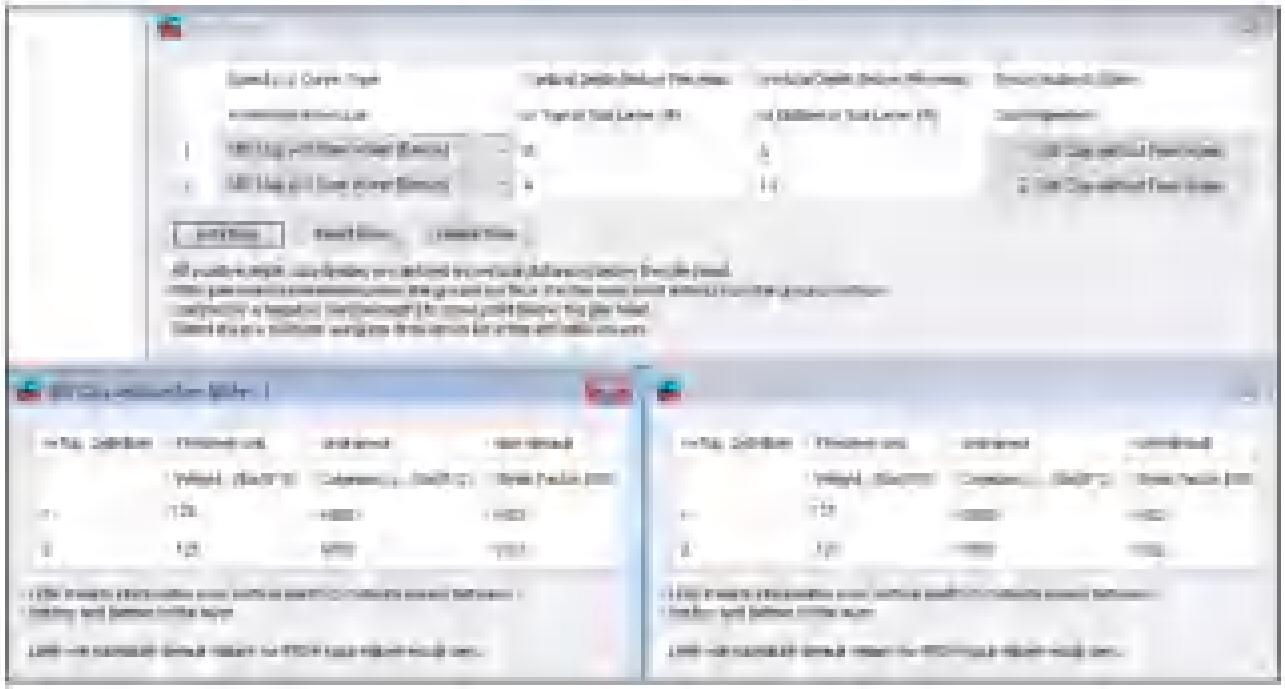


G) Soil Parameter:

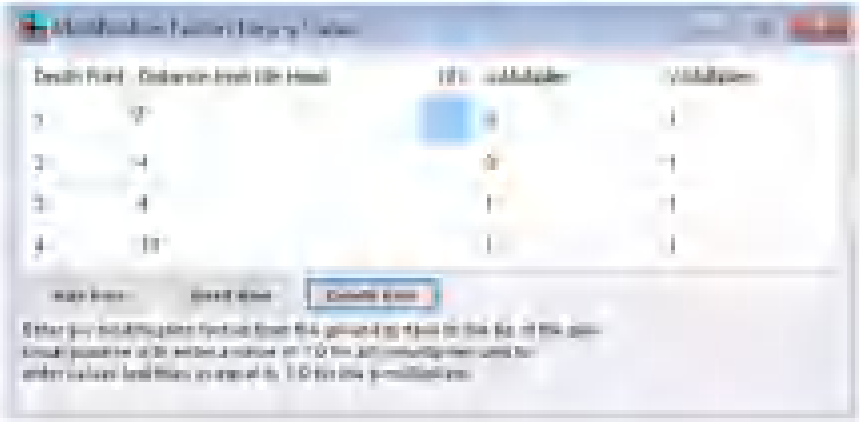
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	8,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations

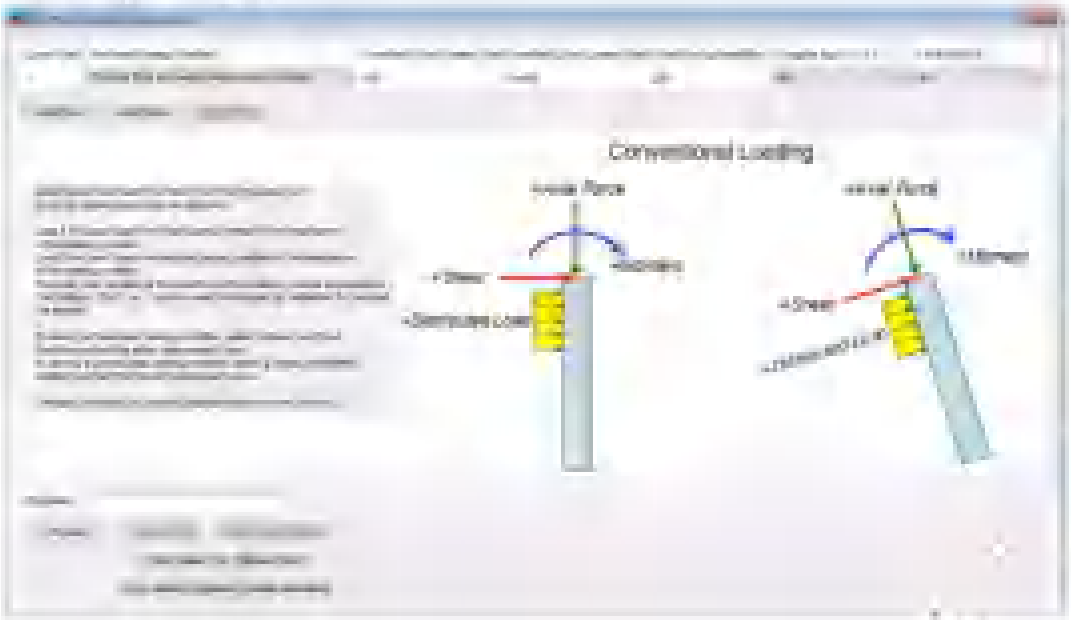


H) Loading Inputs

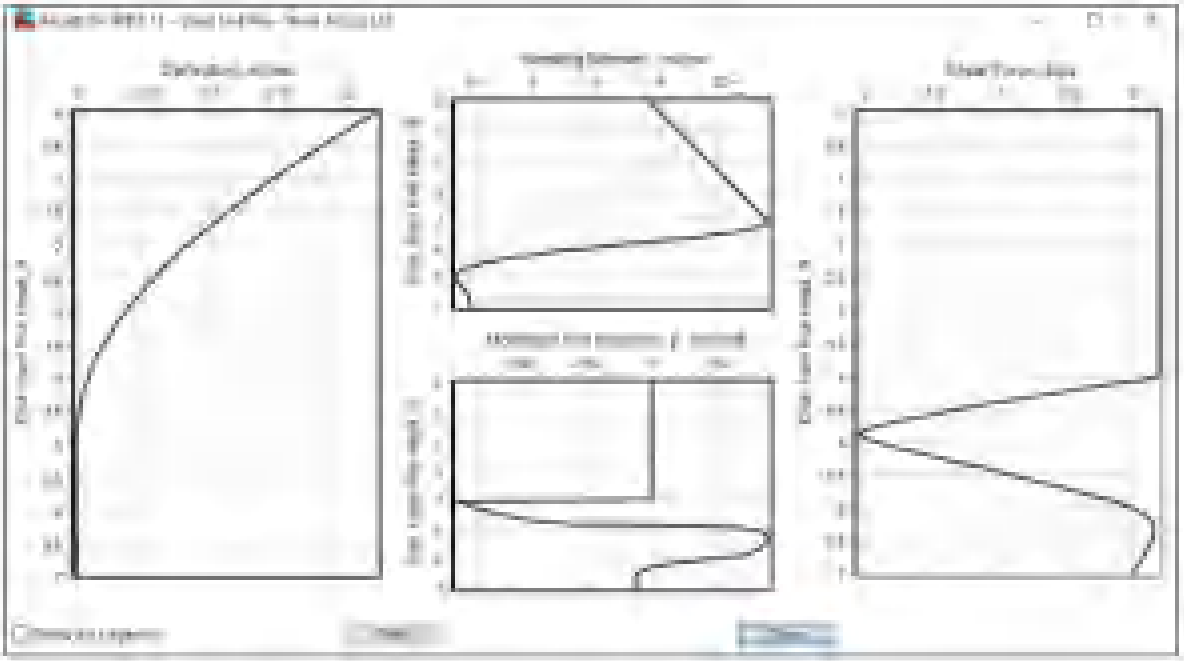
Loading inputs are based on the worst-case loading from the posts and are as follows:

Axial: **266 lb**
Shear = **192 lb**
Moment = 1.2 kips-ft = 1200 lb-ft = **14,400 lbs-in**

Load L-pile Inputs



I) L-Pile Result:



Shear force at pile head	=	192.0 lbs
Applied moment at pile head	=	14400.0 in-lbs
Axial thrust load on pile head	=	266.0 lbs

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. p	Soil Spr. Es*H	Distrib. Lat. Load
feet	inches	in-lbs	lbs	radians	psi*	lb-in^2	lb/inch	lb/inch	lb/inch
0.00	0.2244	14400.	192.0000	-0.00703	7495.	1.66E+08	0.00	0.00	0.00

Deflection = 0.23" < 0.50" W6X15 W/7ft Embedment min.

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J) Moment capacity check:

M_n/Ω =(50 Ksi)*(1.95 in^3)/1.67 = 58.38 Kip-in > 23.8824 Kip-in OK!

Pile head deflection	=	0.22444129 inches
Computed slope at pile head	=	0.0070268 radians
Maximum bending moment	=	23812. inch-lbs
Maximum shear force	=	2018. lbs
Depth of maximum bending moment	=	4.06000000 feet below pile head
Depth of maximum shear force	=	4.90000000 feet below pile head
Number of iterations	=	16
Number of zero deflection points	=	2

Dead End Pile to use is **W6x15** with an embedment of **7ft.**

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LBD & AUXILIARY EQUIPMENTS PILE DESIGN CALCULATIONS

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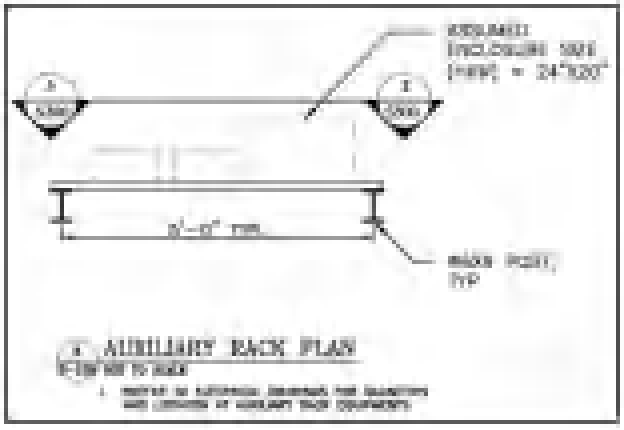
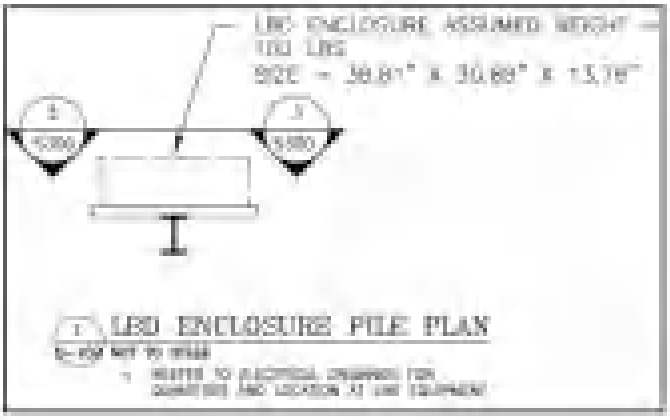
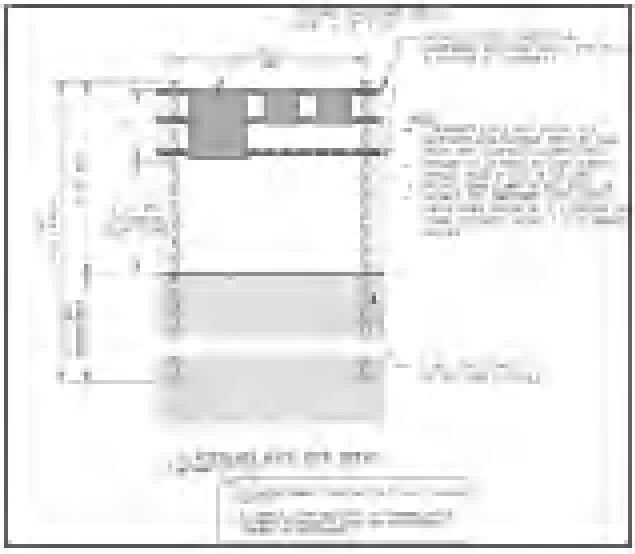
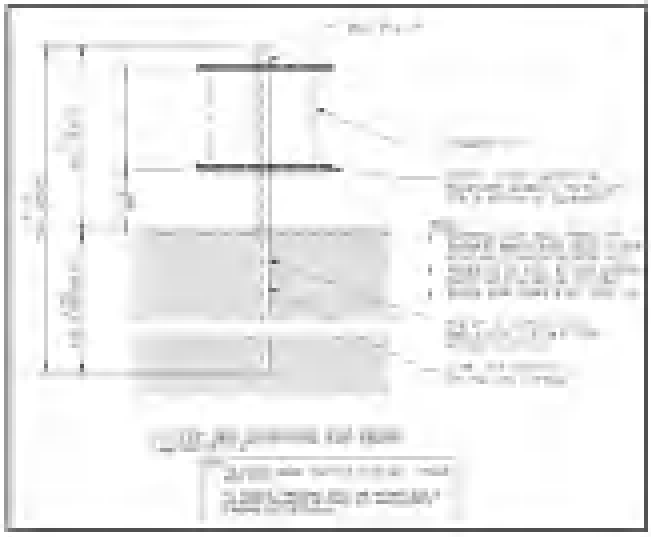
A. Plans & Elevations:









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B. Loading:

The analysis will be performed for the piles using worst case loading

B.1. Dead Load

P_{Dead} = 100 lbs

B.2. Snow Load

P_g = 5 psf

$P_{f\,(calculated)} = 0.7 C_e C_t I_s p_g = 0.7*1*1*1.2*5 = 4.2$ psf

s = min (30, 0.13p_g+14 = 0.13*5+14 = 14.65 psf

Rain on Snow Surcharge = p_f + 5 psf = 9.2 psf

Controlling depth = 13.76"

Equipment Snow Area = 1.2' * 2.574' = 3.088 ft²

P_{Snow} = 9.2 psf * 2.574 ft² = 24 lb

Combined Dead and Snow Load:

$P_{Total} = P_{Dead} + P_{Snow}$ = 100 lb + 24 lb = 124 lb

B.3. Wind Load

Wind Speed = 115 mph

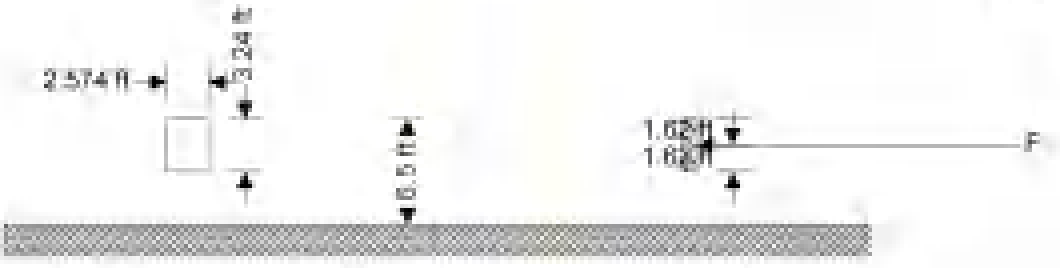
Exp = C

WIND LOADING

In accordance with ASCE7-10

Using the directional design method

Toledo calculation Version 2.1.15



Wall/sign data

Length of wall/sign	B = 2.57 ft
Height of wall/sign	s = 3.24 ft
Height to top of sign	h = 8.50 ft

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General wind load requirements

Basic wind speed	V = 115.0 mph
Risk category	II
Velocity pressure exponent coef (Table 26.6-1)	K_a = 0.85
Exposure category (cl 26.7.3)	C
Gust effect factor	G_f = 0.85
Minimum design wind loading (cl 27.1.5)	p_{min_f} = 8 lb/ft²

Topography

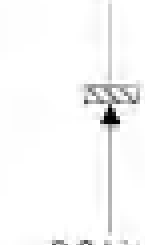
Topography factor not significant	K_{zt} = 1.0

Velocity pressure

Velocity pressure coefficient (T 29.3-1)	K_z = 0.85
Velocity pressure	$q_s = 0.00256 \times K_z \times K_{zt} \times K_d \times V^2 \times 1 psf/mph^2$ = 24.5 psf
Area of sign	$A_f = B \times s$ = 8.34 ft²
Ratio of solid area to gross area	ε = 1.00

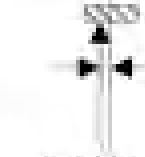
Wall/sign forces – Case A and B

Force coefficient (Figure 29.4-1)	C_{f_x} = 1.76
Resultant force	$F_s = \max[16psf, q_s \times G_f \times C_{f_x}] \times A_f$ = 0.3 kips



0.3 kips

Plan - Case A



0.3 kips

Plan - Case B

P_{wind} is at a height of h = 4.9 ft

$M_{wind} = P_{wind} \times h$ = 300lb*4.9 ft = 1,470 lb-ft = 1.5 k-ft

Corrosion Analysis:

- According to the geotechnical report, the post will be susceptible to corrosion
- The post that will be used is the W6x9.
- Per the Geotech report, the corrosion characteristics are as follows

6.3 Soil Corrosivity and Resistivity

6.3.1 ERT Test Results

Field electrical resistivity soil values generally ranged from about 1,150 to 5,600 Ω-cm, except for ERT-5, which exhibited relatively high values ranging from about 5,900 to 24,600 Ω-cm. Resistivity values generally decreased as probe spacing increased to about 30 feet, with most soft values generally correlated with drier (dry) fill soil. Based on guidelines presented in Corrosion Basics: An Introduction [illegible] for 12/08), the values of these test locations could be/are considered moderately corrosive or otherwise not/less corrosive. ERT results are provided in Attachment C.

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-PINT METHOD

PROJECT NAME:	Chisholm Solar and Storage		
PROJECT NUMBER:	[illegible]	INSPECTOR:	[illegible]
DATE:	[illegible]	TIME:	[illegible]
TEST LOCATION:	[illegible]	WEATHER:	[illegible]

DIRECTION 1: NS/EW

ELECTRODE SPACING 'a' (ft)	(m)	MAX PENETRATION (10% a) (ft)	ACTUAL PENETRATION (ft)	(m)	READING (Ω)	RESISTIVITY (Ω-CM)
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Therefore, the site is considered moderately corrosive.

For a moderately corrosive environment, we use the following corrosion rates.

Assume a **3-mil of zinc on wide flange shapes and a 50-year** project life.

Pure Power Engineering	Project:				Job Ref:	
	Section:				Sheet no./rev.	
	Calc. by	Date	Check by	Date	Appd by	Date

Table 8 – Estimated Corrosion Rates

Soil resistivity (Ω-cm)	Total Corrosion (mpy)	
	Zinc	Steel (both side)
250 – 750	0.64	5.5
750 – 1250	0.53	2.5
1250 – 3000	0.39	2.2

Project Life	50	years
Zinc Corrosion Rate	0.53	mils/year
Zinc Thickness	3	mils
Zinc Life	5.7	years
Remaining Life for Steel	44.3	years
Steel Corrosion Rate	2.5	mils/year
Total Steel Loss	110.8	mils
Total Steel Loss (in.)	0.1108	in

W6X9

	Original Dims. (in.)	Reduced Dims. (in.)
t_w =	0.170	0.059
t_f =	0.215	0.104
d =	5.900	5.789
b_f =	3.940	3.829

CALCULATION OF SECTION PROPERTIES

Area

A = 1.53 in²

2nd moment of area

I_{xx} = 7.36 in⁴ I_{xy} = 905 x10⁻³ in⁴ I_{yy} = 7.36 in⁴ I_{zz} = 978 x10⁻³ in⁴

Radius of gyration

r_{xx} = 2.54 in r_{xy} = 0.63 in r_{yy} = 2.54 in r_{zz} = 0.63 in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = 2.72 in³ Z_{yy} = 597 x10⁻³ in³

Distance to combined centroid

x_c = 0.08 in y_c = 0.00 in

Distance to equal area axis (only shapes with all rectangles at 90 degs)

x_p = 0.08 in y_p = 0.00 in

Elastic section modulus

S_{xx} = 2.52 in³ S_{yy} = 508 x10⁻³ in³

PUREPOWER ENGINEERING Pure Power Engineering	Project				Job #	
	Location				Sheet no./rev.	
	Calc. by	Date	Check by	Date	Appd. by	Date

Post design using RAM Element

The pile reveal is 6.5 ft. and the attachment will be at 4.9' and According to the geotechnical report skin friction and allowable bearing capacity from the upper 4 feet of soil are disregarded. Consequently, but as per our judgment the fixed base point for the pile will be considered to be 2 feet below the ground surface, resulting in a total pile length of 8.5 feet.

Ram Model

Loading

Reactions

Utilisation

UTILIZATION = 0.41 < 1.00 ∴ W6X9 OK !

RAM Elements

Steel Code Check

Summary - Group by description

Description	Section	Member	Ctrl Ex.	Ratio	Status	Reference
	W-Sect - W / CORRIDOR	4		0.41	OK	

Axial Check:

W6x15 reduced section due to corrosion:

perimeter = $2(b_f + d) + 4\,[(b_f - t_w)/2]$ = 2(3.939 + 5.789)+ 4[(5.789-0.259)/2] = 26.7"/12 = **2.23 ft**

Area = $2*b_f*t_f + (d - 2\,t_f)^2\,t_w$ = 2*3.939*0.109 + (5.789-2*0.109)^2*0.259 = 1.12in²/144 = **0.007 ft²**

The axial load P = 157 lbs, according to the worst-case combination load analysis: **LC2 = D_L + 0.75L + 0.45 W_L**

- The allowable skin friction, as mentioned in the geotechnical report, is as follows:

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (ft)	Allowable End Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4			
Stratum 2	4 – 20 4 – 15	8,000	750	375
Stratum 3	15 – 20	20,000	2500	500
Stratum 4	15 – 20	20,000	1,000	500

Notes:
1) [illegible]
2) [illegible]
3) [illegible]

Pile vertical area = 2.23' x 2' (based on 6' total embedment & ignoring the upper 1.0') = 4.46 ft²

- **Allowable Friction force:**

Stratum 1: from 0 – 4 ft = **0 lbs**

Stratum 2: from 4 – 6ft (Conservative Height) = 750 psf x 2ft x 2.23ft = **3,345 lbs**

- **Allowable End Bearing: 20,000 psf** (Pile to Bear Within stratum 2)

Net bearing Resisting Force = 22,000 psf X 0.007ft² (Section Area) = **154 lbs**

Total resistance = 3,345 + 154 = **3,499 lbs > 157 lbs** ✓ Ratio: 5% **OK!**

Therefore, the W6x9 pile with 6ft embedment is performing adequately for the axial loads listed.

PURE POWER ENGINEERING

Pure Power Engineering

Project		Job No#	
Location		Drawing No./Rev.	
Calc. by	Date	Check by	Date	Appvd by	Date

Expansive Soil :

Based on the geotechnical report, the presence of expansive soils indicates that soil heave should be anticipated. The relevant data are summarized below:

Skin friction in the upper 1 foot of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative skin friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for possible movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Soil Heave Depth = **4.0 ft.**

Soil Heave strength = **750 psf.**

Pile vertical area = 4ft x 2.23ft = 8.92 ft^2

Soil Heave Uplift force = 750 psf X 8.92 ft^2 = **6,690 lbs**

Skin Friction Resistance Force = **3,345 lbs**

Skin Friction Resistance Force = **5,580 lbs** + 3,345 lbs → 200lb

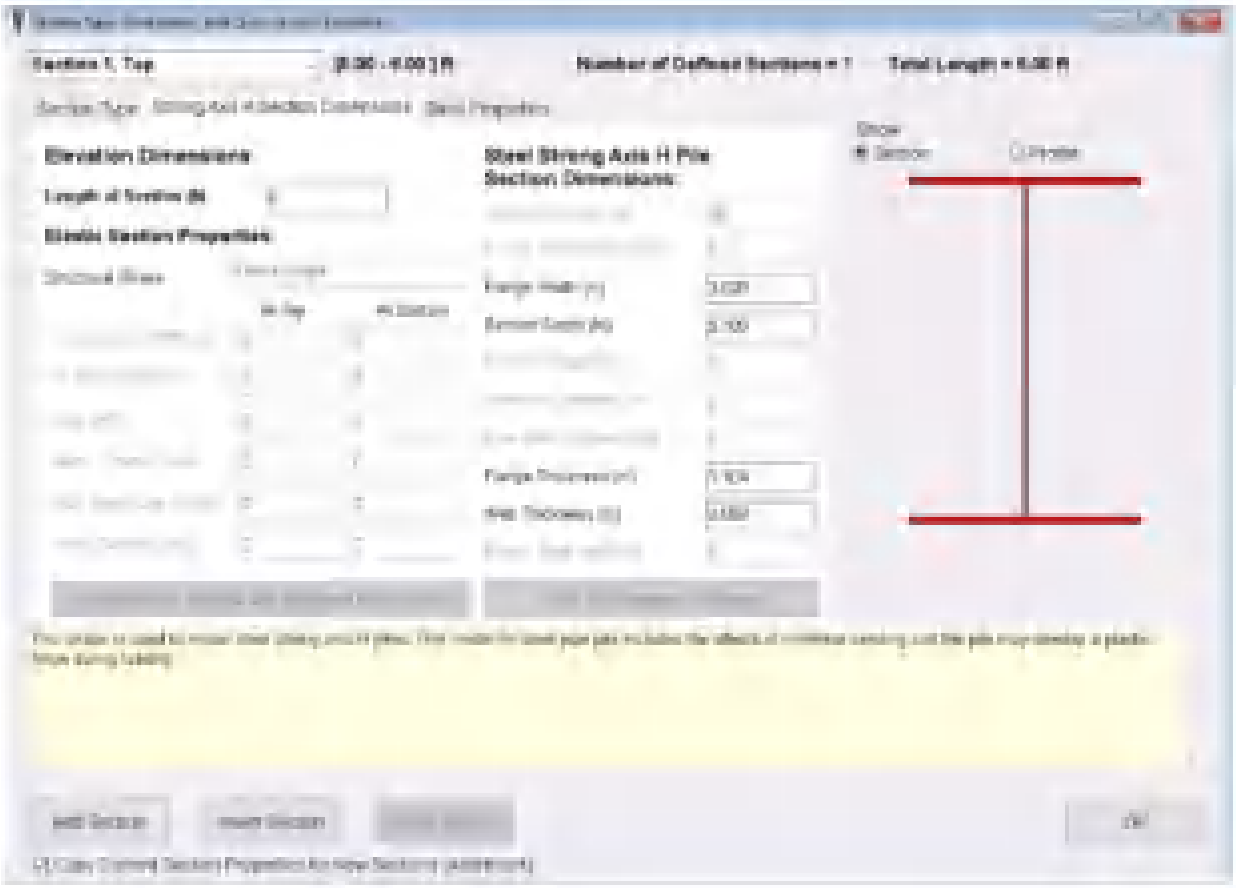
To address the uplift force resulting from expansive soil movement—and recognizing the limited skin friction resistance available along the pile—preventive measures are essential. Several strategies have been proposed to reduce uplift and mitigate these effects.

- Apply Silicoat in the top **4 ft & 6 inches** above ground
- Apply yellow jacket friction reduction in the top **4 ft & 6 inches** above ground.
- Pre-drill the top **4 ft** and replace the soil with compacted washed ¾" clean gravel
- Or increasing the pile embedment to **9ft**

7- W6x15 Pile Embedment Design for Lateral Loads Using L-Pile Software:

L-Pile Inputs: Design along -

- W6x9 reduced section due to corrosion
- **6ft** embedment.

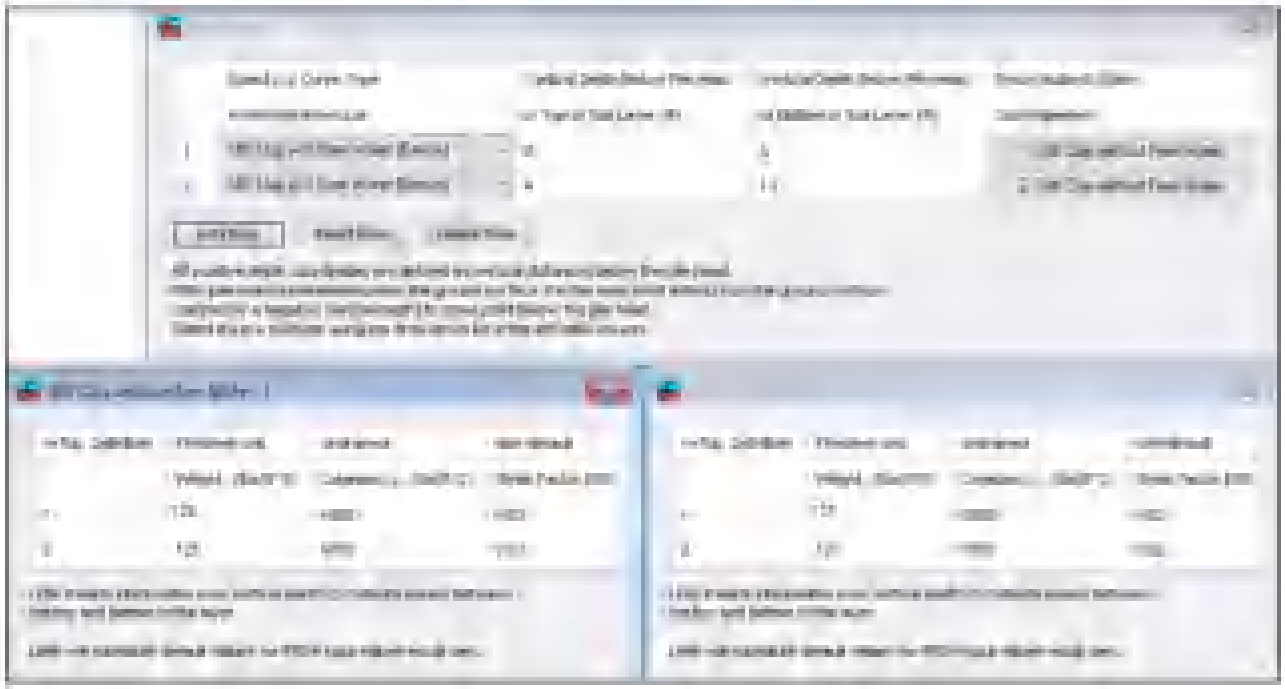


Soil Parameter:

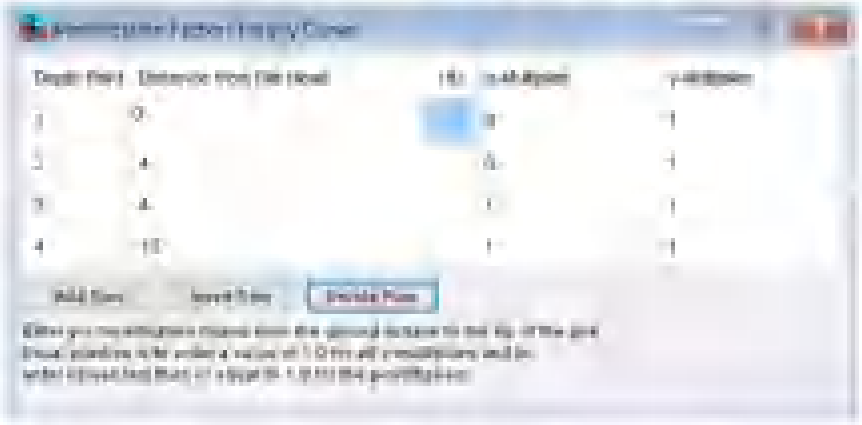
Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor ε50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	8,500	0.02

The soil parameters to be used as input for the L-Pile analysis are detailed below:



the uppermost 4 feet of soil in the profile will be disregarded and omitted from all calculations.

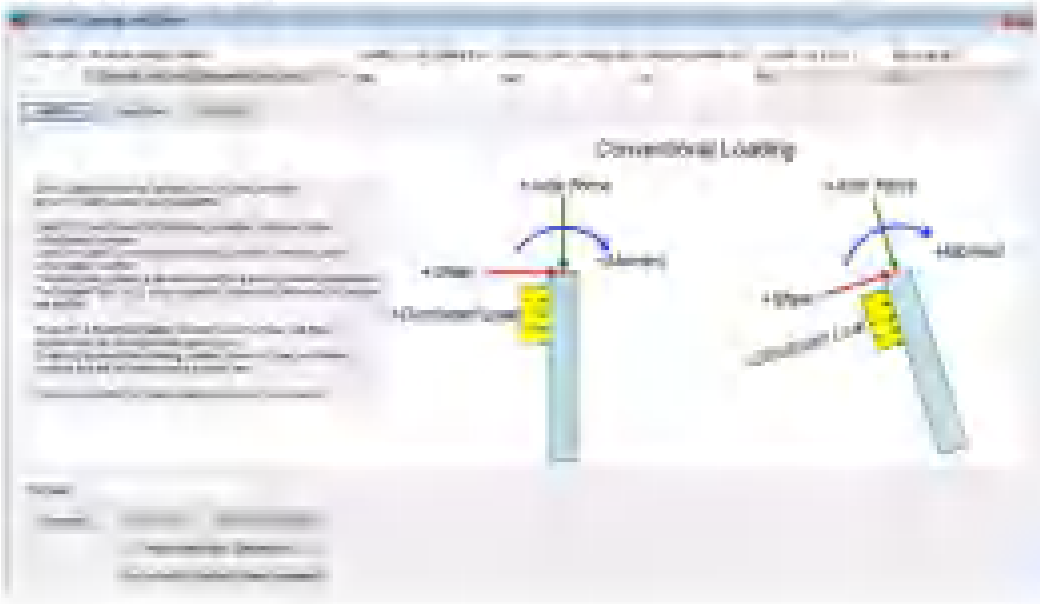


Loading Inputs

Loading inputs are based on the worst-case loading from the posts and are as follows:

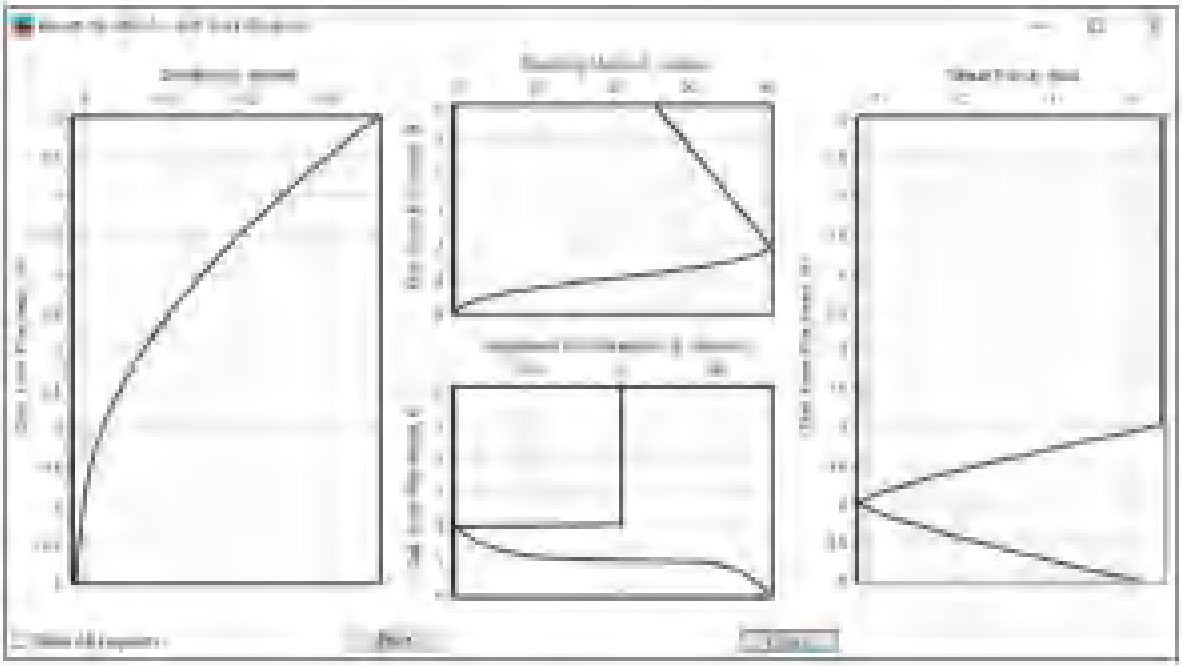
Axial: **157 lb**
Shear = **300 lb**
Moment = 2.16 kips-ft = 2,160 lb-ft = **25,920 lbs-in**

Load L-pile Inputs



PURE POWER ENGINEERING Pure Power Engineering	Project:				Job # ref:	
	Section:				Sheet no./rev.	
	Calc. by	Date	Check by	Date	Appd by	Date

K) L-Pile Result:



Shear force at pile head	=	300.0 lbs
Applied moment at pile head	=	25920.0 in-lbs
Axial thrust load on pile head	=	157.0 lbs

Depth x feet	Deflect. y Inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res, p lb/inch	Soil Spr. Es*H lb/inch	Distrib. Lat.Load lb/inch
0.00	0.3656	25920.	300.0000	0.01061	6946.	2.11E+08	0.00	0.00	0.00

Deflection = 0.37" < 0.50" W6X9 W/6ft Embedment min.

L) Moment capacity check:

Mn/Ω =(50 Ksi)*(2.52 in^3)/1.67 = 75.449 Kip-in > 40.479 Kip-in OK!

Pile-head deflection	=	0.36559356 inches
Computed slope at pile head	=	-0.0106138 radians
Maximum bending moment	=	40479. inch-lbs
Maximum shear force	=	3100. lbs
Depth of maximum bending moment	=	4.08000000 feet below pile head
Depth of maximum shear force	=	4.98000000 feet below pile head
Number of iterations	=	34
Number of zero deflection points	=	1

215.47 MWDC/147.00 MWAC SOLAR GROUND MOUNT SYSTEM AT

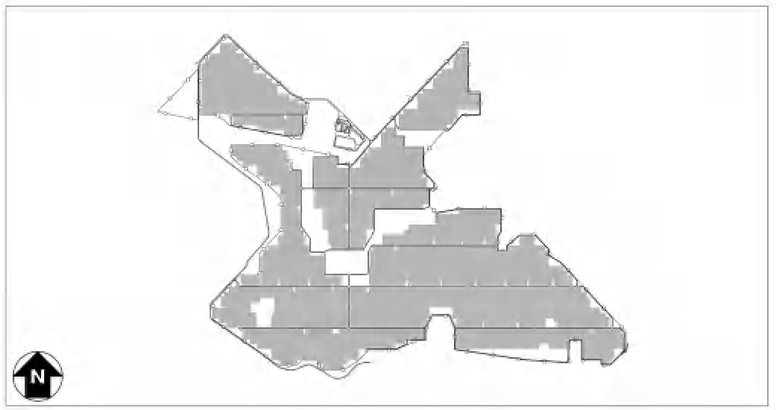
CHISME SOLAR – TX-PS-2701

BROWN & MILLS COUNTY, TX

31.578332°, -98.834972°

LOCATION MAP
SCALE: 1" = 5000'

STATE MAP
SCALE: NONE



SYSTEM PLAN
SCALE: 1" = 1500'

SYSTEM SUMMARY: CHISME	
AC SIZE - POI LIMIT (MWAC)	147.00
AC SIZE - NAMEPLATE (MWAC)	176.00
OVERBUILD %	19.72%
DC SIZE (MWDC)	215.47
AC POI VOLTAGE (kV)	34.5
DC VOLTAGE (VDC)	1500
AVERAGE DC/AC RATIO (NAMEPLATE)	1.22
AVERAGE DC/AC RATIO (REDUCED)	1.47
INVERTER OUTPUT VOLTAGE (V)	645 (INV) / 34.5k (XFMR)
(QTY) INVERTERS	(40) SUNGROW SG4400UD-MV
(TOTAL QTY) MODULES	392,040
LONGI SOLAR Hi-MO 5 / LR5-72HBD-545M	
MODULES PER STRING	27
(TOTAL QTY) STRINGS	1,835
(QTY) XL TABLE	419
(QTY) L TABLE	39
(QTY) M TABLE	21
GROUND COVER RATIO	48.00%
LONGI SOLAR Hi-MO 5 / LR5-72HBD-550M	
MODULES PER STRING	27
(TOTAL QTY) STRINGS	11,959
(QTY) XL TABLE	2,396
(QTY) L TABLE	465
(QTY) M TABLE	490
GROUND COVER RATIO	48.00%
LONGI SOLAR Hi-MO 5 / LR5-72HBD-555M	
MODULES PER STRING	27
(TOTAL QTY) STRINGS	726
(QTY) XL TABLE	158
(QTY) L TABLE	10
(QTY) M TABLE	32
GROUND COVER RATIO	48.00%
RACKING	
MANUFACTURER/MODEL	ATI OMNITRACK (1P Tracker)
AZIMUTH (deg)	180
PITCH (ft/m)	15.57/4.746
MODULE ORIENTATION	PORTRAIT (1P)
RACKING ROTATION (deg)	+/- 77
SITE DESIGN PARAMETERS	
NEC YEAR	2020
UTILITY	ONCOR
ASHRAE WEATHER STATION (YEAR)	BROWNWOOD, TX (WMO: 722666)
MAX TEMPERATURE (°C)	36.1
MIN TEMPERATURE (°C)	-9.9

ENGINEERED BY:
PUREPOWER ENGINEERING
111 RIVER STREET, SUITE 1110
HOBOKEN, NEW JERSEY, 07030

OWNER:
RED RIVER CLEAN ENERGY
RED RIVER CLEAN ENERGY
11801 DOMAIN BLVD
FLOOR 3
AUSTIN, TX 78758
(312)-883-4846

DEVELOPED FOR:
LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
(817) 328-3200
WWW.LANGAN.COM

NOT FOR CONSTRUCTION

DRAWING TITLE: TITLE SHEET

DRAWING #: G0.001

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

DESIGNED BY: PUREPOWER ENGINEERING 111 RIVER STREET, HOBOKEN, NJ WWW.PUREPOWER.COM

NO	DATE	REVISION DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

PLOT DATE: 9/5/2025 3:48 PM

RULER IN INCHES

DRAWING INDEX

Sheet Number	Sheet Title	30% ELECTRICAL DESIGN 04/11/2025	60% ELECTRICAL DESIGN 09/05/2025
GENERAL			
G0.001	TITLE SHEET	●	●
G0.002	SHEET INDEX	●	●
G0.003	ELECTRICAL BASIS OF DESIGN	●	●
G0.010	PROJECT DESIGN SUMMARY	●	●
ELECTRICAL			
E0.001	ELECTRICAL NOTES LIST	●	●
E0.002	ELECTRICAL SYMBOLS & ABBREVIATIONS LIST	●	●
E1.000	OVERALL ELECTRICAL PLAN	●	●
E1.010	OVERALL ELECTRICAL PLAN - FEEDER 100	●	●
E1.011	PARTIAL ELECTRICAL PLAN - PCS 101	●	●
E1.012	PARTIAL ELECTRICAL PLAN - PCS 102		●
E1.013	PARTIAL ELECTRICAL PLAN - PCS 103		●
E1.014	PARTIAL ELECTRICAL PLAN - PCS 104		●
E1.015	PARTIAL ELECTRICAL PLAN - PCS 105		●
E1.016	PARTIAL ELECTRICAL PLAN - PCS 106		●
E1.017	PARTIAL ELECTRICAL PLAN - PCS 107		●
E1.020	OVERALL ELECTRICAL PLAN - FEEDER 200	●	●
E1.021	PARTIAL ELECTRICAL PLAN - PCS 201		●
E1.022	PARTIAL ELECTRICAL PLAN - PCS 202		●
E1.023	PARTIAL ELECTRICAL PLAN - PCS 203		●
E1.024	PARTIAL ELECTRICAL PLAN - PCS 204		●
E1.025	PARTIAL ELECTRICAL PLAN - PCS 205		●
E1.026	PARTIAL ELECTRICAL PLAN - PCS 206		●
E1.027	PARTIAL ELECTRICAL PLAN - PCS 207		●
E1.030	OVERALL ELECTRICAL PLAN - FEEDER 300	●	●
E1.031	PARTIAL ELECTRICAL PLAN - PCS 301		●
E1.032	PARTIAL ELECTRICAL PLAN - PCS 302		●
E1.033	PARTIAL ELECTRICAL PLAN - PCS 303		●
E1.034	PARTIAL ELECTRICAL PLAN - PCS 304		●
E1.035	PARTIAL ELECTRICAL PLAN - PCS 305		●
E1.036	PARTIAL ELECTRICAL PLAN - PCS 306		●
E1.037	PARTIAL ELECTRICAL PLAN - PCS 307		●
E1.040	OVERALL ELECTRICAL PLAN - FEEDER 400	●	●
E1.041	PARTIAL ELECTRICAL PLAN - PCS 401		●
E1.042	PARTIAL ELECTRICAL PLAN - PCS 402		●
E1.043	PARTIAL ELECTRICAL PLAN - PCS 403		●
E1.044	PARTIAL ELECTRICAL PLAN - PCS 404		●
E1.045	PARTIAL ELECTRICAL PLAN - PCS 405		●
E1.046	PARTIAL ELECTRICAL PLAN - PCS 406		●
E1.047	PARTIAL ELECTRICAL PLAN - PCS 407		●
E1.050	OVERALL ELECTRICAL PLAN - FEEDER 500	●	●
E1.051	PARTIAL ELECTRICAL PLAN - PCS 501		●
E1.052	PARTIAL ELECTRICAL PLAN - PCS 502		●
E1.053	PARTIAL ELECTRICAL PLAN - PCS 503		●
E1.054	PARTIAL ELECTRICAL PLAN - PCS 504		●
E1.055	PARTIAL ELECTRICAL PLAN - PCS 505		●
E1.056	PARTIAL ELECTRICAL PLAN - PCS 506		●
E1.060	OVERALL ELECTRICAL PLAN - FEEDER 600	●	●
E1.061	PARTIAL ELECTRICAL PLAN - PCS 601		●
E1.062	PARTIAL ELECTRICAL PLAN - PCS 602		●
E1.063	PARTIAL ELECTRICAL PLAN - PCS 603		●
E1.064	PARTIAL ELECTRICAL PLAN - PCS 604		●
E1.065	PARTIAL ELECTRICAL PLAN - PCS 605		●
E1.066	PARTIAL ELECTRICAL PLAN - PCS 606		●
E2.011	PARTIAL STRINGING PLAN - PCS 101	●	●
E2.012	PARTIAL STRINGING PLAN - PCS 102		●
E2.013	PARTIAL STRINGING PLAN - PCS 103		●
E2.014	PARTIAL STRINGING PLAN - PCS 104		●
E2.015	PARTIAL STRINGING PLAN - PCS 105		●
E2.016	PARTIAL STRINGING PLAN - PCS 106		●
E2.017	PARTIAL STRINGING PLAN - PCS 107		●
E2.021	PARTIAL STRINGING PLAN - PCS 201		●
E2.022	PARTIAL STRINGING PLAN - PCS 202		●
E2.023	PARTIAL STRINGING PLAN - PCS 203		●
E2.024	PARTIAL STRINGING PLAN - PCS 204		●
E2.025	PARTIAL STRINGING PLAN - PCS 205		●
E2.026	PARTIAL STRINGING PLAN - PCS 206		●
E2.027	PARTIAL STRINGING PLAN - PCS 207		●
E2.031	PARTIAL STRINGING PLAN - PCS 301		●
E2.032	PARTIAL STRINGING PLAN - PCS 302		●
E2.033	PARTIAL STRINGING PLAN - PCS 303		●
E2.034	PARTIAL STRINGING PLAN - PCS 304		●
E2.035	PARTIAL STRINGING PLAN - PCS 305		●
E2.036	PARTIAL STRINGING PLAN - PCS 306		●
E2.037	PARTIAL STRINGING PLAN - PCS 307		●
E2.041	PARTIAL STRINGING PLAN - PCS 401		●
E2.042	PARTIAL STRINGING PLAN - PCS 402		●
E2.043	PARTIAL STRINGING PLAN - PCS 403		●
E2.044	PARTIAL STRINGING PLAN - PCS 404		●
E2.045	PARTIAL STRINGING PLAN - PCS 405		●
E2.046	PARTIAL STRINGING PLAN - PCS 406		●
E2.047	PARTIAL STRINGING PLAN - PCS 407		●
E2.051	PARTIAL STRINGING PLAN - PCS 501		●
E2.052	PARTIAL STRINGING PLAN - PCS 502		●
E2.053	PARTIAL STRINGING PLAN - PCS 503		●
E2.054	PARTIAL STRINGING PLAN - PCS 504		●
E2.055	PARTIAL STRINGING PLAN - PCS 505		●
E2.056	PARTIAL STRINGING PLAN - PCS 506		●
E2.061	PARTIAL STRINGING PLAN - PCS 601		●
E2.062	PARTIAL STRINGING PLAN - PCS 602		●
E2.063	PARTIAL STRINGING PLAN - PCS 603		●
E2.064	PARTIAL STRINGING PLAN - PCS 604		●
E2.065	PARTIAL STRINGING PLAN - PCS 605		●
E2.066	PARTIAL STRINGING PLAN - PCS 606		●
E2.800	EQUIPMENT AREA PLANS & ELEVATIONS	●	●
E2.900	STRING WIRING DETAILS		●
E2.910	STRING WIRING TRANSITION DETAILS		●
E2.920	MESSENGER WIRE SYSTEM DETAILS		●
E2.930	E-W TO N-S MESSENGER DETAILS		●
E3.010	MV ONELINE DIAGRAMS - FEEDER 100	●	●
E3.020	MV ONELINE DIAGRAMS - FEEDER 200	●	●
E3.030	MV ONELINE DIAGRAMS - FEEDER 300	●	●
E3.040	MV ONELINE DIAGRAMS - FEEDER 400	●	●
E3.050	MV ONELINE DIAGRAMS - FEEDER 500	●	●
E3.060	MV ONELINE DIAGRAMS - FEEDER 600	●	●
E3.310	MV SCHEDULES & CALCULATIONS	●	●
E3.320	MV SCHEDULES & CALCULATIONS	●	●
E3.400	TYPICAL DC ONE LINE DIAGRAM	●	●
E3.500	DC STRING CALCULATIONS	●	●
E3.510	DC SCHEDULES & CALCULATIONS	●	●
E3.520	DC SCHEDULES & CALCULATIONS		●
E3.530	DC SCHEDULES & CALCULATIONS		●
E3.540	DC SCHEDULES & CALCULATIONS		●
E3.550	DC SCHEDULES & CALCULATIONS		●
E3.560	DC SCHEDULES & CALCULATIONS		●
E3.570	DC SCHEDULES & CALCULATIONS		●
E3.580	DC SCHEDULES & CALCULATIONS		●
E3.590	DC SCHEDULES & CALCULATION		●
E3.600	DC SCHEDULES & CALCULATION		●
E3.610	DC SCHEDULES & CALCULATION		●
E3.620	DC SCHEDULES & CALCULATION		●
E3.800	AUXILIARY PANEL SCHEDULES		●
E3.810	LVAC SCHEDULES		●
E3.820	LVAC SCHEDULES		●
E3.830	LVAC SCHEDULES		●
E4.000	GROUNDING SITE PLAN		●
E4.100	GROUNDING DETAILS		●
E4.101	GROUNDING DETAILS		●
E4.110	FENCE GROUNDING DETAILS		●
E4.200	ELECTRICAL DETAILS		●
E4.300	UNDERGROUND CROSSING SITE PLAN		●
E4.310	TRENCH DETAILS	●	●
E6.000	COMMUNICATIONS SITE PLAN		●
E6.010	COMMUNICATIONS ONELINE AND DETAILS		●
E6.020	COMMUNICATIONS ONELINE AND DETAILS		●
E6.210	COMMUNICATION DETAILS		●
E7.000	EQUIPMENT DATA SHEET	●	●
E7.010	EQUIPMENT DATA SHEET		●

LEGEND:

UPDATED DRAWING ISSUED	●
UNCHANGED, PREVIOUSLY ISSUED DRAWING STILL CURRENT	○
DRAWING REMOVED FROM SET	×

STUDIES INDEX

	30% ELECTRICAL DESIGN 04/11/2025	60% ELECTRICAL DESIGN 09/05/2025
ELECTRICAL		
CABLE AMPACITY STUDY	●	●
SHORT CIRCUIT STUDY		●
PERFORMANCE		
PVSYST	●	●

DWN	CHK	DATE	REVISION DESCRIPTION
BH	AHR	09/05/2025	60% ELECTRICAL DESIGN
BH	AHR	04/10/2025	30% LAYOUT REVIEW
BH	EL	04/11/2025	30% ELECTRICAL DESIGN

ENGINEER:
PUREPOWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM

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PREPARED FOR:
LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE:
SHEET INDEX

DRAWING #:
G0.002

RULER IN INCHES

SOLAR ELECTRICAL BASIS OF DESIGN		
ITEM	**VALUE**	**UNIT**
SITE		
NAME	CHISME	-
LOCATION	BROWN & MILLS COUNTY, TX	-
COORDINATES (LAT., LONG.)	31.578332°, -98.834972°	-
UTILITY	ONCOR	-
ASHRAE WEATHER STATION	BROWNWOOD, TX (WMO: 722666)	-
EXTREME LOW DB TEMPERATIRE	-9.9	°C
2% HIGH DB TEMPERATURE	36	°C
DESIGN FLOOD DEPTH	PER CIVIL	INCHES
FREEBOARD	12	INCHES
SOIL TYPE	SAND/CLAY	-
WET SOIL THERMAL RESISTIVITY	0.149	°C*m/W
DRY SOIL THERMAL TESISTIVITY	0.274	°C*m/W
ACCESS ROAD WIDTH	16	FEET
ACCESS ROAD TURN RADIUS	40	FEET
ACCESS ROAD TO MODULE OFFSET	10	FEET
ROW TO ROW GAP (MIN)	10	FEET
FENCE TO MODULE OFFSET	20	FEET
MODULE TYPE 1		
MAKE/MODEL	LONGI SOLAR Hi-MO 5 / LR5-72HBD-545M	-
NAMEPLATE POWER	545	W
TYPE	BIFACIAL	-
GCR (TARGET OR MAX)	48	%
STRING LENGTH	27	-
COMPOSITION TARGET (MWDC or %)	27.002	MW
MODULE TYPE 2		
MAKE/MODEL	LONGI SOLAR Hi-MO 5 / LR5-72HBD-550M	-
NAMEPLATE POWER	550	W
TYPE	BIFACIAL	
GCR (TARGET OR MAX)	48	%
STRING LENGTH	27	-
COMPOSITION TARGET (MWDC or %)	177.591	MW
MODULE TYPE 3		
MAKE/MODEL	LONGI SOLAR Hi-MO 5 / LR5-72HBD-555M	-
NAMEPLATE POWER	555	W
TYPE	BIFACIAL	
GCR (TARGET OR MAX)	48	%
STRING LENGTH	27	-
COMPOSITION TARGET (MWDC or %)	10.879	MW
RACKING		
MANUFACTURER	ATI	-
TYPE	Tracker 1P	-
POWER	MOTOR/DRIVELINE	-
AZIMUTH	180	DEGREES
TRACKER RANGE	±77	DEGREES
MODULE LEADING EDGE DISTANCE AFG	18	INCHES
SITE GCR (TARGET OR MAX)	48	%
TABLE SIZES	54, 81, 108	MODS
PCS		
MADE/MODEL	SUNGROW SG4400UD-MV	-
NAMEPLATE POWER	4.4	MVA
QUANTITY	40	-
TYPE	INVERTER SKID/CENTRAL	-
LVAC VOLTAGE	645	V
MVAC VOLTAGE	34.5	KV
MV COLLECTION		
COLLECTION CIRCUIT QUANTITY	6	-
COLLECTION VOLTAGE	34.5	KV
CABLE SPEC	ALUMINUM WITH COPPER CONCENTRIC NEUTRAL	-
INSULATION	100% INSULATION, XLPE	-
TEMPERATURE	MV-105	
TRENCH GROUND	7#6 CCS	-
MV COLLECTION CONFIGURATION	LOOP-FEED	-
DC COLLECTION		
STRATEGY	TRUNK BUS COLLECTION USING IPCS, MESSENGER SUPPORT SYSTEM, LOAD BREAK DISCONNECTS	-
DC WIRING MANUFACTURER	TE CONNECTIVITY	-
LBD	NEMA 4 POLYCARBONATE	-
LBD MOUNTING LOCATION	CLUSTERED (1-4 PER ROW GAP), &END OF ROW	-
STRING/HARNESS CABLE ROUTING	STRING TO IPC ON TRUNK BUS ALONG RACKING, ABOVE GROUND MESSENGER SYSTEM TO LBD, DIRECT BURIED TO INVERTER	-
DC COMBINER FEEDER CABLE ROUTING	MESSENGER SYSTEM TO DIRECT BURIED	-
MESSENGER SYSTEM	AWM	-
MESSENGER TO UNDERGROUND TRANSITION	LBD	-
STRING EXTENSION WIRE	10AWG CU	-
DC EGC	2AWG CU	-
POI		
POWER LIMIT	147	MW
VOLTAGE	345	KV
POWER FACTOR	±0.95	-
CAP BANK REQUIRED?	NO	-
COMMUNICATIONS		
FIBER SPEC	12 STRAND SINGLE MODE, 1 CABLE PER CIRCUIT, COLLAPSED LOOP	-
SHIELDING	NON-ARMORED	-
FIBER INSTALLATION	WITHIN INNERDUCT	-
CAT CABLE SPEC	CAT 6	-
INSTALLATION		
MV CABLE TRENCH DEPTH (MIN)	36	INCHES
DC CABLE TRENCH DEPTH (MIN)	30	INCHES
BORE DEPTHS	VARIES, TBD	FEET
BORE CONDUIT	HDPE, SDR-13.5	-

SHEET NOTES:
1. ALL DC CALCULATIONS AND SIMULATIONS ARE BASED ON THE 560W MODULE BIN CLASS; HOWEVER, 545W, 550W AND 555W ARE INTENDED FOR SITE CONSTRUCTION

NO.	DATE	REVISION DESCRIPTION	BY	ENG CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BH	AAR EL
2	09/22/2025	60% LAYOUT REVIEW	BH	AAR EL
3	11/11/2025	30% ELECTRICAL DESIGN	BH	SH EL

ENGINEER:
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SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE:
ELECTRICAL BASIS OF DESIGN

DRAWING #:
G0.003

PLOT DATE: 11/11/2025 3:49 PM

RULER IN INCHES:

*NOTE:
- POWER PLANT CONTROLLER AT THE POI WILL DETERMINE THE INVERTER SET POINTS TO AVOID EXCEEDING 149.00 MWAC.
- REDUCED INVERTER AC SIZE SHOWN TO ILLUSTRATE TYPICAL LOAD RATIO.

SYSTEM DESIGN SCHEDULE - SITE TOTALS BY FEEDER

FEEDER	INVERTER	INVERTER QTY	NAMEPLATE INVERTER AC SIZE (MW) @40°C	**REDUCED INVERTER AC SIZE (MW)	TRANSFORMER SIZE (MVA)	PLANT OVERBUILD	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRING QTY	MODULE QTY	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
100	SUNGROW SG4400UD-MV	7	30.80	25.73	30.80	19.73%	483	135	113	2593	89201	37.96	1.23	1.48	135
200	SUNGROW SG4400UD-MV	7	30.80	25.73	30.80		507	30	38	2564	89958	37.93	1.23	1.47	140
300	SUNGROW SG4400UD-MV	7	30.80	25.73	30.80		494	109	142	2587	89849	38.07	1.25	1.48	141
400	SUNGROW SG4400UD-MV	7	30.80	25.73	30.80		539	85	60	2531	88337	37.59	1.22	1.46	135
500	SUNGROW SG4400UD-MV	6	26.40	22.05	26.40		448	81	102	2123	87321	31.53	1.19	1.43	116
600	SUNGROW SG4400UD-MV	5	26.40	22.05	26.40		441	74	80	2162	88374	32.11	1.22	1.46	115
TOTAL		40	176.00	147.00	176.00		2973	514	543	14520	392040	215.47	1.22 (AVG)	1.46 (AVG)	782

MODULE BREAKDOWN

MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	MODULE TYPE	MODULES PER STRING	STRING QTY	MODULE QTY	ROW PITCH (FT) / GCR (%)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	DC SIZE (MW)	MODULE DISTRIBUTION
LONGI SOLAR HI-MO 5 / LRS-72HBD-545M	545	BIFACIAL	27	1,835	49,545	15.57 / 48%	419	39	21	27.002	13%
LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	BIFACIAL	27	11,959	322,893	15.57 / 48%	2,396	495	496	177.591	82%
LONGI SOLAR HI-MO 5 / LRS-72HBD-555M	555	BIFACIAL	27	726	19,602	15.57 / 48%	138	10	32	10.879	5%
TOTAL				14520	392040		2973	514	543	215.472	100%

SYSTEM DESIGN SCHEDULE - FEEDER 100

INVERTER ID	INVERTER	NAMEPLATE INVERTER AC SIZE (MW) @40°C	REDUCED INVERTER AC SIZE (MW)*	TRANSFORMER SIZE (MVA)	MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRINGS PER INVERTER	MODULES PER STRING	MODULES PER INVERTER	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
PCS-101	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	54	45	8	367	27	9,909	5.450	1.239	1.065	19
PCS-102	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	68	16	34	364	27	9,828	5.405	1.229	1.471	19
PCS-103	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-545M	545	74	10	15	368	27	9,936	5.413	1.231	1.474	20
PCS-104	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	74	6	25	364	27	9,828	5.405	1.229	1.471	19
PCS-105	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	70	18	18	366	27	9,882	5.435	1.235	1.479	19
PCS-106	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-545M	545	77	16	6	368	27	9,936	5.413	1.231	1.474	20
PCS-107	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	66	20	8	366	27	9,882	5.435	1.235	1.479	20
TOTAL		30.80	25.73	30.80			483	135	113	2563		69201	37.96	1.23 (AVG)	1.48 (AVG)	135

SYSTEM DESIGN SCHEDULE - FEEDER 200

INVERTER ID	INVERTER	NAMEPLATE INVERTER AC SIZE (MW) @40°C	REDUCED INVERTER AC SIZE (MW)*	TRANSFORMER SIZE (MVA)	MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRINGS PER INVERTER	MODULES PER STRING	MODULES PER INVERTER	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
PCS-201	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-555M	555	75	0	32	364	27	9,828	5.453	1.232	1.484	20
PCS-202	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	83	10	0	362	27	9,774	5.425	1.233	1.476	21
PCS-203	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-545M	545	90	1	0	369	27	9,963	5.430	1.234	1.493	22
PCS-204	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-545M	545	87	3	0	357	27	9,639	5.253	1.194	1.429	18
PCS-205	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	90	3	0	369	27	9,963	5.480	1.245	1.491	20
PCS-206	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	89	3	0	365	27	9,855	5.420	1.232	1.475	19
PCS-207	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	93	9	6	368	27	9,936	5.465	1.242	1.487	20
TOTAL		30.80	25.73	30.80			597	30	38	2554		68958	37.93	1.23 (AVG)	1.47 (AVG)	140

SYSTEM DESIGN SCHEDULE - FEEDER 300

INVERTER ID	INVERTER	NAMEPLATE INVERTER AC SIZE (MW) @40°C	REDUCED INVERTER AC SIZE (MW)*	TRANSFORMER SIZE (MVA)	MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRINGS PER INVERTER	MODULES PER STRING	MODULES PER INVERTER	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
PCS-301	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	65	25	15	365	27	9,855	5.420	1.232	1.475	18
PCS-302	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	72	21	5	363	27	9,801	5.391	1.225	1.467	19
PCS-303	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	67	3	33	363	27	9,801	5.391	1.225	1.467	19
PCS-304	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-545M	545	91	3	0	373	27	10,071	5.489	1.247	1.494	20
PCS-305	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	79	9	9	361	27	9,747	5.360	1.218	1.459	20
PCS-306	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	64	29	52	377	27	10,179	5.598	1.272	1.523	20
PCS-307	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	66	19	12	385	27	10,395	5.717	1.299	1.556	22
TOTAL		30.80	25.73	30.80			494	109	142	2587		69849	38.37	1.25 (AVG)	1.48 (AVG)	141

SYSTEM DESIGN SCHEDULE - FEEDER 400

INVERTER ID	INVERTER	NAMEPLATE INVERTER AC SIZE (MW) @40°C	REDUCED INVERTER AC SIZE (MW)*	TRANSFORMER SIZE (MVA)	MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRINGS PER INVERTER	MODULES PER STRING	MODULES PER INVERTER	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
PCS-401	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	65	13	28	337	27	9,099	5.001	1.205	1.443	18
PCS-402	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	81	3	14	361	27	9,747	5.360	1.218	1.459	20
PCS-403	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	66	21	17	361	27	9,747	5.361	1.218	1.459	19
PCS-404	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	80	29	0	357	27	9,639	5.301	1.205	1.443	20
PCS-405	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	91	3	0	375	27	10,017	5.509	1.259	1.507	19
PCS-406	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	88	3	0	361	27	9,747	5.360	1.218	1.459	20
PCS-407	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	88	3	0	361	27	9,747	5.361	1.216	1.459	19
TOTAL		30.80	25.73	30.80			539	85	60	2531		68337	37.59	1.22 (AVG)	1.46 (AVG)	135

SYSTEM DESIGN SCHEDULE - FEEDER 500

INVERTER ID	INVERTER	NAMEPLATE INVERTER AC SIZE (MW) @40°C	REDUCED INVERTER AC SIZE (MW)*	TRANSFORMER SIZE (MVA)	MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRINGS PER INVERTER	MODULES PER STRING	MODULES PER INVERTER	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
PCS-501	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	65	18	0	354	27	9,558	5.257	1.193	1.430	19
PCS-502	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	77	3	21	359	27	9,693	5.330	1.211	1.451	21
PCS-503	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	75	14	8	354	27	9,558	5.257	1.193	1.430	20
PCS-504	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	74	12	11	354	27	9,558	5.257	1.193	1.430	19
PCS-505	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	49	17	52	351	27	9,477	5.211	1.183	1.418	18
PCS-506	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	69	17	12	351	27	9,477	5.212	1.185	1.418	19
TOTAL		26.40	22.05	26.40			419	81	102	2123		57321	31.53	1.19 (AVG)	1.43 (AVG)	116

SYSTEM DESIGN SCHEDULE - FEEDER 600

INVERTER ID	INVERTER	NAMEPLATE INVERTER AC SIZE (MW) @40°C	REDUCED INVERTER AC SIZE (MW)*	TRANSFORMER SIZE (MVA)	MODULE MAKE/MODEL	NAMEPLATE MODULE POWER (W)	TABLE QUANTITY (XL) TABLES	TABLE QUANTITY (L) TABLES	TABLE QUANTITY (M) TABLES	STRINGS PER INVERTER	MODULES PER STRING	MODULES PER INVERTER	INVERTER DC SIZE (MW)	NAMEPLATE DC/AC RATIO	**REDUCED DC/AC RATIO	LBD QTY
PCS-601	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	45	44	39	360	27	9,720	5.346	1.215	1.455	20
PCS-602	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	72	14	16	362	27	9,774	5.376	1.222	1.462	19
PCS-603	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	67	4	0	360	27	9,720	5.346	1.215	1.455	19
PCS-604	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	58	16	33	350	27	9,450	5.198	1.181	1.414	18
PCS-605	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	90	3	0	369	27	9,963	5.480	1.245	1.491	18
PCS-606	SUNGROW SG4400UD-MV	4.4	3.68	4.4	LONGI SOLAR HI-MO 5 / LRS-72HBD-550M	550	88	3	0	361	27	9,747	5.362	1.216	1.459	19
TOTAL		26.40	22.05	26.40			441	74	88	2162		58374	32.11	1.22 (AVG)	1.46 (AVG)	115

AVERAGE MV VOLTAGE DROP SUMMARY

	FEEDER 100	FEEDER 200	FEEDER 300	FEEDER 400	FEEDER 500	FEEDER 600	SITE
MV-1	0.02%	0.04%	0.06%	0.10%	0.11%	0.19%	
MV-2	0.12%	0.12%	0.11%	0.13%	0.43%	0.42%	
MV-3	0.11%	0.23%	0.23%	0.35%	0.53%	0.47%	
MV-4	0.15%	0.22%	0.24%	0.41%	0.53%	0.59%	
MV-5	0.05%	0.06%	0.25%	0.23%	0.63%	0.55%	
MV-6	0.12%	0.11%	0.31%	0.26%	0.57%	0.48%	
MV-7	0.14%	0.12%	0.27%	0.41%			
SPAN	0.13%	0.23%	0.27%	0.41%	0.63%	0.59%	0.68%
AVERAGE	0.11%	0.13%	0.24%	0.29%	0.51%	0.49%	0.38%

SYSTEM INTERCONNECTION (HV)

MVAC MAX PEAK		MVAC MAX AVERAGE		DC MAX PEAK		DC MAX AVERAGE	
CONTRACT REQ.	3%	CONTRACT REQ.	1.5%	CONTRACT REQ.	3%	CONTRACT REQ.	1.50%
DESIGN	0.68%	DESIGN	0.53%	DESIGN	1.34%	DESIGN	1.31%
RESULT	PASS	RESULT	PASS	RESULT	PASS	RESULT	PASS

AVERAGE DC VOLTAGE DROP SUMMARY

	FEEDER 100	FEEDER 200	FEEDER 300	FEEDER 400	FEEDER 500	FEEDER 600	SITE
INV-1	1.55%	1.69%	1.74%	1.80%	1.15%	1.09%	
INV-2	1.38%	1.41%	1.40%	1.11%	1.24%	1.34%	
INV-3	1.38%	1.27%	1.35%	1.15%	1.20%	1.43%	
INV-4	1.04%	1.40%	1.38%	1.15%	1.20%	1.43%	
INV-5	1.46%	1.41%	1.44%	1.14%	1.46%	1.09%	
INV-6	1.58%	1.34%	1.41%	1.14%	1.41%	1.43%	
INV-7	1.60%	1.08%	1.28%	1.11%			
MAX	1.94%	1.69%	1.72%	1.80%	1.69%	1.64%	1.94%
AVERAGE	1.51%	1.36%	1.43%	1.15%	1.30%	1.29%	1.34%

NOT FOR CONSTRUCTION

DRAWING TITLE: PROJECT DESIGN SUMMARY

DRAWING #: G0.010

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701, 8987 DR 266, BROWN & MILLS COUNTY, TX 76801

PREPARED BY: LANGAN, LLC, 2800 POST OAK BLVD, SUITE 700, HOUSTON, TX 77056, WWW.LANGAN.COM

PREPARED FOR: PURE POWER ENGINEERING, 77 HIGH STREET, HUNTSVILLE, MA 01749, WWW.PUREPOWERENG.COM

NO.	DATE	DESCRIPTION	BY	CHK	APP
1	10/20/2023	100% DESIGN REVIEW	BA	AAE	EL
2	11/17/2023	100% DESIGN REVIEW	BA	AAE	EL
3	12/15/2023	100% DESIGN REVIEW	BA	AAE	EL

DRAWN BY: BA | CHECKED BY: AAE | APPROVED BY: EL

DATE: 12/15/2023 | SCALE: AS SHOWN @ 11"x17" | PROJECT #: 191801

DO NOT SCALE DRAWINGS

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WHERE IN DOUBT ASK

GENERAL

1. THE WORK INCLUDED SHALL CONSIST OF FURNISHING LABOR AND MATERIALS NECESSARY FOR THE COMPLETE INSTALLATION OF LIGHTING, POWER, AND PHOTOVOLTAIC SYSTEMS SHOWN ON THE DRAWINGS. ALL WORK SHALL BE COMPLETE AND LEFT IN OPERATING CONDITION AT COMPLETION OF CONTRACT.
2. INCLUDE ALL APPURTENANCES NECESSARY TO COMPLETE THE INSTALLATION.
3. SOME EQUIPMENT AND MATERIALS PROVIDED UNDER OTHER DIVISIONS MAY REQUIRE COMPOSITE WORK CREWS BECAUSE OF TRADE JURISDICTION. IT IS THE CONTRACTOR'S OR SUBCONTRACTOR'S RESPONSIBILITY TO REVIEW ALL CONTRACT DOCUMENTS TO DETERMINE WHERE THESE COMPOSITE CREWS ARE REQUIRED.
4. ALL TEMPORARY AND PERMANENT PERMITS AND LICENSES REQUIRED IN CONNECTION WITH THIS DIVISION'S WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
5. INSTALLATION SHALL MEET OR EXCEED CURRENT APPLICABLE CODES, ORDINANCES AND REGULATIONS IN EFFECT AT THE SITE. IF A CONTRACTOR OR SUBCONTRACTOR OBSERVES THAT THE CONTRACT DOCUMENTS ARE AT VARIANCE WITH GOVERNING CODES AND REGULATIONS, CONTRACTOR SHALL PROMPTLY NOTIFY THE ENGINEER IN WRITING, WHO WILL RESPOND TO SUCH VARIANCES IN WRITING. IF THE CONTRACTOR PERFORMS WORK KNOWING IT IS NOT COMPLIANT WITH APPLICABLE CODES, AND DOES NOT NOTIFY THE ENGINEER, THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY AND BEAR ALL COSTS ATTRIBUTABLE TO CORRECTING THE NON-COMPLYING WORK.
6. THE REFERENCE TO CODES AND STANDARDS SHALL NOT PERMIT A LOWER GRADE OF CONSTRUCTION WHERE CONTRACT DOCUMENTS CALL FOR WORKMANSHIP AND/OR MATERIALS IN EXCESS OF THOSE REFERENCED.
7. WHERE THE TERMS "PROVIDE" OR "SHALL BE" ARE USED HEREIN OR ON THE DRAWINGS, THEY SHALL BE TAKEN TO MEAN "THE CONTRACTOR SHALL FURNISH AND INSTALL".
8. WHERE THE TERM "WHERE REQUIRED" AND "AS REQUIRED" ARE USED HEREIN OR ON THE DRAWINGS, THIS COVERAGE SHALL BE TAKEN TO MEAN "WHERE REQUIRED BY THE CONTRACT DOCUMENTS, APPLICABLE CODES, APPLICABLE STANDARDS AND UTILITY AGREEMENTS".
9. IF EQUIPMENT OR MATERIALS OTHER THAN THOSE SPECIFIED IN THE DESIGN OF THIS PROJECT ARE PROPOSED TO BE USED ON THIS PROJECT, THE CONTRACTOR AND SUPPLIER SHALL DOCUMENT DIMENSIONAL DIFFERENCES, ELECTRICAL REQUIREMENTS AND ANY OTHER POTENTIAL VARIANCES. THIS DOCUMENTED COMPARISON SHALL BE MADE FOR MANUFACTURERS SPECIFIED AS WELL AS THOSE PROPOSED PRIOR TO REQUESTING APPROVAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY EXTRA COSTS INCURRED AS A RESULT OF SUBSTITUTIONS, INCLUDING THOSE OF OTHER CONTRACTORS, SUCH AS MIGHT BE DUE TO (BUT NOT LIMITED TO) DIFFERENT ELECTRICAL, MECHANICAL AND ARCHITECTURAL REQUIREMENTS.
10. SHOP DRAWINGS:
    a. CAREFULLY EXAMINE ALL SHOP DRAWINGS NOTING CAPACITY, ARRANGEMENT AND PHYSICAL DIMENSIONS AND MARK THE DRAWINGS AS BEING REVIEWED AND APPROVED PRIOR TO SUBMITTING TO THE ENGINEER WHERE CATALOG DATA IS SUBMITTED WHICH INCLUDES ITEMS WHICH DO NOT APPLY TO THIS PROJECT, THOSE ITEMS SHALL BE CLEARLY MARKED OUT OR RELEVANT ITEMS CLEARLY NOTED. ANY DEVIATIONS FROM THE DOCUMENTS SHALL BE SO NOTED BY THE CONTRACTOR OR EQUIPMENT SUPPLIER. THE INTENT AND REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS SHALL BE ADHERED TO AT ALL TIMES AND ARE NOT WAIVED OR SUPERSEDED IN ANY WAY BY THE SHOP DRAWING SUBMITTAL OR REVIEW.
    b. SUBMIT A MINIMUM (1) ELECTRONIC COPY OF SHOP DRAWINGS FOR REVIEW AND APPROVAL. CONTRACTOR SHALL REVIEW & STAMP APPROVED COPY FOR INCORPORATION IN THE "OPERATION AND MAINTENANCE MANUALS".
    c. IF RETURNED SHOP DRAWINGS ARE MARKED "NO EXCEPTIONS TAKEN", NO ADDITIONAL SUBMITTAL IS REQUIRED. IF THE SHOP DRAWING IS MARKED "MAKE CORRECTIONS NOTED", THE CHANGES NOTED ON THE SHOP DRAWINGS ARE TO BE INCORPORATED WITH NO FURTHER RESUBMITTAL REQUIRED. IF MARKED "REVISE AND RESUBMIT", CHANGES NOTED ON THE SHOP DRAWINGS ARE TO BE MADE AND THE DRAWINGS RESUBMITTED FOR REVIEW. IF MARKED "REJECTED", THE EQUIPMENT SUBMITTED IS UNACCEPTABLE AND DIFFERENT EQUIPMENT OR MATERIALS NEED TO BE SUBMITTED.
11. NO ASBESTOS OR PCB CONTAINING MATERIALS OF ANY TYPE SHALL BE USED ON THIS PROJECT.
12. CONSULT THE CONTRACT DRAWINGS AND SPECIFICATIONS OF ALL OTHER DIVISIONS AND OTHER TRADES FOR CORRELATING INFORMATION AND LAYOUT WORK SO THAT IT WILL NOT INTERFERE WITH OTHER TRADES. VERIFY ALL DIMENSIONS AND CONDITIONS. IF DISCREPANCIES OCCUR SUCH THAT RESOLUTION IS NOT POSSIBLE BY THE AFFECTED TRADES ON THE JOB, THE ENGINEER SHALL BE NOTIFIED AND A RESOLUTION WILL BE WORKED OUT.
13. ELECTRICAL EQUIPMENT ENCLOSURES (SWITCHGEAR, PANELBOARDS, TRANSFORMERS, RELAY CABINETS, SYSTEMS RACKS/CABINETS, COMBINER BOXES, ETC.) SHALL BE VACUUMED AND WIPED CLEAN PRIOR TO ENERGIZING.
14. INSTALL MATERIAL AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS, INSTRUCTIONS, AND CURRENT NFPA STANDARDS.
15. INSTALL EQUIPMENT AND MATERIALS TO PROVIDE REQUIRED ACCESS FOR SERVICING AND MAINTENANCE. COORDINATE FINAL EQUIPMENT LOCATION WITH REQUIRED ACCESS PANELS AND DOORS. ALLOW AMPLE SPACE FOR REMOVAL OF ALL PARTS THAT REQUIRE REPLACEMENT OR SERVICING.
16. RECORD DRAWINGS: THROUGHOUT CONSTRUCTION, ACTIVITIES IN A NEAT AND LEGIBLE MANNER, DOCUMENT AND RECORD ALL CHANGES OR DEVIATIONS FROM THE CONTRACT DRAWINGS. SUBMIT REVISED DRAWINGS TO ENGINEER FOR REVIEW AT COMPLETION OF WORK AND INTERMITTENTLY IF REQUESTED BY THE ENGINEER IN WRITING. THE RECORD DRAWINGS WILL BECOME PART OF THE OPERATION AND MAINTENANCE MANUAL (MANUAL) SUBMITTED TO THE OWNER AFTER THE COMPLETION OF THE PROJECT.

MATERIALS AND METHODS

1. ALL MATERIALS SHALL BE NEW, AS SPECIFIED (OR APPROVED), AND RECEIVED IN ORIGINAL PACKAGING. CATALOG NUMBERS SPECIFIED SHALL BE VERIFIED WITH VENDORS PRIOR TO ORDERING MATERIAL.
2. ALL MATERIALS SHALL BE LISTED BY A NRTL (I.E. UL, ETL, ETC.) AND HAVE AN ASSOCIATED LABEL, UNLESS SPECIAL FABRICATION OF MATERIAL IS REQUIRED. SPECIAL FABRICATED MATERIAL SHALL BE FABRICATED USING LISTED COMPONENTS AND PROCEDURES.
3. ALL WORK SHALL BE TESTED IN ACCORDANCE WITH INDUSTRY ACCEPTED STANDARDS. BEFORE TESTING, A THOROUGH VISUAL INSPECTION SHALL BE MADE TO DETECT CONNECTION PROBLEMS, DAMAGED COMPONENTS, POOR WORKMANSHIP, IMPROPERLY OVERCURRENT PROTECTION, DEBRIS, ETC. TESTING APPARATUS SHALL BE CERTIFIED OR DEMONSTRATED TO BE ACCURATE WITHIN REASONABLE LIMITS. QUALIFIED PERSONNEL FAMILIAR WITH THE TEST EQUIPMENT SHALL PERFORM ALL TESTS. IF TESTING PROCEDURES EMPLOYED ARE NOT SATISFACTORY TO THE ENGINEER, OUTSIDE TESTING WILL BE DONE AT THE CONTRACTOR'S EXPENSE.
4. PROVIDE PERMANENT IDENTIFICATION FOR ALL ELECTRICAL EQUIPMENT WITH ENGRAVED 1/4" WHITE LETTERS ON BLACK BAKELITE-MICARTA PLATES (UNLESS NOTED OTHERWISE). NOTED INSCRIPTIONS SHALL INDICATE THE NAME, VOLTAGE, PHASE, WIRES, FEEDER SIZE, LISTING SOURCE AND LOCATION OF SOURCE, AND THE DEVICE NUMBER. THIS REQUIREMENT IS IN ADDITION TO OTHER REQUIREMENTS IDENTIFIED BY THE CONTRACT DOCUMENTS.
5. ALL LOW-VOLTAGE CABLES SHALL BE BUNDLED AND LABELED AS TO THEIR FUNCTION WITHIN TERMINAL CABINETS, WIREWAYS AND CABLE TRAYS.
6. BRANCH CIRCUITS SHALL MATCH CIRCUIT NUMBERS AS SHOWN ON THE DRAWINGS AND AS SCHEDULED. NOTIFY ENGINEER IN WRITING AND RECORD ALL DEVIATIONS ON THE AS-BUILT DRAWINGS.
7. ALL OPENINGS INTO EQUIPMENT SHALL BE SEALED WITH GALVANIZED STEEL PLATES OR SCREENS TO PREVENT ENTRY OF INSECTS AND RODENTS.
8. CLEAN, DE-BURR AND RE-FINISH ALL FIELD-PERFORMED ENCLOSURE PENETRATIONS TO MATCH OR EXCEED THE MANUFACTURER'S MEANS OF WEATHERPROOFING AND CORROSION-PREVENTION. TOUCH MATERIALS THAT MEET OR EXCEED THE PERFORMANCE OF THE MANUFACTURER'S MEANS OF CORROSION PROTECTION.

RACEWAYS

1. CONSTRUCTION SHALL BE AS PER UNDERWRITER'S LABORATORIES STANDARD UL 870 FOR WIREWAYS AUXILIARY GUTTERS AND ASSOCIATED FITTINGS.
2. WIREWAYS SHALL BE PAINTED STEEL WITH HINGED, REMOVABLE COVER WHICH CAN BE USED AS BOTH A HINGED COVER AND A SCREW COVER. WIREWAY SHALL BE FABRICATED SUCH THAT THE ENTIRE LENGTH OF WIREWAY AND FITTINGS PERMIT LAY-IN WIRING APPLICATION. CROSS SECTIONAL AREA SHALL BE 4" X 4" MINIMUM UNLESS OTHERWISE NOTED. WAYSTON "WIREWAY" SHALL BE NEMA 3/4R/4 CONSTRUCTION WITH GASKETS AND ANSI 49 CORROSION RESISTANT FINISH.
3. WHERE REQUIRED, PROVIDE CABLE STRAIN RELIEF AND GROUNDING CONNECTORS.
4. UNLESS NOTED OTHERWISE, EXPANSION FITTINGS SHALL BE UTILIZED FOR ALL PVC CONDUITS EMERGING FROM THE GROUND.
5. SCHEDULE 40 PVC SHALL BE USED FOR ALL RACEWAYS WHERE NOT RESTRICTED BY THIS SECTION OR SPECIFICALLY NOTED OTHERWISE.
6. ABOVE-GRADE PVC CONDUIT IS ONLY ALLOWED WHERE TRANSITIONING FROM BELOW GRADE AND SHALL BE UV RESISTANT TYPE SCHEDULE 80.
7. FLEXIBLE LIQUID TIGHT CONDUIT SHALL BE USED ON ALL MOTOR, MOVING, AND VIBRATING EQUIPMENT CONNECTIONS. USE MINIMUM 3/4" SIZE WITH GROUNDING TYPE FITTINGS AND PROVIDE GROUNDING CONDUCTOR.
8. INSTALLATIONS OF UNDERGROUND WIRING SHALL BE IN TRENCH, DUCT OR CONDUIT OR BY PLOWING IN PLACE AS SPECIFIED ON THE DRAWINGS.
9. UNDERGROUND CONDUIT SHALL BE INSTALLED TO ALLOW DRAINAGE INTO HANDHOLES A MINIMUM OF 4 INCHES PER 100 FEET OF HORIZONTAL RUN.
10. WHEN NON-METALLIC CONDUIT REQUIRES FIELD BENDING, UTILIZE A HOT-BENDING APPLIANCE. USE OF TORCHES TO BEND CONDUIT IS UNACCEPTABLE. WHERE CONDUITS TERMINATE IN HANDHOLES/VAULTS OR IN PAD MOUNTED EQUIPMENT, TERMINATE CONDUITS A MINIMUM OF 4 INCHES ABOVE BOTTOM OF SLAB, WHERE POINTED THROUGH SLABS, PROVIDE "SLEEVE" TO ALLOW SETTLING/HEAVING OF SLAB.
11. WHERE PVMC IMPERVIOUS IS USED, SCHEDULE 80 PVC CONDUIT SHALL BE USED FOR TRANSITIONS TO ABOVE GRADE.
12. ALL RACEWAYS SHALL UTILIZE POLYWATER OR EQUAL FOX SEALANT. DUCT SEAL IS NOT CONSIDERED EQUAL.

WIRING AND CABLE

1. WIRE
    a. DESCRIPTION: SINGLE CONDUCTOR INSULATED WIRE.
    b. CONDUCTOR: 98% COMMERCIALLY PURE COPPER CONFORMING TO ASTM B-8 CLASS B STRANDED, OR ASTM B-800 SERIES ALUMINUM ALLOY COMPACT STRANDED CONDUCTORS.
    c. INSULATION VOLTAGE RATING: 600 VOLTS AND 2000 VOLTS ONLY.
    d. INSULATION: XHHW/THHN 90, OR -2 TYPE THWN-2, THHW-2, XHHW-2, RHW-2, USE-2, AND RHW-WIRE.
    e. EXPOSED PV MODULE WIRING AND DC FEEDERS SHALL BE 2000 VOLT RATED PV-WIRE.
    f. PROVIDE SERVICE LOOPS AT TERMINATIONS.
2. LISTED BURIAL CABLE ASSEMBLY SHALL BE USED ONLY WHERE APPROVED.
3. USE SUITABLE WIRE PULLING LUBRICANT FOR BUILDING WIRE 4 AWG AND LARGER.
4. NEATLY TRIM AND LACE WIRING INSIDE BOXES, EQUIPMENT, ETC.
5. CLEAN CONDUCTOR SURFACES BEFORE INSTALLING LUGS AND CONNECTORS.
6. MAKE SPLICES, TAPS AND TERMINATIONS TO CARRY FULL AMPACITY OF CONDUCTORS WITH NO PERCEPTIBLE TEMPERATURE RISE. SPLICES ARE NOT ALLOWED UNLESS APPROVED IN WRITING BY PROJECT MANAGER.
7. PARALLEL 3-PHASE FEEDER RUNS IN CONDUIT SHALL HAVE ALL THREE PHASE CONDUCTORS (INCLUDING NEUTRAL AND GROUND WHERE REQUIRED) INSTALLED IN EACH CONDUIT. GROUPING A SINGLE PHASE (OF TWO PHASES) IN A SINGLE CONDUIT IS NOT PERMITTED.
8. WIRE CLIPS: CONTRACTOR SHALL PROCURE (EAT, HOOPTI) STRING WIRE SUPPORT CLAMPS). SHOALS WIRE MANAGEMENT CLIPS, OR OWNER-APPROVED EQUAL ON EVERY PANEL SUPPORT BRACKET IN SUPPORT STRING WIRING TO THE TORQUE TUBE STRUCTURE. STAINLESS STEEL E-CLIPS SHALL BE USED ON ALL TRANSITIONS AND MOTORS. FINAL WIRE MANAGEMENT TO BE APPROVED BY OWNER AS PER IFC DESIGN SET.
9. TIE WRAPS: EACH USE OF A TIE WRAP OTHER THAN SPECIFIED IN THIS DOCUMENT, MUST BE APPROVED BY OWNER. CONTRACTOR SHALL NOT USE TIE WRAPS WHEN TRANSITIONING ACROSS LARGE GAPS OR MOTION GAPS. CONTRACTOR SHALL ADHERE TO THE FOLLOWING SPECIFICATIONS WHEN USING TIE WRAPS:
    a. CONTRACTOR MAY USE TIE WRAPS TO BUNDLE WIRES TOGETHER, BUT NOT AS THE SUPPORT METHOD TO STRUCTURE OR MODULE.
    b. WHEN USING TIE WRAPS, CONTRACTOR SHALL AVOID PINCHING WIRE INSULATION, AND ENSURE THAT THE TIE WRAP IS PULLED TO A REASONABLE TIGHTNESS.
    c. ALL TIE WRAPS USED BY CONTRACTOR SHALL HAVE A MINIMUM WIDTH OF 0.150 INCHES.
    d. CONTRACTOR SHALL ONLY USE REAL STABILIZED ULTRAVIOLET RESISTANT TIE WRAPS.
10. ALL PLUG AND SOCKET CONNECTIONS MATED TOGETHER SHALL BE OF THE SAME TYPE AND OF THE SAME MANUFACTURER. "COMPATIBLE" CONNECTORS SHALL NOT BE ACCEPTED.
11. ALL FIELD-MADE PLUG & SOCKET CONNECTORS SHALL BE INSTALLED USING MANUFACTURER APPROVED TOOLS AND METHODS, AND CABLE CLAMPS SHALL BE TIGHTENED TO MANUFACTURER'S SPECIFIED TORQUE VALUE.
12. WHERE EXPOSED, ALL STRING/HARNESS CONNECTORS (MOBILE AND OTHERWISE) SHALL BE CAPPED AS SUCH TO AVOID DAMAGE DUE TO ENVIRONMENTAL ELEMENTS.
13. DISTANCES PROVIDED IN SCHEDULE TABLES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND LENGTHS.

10. PHASE RELATIONSHIP
    a. CONSIST FEEDERS TO MAINTAIN PHASE RELATIONSHIP THROUGH SYSTEM. PHASE LEGS OF FEEDERS SHALL MATCH BUS OR CABLE ARRANGEMENTS IN EQUIPMENT TO WHICH THE FEEDERS ARE CONNECTED. COLOR CODING SHALL BE AS FOLLOWS:

        208/120 VAC
        A PHASE: BLACK, B PHASE: RED, C PHASE: BLUE

        277/480 VAC, 346/600 VAC, 354/600 VAC
        A PHASE: BROWN, B PHASE: ORANGE, C PHASE: YELLOW

        240 VDC, 1000 VDC, OR 600 VDC
        POSITIVE CONDUCTOR: RED
        NEGATIVE CONDUCTOR: BLACK

        48 AND 24 VOLTS:
        GROUNDED CONDUCTOR: WHITE
        SYSTEM: GREEN OR BARE

        MEDIUM VOLTAGE SYSTEMS
        A PHASE: BLACK, B PHASE: RED, C PHASE: BLUE

    b. CONFIRM CONDUCTORS (INDUSTRIAL) AND EQUIPMENT GROUNDING CONDUCTORS SMALLER THAN #4 MUST HAVE GREEN COLOR INSULATION. WHERE GREEN INSULATION CABLE IS NOT USED, TAG CONDUCTOR WITH OVERWRAPPED COLORED TAPE FOR A MINIMUM OF 6" IN ACCESSIBLE LOCATIONS. COLOR CODING MUST BE USED CONSISTENTLY FOR THE ENTIRE PROJECT.

MEDIUM VOLTAGE CABLES

1. CABLES FOR THE 34.5 KV SYSTEM SHALL BE UL 83 KV RATED LISTED SINGLE CONDUCTOR INSULATED CONCENTRIC NEUTRAL AND JACKETED MEDIUM VOLTAGE TYPE POWER CABLE WITH 100% INSULATION LEVEL, 105° C CONTINUOUS OPERATION RATING, 130° C EMERGENCY RATING, 250° C SHORT CIRCUIT RATING.
2. CABLE SHALL HAVE ASTM B-609 ALUMINUM CONDUCTORS WITH CLASS B STRANDING IN ACCORDANCE WITH ASTM B-231, WATERTIME BLOCKED STRANDS, AN EXTRUDED SEMI-CONDUCTING SHIELD LAYER (40 MIL MIN.) OVER THE CONDUCTOR FOR STRESS CONTROL, DIRECT-BURIAL CROSS-LINKED INSULATION (345 MILS MIN.), A CONCENTRIC COPPER NEUTRAL AND MOISTURE/CHEMICAL/OIL/FLAME RESISTANT PVC JACKET.
3. COMPLETE INSTALLATION SHALL BE PER NATIONAL ELECTRICAL CODE ARTICLES 310 AND 328. DO NOT EXCEED MANUFACTURER'S PUBLISHED MAXIMUM PULLING TENSION OR SIDEWALL PRESSURE. PROVIDE SUFFICIENT SLACK IN CABLE, GROUND AND DRAIN WIRES TO PERMIT ELEVATION/SECTIONS TO BE MOVED TO THEIR RESPECTIVE MARKING STAKES.
4. ALL CABLES SHALL BE LABELED AT EACH END AT AN ACCESSIBLE LOCATION FOR VIEWING. LABEL SHALL INDICATE CIRCUIT, PHASES AND DESTINATION/ORIGINATION. LABELS SHALL BE CABLE TIE TAGS WITH WHITE LETTERING AND SECURED WITH A MINIMUM OF (2) UV-RESISTANT TIE TIES.
5. SPLICES ARE NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY OWNER. SPLICES AND TERMINATIONS SHALL BE MADE BY A QUALIFIED JOURNEYMAN.
6. ARRANGE PHASES AT TERMINATION POINTS, A-B-C FROM LEFT TO RIGHT OR TOP TO BOTTOM AS VIEWED FROM THE FRONT. PROVIDE APPROPRIATE SLACK TO INTERCHANGE CABLES AT TERMINATION POINTS.
7. PERFORM TESTING IN ACCORDANCE WITH EPC CONTRACT.

MEDIUM VOLTAGE JUNCTION BOXES

1. MV JUNCTION BOXES SHALL BE DESIGNED FOR BURIAL WITH THE JUNCTION MODULES MOUNTED ABOVE THE GROUND SURFACE. ENCLOSURE SHALL BE IN COMPLETE CONFORMANCE WITH ANSI 057.12.28, PAD-MOUNTED EQUIPMENT ENCLOSURE INTEGRITY STANDARD.
2. MV JUNCTION BOXES SHALL BE MANUFACTURED BY NORDIC, EATON, HUBBELL, MWE, POWER DESIGN INC., HIGHLINE, FEDERAL PACIFIC, HUFFMAN, OR SIEC (OR EQUAL).
3. ENCLOSURE SHALL BE WITH 7 NOMINAL THICKNESS FIRE RESISTANT LAMINATE FIBERGLASS WITH MUNSELL GREEN GEL COAT FINISH. (1) SHALL BE 12 GAUGE GALVANIZED STEEL WITH MUNSELL GREEN POLYESTER POWDER COAT FINISH. ENCLOSURE DOORS SHALL INCLUDE STAINLESS STEEL HINGES AND SHALL HAVE PROVISIONS FOR PADLOCKING. DOORS SHALL HAVE PROVISIONS FOR SECURING IN THE OPEN POSITION.
4. PROVIDE JUNCTION PANELS WITH WELLS TO ACCOMMODATE THE SIZE AND QUANTITY OF LOAD BREAK ELBOWS INDICATED ON DRAWINGS.
5. PROVIDE GROUND BAR IN UNIT FOR BONDING OF GROUND CONDUCTORS AND BONDING TO NEUTRAL.
6. PROVIDE FIBERGLASS GROUND SLEEVE EXTENDING 30 BELOW CABINET INSTALLED ON A 6" PEA ROCK BASE TO ALLOW DRAINAGE OF LOCAL GROUNDWATER.

BOXES

1. PULL AND JUNCTION BOXES SHALL BE (CODE GAUGE, GASKETED, HINGED, GALVANIZED STEEL, PVC, OR FIBERGLASS) COVERS SHALL BE SECURED WITH SCREWS.
2. OUTLET BOXES SHALL BE CAST MALLEABLE IRON WITH THREADED HUBS OR PVC AND BE OF HIGH CONDUCTIVE METAL TO MAINTAIN MAXIMUM ELECTRIC CONTINUITY.
3. ALL OUTLETS SHALL BE WEATHER RESISTANT WITH WEATHERPROOF WHILE-IN-USE COVERPLATES AND WEATHERPROOF BOXES.
4. COVERS OR PLATES FOR BOXES SHALL CONFORM SUBSTANTIALLY TO THE OUTLET OF THE BOXES WITH NO PROJECTING EDGES OR CORNERS.
5. (SNOOP) FITTINGS (T'S, T', LL, LR, TT) OR TYPES APPROVED FOR THE LOCATION MAY BE EMPLOYED AS REQUIRED TO FACILITATE PULLING IN CONDUCTORS.
6. PROVIDE PULL AND JUNCTION BOXES TO FACILITATE PULLING OR SPLICING OF CONDUCTORS.
7. MOUNT BOXES TO ALLOW FOR MAXIMUM ACCESSIBILITY.
8. INSTALL GROUNDING BUSHINGS WITH GROUNDING CONNECTION ON ALL METALLIC FEEDER CONDUITS ENTERING BOX. GROUND BUSHINGS AND BONDING CONNECTIONS ARE NOT REQUIRED ON BRANCH CIRCUIT DOWNTUBES.
9. ALL GALVANIZED EQUIPMENT SHALL BE HOT DIPPED. NO ALTERNATIVES ARE ALLOWED.

LOAD BREAK DISCONNECTS (LBDS)

1. DISCONNECTS SHALL BE SERVICE RATED (1600V) AT 1.2 CONTINUOUS CURRENT RATING. DISCONNECTS SHALL BE TE CONNECTIVITY OR APPROVED EQUAL.
2. DISCONNECTS SHALL BE LISTED AND MARKED SUCH THAT THE TERMINALS ARE RATED IN THE SAME CURRENT RATING OF THE SWITCH.
3. DISCONNECTS SHALL BE INTERLOCKED TO PREVENT THE OPENING OF THE COVER WHEN THE SWITCH IS IN THE ON POSITION. INTERLOCK SHALL BE DEFEATABLE FOR TESTING PURPOSES. HANDLE MUST BE LOCKABLE IN OFF POSITION.
4. DISCONNECTS SHALL BE DESIGNED FOR A FUNCTIONALLY GROUNDED SYSTEM.
5. ENCLOSURES SHALL BE A MINIMUM OF NEMA 3/IP54 WITH SEAMLESS DOOR GASKETS.
6. ALL WIRE TERMINATIONS/LUGS SHALL BE LISTED FOR 90°C FIELD TERMINATIONS.
7. PROVIDE UNITS WITH INTEGRAL DC SURGE PROTECTION DEVICES RATED FOR ARRA DISCHARGE CURRENT (8/20 µS) AND MAXIMUM CONTINUOUS OPERATING VOLTAGE OF 1500VDC.

COMBINER BOXES

1. ALL COMBINER BOXES SHALL BE 1500VDC, COMPLETE WITH CIRCUITRY AS AND AS NECESSARY TO PROTECT THE EQUIPMENT INCLUDING DISCONNECT SWITCH WITH FINGER-SAFE FUSE HOLDERS HAVING ALL NECESSARY FUSING. COMBINER BOXES SHALL BE EATON/POWERS, SOLAR2, SOLARBOS, AMTEC, TEAL, BENTEK, OR APPROVED EQUAL.
2. A FINGER-SAFE NON-FUSED DISCONNECT IS REQUIRED AND IT SHALL BE INTERLOCKED TO PREVENT THE OPENING OF THE COVER WHEN THE SWITCH IS IN THE ON POSITION. INTERLOCK SHALL BE DEFEATABLE FOR TESTING PURPOSES. HANDLE MUST BE LOCKABLE IN OFF POSITION.
3. ALL FUSE HOLDERS SHALL BE FINGER-SAFE AND SHALL HAVE LOCAL BLOWN-FUSE INDICATION. ALL FUSE HOLDERS ONLY OPEN UPWARD, ALLOWING FUSES TO BE INSERTED TOP-DOWN.
4. THE COMBINER BOX SHALL BE ARRANGED TO HAVE A MINIMUM NUMBER OF INPUT CIRCUITS AND FUSE SIZES AS INDICATED ON THE COMBINER BOX SCHEDULES FOR A NEGATIVELY GROUNDED SYSTEM. FUSE HOLDERS SHALL BE RATED AS SHOWN ON PLANS.
5. ENCLOSURES SHALL BE A MINIMUM OF NEMA 3/IP54 WITH SEAMLESS DOOR GASKETS AND AN INTEGRAL DOOR/PANEL RATED AS INDICATED ON THE COMBINER BOX SCHEDULES.
6. ALL WIRE TERMINATIONS/LUGS SHALL BE LISTED FOR 90°C FIELD TERMINATIONS.
7. COMBINER BOXES INCLUDING DISCONNECT AND FUSES SHALL BE LISTED FOR CONTINUOUS OPERATION AT 100% OF IT'S COLLECTOR BUS/DISCONNECT RATING.
8. PROVIDE UNITS WITH INTEGRAL DC SURGE PROTECTION DEVICES RATED FOR/NOMINAL DISCHARGE CURRENT (8/20 µS) AND MAXIMUM CONTINUOUS OPERATING VOLTAGE OF 1500VDC.
9. EQUIPMENT SHALL HAVE A NAMEPLATE INSTALLED AND MOUNTED TO THE FRONT COVER AND INDICATE AT A MINIMUM: NUMBER OF INPUT CIRCUITS, AMPERE RATING OF INPUT CIRCUITS, VOLTAGE RATING, SHORT-CIRCUIT CURRENT RATING, AND INTEGRATED DISCONNECT AMPERE RATING.
10. PROVIDE TYPED PV WIRING DIRECTORY INDEX CLOSELY TO TERMINAL STRINGS AND THEIR ASSOCIATED FUSE/TERMINAL HOLDER.

GROUNDING

1. PROVIDE COMPLETE GROUNDING SYSTEM AS DESCRIBED HEREIN AND AS SHOWN ON THE DRAWINGS.
2. ALL GROUNDING COMPONENTS SHALL BE USED FOR THE PURPOSE THEY ARE INSTALLED FOR. COMPONENTS SHALL BE MANUFACTURED BY AMPHENOL, BURNDY, ITT BLACKBURN, ILSCO, OR JOSLYN (OR EQUAL).
3. GROUND RODS SHALL BE 3/4-INCH DIAMETER BY 10 FEET LONG COPPER CLAD STEEL. CONNECTIONS TO RODS SHALL BE COPPER, SIZE(S) AS INDICATED ON DRAWINGS. ALL GROUND CONNECTIONS EXPOSED TO THE ELEMENTS OR IN DIRECT CONTACT WITH THE EARTH SHALL BE TIN COATED COPPER.
4. ALL METALLIC CONDUITS, SUPPORTS, CABINETS, NON-CURRENT CARRYING PARTS OF EQUIPMENT AND METALLIC STRUCTURES SHALL BE SOLIDLY GROUNDED TO FORM A CONTINUOUS PERMANENT AND EFFECTIVE GROUNDED SYSTEM.
5. ALL WIREWAY, METAL ENCLOSURES, CABLE TRAYS AND SIMILAR PARTS OF THE ELECTRICAL INSTALLATION DESCRIBED HEREIN SHALL BE GROUNDED.
6. ALL GROUNDING ELECTRODE CONNECTIONS SHALL BE IRREVERSIBLE CRIMP TYPE. CONNECTIONS MADE BELOW GRADE SHALL BE EXOTHERMIC WELD OR IRREVERSIBLE CRIMP TYPE.
7. BOLTED CONNECTIONS TO GROUND BUS BARS SHALL BE MADE USING A (2) EYELET IRREVERSIBLE CRIMP CONNECTION ON THE GROUND CONDUCTOR.
8. THE SPECIAL ATTENTION OF THE CONTRACTOR IS CALLED TO METALLIC BUILDING COMPONENTS AND MECHANICAL PIPING WHICH MUST BE GROUNDED IN AN APPROVED MANNER ACCORDING TO THE NEC.
9. PROVIDE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR EACH SINGLE OR THREE PHASE FEEDER AND EACH BRANCH CIRCUIT WITH A THREE PHASE PROTECTIVE DEVICE. INSTALL THE REQUIRED GROUNDING CONDUCTOR IN THE COMMON CONDUIT WITH THE RELATED PHASE/HOT AND NEUTRAL CONDUCTORS, WHERE PARALLEL FEEDERS ARE INSTALLED IN MORE THAN ONE RACEWAY, PROVIDE A SIZED ON WIRE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY.
10. SINGLE PHASE BRANCH CIRCUITS FOR LIGHTING, RECEPTACLES, MOTORS AND OTHER SIMILAR EQUIPMENT: PROVIDE SINGLE PHASE BRANCH CIRCUITS SERVING LIGHTING, RECEPTACLES, MOTORS, AND OTHER SIMILAR EQUIPMENT CONSISTING OF PHASE, NEUTRAL AND GREEN INSULATED EQUIPMENT GROUND CONDUCTOR INSTALLED IN A COMMON CONDUIT.
11. CONNECTIONS TO THE PV MODULES SHALL BE INSTALLED SUCH THAT REMOVAL OF A MODULE FROM THE STRING DOES NOT INTERRUPT THE GROUNDED CONDUCTOR TO ANOTHER STRING. SETS OF MODULES CONNECTED IN SERIES RATED AT 50 VOLTS OR MORE WITH OR WITHOUT BLOCKING DIODES, AND HAVING A SINGLE OVERCURRENT DEVICE SHALL BE CONSIDERED A STRING.
12. THE TOTAL RESISTANCE TO EARTH OF THE INSTALLED GROUNDING SYSTEM SHALL BE EQUAL TO, OR LESS THAN 5 OHMS. THE RESISTANCE TO EARTH OF THE COMPLETE GROUNDING SYSTEM SHALL BE MEASURED WITH AN EARTH RESISTANCE TESTER DESIGNED FOR THAT PURPOSE AT EACH GROUND CONNECTION TO ENSURE CONTINUITY OF GROUNDING SYSTEM.

FUSES

1. THE FUSES FOR PV STRING CIRCUITS SHALL BE CLASS CPV TYPE AS MANUFACTURED BY BUSSMAN, MERSEN, LITTELFUSE OR APPROVED EQUAL.
2. THE FUSES FOR PV FEEDERS SHALL BE CLASS J OR CPV TYPE AS MANUFACTURED BY BUSSMAN, MERSEN, OR LITTELFUSE OR APPROVED EQUAL.
3. FUSES SHALL BE INSTALLED SUCH THAT THE RATING IS VISIBLE WITHOUT REMOVAL.

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL NOTES LIST

DRAWING #: E0.001

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-FS-2701, 8957 DE 265, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN, LLC

PURE ENERGY END USER TO THE POWER OF SUNSHINE

NO.	DESCRIPTION	BY	APP.	DATE
1	ISSUED FOR PERMIT			
2	ISSUED FOR PERMIT			
3	ISSUED FOR PERMIT			
4	ISSUED FOR PERMIT			
5	ISSUED FOR PERMIT			
6	ISSUED FOR PERMIT			
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12	ISSUED FOR PERMIT			
13	ISSUED FOR PERMIT			
14	ISSUED FOR PERMIT			
15	ISSUED FOR PERMIT	

ID NUMBERING SYSTEM

POWER CONVERSION STATION LABEL
PCS-1XX
- SEQUENCE #
- FEEDER #
- EQUIPMENT DESIGNATION

ALBEDOMETER LABEL
ALBEDO-XXX
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

NETWORK ENCLOSURE LABEL
NET-XXX
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

MV FEEDER LABEL
MVF-XXX.1XX
- SEQUENCE #
- FEEDER #
- EQUIPMENT IDENTIFIER (PCS OR MVSC)
- MV FEEDER

MV SECTIONALIZING CABINET LABEL
MVSC-1XX
- SEQUENCE #
- FEEDER #
- EQUIPMENT DESIGNATION

LOAD BREAK DISCONNECT LABEL
LBD-XXX-01
- SEQUENCE #
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

ATI MOTOR LABEL
MTR-XXX-01
- SEQUENCE #
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

STRING LABEL
XXX-XX1.1SX
- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

MET STATION LABEL
MET-XXX
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

ATI MOTOR ELECTRONICS LABEL
CTL-XXX-01
- SEQUENCE #
- PCS IDENTIFIER
- EQUIPMENT DESIGNATION

LEGEND – GENERAL

SYMBOL	DESCRIPTION
	LIGHT LINE INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
	DARK LINE INDICATES NEW OR WITHIN THE SCOPE OF PROJECT
	DASHED LINE INDICATES EQUIPMENT AT A DIFFERENT ELEVATION
EXISTING TEXT	LIGHT TEXT INDICATES EXISTING OR BEYOND THE SCOPE OF PROJECT
NEW TEXT	DARK TEXT INDICATES NEW OR WITHIN THE SCOPE OF PROJECT

LEGEND – CIRCUITS

ABBREVIATION	DESCRIPTION
DC	DIRECT CURRENT
AC	ALTERNATING CURRENT
MV	MEDIUM VOLTAGE
C	COMMUNICATIONS
GND	GROUND
MES	MESSENGER WIRE SYSTEM
FO	FIBER OPTIC

LEGEND – PLAN SYMBOLS

SYMBOL	DESCRIPTION
	RACEWAY TURNING UP OR TOWARDS OBSERVER
	RACEWAY TURNING DOWN OR AWAY FROM OBSERVER
(P) OR (P)	PULLBOX
(J) OR (J)	JUNCTION BOX
	GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE, RATED: 125-VOLTS AC, 20A
	GROUND ROD
	GROUND ROD W/ TEST WELL
	SLOPE DIRECTION INDICATOR

LEGEND – ONE LINE DIAGRAM & WIRING DIAGRAM SYMBOLS

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER, FRAME SIZE AND TRIP SETTING AS NOTED
	DISCONNECT SWITCH
	INVERTER
	BUSS CONNECTION POINT
	CROSSING POINT (NO CONNECTION)
	NORMALLY CLOSED - NORMALLY OPEN CONTACTS
	TRANSFORMER CONTROL/POWER; SIZE AND RATING AS NOTED
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	FUSE, SIZE/RATING AS NOTED
	FUSED DISCONNECT SWITCH
	EARTH GROUND
NC NO	PUSHBUTTON SWITCHES; NUMBER AND TYPE OF CONTACT BLOCKS MAY VARY
NC NO	PUSHBUTTON SWITCHES MUSHROOM HEAD; NUMBER AND TYPE OF CONTACT BLOCKS MAY VARY
(K)	KEYED INTERLOCK (KIRK KEY OR EQ.)
(ST)	SHUNT TRIP COIL
	FAULT INDICATOR

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
A	AMPERES
AERMS	ARC ENERGY REDUCING MAINTENANCE SYSTEM
AF	AMPERE FRAME
A.F.F.	ABOVE FINISH FLOOR
A.F.G.	ABOVE FINISH GRADE
AFDI	ARC FAULT DETECTION & INTERRUPTER
AIC	AMPS INTERRUPTING CAPACITY
AL	ALUMINUM
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BKR	CIRCUIT BREAKER
C	CONDUIT
CB	COMBINER BOX
CKT	CIRCUIT
COU	CONDITIONS OF USE
CP	CONTROL PANEL
CT	CURRENT TRANSFORMER
CU	COPPER
DB	DIRECT BURIAL
DISC	DISCONNECT
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELEC	ELECTRIC, ELECTRICAL
EMERG	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EQUIP	EQUIPMENT
EV	ELECTRIC VEHICLE
EVCS	ELECTRIC VEHICLE CHARGING STATION
EXIST	EXISTING
G, GND	GROUND
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND-FAULT CIRCUIT INTERRUPTER
GFPE	GROUND-FAULT PROTECTION OF EQUIPMENT
HID	HIGH-INTENSITY DISCHARGE (LIGHTING)
HZ	HERTZ
IMC	INTERMEDIATE METAL CONDUIT
kAIC	1000 AMPS INTERRUPT CAPACITY
KCMIL	1000 CIRCULAR MILS
kVA	KILO-VOLT AMPERE
kW	KILOWATT
LA	LIGHTNING & SURGE ARRESTOR
LBD	LOAD BREAK DISCONNECT
LED	LIGHT-EMITTING DIODE
LSIG	LONG, SHORT, INSTANTANEOUS, & GROUND-FAULT
LTG	LIGHTING
MAX	MAXIMUM
MCM	1000 CIRCULAR MILS
MFG	MANUFACTURER
MLO	MAIN LUGS ONLY
MLPE	MODULE LEVEL POWER ELECTRONICS
MPPT	MAXIMUM POWER POINT TRACKING
MTR	ATI TRACKER MOTOR
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NTS	NOT TO SCALE
OV	OVER VOLTAGE
P	POLE
PF	POWER FACTOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
POA	PLANE OF ARRAY
POI	POINT OF INTERCONNECTION
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PWR	POWER
RAC	RIGID ALUMINUM CONDUIT
RCPT	RECEPTACLE
RGS	RIGID GALVANIZED STEEL CONDUIT
RMC	RIGID METAL CONDUIT
SA	SURGE ARRESTOR
SEC	SECONDARY
SPD	SURGE PROTECTION DEVICE
SSBJ	SUPPLY SIDE BONDING JUMPER
ST	SHUNT TRIP
STP	SHIELDED TWISTED PAIR
SW	SWITCH
TBD	TO BE DETERMINED
TP	TWISTED PAIR
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UV	UNDER VOLTAGE OR ULTRAVIOLET
V	VOLT
VA	VOLT-AMPERE
W	WATT
WR	WEATHER RESISTANT
XFMR	TRANSFORMER
?	? PHASE

NOT FOR CONSTRUCTION

DRAWING TITLE: ELECTRICAL SYMBOLS & ABBREVIATIONS LIST

DRAWING #: E0.002

NO	DWG	DATE	REVISION DESCRIPTION
3	EL	09/25/2023	60% ELECTRICAL DESIGN
2	EL	06/23/2023	30% LAYOUT REVIEW
1	EL	4/11/2023	30% ELECTRICAL DESIGN

PREPARED BY: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

PREPARED FOR: LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

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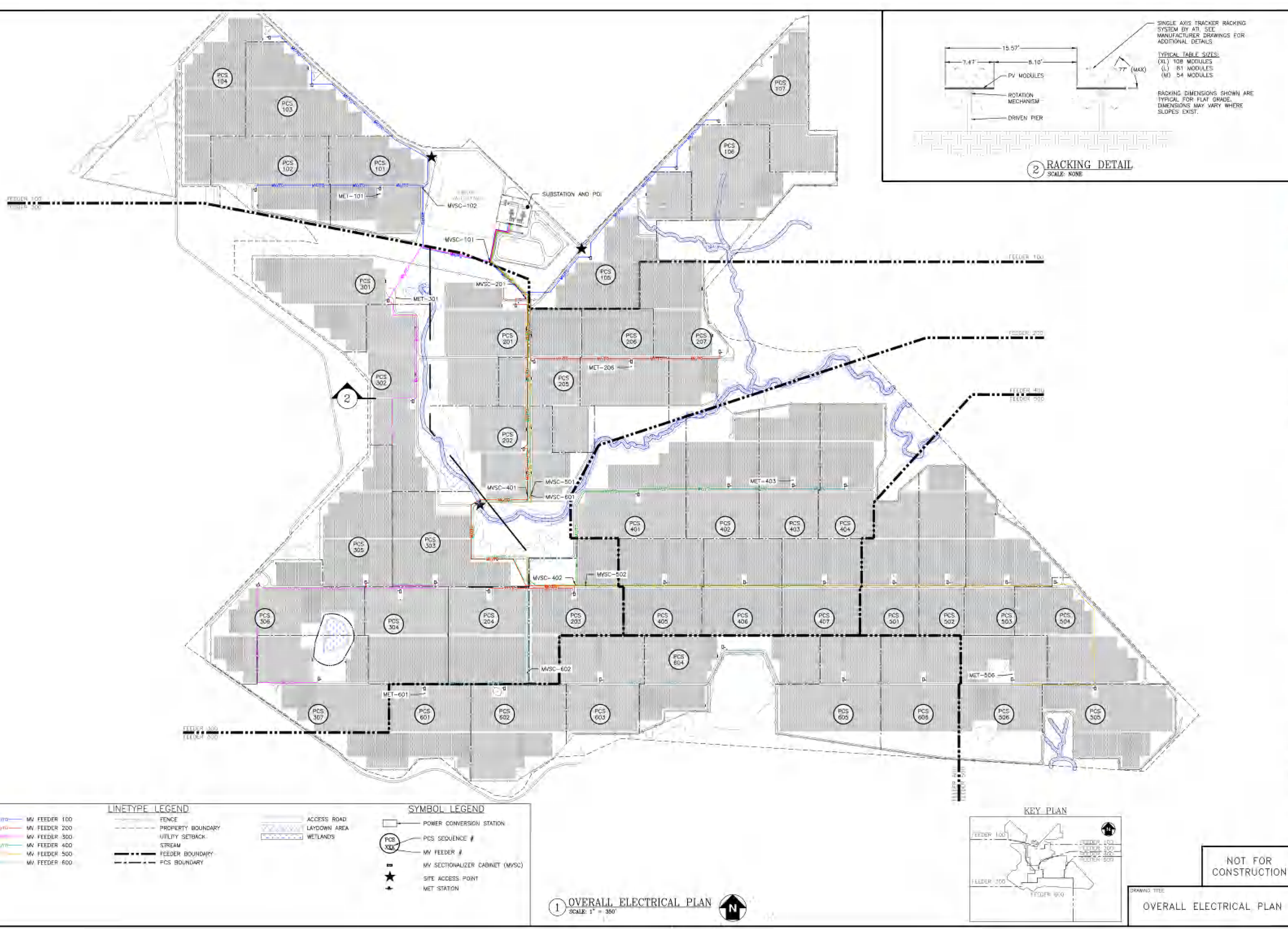

SINGLE AXIS TRACKER RACKING SYSTEM BY ATI. SEE MANUFACTURER DRAWINGS FOR ADDITIONAL DETAILS.

TYPICAL TABLE SIZES:
(XL) 108 MODULES
(L) 81 MODULES
(M) 54 MODULES

RACKING DIMENSIONS SHOWN ARE TYPICAL FOR FLAT GRADE. DIMENSIONS MAY VARY WHERE SLOPES EXIST.

2 RACKING DETAIL
SCALE: NONE

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FENCE
- PROPERTY BOUNDARY
- UTILITY SETBACK
- STREAM
- FEEDER BOUNDARY
- PCS BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)
- SITE ACCESS POINT
- MET STATION

1 OVERALL ELECTRICAL PLAN
SCALE: 1" = 350'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN

DRAWING #: E1.000

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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PROJECT #: TX-PS-2701

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1	09/25/2025	60% ELECTRICAL DESIGN	BA	AAR
2	10/23/2025	90% LAYOUT REVIEW	BA	AAR
3	11/17/2025	90% ELECTRICAL DESIGN	BA	EL

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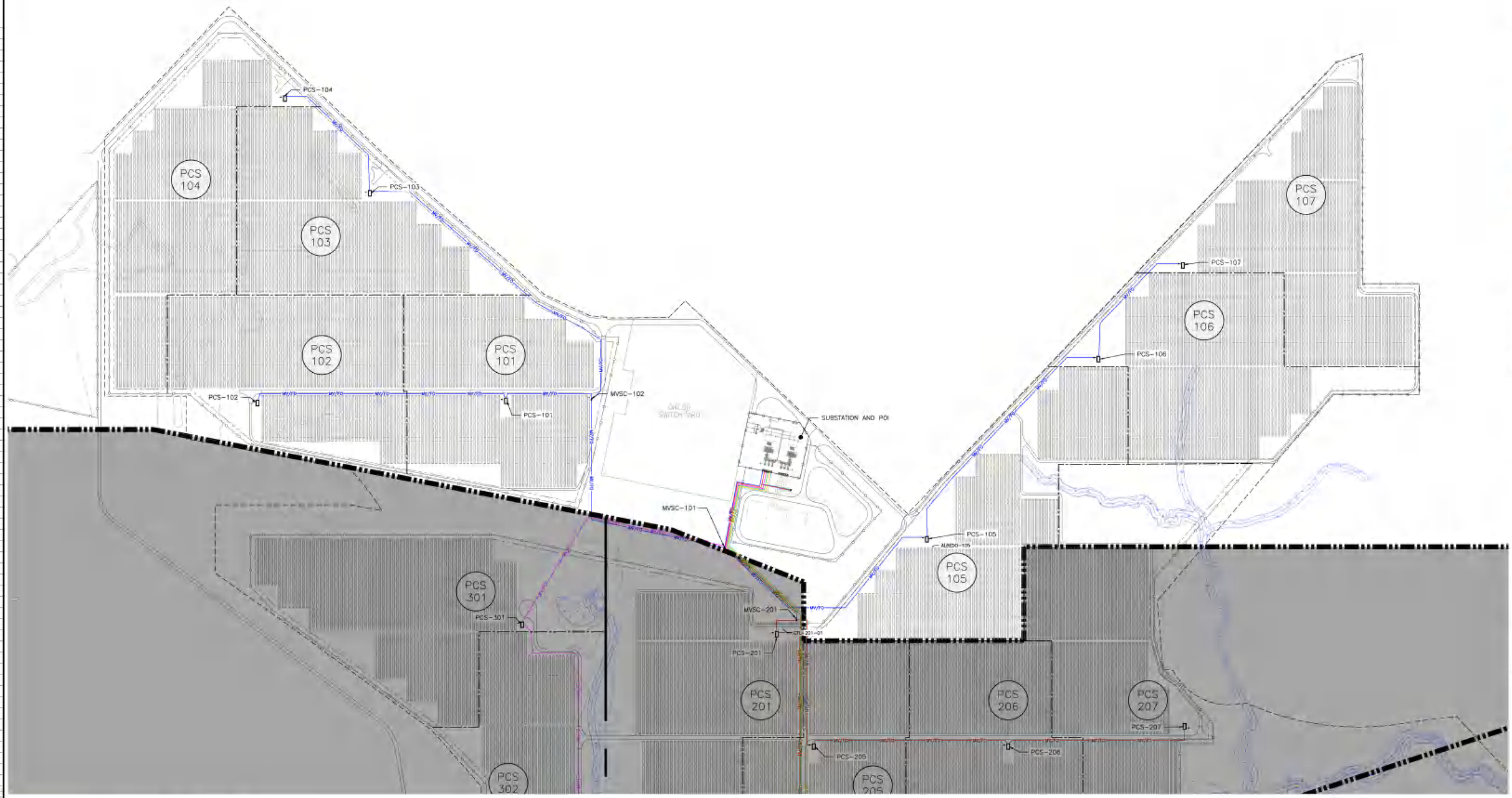


LINETYPE LEGEND

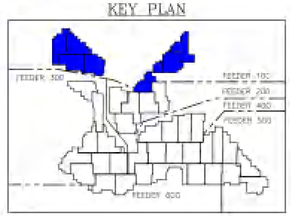
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FEEDER BOUNDARY
- PCS BOUNDARY
- FENCE
- FENCE SETBACK
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- PCS XXX — PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)

1 OVERALL ELECTRICAL PLAN – FEEDER 100
SCALE: 1" = 200'

KEY PLAN



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DRAWING TITLE: OVERALL ELECTRICAL PLAN – FEEDER 100

DRAWING # E1.010

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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	08/22/2025	60% LAYOUT REVIEW	BA	AAR
	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

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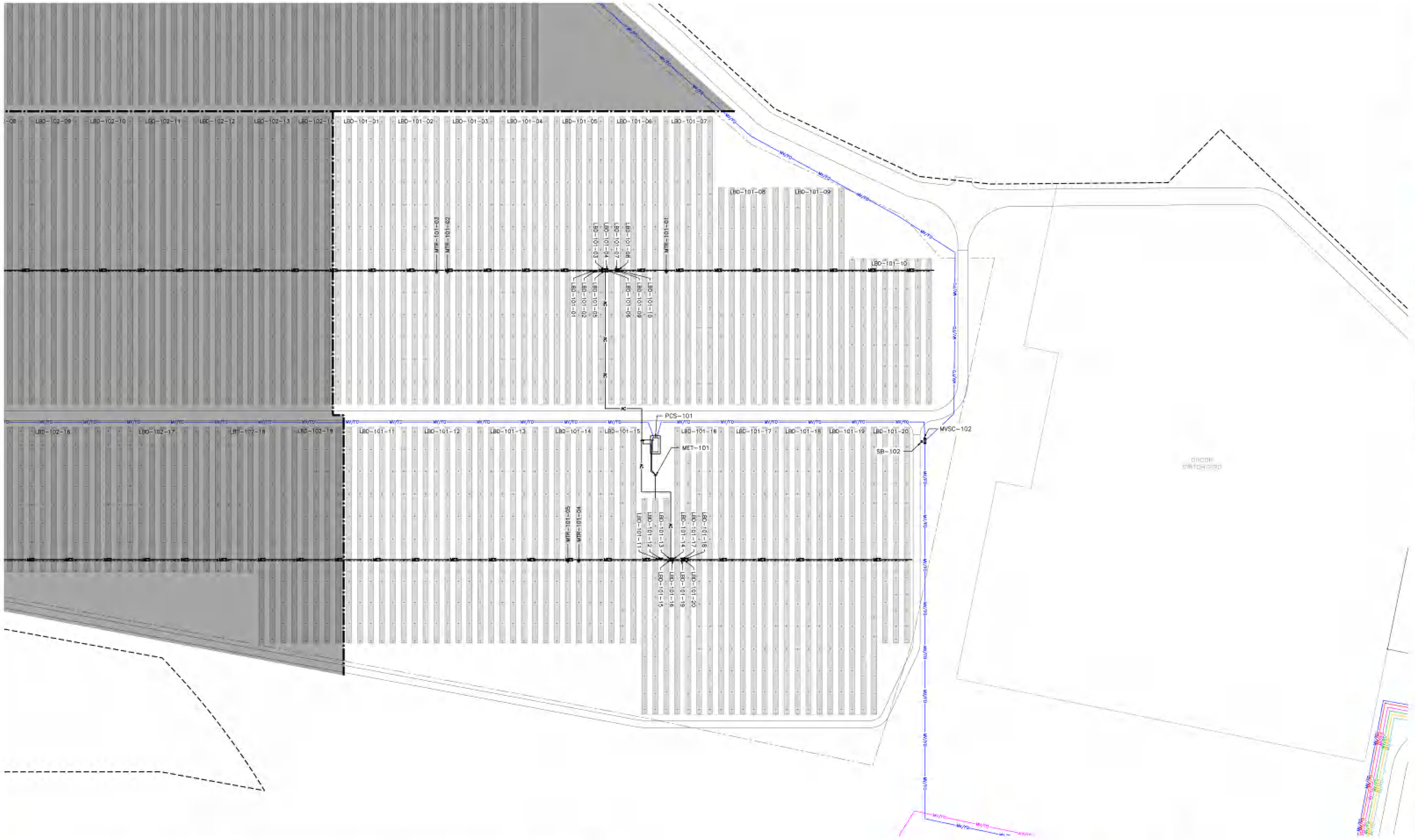


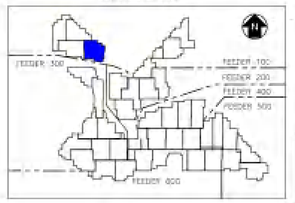
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESS MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 101
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 101

DRAWING # E1.011

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PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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PCS-102

PCS-101

MET-101

LBD-102-15
LBD-102-16
LBD-102-17
LBD-102-18
LBD-102-19

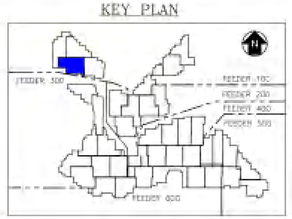
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 102

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 102

DRAWING # E1.012

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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DESIGNED:

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1	04/17/2025	30% ELECTRICAL DESIGN	BA	AAR

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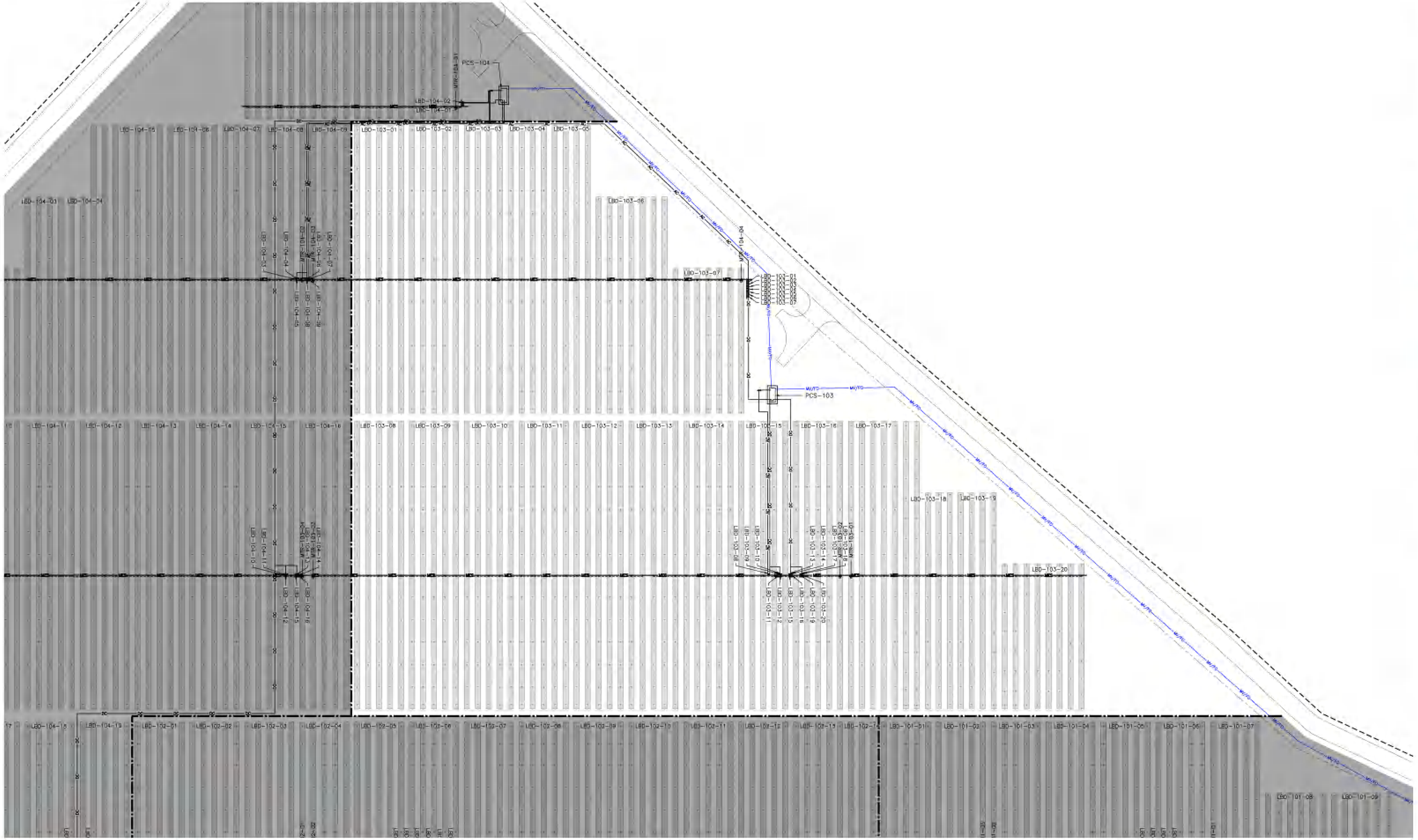
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LBD-101-06
LBD-101-07
LBD-101-08
LBD-101-09
MV/FD
MV/FD
MV/FD

PCS-104

PCS-103

PCS-102

PCS-101

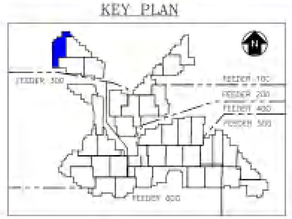
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 104

SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 104

DRAWING # E1.014

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3	09/05/2025	60% ELECTRICAL DESIGN	BA	AJR
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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

RULER IN INCHES

SUBSTATION AND POI

PCS-106

PCS-105

PCS-201

ALBEDO-105

MVSC-201
SB-201

IC-101

B-101

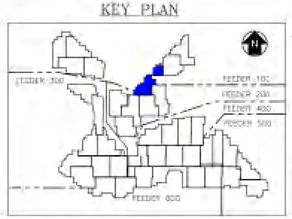
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESS MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 105
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 105

DRAWING # E1.015

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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NO	DATE	REVISION / DESCRIPTION	BY	APP.
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AR
2	08/22/2025	60% LAYOUT REVIEW	BA	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AR

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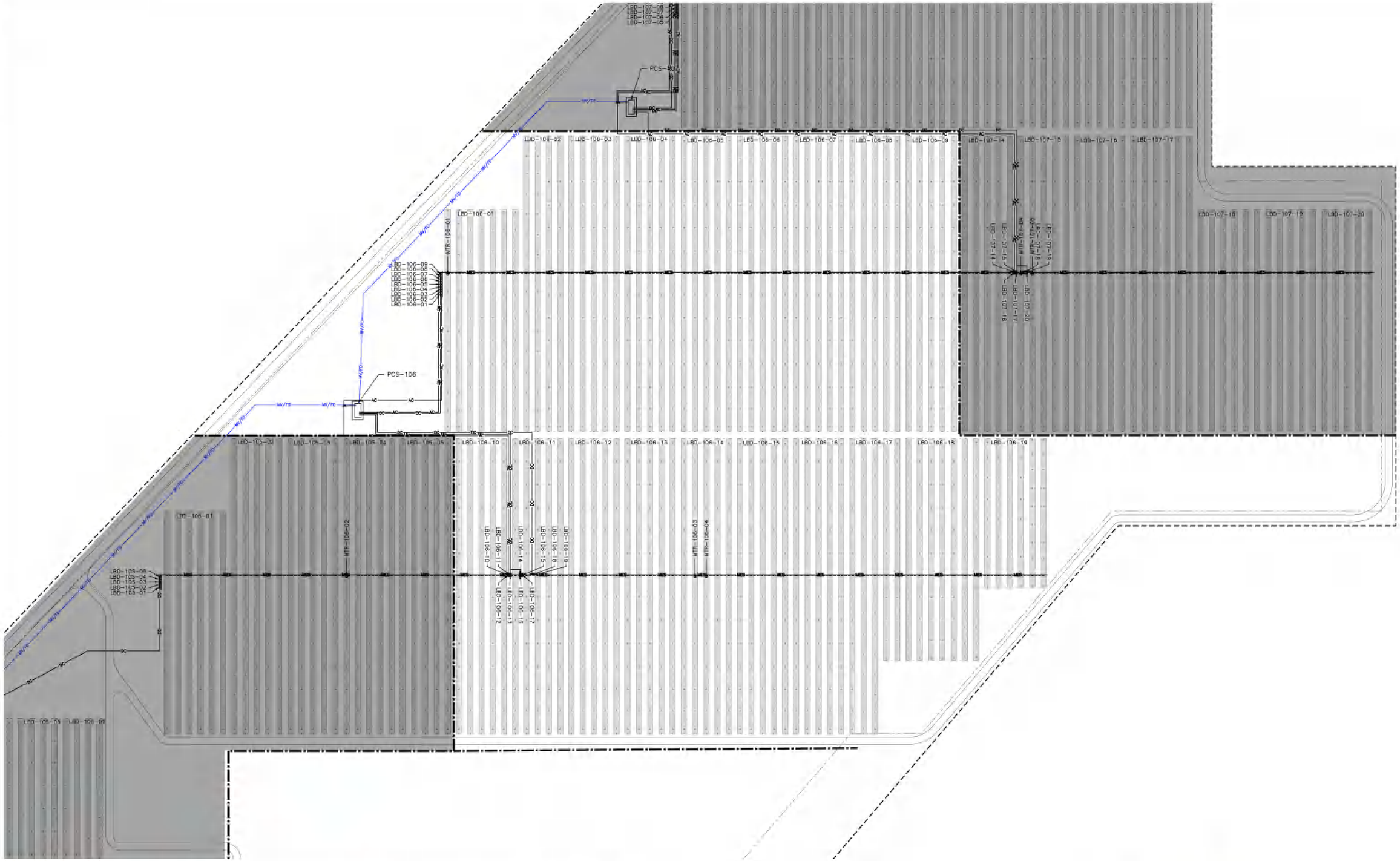


LINETYPE LEGEND

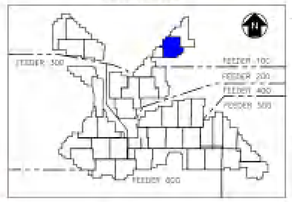
- MV/PD — MV FEEDER 100
- MV/PD — MV FEEDER 200
- MV/PD — MV FEEDER 300
- MV/PD — MV FEEDER 400
- MV/PD — MV FEEDER 500
- MV/PD — MV FEEDER 600
- DC — DC CIRCUIT
- AC — AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD — LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 106
SCALE: 1" = 60'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 106

DRAWING #: E1.016

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

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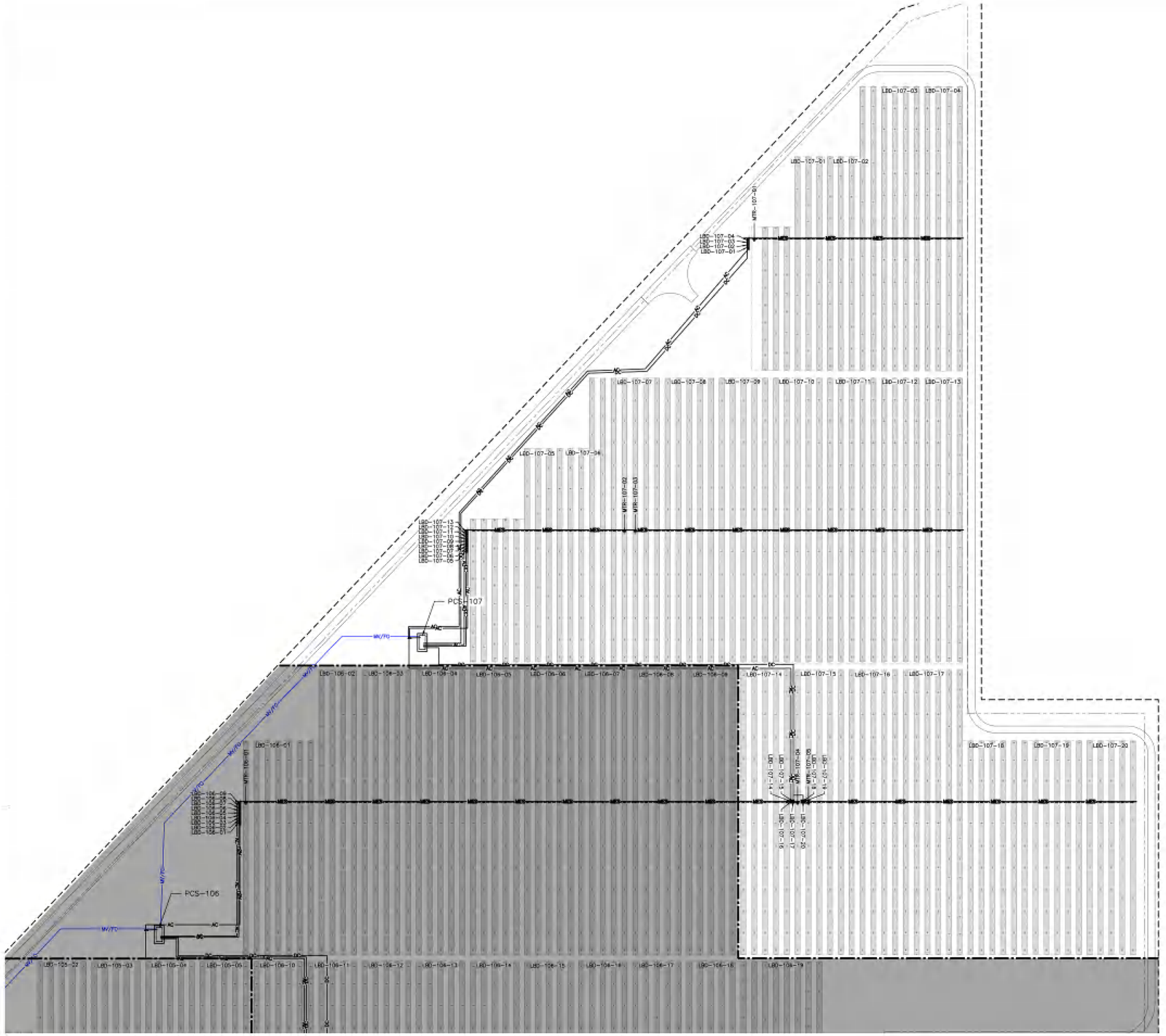


LINETYPE LEGEND

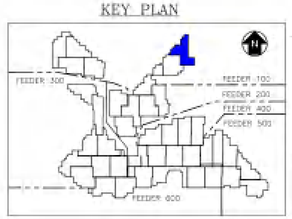
- MV/FD — MV FEEDER 100
- MV/FD — MV FEEDER 200
- MV/FD — MV FEEDER 300
- MV/FD — MV FEEDER 400
- MV/FD — MV FEEDER 500
- MV/FD — MV FEEDER 600
- DC — DC CIRCUIT
- AC — AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LoD — LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESS — MESSENGER WIRE SYSTEM
- LBD BOUNDARY

SYMBOL LEGEND

- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS
- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 107
SCALE: 1" = 75'

KEY PLAN



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DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 107

DRAWING #: E1.017

NO	DATE	REVISION DESCRIPTION	BY	CHK
			BY	APP
1	09/05/2025	60% ELECTRICAL DESIGN	BK	AAR
2	09/23/2025	60% LAYOUT REVIEW	BK	AAR
3	11/17/2025	30% ELECTRICAL DESIGN	BK	AAR

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PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

RULER IN INCHES

PLOT DATE: 11/17/2025 3:57 PM

PCS 301
PCS 105
PCS 201
PCS 206
PCS 207
PCS 302
PCS 205
PCS 202
PCS 401
PCS 402
PCS 403
PCS 404
PCS 306
PCS 303
PCS 304
PCS 204
PCS 203
PCS 405
PCS 406
PCS 407
PCS 501
PCS 604

MVSC-201
MVSC-401
MVSC-501
MVSC-402
MVSC-502
MVSC-602

PCS-105
PCS-201
PCS-207
PCS-205
PCS-206
PCS-301
PCS-302
PCS-202
PCS-401
PCS-402
PCS-403
PCS-404
PCS-306
PCS-305
PCS-303
PCS-304
PCS-204
PCS-203
PCS-405
PCS-406
PCS-407
PCS-501
PCS-502
PCS-604
PCS-307
PCS-605

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FEEDER BOUNDARY
- PCS BOUNDARY
- FENCE
- FENCE SETBACK
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- STREAM

SYMBOL LEGEND

- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS
- POWER CONVERSION STATION
- PCS XXX — PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)

KEY PLAN

NOT FOR CONSTRUCTION

1 OVERALL ELECTRICAL PLAN – FEEDER 200
SCALE: 1" = 200'

N

NO	DATE	DESCRIPTION	BY
1	09/25/2025	60% SUBMITTAL DESIGN	BH
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3	11/17/2025	100% ELECTRICAL DESIGN	BH

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PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

DRAWING TITLE: OVERALL ELECTRICAL PLAN – FEEDER 200

DRAWING #: E1.020

PROJECT #: TX-PS-2701

SIZE: 36" x 24"

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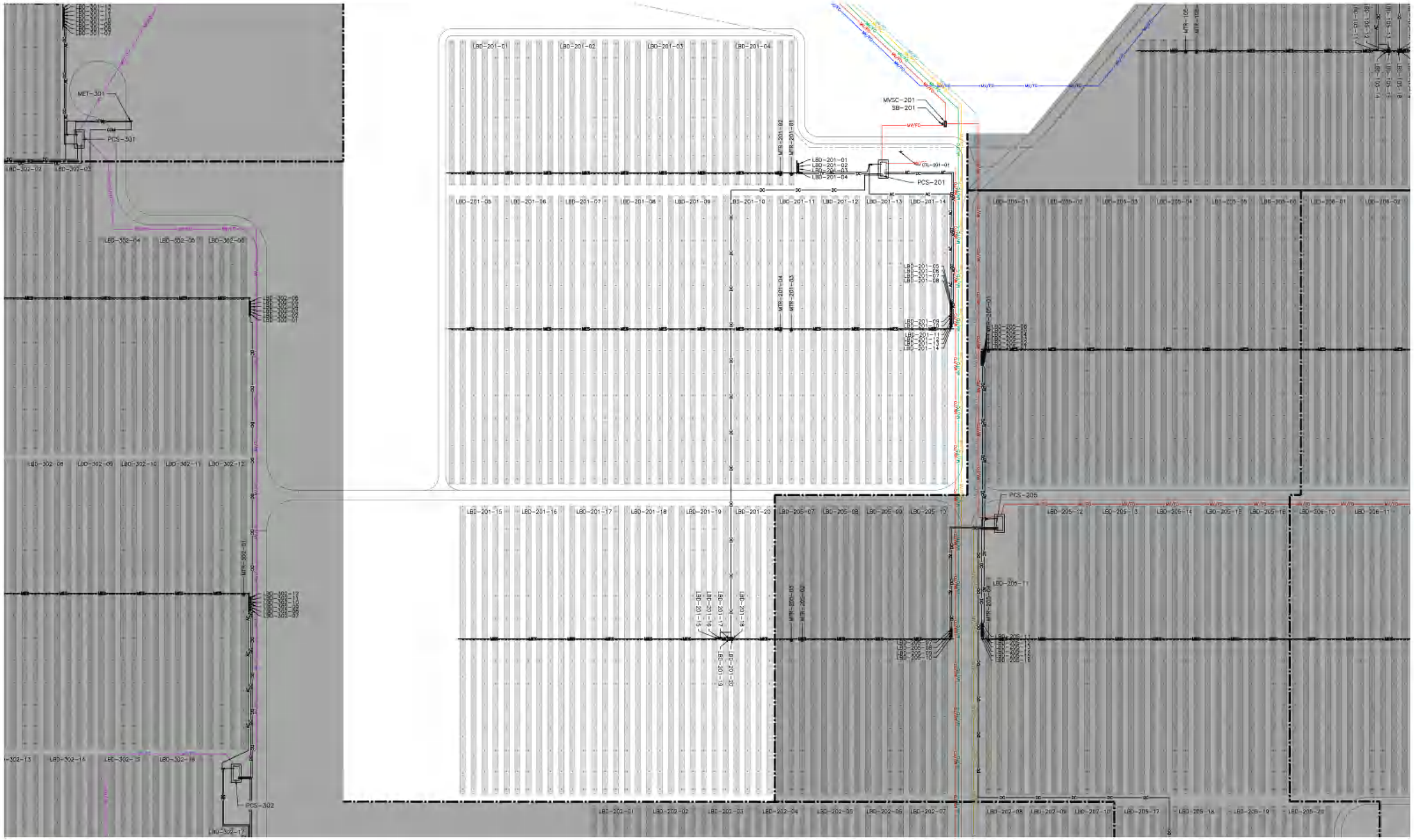


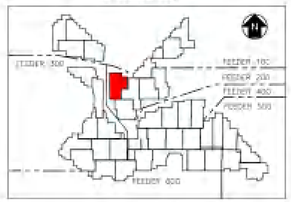
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESS MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 201
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 201

DRAWING # E1.021

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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PREPARED BY: PURE POWER ENGINEERING 111 RIVER STREET HOBOKEN, NJ WWW.PUREPOWER.COM

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1	04/17/2025	30% ELECTRICAL DESIGN	BA	MR

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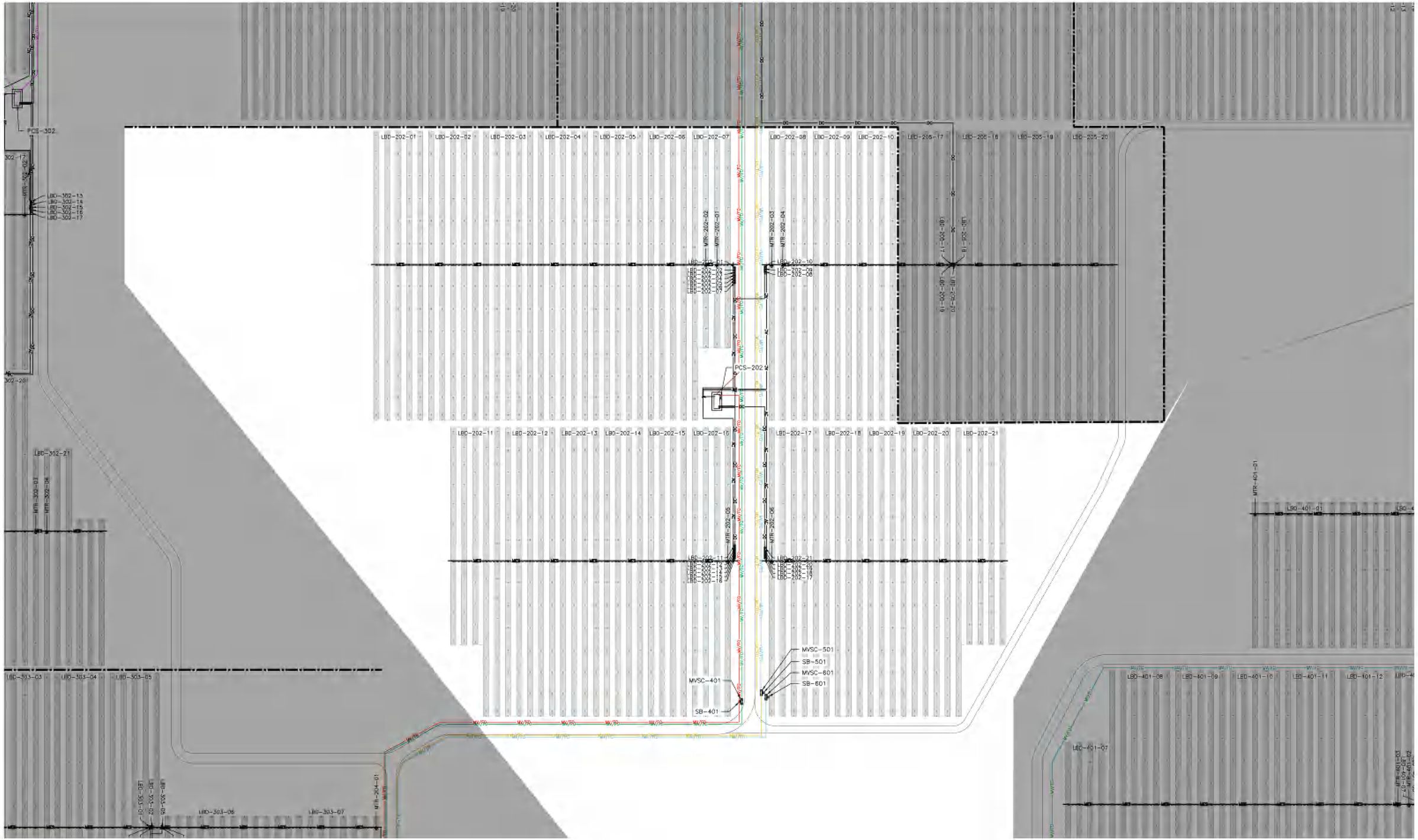


LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

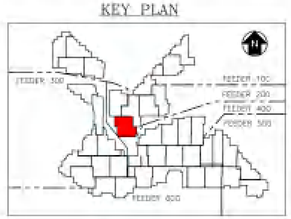
SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 202

SCALE: 1" = 60'

KEY PLAN



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DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 202

DRAWING #: E1.022

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PROJECT # TX-PS-2701

PAGE SIZE: 36" x 24"

PREPARED FOR: LANGAN

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HOUSTON, TX 77024
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3	E1.022	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR	EL
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RULER IN INCHES

LINETYPE LEGEND

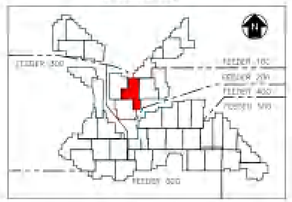
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 203
SCALE: 1" = 75'

KEY PLAN



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DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 203

DRAWING # E1.023

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT # TX-PS-2701

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PREPARED BY: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2023	ISSUE FOR CONSTRUCTION	BA	AR
2	08/23/2023	ISSUE FOR REVIEW	BA	AR
1	04/11/2023	ISSUE FOR PERMIT	BA	AR

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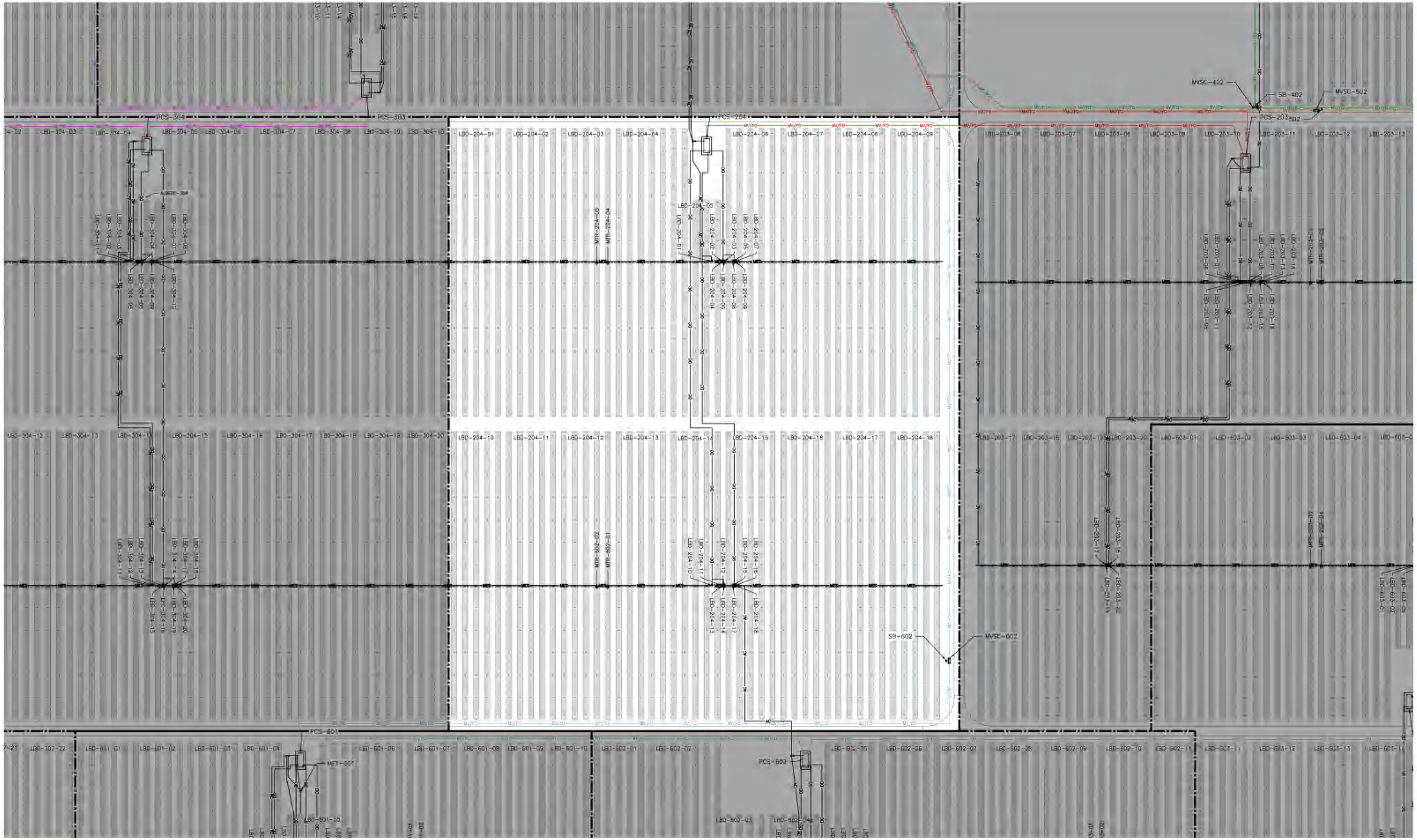


LINETYPE LEGEND

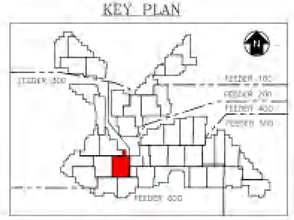
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 204
SCALE: 1" = 80'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 204

DRAWING #: E1.024

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 266, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	APP.
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AR
2	08/22/2025	60% LAYOUT REVIEW	BA	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AR

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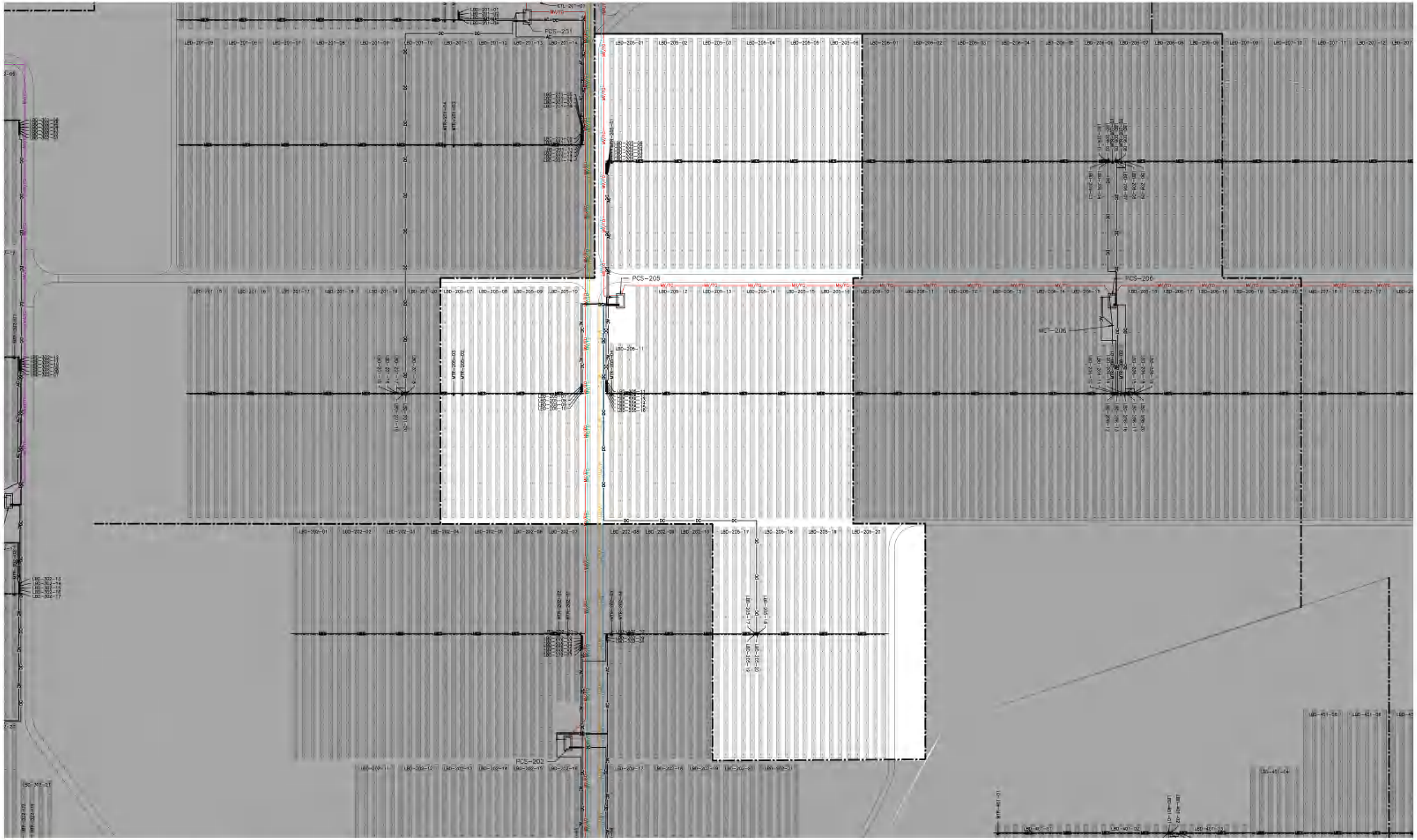


LINETYPE LEGEND

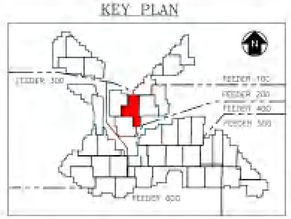
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 205
SCALE: 1" = 75'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 205

DRAWING # E1.025

NO	DWG	CHK
3	BA	AR
2	BA	AR
1	BA	EL

NO	DATE	REVISION / DESCRIPTION
3	09/25/2023	60% ELECTRICAL DESIGN
2	08/23/2023	60% LAYOUT REVIEW
1	04/11/2023	30% ELECTRICAL DESIGN

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HOUSTON, TX 77024
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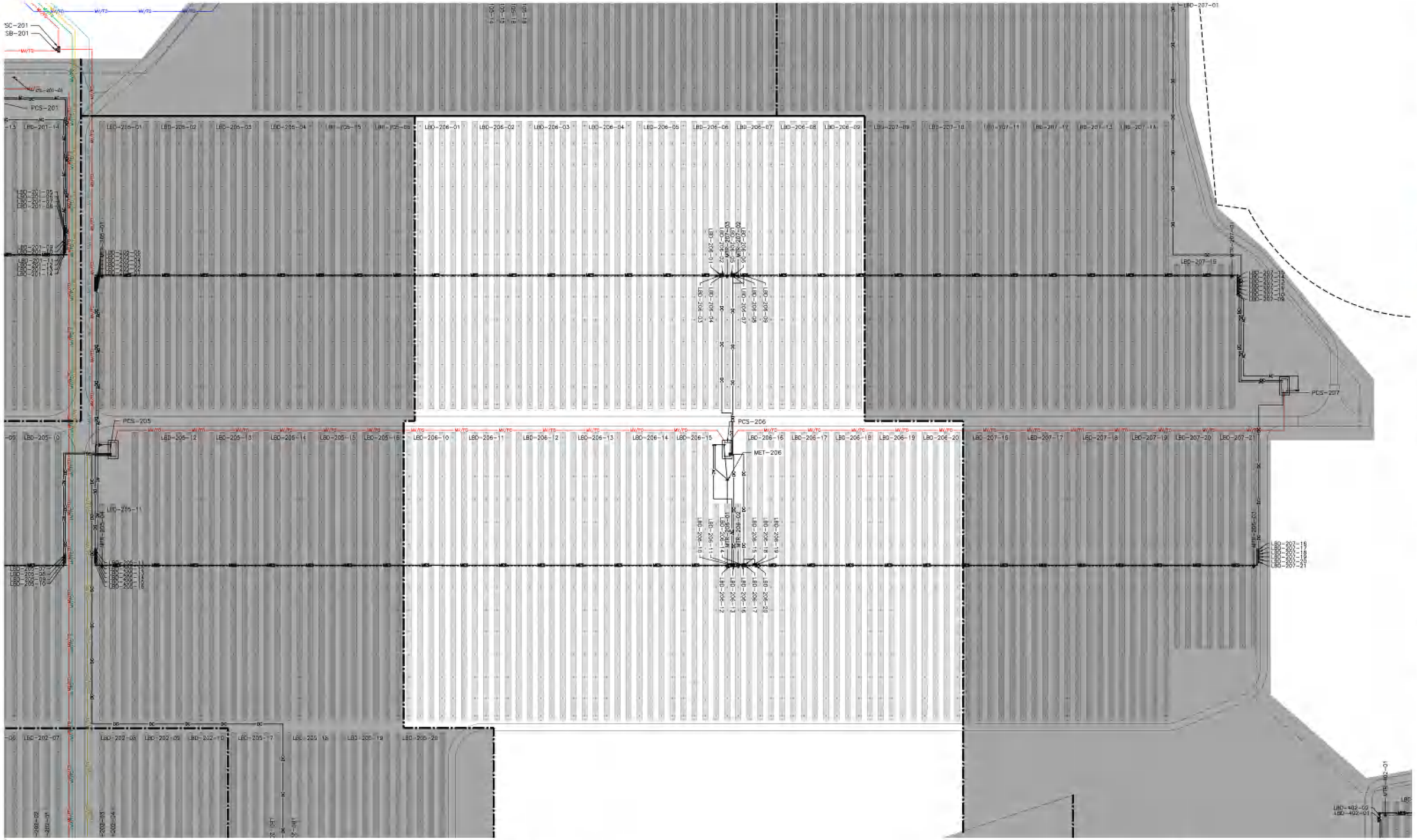
PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

BAR IS 1" IN ORIGINAL



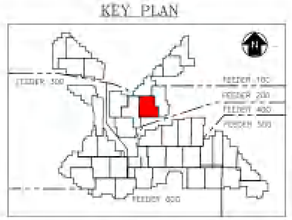
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 206
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 206

DRAWING # E1.026

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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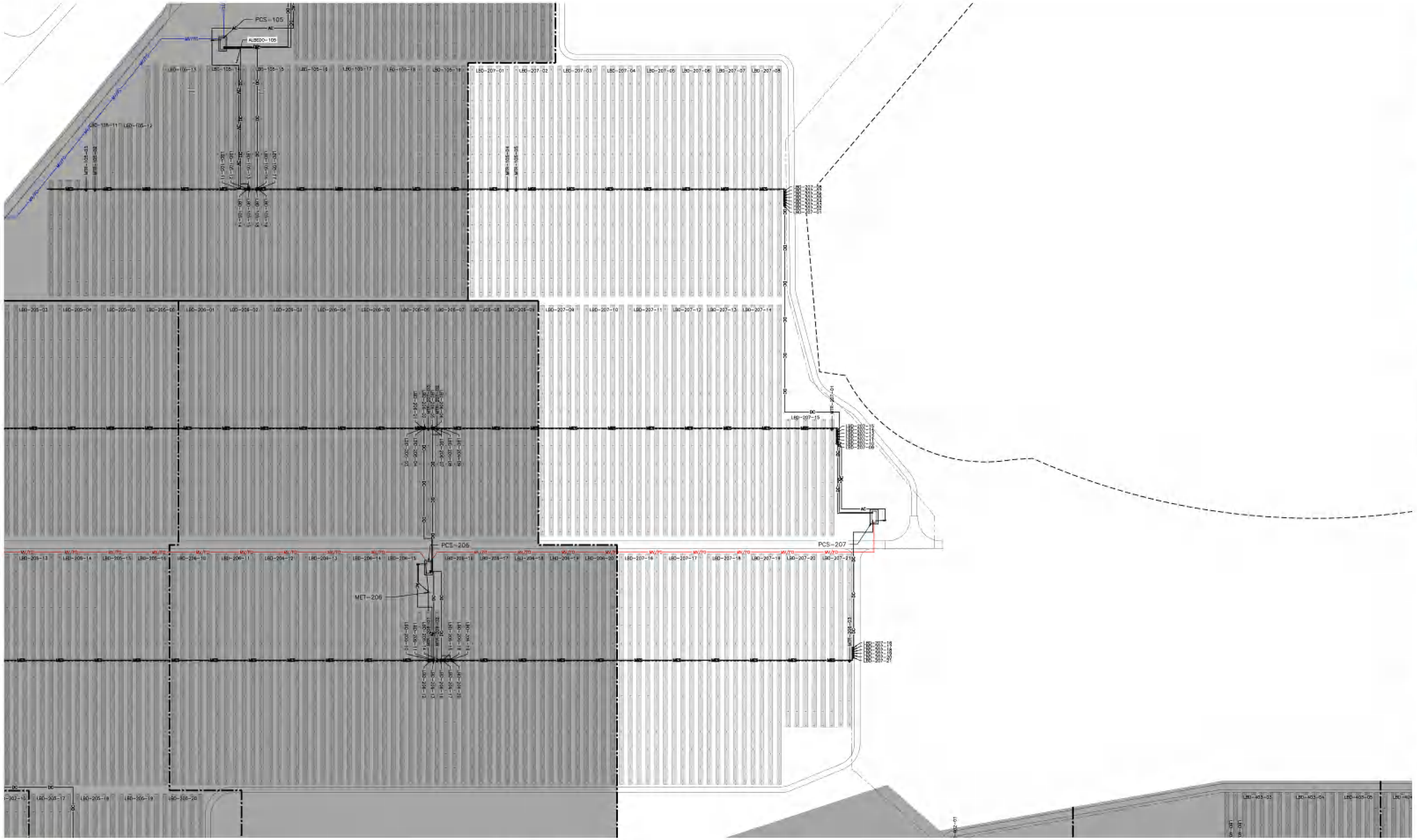
PREPARED BY: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	APP.
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AR
2	08/22/2025	90% LAYOUT REVIEW	BH	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AR

NOTE: DRAWN TO BE PLOTTED ON 24" x 36" SHEET. ANY PORTION OF DRAWING PLOTTED AT REDUCED SIZE SHALL NOT BE USED FOR CONSTRUCTION. ALL DIMENSIONS, TOLERANCES, AND NOTES SHALL BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. © 2024 PURE POWER ENGINEERING INC., ALL RIGHTS RESERVED

PLOT DATE: 09/25/2025 9:12 AM

RULER IN INCHES



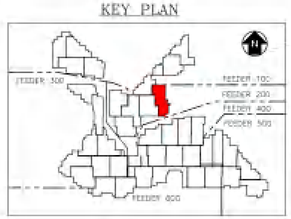
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 207

SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 207

DRAWING # E1.027

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	06/20/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

PREPARED BY: LANGAN

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PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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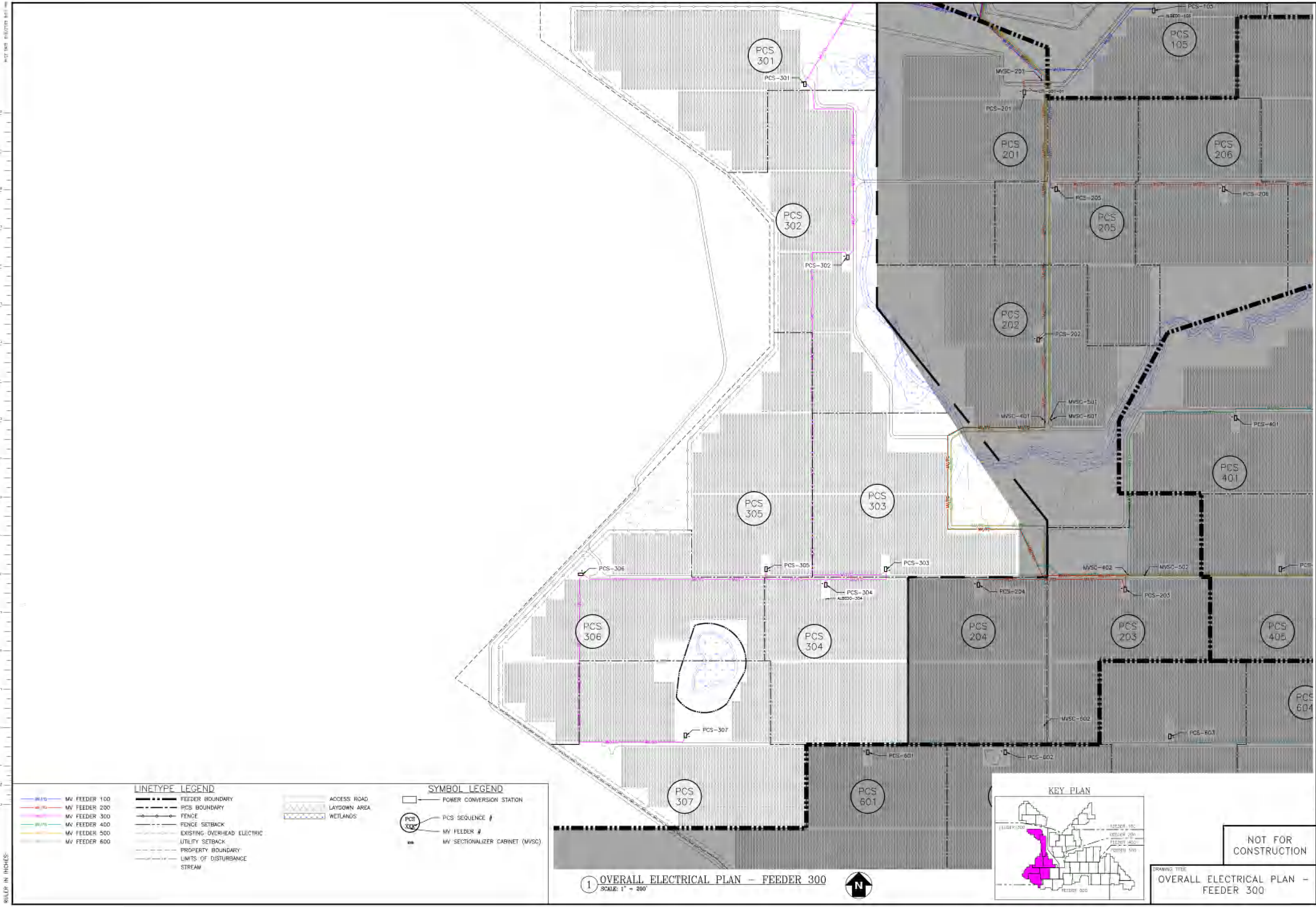

1 OVERALL ELECTRICAL PLAN – FEEDER 300
SCALE: 1" = 200'

NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN – FEEDER 300

DRAWING #: E1.030

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

NO	DATE	REVISION / DESCRIPTION	DRN	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AR
2	06/03/2025	60% LAYOUT REVIEW	BA	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AR

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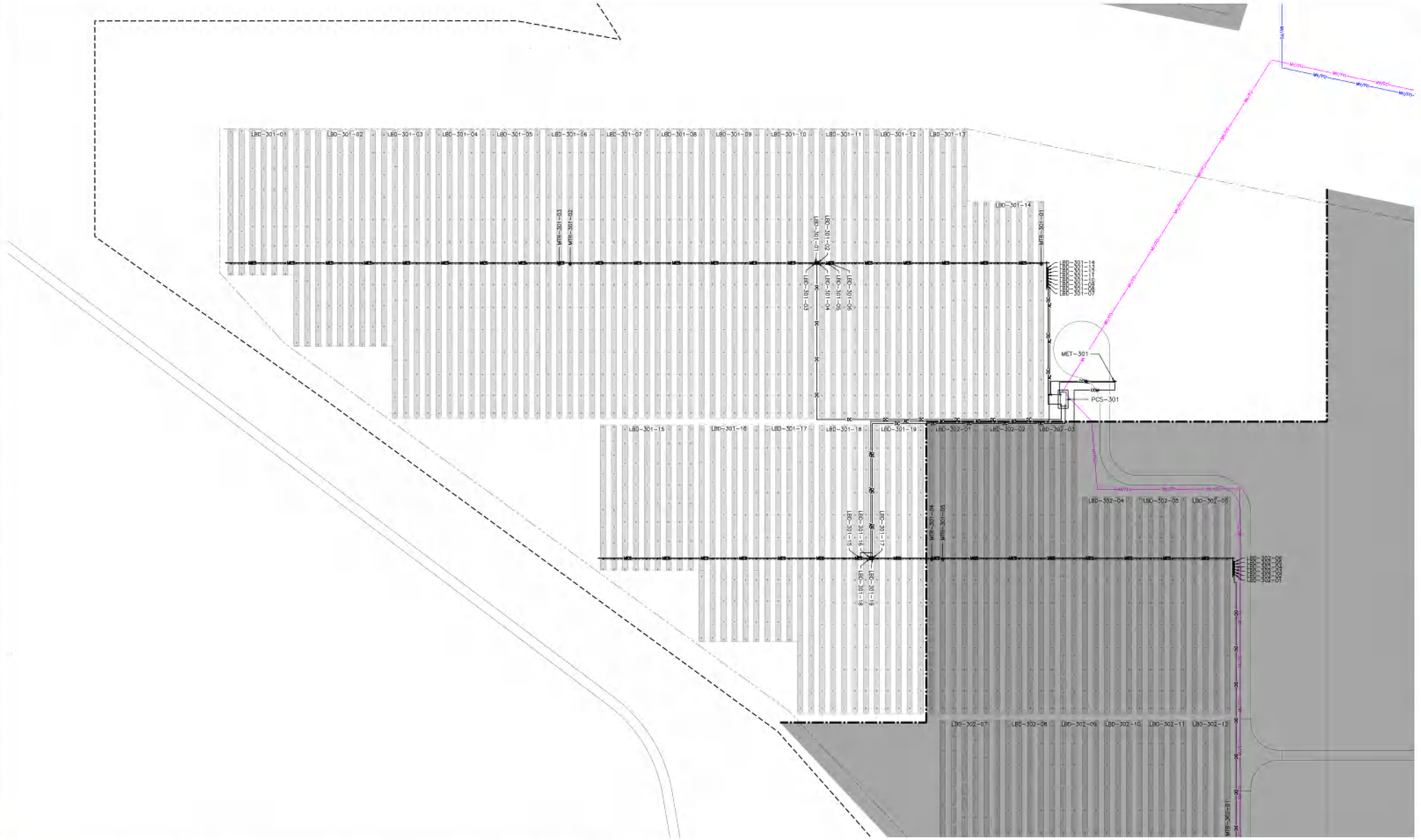


LINETYPE LEGEND

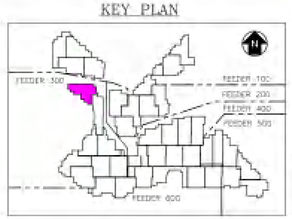
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 301
SCALE: 1" = 60'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 301

DRAWING #: E1.031

NO	DATE	REVISION DESCRIPTION	BY
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	08/22/2025	60% LAYOUT REVIEW	BA
	04/11/2025	30% ELECTRICAL DESIGN	BA

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HOUSTON, TX 77024
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PREPARED / SEAL: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PLOT DATE: 9/5/2025 9:59 AM

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PCS-205

PCS-302

MVSC-501
SB-501
MVSC-601
SB-601
MVSC-401
SB-401

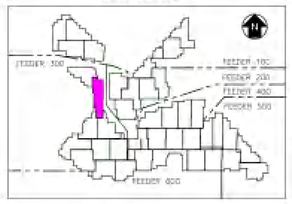
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 302
SCALE: 1" = 90'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 302

DRAWING #: E1.032

NO	DATE	REVISION / DESCRIPTION	BY
3	09/05/2025	60% ELECTRICAL DESIGN	BA
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1	04/11/2025	30% ELECTRICAL DESIGN	BA

DESIGNED BY: AAR | DRAWN BY: EL | CHECKED BY: EL

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PREPARED FOR: LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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PLOT DATE: 9/5/2025 3:55 PM

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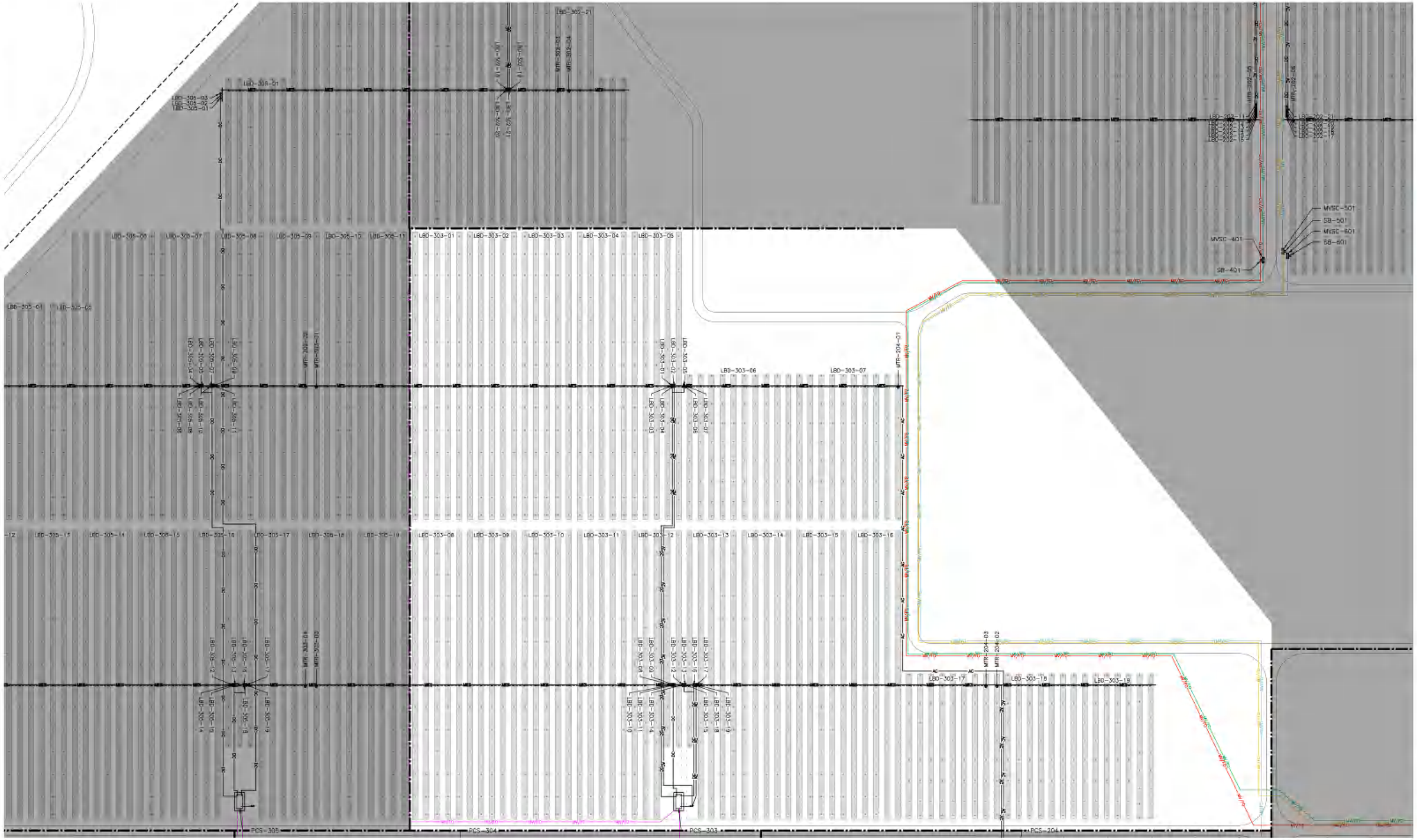


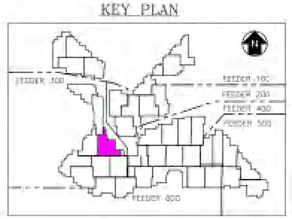
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 303
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

NO	DATE	REVISION / DESCRIPTION	BY	CHK'D
3	09/05/2025	60% ELECTRICAL DESIGN	BA	MR
2	06/20/2025	60% LAYOUT REVIEW	BA	MR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

PREPARED FOR: LANGAN

PREPARED BY: PURE POWER ENGINEERING, 111 RYER STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

DESIGNED BY:

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 303

DRAWING #: E1.033

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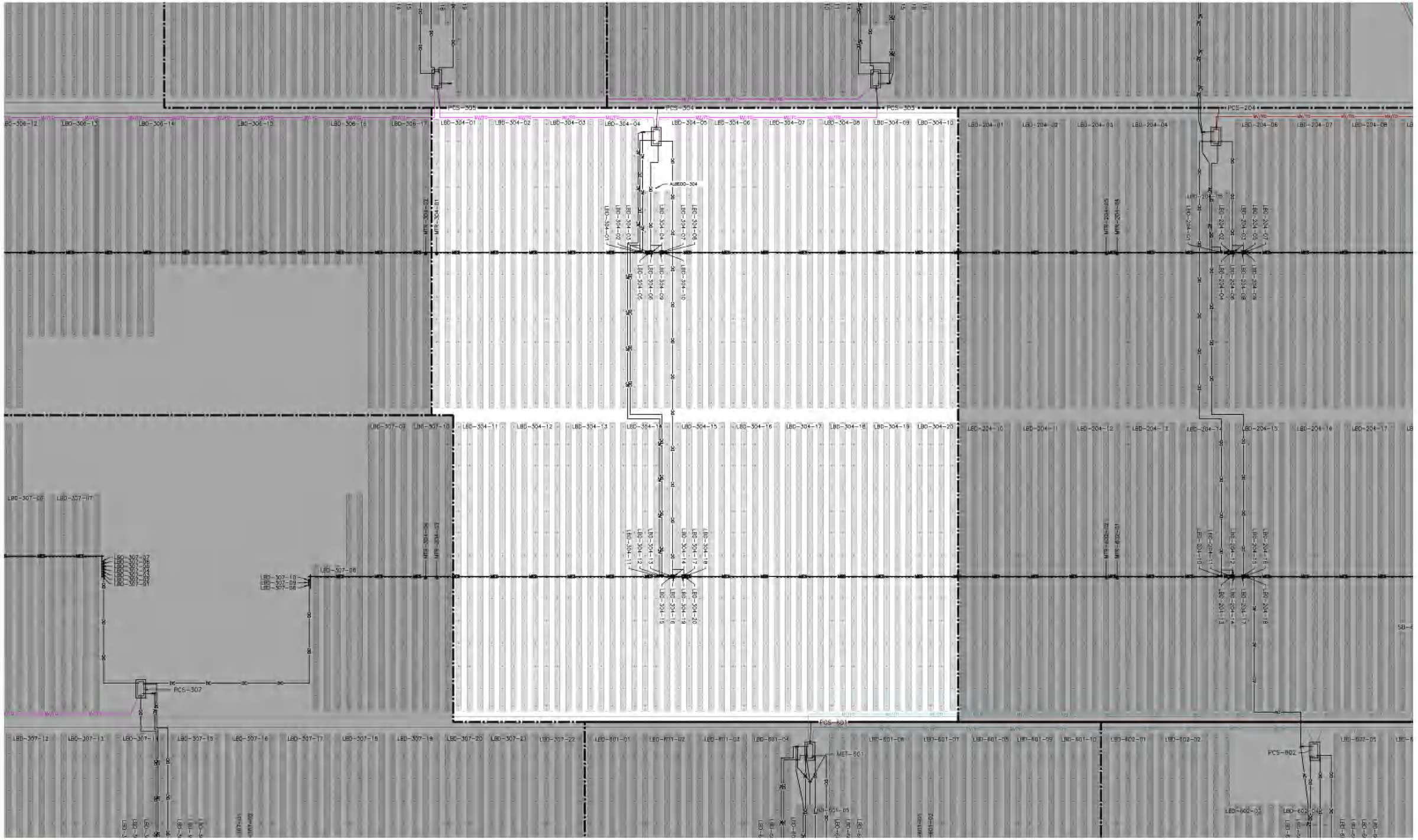
RULER IN INCHES



LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
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- LIMITS OF DISTURBANCE
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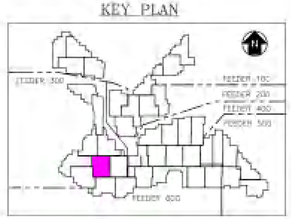
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 304

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

NO	DATE	REVISION / DESCRIPTION	BY	APP.
3	09/25/2025	60% ELECTRICAL DESIGN	BA	AR
2	08/22/2025	60% LAYOUT REVIEW	BA	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AR

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PREPARED BY: LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 304

DRAWING #: E1.034

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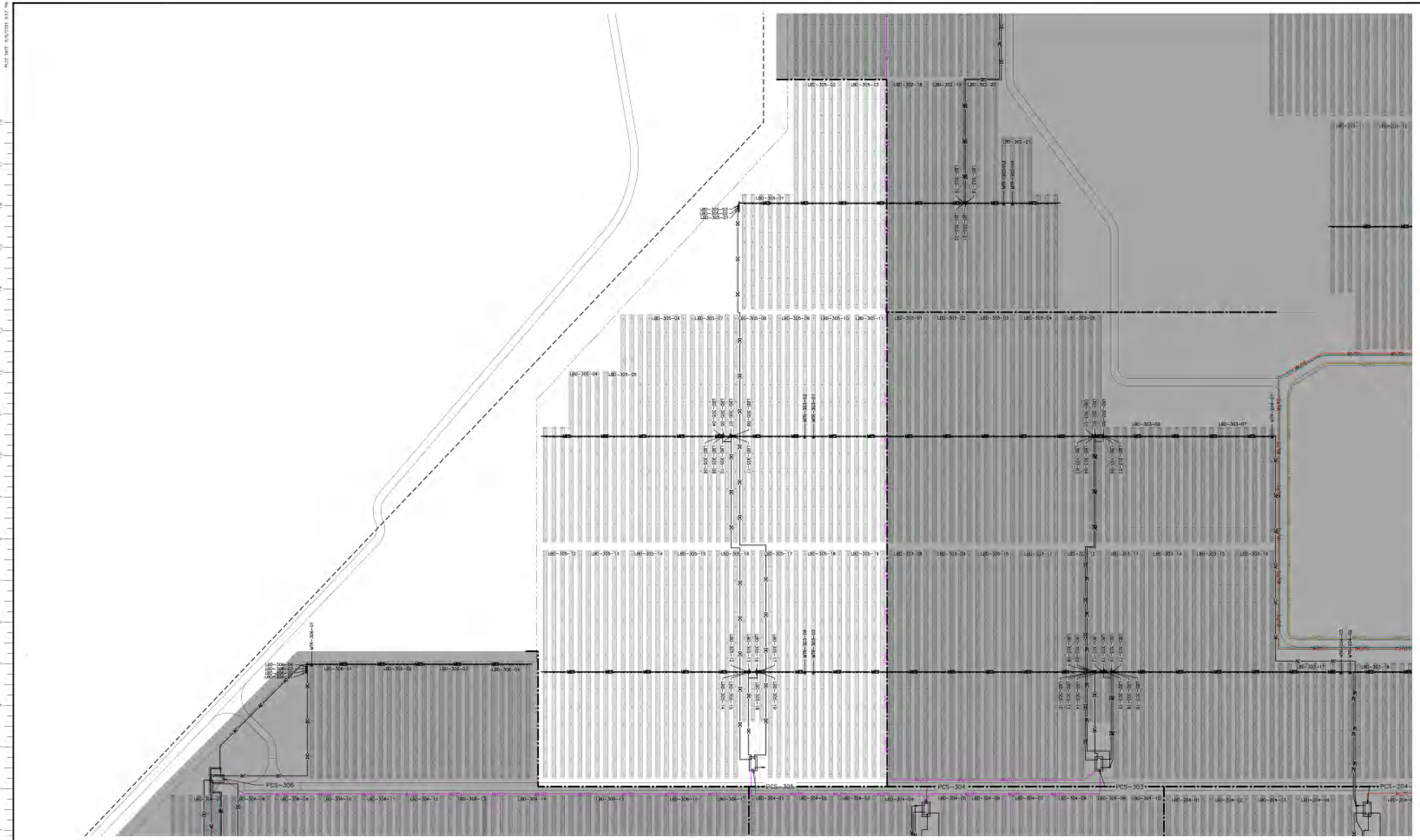

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
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- LIMITS OF DISTURBANCE
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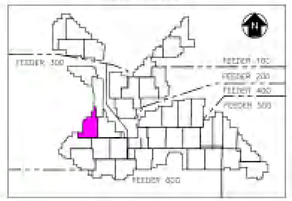
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 305
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 305

DRAWING #: E1.035

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	JMR
2	06/23/2025	60% LAYOUT REVIEW	BA	JMR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	JMR

PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD SUITE 740
HOUSTON, TX 77024
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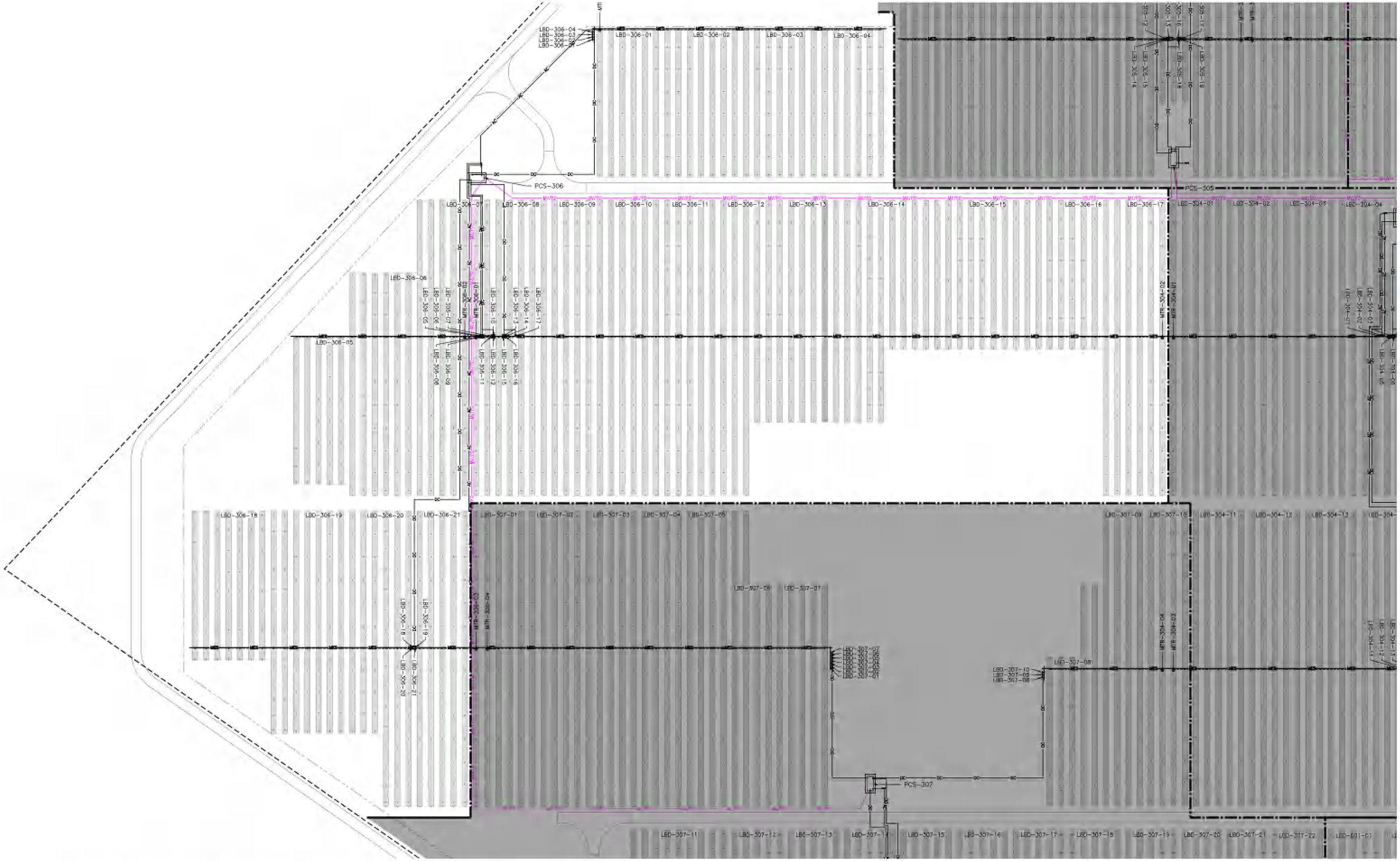
PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PLOT DATE: 9/8/2025 9:57 AM

RULER IN INCHES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PCS-305
PCS-307
LBD-306-01
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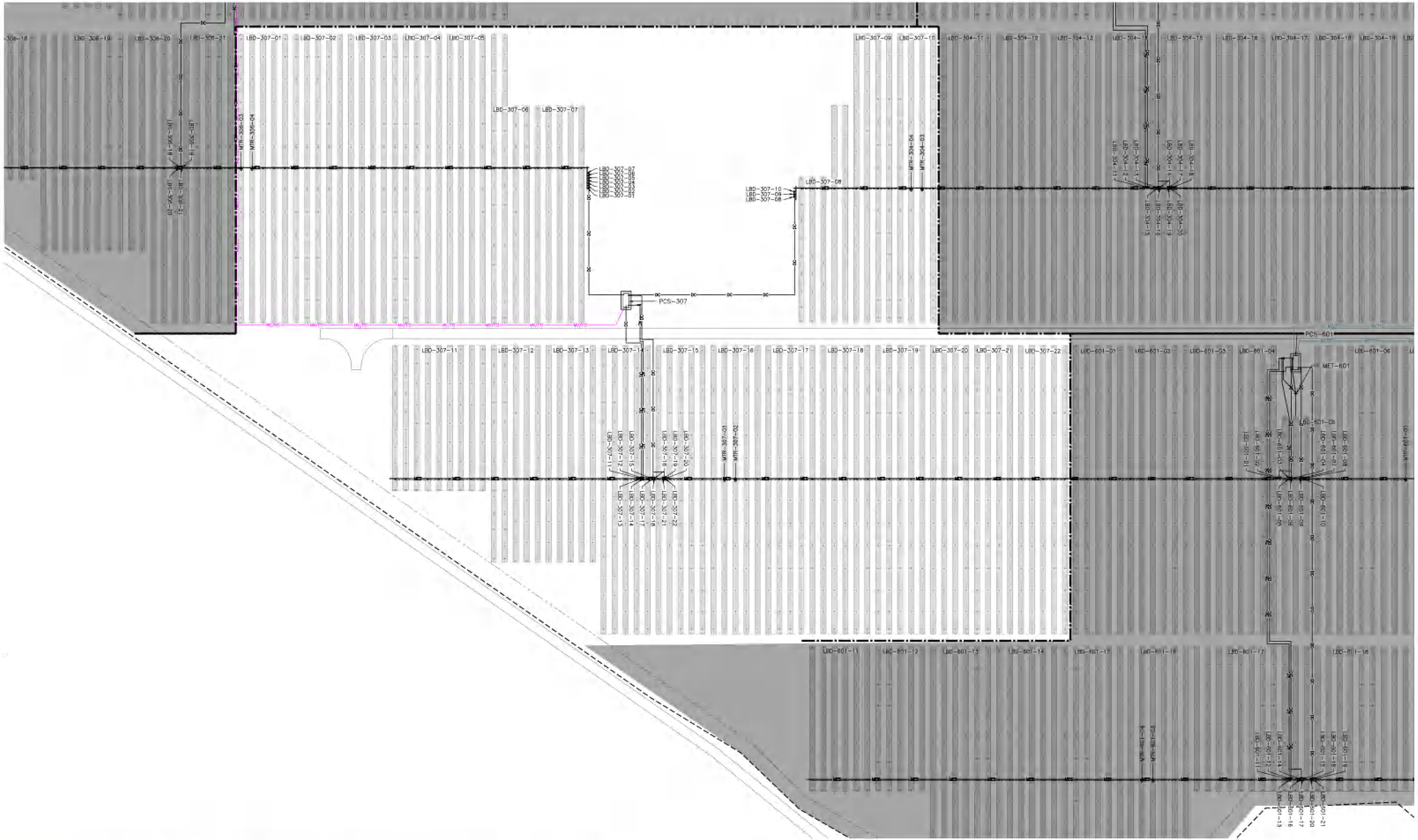


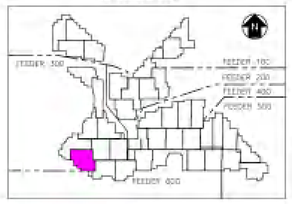
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 307

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 307

DRAWING # E1.037

NO	DATE	REVISION / DESCRIPTION	BY
3	09/05/2025	60% ELECTRICAL DESIGN	BA
2	08/22/2025	60% LAYOUT REVIEW	BA
1	04/11/2025	30% ELECTRICAL DESIGN	BA

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111 RYAN STREET HUBBARD, NJ
WWW.PUREPOWER.COM

DESIGNED BY: JAR | DRAWN BY: EL | CHECKED BY: JAR

PREPARED FOR: LANGAN
LANGAN, LLC
840 GESSNER ROAD SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

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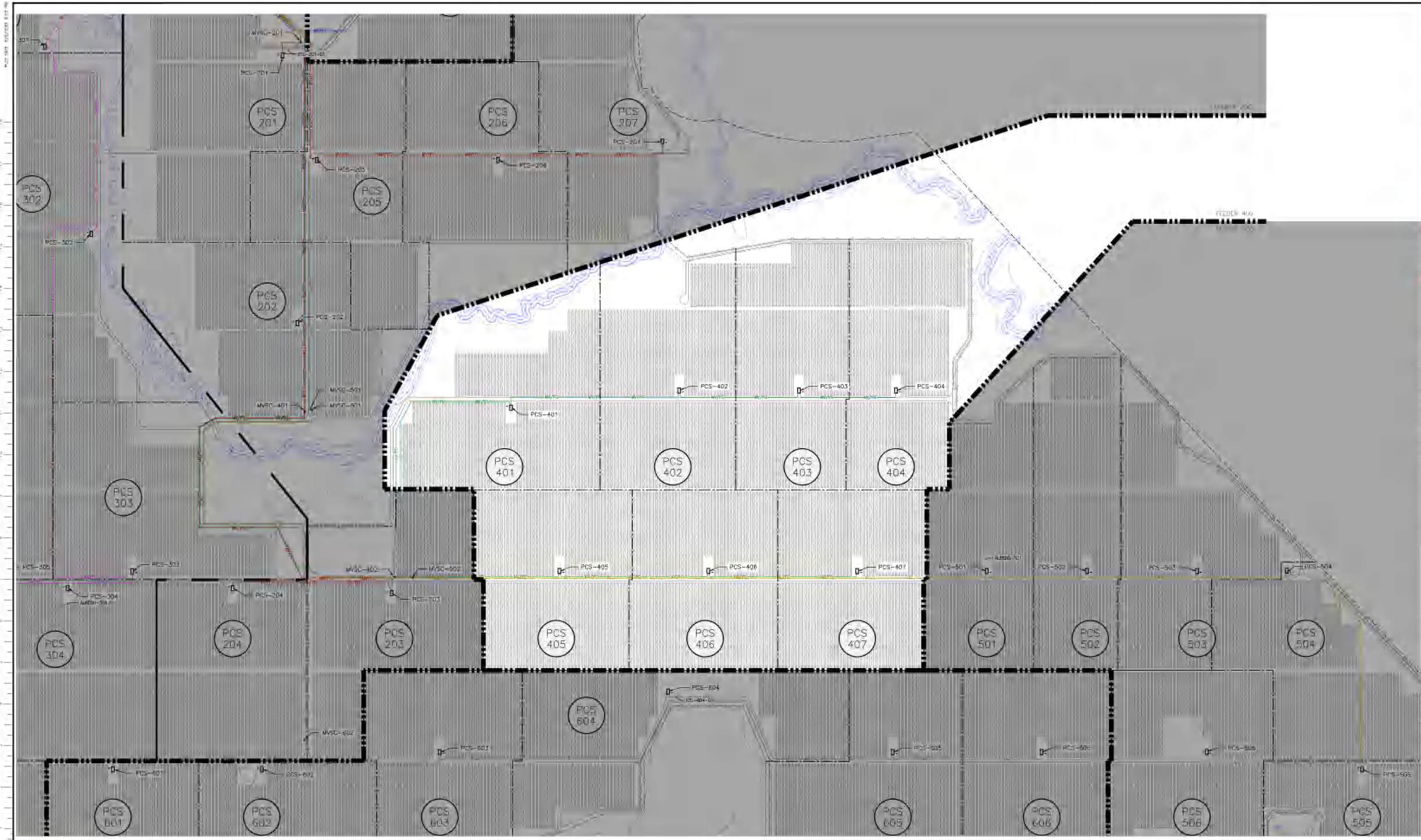


LINETYPE LEGEND

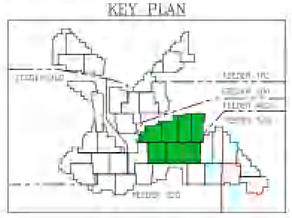
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FEEDER BOUNDARY
- PCS BOUNDARY
- FENCE
- FENCE SETBACK
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)

1 OVERALL ELECTRICAL PLAN – FEEDER 400
SCALE: 1" = 200'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN – FEEDER 400

DRAWING #: E1.040

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 266 BROWN & MILLS COUNTY, TX 76801

PAPER SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC 840 GESSNER ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

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2	10/23/2025	90% TECHNICAL DESIGN	BA	AAR
3	11/17/2025	30% ELECTRICAL DESIGN	BA	AAR

DRAWN BY: BA

CHK'D BY: AAR

APPD BY: EL

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RULER IN INCHES

PCS-202
MVSC-501
SB-501
MVSC-601
SB-601
MVSC-401
SB-601
PCS-401
PCS-402
MVSC-402
SB-402
MVSC-502
PCS-203
PCS-405
PCS-406

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 401
SCALE: 1" = 75'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 401

DRAWING #: E1.041

NO	DATE	REVISION / DESCRIPTION	BY	APP.
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HOUSTON, TX 77024
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PREPARED BY: PURE POWER ENGINEERING
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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

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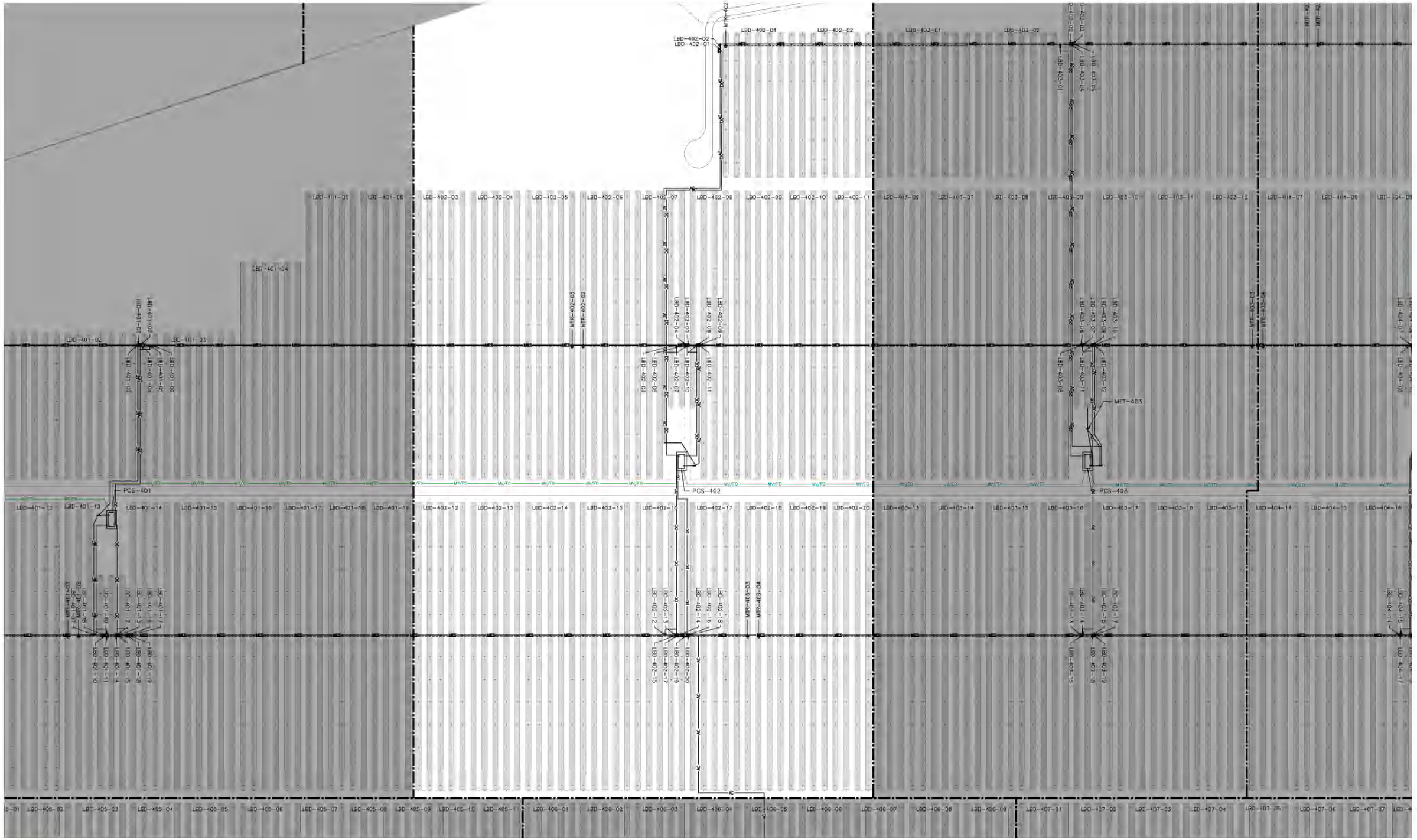


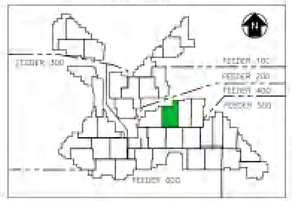
LINETYPE LEGEND

- MV/FD — MV FEEDER 100
- MV/FD — MV FEEDER 200
- MV/FD — MV FEEDER 300
- MV/FD — MV FEEDER 400
- MV/FD — MV FEEDER 500
- MV/FD — MV FEEDER 600
- DC — DC CIRCUIT
- AC — AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD — LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESS — MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 402
SCALE: 1" = 80'

N

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 402

DRAWING # E1.042

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 266, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

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1	04/11/2025	30% ELECTRICAL DESIGN	BH	EL

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PLOT DATE: 9/5/2025 9:16 PM

RULER IN INCHES

PCS-402

PCS-403

PCS-404

MET-403

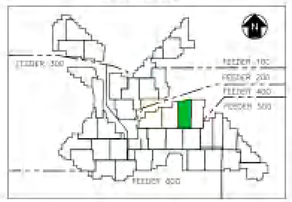
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MES MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 403

SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 403

DRAWING # E1.043

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PREPARED BY: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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3	11/17/2025	90% ELECTRICAL DESIGN	BH	AAR

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PLOT DATE: 11/17/2025 3:58 PM

RULER IN INCHES

PCS-402
PCS-403
PCS-404
MET-403

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 404
SCALE: 1" = 75'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 404

DRAWING #: E1.044

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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840 GESSNER ROAD SUITE 740
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	10/23/2025	90% LAYOUT REVIEW	BA	AAR
	11/11/2025	30% ELECTRICAL DESIGN	BA	AAR

DESIGNED BY: BA
DRAWN BY: AAR
CHECKED BY: EL

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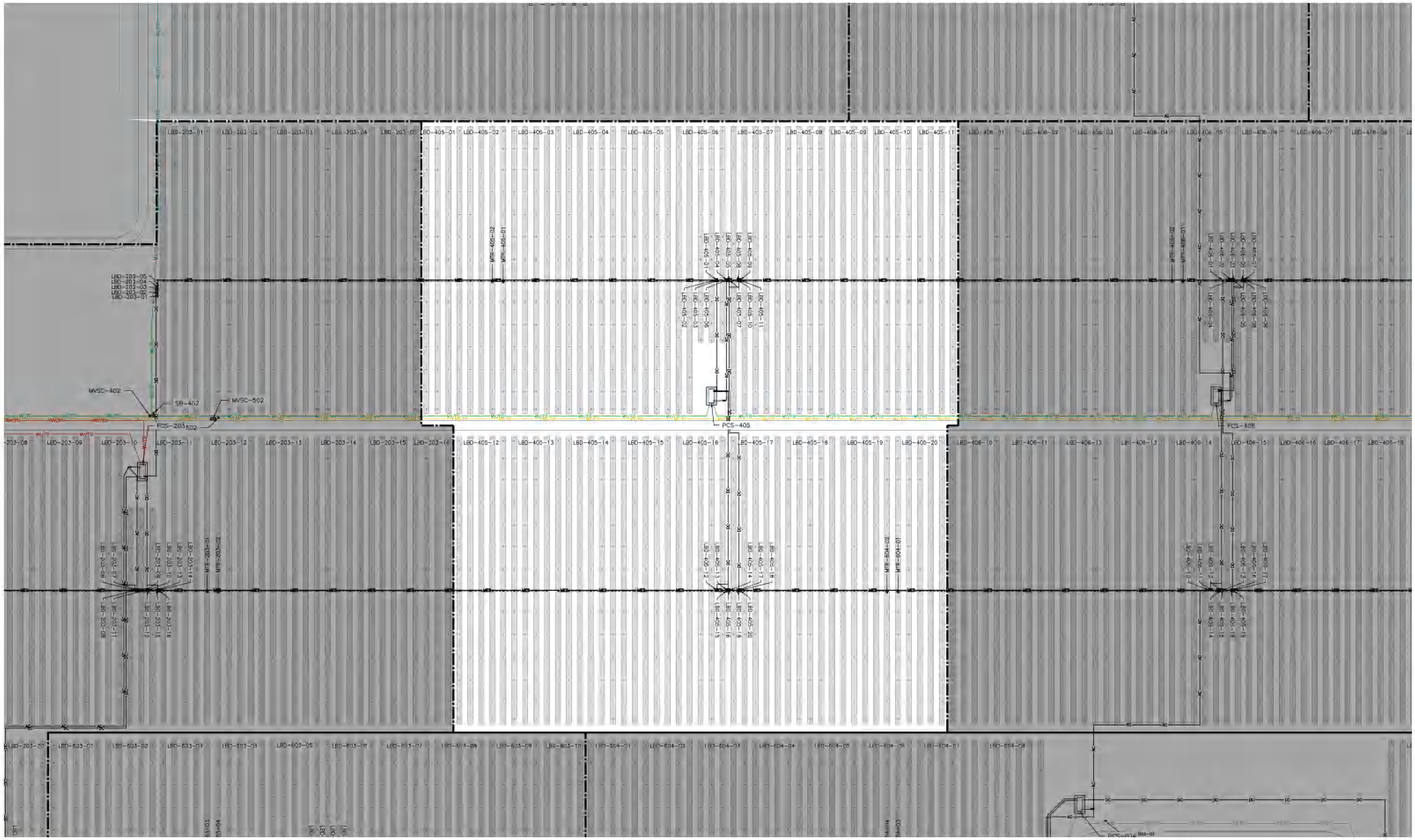


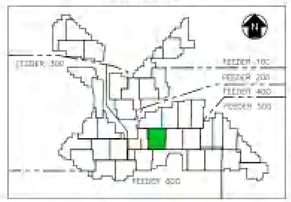
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 405

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 405

DRAWING #: E1.045

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 CESTER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PREPARED BY: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY
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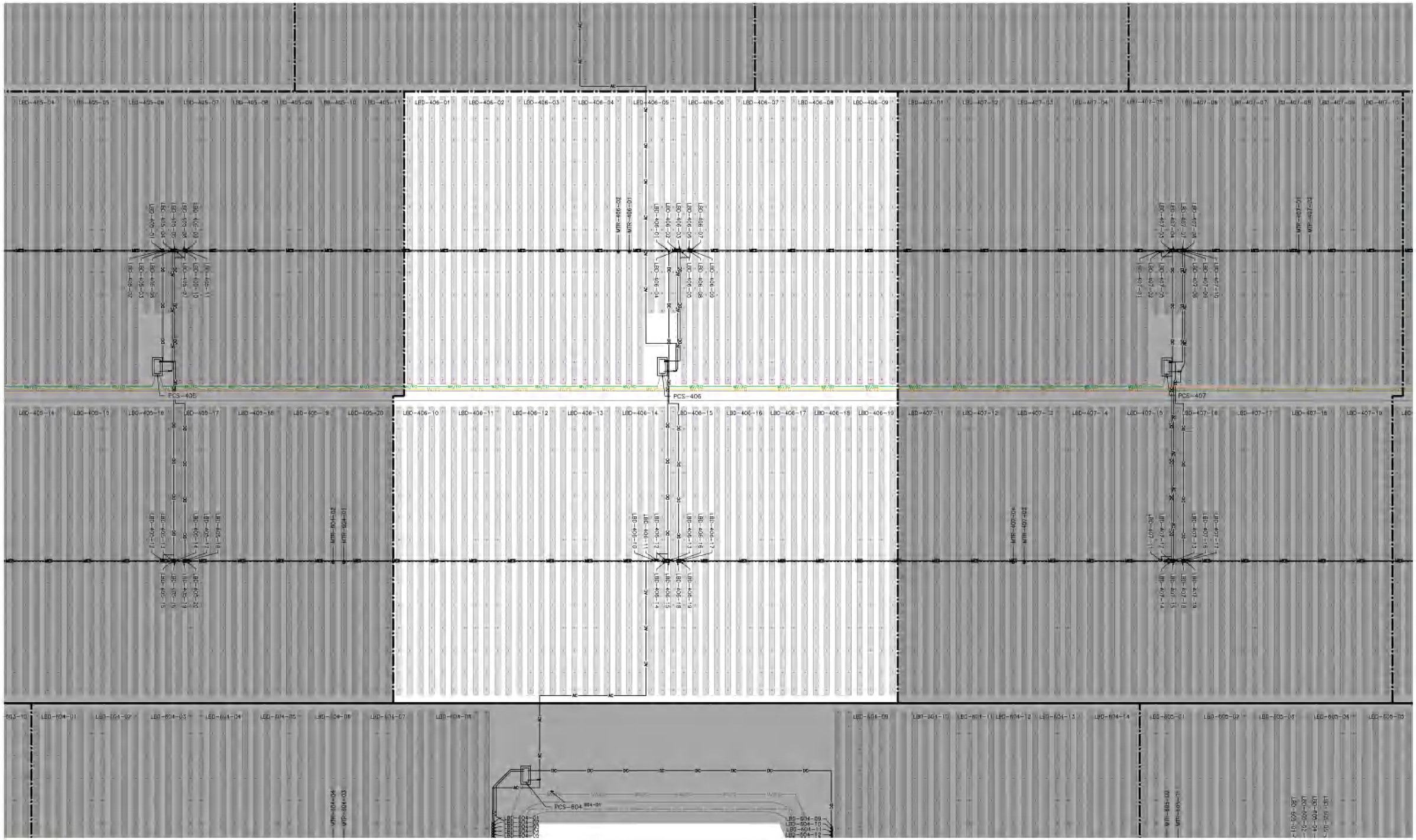


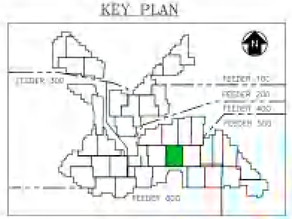
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MES MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 406

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 406

DRAWING # E1.046

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

LANGAN, LLC 840 CESSNA ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

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NO	DATE	REVISION / DESCRIPTION	BY	CHK
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2	08/22/2025	90% LAYOUT REVIEW	BA	ARS
1	04/11/2025	30% ELECTRICAL DESIGN	BA	ARS

PAGE SIZE: 36" x 24" PROJECT #: TX-PS-2701

PLOT DATE: 09/25/2025 9:42 AM

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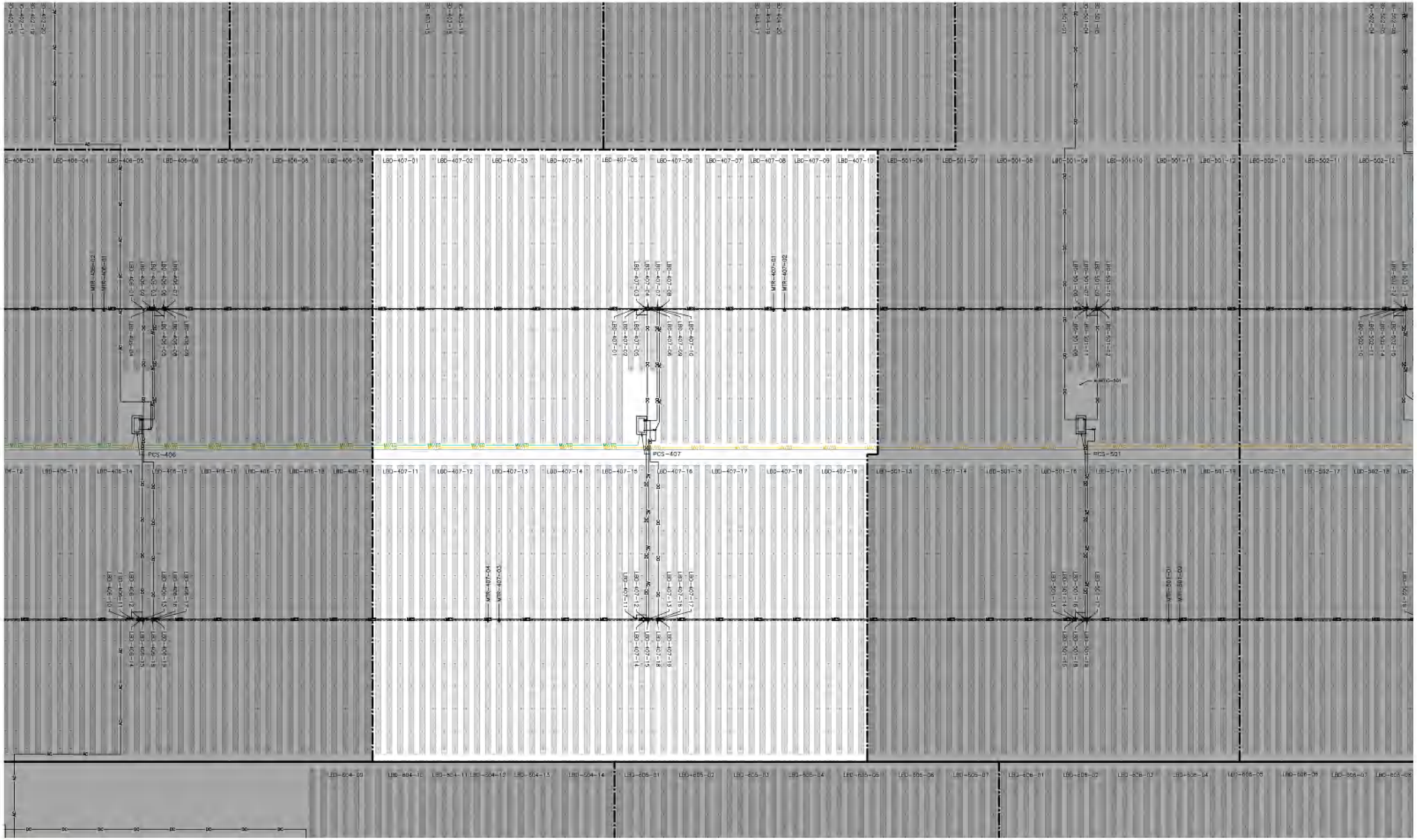


LINETYPE LEGEND

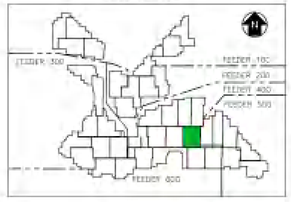
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 407
SCALE: 1" = 60'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 407

DRAWING #: E1.047

NO	DATE	REVISION DESCRIPTION	BY	APP.
3	09/05/2023	60% ELECTRICAL DESIGN	BA	AR
2	10/23/2023	90% LAYOUT REVIEW	BA	AR
1	11/17/2023	30% ELECTRICAL DESIGN	BA	AR

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PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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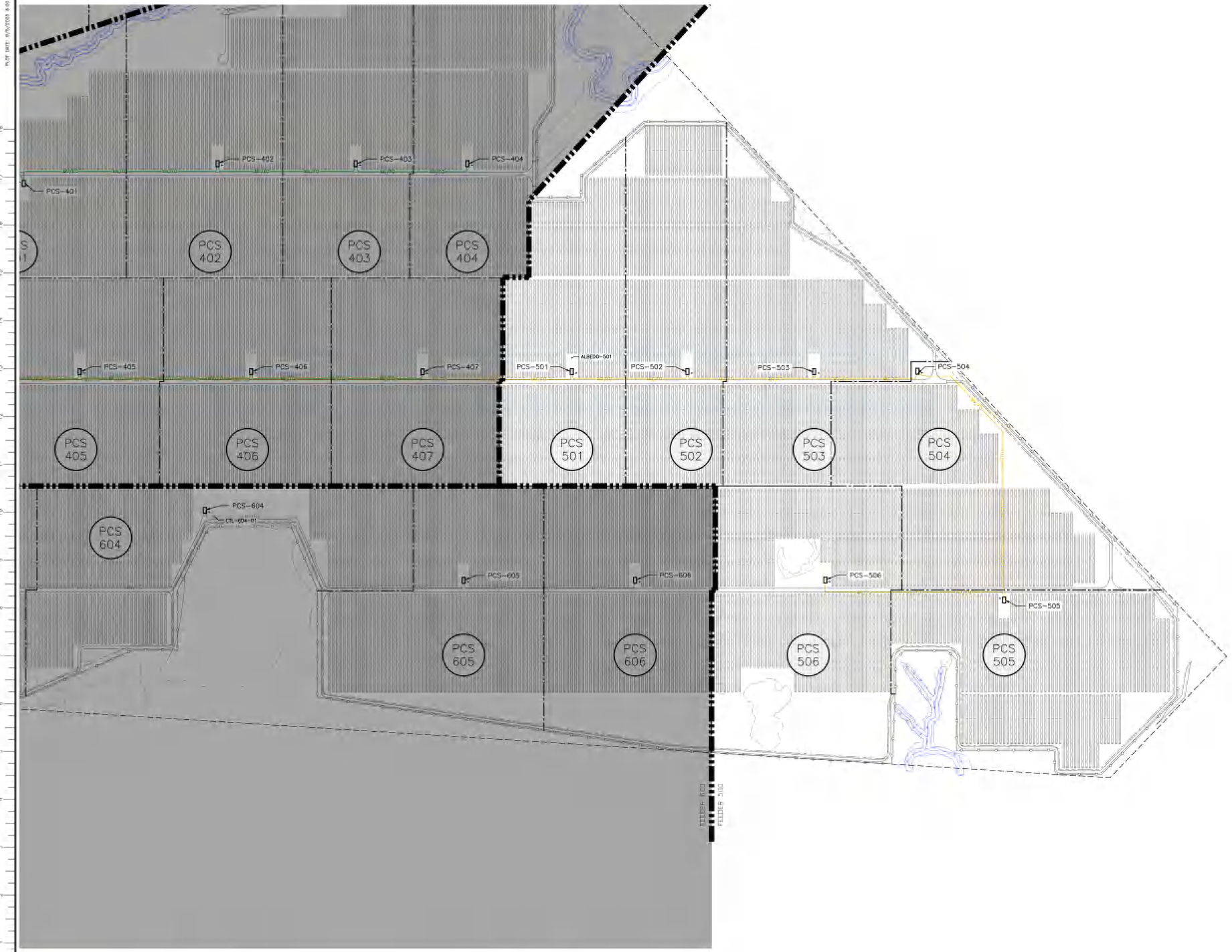
RULER IN INCHES



LINETYPE LEGEND

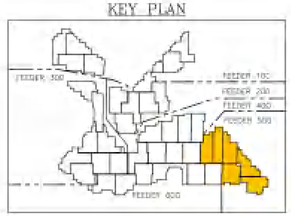
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FEEDER BOUNDARY
- PCS BOUNDARY
- FENCE
- FENCE SETBACK
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- PCS XXX — PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)

1 OVERALL ELECTRICAL PLAN – FEEDER 500
SCALE: 1" = 200'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN – FEEDER 500

DRAWING #: E1.050

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AJR
2	08/22/2025	60% LAYOUT REVIEW	BA	AJR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AJR

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PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

DRAWN BY:

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RULER IN INCHES

LINETYPE LEGEND

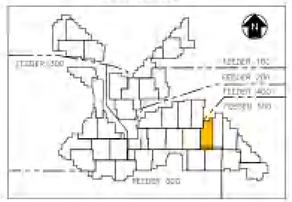
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

1 PARTIAL ELECTRICAL PLAN – PCS 501
SCALE: 1" = 75'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 501

DRAWING #: E1.051

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2023	60% ELECTRICAL DESIGN	BH	AR
2	10/23/2023	90% ELECTRICAL DESIGN	BH	AR
3	11/17/2023	30% ELECTRICAL DESIGN	BH	AR

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RULER IN INCHES

PCS-401
PCS-406
PCS-407
PCS-501
PCS-502
PCS-503
PCS-504

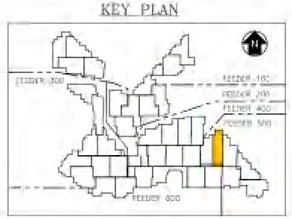
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 502

SCALE: 1" = 90'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 502

DRAWING #: E1.052

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

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PREPARED BY: LANGAN, LLC 840 GESSNER ROAD SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2023	60% ELECTRICAL DESIGN	BA	AAR
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3	11/17/2023	30% ELECTRICAL DESIGN	BA	AAR

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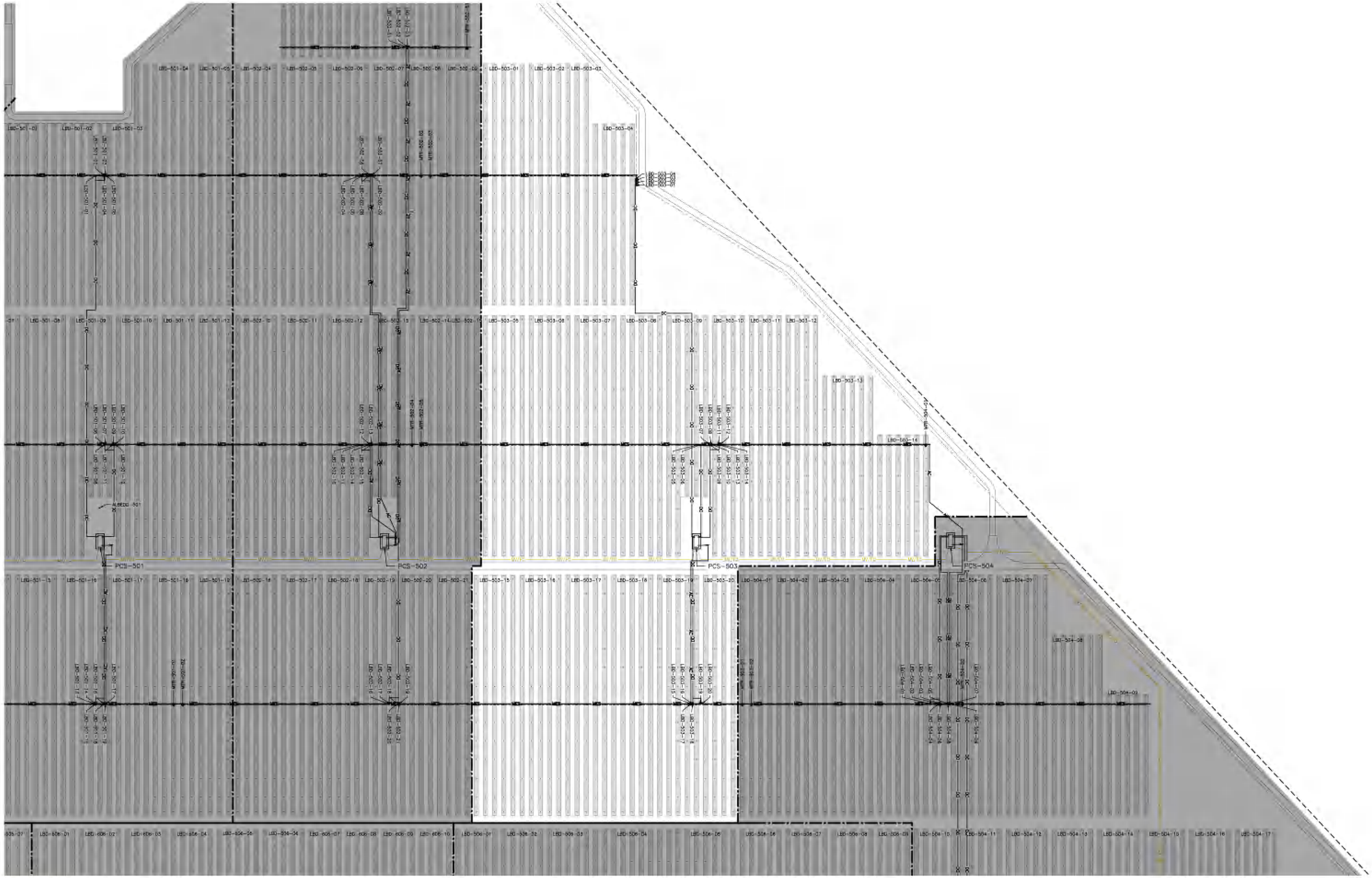


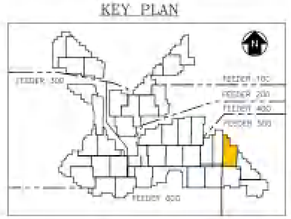
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 503
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 503

DRAWING # E1.053

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

PREPARED BY: LANGAN, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/20/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

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RULER IN INCHES

PCS-502
PCS-503
PCS-504
PCS-505
PCS-506
MET-506

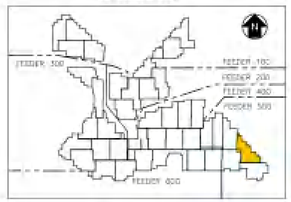
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 504

SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 504

DRAWING #: E1.054

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

PREPARED FOR: LANGAN

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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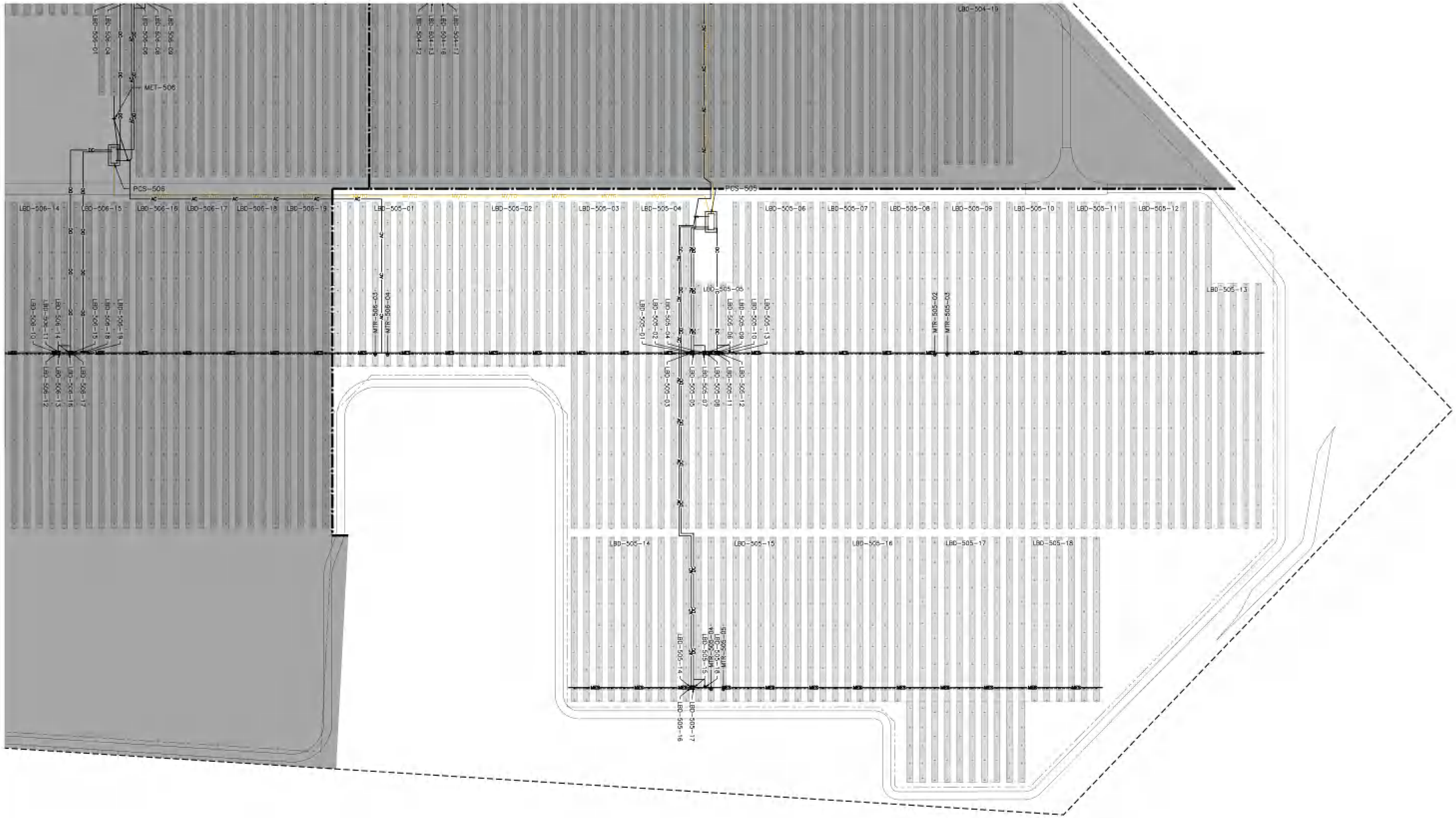


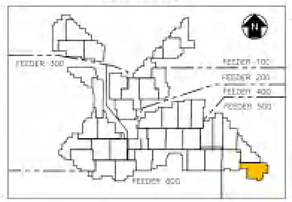
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 505

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 505

DRAWING #: E1.055

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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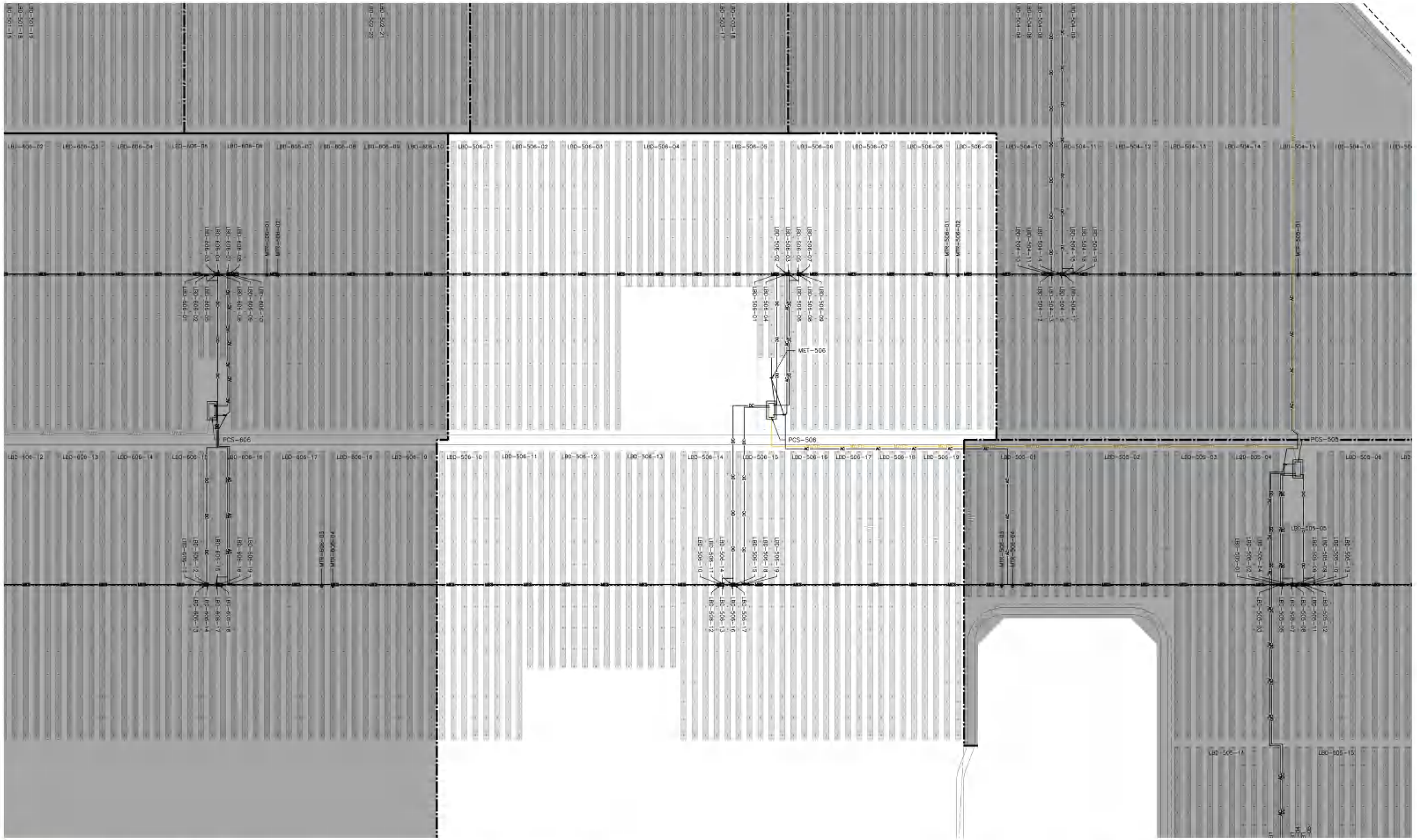


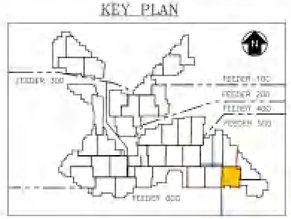
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 506
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 506

DRAWING #: E1.056

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN
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DESIGNED BY:

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NO	REVISION / DESCRIPTION	DATE	BY	CHK
3	60% ELECTRICAL DESIGN	09/25/2023	BA	AVR
2	60% LAYOUT REVIEW	08/23/2023	BA	AVR
1	30% ELECTRICAL DESIGN	04/17/2023	BA	AVR

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RULER IN INCHES

LINETYPE LEGEND

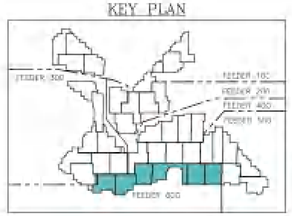
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FEEDER BOUNDARY
- PCS BOUNDARY
- FENCE
- FENCE SETBACK
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)

1 OVERALL ELECTRICAL PLAN – FEEDER 600
SCALE: 1" = 200'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN – FEEDER 600

DRAWING #: E1.060

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED BY: LANGAN, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PM	DRN	CHK
BH	AR	EL
BH	AR	EL
BH	JH	EL

DATE	REVISION / DESCRIPTION
09/25/2023	60% ELECTRICAL DESIGN
10/23/2023	90% LAYOUT REVIEW
11/17/2023	30% ELECTRICAL DESIGN

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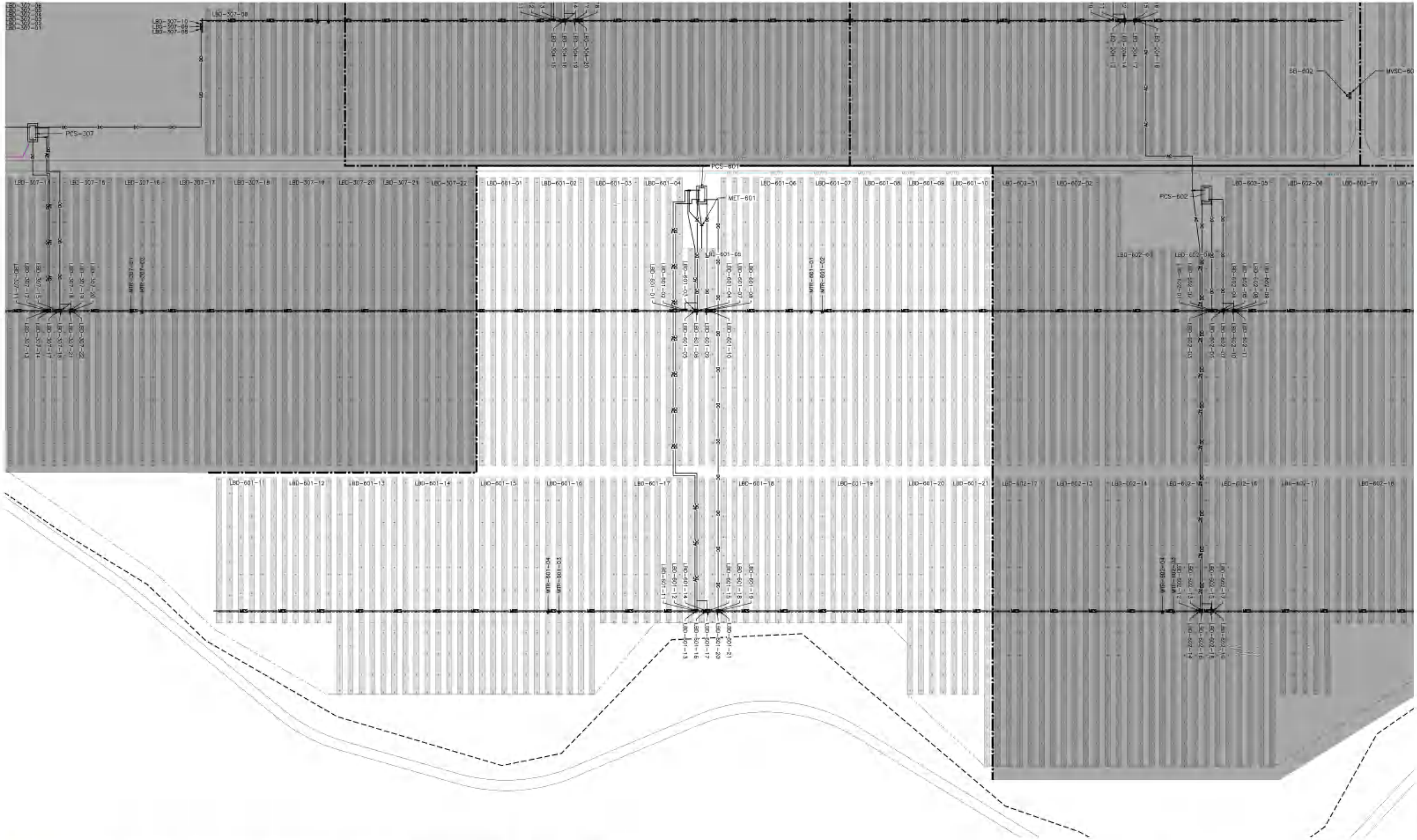


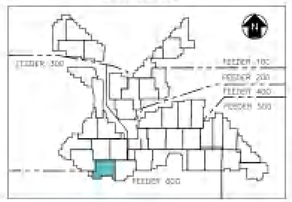
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 601

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

NO	DWG	DATE	REVISION DESCRIPTION	BY
3	E1.061	09/05/2025	60% ELECTRICAL DESIGN	BA
2	E1.061	08/22/2025	60% LAYOUT REVIEW	BA
1	E1.061	04/11/2025	30% ELECTRICAL DESIGN	BA

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 601

DRAWING #: E1.061

RULER IN INCHES

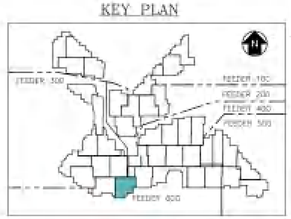
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 602

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 602

DRAWING # E1.062

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: PURE POWER ENGINEERING 111 RYAN STREET HIBBEN, NJ WWW.PUREPOWER.COM

PREPARED BY: LANGAN, LLC 840 GESSNER ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	APP.
1	09/05/2023	60% ELECTRICAL DESIGN	BA	AR
2	10/23/2023	90% LAYOUT REVIEW	BA	AR
3	11/17/2023	30% ELECTRICAL DESIGN	BA	AR

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RULER IN INCHES

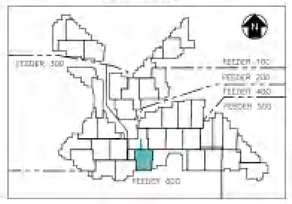
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 603
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 603

DRAWING #: E1.063

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD SUITE 740
HOUSTON, TX 77024
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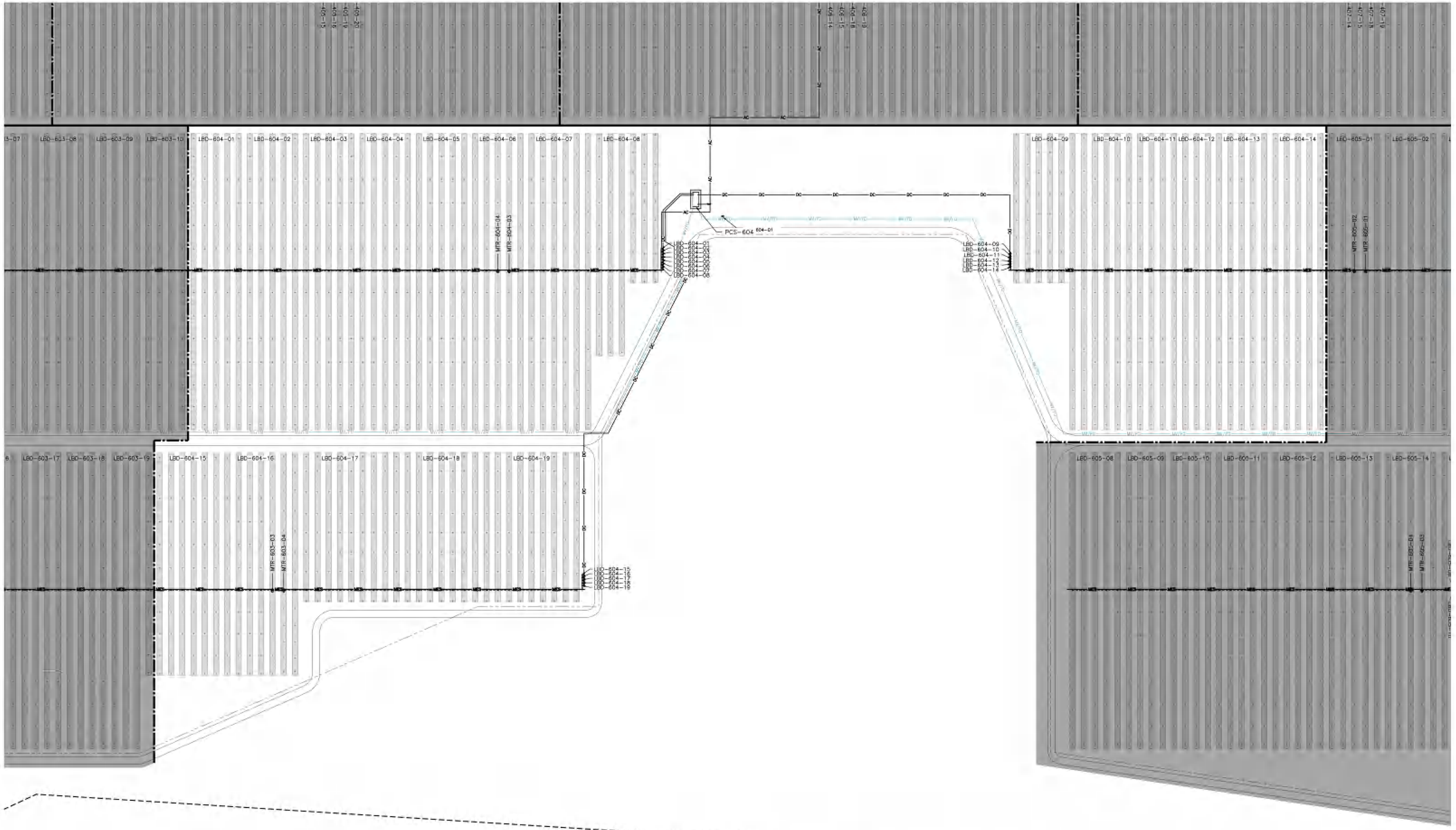


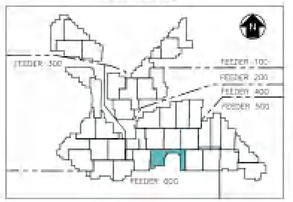
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC DC CIRCUIT
- AC AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LOD LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MWSC MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 604
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 604

DRAWING # E1.064

NO	DRWG	REVISION DESCRIPTION	DATE
3	EL	30% ELECTRICAL DESIGN	04/1/2025
2	AAR	60% LAYOUT REVIEW	03/03/2025
1	AAR	60% ELECTRICAL DESIGN	09/05/2024
0	EL	30% ELECTRICAL DESIGN	

PREPARED FOR: LANGAN

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840 CESTER ROAD, SUITE 740
HOUSTON, TX 77024
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111 RYAN STREET, HEBRON, NJ
WWW.PUREPOWER.COM

ENGINEER:

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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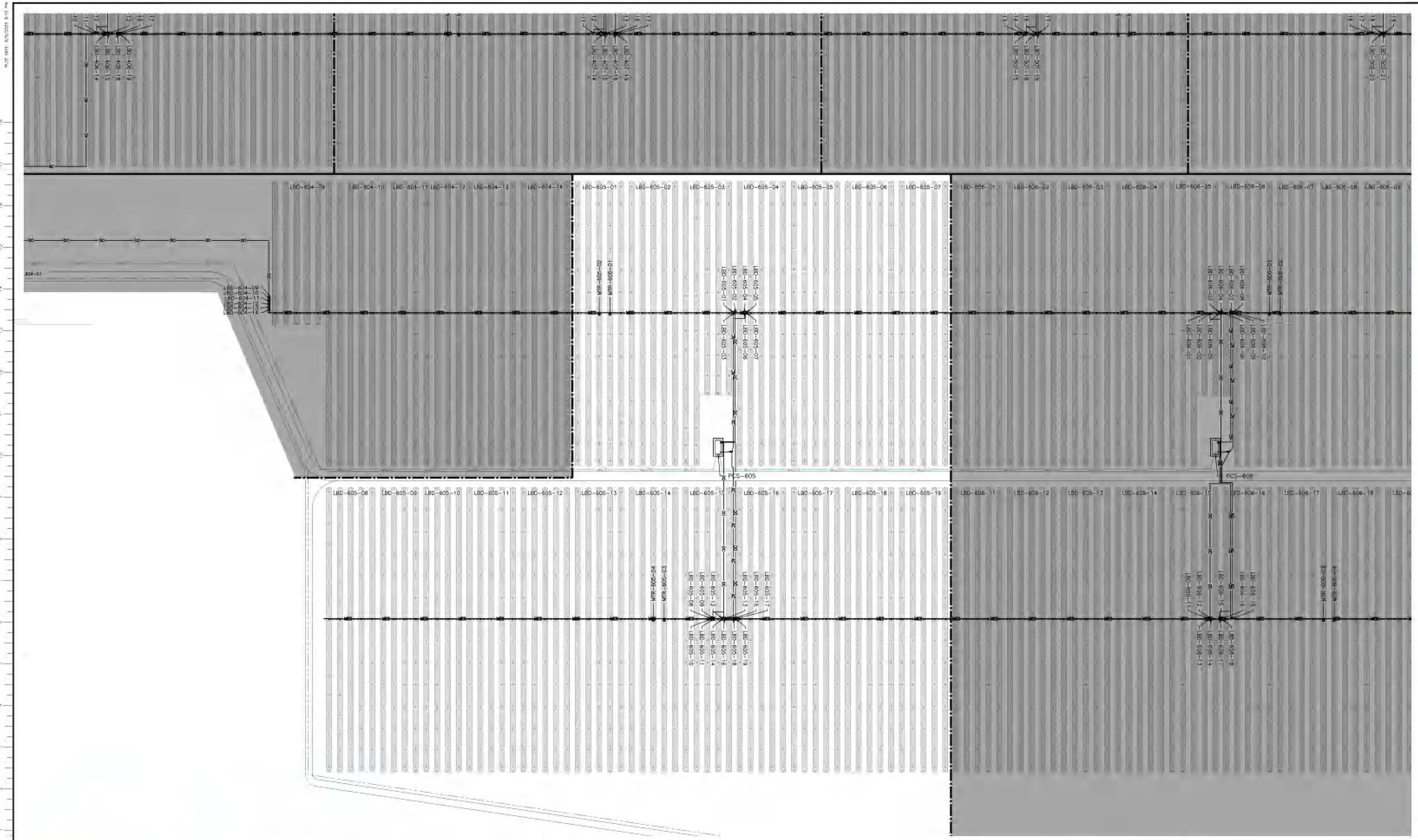
RULER IN INCHES

PLOT DATE: 8/9/2025 9:15 AM



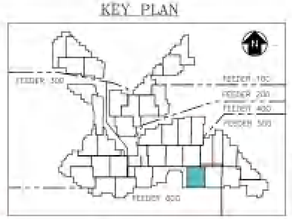
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 605

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 605

DRAWING #: E1.065

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

DESIGNED BY:

PUREPOWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY
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2	06/20/2025	60% LAYOUT REVIEW	BA
1	04/11/2025	30% ELECTRICAL DESIGN	BA

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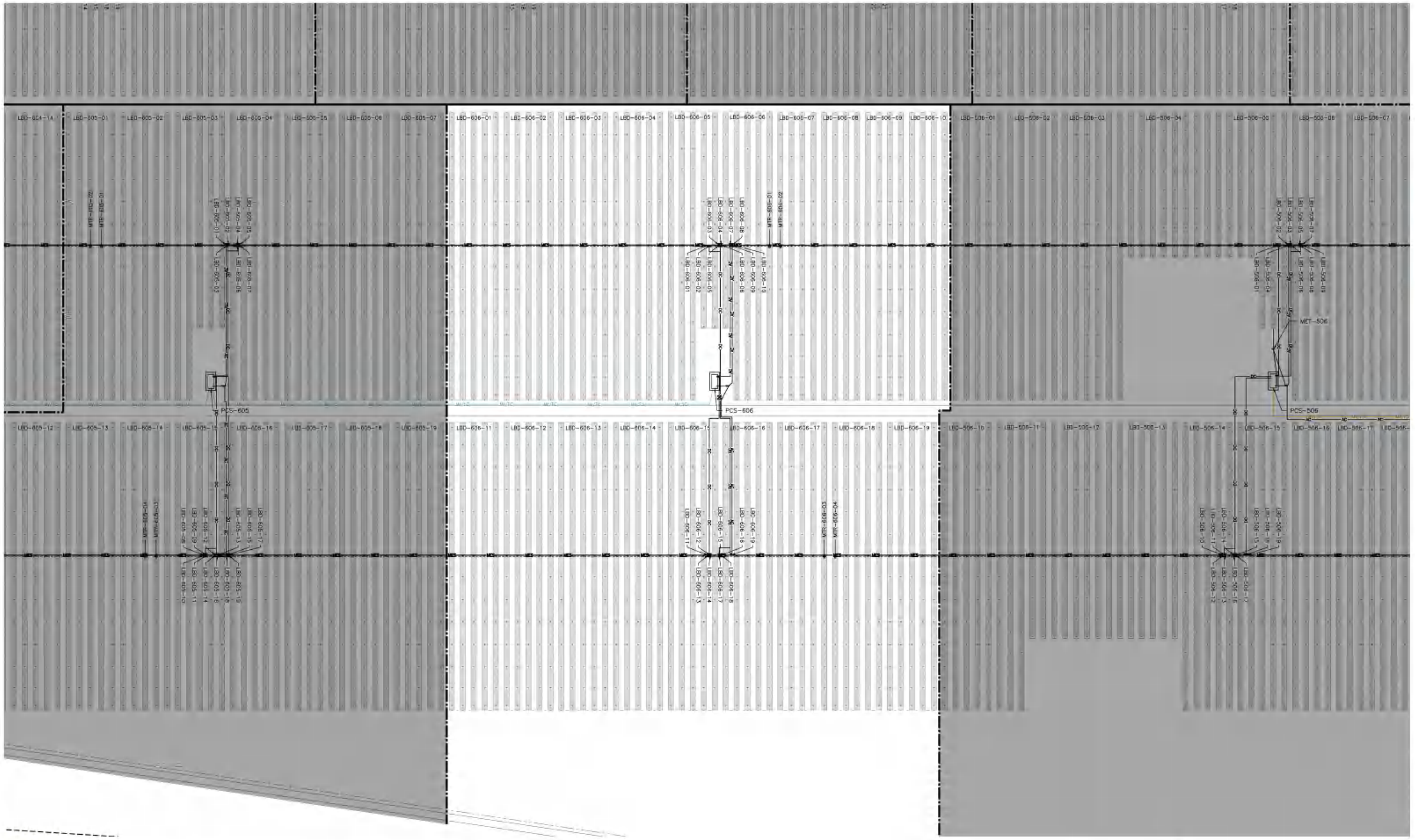
BAR IS 1" IF NOT PRINTED AT 24" X 36"



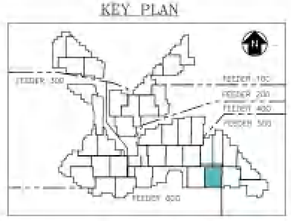
LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- DC CIRCUIT
- AC CIRCUIT
- FENCE
- FENCE SETBACK
- PROPERTY BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING OVERHEAD ELECTRIC
- UTILITY SETBACK
- PCS BOUNDARY
- STREAM
- ATI MOTOR DRIVELINE
- MESSENGER WIRE SYSTEM
- LBD BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- MV SECTIONALIZER CABINET (MVSC)
- LOAD BREAK DISCONNECT (LBD)
- TRACKER MOTOR

KEY PLAN



1 PARTIAL ELECTRICAL PLAN – PCS 606

SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL ELECTRICAL PLAN – PCS 606

DRAWING #: E1.066

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	JMR
2	06/20/2025	60% LAYOUT REVIEW	BA	JMR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	JMR

DRAWN BY: EL

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PREPARED FOR: LANGAN

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840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
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PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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PLOT DATE: 09/5/2025 9:15 AM

RULER IN INCHES

PCS-101

LBD-101-10

LBD-101-08 LBD-101-09

LBD-102-08 LBD-102-09 LBD-102-10 LBD-102-11 LBD-102-12 LBD-102-13 LBD-102-14 LBD-102-15 LBD-102-16 LBD-102-17 LBD-102-18 LBD-102-19

LBD-101-01 LBD-101-02 LBD-101-03 LBD-101-04 LBD-101-05 LBD-101-06 LBD-101-07

LBD-101-11 LBD-101-12 LBD-101-13 LBD-101-14 LBD-101-15 LBD-101-16 LBD-101-17 LBD-101-18 LBD-101-19 LBD-101-20

ONCOR SWITCHYARD

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

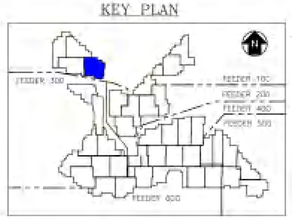
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 101

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 101

DRAWING #: E2.011

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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PREPARED BY: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWERNJ.COM

NO	DATE	REVISION / DESCRIPTION	PM	ENG	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR	EL
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR	EL
1	04/11/2025	30% ELECTRICAL DESIGN	BA	SH	EL

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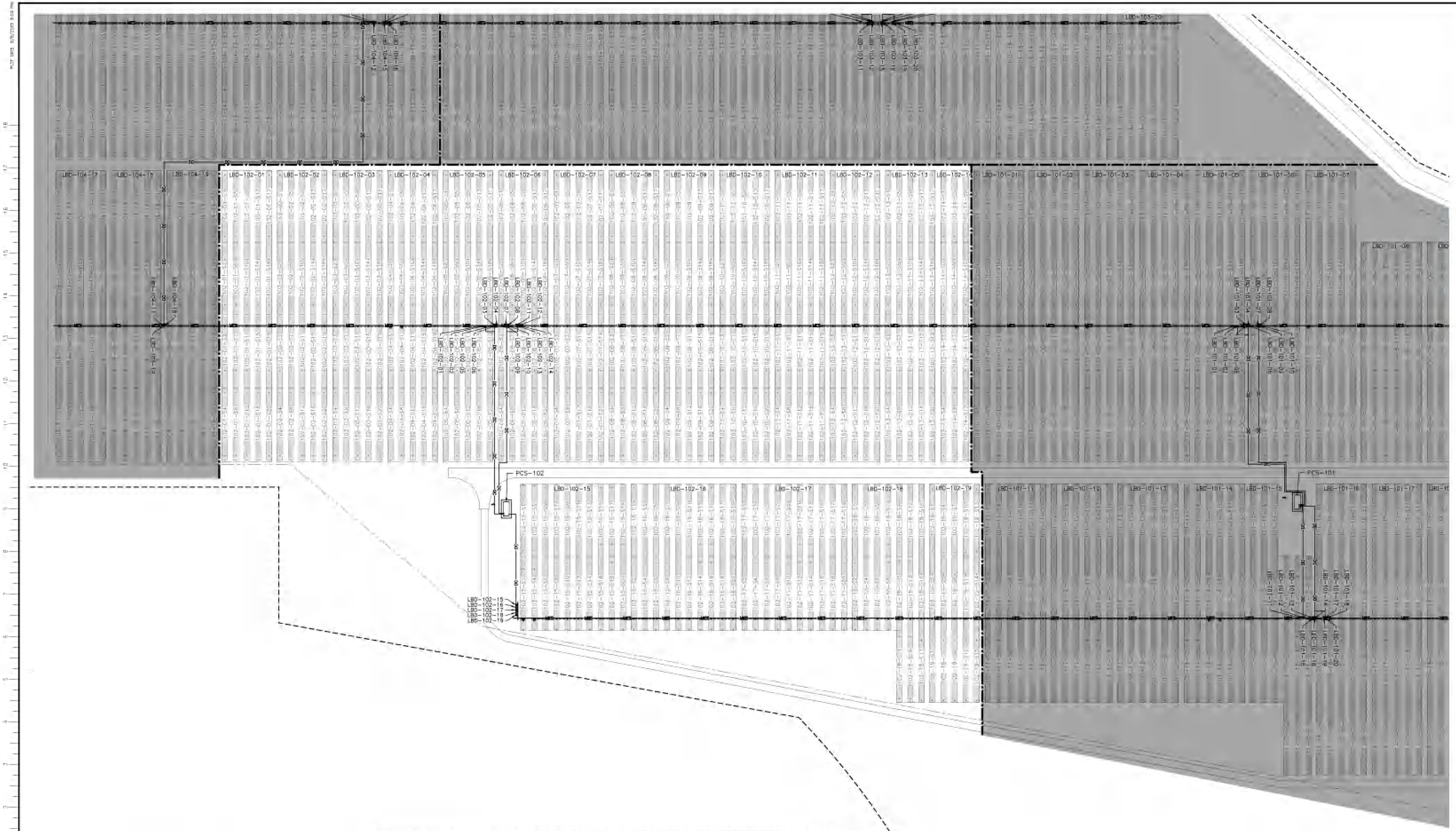


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

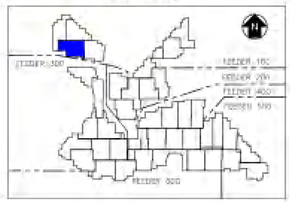
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\XX/SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- XX: STRING POSITION — ARRAY LOCATION

KEY PLAN



NOT FOR CONSTRUCTION

1 PARTIAL STRINGING PLAN – PCS 102

SCALE: 1" = 80'

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 102

DRAWING #: E2.012

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2023	60% ELECTRICAL DESIGN	BH	AR
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3	11/17/2023	30% ELECTRICAL DESIGN	BH	AR

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111 RYAN STREET HUBBARD, NJ
WWW.PUREPOWER.COM

DESIGNED BY: BH
DRAWN BY: BH
CHECKED BY: AR

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HOUSTON, TX 77024
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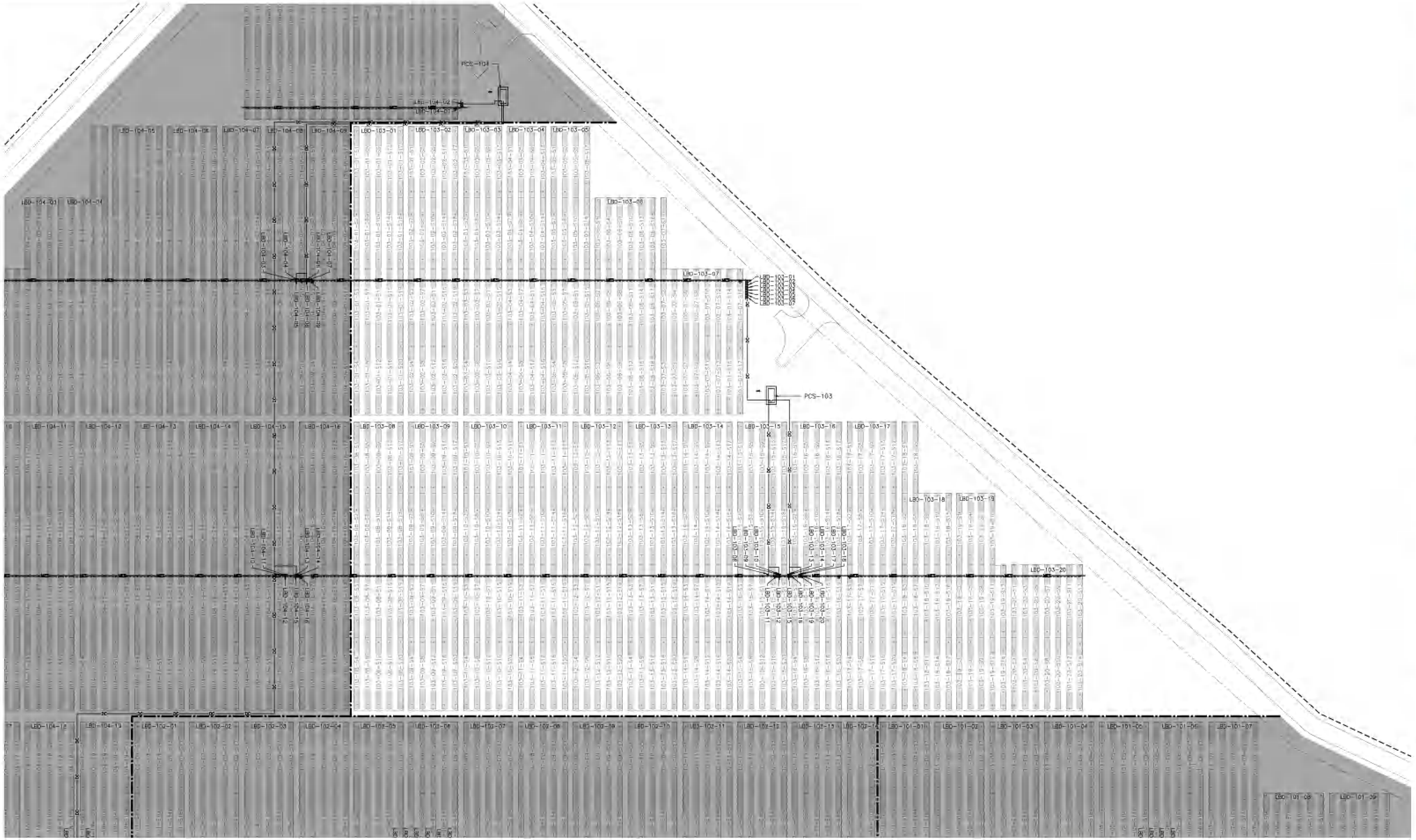
PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

BUILT IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

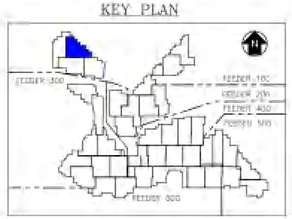
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 103
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 103

DRAWING # E2.013

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2023	60% ELECTRICAL DESIGN	BA	AR
2	10/20/2023	90% LAYOUT REVIEW	BA	AR
1	11/17/2023	90% ELECTRICAL DESIGN	BA	AR

ENGINEER: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWERNJ.COM

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HOUSTON, TX 77024
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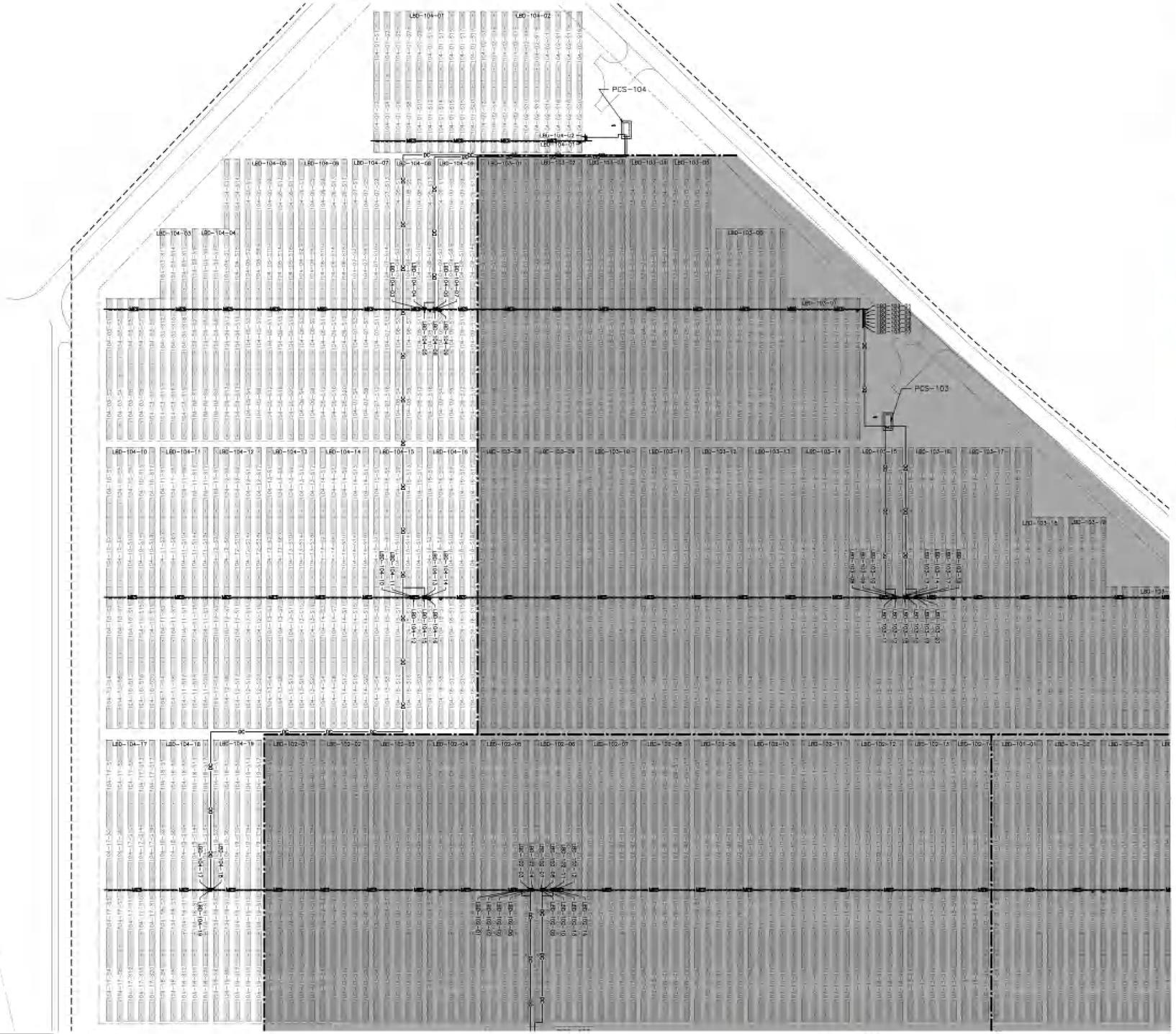
RULER IN INCHES

PLOT DATE: 09/17/2025 9:44 AM



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

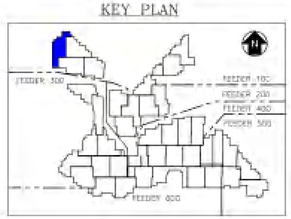
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX1 — PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT

SX — STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 104

SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 104

DRAWING #: E2.014

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

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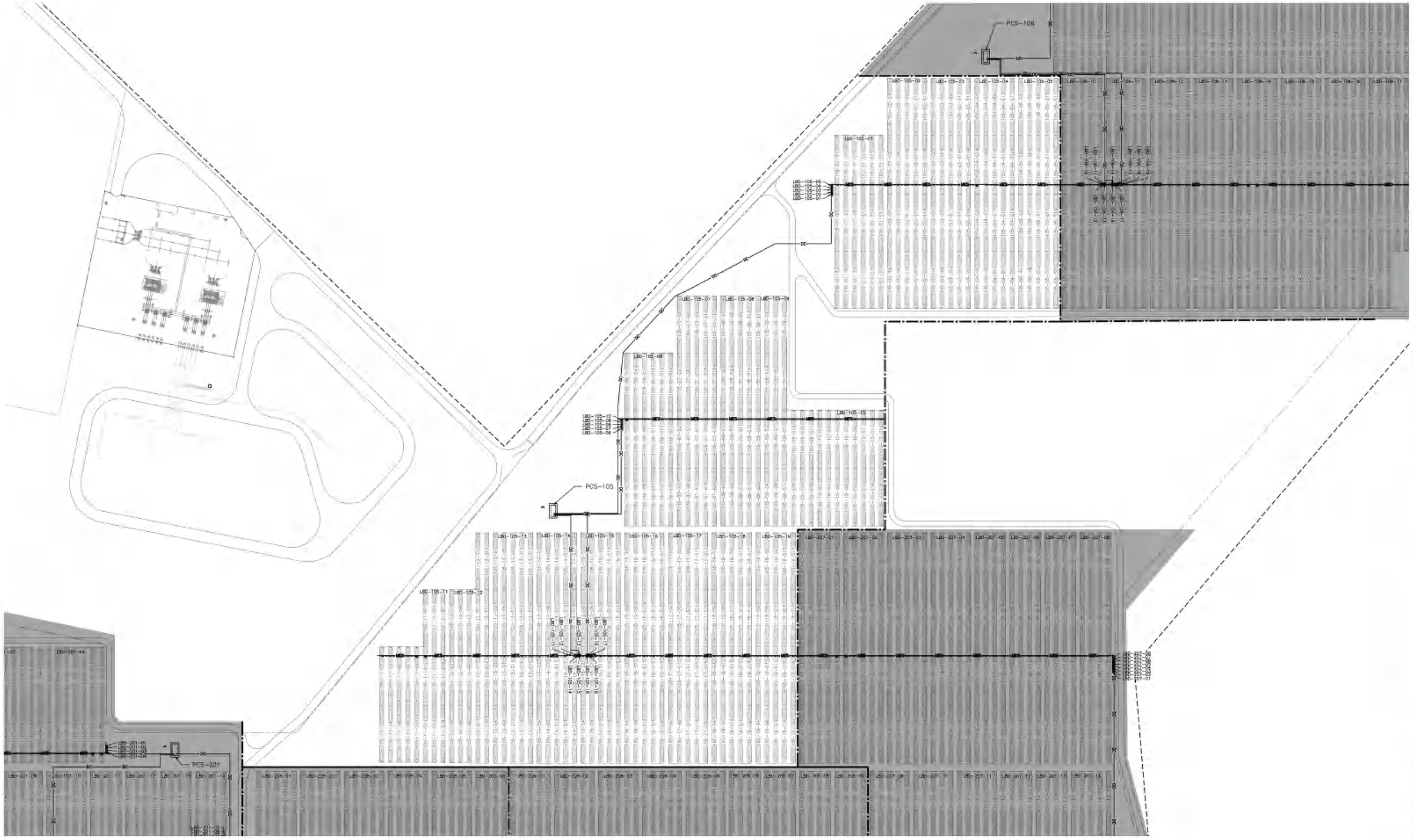
PREPARED BY: PURE POWER ENGINEERING, 111 RYAN STREET, HADDON, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BA	AJR
2	08/22/2025	60% LAYOUT REVIEW	BA	AJR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AJR

SIZE: 36" x 24" | PROJECT #: TX-PS-2701

RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

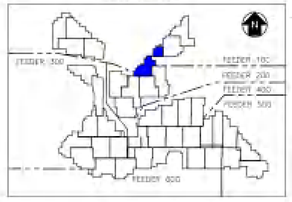
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX
PCS IDENTIFIER
LBD IDENTIFIER
ASSOCIATED EQUIPMENT

/SX
STRING POSITION
ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 105

SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 105

DRAWING # E2.015

NO	DATE	REVISION / DESCRIPTION	BY
3	09/05/2025	60% ELECTRICAL DESIGN	BA
2	08/22/2025	60% LAYOUT REVIEW	BA
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HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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BUILT IN INCHES

PCS-107

PCS-106

PCS-105

LBD-106-01 … LBD-106-19

LBD-105-01 … LBD-105-19

LBD-107-01 … LBD-107-20

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

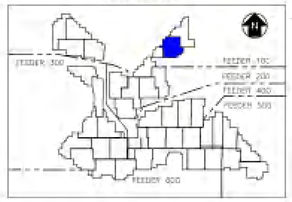
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 106
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 106

DRAWING #: E2.016

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AR
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1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

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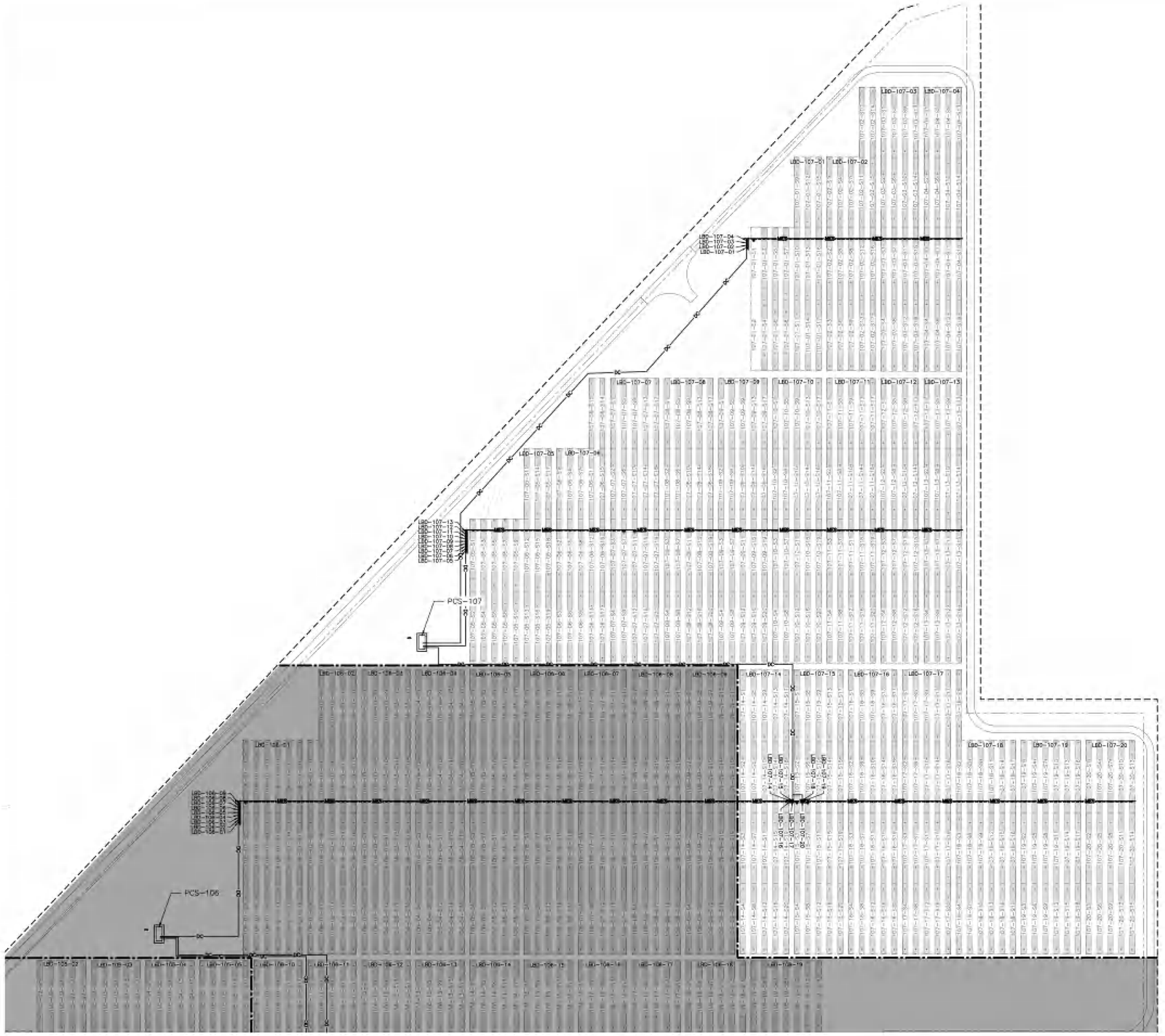
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

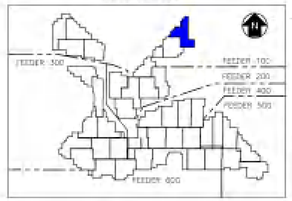
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 107
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 107

DRAWING #: E2.017

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

DESIGNED BY: EL

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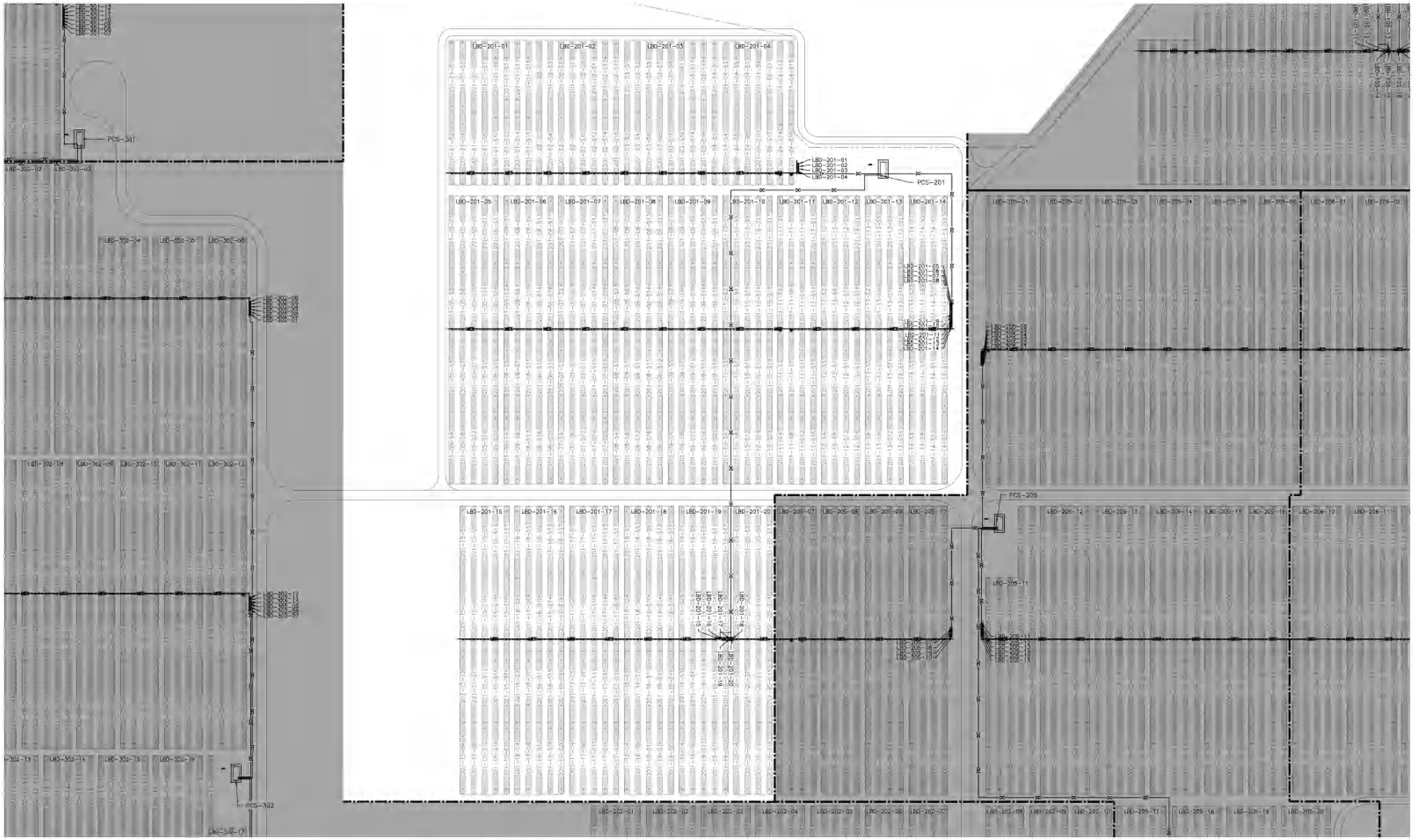


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

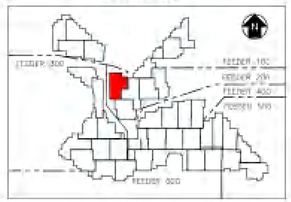
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-YXX-XX — LBD ZONE; LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ \SX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 201
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 201

DRAWING # E2.021

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BH	AMT
2	08/22/2025	60% LAYOUT REVIEW	BH	AMT
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AMT

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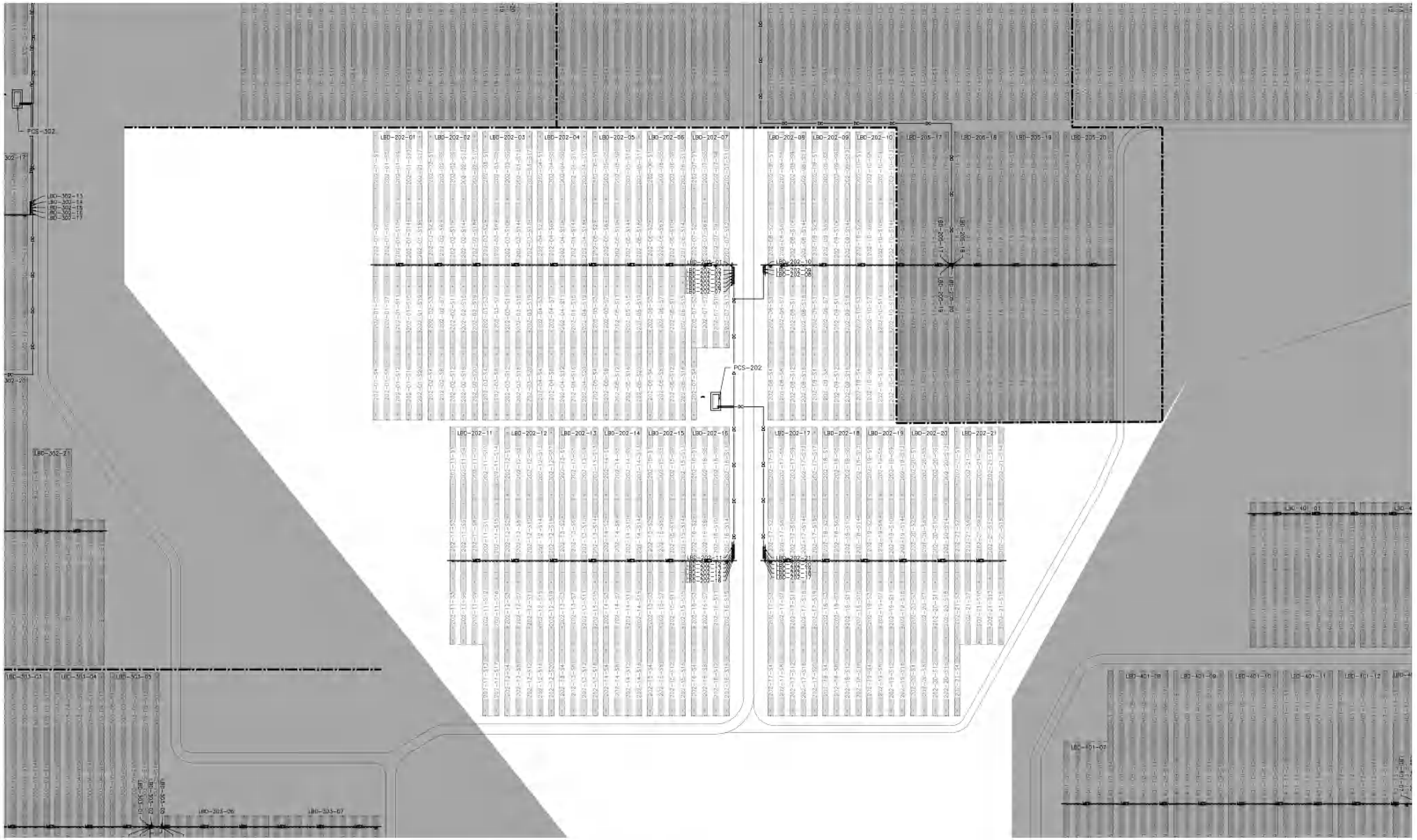
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

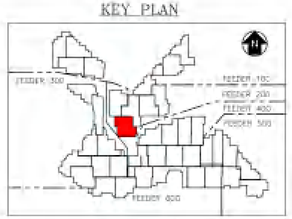
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XXX / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 202

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 202

DRAWING #: E2.022

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

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PREPARED BY: LANGAN, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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1	04/17/2025	30% ELECTRICAL DESIGN	BA	AR

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BUILT IN INCHES

PCS-203

PCS-204

PCS-405

PCS-202

PCS-201

PCS-403

PCS-802

PCS-803

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / XX

- PCS IDENTIFIER
- LBD IDENTIFIER
- ASSOCIATED EQUIPMENT
- STRING POSITION
- ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 203
SCALE: 1" = 75'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 203

DRAWING #: E2.023

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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HOUSTON, TX 77024
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PREPARED BY: PURE POWER ENGINEERING
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NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AMT
2	08/22/2025	90% LAYOUT REVIEW	BH	AMT
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AMT

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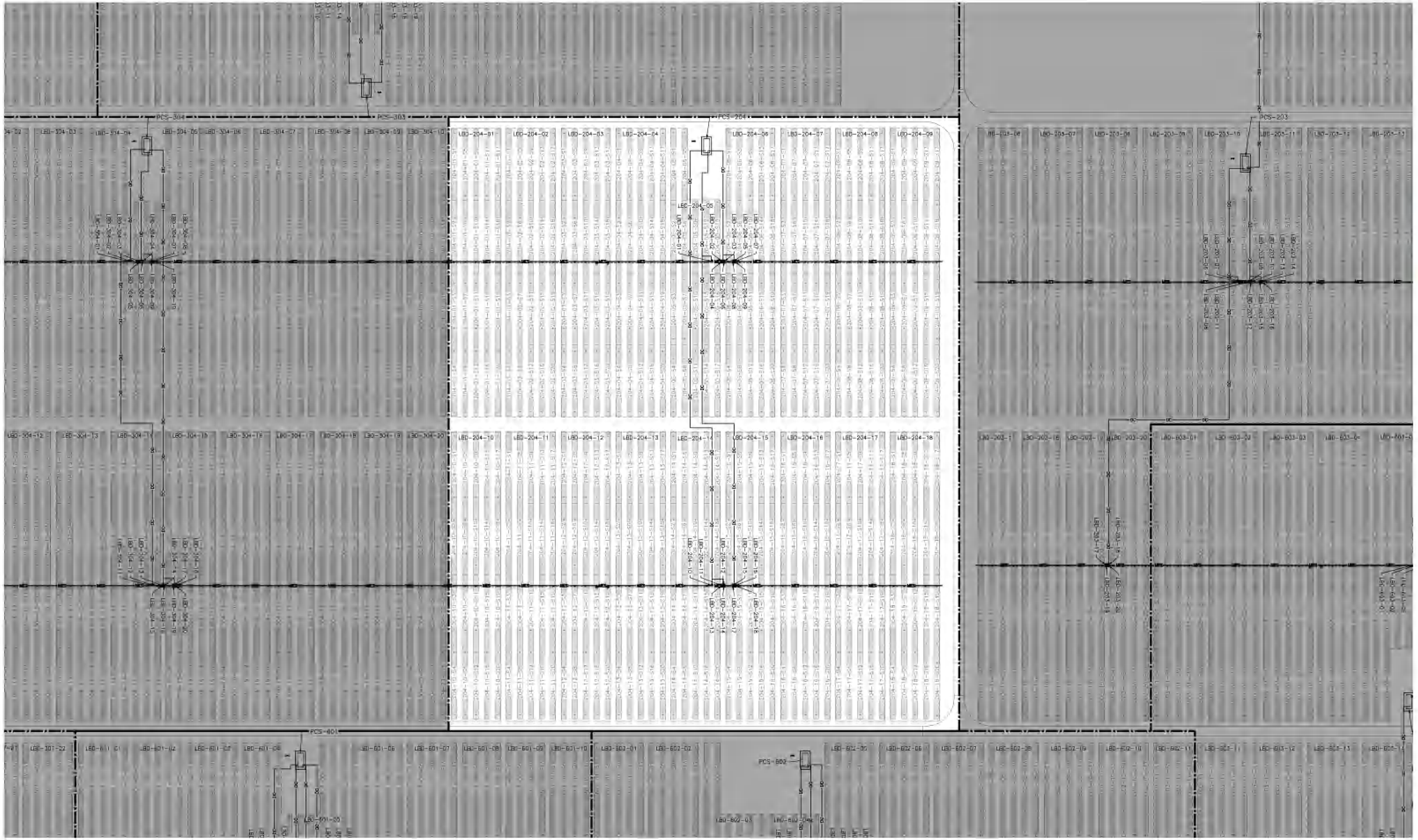


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

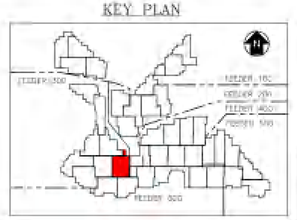
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX1 / SX

- XXX-XX1: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 204
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 204

DRAWING #: E2.024

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

DRAWING FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	APP.
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2	08/20/2025	30% LAYOUT REVIEW	BH	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AR

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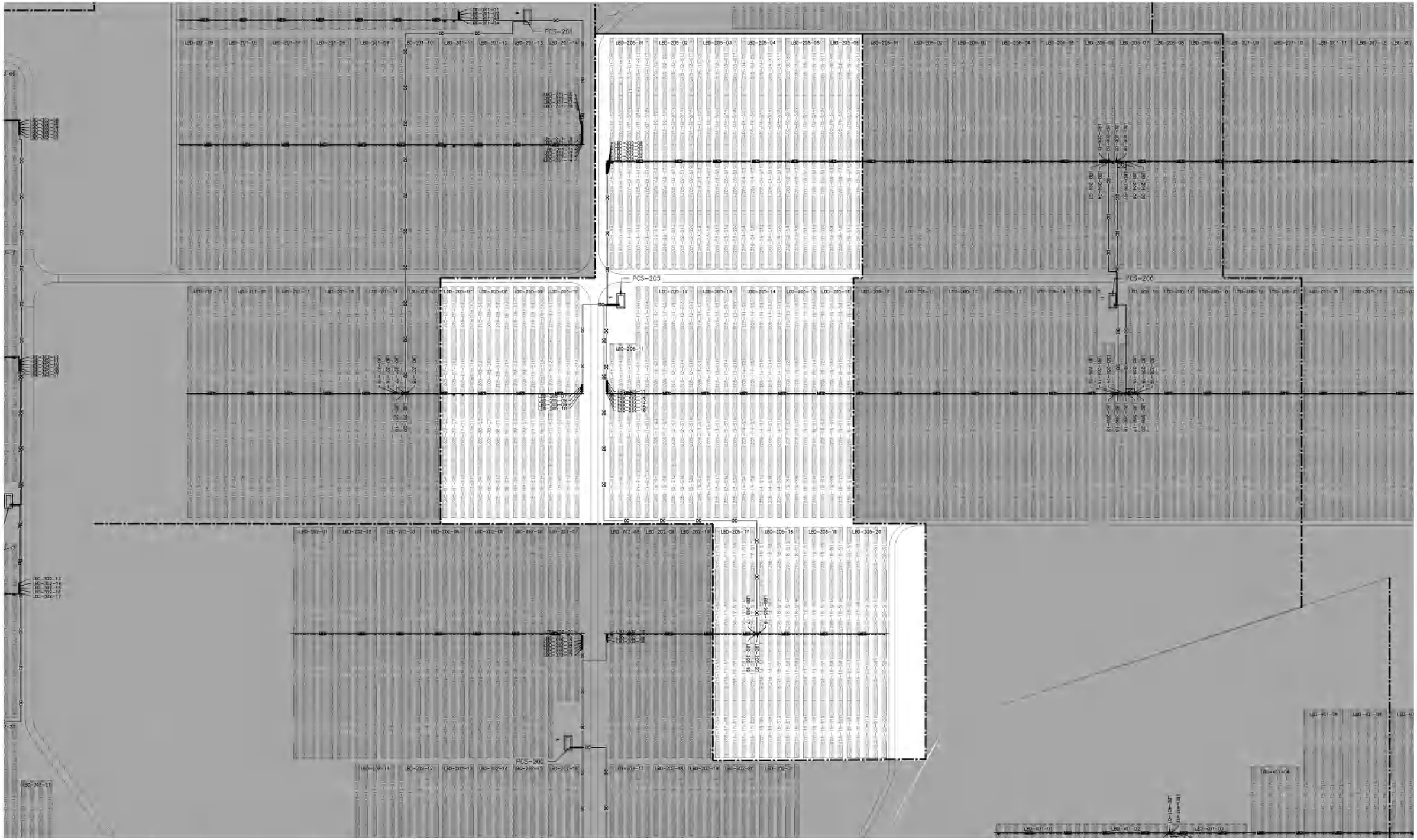
MAKE IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

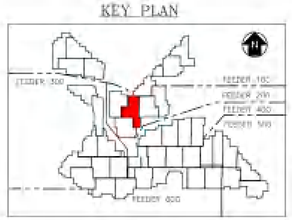
STRING LABEL

XXX-XX\S/X

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- S/X: S — STRING POSITION; X — ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 205
SCALE: 1" = 75'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 205

DRAWING #: E2.025

NO	BY	CHK
03	BA	AR
02	BA	AR
01	BA	AR

REVISION / DESCRIPTION	DATE
60% ELECTRICAL DESIGN	09/25/2023
60% LAYOUT REVIEW	09/20/2023
30% ELECTRICAL DESIGN	04/11/2023

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

RULER IN INCHES

PCS-201

PCS-205

PCS-206

PCS-207

LBD-207-01

LBD-207-18

LBD-205-11

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBC-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX | ISX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ISX: STRING POSITION — ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 206
SCALE: 1" = 60'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 206

DRAWING #: E2.026

NO	DATE	REVISION / DESCRIPTION	BY	APP.
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AR
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1	04/11/2025	30% ELECTRICAL DESIGN	BH	AR

PREPARED FOR: LANGAN

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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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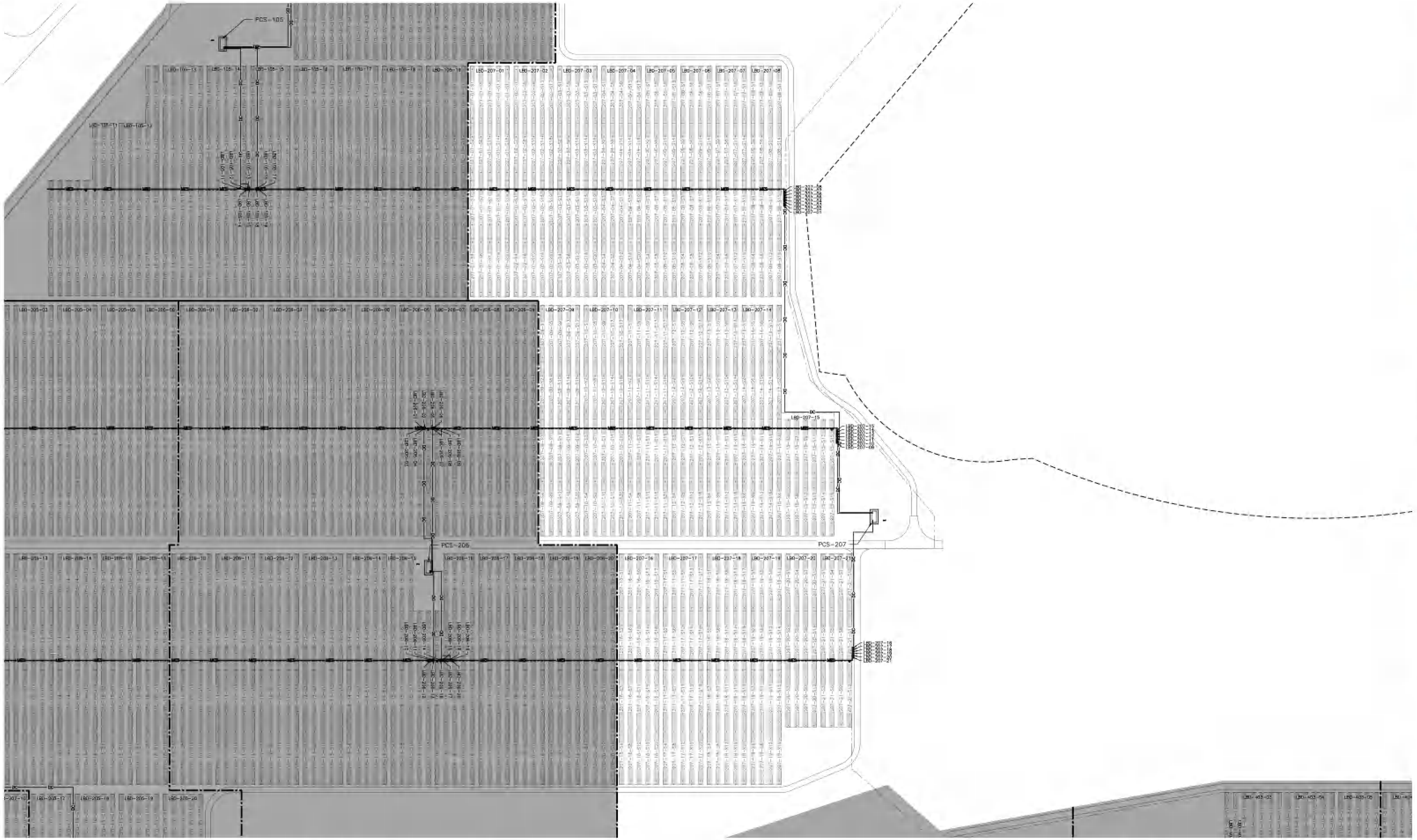
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

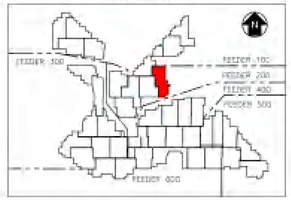
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / SX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 207
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 207

DRAWING #: E2.027

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	10/03/2025	90% ELECTRICAL DESIGN	BA	AAR
3	11/11/2025	30% ELECTRICAL DESIGN	BA	AAR

DESIGNED BY: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

LANGAN, LLC, 840 CESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

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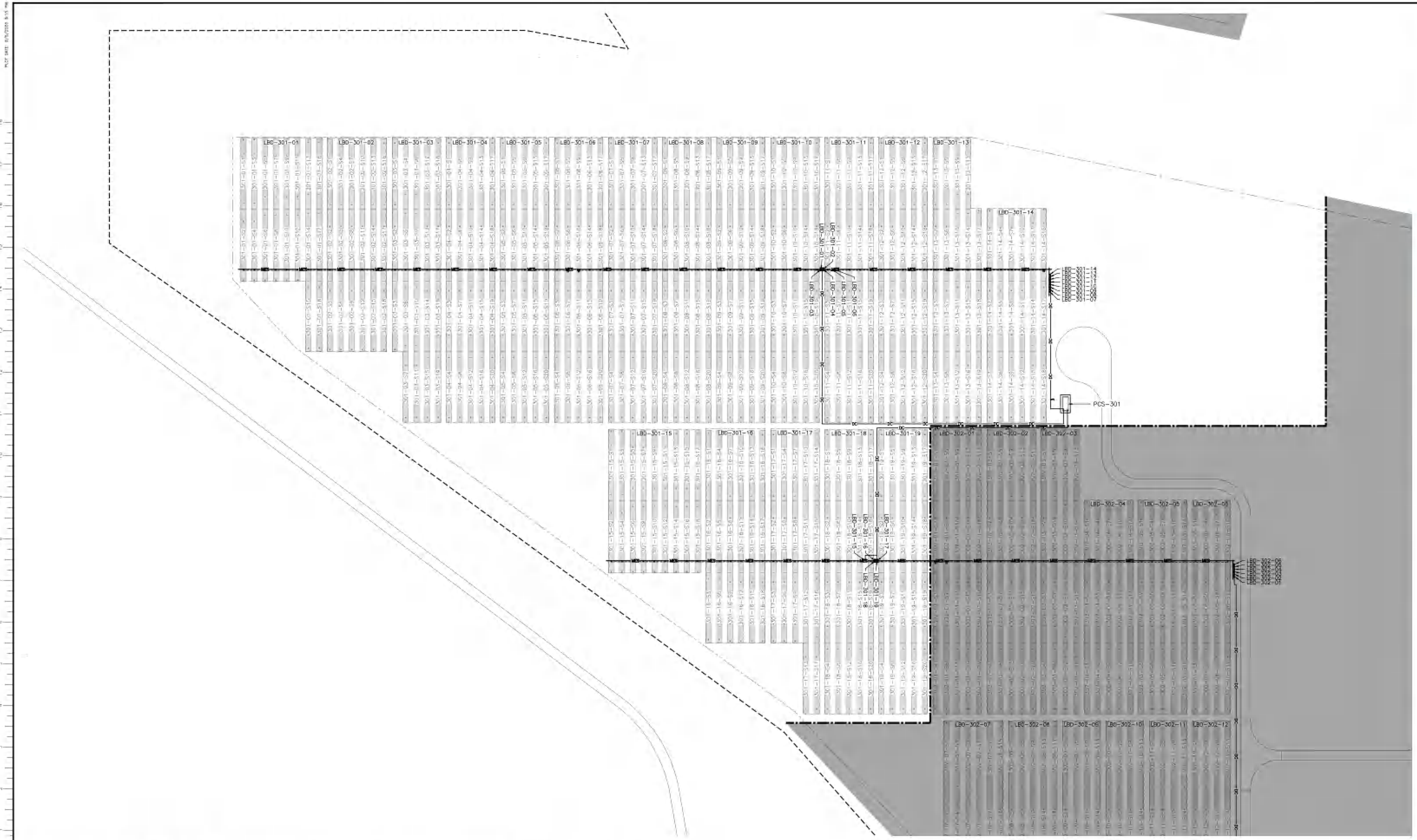


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

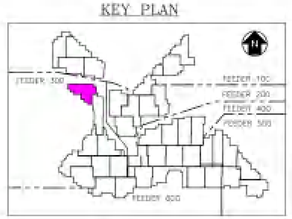
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX1 / SX

- XXX-XX1: PCS IDENTIFIER, LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 301
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 301

DRAWING #: E2.031

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

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LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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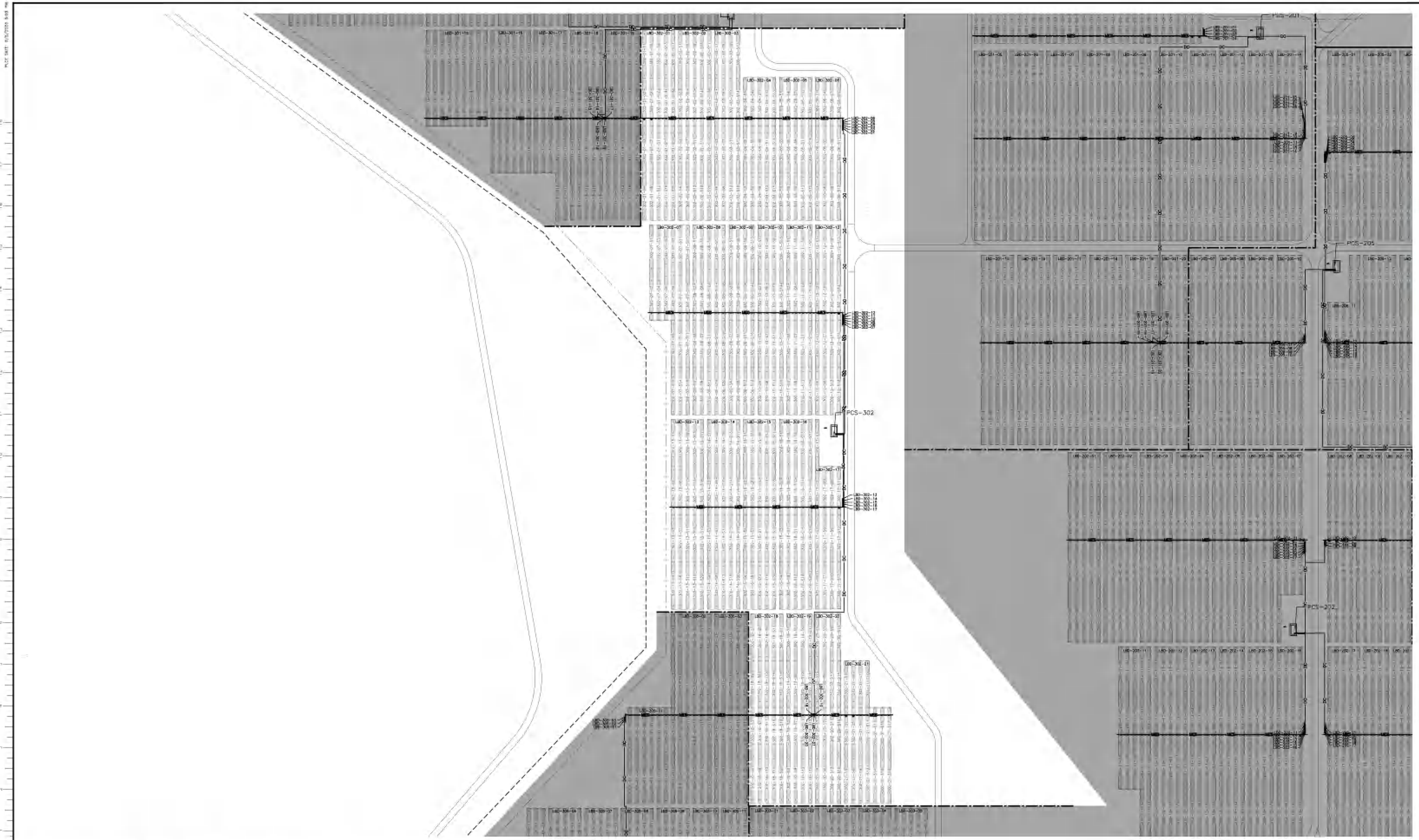


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

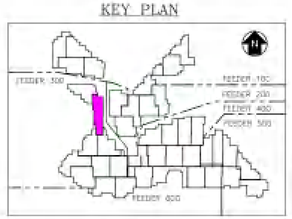
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / XX
- PCS IDENTIFIER
- LBD IDENTIFIER
- ASSOCIATED EQUIPMENT

/XX
- STRING POSITION
- ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 302
SCALE: 1" = 90'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 302

DRAWING #: E2.032

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN
LANGAN, LLC
840 GESSNER ROAD SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PREPARED BY: PURE POWER ENGINEERING
111 RYAN STREET HUBBARD, NJ
WWW.PUREPOWER.COM

DRAWN BY:

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

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PLOT DATE: 09/5/2025 9:58 AM

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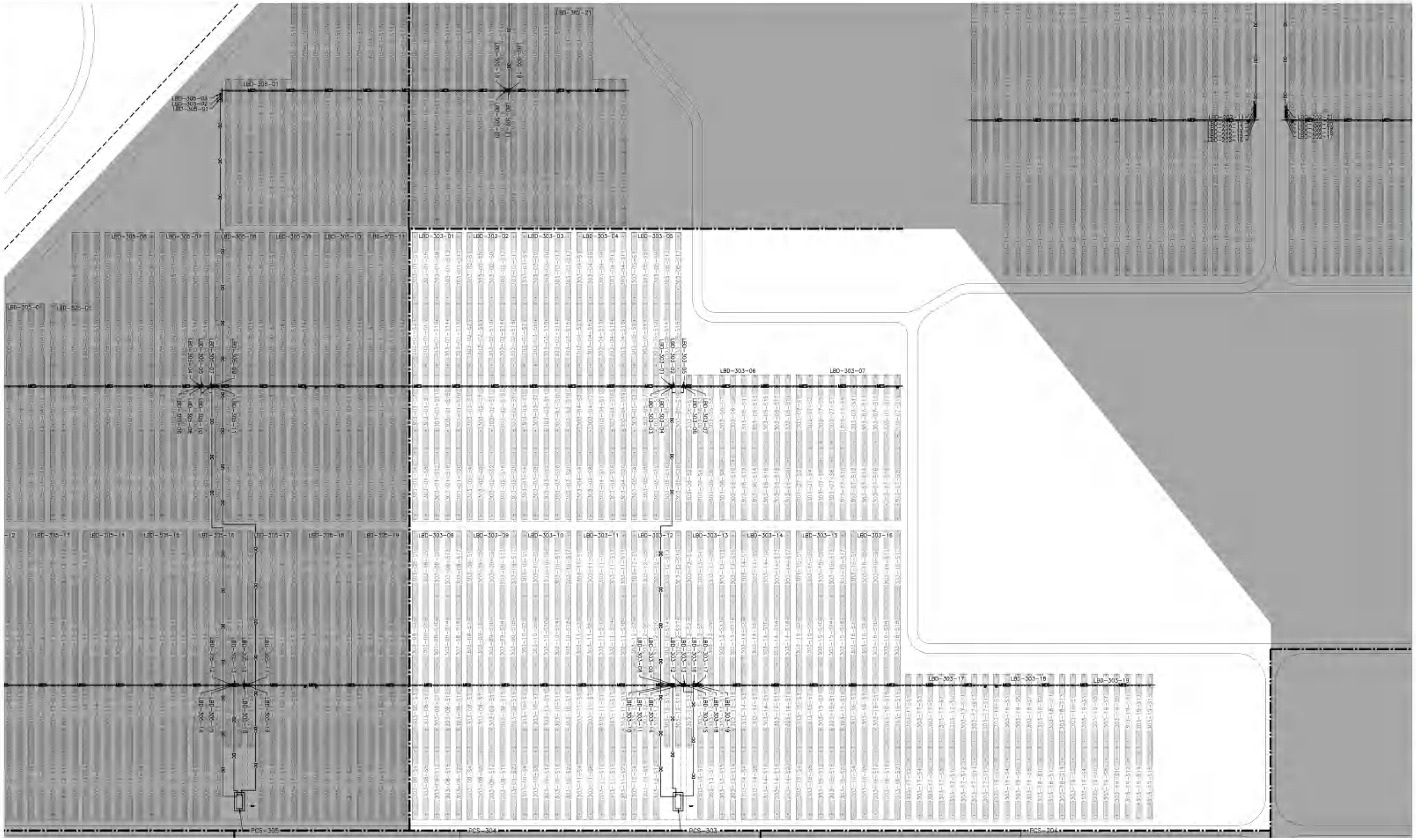


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

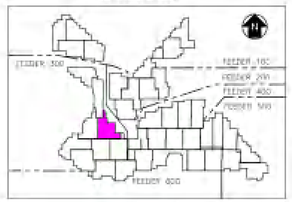
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ISX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ISX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 303
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 303

DRAWING #: E2.033

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

PREPARED BY: LANGAN, LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK'D
1	09/25/2023	60% ELECTRICAL DESIGN	BA	AAR
2	10/23/2023	90% LAYOUT REVIEW	BA	AAR
3	11/17/2023	30% ELECTRICAL DESIGN	BA	AAR

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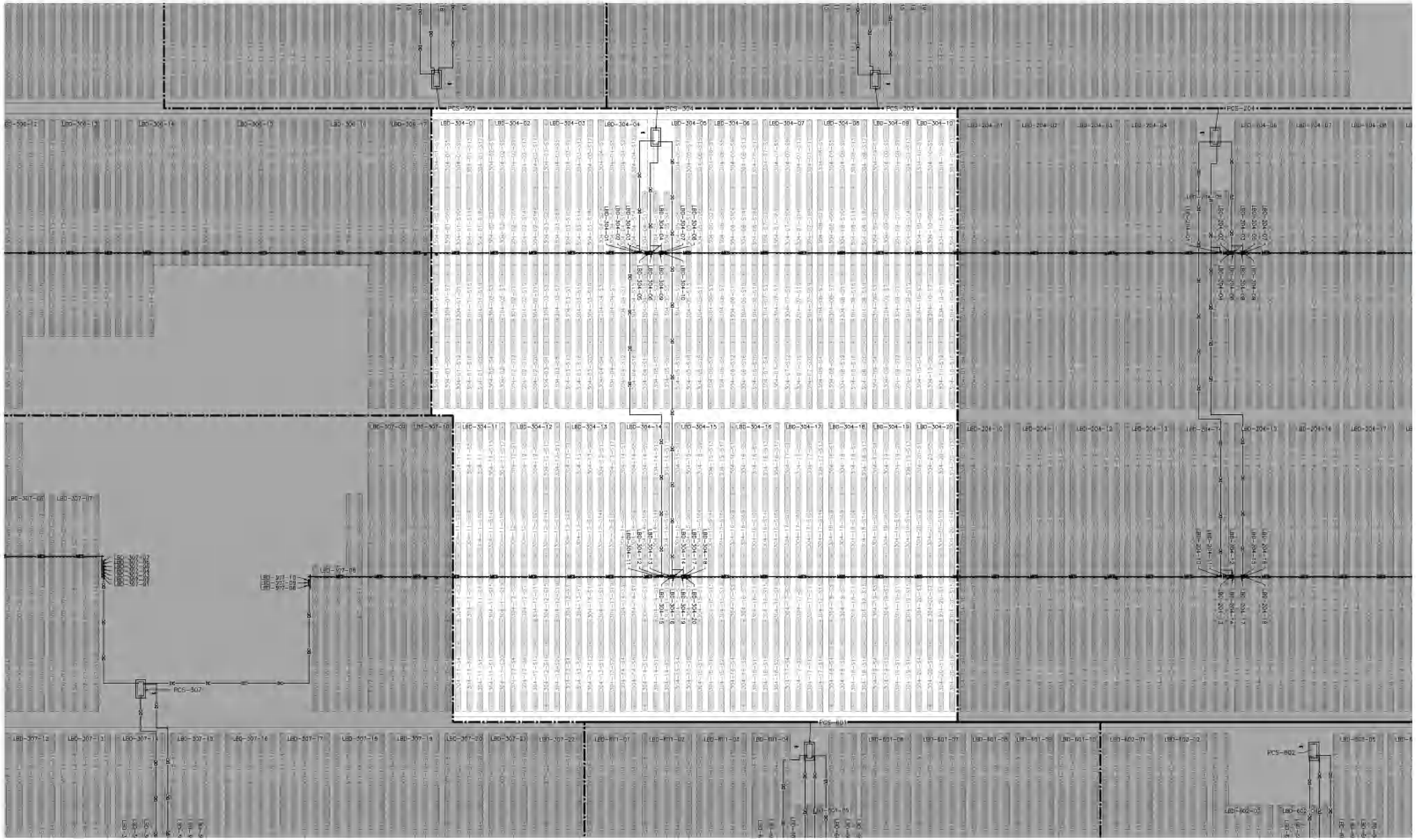
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

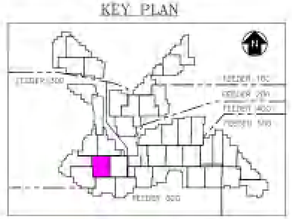
SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE / LBD ZONE BOUNDARY

STRING LABEL

- XXX-XX — PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- XX — STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 304
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 304

DRAWING # E2.034

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: PURE POWER ENGINEERING, 111 RIVER STREET HOBOKEN, NJ, WWW.PUREPOWER.COM

PREPARED BY: LANGAN, LLC, 840 CESSNA ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AR
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1	04/11/2025	30% ELECTRICAL DESIGN	BH	AR

SIZE: 36" x 24" | PROJECT #: TX-PS-2701

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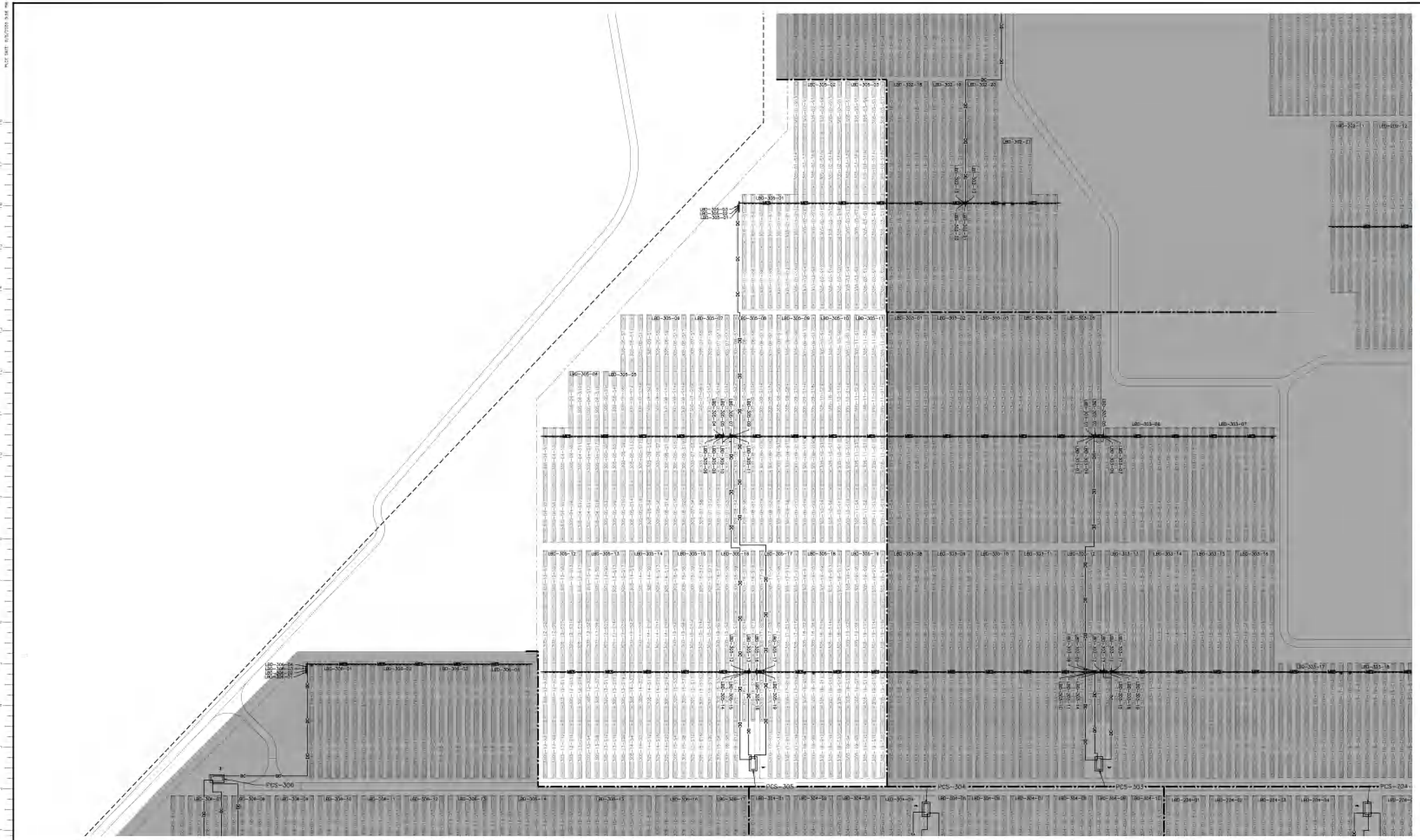
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

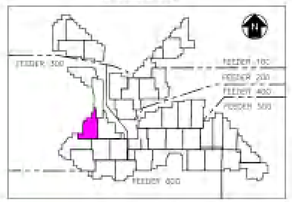
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / X.X

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- X.X: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 305
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 305

DRAWING #: E2.035

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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HOUSTON, TX 77024
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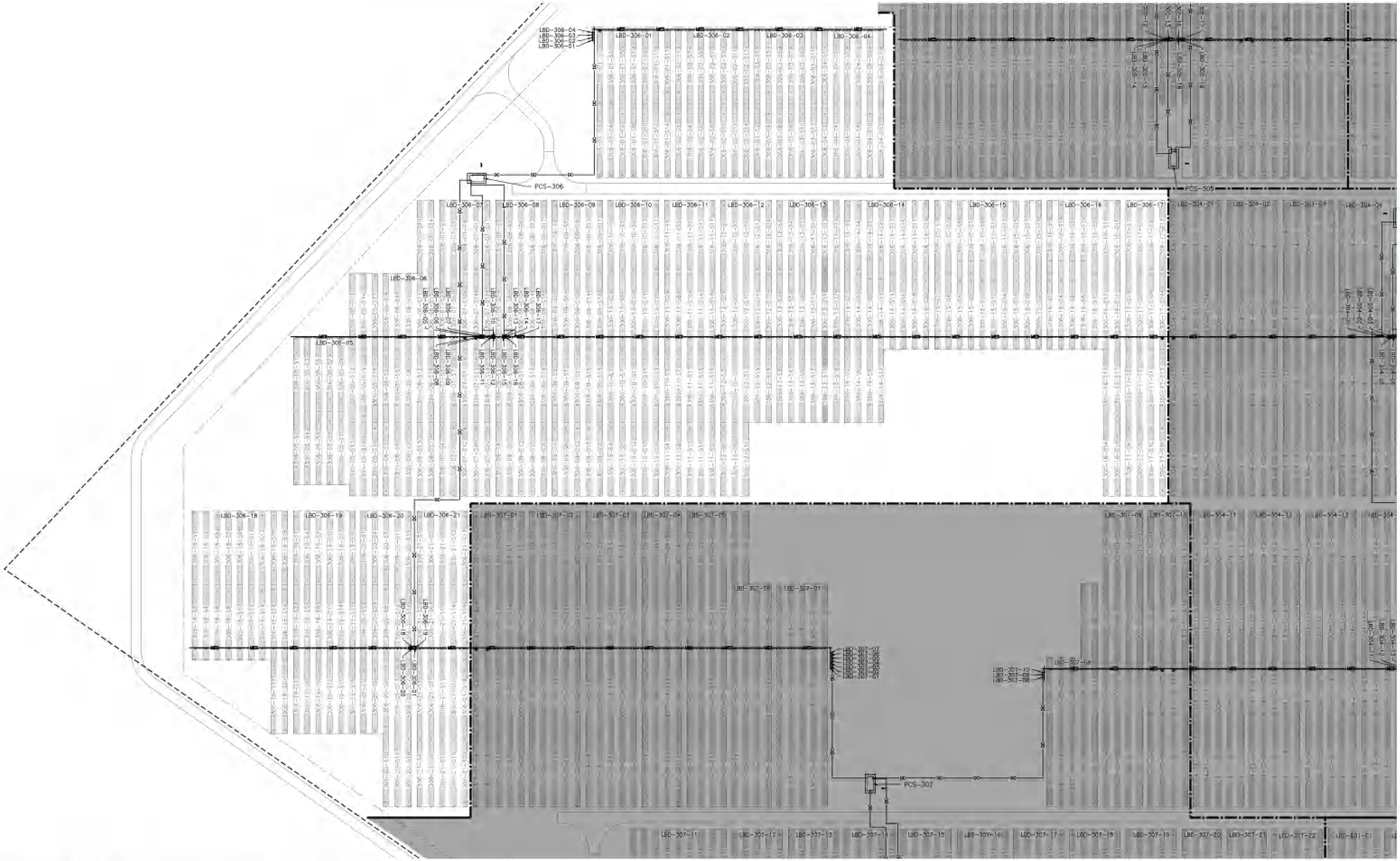
NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AR
2	08/22/2025	60% LAYOUT REVIEW	BA	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

PLOT DATE: 9/8/2025 9:58 AM

RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

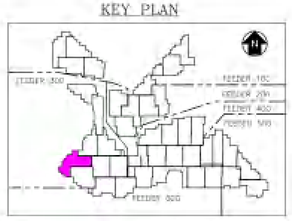
SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

- XXX-XX — PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX — STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 306
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 306

DRAWING #: E2.036

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

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NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2023	60% ELECTRICAL DESIGN	BH	AR
2	08/23/2023	30% LAYOUT REVIEW	BH	AR
1	04/17/2023	30% ELECTRICAL DESIGN	BH	AR

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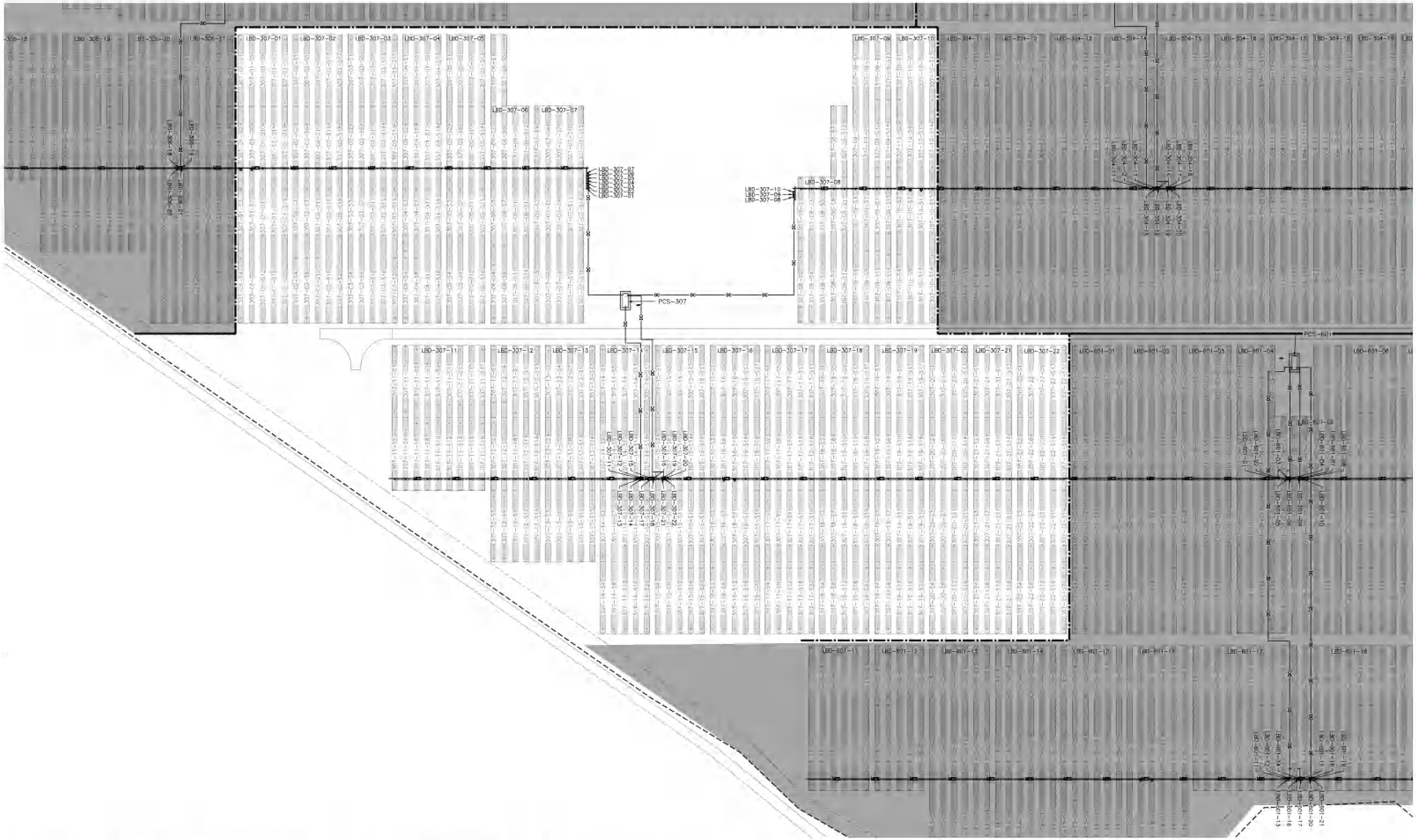
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD

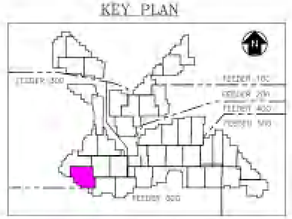
LBD-XXX-XX — LBD ZONE; LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ITSX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ITSX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 307
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 307

DRAWING # E2.037

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

PREPARED BY: LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AAR
2	08/22/2025	30% LAYOUT REVIEW	BH	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AAR

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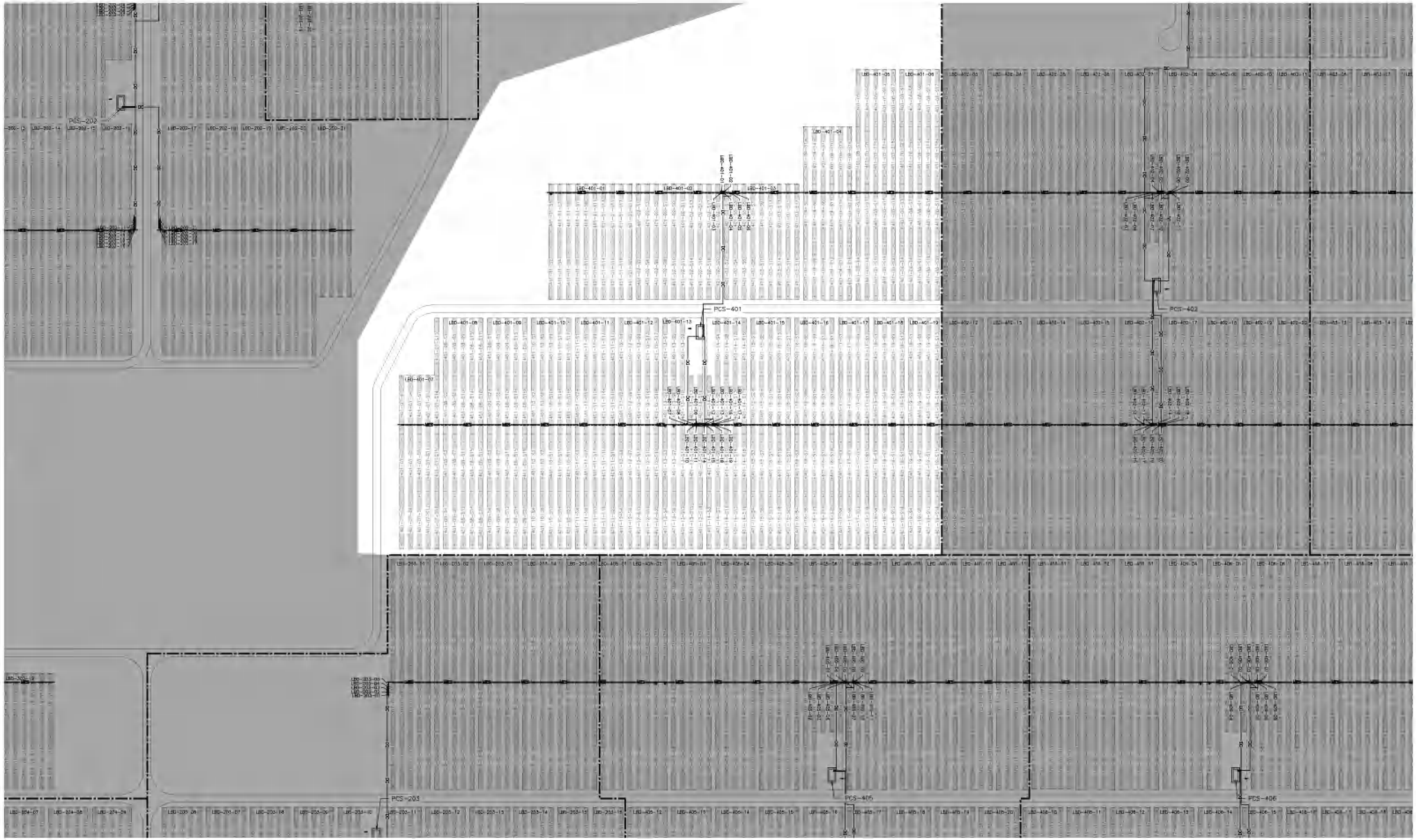


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD

LBD-XXX-XX — LBD ZONE; LBD ZONE BOUNDARY

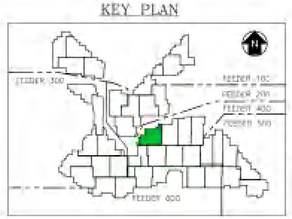
STRING LABEL

XXX-XX\ /XX — PCS IDENTIFIER; LBD IDENTIFIER; STRING POSITION

ASSOCIATED EQUIPMENT — ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 401
SCALE: 1" = 75'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 401

DRAWING #: E2.041

NO	DATE	REVISION / DESCRIPTION	BY	CHK'D
3	09/05/2025	60% ELECTRICAL DESIGN	BH	AVR
2	08/22/2025	60% LAYOUT REVIEW	BH	AVR
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AVR

PREPARED FOR: LANGAN

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" × 24" | PROJECT #: TX-PS-2701

PREPARED BY: PURE POWER ENGINEERING, 111 RYER STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

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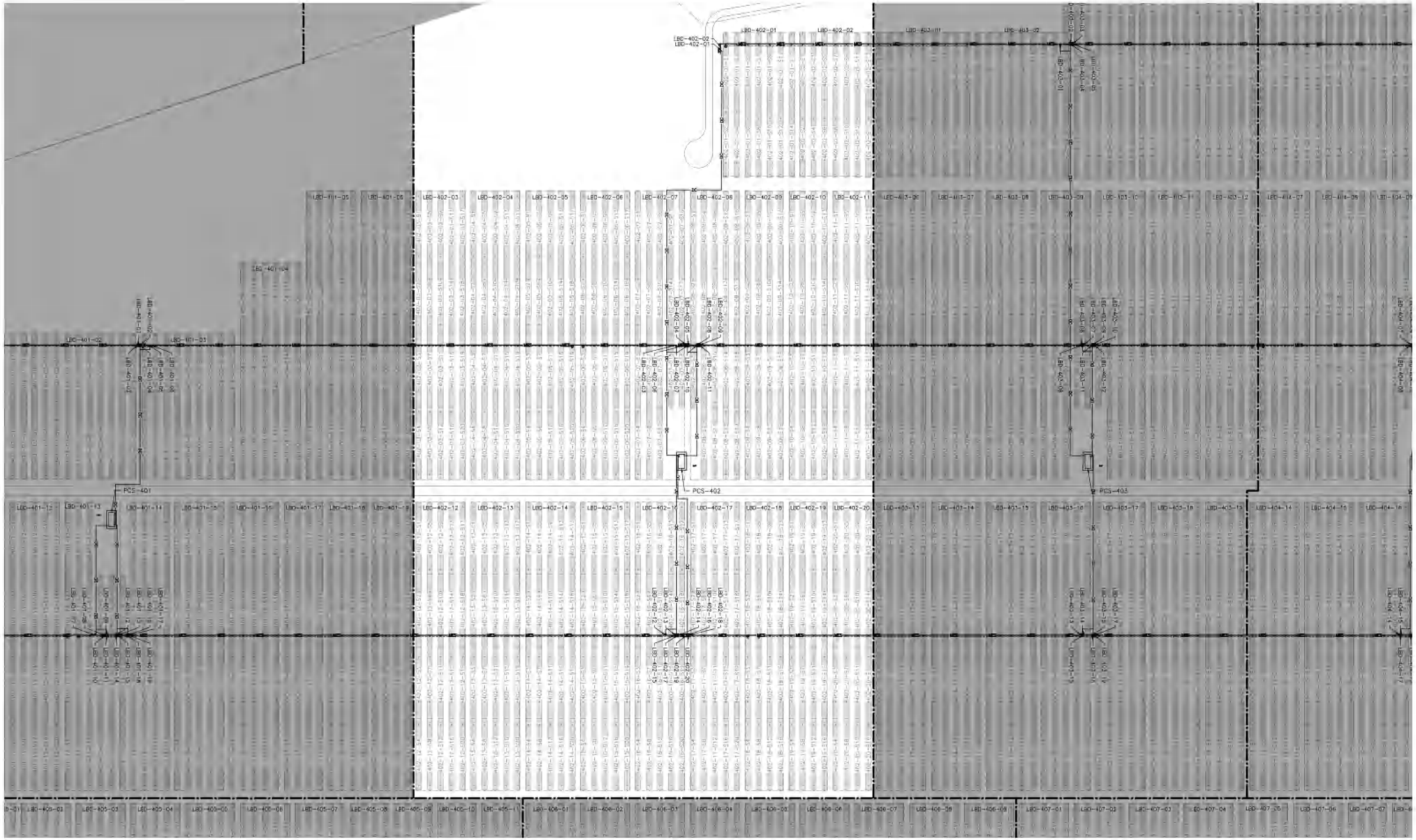
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

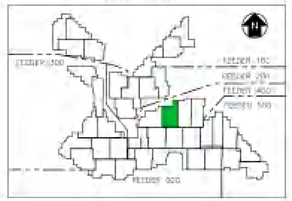
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ISX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ISX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 402
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 402

DRAWING #: E2.042

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2023	60% ELECTRICAL DESIGN	BH	AR
2	08/23/2023	30% ARTIFICIAL INTELLIGENCE	BH	AR
1	04/11/2023	30% ELECTRICAL DESIGN	BH	AR

DESIGNED BY: BH | DRAWN BY: EL | CHECKED BY: AR

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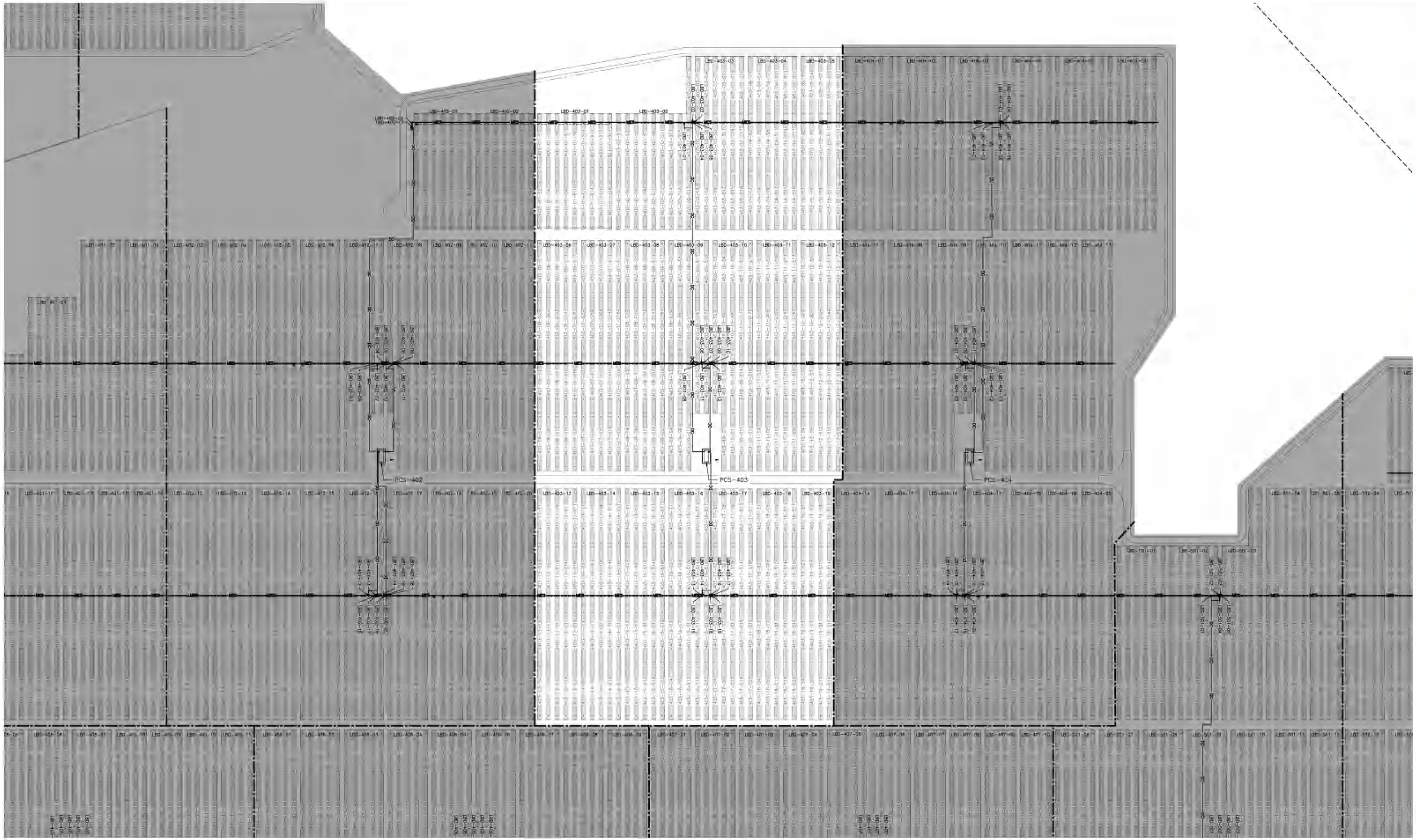
BARS ARE 1" IF NOT ONE INCH ADJUST SCALES ACCORDINGLY



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

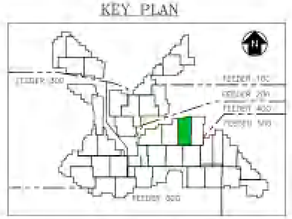
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-YXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX1 / 1SX

- XXX-XX1: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- 1SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 403
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 403

DRAWING #: E2.043

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AMT
2	08/22/2025	30% LAYOUT REVIEW	BH	AMT
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AMT

PREPARED BY: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

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PLOT DATE: 9/25/2025 9:58:49 AM

RULER IN INCHES

PCS-402

PCS-403

PCS-404

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / XX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 404
SCALE: 1" = 75'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 404

DRAWING #: E2.044

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

DESIGNED BY: PURE POWER ENGINEERING, 111 RIVER STREET HOBOKEN, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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3	11/17/2025	30% ELECTRICAL DESIGN	BH	AAR

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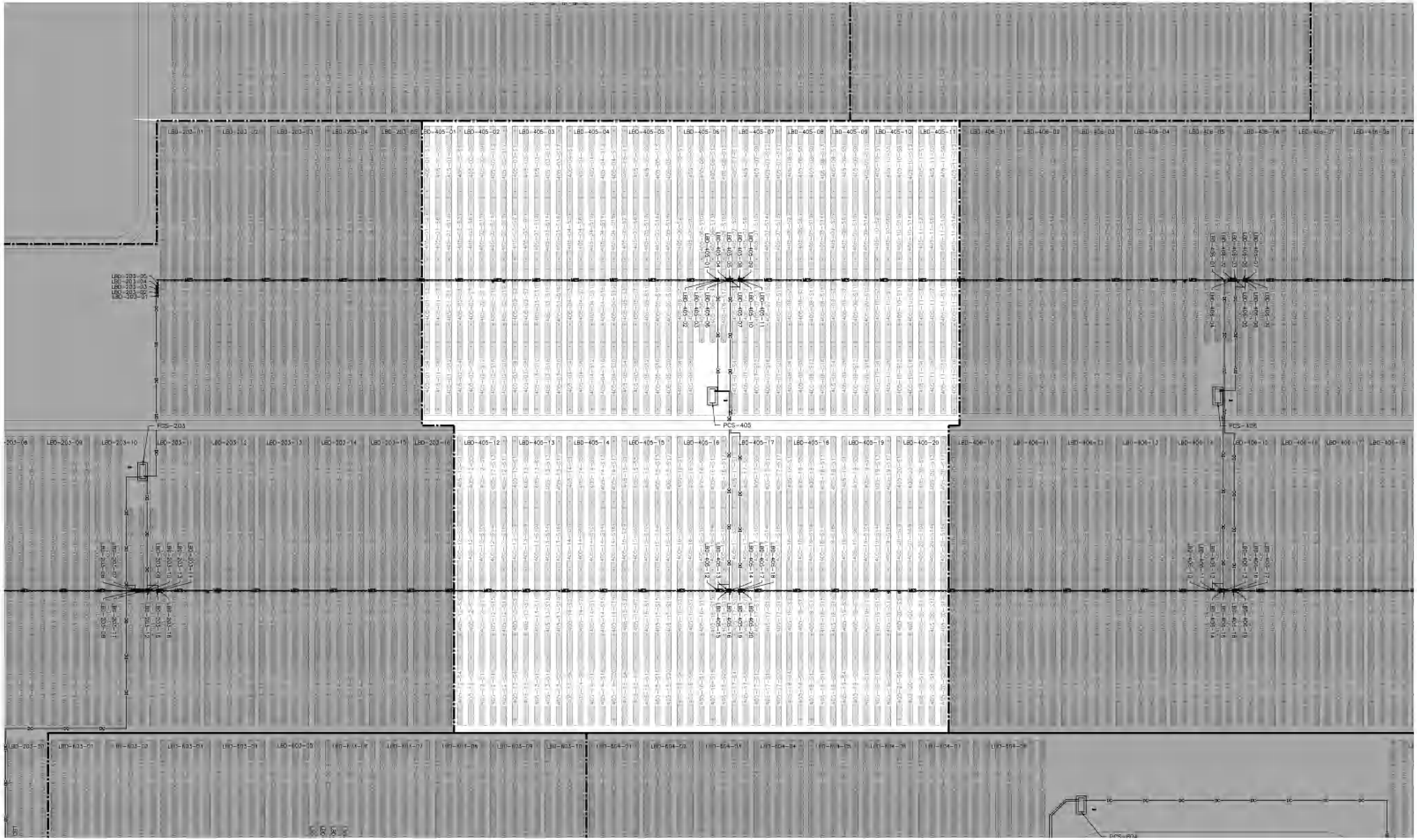
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ISX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ISX: STRING POSITION — ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 405
SCALE: 1" = 80'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 405

DRAWING #: E2.045

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 266, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

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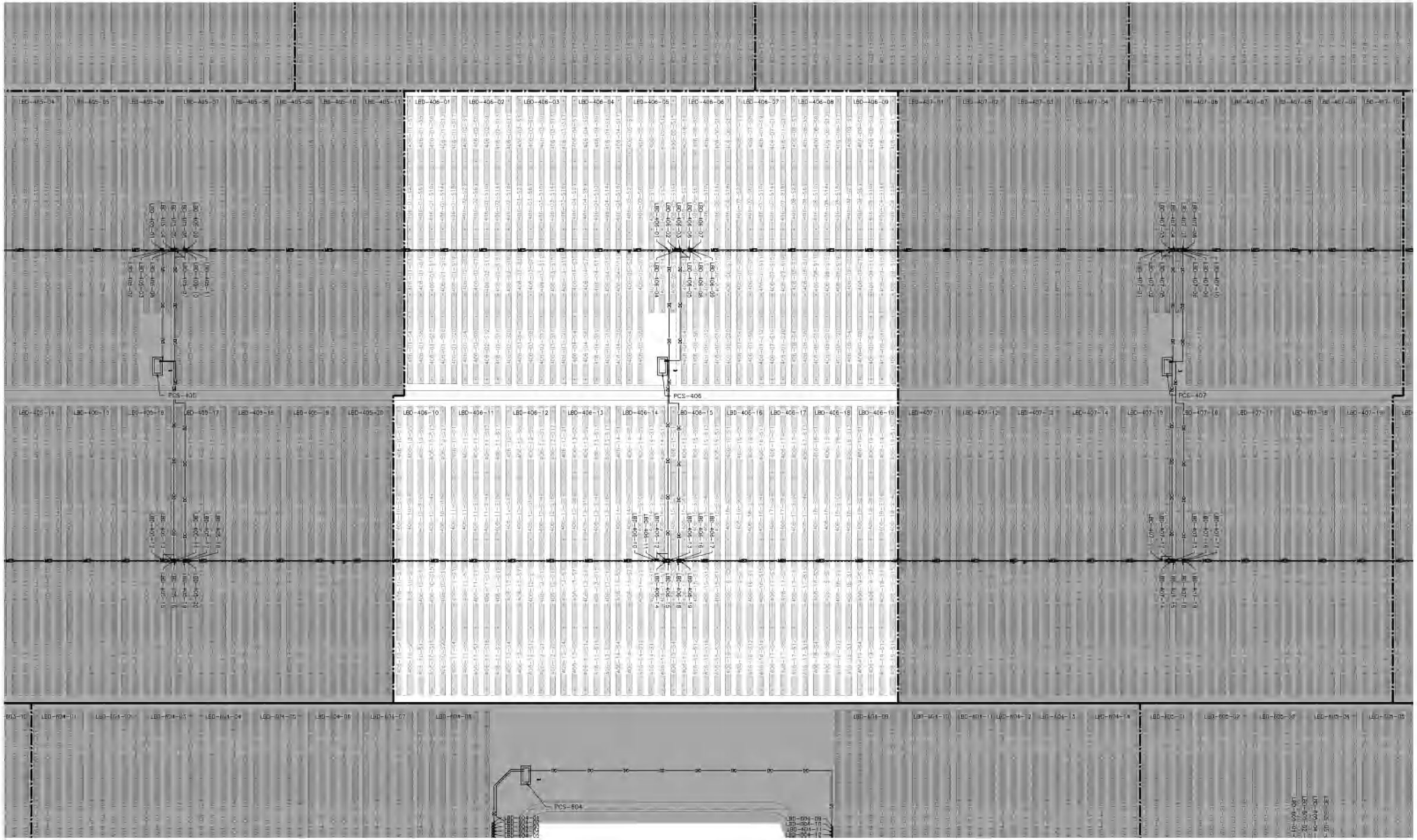
NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2023	60% ELECTRICAL DESIGN	BH	AR
2	09/20/2023	60% LAYOUT REVIEW	BH	AR
1	04/11/2023	30% ELECTRICAL DESIGN	BH	AR

ISSUED FOR: PRE-CONSTRUCTION

PLOT DATE: 9/25/2023 9:18 AM

RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

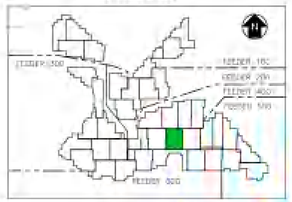
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\S/X

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- S/X: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 406

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 406

DRAWING # E2.046

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: PURE POWER ENGINEERING, 111 RIVER STREET HOBOKEN NJ, WWW.PUREPOWER.COM

PREPARED BY: LANGAN, LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2023	60% DESIGN	BH	AR
2	10/20/2023	90% DESIGN	BH	AR
3	11/17/2023	30% ELECTRICAL DESIGN	BH	AR

SCALE: AS NOTED @ 36" x 24"

PROJECT #: TX-PS-2701

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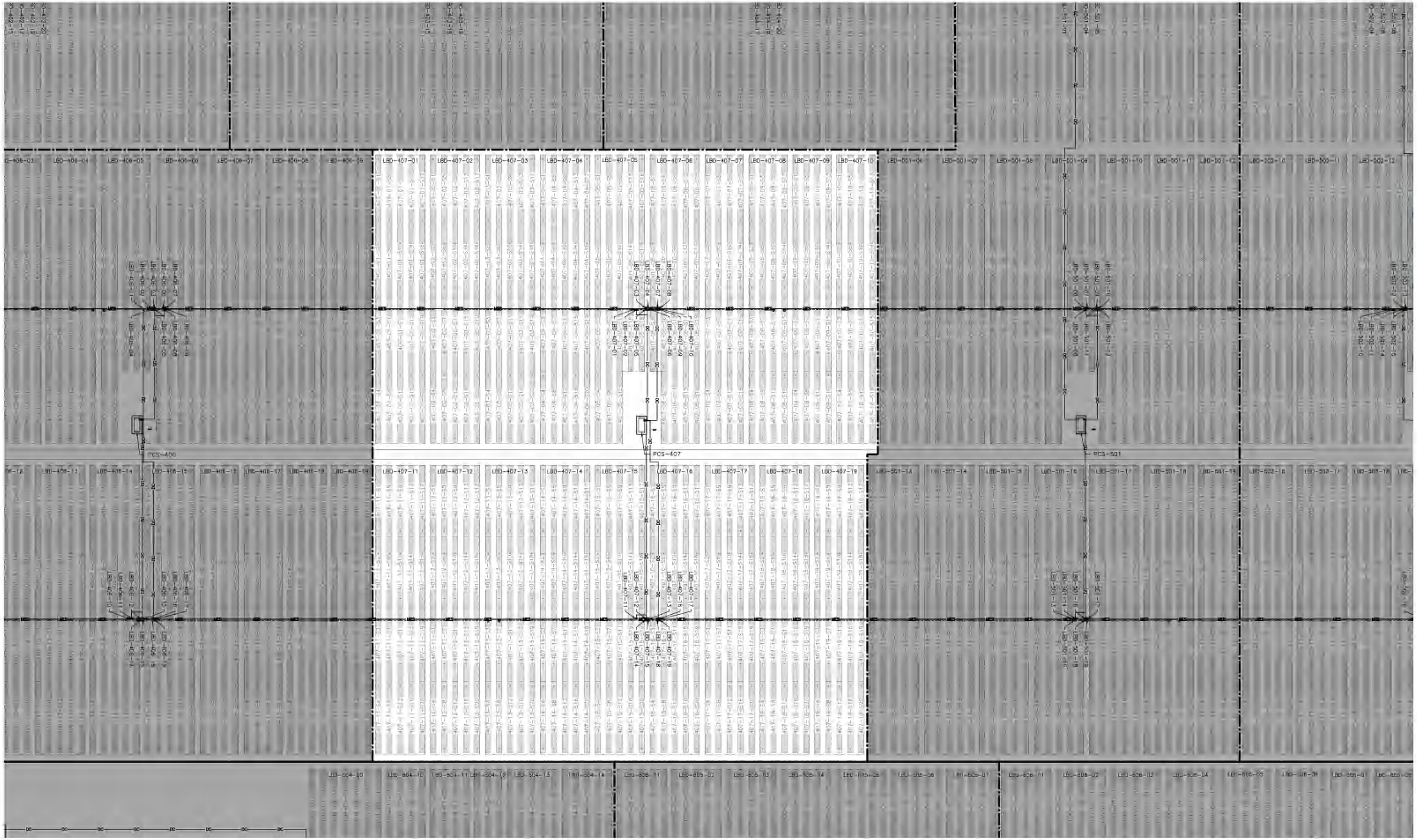
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD

LBC-XXX-XX — LBD ZONE; LBD ZONE BOUNDARY

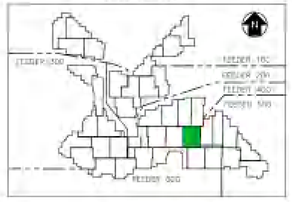
STRING LABEL

XXX-XX1.1SX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 407
SCALE: 1" = 80'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 407

DRAWING #: E2.047

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

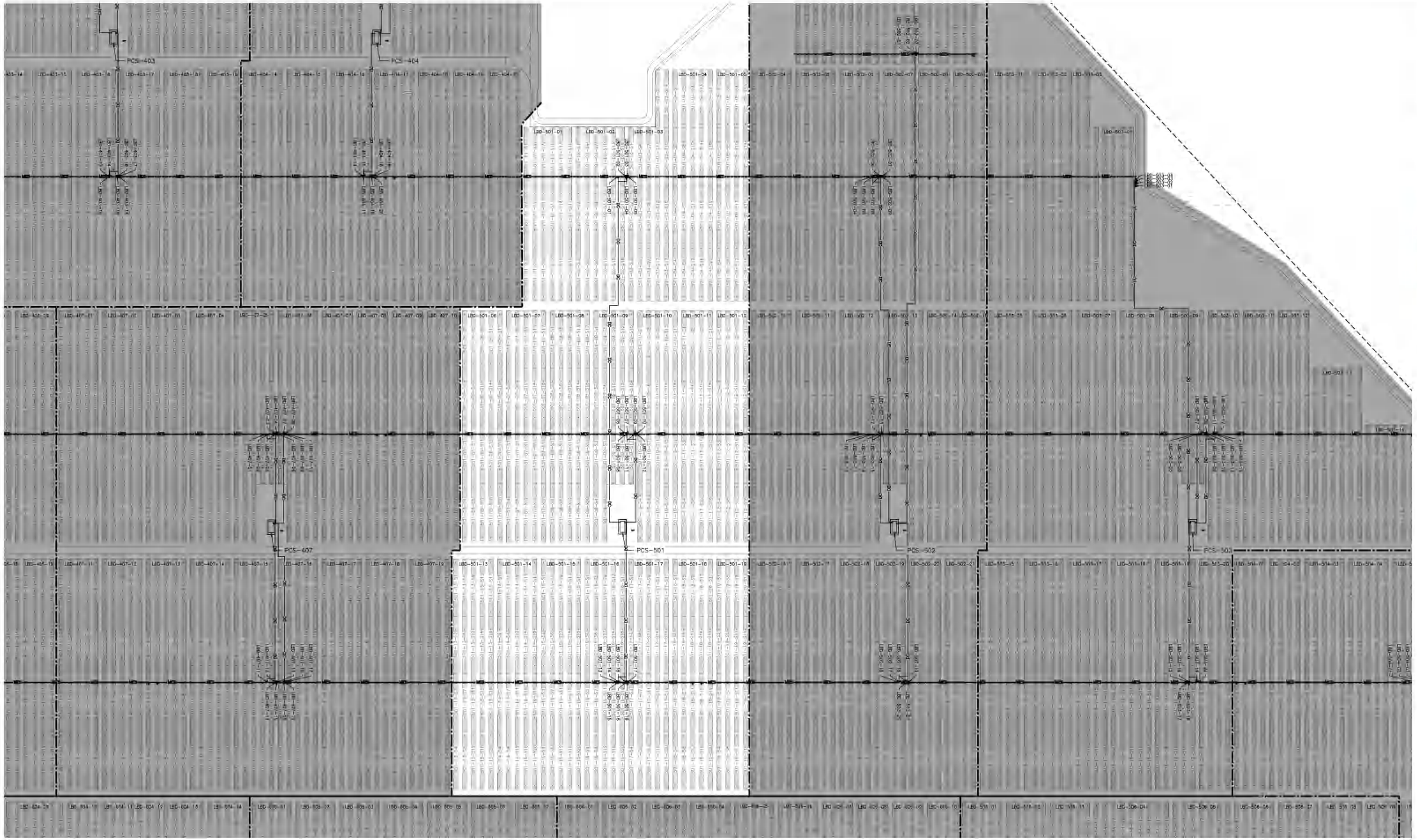
PREPARED BY: PUREPOWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	APP.
3	09/25/2023	60% ELECTRICAL DESIGN	BH	AR
2	09/20/2023	60% LAYOUT REVIEW	BH	AR
1	04/11/2023	30% ELECTRICAL DESIGN	BH	AR

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PLOT DATE: 09/25/2023 3:57 PM

RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

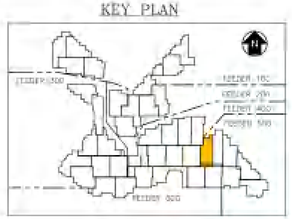
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-YXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX1.1SX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 501
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 501

DRAWING #: E2.051

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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PREPARED BY: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
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3	11/17/2025	90% ELECTRICAL DESIGN	BH	AR

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PLOT DATE: 11/17/2025 9:58:49 AM

RULER IN INCHES

PCS-502

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD

LBC-XXX-XX — LBD ZONE; LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ | SX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 502
SCALE: 1" = 90'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 502

DRAWING #: E2.052

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2025	60% ELECTRICAL DESIGN	BH	AAR
2	10/23/2025	90% ELECTRICAL REVIEW	BH	AAR
3	11/17/2025	30% ELECTRICAL DESIGN	BH	AAR

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111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM

DESIGNED BY: BH
DRAWN BY: EL
CHECKED BY: AAR

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

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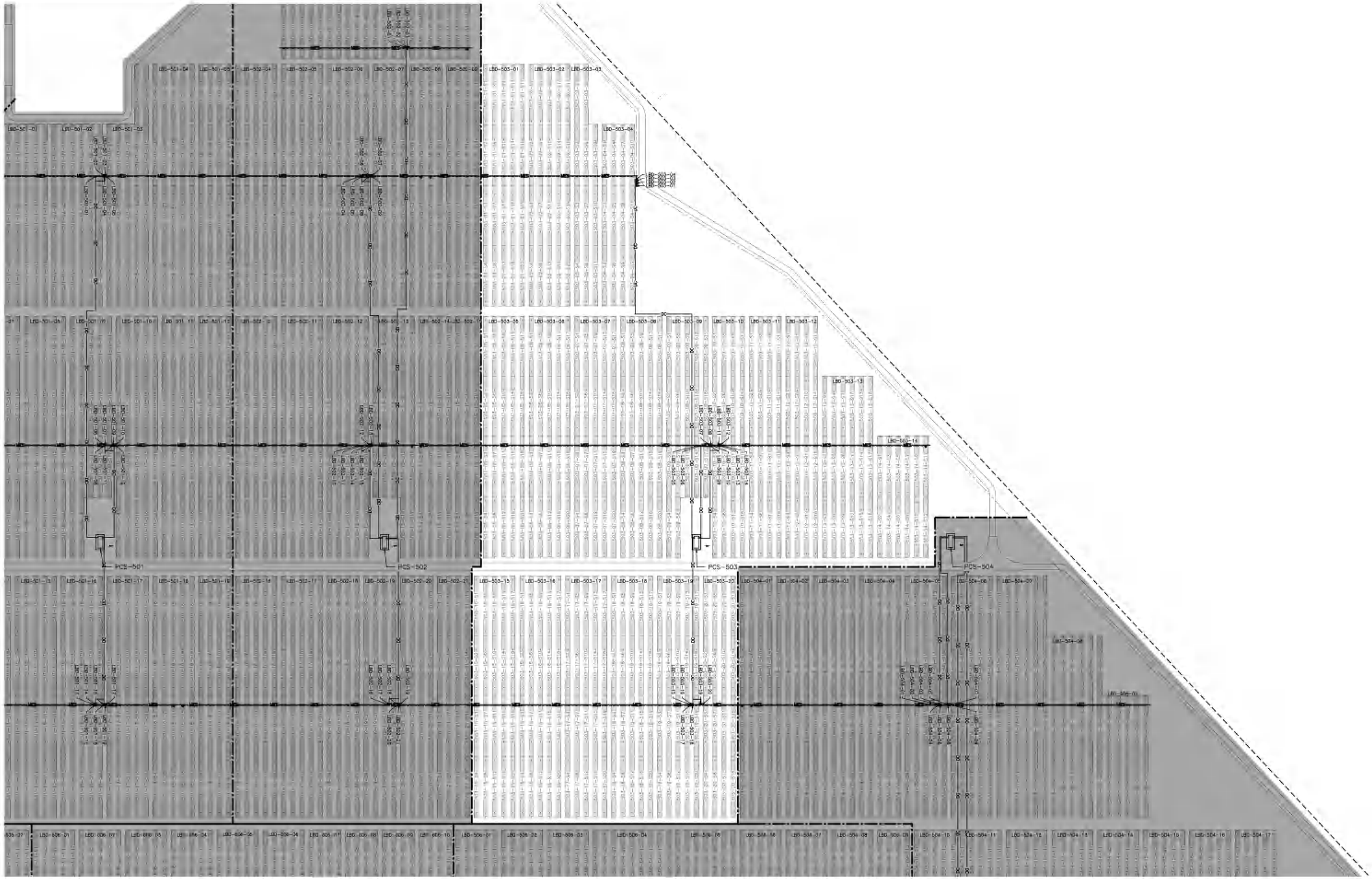
RULER IN INCHES



LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

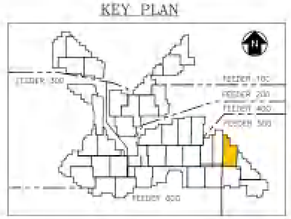
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ITA

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ITA: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 503
SCALE: 1" = 75'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 503

DRAWING # E2.053

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 266, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

NO	DATE	REVISION / DESCRIPTION	BY	CHK
	09/25/2025	60% ELECTRICAL DESIGN	BA	AR
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	11/17/2025	30% ELECTRICAL DESIGN	BA	AR

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PLOT DATE: 11/17/2025 9:15 AM

BUILT IN INCHES

PCS-502
PCS-503
PCS-504
PCS-506
PCS-505

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

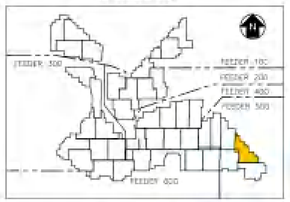
PCS IDENTIFIER — XXX-XX
LBD IDENTIFIER
ASSOCIATED EQUIPMENT

/SX — STRING POSITION
ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 504

SCALE: 1" = 75'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 504

DRAWING #: E2.054

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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HOUSTON, TX 77024
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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

DESIGNED BY:

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111 RIVER STREET, HOBOKEN, NJ
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NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

PLOT DATE: 9/5/2025 9:58 AM

BUILT IN INCHES

PCS-506

PCS-505

LBD-506-14 LBD-506-15 LBD-506-16 LBD-506-17 LBD-506-18 LBD-506-19

LBD-505-01 LBD-505-02 LBD-505-03 LBD-505-04 LBD-505-05 LBD-505-06 LBD-505-07 LBD-505-08 LBD-505-09 LBD-505-10 LBD-505-11 LBD-505-12 LBD-505-13

LBD-505-14 LBD-505-15 LBD-505-16 LBD-505-17 LBD-505-18

LBD-504-19

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

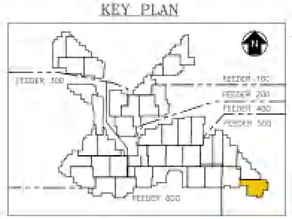
STRING LABEL

XXX-XX / SX

XXX-XX: PCS IDENTIFIER, LBD IDENTIFIER — ASSOCIATED EQUIPMENT

SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 505

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 505

DRAWING #: E2.055

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

DESIGNED BY: PURE POWER ENGINEERING
111 RYAN STREET, HUBBARD, NJ
WWW.PUREPOWERNJ.COM

PREPARED FOR: LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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PLOT DATE: 09/5/2025 9:55 PM

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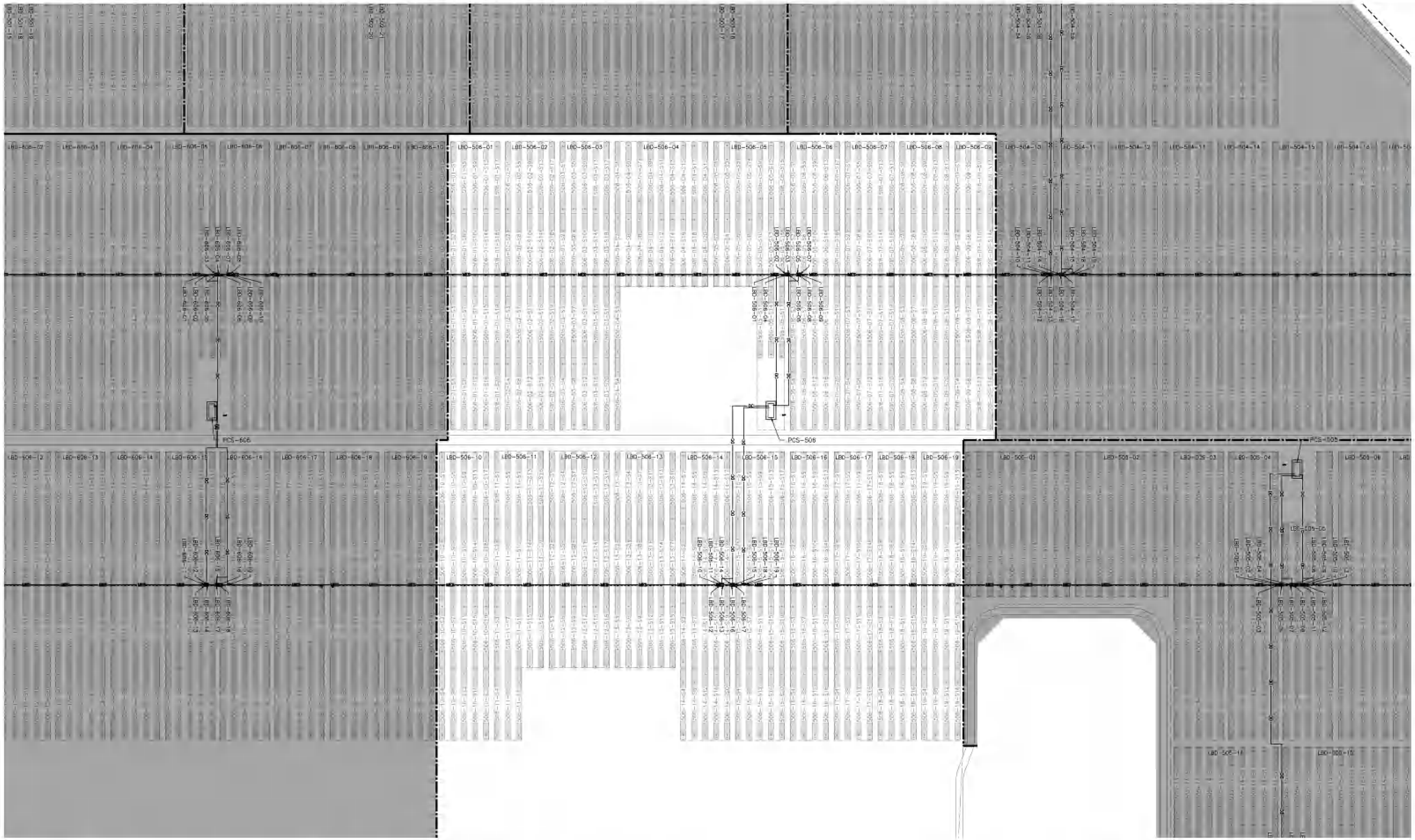

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD

LBC-XXX-XX — LBD ZONE; LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ /XX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 506
SCALE: 1" = 60'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 506

DRAWING # E2.056

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

PREPARED BY: PURE POWER ENGINEERING, 111 RIVER STREET HOBOKEN, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION DESCRIPTION	BY	APP.
3	09/25/2023	60% ELECTRICAL DESIGN	BH	AMT
2	08/23/2023	30% LAYOUT REVIEW	BH	AMT
1	04/17/2023	30% ELECTRICAL DESIGN	BH	AMT

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RULER IN INCHES

PCS-307

PCS-601

PCS-602

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ITEM

- PCS IDENTIFIER
- LBD IDENTIFIER
- ASSOCIATED EQUIPMENT
- STRING POSITION
- ARRAY LOCATION

KEY PLAN

1 PARTIAL STRINGING PLAN – PCS 601
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 601

DRAWING #: E2.061

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAPER SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PREPARED BY: PURE POWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2023	60% ELECTRICAL DESIGN	BA	AR
2	06/23/2023	60% LAYOUT REVIEW	BA	AR
1	04/17/2023	30% ELECTRICAL DESIGN	BA	AR

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PLOT DATE: 9/25/2023 9:17 PM

RULER IN INCHES

PCS-601

PCS-602

PCS-603

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

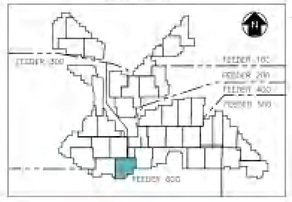
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ /SX

- PCS IDENTIFIER
- LBD IDENTIFIER
- STRING POSITION
- ASSOCIATED EQUIPMENT
- ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 602
SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 602

DRAWING #: E2.062

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC 840 GESSNER ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

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RULER IN INCHES

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

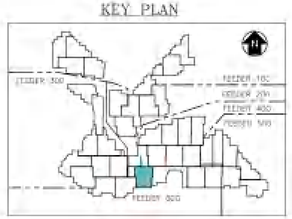
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE; LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ITEM

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- ITEM: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 603
SCALE: 1" = 60'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 603

DRAWING #: E2.063

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: PURE POWER ENGINEERING
111 RYAN STREET HUDSON, NJ
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PREPARED BY: LANGAN
LANGAN, LLC
840 GESSNER ROAD SUITE 740
HOUSTON, TX 77024
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3	09/25/2025	60% ELECTRICAL DESIGN	BH	AAR
2	08/22/2025	30% LAYOUT REVIEW	BH	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BH	AAR

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PLOT DATE: 9/9/2025 9:14 AM

PCS-604

LBD-604-01
LBD-604-02
LBD-604-03
LBD-604-04
LBD-604-05
LBD-604-06
LBD-604-07
LBD-604-08
LBD-604-09
LBD-604-10
LBD-604-11
LBD-604-12
LBD-604-13
LBD-604-14

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

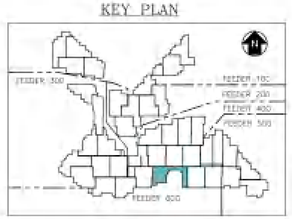
- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX\ / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

KEY PLAN



1 PARTIAL STRINGING PLAN – PCS 604

SCALE: 1" = 80'

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 604

DRAWING #: E2.064

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 266
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

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111 RYAN STREET HUBBARD, NJ
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NO	DATE	REVISION / DESCRIPTION	BY	CHK
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2	10/03/2025	90% LAYOUT REVIEW	BA	AAR
3	11/17/2025	30% ELECTRICAL DESIGN	BA	AAR

PLOT DATE: 11/17/2025 9:19 AM

PLOT SCALE: 1:1

RULER IN INCHES

PCS-605

PCS-606

LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

STRING LABEL

XXX-XX / SX

- XXX: PCS IDENTIFIER
- XX: LBD IDENTIFIER
- ASSOCIATED EQUIPMENT
- SX: STRING POSITION
- ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 605
SCALE: 1" = 80'

KEY PLAN

NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 605

DRAWING #: E2.065

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
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PREPARED BY:
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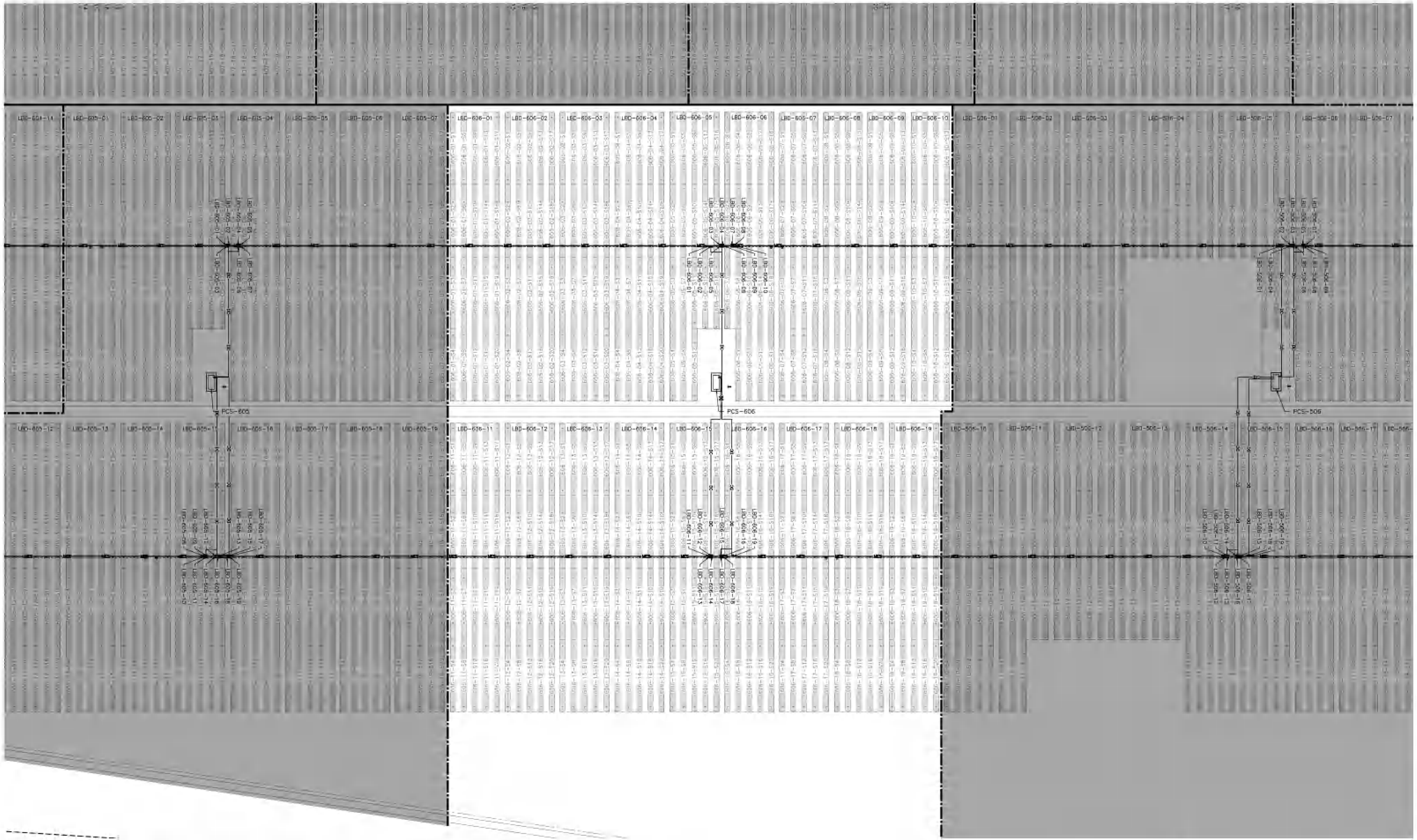


LINETYPE LEGEND

- MESSENGER WIRE SYSTEM
- DC CIRCUIT UNDERGROUND
- FENCE
- 20' FENCE SETBACK
- PCS BOUNDARY
- ATI MOTOR DRIVELINE

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- LOAD BREAK DISCONNECT (LBD)
- ACCESS ROAD
- LBD-XXX-XX — LBD ZONE
- LBD ZONE BOUNDARY

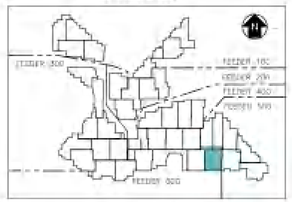
STRING LABEL

XXX-XX / SX

- XXX-XX: PCS IDENTIFIER / LBD IDENTIFIER — ASSOCIATED EQUIPMENT
- SX: STRING POSITION — ARRAY LOCATION

1 PARTIAL STRINGING PLAN – PCS 606
SCALE: 1" = 80'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: PARTIAL STRINGING PLAN – PCS 606

DRAWING #: E2.066

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

ENGINEER: PUREPOWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BH	AR
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1	04/11/2025	30% ELECTRICAL DESIGN	BH	EL

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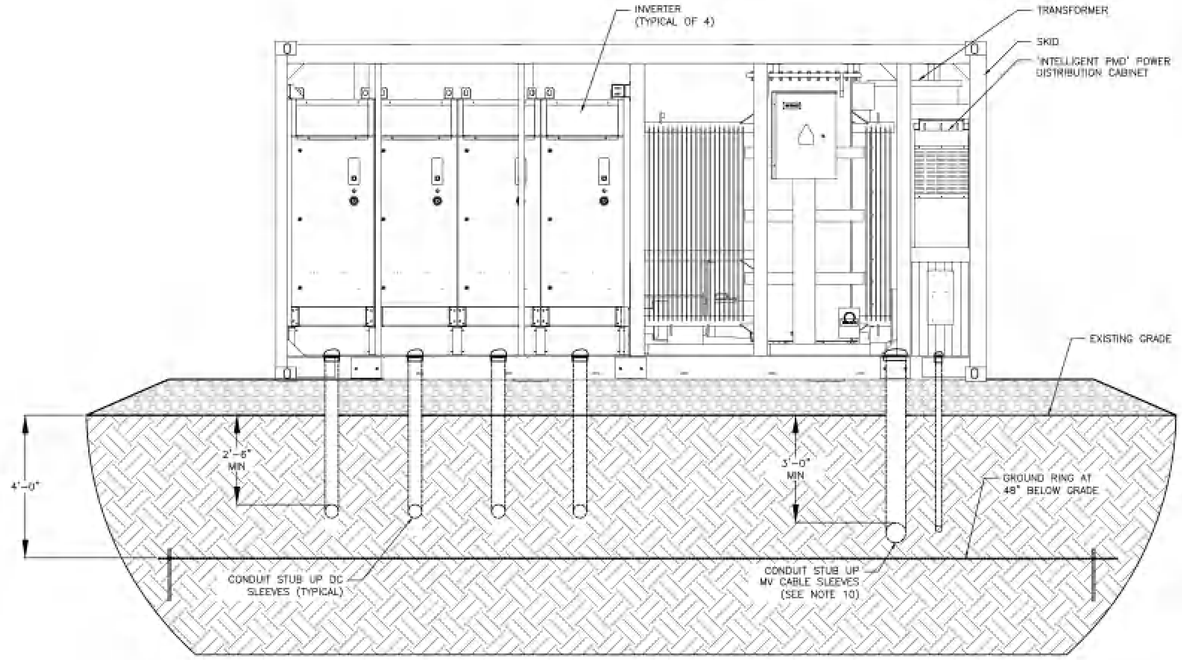
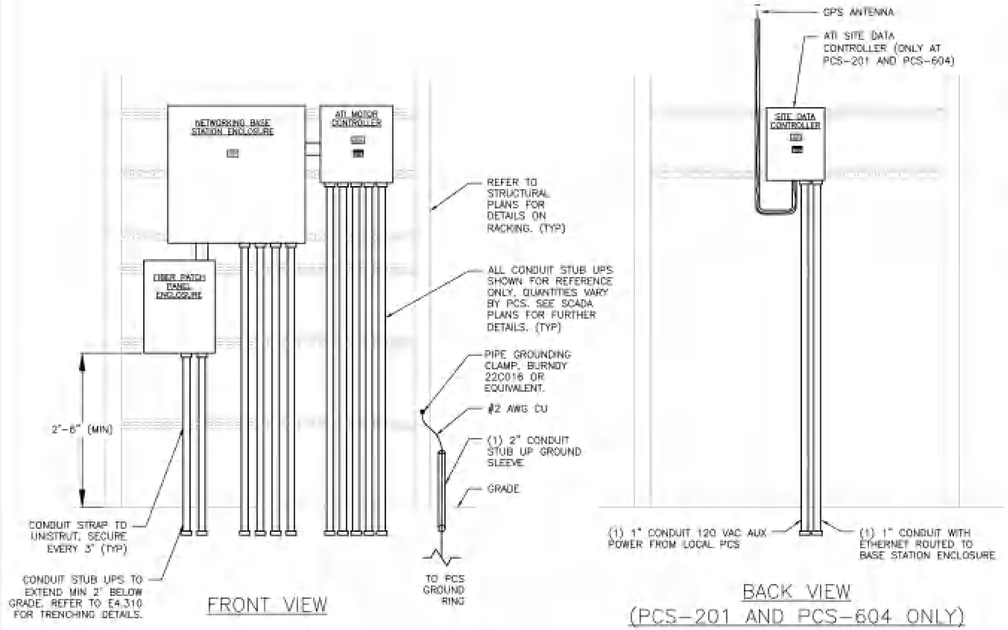
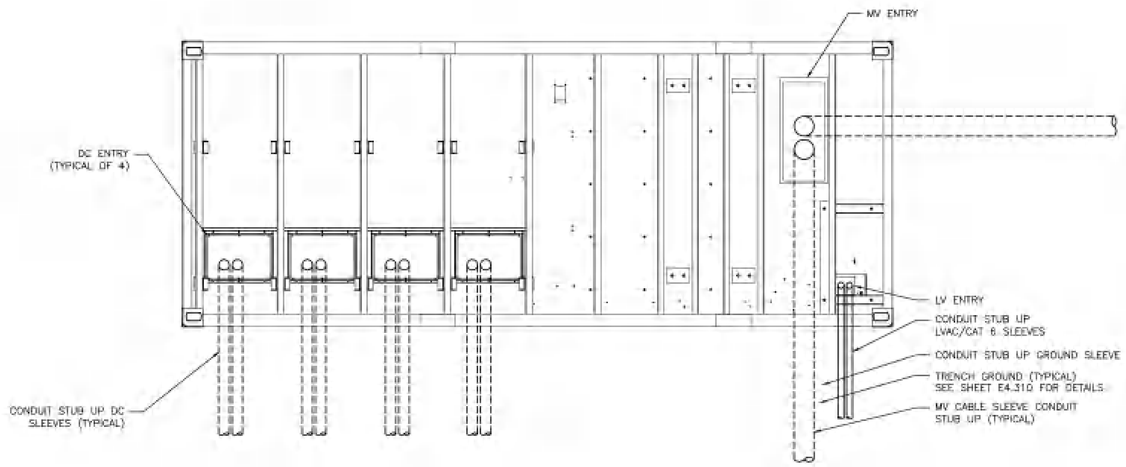


1 TYPICAL PCS ELEVATION
SCALE: NONE



2 TYPICAL AUXILIARY RACK ELEVATION
SCALE: NONE



3 TYPICAL PCS AREA CONDUIT PLAN
SCALE: NONE

CONDUIT STUB-UP SCHEDULE	
CABLE TYPE	STUB-UP CONDUIT SIZE
MV #1000MCM	8"
MV #500MCM OR SMALLER	6"
TWO DC OUTPUT CIRCUITS	4"
LVAC CIRCUITS	1"
FIBER OPTIC	1"
CAT5E/CAT6	1"

NOTES:
1. REFER TO STRUCTURAL PLANS FOR EQUIPMENT OPENING LOCATIONS AND DIMENSIONS.
2. REFER TO CIVIL DRAWINGS FOR ALL GRADING.
3. ONLY (2) DC OUTPUT CIRCUITS SHALL BE IN (1) 4" CONDUIT SLEEVE.
4. ONLY (1) MEDIUM VOLTAGE CIRCUIT SHALL BE IN (1) 6" OR 8" CONDUIT SLEEVE.
5. ALL CONDUIT SLEEVES SHALL BE FOAMED BEFORE CLOSE OF CONSTRUCTION USING APPROVED CONDUIT SEALANT. APPROVED CONDUIT SEALANT NOT TO EXCEED DEPTH OF 4" FROM THE CONDUIT OPENING.
6. FILL ALL CONDUIT WINDOWS WITH GRAVEL AFTER CONDUIT AND EQUIPMENT ARE INSTALLED (TYP).
7. NOT ALL PCS AREAS WILL HAVE THE SAME NUMBER OF CONDUIT SLEEVES.
8. ABOVE GRADE CONDUIT AND FITTINGS WILL BE SCH 80. ALL BELOW GROUND WILL BE SCH 40.
9. INSTALLATION OF THE CABLE WITHIN THE PCS SKID IS BY SUNGROW. CONTRACTOR SHALL INSTALL THE DC WIRING FROM THE ARRAY, THE AC WIRING FROM THE PCS, AND THE COMMUNICATIONS WIRING FROM THE AUXILIARY RACK.
10. CONTRACTOR SHALL CONFIRM CONDUIT ENTRY LOCATIONS AND EQUIPMENT DIMENSIONS PRIOR TO INSTALLATION.
11. SECONDARY CONTAINMENT SHALL BE INSTALLED AT ALL PCS LOCATIONS. SEE SUNGROW DRAWINGS.
12. CONDUITS SHALL BE STUBBED OUT 5' MINIMUM FROM THE PCS SKID FOOTPRINT.
13. MV CONDUCTORS SHALL NOT BE RAN IN PARALLEL WHERE CLOSER THAN SPECIFIED ON E4.310 LONGER THAN 10'.

NOT FOR CONSTRUCTION

DRAWING TITLE: EQUIPMENT AREA PLANS & ELEVATIONS

DRAWING #: E2.800

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BA	AR
2	08/22/2025	30% LAYOUT REVIEW	BA	AR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AR

PREPARED BY: LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PREPARED FOR: PURE POWER ENGINEERING
111 RIVER STREET HOBOKEN, NJ
WWW.PUREPOWER.COM

ENGINEER:

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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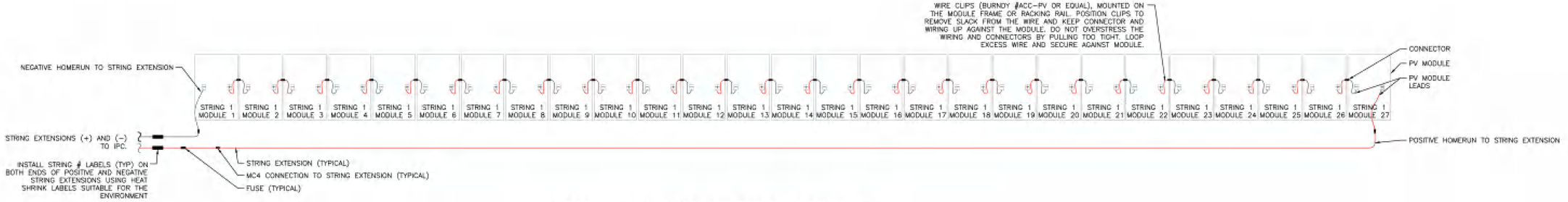
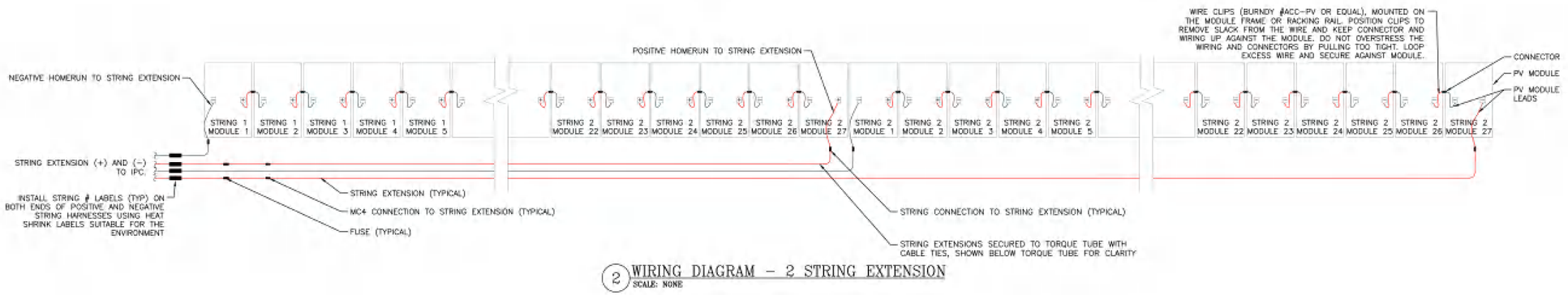
RULER IN INCHES

NOTES:
1. CONNECTING MORE THAN 27 MODULES IN SERIES MAY VIOLATE MANUFACTURER RATINGS AND COULD CAUSE INJURY OR EQUIPMENT DAMAGE.
2. ALL EXPOSED PV WIRE SHALL BE WRAPPED IN UL LISTED WIRE LOOM (OAE) WHEN TRANSITIONING FROM TRACKER TO MESSENGER SYSTEM.
3. MODULE LEAD CONDUCTORS SHALL BE SECURED TO MODULE FRAME WITH WIRE CLIPS.
4. SOURCE CIRCUIT CONDUCTORS SHALL BE TRANSITIONED TO THE WIRE MANAGEMENT SYSTEM SUCH THAT THERE IS NO TENSION THROUGHOUT THE TRACKER'S COMPLETE RANGE OF MOTION.
5. CONTRACTOR SHALL ENSURE THAT MODULE CONNECTION TYPES AND JUMPER CONNECTION TYPES ARE COMPATIBLE.
6. PV WIRE LEAVING TRACKER MUST NOT TOUCH OR COME CLOSE TO MESSENGER WIRE IN TRANSITION FROM TRACKER TO MESSENGER SYSTEM.
7. MODULE JUNCTION BOX LOCATIONS ARE SHOWN DIAGRAMMATICALLY FOR CLARITY.
8. MODULE HOMERUNS, DC HARNESS LEADS, AND PV MODULE LEADS SHOULD NOT SHADE REAR SIDE OF MODULE. WIRE MANAGEMENT SHALL BE DONE ALONG THE TORQUE TUBE IN A WAY TO MINIMIZE THE REAR SHADING ON BACK OF MODULES.
9. CONDUCTORS TRANSITIONING BETWEEN TABLES SHALL BE PROPERLY SECURED AND PROTECTED WITH UV RESISTANT SPLIT LOOM OR SPIRAL WRAP.
10. STRING HOME RUN CONDUCTORS SHALL USE HORIZONTAL PURLINS FOR CABLE MANAGEMENT AND SUPPORT. SECURE CONDUCTORS WITH UV RESISTANT CABLE TIES.



1 WIRING DIAGRAM – 1 STRING EXTENSION
SCALE: NONE



2 WIRING DIAGRAM – 2 STRING EXTENSION
SCALE: NONE

NO	DATE	REVISION DESCRIPTION	BY	CHK
3	09/05/2025	40% ELECTRICAL DESIGN	BA	AAR
2	09/23/2025	60% LAYOUT REVIEW	BA	AAR
1	11/1/2025	30% ELECTRICAL DESIGN	BA	EL

ENGINEER:
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111 RIVER STREET, HOBOKEN, NJ
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LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
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WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

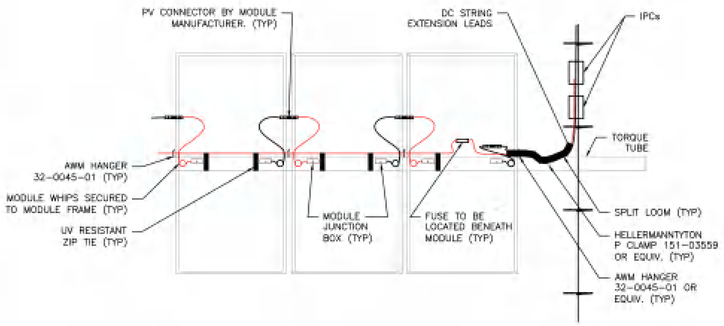
DRAWING TITLE:
STRING WIRING DETAILS

DRAWING #:
E2.900

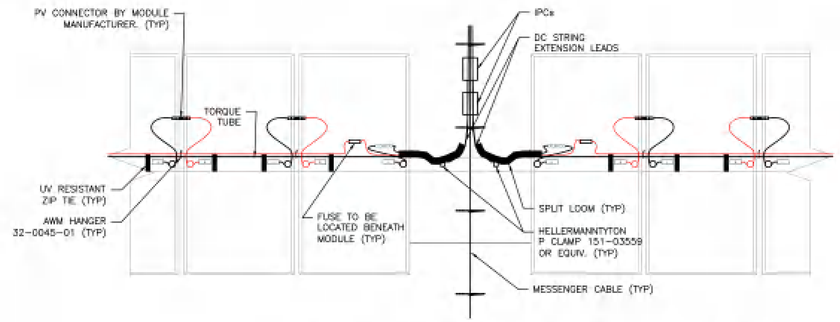
PLOT DATE: 11/6/2025 9:53 PM

RULER IN INCHES

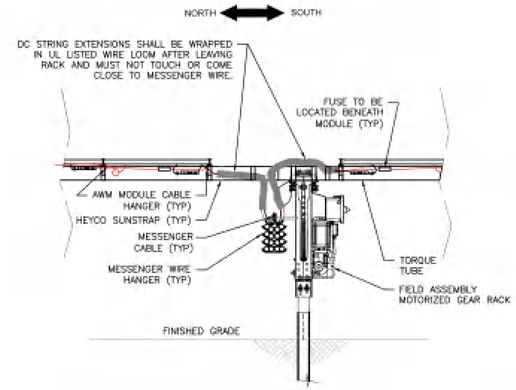
NOTES:
1. DC CONDUCTORS TO BE PROTECTED IN SPLIT LOOM WHEN CROSSING ATI BEARING ASSEMBLY.
2. AWM HANGER 32-0045-01 TO BE USED TO SECURE THE STRING EXTENSIONS TO THE ATI TORQUE TUBE BRACKETS.
3. OVERMOLD WHIPS TO BE SECURED DIRECTLY TO TRUNK CABLE OR MESSENGER SUPPORT HANGER TO AVOID DAMAGE. STRING EXTENSIONS WILL CONNECT TO WHIP ON THE MESSENGER BEFORE TRANSITIONING TO THE TORQUE TUBE. ENSURE WHIP/CONNECTIONS ARE NOT UNDER TENSION, STRAINED, OR BENT DURING NORMAL OPERATION. ENSURE WHIPS/CONNECTIONS DO NOT ABRADE AGAINST ANY SHARP OR ROUGH SURFACE, ESPECIALLY DURING WIND EVENTS.
4. SPLIT LOOM TO BE SECURED TO CONDUCTORS ON EITHER END WITH NYLON COATED, UV RESISTANT ZIP TIES.
5. MC4 CONNECTORS MUST BE CAPPED PRIOR TO CONNECTION TO STRING EXTENSION TO PREVENT CONTAMINATION OF CONNECTION POINTS.



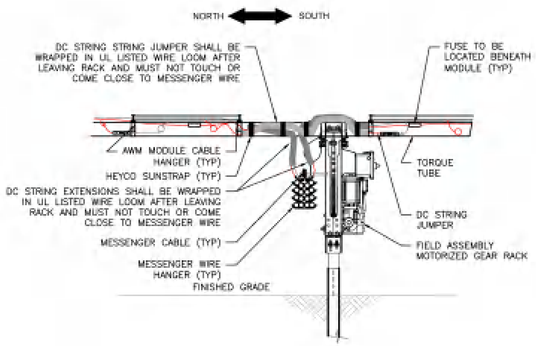
1 SINGLE STRING TRANSITION TO MESSENGER
SCALE: NONE



2 MULTIPLE STRING TRANSITION TO MESSENGER
SCALE: NONE



3 TRANSITION TO MESSENGER – ELEVATION DETAIL
SCALE: NONE



4 TRANSITION TO MESSENGER – STRINGING ACROSS MOTOR GAP – ELEVATION DETAIL
SCALE: NONE

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BH	AAR
2	09/23/2025	60% LAYOUT REVIEW	BH	AAR
3	10/17/2025	30% ELECTRICAL DESIGN	BH	EJL

PREPARED FOR: PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWERCO.COM

ENGINEER: LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

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PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

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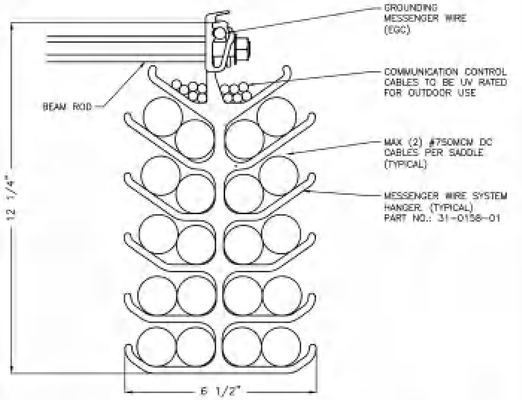
DRAWING TITLE: STRING WIRING DETAILS

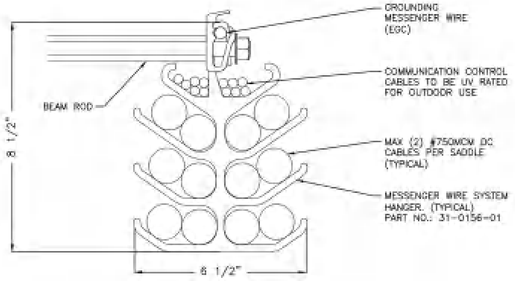
DRAWING #: E2.910

PLOT DATE: 10/6/2025 9:58 AM

RULER IN INCHES

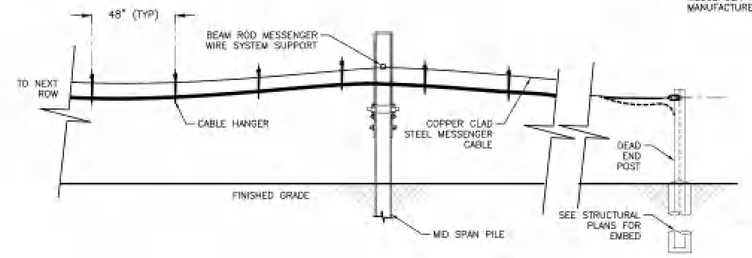


1 MESSENGER WIRE HANGER (10 DC CIRCUITS)
SCALE: NONE

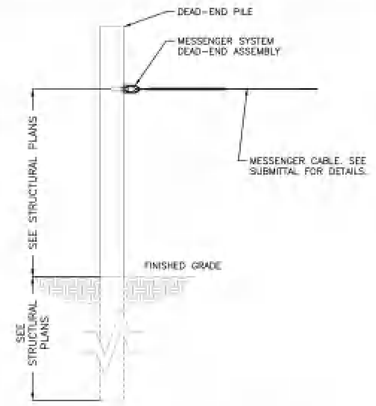


2 MESSENGER WIRE HANGER (6 DC CIRCUITS)
SCALE: NONE

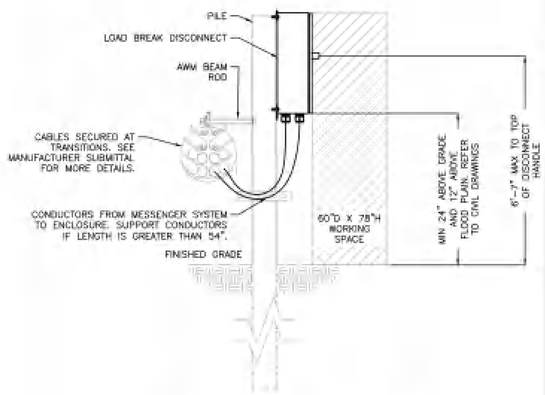
NOTES:
1. DETAILS ARE FOR ELECTRICAL COORDINATION ONLY. STRUCTURAL ENGINEER SHALL REVIEW AND APPROVE DETAILED DESIGN.
2. REFER TO MANUFACTURER SUBMITTAL AND INSTALL MANUAL FOR MORE DETAILS ON MESSENGER WIRE COMPONENTS.
3. CONTRACTOR TO VERIFY INSTALLATION OF MESSENGER HANGERS CONFORMS WITH MANUFACTURER GUIDELINES AND MANUALS.



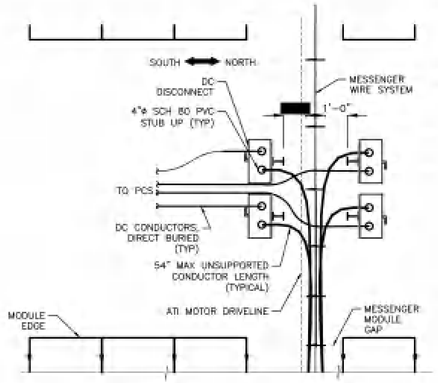
3 MESSENGER WIRE SYSTEM INSTALLATION – RACK SUPPORTS
SCALE: NONE



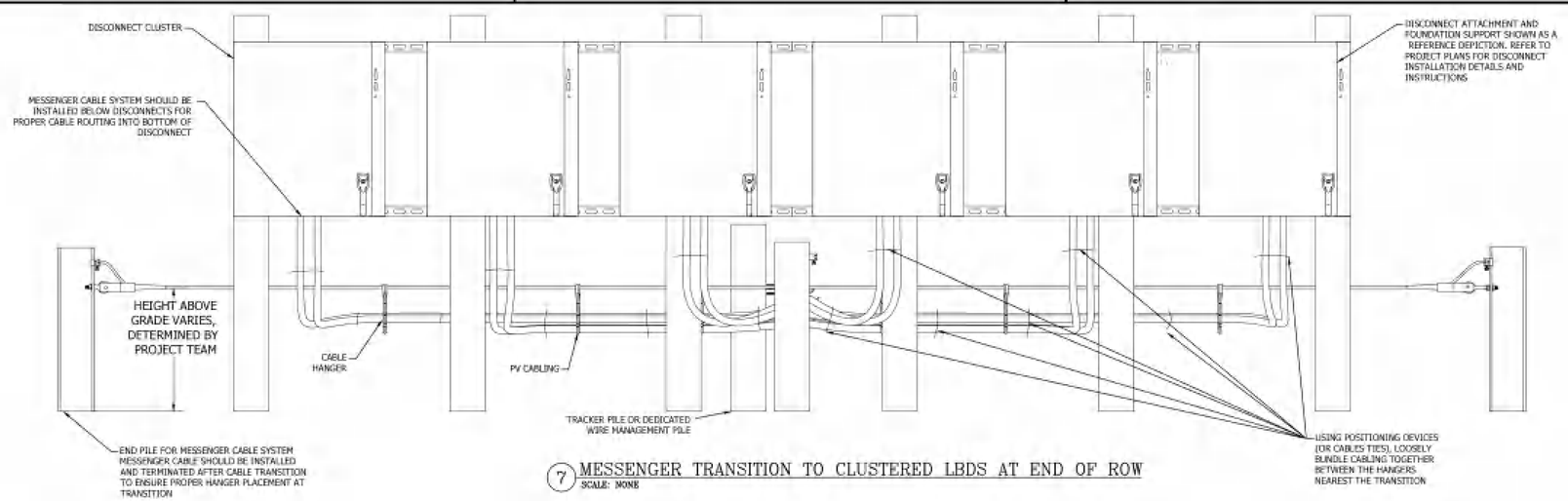
4 TYPICAL MESSENGER DEAD END
SCALE: NONE



5 TYPICAL LBD MOUNTING
SCALE: NONE



6 TYPICAL LBD TO MESSENGER TRANSITION
SCALE: NONE



7 MESSENGER TRANSITION TO CLUSTERED LBDS AT END OF ROW
SCALE: NONE

NO.	DATE	REVISION DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	09/23/2025	90% LAYOUT REVIEW	BA	AAR
3	10/17/2025	30% ELECTRICAL DESIGN	BA	EJL

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PREPARED FOR:
LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

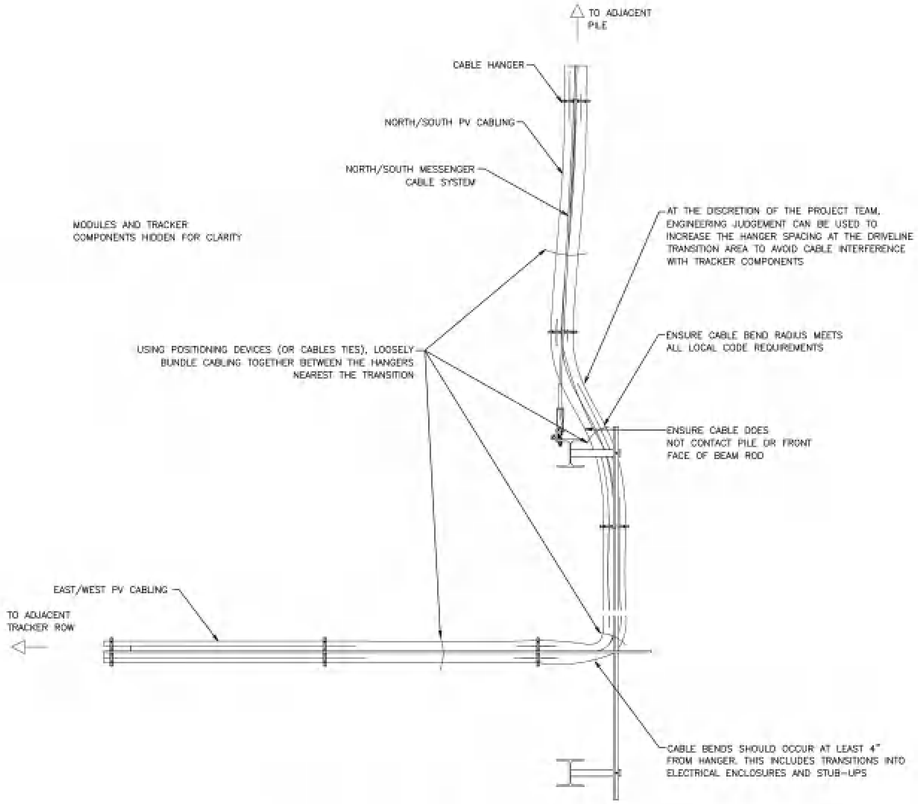
PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE:
STRING WIRING DETAILS

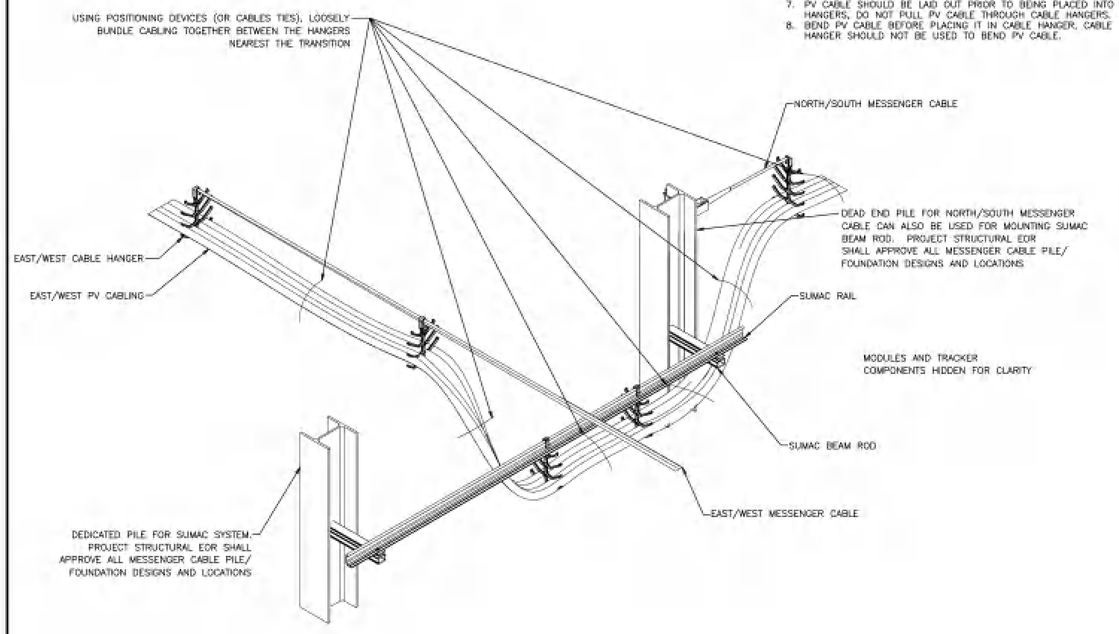
DRAWING #:
E2.920

RULER IN INCHES

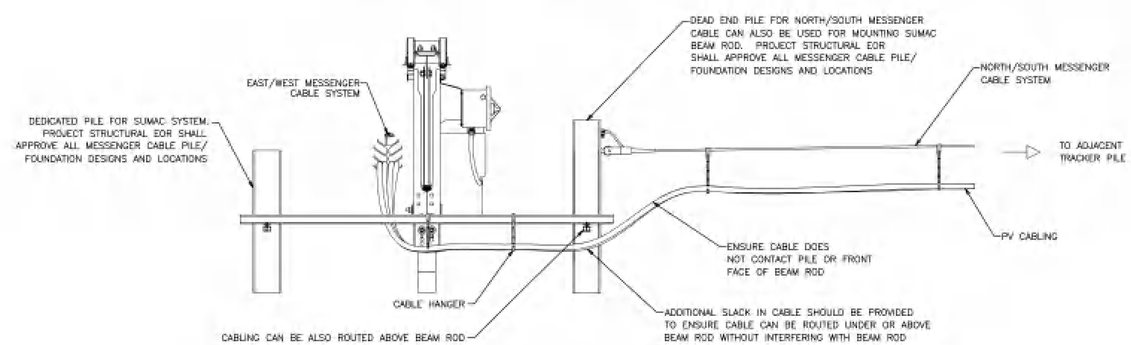


1 AWM SUMAC RAIL INSTALLATION – TOP VIEW
SCALE: NONE

SHEET NOTES:
1. ALL DRAWINGS ON THIS SHEET WERE SUPPLIED BY AWM. PLEASE CONSULT AWM FOR SYSTEM SPECIFIC QUESTIONS.
2. AT THE DISCRETION OF THE PROJECT TEAM, ADDITIONAL HANGERS CAN BE INSTALLED AT THE TRANSITIONS.
3. WHEN POSSIBLE, CABLE BENDS SHOULD OCCUR AT LEAST 4" FROM THE CABLE HANGER, ENSURING THAT CABLE IS STRAIGHT WHEN ROUTED NEAR A CABLE HANGER.
4. WHEN TRANSITIONING FROM EAST/WEST TO NORTH/SOUTH, WHEN POSSIBLE, ROUTE CABLES THROUGH SAME HANGER SADDLES ON ADJACENT HANGERS.
5. AT CABLE TRANSITIONS, ENSURE WIRE POSITIONING DEVICES OR CABLE TIES ARE USED BETWEEN CABLE HANGERS PRIOR TO AND AT THE TRANSITION POINT TO LOOSELY BUNDLE THE CABLING TOGETHER.
6. BEFORE BENDING PV CABLE AND PLACING CABLE IN HANGER, ENSURE THERE IS ENOUGH PV CABLE SLACK THAT CODE-COMPLIANT BEND RADIUS CAN BE MADE.
7. PV CABLE SHOULD BE LAID OUT PRIOR TO BEING PLACED INTO HANGERS. DO NOT PULL PV CABLE THROUGH CABLE HANGERS.
8. BEND PV CABLE BEFORE PLACING IT IN CABLE HANGER. CABLE HANGER SHOULD NOT BE USED TO BEND PV CABLE.



2 AWM SUMAC RAIL INSTALLATION – ISOMETRIC VIEW
SCALE: NONE



3 AWM SUMAC RAIL INSTALLATION – SIDE VIEW
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: STRING WIRING DETAILS

DRAWING # E2.930

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC 840 GESSNER ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

DESIGNED:

PURE POWER ENGINEERING 111 RYAN STREET, HOBOKEN, NJ WWW.PUREPOWER.COM

NO	DATE	REVISION DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

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2. PROVIDE MV JUNCTION BOX, EATON SEC3842JF6382MOG FOR 2-WAY, SEC3842JF6383MOG FOR 3-WAY, OR SEC3983JF6384MOG FOR 4-WAY BOXES (OR EQUAL) WITH 18" FIBERGLASS GROUND SLEEVE.
3. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.
4. ASSUMED MV CONDUCTOR SPOOL LENGTH OF 3000'. 2-WAY MV SECTIONALIZING CABINET REQUIRED EVERY 3,000' OF CONTINUOUS LENGTH.

SUBSTATION
BY OTHERS
SEE NOTE 1

52

100 200

SUBSTATION

ARRAY AREA

MVF-MVSC-101

MV SECTIONALIZER CABINET
MVSC-101
3-WAY
35KV, 150KV BIL
600A CONTINUOUS DEAD-BREAK TERMINATIONS
25KAIC
SEE NOTE 2

MVF-MVSC-102

MV SECTIONALIZER CABINET
MVSC-102
3-WAY
35KV, 150KV BIL
600A CONTINUOUS DEAD-BREAK TERMINATIONS
25KAIC
SEE NOTE 2

MVF-PCS-103

MVF-PCS-101

MVF-PCS-102

MVF-PCS-104

PCS-101

PCS-102

(3)SAs
30kV
24.4kV MCOV

PCS-103

PCS-104

(3)SAs
30kV
24.4kV MCOV

TYPICAL POWER CONVERSION STATION
(PCS-107)
UNLESS NOTED OTHERWISE

600A, 25kV,
DEAD BREAK
ELBOWS

SAs ONLY AT
LOCATIONS AS
SHOWN ON THE
ONELINE

(3)SAs
30kV
24.4kV MCOV

LOAD-BREAK

CLF

EXP

SOLAR TRANSFORMER 107
(XFMR-107)
4400KVA,
PAD MOUNTED,
FR-3 COOLED KNAN,
PRI: 34.5kV, 3ø, 3W,
SEC: 645V, 3ø, 3W,
Z=8%, X/R=8.83

NOTES:
1. STATIC SHIELD TO BE EXTERNALLY GROUNDED IN LV CABINET
2. Xo TO BE ISOLATED.

STATIC
SHIELD

TO AUXILIARY
TRANSFORMER,
SEE SHEET E3.800
FOR DETAILS

Xo G

BUS DUCT

SOLAR INVERTER 107
(INV-107)
SUNGROW SG4400UD-MV,
4400 KVA MAX APPARENT OUTPUT,
IEEE-1547 COMPLIANT,
1500 VDC INPUT,
90°C RATED DC TERMINALS,
DC NEGATIVELY GROUNDED,
DC FUSES ON POSITIVE POLES ONLY.

CB 1 CB 2 CB 3 CB 4

INV 1 INV 2 INV 3 INV 4

DC SW 1 DC SW 2 DC SW 3 DC SW 4

7 DC INPUTS

TO TYPICAL DC FEEDER CIRCUIT.

MVF-PCS-107

MVF-PCS-106

MVF-PCS-105

PCS-106

PCS-105

1 MV ONELINE DIAGRAMS – FEEDER 100
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE
MV ONELINE DIAGRAMS – FEEDER 100

DRAWING #
E3.010

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PREPARED FOR
LANGAN

PAGE SIZE
36" x 24"

PROJECT #
TX-PS-2701

ENGINEER
PURE POWER ENGINEERING
111 RYAN STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

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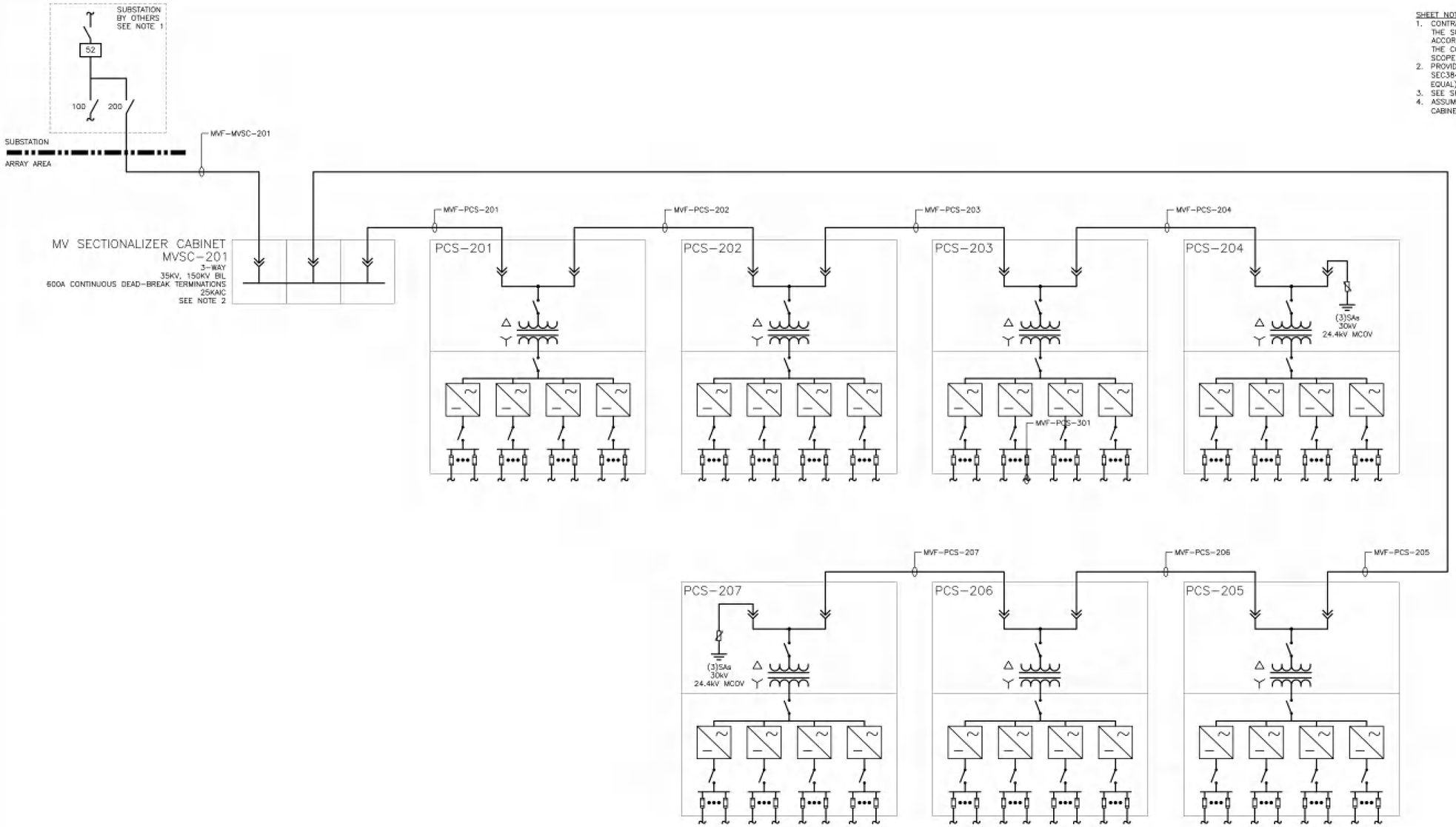
3. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.
4. ASSUMED MV CONDUCTOR SPOOL LENGTH OF 3000'. 2-WAY MV SECTIONALIZING CABINET REQUIRED EVERY 3,000' OF CONTINUOUS LENGTH.



1 MV ONELINE DIAGRAMS – FEEDER 200
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV ONELINE DIAGRAMS – FEEDER 200

DRAWING #: E3.020

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

ENGINEER: PURE POWER ENGINEERING, 111 RIVER STREET, HOBOKEN, NJ, WWW.PUREPOWERE.COM

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PROJECT #: TX-PS-2701

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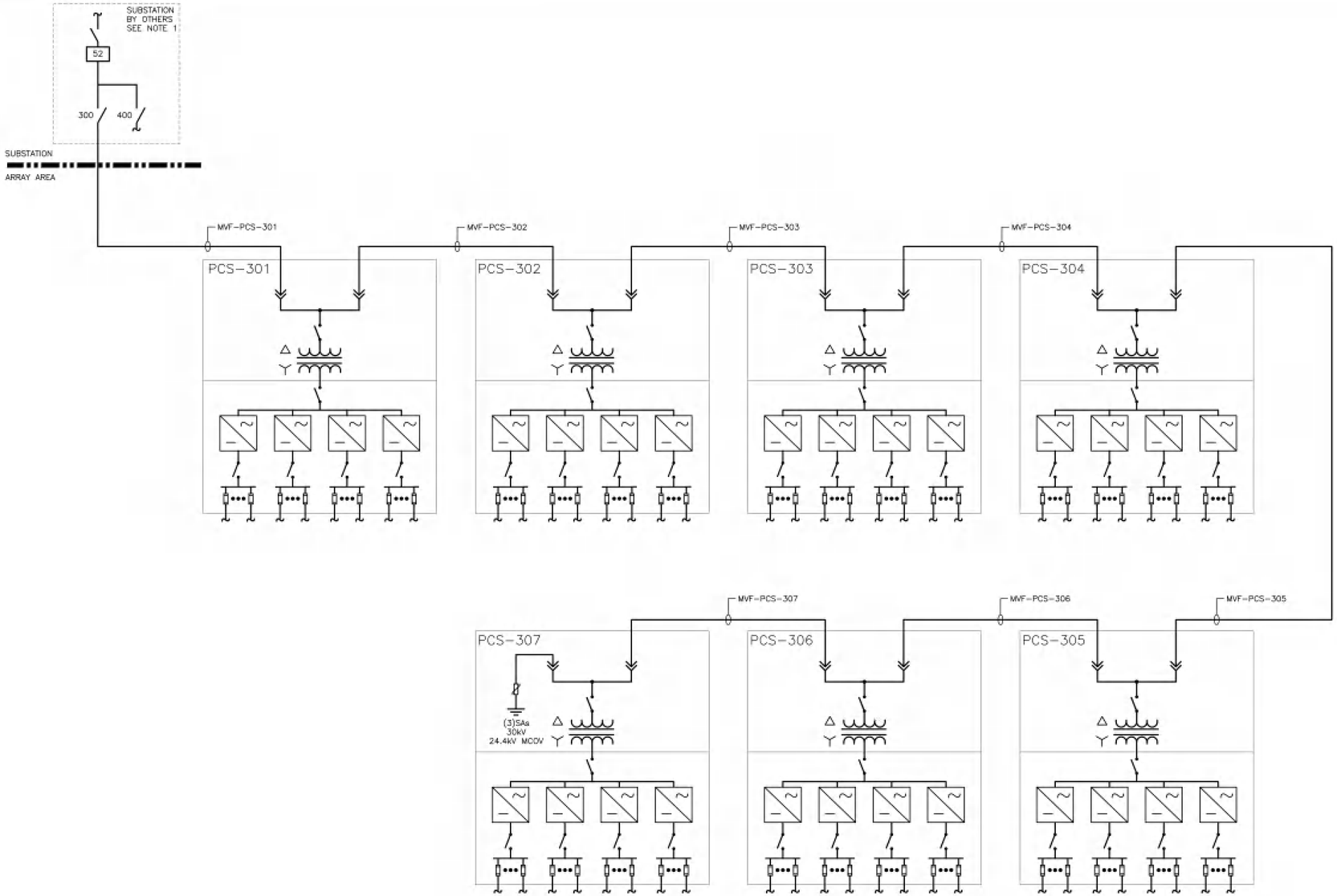

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3. SEE SHEETS E3.310 – E3.320 FOR FEEDER SPECIFICATIONS, SIZES, AND LENGTHS.
4. ASSUMED MV CONDUCTOR SPOOL LENGTH OF 3000'. 2-WAY MV SECTIONALIZING CABINET REQUIRED EVERY 3,000' OF CONTINUOUS LENGTH.

1 MV ONELINE DIAGRAMS – FEEDER 300
SCALE: NONE

NO	DATE	REVISION DESCRIPTION	BY	CHK
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PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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DRAWING TITLE:
MV ONELINE DIAGRAMS – FEEDER 300

DRAWING #:
E3.030

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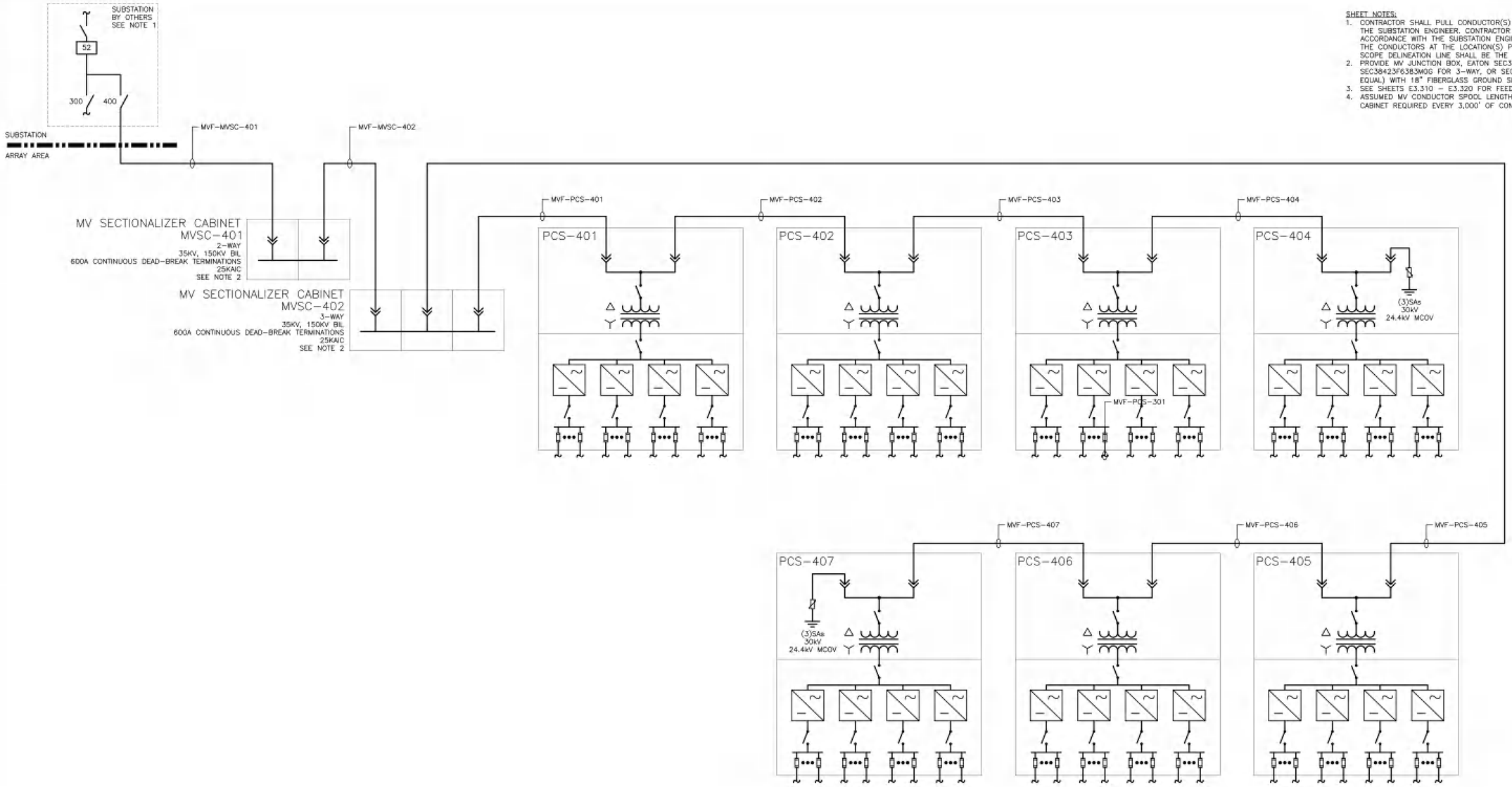

1 MV ONELINE DIAGRAMS – FEEDER 400
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV ONELINE DIAGRAMS – FEEDER 400

DRAWING #: E3.040

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

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PROJECT #: TX-PS-2701

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HOUSTON, TX 77024
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ENGINEER: PURE POWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
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REVISION DESCRIPTION	DATE	DWN	CHK
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60% LAYOUT REVIEW	09/23/2025	BA	AAR
30% ELECTRICAL DESIGN	11/11/2025	BA	AAR

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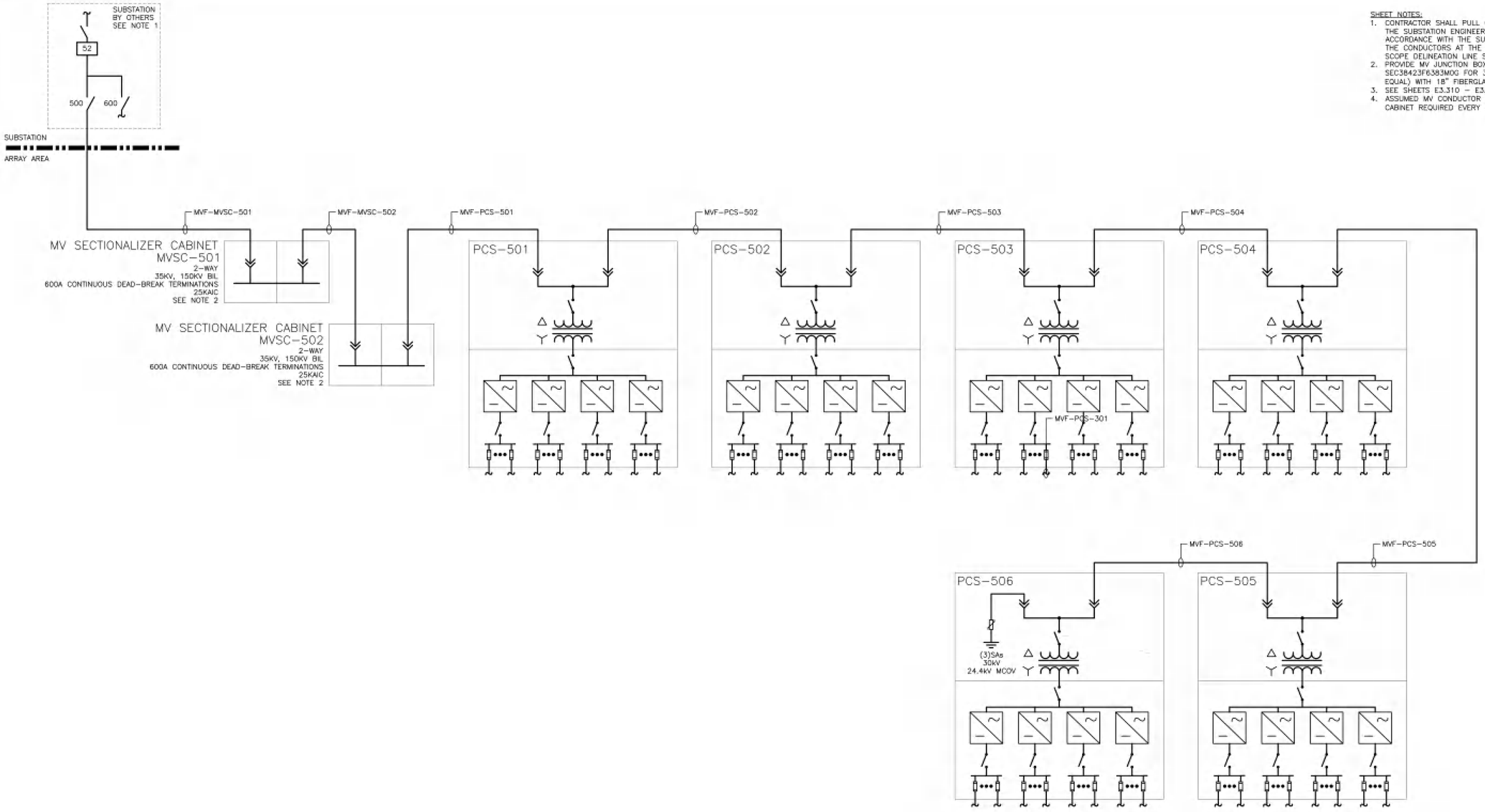

1 MV ONELINE DIAGRAMS – FEEDER 500
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV ONELINE DIAGRAMS – FEEDER 500

DRAWING #: E3.050

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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ENGINEER: PUREPOWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
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3	11/1/2025	30% ELECTRICAL DESIGN	BA	EL

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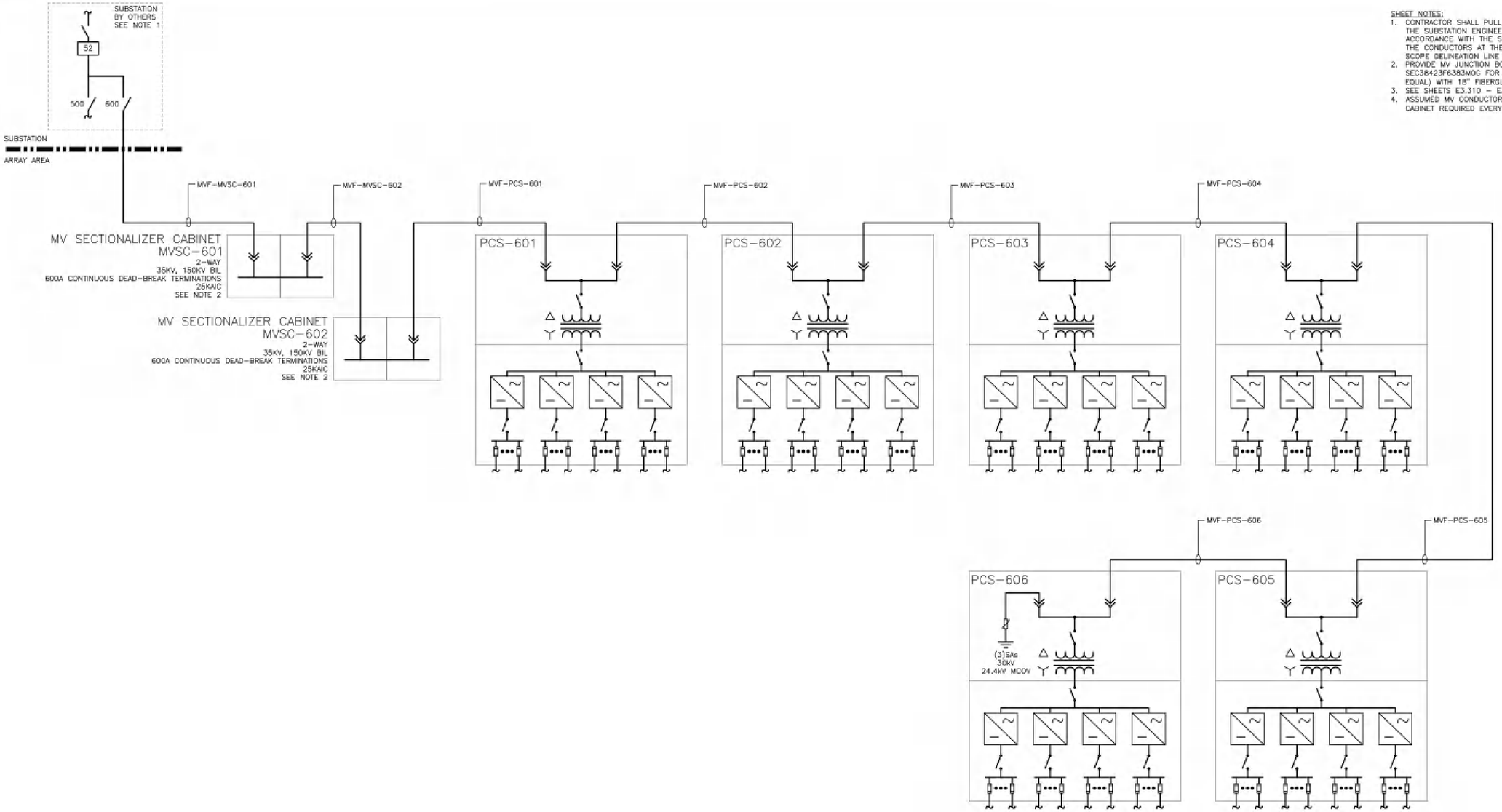
4. ASSUMED MV CONDUCTOR SPOOL LENGTH OF 3000'. 2-WAY MV SECTIONALIZING CABINET REQUIRED EVERY 3,000' OF CONTINUOUS LENGTH.



1 MV ONELINE DIAGRAMS – FEEDER 600
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV ONELINE DIAGRAMS – FEEDER 600

DRAWING # E3.060

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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NO	DATE	REVISION DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BM	AAR
2	06/20/2025	60% LAYOUT REVIEW	BM	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BM	AAR

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SHEET NOTES:
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TABLE 1: MV FEEDER CABLE & AMPACITY SCHEDULE				
CABLE SPEC: 35KV, AL, MV90 OR MV105, TRIPLE OR EPR, 100% INSULATION				
CABLE SIZE	STUDY CASE	CABLE AMPACITY [A]	MAX APPARENT POWER [MVA]	MAX # OF INVERTERS
#4/0	1	227	13.55	3
500MCM	1	361	21.54	4
	3A	349	20.88	4
	3B	344	20.55	4
	5	273	16.31	3
1000MCM	1	510	30.46	6
	2	482	28.82	6
	3A	485	28.99	6
	3B	474	28.29	6
	5	514	30.70	6
1250MCM	1	567	33.86	7
	2	536	32.03	7
	3A	537	32.09	7
	3B	541	32.35	7
REFER TO CABLE STUDY FOR ADDITIONAL INFORMATION.				

TABLE 2: MV FEEDER STUDY CASE SCHEDULE	
CASE	DESCRIPTION
1	SINGLE CABLE IN INDIVIDUAL TRENCH, DIRECT BURIED, 36" BELOW GRADE
2	SEVEN CIRCUITS IN PARALLEL - SUBSTATION COLLECTION. MULTI-FEEDER IN INDIVIDUAL TRENCHES, DIRECT BURIED, 36" BELOW GRADE, 96" ON CENTER SPACING, DIFFERENT FEEDER SIZES. INCLUDES A BESS FEEDER THAT RUNS PARALLEL TO THE PV CIRCUITS AND IS MODELED AS A 90°C THERMAL SOURCE.
3A	SIX CIRCUITS IN PARALLEL, 96" SEPARATION, MULTI-FEEDER IN INDIVIDUAL TRENCHES, DIRECT BURIED, 36" BELOW GRADE, DIFFERENT FEEDER SIZES.
3B	FOUR CIRCUITS IN PARALLEL 72" SEPARATION, MULTI-FEEDER IN INDIVIDUAL TRENCHES, DIRECT BURIED, 36" BELOW GRADE, DIFFERENT FEEDER SIZES. FOR THIS CASE THE ORDER OF THE CIRCUITS IN THE TRENCH MUST BE MAINTAINED AS SHOWN IN TABLE 3.5.3-2 TO OBTAIN THE REQUIRED AMPACITY.
5	NINE DC CIRCUITS IN TWO TRENCHES, FIVE IN ONE AND FOUR IN THE OTHER, 9" SEPARATION, DIRECT BURIED, 30" BELOW GRADE. PASSING UNDERNEATH THEM ARE TWO MV CABLES IN PARALLEL, 48" ON CENTER SEPARATION, MULTI-FEEDER IN INDIVIDUAL TRENCHES, DIRECT BURIED, 48" BELOW GRADE. SEE CYMCAP REPORT IN APPENDIX C FOR A DIAGRAM.
REFER TO CABLE AMPACITY STUDY FOR SIMULATION PARAMETERS	

MV FEEDER CALCULATIONS - FEEDER 100																
FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-MVSC-101	MVSC-101	SUBSTATION	UNDERGROUND DIRECT BURY	7	30,800	603	515.4	AL	1250MCM	2	536	96%	1/6	7#6 CCS	0.02%	0.02%
MVF-MVSC-102	MVSC-102	MVSC-101	UNDERGROUND DIRECT BURY	4	17,600	1,203	294.5	AL	500MCM	1	360.5	82%	1/3	7#6 CCS	0.08%	0.10%
MVF-PCS-101	PCS-101	MVSC-102	UNDERGROUND DIRECT BURY	2	8,800	483	147.3	AL	500MCM	1	360.5	41%	1/3	7#6 CCS	0.02%	0.12%
MVF-PCS-102	PCS-102	PCS-101	UNDERGROUND DIRECT BURY	1	4,400	1,202	73.6	AL	500MCM	1	360.5	20%	1/3	7#6 CCS	0.02%	0.14%
MVF-PCS-103	PCS-103	MVSC-102	UNDERGROUND DIRECT BURY	2	8,800	1,216	147.3	AL	500MCM	1	360.5	41%	1/3	7#6 CCS	0.04%	0.14%
MVF-PCS-104	PCS-104	PCS-103	UNDERGROUND DIRECT BURY	1	4,400	694	73.6	AL	500MCM	1	360.5	20%	1/3	7#6 CCS	0.01%	0.15%
MVF-PCS-105	PCS-105	MVSC-101	UNDERGROUND DIRECT BURY	3	13,200	1,228	220.9	AL	500MCM	3A	349.4	63%	1/3	7#6 CCS	0.06%	0.08%
MVF-PCS-106	PCS-106	PCS-105	UNDERGROUND DIRECT BURY	2	8,800	1,249	147.3	AL	500MCM	1	360.5	41%	1/3	7#6 CCS	0.04%	0.12%
MVF-PCS-107	PCS-107	PCS-106	UNDERGROUND DIRECT BURY	1	4,400	692	73.6	AL	500MCM	1	360.5	20%	1/3	7#6 CCS	0.01%	0.14%

MV FEEDER CALCULATIONS - FEEDER 200																
FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-MVSC-201	MVSC-201	SUBSTATION	UNDERGROUND DIRECT BURY	7	30,800	1,067	515.4	AL	1250MCM	2	536	96%	1/6	7#6 CCS	0.04%	0.04%
MVF-PCS-201	PCS-201	MVSC-201	UNDERGROUND DIRECT BURY	4	17,600	227	294.5	AL	500MCM	1	360.5	82%	1/3	7#6 CCS	0.02%	0.05%
MVF-PCS-202	PCS-202	PCS-201	UNDERGROUND DIRECT BURY	3	13,200	1,529	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.08%	0.13%
MVF-PCS-203	PCS-203	PCS-202	UNDERGROUND DIRECT BURY	2	8,800	2,396	147.3	AL	500MCM	3B	343.9	43%	1/3	7#6 CCS	0.08%	0.21%
MVF-PCS-204	PCS-204	PCS-203	UNDERGROUND DIRECT BURY	1	4,400	571	73.6	AL	500MCM	1	360.5	20%	1/3	7#6 CCS	0.01%	0.22%
MVF-PCS-205	PCS-205	MVSC-201	UNDERGROUND DIRECT BURY	3	13,200	762	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.04%	0.08%
MVF-PCS-206	PCS-206	PCS-205	UNDERGROUND DIRECT BURY	2	8,800	1,011	147.3	AL	500MCM	1	360.5	41%	1/3	7#6 CCS	0.03%	0.11%
MVF-PCS-207	PCS-207	PCS-206	UNDERGROUND DIRECT BURY	1	4,400	970	73.6	AL	500MCM	1	360.5	20%	1/3	7#6 CCS	0.02%	0.13%

1 MV SCHEDULES & CALCULATIONS
SCALE: NONE

NO	DATE	REVISION DESCRIPTION	PM	DWG CHK
	09/05/2025	40% ELECTRICAL DESIGN	BA	AAR EL
	09/23/2025	60% LAYOUT REVIEW	BA	AAR EL
	11/12/2025	90% ELECTRICAL DESIGN	BA	AH EL

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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE:
MV SCHEDULES & CALCULATIONS

DRAWING #:
E3.310

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MV FEEDER CALCULATIONS - FEEDER 300

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-PCS-301	PCS-301	SUBSTATION	UNDERGROUND DIRECT BURY	7	30,800	1,785	515.4	AL	1250MCM	2	536	96%	1/6	7#6 CCS	0.06%	0.06%
MVF-PCS-302	PCS-302	PCS-301	UNDERGROUND DIRECT BURY	6	26,400	1,266	441.8	AL	1000MCM	1	509.8	87%	1/6	7#6 CCS	0.07%	0.13%
MVF-PCS-303	PCS-303	PCS-302	UNDERGROUND DIRECT BURY	5	22,000	2,054	368.2	AL	1000MCM	1	509.8	72%	1/6	7#6 CCS	0.09%	0.23%
MVF-PCS-304	PCS-304	PCS-303	UNDERGROUND DIRECT BURY	4	17,600	226	294.5	AL	500MCM	1	360.5	82%	1/3	7#6 CCS	0.02%	0.24%
MVF-PCS-305	PCS-305	PCS-304	UNDERGROUND DIRECT BURY	3	13,200	736	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.04%	0.28%
MVF-PCS-306	PCS-306	PCS-305	UNDERGROUND DIRECT BURY	2	8,800	806	147.3	AL	500MCM	1	360.5	41%	1/3	7#6 CCS	0.03%	0.31%
MVF-PCS-307	PCS-307	PCS-306	UNDERGROUND DIRECT BURY	1	4,400	1,536	73.6	AL	#4/0	1	226.5	33%	2/3	7#6 CCS	0.06%	0.37%

MV FEEDER CALCULATIONS - FEEDER 400

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-MVSC-401	MVSC-401	SUBSTATION	UNDERGROUND DIRECT BURY	7	30,800	2,855	515.4	AL	1250MCM	2	536	96%	1/6	7#6 CCS	0.10%	0.10%
MVF-MVSC-402	MVSC-402	MVSC-401	UNDERGROUND DIRECT BURY	7	30,800	2,244	515.4	AL	1250MCM	38	541.4	95%	1/6	7#6 CCS	0.08%	0.18%
MVF-PCS-401	PCS-401	MVSC-402	UNDERGROUND DIRECT BURY	4	17,600	1,446	294.5	AL	500MCM	1	360.5	82%	1/3	7#6 CCS	0.10%	0.28%
MVF-PCS-402	PCS-402	PCS-401	UNDERGROUND DIRECT BURY	3	13,200	981	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.05%	0.33%
MVF-PCS-403	PCS-403	PCS-402	UNDERGROUND DIRECT BURY	2	8,800	750	147.3	AL	#4/0	1	226.5	65%	2/3	7#6 CCS	0.06%	0.39%
MVF-PCS-404	PCS-404	PCS-403	UNDERGROUND DIRECT BURY	1	4,400	607	73.6	AL	#4/0	1	226.5	33%	2/3	7#6 CCS	0.02%	0.41%
MVF-PCS-405	PCS-405	MVSC-402	UNDERGROUND DIRECT BURY	3	13,200	913	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.05%	0.23%
MVF-PCS-406	PCS-406	PCS-405	UNDERGROUND DIRECT BURY	2	8,800	857	147.3	AL	500MCM	5	273	54%	1/3	7#6 CCS	0.05%	0.26%
MVF-PCS-407	PCS-407	PCS-406	UNDERGROUND DIRECT BURY	1	4,400	869	73.6	AL	500MCM	1	360.5	20%	1/3	7#6 CCS	0.01%	0.27%

MV FEEDER CALCULATIONS - FEEDER 500

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-MVSC-501	MVSC-501	SUBSTATION	UNDERGROUND DIRECT BURY	6	26,400	2,866	441.8	AL	1000MCM	2	482.3	92%	1/6	7#6 CCS	0.16%	0.16%
MVF-MVSC-502	MVSC-502	MVSC-501	UNDERGROUND DIRECT BURY	6	26,400	2,363	441.8	AL	1000MCM	38	478.5	93%	1/6	7#6 CCS	0.13%	0.29%
MVF-PCS-501	PCS-501	MVSC-502	UNDERGROUND DIRECT BURY	6	26,400	2,902	441.8	AL	1000MCM	5	513.72	86%	1/6	7#6 CCS	0.16%	0.45%
MVF-PCS-502	PCS-502	PCS-501	UNDERGROUND DIRECT BURY	5	22,000	643	368.2	AL	1000MCM	1	509.8	72%	1/6	7#6 CCS	0.03%	0.48%
MVF-PCS-503	PCS-503	PCS-502	UNDERGROUND DIRECT BURY	4	17,600	655	294.5	AL	500MCM	1	360.5	82%	1/3	7#6 CCS	0.04%	0.52%
MVF-PCS-504	PCS-504	PCS-503	UNDERGROUND DIRECT BURY	3	13,200	574	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.03%	0.55%
MVF-PCS-505	PCS-505	PCS-504	UNDERGROUND DIRECT BURY	2	8,800	1,268	147.3	AL	#4/0	1	226.5	65%	2/3	7#6 CCS	0.09%	0.65%
MVF-PCS-506	PCS-506	PCS-505	UNDERGROUND DIRECT BURY	1	4,400	676	73.6	AL	#4/0	1	226.5	33%	2/3	7#6 CCS	0.02%	0.67%

MV FEEDER CALCULATIONS - FEEDER 600

FEEDER ID	EQUIPMENT SUPPLIED	FED FROM	CIRCUIT ROUTING	# OF INVERTERS	APPARENT POWER [KVA]	FEEDER LENGTH [FT]	FULL LOAD AMPS 'FLA' [A]	CONDUCTOR MATERIAL	CONDUCTOR SIZE	STUDY CASE	CONDUCTOR AMPACITY [A]	CONDUCTOR LOADING	CONCENTRIC NEUTRAL SIZE	GROUND SIZE	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
MVF-MVSC-601	MVSC-601	SUBSTATION	UNDERGROUND DIRECT BURY	6	26,400	2,865	441.8	AL	1000MCM	2	482.3	92%	1/6	7#6 CCS	0.16%	0.16%
MVF-MVSC-602	MVSC-602	MVSC-601	UNDERGROUND DIRECT BURY	6	26,400	2,635	441.8	AL	1000MCM	38	478.5	93%	1/6	7#6 CCS	0.15%	0.30%
MVF-PCS-601	PCS-601	MVSC-602	UNDERGROUND DIRECT BURY	6	26,400	1,169	441.8	AL	1000MCM	1	509.8	87%	1/6	7#6 CCS	0.06%	0.37%
MVF-PCS-602	PCS-602	PCS-601	UNDERGROUND DIRECT BURY	5	22,000	1,064	368.2	AL	1000MCM	1	509.8	72%	1/6	7#6 CCS	0.05%	0.42%
MVF-PCS-603	PCS-603	PCS-602	UNDERGROUND DIRECT BURY	4	17,600	817	294.5	AL	500MCM	1	360.5	82%	1/3	7#6 CCS	0.05%	0.47%
MVF-PCS-604	PCS-604	PCS-603	UNDERGROUND DIRECT BURY	3	13,200	1,425	220.9	AL	500MCM	1	360.5	61%	1/3	7#6 CCS	0.07%	0.54%
MVF-PCS-605	PCS-605	PCS-604	UNDERGROUND DIRECT BURY	2	8,800	1,417	147.3	AL	#4/0	1	226.5	65%	2/3	7#6 CCS	0.10%	0.65%
MVF-PCS-606	PCS-606	PCS-605	UNDERGROUND DIRECT BURY	1	4,400	857	73.6	AL	#4/0	1	226.5	33%	2/3	7#6 CCS	0.03%	0.68%

1 MV SCHEDULES & CALCULATIONS
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: MV SCHEDULES & CALCULATIONS

DRAWING #: E3.320

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	09/26/2025	60% LAYOUT REVIEW	BA	AAR
3	11/17/2025	30% ELECTRICAL DESIGN	BA	EL

ENGINEER:
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PREPARED FOR: LANGAN
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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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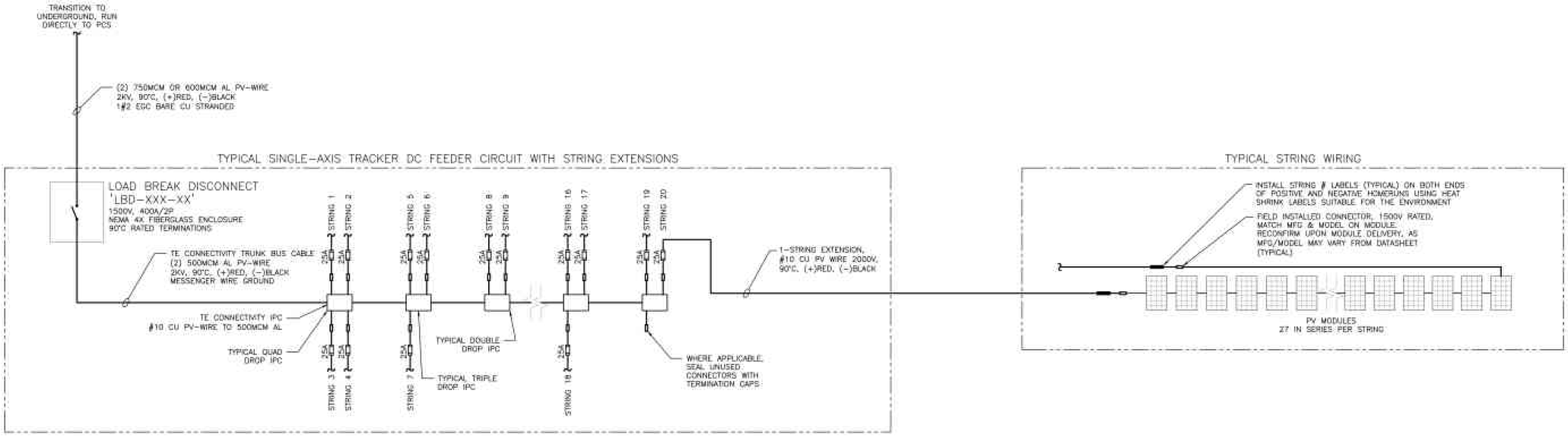
PLOTTED BY: ELIAS LOPEZ
FILE NAME: E3.320 MV SCHEDULES & CALCULATIONS.DWG
XREF: E3.320 MV SCHEDULES & CALCULATIONS.DWG
PLOT SCALE: 1.0000 = 1.0000
PLOT STYLE TABLE: LANGAN.CTB
LAYOUT: E3.320 MV SCHEDULES & CALCULATIONS

BAR IS 1" IN INCHES



1 TYPICAL DC ONE LINE DIAGRAM
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: TYPICAL DC ONE LINE DIAGRAM

DRAWING #: E3.400

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

ENGINEER: PUREPOWER ENGINEERING 111 MAIN STREET, HINGHAM, MA WWW.PUREPOWER.COM

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NO	DATE	REVISION DESCRIPTION	BY	CHKD	DAR
1	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR	EL
2	09/23/2025	SITE LAYOUT REVIEW	BA	AAR	EL
3	10/17/2025	90% ELECTRICAL DESIGN	BA	CH	EL

PLOT DATE: 10/17/2025 9:51 PM

RULER IN INCHES

MODULE SPECIFICATIONS	
MAKE/MODEL	LONGI SOLAR Hi-MO 5 / LRS-72HBD-545M
POWER [W]	545
ISC [A]	13.92
IMP [A]	13.04
VOC [V]	49.65
VMP [V]	41.80
β VOC [%/degC]	-0.265%
SITE CLIMATE CRITERIA	
ASHRAE HIGH [°C]	36.1
ASHRAE LOW [°C]	-9.9
STRING SPECIFICATIONS AT STC	
MODULES/STRING	27
POWER [W]	14715
STRING ISC [A]	13.92
STRING IMP [A]	13.04
STRING VMP [V]	1128.60

MODULE SPECIFICATIONS	
MAKE/MODEL	LONGI SOLAR Hi-MO 5 / LRS-72HBD-550M
POWER [W]	550
ISC [A]	13.99
IMP [A]	13.12
VOC [V]	49.80
VMP [V]	41.95
β VOC [%/degC]	-0.265%
SITE CLIMATE CRITERIA	
ASHRAE HIGH [°C]	36.1
ASHRAE LOW [°C]	-9.9
STRING SPECIFICATIONS AT STC	
MODULES/STRING	27
POWER [W]	14850
STRING ISC [A]	13.99
STRING IMP [A]	13.12
STRING VMP [V]	1132.65

MODULE SPECIFICATIONS	
MAKE/MODEL	LONGI SOLAR Hi-MO 5 / LRS-72HBD-555M
POWER [W]	555
ISC [A]	14.05
IMP [A]	13.19
VOC [V]	49.95
VMP [V]	42.10
β VOC [%/degC]	-0.265%
SITE CLIMATE CRITERIA	
ASHRAE HIGH [°C]	36.1
ASHRAE LOW [°C]	-9.9
STRING SPECIFICATIONS AT STC	
MODULES/STRING	27
POWER [W]	14985
STRING ISC [A]	14.05
STRING IMP [A]	13.19
STRING VMP [V]	1136.70

SAM SIMULATED VALUES	
MAXIMUM ISC CURRENT [A]	15.79
MAXIMUM IMP CURRENT [A]	14.83
MAXIMUM STRING VOC [V]	1492.45

THE STRING MAX CURRENT IS CALCULATED BY SYSTEM ADVISOR MODEL SIMULATION PROGRAM PROVIDED BY THE NATIONAL RENEWABLE ENERGY LABORATORY, REFERENCE SAND 2004-3535, PHOTOVOLTAIC ARRAY PERFORMANCE MODEL, AS ALLOWABLE BY NEC 690.8(A)(1)(2), THE CALCULATED CURRENT IS 89.9% OF THE VALUE USING 690.8(A)(1)(1).

NOTE: ALL DC CALCULATION AND SIMULATIONS ARE BASED ON THE 560W MODULE BIN CLASS; HOWEVER, 545W, 550W AND 555W MODULEs ARE INTENDED FOR SITE CONSTRUCTION.

DC STRING WIRING CALCULATION - [MESSENGER WIRE]	SINGLE STRING	TRUNK BUS (500MCM)
STRING IMAX SIMULATED [A]	15.79	15.79 x (20) STRINGS MAX
MAX CONTINUOUS FAULT CURRENT FROM PARALLEL SOURCES [AMPS]	15.79	47.37
1.25x MAX CONTINUOUS FAULT CURRENT [AMPS]	19.74	59.21
MAX # OF WIRES PER BUNDLE	8	2
DERATE FOR # OF CONDUCTORS IN A BUNDLE	0.7	1
MAX AMBIENT TEMPERATURE	36	36
TEMPERATURE DERATE	1.00	1.00
WIRE GAUGE	CU #10	AL 500MCM
90 DEG AMPACITY WITHOUT COU ADJUSTMENT [AMPS]	40	458
IS 90 DEG AMPACITY WITHOUT COU ADJUSTMENT >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(1)	YES. COMPLIES WITH 690.8(B)(1)
90DEG AMPACITY WITH COU ADJUSTMENT [AMPS]	34.3	458.0
IS 90DEG AMPACITY WITH COU ADJUSTMENT >= 1.0x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.8(B)(2)	YES. COMPLIES WITH 690.8(B)(2)
PV SOURCE CIRCUIT (SIMULATED) FUSE RATING [AMPS]	25	400
AVAILABLE FAULT CURRENT FROM ALL PARALLEL SOURCES [AMPS]	15.79	47.37
IS FUSE RATING >= 1.25x MAX CIRCUIT CURRENT?	YES. COMPLIES WITH 690.9(B)	YES. COMPLIES WITH 690.9(B)

NOTE: #10AWG CONDUCTOR SIZE IS NOT INCLUDED IN TABLE 310.15(B)(20), THEREFORE THE VALUE SHOWN IN THE TABLE ABOVE HAS BEEN DETERMINED VIA EXTRAPOLATION.

1 DC STRING CALCULATIONS
SCALE: NONE

NO.	DATE	REVISION DESCRIPTION	ENG	CHK
4	09/05/2025	60% ELECTRICAL DESIGN	BH	AAR
3	08/22/2025	60% LAYOUT REVIEW	BH	AAR
2	08/11/2025	30% ELECTRICAL DESIGN	BH	EL
1	04/11/2025		BH	EL

ENGINEER:

PURE POWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWERPE.COM

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PREPARED FOR:

LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE:
DC STRING CALCULATIONS

DRAWING #:
E3.500

PLOT DATE: 9/9/2025 9:11 PM

RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS					
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp (V)	STRING MAXIMUM CURRENT, SIMULATED Imp (A)	FEEDER MAXIMUM CURRENT (A)	FEEDER MAXIMUM CURRENT x 1.25 (A)	OCPD SIZE (A)	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) (A)	SEGMENT VOLTAGE DROP (%) (UNDERGROUND)	SEGMENT VOLTAGE DROP (%) (MESSENGER WIRE)	SEGMENT VOLTAGE DROP (%) (STRING TO FEEDER)	TOTAL VOLTAGE DROP (%)	TOTAL WATT LOSS (%)	WEIGHTED AVERAGE VOLTAGE DROP (%)
101-01	LBD-101-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	350	AL 500MCM	CU #2	386	262.4	0.5%	0.8%	0.4%	1.6%	1.6%	1.7%
101-02	LBD-101-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	350	AL 500MCM	CU #2	309	262.4	0.5%	0.6%	0.4%	1.4%	1.5%	
101-03	LBD-101-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	242	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
101-04	LBD-101-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
101-05	LBD-101-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
101-06	LBD-101-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	21	262.4	0.4%	0.1%	0.4%	0.9%	0.9%	
101-07	LBD-101-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	355	AL 500MCM	CU #2	149	262.4	0.5%	0.3%	0.4%	1.1%	1.2%	
101-08	LBD-101-08	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	355	AL 500MCM	CU #2	242	236.2	0.4%	0.4%	0.4%	1.2%	1.3%	
101-09	LBD-101-09	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	355	AL 500MCM	CU #2	345	236.2	0.4%	0.6%	0.4%	1.5%	1.5%	
101-10	LBD-101-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	355	AL 500MCM	CU #2	469	209.9	0.5%	0.7%	0.4%	1.6%	1.6%	
101-11	LBD-101-11	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	468	236.2	0.3%	0.8%	0.4%	1.5%	1.5%	
101-12	LBD-101-12	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	376	236.2	0.3%	0.7%	0.4%	1.3%	1.4%	
101-13	LBD-101-13	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	294	236.2	0.2%	0.5%	0.4%	1.1%	1.2%	
101-14	LBD-101-14	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	201	236.2	0.2%	0.4%	0.4%	1.0%	1.0%	
101-15	LBD-101-15	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	21	236.2	0.2%	0.0%	0.4%	0.7%	0.7%	
101-16	LBD-101-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.8%	0.9%	
101-17	LBD-101-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	134	262.4	0.3%	0.3%	0.4%	0.9%	1.0%	
101-18	LBD-101-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	220	AL 500MCM	CU #2	211	209.9	0.3%	0.5%	0.4%	1.0%	1.0%	
101-19	LBD-101-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	220	AL 500MCM	CU #2	278	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
101-20	LBD-101-20	13	1132.7	15.79	205.3	256.6	315	1	AL 600MCM	CU #2	220	AL 500MCM	CU #2	340	170.6	0.2%	0.4%	0.4%	1.0%	1.1%	
102-01	LBD-102-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	386	262.4	0.4%	0.8%	0.4%	1.5%	1.6%	1.4%
102-02	LBD-102-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
102-03	LBD-102-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	242	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
102-04	LBD-102-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
102-05	LBD-102-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
102-06	LBD-102-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	21	262.4	0.4%	0.0%	0.4%	0.8%	0.8%	
102-07	LBD-102-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.0%	1.1%	
102-08	LBD-102-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	227	262.4	0.4%	0.4%	0.4%	1.2%	1.2%	
102-09	LBD-102-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.5%	1.4%	
102-10	LBD-102-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	386	262.4	0.4%	0.8%	0.4%	1.6%	1.5%	
102-11	LBD-102-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	453	262.4	0.4%	0.9%	0.4%	1.8%	1.7%	
102-12	LBD-102-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	530	262.4	0.4%	1.0%	0.4%	1.8%	1.8%	
102-13	LBD-102-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	618	262.4	0.4%	1.2%	0.4%	2.0%	2.0%	
102-14	LBD-102-14	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	290	AL 500MCM	CU #2	959	157.4	0.3%	0.9%	0.4%	1.6%	1.5%	
102-15	LBD-102-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	180	AL 500MCM	CU #2	165	262.4	0.2%	0.3%	0.4%	1.0%	1.0%	
102-16	LBD-102-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	180	AL 500MCM	CU #2	345	262.4	0.2%	0.7%	0.4%	1.3%	1.3%	
102-17	LBD-102-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	185	AL 500MCM	CU #2	508	262.4	0.2%	1.0%	0.4%	1.6%	1.7%	
102-18	LBD-102-18	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	808	223.0	0.2%	1.0%	0.4%	1.6%	1.7%	
102-19	LBD-102-19	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	190	AL 500MCM	CU #2	845	198.8	0.2%	1.0%	0.4%	1.6%	1.7%	
103-01	LBD-103-01	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	592	260.8	0.3%	1.2%	0.4%	1.8%	1.9%	1.3%
103-02	LBD-103-02	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	345	260.8	0.3%	1.0%	0.4%	1.7%	1.7%	
103-03	LBD-103-03	16	1128.6	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	439	208.6	0.4%	0.7%	0.4%	1.3%	1.4%	
103-04	LBD-103-04	16	1128.6	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	210	AL 500MCM	CU #2	376	208.6	0.3%	0.6%	0.4%	1.2%	1.3%	
103-05	LBD-103-05	16	1128.6	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	314	208.6	0.3%	0.5%	0.4%	1.1%	1.2%	
103-06	LBD-103-06	18	1128.6	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	258	234.7	0.2%	0.5%	0.4%	1.1%	1.1%	
103-07	LBD-103-07	17	1128.6	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	165	221.7	0.2%	0.3%	0.4%	0.9%	0.9%	
103-08	LBD-103-08	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	618	260.8	0.4%	1.2%	0.4%	2.0%	2.0%	
103-09	LBD-103-09	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	189	AL 500MCM	CU #2	561	260.8	0.4%	1.1%	0.4%	1.8%	1.9%	
103-10	LBD-103-10	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	474	260.8	0.4%	0.9%	0.4%	1.7%	1.7%	
103-11	LBD-103-11	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	386	260.8	0.4%	0.8%	0.4%	1.6%	1.6%	
103-12	LBD-103-12	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	309	260.8	0.4%	0.6%	0.4%	1.5%	1.4%	
103-13	LBD-103-13	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	247	260.8	0.4%	0.5%	0.4%	1.2%	1.3%	
103-14	LBD-103-14	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	170	260.8	0.4%	0.3%	0.4%	1.1%	1.1%	
103-15	LBD-103-15	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	300	AL 500MCM	CU #2	82	260.8	0.4%	0.2%	0.4%	0.9%	1.0%	
103-16	LBD-103-16	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	300	AL 500MCM	CU #2	82	260.8	0.4%	0.2%	0.4%	0.9%	1.0%	
103-17	LBD-103-17	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	155	260.8	0.4%	0.3%	0.4%	1.1%	1.1%	
103-18	LBD-103-18	17	1128.6	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	232	221.7	0.3%	0.4%	0.4%	1.1%	1.1%	
103-19	LBD-103-19	14	1128.6	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	315	AL 500MCM	CU #2	308	182.6	0.4%	0.4%	0.4%	1.2%	1.3%	
103-20	LBD-103-20	14	1128.6	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	315	AL 500MCM	CU #2	422	182.6	0.4%	0.6%	0.4%	1.3%	1.4%	
104-01	LBD-104-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	85	AL 500MCM	CU #2	330	262.4	0.1%	0.6%	0.4%	1.1%	1.2%	1.3%
104-02	LBD-104-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	85	AL 500MCM	CU #2	170	262.4	0.1%	0.3%	0.4%	0.8%	0.9%	
104-03	LBD-104-03	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	570	AL 500MCM	CU #2	484	248.3	0.7%	0.9%	0.4%	2.0%	2.0%	
104-04	LBD-104-04	12	1132.7	15.79	189.4	236.8	250	1	AL 750MCM	CU #2	570	AL 500MCM	CU #2	361	223.0	0.6%	0.6%	0.4%	1.6%	1.7%	
104-05	LBD-104-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	570	AL 500MCM	CU #2	278	262.4	0.7%	0.5%	0.4%	1.7%	1.7%	
104-06	LBD-104-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	555	AL 500MCM	CU #2	211	262.4	0.7%	0.4%	0.4%	1.5%	1.6%	
104-07	LBD-104-07	15	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	555	AL 500MCM	CU #2	154	209.9	0.7%	0.2%	0.4%	1.3%	1.4%	
104-08	LBD-104-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	555	AL 500MCM	CU #2	67	209.9	0.7%	0.1%	0.4%	1.2%	1.3%	
104-09	LBD-104-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	555	AL 500MCM	CU #2	67	209.9	0.7%	0.1%	0.4%	1.2%	1.3%	
104-10	LBD-104-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1005	AL 500MCM	CU #2	460	262.4	1.3%	0.9%	0.4%	2.6%	2.7%	1.9%
104-11	LBD-104-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1005	AL 500MCM	CU #2	391	262.4	1.3%	0.8%	0.4%	2.5%	2.5%	
104-12	LBD-104-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1005	AL 500MCM	CU #2	309	262.4	1.3%	0.6%	0.4%	2.3%	2.3%	
104-13	LBD-104-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1020	AL 500MCM	CU #2	242	262.4	1.3%	0.5%	0.4%	2.2%	2.2%	
104-14	LBD-104-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1020	AL 500MCM	CU #2	165	262.4	1.3%	0.3%	0.4%	2.0%	2.1%	
104-15	LBD-104-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1020	AL 500MCM	CU #2	82	262.4	1.3%	0.2%	0.4%	1.9%	1.9%	
104-16	LBD-104-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1020	AL 500MCM	CU #2	82	262.4	1.3%	0.2%	0.4%	1.9%	1.9%	
104-17	LBD-104-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1705	AL 500MCM	CU #2	165	262.4	2.2%	0.3%	0.4%	2.9%	3.0%	
104-18	LBD-104-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1725	AL 500MCM	CU #2	88	262.4	2.2%	0.2%	0.4%	2.8%	2.9%	
104-19	LBD-104-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1725	AL 500MCM	CU #2	88	262.4	2.2%	0.2%	0.4%	2.8%	2.9%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.510

NO	DESCRIPTION	DATE	BY
1	50% ELECTRICAL DESIGN	04/12/2024	EL
2	90% ELECTRICAL DESIGN	06/26/2024	EL
3	IFB ELECTRICAL DESIGN	08/30/2024	EL

PREPARED FOR: PURE POWER ENGINEERING
1111 HIGH STREET, HUBBARD, TX 76648
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PREPARED BY: LANGAN, LLC
840 GESSNER ROAD, SUITE 1400
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SEAL AND SIGNATURE

ISSUE DATE: 10/25/2024
PROJECT #: 170151701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-FS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX, 76801

SCALE IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	OCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH [FT] (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH [FT] (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE (MPP)* [%]
105-01	LBD-105-01	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	940	AL 500MCM	CU #2	124	236.2	1.1%	0.2%	0.4%	3.7%	1.8%	1.5%
105-02	LBD-105-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	945	AL 500MCM	CU #2	196	262.4	1.2%	0.4%	0.4%	2.0%	2.0%	
105-03	LBD-105-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	945	AL 500MCM	CU #2	273	262.4	1.2%	0.5%	0.4%	2.2%	2.1%	
105-04	LBD-105-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	960	AL 500MCM	CU #2	350	262.4	1.2%	0.7%	0.4%	2.3%	2.4%	
105-05	LBD-105-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	955	AL 500MCM	CU #2	422	262.4	1.2%	0.8%	0.4%	2.5%	2.5%	
105-06	LBD-105-06	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	124	236.2	0.3%	0.2%	0.4%	0.9%	1.0%	
105-07	LBD-105-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	196	262.4	0.4%	0.4%	0.4%	1.1%	1.2%	
105-08	LBD-105-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	273	262.4	0.4%	0.5%	0.4%	1.3%	1.4%	
105-09	LBD-105-09	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	300	AL 500MCM	CU #2	371	236.2	0.4%	0.7%	0.4%	1.4%	1.4%	
105-10	LBD-105-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	300	AL 500MCM	CU #2	494	209.9	0.4%	0.8%	0.4%	1.5%	1.6%	1.5%
105-11	LBD-105-11	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	355	249.3	0.4%	0.7%	0.4%	1.5%	1.5%	
105-12	LBD-105-12	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	242	223.0	0.4%	0.4%	0.4%	1.1%	1.2%	
105-13	LBD-105-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
105-14	LBD-105-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	82	262.4	0.4%	0.3%	0.4%	1.0%	1.0%	
105-15	LBD-105-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
105-16	LBD-105-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
105-17	LBD-105-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	227	262.4	0.4%	0.4%	0.4%	1.3%	1.3%	
105-18	LBD-105-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
105-19	LBD-105-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	386	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
106-01	LBD-106-01	18	1128.6	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	300	AL 500MCM	CU #2	134	234.7	0.4%	0.2%	0.4%	1.0%	1.0%	
106-02	LBD-106-02	19	1128.6	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	211	247.8	0.4%	0.4%	0.4%	1.2%	1.2%	
106-03	LBD-106-03	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	288	260.8	0.4%	0.6%	0.4%	1.3%	1.4%	
106-04	LBD-106-04	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	366	260.8	0.4%	0.7%	0.4%	1.5%	1.6%	
106-05	LBD-106-05	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	443	260.8	0.4%	0.9%	0.4%	1.7%	1.7%	
106-06	LBD-106-06	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	570	260.8	0.4%	1.0%	0.4%	1.8%	1.9%	
106-07	LBD-106-07	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	597	260.8	0.4%	1.2%	0.4%	2.0%	2.0%	
106-08	LBD-106-08	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	670	260.8	0.4%	1.3%	0.4%	2.1%	2.2%	
106-09	LBD-106-09	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	330	AL 500MCM	CU #2	747	260.8	0.4%	1.5%	0.4%	2.3%	2.3%	
106-10	LBD-106-10	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	455	AL 500MCM	CU #2	82	260.8	0.6%	0.2%	0.4%	1.1%	1.2%	1.6%
106-11	LBD-106-11	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	455	AL 500MCM	CU #2	21	260.8	0.6%	0.0%	0.4%	1.0%	1.1%	
106-12	LBD-106-12	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	455	AL 500MCM	CU #2	165	260.8	0.6%	0.3%	0.4%	1.3%	1.3%	
106-13	LBD-106-13	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	455	AL 500MCM	CU #2	242	260.8	0.6%	0.5%	0.4%	1.4%	1.5%	
106-14	LBD-106-14	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	470	AL 500MCM	CU #2	309	260.8	0.6%	0.6%	0.4%	1.6%	1.7%	
106-15	LBD-106-15	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	470	AL 500MCM	CU #2	386	260.8	0.6%	0.8%	0.4%	1.7%	1.8%	
106-16	LBD-106-16	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	470	AL 500MCM	CU #2	474	260.8	0.6%	0.9%	0.4%	1.9%	2.0%	
106-17	LBD-106-17	18	1128.6	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	470	AL 500MCM	CU #2	551	234.7	0.6%	1.0%	0.4%	1.9%	2.0%	
106-18	LBD-106-18	18	1128.6	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	485	AL 500MCM	CU #2	633	234.7	0.6%	1.1%	0.4%	2.1%	2.1%	
106-19	LBD-106-19	15	1128.6	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	485	AL 500MCM	CU #2	742	195.6	0.6%	1.1%	0.4%	2.1%	2.1%	
107-01	LBD-107-01	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	855	AL 500MCM	CU #2	134	223.0	0.9%	0.2%	0.4%	1.6%	1.6%	
107-02	LBD-107-02	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	860	AL 500MCM	CU #2	211	223.0	1.0%	0.4%	0.4%	1.7%	1.7%	
107-03	LBD-107-03	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	860	AL 500MCM	CU #2	278	209.9	1.1%	0.4%	0.4%	1.9%	2.0%	
107-04	LBD-107-04	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	865	AL 500MCM	CU #2	390	209.9	1.1%	0.5%	0.4%	2.0%	2.1%	
107-05	LBD-107-05	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	170	249.3	0.3%	0.3%	0.4%	1.0%	1.0%	
107-06	LBD-107-06	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	242	223.0	0.2%	0.4%	0.4%	1.0%	1.1%	
107-07	LBD-107-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	319	262.4	0.3%	0.6%	0.4%	1.3%	1.4%	
107-08	LBD-107-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	397	262.4	0.3%	0.8%	0.4%	1.5%	1.5%	
107-09	LBD-107-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	235	AL 500MCM	CU #2	474	262.4	0.3%	0.9%	0.4%	1.6%	1.7%	
107-10	LBD-107-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	235	AL 500MCM	CU #2	551	262.4	0.3%	1.1%	0.4%	1.8%	1.8%	
107-11	LBD-107-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	240	AL 500MCM	CU #2	628	262.4	0.3%	1.2%	0.4%	1.9%	2.0%	
107-12	LBD-107-12	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	690	209.9	0.3%	1.1%	0.4%	1.8%	1.8%	
107-13	LBD-107-13	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	747	209.9	0.3%	1.2%	0.4%	1.9%	1.9%	
107-14	LBD-107-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	780	AL 500MCM	CU #2	82	262.4	1.0%	0.2%	0.4%	1.6%	1.6%	
107-15	LBD-107-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	780	AL 500MCM	CU #2	82	262.4	1.0%	0.2%	0.4%	1.6%	1.6%	
107-16	LBD-107-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	780	AL 500MCM	CU #2	165	262.4	1.0%	0.3%	0.4%	1.7%	1.8%	
107-17	LBD-107-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	780	AL 500MCM	CU #2	242	262.4	1.0%	0.5%	0.4%	1.9%	1.9%	
107-18	LBD-107-18	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	795	AL 500MCM	CU #2	318	249.3	1.0%	0.6%	0.4%	2.0%	2.0%	
107-19	LBD-107-19	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	795	AL 500MCM	CU #2	422	236.2	0.9%	0.7%	0.4%	2.1%	2.1%	
107-20	LBD-107-20	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	795	AL 500MCM	CU #2	500	196.8	1.0%	0.7%	0.4%	2.1%	2.1%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.520

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN
LANGAN, LLC
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PREPARED BY: PURE POWER ENGINEERING
1111 RIVER STREET, HUDSON, WI
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NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2025	60% DESIGN REVIEW	BH	AR
2	10/23/2025	90% DESIGN REVIEW	BH	AR
3	11/17/2025	100% DESIGN REVIEW	BH	EL

SIZE: 24" x 36" | PROJECT #: TX-PS-2701

RULER IN INCHES

PLOT DATE: 11/19/2025 9:41:11 AM
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SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

DIVERSE CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp (V)	STRING MAXIMUM CURRENT, SIMULATED Isc (A)	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT x 1.25 [A]	DEVICE SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH [FT] (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH [FT] (MESSENGER WIRE)	FEEDER OPERATING CURRENT STRING Vmp [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP (%)
201-01	LBD-201-01	16	1136.7	15.75	252.6	315.8	150	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	575	211.0	0.8%	0.8%	0.4%	1.8%	1.7%	1.7%
201-02	LBD-201-02	16	1136.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	397	211.0	0.4%	0.6%	0.4%	1.4%	1.6%	
201-03	LBD-201-03	16	1136.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	268	211.0	0.4%	0.4%	0.4%	1.2%	1.3%	
201-04	LBD-201-04	16	1136.7	15.75	252.6	315.8	150	1	AL 600MCM	CU #2	320	AL 500MCM	CU #1	139	211.0	0.4%	0.3%	0.4%	1.0%	1.1%	
201-05	LBD-201-05	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	778	263.8	0.4%	1.5%	0.4%	2.3%	2.4%	
201-06	LBD-201-06	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	695	263.8	0.4%	1.4%	0.4%	2.2%	2.3%	
201-07	LBD-201-07	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	615	263.8	0.4%	1.2%	0.4%	2.0%	2.0%	
201-08	LBD-201-08	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	530	263.8	0.4%	1.0%	0.4%	1.8%	1.9%	
201-09	LBD-201-09	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #1	448	263.8	0.4%	0.4%	0.4%	1.2%	1.7%	
201-10	LBD-201-10	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	361	263.8	0.4%	0.7%	0.4%	1.5%	1.6%	
201-11	LBD-201-11	16	1136.7	15.75	252.6	315.8	150	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	278	211.0	0.8%	0.4%	0.4%	1.7%	1.6%	1.7%
201-12	LBD-201-12	16	1136.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	330	AL 500MCM	CU #2	221	211.0	0.4%	0.3%	0.4%	1.1%	1.2%	
201-13	LBD-201-13	16	1136.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	330	AL 500MCM	CU #2	139	211.0	0.4%	0.2%	0.4%	1.0%	1.1%	
201-14	LBD-201-14	16	1136.7	15.75	252.6	315.8	150	1	AL 600MCM	CU #2	335	AL 500MCM	CU #1	72	211.0	0.4%	0.1%	0.4%	0.9%	1.0%	
201-15	LBD-201-15	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	930	AL 500MCM	CU #2	386	263.8	1.2%	0.8%	0.4%	2.3%	2.4%	
201-16	LBD-201-16	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	970	AL 500MCM	CU #2	309	263.8	1.2%	0.6%	0.4%	2.2%	2.2%	
201-17	LBD-201-17	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	905	AL 500MCM	CU #2	242	263.8	1.2%	0.3%	0.4%	2.0%	2.1%	
201-18	LBD-201-18	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	905	AL 500MCM	CU #2	155	263.8	1.2%	0.2%	0.4%	1.8%	1.9%	
201-19	LBD-201-19	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	905	AL 500MCM	CU #1	82	263.8	1.2%	0.1%	0.4%	1.7%	1.8%	
201-20	LBD-201-20	16	1136.7	15.75	252.6	315.8	150	1	AL 600MCM	CU #2	905	AL 500MCM	CU #1	67	211.0	1.2%	0.1%	0.4%	1.7%	1.7%	
202-01	LBD-202-01	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	541	263.8	0.3%	1.1%	0.4%	1.8%	1.8%	
202-02	LBD-202-02	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	464	263.8	0.3%	0.9%	0.4%	1.6%	1.6%	
202-03	LBD-202-03	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	386	263.8	0.3%	0.8%	0.4%	1.4%	1.5%	
202-04	LBD-202-04	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	309	263.8	0.3%	0.6%	0.4%	1.3%	1.3%	
202-05	LBD-202-05	28	1136.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #1	232	263.8	0.3%	0.5%	0.4%	1.3%	1.3%	
202-06	LBD-202-06	16	1136.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	160	211.0	0.3%	0.3%	0.4%	0.9%	1.0%	
202-07	LBD-202-07	17	1136.7	15.79	268.4	335.5	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	98	223.1	0.2%	0.1%	0.4%	0.7%	0.8%	
202-08	LBD-202-08	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	210	AL 500MCM	CU #2	82	211.0	0.4%	0.1%	0.4%	0.9%	0.9%	
202-09	LBD-202-09	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	139	211.0	0.4%	0.2%	0.4%	1.0%	1.0%	
202-10	LBD-202-10	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #1	201	211.0	0.4%	0.3%	0.4%	1.1%	1.1%	
202-11	LBD-202-11	17	1136.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	250	AL 500MCM	CU #2	448	224.2	0.3%	0.7%	0.4%	1.4%	1.5%	1.3%
202-12	LBD-202-12	28	1136.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	361	263.8	0.3%	0.7%	0.4%	1.4%	1.5%	
202-13	LBD-202-13	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	255	AL 500MCM	CU #2	278	211.0	0.3%	0.4%	0.4%	1.2%	1.2%	
202-14	LBD-202-14	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	260	AL 500MCM	CU #2	211	211.0	0.3%	0.3%	0.4%	1.1%	1.1%	
202-15	LBD-202-15	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	265	AL 500MCM	CU #1	144	211.0	0.4%	0.2%	0.4%	1.0%	1.0%	
202-16	LBD-202-16	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	265	AL 500MCM	CU #2	77	211.0	0.3%	0.1%	0.4%	0.8%	0.9%	
202-17	LBD-202-17	28	1136.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	110	AL 500MCM	CU #2	93	263.8	0.4%	0.2%	0.4%	1.0%	1.0%	
202-18	LBD-202-18	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	305	AL 500MCM	CU #2	160	211.0	0.4%	0.3%	0.4%	1.0%	1.1%	
202-19	LBD-202-19	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	305	AL 500MCM	CU #2	227	211.0	0.4%	0.4%	0.4%	1.2%	1.2%	
202-20	LBD-202-20	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	300	AL 500MCM	CU #1	294	211.0	0.4%	0.5%	0.4%	1.3%	1.3%	
202-21	LBD-202-21	16	1136.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	295	AL 500MCM	CU #1	361	211.0	0.4%	0.6%	0.4%	1.4%	1.4%	
203-01	LBD-203-01	28	1128.6	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	300	AL 500MCM	CU #2	108	260.8	0.4%	0.2%	0.4%	1.0%	1.0%	
203-02	LBD-203-02	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	300	AL 500MCM	CU #2	180	260.8	0.4%	0.4%	0.4%	1.2%	1.2%	
203-03	LBD-203-03	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	258	260.8	0.4%	0.5%	0.4%	1.3%	1.3%	
203-04	LBD-203-04	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	335	260.8	0.4%	0.7%	0.4%	1.4%	1.5%	
203-05	LBD-203-05	16	1128.6	15.79	252.6	315.8	150	1	AL 600MCM	CU #2	310	AL 500MCM	CU #1	167	208.6	0.4%	0.4%	0.4%	1.4%	1.5%	
203-06	LBD-203-06	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	165	AL 500MCM	CU #2	386	260.8	0.3%	0.8%	0.4%	1.4%	1.4%	
203-07	LBD-203-07	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	309	260.8	0.3%	0.8%	0.4%	1.4%	1.5%	
203-08	LBD-203-08	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	232	260.8	0.2%	0.5%	0.4%	1.1%	1.1%	
203-09	LBD-203-09	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	155	260.8	0.2%	0.3%	0.4%	1.0%	1.0%	
203-10	LBD-203-10	18	1128.6	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #1	88	234.7	0.1%	0.1%	0.4%	0.8%	0.8%	
203-11	LBD-203-11	19	1128.6	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	88	247.8	0.1%	0.2%	0.4%	0.8%	0.8%	1.1%
203-12	LBD-203-12	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	185	260.8	0.2%	0.4%	0.4%	1.0%	1.0%	
203-13	LBD-203-13	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	232	260.8	0.3%	0.5%	0.4%	1.1%	1.2%	
203-14	LBD-203-14	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	309	260.8	0.3%	0.6%	0.4%	1.3%	1.3%	
203-15	LBD-203-15	16	1128.6	15.79	252.6	315.8	150	1	AL 600MCM	CU #2	205	AL 500MCM	CU #1	376	208.6	0.3%	0.6%	0.4%	1.2%	1.3%	
203-16	LBD-203-16	16	1128.6	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	438	208.6	0.3%	0.7%	0.4%	1.3%	1.4%	
203-17	LBD-203-17	16	1128.6	15.79	252.6	315.8	150	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	196	208.6	0.3%	0.3%	0.4%	1.1%	1.1%	
203-18	LBD-203-18	16	1128.6	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	134	208.6	0.3%	0.2%	0.4%	0.9%	1.0%	
203-19	LBD-203-19	16	1128.6	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	67	208.6	0.3%	0.1%	0.4%	0.8%	0.9%	
203-20	LBD-203-20	16	1128.6	15.79	252.6	315.8	150	1	AL 600MCM	CU #2	285	AL 500MCM	CU #1	67	208.6	0.3%	0.1%	0.4%	0.8%	0.9%	
204-01	LBD-204-01	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #1	361	260.8	0.3%	0.8%	0.4%	1.4%	1.5%	
204-02	LBD-204-02	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	324	260.8	0.3%	0.6%	0.4%	1.3%	1.3%	
204-03	LBD-204-03	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	247	260.8	0.3%	0.5%	0.4%	1.2%	1.2%	
204-04	LBD-204-04	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	185	260.8	0.3%	0.4%	0.4%	1.0%	1.0%	
204-05	LBD-204-05	17	1128.6	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	98	223.1	0.2%	0.2%	0.4%	0.8%	0.8%	
204-06	LBD-204-06	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #1	82	260.8	0.3%	0.3%	0.4%	0.8%	0.9%	
204-07	LBD-204-07	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	149	260.8	0.3%	0.3%	0.4%	1.0%	1.0%	
204-08	LBD-204-08	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	232	260.8	0.4%	0.5%	0.4%	1.3%	1.3%	
204-09	LBD-204-09	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	309	260.8	0.3%	0.6%	0.4%	1.3%	1.3%	
204-10	LBD-204-10	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #1	361	260.8	0.9%	0.8%	0.4%	2.1%	2.1%	
204-11	LBD-204-11	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	680	AL 500MCM	CU #1	324	260.8	0.9%	0.6%	0.4%	1.9%	2.0%	
204-12	LBD-204-12	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	680	AL 500MCM	CU #2	247	260.8	0.9%	0.5%	0.4%	1.8%	1.8%	
204-13	LBD-204-13	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	680	AL 500MCM	CU #2	185	260.8	0.9%	0.3%	0.4%	1.6%	1.6%	
204-14	LBD-204-14	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	680	AL 500MCM	CU #2	88	260.8	0.9%	0.2%	0.4%	1.4%	1.5%	
204-15	LBD-204-15	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #2	72	260.8	0.9%	0.1%	0.4%	1.4%	1.5%	
204-16	LBD-204-16	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #1	148	260.8	0.9%	0.3%	0.4%	1.6%	1.6%	
204-17	LBD-204-17	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #2	232	260.8	0.9%	0.5%	0.4%	1.7%	1.8%	
204-18	LBD-204-18	28	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #2	309	260.8	0.9%	0.6%	0.4%	1.9%	1.9%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.530

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701 8987 CR 266 BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN, LLC 2555 TOWN & COUNTRY DRIVE, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

PREPARED BY: PURE POWER ENGINEERING 717 IRON STREET, HUBBARD, TX 76648 WWW.PUREPOWER.COM

PAGE SIZE: 36" x 24" PROJECT #: TX-PS-2701

NO	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	06/26/2024
2	ISSUED FOR PERMIT	08/23/2024
3	ISSUED FOR ELECTRICAL DESIGN	09/11/2024

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS:									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	DCFD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH [FT] (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH [FT] (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
205-01	LBD-205-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	108	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	1.5%
205-02	LBD-205-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	180	262.4	0.4%	0.4%	0.4%	1.1%	1.1%		
205-03	LBD-205-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	258	262.4	0.4%	0.5%	0.4%	1.2%	1.3%	
205-04	LBD-205-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	335	262.4	0.4%	0.7%	0.4%	1.4%	1.5%	
205-05	LBD-205-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	412	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
205-06	LBD-205-06	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	474	209.9	0.4%	0.7%	0.4%	1.5%	1.5%	
205-07	LBD-205-07	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	240	AL 500MCM	CU #2	278	209.9	0.3%	0.4%	0.4%	1.1%	1.2%	
205-08	LBD-205-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	206	209.9	0.3%	0.3%	0.4%	1.0%	1.1%	
205-09	LBD-205-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	250	AL 500MCM	CU #2	139	209.9	0.3%	0.2%	0.4%	0.9%	1.0%	
205-10	LBD-205-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	255	AL 500MCM	CU #2	72	209.9	0.3%	0.1%	0.4%	0.8%	0.9%	
205-11	LBD-205-11	17	1132.7	15.79	268.4	335.5	350	1	AL 600MCM	CU #2	185	AL 500MCM	CU #2	108	223.0	0.2%	0.2%	0.4%	0.8%	0.8%	
205-12	LBD-205-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	185	262.4	0.2%	0.4%	0.4%	1.0%	1.0%	
205-13	LBD-205-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	258	262.4	0.2%	0.5%	0.4%	1.1%	1.2%	
205-14	LBD-205-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	335	262.4	0.3%	0.7%	0.4%	1.3%	1.3%	
205-15	LBD-205-15	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	397	209.9	0.3%	0.6%	0.4%	1.3%	1.3%	
205-16	LBD-205-16	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	453	209.9	0.3%	0.7%	0.4%	1.4%	1.4%	
205-17	LBD-205-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	915	AL 500MCM	CU #2	82	262.4	1.2%	0.2%	0.4%	1.7%	1.8%	
205-18	LBD-205-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	915	AL 500MCM	CU #2	82	262.4	1.2%	0.2%	0.4%	1.7%	1.8%	
205-19	LBD-205-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	915	AL 500MCM	CU #2	165	262.4	1.2%	0.3%	0.4%	1.8%	1.9%	
205-20	LBD-205-20	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	915	AL 500MCM	CU #2	242	262.4	1.2%	0.5%	0.4%	2.1%	2.1%	1.5%
206-01	LBD-206-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	453	262.4	0.4%	0.9%	0.4%	1.7%	1.7%	
206-02	LBD-206-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	376	262.4	0.4%	0.7%	0.4%	1.5%	1.6%	
206-03	LBD-206-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	294	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
206-04	LBD-206-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	216	262.4	0.4%	0.4%	0.4%	1.2%	1.2%	
206-05	LBD-206-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.0%	1.1%	
206-06	LBD-206-06	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	260	AL 500MCM	CU #2	72	209.9	0.4%	0.1%	0.4%	0.9%	0.9%	
206-07	LBD-206-07	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	260	AL 500MCM	CU #2	72	209.9	0.4%	0.1%	0.4%	0.9%	0.9%	
206-08	LBD-206-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	260	AL 500MCM	CU #2	134	209.9	0.4%	0.2%	0.4%	1.0%	1.0%	
206-09	LBD-206-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	295	AL 500MCM	CU #2	180	209.9	0.4%	0.3%	0.4%	1.0%	1.1%	
206-10	LBD-206-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	484	262.4	0.2%	1.0%	0.4%	1.6%	1.6%	
206-11	LBD-206-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	407	262.4	0.2%	0.8%	0.4%	1.4%	1.5%	
206-12	LBD-206-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	328	262.4	0.2%	0.6%	0.4%	1.3%	1.3%	
206-13	LBD-206-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	247	262.4	0.2%	0.5%	0.4%	1.1%	1.2%	
206-14	LBD-206-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	180	262.4	0.3%	0.4%	0.4%	1.0%	1.1%	
206-15	LBD-206-15	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	108	236.2	0.2%	0.2%	0.4%	0.8%	0.9%	
206-16	LBD-206-16	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	52	249.3	0.1%	0.1%	0.4%	0.8%	0.8%	
206-17	LBD-206-17	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	134	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
206-18	LBD-206-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	185	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
206-19	LBD-206-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	242	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
206-20	LBD-206-20	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	309	209.9	0.3%	0.5%	0.4%	1.2%	1.2%	
207-01	LBD-207-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	653	262.4	1.0%	1.2%	0.4%	2.5%	2.6%	
207-02	LBD-207-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	740	AL 500MCM	CU #2	530	262.4	1.0%	1.0%	0.4%	2.4%	2.4%	
207-03	LBD-207-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	740	AL 500MCM	CU #2	443	262.4	1.0%	0.9%	0.4%	2.3%	2.3%	
207-04	LBD-207-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	745	AL 500MCM	CU #2	361	262.4	1.0%	0.7%	0.4%	2.1%	2.1%	
207-05	LBD-207-05	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	750	AL 500MCM	CU #2	278	209.9	1.0%	0.4%	0.4%	1.8%	1.8%	
207-06	LBD-207-06	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	755	AL 500MCM	CU #2	211	209.9	1.0%	0.3%	0.4%	1.7%	1.7%	
207-07	LBD-207-07	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	755	AL 500MCM	CU #2	139	209.9	1.0%	0.2%	0.4%	1.6%	1.6%	
207-08	LBD-207-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	760	AL 500MCM	CU #2	72	209.9	1.0%	0.1%	0.4%	1.5%	1.5%	
207-09	LBD-207-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	577	262.4	0.3%	1.2%	0.4%	1.8%	1.9%	
207-10	LBD-207-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	494	262.4	0.3%	1.0%	0.4%	1.7%	1.7%	
207-11	LBD-207-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	235	AL 500MCM	CU #2	407	262.4	0.3%	0.8%	0.4%	1.5%	1.5%	1.6%
207-12	LBD-207-12	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	235	AL 500MCM	CU #2	324	209.9	0.3%	0.5%	0.4%	1.2%	1.2%	
207-13	LBD-207-13	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	240	AL 500MCM	CU #2	256	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
207-14	LBD-207-14	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	191	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
207-15	LBD-207-15	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	118	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
207-16	LBD-207-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	464	262.4	0.4%	0.9%	0.4%	1.7%	1.7%	
207-17	LBD-207-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	376	262.4	0.4%	0.7%	0.4%	1.5%	1.5%	
207-18	LBD-207-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	294	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
207-19	LBD-207-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	295	AL 500MCM	CU #2	211	209.9	0.4%	0.4%	0.4%	1.1%	1.1%	
207-20	LBD-207-20	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	300	AL 500MCM	CU #2	139	157.4	0.3%	0.2%	0.4%	0.8%	0.9%	
207-21	LBD-207-21	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	305	AL 500MCM	CU #2	72	157.4	0.3%	0.1%	0.4%	0.8%	0.8%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING # E3.540

NO	DESCRIPTION	DATE	BY
3	ISSUED FOR PERMIT	09/25/2024	BH
2	ISSUED FOR PERMIT	04/26/2024	BH
1	ISSUED FOR PERMIT	04/11/2024	BH

PURE POWER ENGINEERING
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DRAWN BY:

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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp (V)	STRING MAXIMUM CURRENT, SIMULATED Isc (A)	FEEDER MAXIMUM CURRENT (A)	FEEDER MAXIMUM CURRENT X 1.25 (A)	OCPD SIZE (A)	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) (A)	SEGMENT VOLTAGE DROP (%) (UNDERGROUND)	SEGMENT VOLTAGE DROP (%) (MESSENGER WIRE)	SEGMENT VOLTAGE DROP (%) (STRING TO FEEDER	TOTAL VOLTAGE DROP (%)	TOTAL WATT LOSS (W)	WEIGHTED AVERAGE DES VOLTAGE DROP (%)
301-01	LBD-301-01	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	615	AL 500MCM	CU #2	670	236.2	0.7%	1.2%	0.4%	2.2%	2,276	1.7%
301-02	LBD-301-02	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	625	AL 500MCM	CU #2	747	236.2	0.7%	1.3%	0.4%	2.4%	2,535	1.5%
301-03	LBD-301-03	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	615	AL 500MCM	CU #2	644	249.3	0.8%	1.2%	0.4%	2.3%	2,436	1.6%
301-04	LBD-301-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	625	AL 500MCM	CU #2	587	262.4	0.8%	1.1%	0.4%	2.3%	2,336	2.3%
301-05	LBD-301-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	885	262.4	0.3%	1.3%	0.4%	2.1%	2,146	2.4%
301-06	LBD-301-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	778	262.4	0.3%	1.5%	0.4%	2.2%	2,276	2.2%
301-07	LBD-301-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	685	262.4	0.3%	1.3%	0.4%	2.0%	2,116	2.1%
301-08	LBD-301-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	613	262.4	0.3%	1.2%	0.4%	1.9%	1,996	1.9%
301-09	LBD-301-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	530	262.4	0.3%	1.0%	0.4%	1.7%	1,775	1.7%
301-10	LBD-301-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	443	262.4	0.3%	0.8%	0.4%	1.5%	1,555	1.5%
301-11	LBD-301-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	361	262.4	0.3%	0.7%	0.4%	1.4%	1,434	1.4%
301-12	LBD-301-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	278	262.4	0.3%	0.5%	0.4%	1.2%	1,314	1.3%
301-13	LBD-301-13	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	195	249.3	0.3%	0.4%	0.4%	1.1%	1,115	1.1%
301-14	LBD-301-14	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	108	236.2	0.2%	0.2%	0.4%	0.8%	0.896	0.9%
301-15	LBD-301-15	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	530	AL 500MCM	CU #2	591	236.2	0.6%	0.7%	0.4%	1.7%	1,775	1.7%
301-16	LBD-301-16	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	515	AL 500MCM	CU #2	258	236.2	0.6%	0.3%	0.4%	1.4%	1,536	1.5%
301-17	LBD-301-17	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	515	AL 500MCM	CU #2	165	221.0	0.6%	0.2%	0.4%	1.2%	1,316	1.3%
301-18	LBD-301-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	515	AL 500MCM	CU #2	82	262.4	0.7%	0.2%	0.4%	1.2%	1,316	1.3%
301-19	LBD-301-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	515	AL 500MCM	CU #2	82	262.4	0.7%	0.2%	0.4%	1.2%	1,316	1.3%
302-01	LBD-302-01	20	1133.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	685	AL 500MCM	CU #2	488	262.4	0.9%	1.0%	0.4%	2.3%	2,836	2.3%
302-02	LBD-302-02	20	1133.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	690	AL 500MCM	CU #2	397	262.4	0.9%	0.8%	0.4%	2.1%	2,636	2.1%
302-03	LBD-302-03	16	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	695	AL 500MCM	CU #2	314	209.9	0.9%	0.5%	0.4%	1.8%	1,894	1.8%
302-04	LBD-302-04	15	1132.7	15.79	236.9	296.1	315	1	AL 500MCM	CU #2	695	AL 500MCM	CU #2	247	196.8	0.8%	0.4%	0.4%	1.6%	1,615	1.6%
302-05	LBD-302-05	15	1132.7	15.79	236.9	296.1	315	1	AL 500MCM	CU #2	700	AL 500MCM	CU #2	165	196.8	0.8%	0.2%	0.4%	1.5%	1,576	1.5%
302-06	LBD-302-06	17	1132.7	15.79	189.5	236.9	250	1	AL 500MCM	CU #2	705	AL 500MCM	CU #2	77	157.4	0.7%	0.1%	0.4%	1.2%	1,235	1.2%
302-07	LBD-302-07	18	1133.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	484	236.2	0.3%	0.8%	0.4%	1.5%	1,656	1.6%
302-08	LBD-302-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	566	262.4	0.4%	0.7%	0.4%	1.5%	1,656	1.5%
302-09	LBD-302-09	16	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	275	AL 500MCM	CU #2	293	209.9	0.4%	0.4%	0.4%	1.2%	1,376	1.3%
302-10	LBD-302-10	16	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	280	AL 500MCM	CU #2	113	209.9	0.4%	0.1%	0.4%	1.1%	1,119	1.1%
302-11	LBD-302-11	14	1133.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	280	AL 500MCM	CU #2	164	209.9	0.4%	0.2%	0.4%	1.0%	1,076	1.0%
302-12	LBD-302-12	16	1133.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	285	AL 500MCM	CU #2	77	209.9	0.4%	0.1%	0.4%	0.9%	0.9%	0.9%
302-13	LBD-302-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	180	AL 500MCM	CU #2	407	262.4	0.2%	0.6%	0.4%	1.4%	1,536	1.5%
302-14	LBD-302-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	185	AL 500MCM	CU #2	324	262.4	0.2%	0.5%	0.4%	1.3%	1,436	1.4%
302-15	LBD-302-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	237	262.4	0.3%	0.4%	0.4%	1.1%	1,236	1.2%
302-16	LBD-302-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	155	262.4	0.3%	0.3%	0.4%	1.0%	1,076	1.0%
302-17	LBD-302-17	11	1133.7	15.79	206.3	258.6	315	1	AL 500MCM	CU #2	210	AL 500MCM	CU #2	72	170.6	0.2%	0.1%	0.4%	0.7%	0.7%	0.7%
302-18	LBD-302-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	725	AL 500MCM	CU #2	145	262.4	0.9%	0.3%	0.4%	1.6%	1,776	1.7%
302-19	LBD-302-19	16	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	725	AL 500MCM	CU #2	72	209.9	0.9%	0.1%	0.4%	1.4%	1,536	1.5%
302-20	LBD-302-20	16	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	725	AL 500MCM	CU #2	72	209.9	0.9%	0.1%	0.4%	1.4%	1,536	1.5%
302-21	LBD-302-21	18	1133.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	725	AL 500MCM	CU #2	180	236.2	0.9%	0.3%	0.4%	1.6%	1,696	1.6%
303-01	LBD-303-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	640	AL 500MCM	CU #2	886	262.4	0.8%	0.8%	0.4%	2.0%	2,496	2.0%
303-02	LBD-303-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	640	AL 500MCM	CU #2	505	262.4	0.8%	0.6%	0.4%	1.9%	2,196	1.9%
303-03	LBD-303-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	640	AL 500MCM	CU #2	227	262.4	0.8%	0.4%	0.4%	1.7%	1,776	1.7%
303-04	LBD-303-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	640	AL 500MCM	CU #2	148	262.4	0.8%	0.3%	0.4%	1.5%	1,656	1.6%
303-05	LBD-303-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	655	AL 500MCM	CU #2	82	262.4	0.8%	0.2%	0.4%	1.4%	1,496	1.4%
303-06	LBD-303-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	655	AL 500MCM	CU #2	165	262.4	0.8%	0.3%	0.4%	1.6%	1,656	1.6%
303-07	LBD-303-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	324	262.4	0.8%	0.6%	0.4%	1.9%	2,196	1.9%
303-08	LBD-303-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	586	262.4	0.2%	0.6%	0.4%	1.4%	1,456	1.4%
303-09	LBD-303-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	348	262.4	0.2%	0.3%	0.4%	1.2%	1,336	1.3%
303-10	LBD-303-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	127	262.4	0.2%	0.2%	0.4%	1.1%	1,116	1.1%
303-11	LBD-303-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	149	262.4	0.2%	0.3%	0.4%	0.9%	1.0%	1.0%
303-12	LBD-303-12	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	82	236.2	0.2%	0.1%	0.4%	0.7%	0.8%	0.8%
303-13	LBD-303-13	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	82	249.3	0.2%	0.2%	0.4%	0.8%	0.8%	0.8%
303-14	LBD-303-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	165	262.4	0.2%	0.3%	0.4%	1.0%	1.0%	1.0%
303-15	LBD-303-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	242	262.4	0.2%	0.5%	0.4%	1.1%	1.2%	1.2%
303-16	LBD-303-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	385	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	1.3%
303-17	LBD-303-17	18	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	205	AL 500MCM	CU #2	436	209.9	0.3%	0.7%	0.4%	1.3%	1.4%	1.4%
303-18	LBD-303-18	14	1132.7	15.79	221.1	276.3	315	1	AL 500MCM	CU #2	205	AL 500MCM	CU #2	551	183.7	0.2%	0.6%	0.4%	1.4%	1.4%	1.4%
303-19	LBD-303-19	16	1132.7	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	205	AL 500MCM	CU #2	675	209.9	0.3%	0.9%	0.4%	1.7%	1.8%	1.8%
304-01	LBD-304-01	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	348	260.8	0.3%	0.6%	0.4%	1.3%	1.4%	1.4%
304-02	LBD-304-02	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	232	260.8	0.3%	0.5%	0.4%	1.1%	1.2%	1.2%
304-03	LBD-304-03	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	195	260.8	0.2%	0.3%	0.4%	1.0%	1.0%	1.0%
304-04	LBD-304-04	19	1128.6	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	88	247.6	0.2%	0.2%	0.4%	0.8%	0.8%	0.8%
304-05	LBD-304-05	18	1128.6	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	88	234.7	0.2%	0.2%	0.4%	0.8%	0.8%	0.8%
304-06	LBD-304-06	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	165	260.8	0.3%	0.3%	0.4%	1.0%	1.0%	1.0%
304-07	LBD-304-07	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	232	260.8	0.3%	0.5%	0.4%	1.1%	1.2%	1.2%
304-08	LBD-304-08	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	325	260.8	0.3%	0.6%	0.4%	1.3%	1.3%	1.3%
304-09	LBD-304-09	16	1128.6	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	205	AL 500MCM	CU #2	576	208.6	0.3%	0.6%	0.4%	1.2%	1.3%	1.3%
304-10	LBD-304-10	16	1128.6	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	205	AL 500MCM	CU #2	438	208.6	0.3%	0.4%	0.4%	1.3%	1.4%	1.4%
304-11	LBD-304-11	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	680	AL 500MCM	CU #2	348	260.8	0.5%	0.6%	0.4%	1.6%	1.6%	1.6%
304-12	LBD-304-12	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	680	AL 500MCM	CU #2	232	260.8	0.5%	0.5%	0.4%	1.5%	1.6%	1.6%
304-13	LBD-304-13	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	665	AL 500MCM	CU #2	195	260.8	0.5%	0.3%	0.4%	1.4%	1.5%	1.5%
304-14	LBD-304-14	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	665	AL 500MCM	CU #2	88	260.8	0.5%	0.2%	0.4%	1.4%	1.5%	1.5%
304-15	LBD-304-15	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	665	AL 500MCM	CU #2	88	260.8	0.5%	0.2%	0.4%	1.4%	1.5%	1.5%
304-16	LBD-304-16	20	1128.6	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	665	AL 500MCM	CU #2	165	260.8	0.5%	0.3%	0.4%	1.6%	1.6%	1.6%
304-17	LBD-304-17	16	1128.6	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	680	AL 500MCM	CU #2	216	208.6	0.5%	0.5%	0.4%	1.6%	1.7%	1.7%
304-18	LBD-304-18	18	1128.6	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	680	AL 500MCM	CU #2	277	208.6	0.5%	0.6%	0.4%	1.7%	1.8%	1.8%
304-19	LBD-304-19	18	1128.6	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	680	AL 500MCM	CU #2	345	208.6	0.5%	0.6%	0.4%	1.8%	1.9%	1.9%
304-20	LBD-304-20	16	1128.6	15.79	252.6	315.8	350	1	AL 500MCM	CU #2	680	AL 500MCM	CU #2	402	208.6	0.5%	0.6%	0.4%	1.9%	1.9%	1.9%

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.550

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-270 8987 CR 265 BROWN & MILLS COUNTY, TX 76801

NO	DESCRIPTION	BY	DATE
1	95% DESIGN REVIEW	MJF	05/30/2025
2	95% DESIGN REVIEW	MJF	06/20/2025
3	ISSUED FOR CONSTRUCTION	EJL	08/11/2025

PUREPOWER ENGINEERING
717 HIGH STREET, HUBBARD, TX
www.purepowerpe.com

LANGAN, LLC
2800 POST OAK BLVD, SUITE 2100
HOUSTON, TX 77056
WWW.LANGAN.COM
LANGAN

PAPER SIZE: 36" x 24"
PROJECT #: TX-PS-270T

ENGINEER OF RECORD: [illegible]

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RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBERS	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT x 1.25 [A]	OCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [W]	WEIGHTED AVERAGE PCS VOLTAGE DROP (%)
305-01	LBD-305-01	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	1055	AL 500MCM	CU #2	134	209.5	1.4%	0.2%	0.4%	2.0%	2.0%	
305-02	LBD-305-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1055	AL 500MCM	CU #2	206	262.4	1.8%	0.4%	0.4%	2.7%	2.7%	
305-03	LBD-305-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	1060	AL 500MCM	CU #2	283	262.4	1.8%	0.6%	0.4%	2.8%	2.8%	
305-04	LBD-305-04	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	340	236.2	0.8%	0.6%	0.4%	1.8%	1.8%	
305-05	LBD-305-05	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	232	236.2	0.8%	0.4%	0.4%	1.6%	1.6%	
305-06	LBD-305-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	149	262.4	0.9%	0.3%	0.4%	1.5%	1.5%	
305-07	LBD-305-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	645	AL 500MCM	CU #2	87	262.4	0.8%	0.2%	0.4%	1.4%	1.4%	
305-08	LBD-305-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	98	262.4	0.9%	0.2%	0.4%	1.4%	1.4%	
305-09	LBD-305-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	645	AL 500MCM	CU #2	105	262.4	0.8%	0.3%	0.4%	1.5%	1.5%	
305-10	LBD-305-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	645	AL 500MCM	CU #2	232	209.9	0.8%	0.4%	0.4%	1.6%	1.6%	1.4%
305-11	LBD-305-11	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	645	AL 500MCM	CU #2	294	209.9	0.8%	0.5%	0.4%	1.7%	1.7%	
305-12	LBD-305-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	386	262.4	0.2%	0.8%	0.4%	1.4%	1.4%	
305-13	LBD-305-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	309	262.4	0.2%	0.6%	0.4%	1.3%	1.3%	
305-14	LBD-305-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	227	262.4	0.2%	0.4%	0.4%	1.1%	1.1%	
305-15	LBD-305-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	149	262.4	0.2%	0.3%	0.4%	0.9%	1.0%	
305-16	LBD-305-16	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	82	236.2	0.2%	0.1%	0.4%	0.7%	0.8%	
305-17	LBD-305-17	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	87	249.3	0.2%	0.2%	0.4%	0.8%	0.8%	
305-18	LBD-305-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	166	262.4	0.2%	0.3%	0.4%	1.0%	1.0%	
305-19	LBD-305-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	242	262.4	0.2%	0.5%	0.4%	1.1%	1.2%	
306-01	LBD-306-01	14	1132.7	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	175	AL 500MCM	CU #2	124	183.7	0.4%	0.2%	0.4%	1.0%	1.0%	
306-02	LBD-306-02	14	1132.7	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	375	AL 500MCM	CU #2	252	183.7	0.8%	0.3%	0.4%	1.1%	1.2%	
306-03	LBD-306-03	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	375	AL 500MCM	CU #2	330	157.4	0.9%	0.4%	0.4%	1.7%	1.7%	
306-04	LBD-306-04	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	190	AL 500MCM	CU #2	422	157.4	0.7%	0.5%	0.4%	1.7%	1.7%	
306-05	LBD-306-05	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	250	AL 500MCM	CU #2	278	249.3	0.3%	0.5%	0.4%	1.2%	1.3%	
306-06	LBD-306-06	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	250	AL 500MCM	CU #2	149	223.0	0.3%	0.2%	0.4%	0.9%	1.0%	
306-07	LBD-306-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	82	262.4	0.3%	0.1%	0.4%	0.9%	0.9%	
306-08	LBD-306-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	250	AL 500MCM	CU #2	103	262.4	0.3%	0.2%	0.4%	0.9%	1.0%	
306-09	LBD-306-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	250	AL 500MCM	CU #2	180	262.4	0.3%	0.4%	0.4%	1.1%	1.1%	
306-10	LBD-306-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.2%	1.3%	
306-11	LBD-306-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	330	262.4	0.3%	0.6%	0.4%	1.4%	1.4%	1.5%
306-12	LBD-306-12	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	402	236.2	0.3%	0.7%	0.4%	1.4%	1.5%	
306-13	LBD-306-13	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	489	236.2	0.3%	0.9%	0.4%	1.6%	1.6%	
306-14	LBD-306-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	613	262.4	0.4%	1.1%	0.4%	1.9%	2.0%	
306-15	LBD-306-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	778	262.4	0.4%	1.5%	0.4%	2.3%	2.3%	
306-16	LBD-306-16	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	886	236.2	0.3%	1.6%	0.4%	2.3%	2.3%	
306-17	LBD-306-17	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	270	AL 500MCM	CU #2	987	209.9	0.4%	1.5%	0.4%	2.3%	2.3%	
306-18	LBD-306-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	825	AL 500MCM	CU #2	374	262.4	1.1%	0.6%	0.4%	2.1%	2.1%	
306-19	LBD-306-19	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	825	AL 500MCM	CU #2	185	236.2	1.0%	0.3%	0.4%	1.7%	1.7%	
306-20	LBD-306-20	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	825	AL 500MCM	CU #2	82	236.2	1.0%	0.1%	0.4%	1.5%	1.5%	
306-21	LBD-306-21	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	825	AL 500MCM	CU #2	21	262.4	1.1%	0.0%	0.4%	1.5%	1.5%	
307-01	LBD-307-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	546	262.4	0.3%	1.1%	0.4%	1.8%	1.8%	
307-02	LBD-307-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	464	262.4	0.3%	0.9%	0.4%	1.6%	1.6%	
307-03	LBD-307-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	240	AL 500MCM	CU #2	381	262.4	0.3%	0.7%	0.4%	1.4%	1.5%	
307-04	LBD-307-04	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	294	209.9	0.3%	0.5%	0.4%	1.2%	1.2%	
307-05	LBD-307-05	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	245	AL 500MCM	CU #2	237	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
307-06	LBD-307-06	18	1132.7	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	250	AL 500MCM	CU #2	160	183.7	0.3%	0.2%	0.4%	0.9%	0.9%	
307-07	LBD-307-07	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	255	AL 500MCM	CU #2	93	196.8	0.3%	0.1%	0.4%	0.8%	0.8%	
307-08	LBD-307-08	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	395	AL 500MCM	CU #2	103	157.4	0.4%	0.1%	0.4%	0.9%	0.9%	
307-09	LBD-307-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	400	AL 500MCM	CU #2	165	209.9	0.5%	0.3%	0.4%	1.2%	1.2%	
307-10	LBD-307-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	405	AL 500MCM	CU #2	221	209.9	0.5%	0.3%	0.4%	1.3%	1.3%	
307-11	LBD-307-11	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	371	236.2	0.3%	0.7%	0.4%	1.4%	1.4%	
307-12	LBD-307-12	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	290	AL 500MCM	CU #2	252	196.8	0.4%	0.8%	0.4%	1.1%	1.1%	1.3%
307-13	LBD-307-13	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	290	AL 500MCM	CU #2	149	196.8	0.4%	0.2%	0.4%	1.0%	1.0%	
307-14	LBD-307-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	72	262.4	0.4%	0.1%	0.4%	0.9%	1.0%	
307-15	LBD-307-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	88	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
307-16	LBD-307-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
307-17	LBD-307-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	247	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
307-18	LBD-307-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	324	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
307-19	LBD-307-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	391	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
307-20	LBD-307-20	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	453	209.9	0.4%	0.7%	0.4%	1.5%	1.6%	
307-21	LBD-307-21	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	520	209.9	0.4%	0.8%	0.4%	1.6%	1.7%	
307-22	LBD-307-22	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	597	262.4	0.4%	1.2%	0.4%	2.0%	2.0%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING # E3.560

NO	DESCRIPTION	DATE	BY
3	30% ELECTRICAL DESIGN	04/11/2025	EL
2	30% LAYOUT REVIEW	03/20/2025	EL
1	60% ELECTRICAL DESIGN	02/25/2025	EL

PUREPOWER ENGINEERING
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PREPARED FOR: LANGAN

PAGE SIZE: 18" x 24" | PROJECT #: TX-PS-17101

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-270
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS								FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT - SIMULATED Ix [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	OCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP (%) (UNDERGROUND)	SEGMENT VOLTAGE DROP (%) (MESSENGER WIRE)	SEGMENT VOLTAGE DROP (%) (STRING TO FEEDER)	TOTAL VOLTAGE DROP (%)	TOTAL WATTLOSS [W]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
401-01	LBD-401-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	324	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
401-02	LBD-401-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
401-03	LBD-401-03	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	148	236.2	0.4%	0.3%	0.4%	1.0%	1.1%	
401-04	LBD-401-04	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	247	236.2	0.4%	0.4%	0.4%	1.2%	1.2%	
401-05	LBD-401-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	309	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
401-06	LBD-401-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	336	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
401-07	LBD-401-07	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	336	209.9	0.3%	0.8%	0.4%	1.5%	1.6%	
401-08	LBD-401-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	469	262.4	0.4%	0.9%	0.4%	1.8%	1.8%	
401-09	LBD-401-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	391	262.4	0.4%	0.8%	0.4%	1.6%	1.5%	
401-10	LBD-401-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	309	262.4	0.4%	0.8%	0.4%	1.3%	1.3%	1.2%
401-11	LBD-401-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	352	262.4	0.4%	0.5%	0.4%	1.1%	1.2%	
401-12	LBD-401-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
401-13	LBD-401-13	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	53	236.2	0.3%	0.1%	0.4%	0.7%	0.8%	
401-14	LBD-401-14	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	88	249.5	0.2%	0.2%	0.4%	0.8%	0.8%	
401-15	LBD-401-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	163	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
401-16	LBD-401-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	352	262.4	0.3%	0.5%	0.4%	1.1%	1.1%	
401-17	LBD-401-17	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	294	209.9	0.3%	0.5%	0.4%	1.1%	1.1%	
401-18	LBD-401-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	361	209.9	0.3%	0.6%	0.4%	1.2%	1.3%	
401-19	LBD-401-19	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	422	209.9	0.3%	0.7%	0.4%	1.3%	1.4%	
402-01	LBD-402-01	18	1132.7	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	210	AL 500MCM	CU #2	134	183.7	0.3%	0.2%	0.4%	1.0%	1.4%	
402-02	LBD-402-02	14	1132.7	15.79	221.1	276.3	315	1	AL 600MCM	CU #2	210	AL 500MCM	CU #2	283	183.7	0.3%	0.3%	0.4%	1.5%	1.6%	
402-03	LBD 402-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	391	262.4	0.4%	0.8%	0.4%	1.6%	1.5%	
402-04	LBD-402-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	324	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
402-05	LBD-402-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	247	262.4	0.3%	0.5%	0.4%	1.1%	1.1%	
402-06	LBD-402-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
402-07	LBD-402-07	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	67	236.2	0.3%	0.1%	0.4%	0.8%	0.8%	
402-08	LBD-402-08	18	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	72	249.5	0.3%	0.1%	0.4%	0.8%	0.8%	
402-09	LBD-402-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	134	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
402-10	LBD-402-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	201	209.9	0.3%	0.5%	0.4%	1.0%	1.0%	
402-11	LBD-402-11	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	268	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
402-12	LBD-402-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	376	262.4	0.4%	0.7%	0.4%	1.5%	1.5%	
402-13	LBD 402-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	309	262.4	0.3%	0.8%	0.4%	1.3%	1.4%	
402-14	LBD-402-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	253	262.4	0.3%	0.5%	0.4%	1.2%	1.2%	
402-15	LBD-402-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	315	AL 500MCM	CU #2	148	262.4	0.3%	0.3%	0.4%	1.0%	1.1%	
402-16	LBD-402-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
402-17	LBD-402-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	265	AL 500MCM	CU #2	98	262.4	0.3%	0.2%	0.4%	0.9%	1.0%	
402-18	LBD-402-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	148	209.9	0.4%	0.3%	0.4%	1.0%	1.0%	
402-19	LBD-402-19	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	216	209.9	0.4%	0.3%	0.4%	1.1%	1.1%	
402-20	LBD-402-20	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	276	209.9	0.4%	0.4%	0.4%	1.2%	1.3%	
403-01	LBD-403-01	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	278	236.2	0.8%	0.5%	0.4%	1.8%	1.7%	
403-02	LBD-403-02	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	645	AL 500MCM	CU #2	148	249.5	0.8%	0.3%	0.4%	1.5%	1.5%	
403-03	LBD-403-03	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	645	AL 500MCM	CU #2	98	236.2	0.4%	0.2%	0.4%	1.1%	1.4%	
403-04	LBD-403-04	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	645	AL 500MCM	CU #2	201	236.2	0.5%	0.4%	0.4%	1.3%	1.5%	
403-05	LBD-403-05	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	645	AL 500MCM	CU #2	276	196.8	0.8%	0.4%	0.4%	1.6%	1.6%	
403-06	LBD-403-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
403-07	LBD-403-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	392	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
403-08	LBD-403-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	148	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
403-09	LBD-403-09	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	82	236.2	0.2%	0.1%	0.4%	0.8%	0.8%	
403-10	LBD-403-10	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	82	249.5	0.2%	0.2%	0.4%	0.8%	0.8%	1.2%
403-11	LBD-403-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
403-12	LBD-403-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	247	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
403-13	LBD-403-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	309	262.4	0.4%	0.8%	0.4%	1.6%	1.4%	
403-14	LBD-403-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.2%	1.3%	
403-15	LBD-403-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	148	262.4	0.4%	0.3%	0.4%	1.0%	1.1%	
403-16	LBD-403-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	83	262.4	0.4%	0.2%	0.4%	0.9%	0.9%	
403-17	LBD-403-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	0.9%	
403-18	LBD-403-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
403-19	LBD-403-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	270	AL 500MCM	CU #2	227	209.9	0.4%	0.4%	0.4%	1.1%	1.1%	
404-01	LBD-404-01	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	278	236.2	0.8%	0.5%	0.4%	1.8%	1.7%	
404-02	LBD-404-02	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	165	236.2	0.8%	0.3%	0.4%	1.5%	1.5%	
404-03	LBD-404-03	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	675	AL 500MCM	CU #2	98	236.2	0.8%	0.2%	0.4%	1.3%	1.4%	
404-04	LBD-404-04	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	675	AL 500MCM	CU #2	98	236.2	0.8%	0.2%	0.4%	1.3%	1.4%	
404-05	LBD-404-05	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	675	AL 500MCM	CU #2	201	236.2	0.8%	0.4%	0.4%	1.5%	1.6%	
404-06	LBD-404-06	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	675	AL 500MCM	CU #2	284	236.2	0.8%	0.5%	0.4%	1.7%	1.7%	
404-07	LBD-404-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	351	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
404-08	LBD-404-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	148	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
404-09	LBD-404-09	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	82	236.2	0.2%	0.1%	0.4%	0.8%	0.8%	
404-10	LBD-404-10	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	82	196.8	0.3%	0.1%	0.4%	0.8%	0.8%	
404-11	LBD-404-11	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	134	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
404-12	LBD-404-12	15	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	201	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
404-13	LBD-404-13	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	268	209.9	0.3%	0.4%	0.4%	1.0%	1.1%	
404-14	LBD-404-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	227	262.4	0.4%	0.4%	0.4%	1.2%	1.3%	
404-15	LBD-404-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	148	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
404-16	LBD-404-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
404-17	LBD-404-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	290	AL 500MCM	CU #2	101	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
404-18	LBD-404-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	275	AL 500MCM	CU #2	148	209.9	0.4%	0.2%	0.4%	1.0%	1.0%	
404-19	LBD-404-19	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	275	AL 500MCM	CU #2	216	209.9	0.4%	0.3%	0.4%	1.1%	1.1%	
404-20	LBD-404-20	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	275	AL 500MCM	CU #2	276	209.9	0.4%	0.4%	0.4%	1.2%	1.2%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.570

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	06/26/2024	BASE ELECTRICAL DESIGN	BH	AMT
2	09/13/2024	100% LAYOUT REVIEW	BH	AMT
3	11/15/2024	100% ELECTRICAL DESIGN	BH	EL

ENGINEER: PURE POWER ENGINEERING, LLC, 1717 MAIN STREET, HUNTSVILLE, TX 77340, WWW.PUREPOWERENG.COM

ARCHITECT: LANGAN, LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., 2777 ALLEN PARKWAY, SUITE 340, HOUSTON, TX 77019, WWW.LANGAN.COM

SIZE: 24" x 36" | PROJECT #: TX-PS-27001

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-27001, 8987 CR 265, BROWN & MILLS COUNTY, TX, 76801

RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS.						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	OCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
405-01	LBD-405-01	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	195	AL 500MCM	CU #2	838	157.4	0.2%	0.5%	0.4%	1.1%	1.1%	
405-02	LBD-405-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	186	262.4	0.3%	0.8%	0.4%	1.4%	1.4%	
405-03	LBD-405-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.2%	1.3%	
405-04	LBD-405-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
405-05	LBD-405-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
405-06	LBD-405-06	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	195	AL 500MCM	CU #2	67	223.0	0.2%	0.1%	0.4%	0.7%	0.8%	
405-07	LBD-405-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.8%	0.9%	
405-08	LBD-405-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	134	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
405-09	LBD-405-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	196	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
405-10	LBD-405-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	263	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
405-11	LBD-405-11	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	225	AL 500MCM	CU #2	324	209.9	0.3%	0.5%	0.4%	1.2%	1.2%	1.1%
405-12	LBD-405-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	330	AL 500MCM	CU #2	391	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
405-13	LBD-405-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	324	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
405-14	LBD-405-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	330	AL 500MCM	CU #2	247	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
405-15	LBD-405-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	330	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
405-16	LBD-405-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	88	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
405-17	LBD-405-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	72	262.4	0.4%	0.1%	0.4%	1.0%	1.0%	
405-18	LBD-405-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
405-19	LBD-405-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
405-20	LBD-405-20	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	335	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
406-01	LBD-406-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	391	262.4	0.3%	0.8%	0.4%	1.4%	1.5%	
406-02	LBD-406-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	324	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
406-03	LBD-406-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	247	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
406-04	LBD-406-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
406-05	LBD-406-05	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	72	223.0	0.2%	0.1%	0.4%	0.7%	0.8%	
406-06	LBD-406-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	72	262.4	0.3%	0.1%	0.4%	0.8%	0.9%	
406-07	LBD-406-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	149	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
406-08	LBD-406-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
406-09	LBD-406-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
406-10	LBD-406-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	186	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	1.1%
406-11	LBD-406-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
406-12	LBD-406-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	242	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
406-13	LBD-406-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
406-14	LBD-406-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
406-15	LBD-406-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
406-16	LBD-406-16	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	134	209.9	0.4%	0.2%	0.4%	1.0%	1.1%	
406-17	LBD-406-17	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	196	209.9	0.4%	0.3%	0.4%	1.1%	1.2%	
406-18	LBD-406-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	263	209.9	0.4%	0.4%	0.4%	1.2%	1.3%	
406-19	LBD-406-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	324	209.9	0.4%	0.5%	0.4%	1.3%	1.4%	
407-01	LBD-407-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	186	262.4	0.3%	0.8%	0.4%	1.4%	1.5%	
407-02	LBD-407-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
407-03	LBD-407-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	242	262.4	0.2%	0.5%	0.4%	1.1%	1.2%	
407-04	LBD-407-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	165	262.4	0.2%	0.3%	0.4%	1.0%	1.0%	
407-05	LBD-407-05	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	82	236.2	0.2%	0.1%	0.4%	0.7%	0.8%	
407-06	LBD-407-06	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	82	249.3	0.2%	0.2%	0.4%	0.8%	0.8%	
407-07	LBD-407-07	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	134	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
407-08	LBD-407-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	196	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
407-09	LBD-407-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	263	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
407-10	LBD-407-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	324	209.9	0.3%	0.5%	0.4%	1.2%	1.2%	1.1%
407-11	LBD-407-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	391	262.4	0.4%	0.8%	0.4%	1.6%	1.6%	
407-12	LBD-407-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	324	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
407-13	LBD-407-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	247	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
407-14	LBD-407-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
407-15	LBD-407-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	88	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
407-16	LBD-407-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	72	262.4	0.4%	0.1%	0.4%	0.9%	1.0%	
407-17	LBD-407-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
407-18	LBD-407-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
407-19	LBD-407-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.580

NO	DATE	REVISION / DESCRIPTION	BY
1	09/25/2025	60% ELECTRICAL DESIGN	BH
2	10/23/2025	90% LAYOUT REVIEW	BH
3	11/17/2025	100% ELECTRICAL DESIGN	BH

PREPARED FOR: PURE POWER ENGINEERING, 1111 MAIN STREET, HUDSON, WI, WWW.PUREPOWERENG.COM

PREPARED BY: LANGAN, LLC, 845 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

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RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp (V)	STRING MAXIMUM CURRENT, SIMULATED Isc (A)	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	DCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH [FT] (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH [FT] (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
501-01	LBD-501-01	18	1132.7	15.75	284.2	355.3	400	1	AL 750MCM	CU #2	675	AL 500MCM	CU #2	180	236.2	0.8%	0.3%	0.4%	1.5%	1.5%	1.2%
501-02	LBD-501-02	18	1132.7	15.75	284.2	355.3	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #2	98	236.2	0.8%	0.2%	0.4%	1.4%	1.4%	
501-03	LBD-501-03	17	1132.7	15.75	268.4	335.5	350	1	AL 750MCM	CU #2	695	AL 500MCM	CU #2	82	223.0	0.8%	0.1%	0.4%	1.3%	1.3%	
501-04	LBD-501-04	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	695	AL 500MCM	CU #2	165	262.4	0.9%	0.3%	0.4%	1.6%	1.7%	
501-05	LBD-501-05	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	695	AL 500MCM	CU #2	227	209.9	0.9%	0.4%	0.4%	1.6%	1.7%	
501-06	LBD-501-06	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	275	AL 500MCM	CU #2	309	262.4	0.3%	0.8%	0.4%	1.3%	1.3%	
501-07	LBD-501-07	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	225	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
501-08	LBD-501-08	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	149	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
501-09	LBD-501-09	17	1132.7	15.75	268.4	335.5	350	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	82	223.0	0.2%	0.1%	0.4%	0.8%	0.8%	
501-10	LBD-501-10	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.8%	0.9%	1.2%
501-11	LBD-501-11	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	210	AL 500MCM	CU #2	149	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
501-12	LBD-501-12	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	210	AL 500MCM	CU #2	211	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
501-13	LBD-501-13	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
501-14	LBD-501-14	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
501-15	LBD-501-15	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
501-16	LBD-501-16	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	87	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
501-17	LBD-501-17	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
501-18	LBD-501-18	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
501-19	LBD-501-19	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	310	AL 500MCM	CU #2	227	209.9	0.4%	0.4%	0.4%	1.1%	1.2%	
502-01	LBD-502-01	14	1132.7	15.75	221.1	276.3	315	1	AL 600MCM	CU #2	935	AL 500MCM	CU #2	227	183.7	1.1%	0.3%	0.4%	1.8%	1.8%	
502-02	LBD-502-02	14	1132.7	15.75	221.1	276.3	315	1	AL 600MCM	CU #2	935	AL 500MCM	CU #2	113	183.7	1.1%	0.2%	0.4%	1.6%	1.7%	
502-03	LBD-502-03	14	1132.7	15.75	221.1	276.3	315	1	AL 600MCM	CU #2	935	AL 500MCM	CU #2	113	183.7	1.1%	0.2%	0.4%	1.8%	1.7%	
502-04	LBD-502-04	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	690	AL 500MCM	CU #2	227	262.4	0.9%	0.4%	0.4%	1.7%	1.8%	
502-05	LBD-502-05	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	690	AL 500MCM	CU #2	149	262.4	0.9%	0.3%	0.4%	1.6%	1.6%	
502-06	LBD-502-06	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	675	AL 500MCM	CU #2	82	262.4	0.9%	0.2%	0.4%	1.4%	1.5%	
502-07	LBD-502-07	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	675	AL 500MCM	CU #2	87	209.9	0.9%	0.1%	0.4%	1.4%	1.4%	
502-08	LBD-502-08	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	675	AL 500MCM	CU #2	134	209.9	0.9%	0.2%	0.4%	1.5%	1.5%	
502-09	LBD-502-09	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	675	AL 500MCM	CU #2	196	209.9	0.9%	0.3%	0.4%	1.6%	1.6%	
502-10	LBD-502-10	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	227	262.4	0.3%	0.4%	0.4%	1.1%	1.2%	
502-11	LBD-502-11	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	149	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	1.2%
502-12	LBD-502-12	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.9%	0.9%	
502-13	LBD-502-13	17	1132.7	15.75	268.4	335.5	350	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	82	223.0	0.2%	0.1%	0.4%	0.8%	0.8%	
502-14	LBD-502-14	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	220	AL 500MCM	CU #2	149	209.9	0.3%	0.2%	0.4%	0.9%	1.0%	
502-15	LBD-502-15	12	1132.7	15.75	189.5	236.9	250	1	AL 600MCM	CU #2	220	AL 500MCM	CU #2	196	157.4	0.2%	0.2%	0.4%	0.8%	0.9%	
502-16	LBD-502-16	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	355	AL 500MCM	CU #2	278	262.4	0.4%	0.5%	0.4%	1.4%	1.4%	
502-17	LBD-502-17	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	355	AL 500MCM	CU #2	201	262.4	0.4%	0.4%	0.4%	1.3%	1.3%	
502-18	LBD-502-18	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	315	AL 500MCM	CU #2	134	209.9	0.4%	0.2%	0.4%	1.0%	1.1%	
502-19	LBD-502-19	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	72	209.9	0.4%	0.1%	0.4%	0.9%	1.0%	
502-20	LBD-502-20	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	72	209.9	0.4%	0.1%	0.4%	0.9%	1.0%	
502-21	LBD-502-21	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	134	209.9	0.4%	0.2%	0.4%	1.0%	1.1%	
503-01	LBD-503-01	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	284	262.4	1.0%	0.5%	0.4%	1.8%	2.0%	
503-02	LBD-503-02	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	740	AL 500MCM	CU #2	211	262.4	1.0%	0.4%	0.4%	1.8%	1.8%	
503-03	LBD-503-03	11	1132.7	15.75	173.7	217.1	250	1	AL 600MCM	CU #2	745	AL 500MCM	CU #2	124	144.3	0.7%	0.1%	0.4%	1.2%	1.2%	
503-04	LBD-503-04	12	1132.7	15.75	189.5	236.9	250	1	AL 600MCM	CU #2	745	AL 500MCM	CU #2	72	157.4	0.7%	0.1%	0.4%	1.2%	1.2%	
503-05	LBD-503-05	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	386	262.4	0.3%	0.8%	0.4%	1.4%	1.5%	
503-06	LBD-503-06	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
503-07	LBD-503-07	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
503-08	LBD-503-08	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
503-09	LBD-503-09	17	1132.7	15.75	268.4	335.5	350	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	82	223.0	0.2%	0.1%	0.4%	0.8%	0.8%	
503-10	LBD-503-10	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	87	209.9	0.3%	0.1%	0.4%	0.8%	0.8%	
503-11	LBD-503-11	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	230	AL 500MCM	CU #2	126	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
503-12	LBD-503-12	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	230	AL 500MCM	CU #2	180	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	1.2%
503-13	LBD-503-13	18	1132.7	15.75	284.2	355.3	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	278	236.2	0.3%	0.5%	0.4%	1.1%	1.2%	
503-14	LBD-503-14	12	1132.7	15.75	189.5	236.9	250	1	AL 600MCM	CU #2	230	AL 500MCM	CU #2	371	157.4	0.2%	0.4%	0.4%	1.0%	1.1%	
503-15	LBD-503-15	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	386	262.4	0.4%	0.8%	0.4%	1.5%	1.6%	
503-16	LBD-503-16	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
503-17	LBD-503-17	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	227	262.4	0.4%	0.4%	0.4%	1.2%	1.3%	
503-18	LBD-503-18	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	305	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
503-19	LBD-503-19	20	1132.7	15.75	315.8	394.8	400	1	AL 750MCM	CU #2	320	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
503-20	LBD-503-20	16	1132.7	15.75	252.6	315.8	350	1	AL 600MCM	CU #2	320	AL 500MCM	CU #2	67	209.9	0.4%	0.1%	0.4%	0.9%	1.0%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING # E3.590

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PREPARED BY: LANGAN
LANGAN, LLC
840 CESTER PARK, SUITE 740
HOUSTON, TX 77024
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PUREPOWER ENGINEERING
111 HIGH STREET, HUBBARD, IA
WWW.PUREPOWER.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

NO	DATE	REVISION / DESCRIPTION	BY	CHK
03	09/25/2025	60% ELECTRICAL DESIGN	BH	AVR
02	09/22/2025	30% LAYOUT REVIEW	BH	AVR
01	04/11/2025	30% ELECTRICAL DESIGN	BH	EL

RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	OCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP (%) (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
504-01	LBD-504-01	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	340	209.9	0.4%	0.5%	0.4%	1.3%	1.4%	
504-02	LBD-504-02	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	310	AL 500MCM	CU #2	294	209.9	0.4%	0.5%	0.4%	1.3%	1.3%	
504-03	LBD-504-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.2%	1.3%	
504-04	LBD-504-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	149	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
504-05	LBD-504-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
504-06	LBD-504-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	310	AL 500MCM	CU #2	98	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
504-07	LBD-504-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.2%	
504-08	LBD-504-08	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	263	249.3	0.4%	0.5%	0.4%	1.3%	1.3%	
504-09	LBD-504-09	13	1132.7	15.79	205.3	256.6	315	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	355	170.6	0.3%	0.5%	0.4%	1.2%	1.2%	
504-10	LBD-504-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	82	262.4	1.0%	0.2%	0.4%	1.5%	1.6%	1.6%
504-11	LBD-504-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	82	262.4	1.0%	0.2%	0.4%	1.5%	1.6%	
504-12	LBD-504-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	165	262.4	1.0%	0.3%	0.4%	1.7%	1.7%	
504-13	LBD-504-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	242	262.4	1.0%	0.5%	0.4%	1.8%	1.9%	
504-14	LBD-504-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	720	AL 500MCM	CU #2	309	262.4	0.9%	0.6%	0.4%	1.9%	2.0%	
504-15	LBD-504-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	720	AL 500MCM	CU #2	386	262.4	0.9%	0.8%	0.4%	2.1%	2.1%	
504-16	LBD-504-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	720	AL 500MCM	CU #2	474	262.4	0.9%	0.9%	0.4%	2.3%	2.3%	
504-17	LBD-504-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	720	AL 500MCM	CU #2	546	262.4	0.9%	1.1%	0.4%	2.4%	2.4%	
504-18	LBD-504-18	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	735	AL 500MCM	CU #2	633	236.2	0.9%	1.1%	0.4%	2.4%	2.4%	
504-19	LBD-504-19	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	740	AL 500MCM	CU #2	726	157.3	0.7%	0.9%	0.4%	2.0%	2.0%	
505-01	LBD-505-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	469	262.4	0.3%	0.9%	0.4%	1.6%	1.6%	
505-02	LBD-505-02	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	309	236.2	0.2%	0.5%	0.4%	1.2%	1.2%	
505-03	LBD-505-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
505-04	LBD-505-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	98	262.4	0.3%	0.2%	0.4%	0.9%	0.9%	
505-05	LBD-505-05	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	82	223.0	0.2%	0.1%	0.4%	0.7%	0.8%	
505-06	LBD-505-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	149	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
505-07	LBD-505-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
505-08	LBD-505-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
505-09	LBD-505-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	376	262.4	0.2%	0.7%	0.4%	1.4%	1.4%	1.4%
505-10	LBD-505-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	453	262.4	0.2%	0.9%	0.4%	1.5%	1.6%	
505-11	LBD-505-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	536	262.4	0.2%	1.1%	0.4%	1.7%	1.7%	
505-12	LBD-505-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	190	AL 500MCM	CU #2	613	262.4	0.2%	1.2%	0.4%	1.8%	1.9%	
505-13	LBD-505-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	695	262.4	0.3%	1.4%	0.4%	2.0%	2.1%	
505-14	LBD-505-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	165	262.4	0.9%	0.3%	0.4%	1.6%	1.6%	
505-15	LBD-505-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	165	262.4	0.9%	0.3%	0.4%	1.6%	1.6%	
505-16	LBD-505-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	309	262.4	0.9%	0.6%	0.4%	1.8%	1.9%	
505-17	LBD-505-17	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	660	AL 500MCM	CU #2	402	236.2	0.8%	0.7%	0.4%	1.9%	1.9%	
505-18	LBD-505-18	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	670	AL 500MCM	CU #2	520	236.2	0.8%	0.9%	0.4%	2.1%	2.1%	
506-01	LBD-506-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	484	262.4	0.3%	1.0%	0.4%	1.7%	1.7%	
506-02	LBD-506-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	240	AL 500MCM	CU #2	422	262.4	0.3%	0.8%	0.4%	1.5%	1.6%	
506-03	LBD-506-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	240	AL 500MCM	CU #2	345	262.4	0.3%	0.7%	0.4%	1.4%	1.4%	
506-04	LBD-506-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	240	AL 500MCM	CU #2	258	262.4	0.3%	0.5%	0.4%	1.2%	1.2%	
506-05	LBD-506-05	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	134	223.0	0.3%	0.2%	0.4%	0.9%	0.9%	
506-06	LBD-506-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	240	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.9%	0.9%	
506-07	LBD-506-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	149	262.4	0.3%	0.5%	0.4%	1.0%	1.1%	
506-08	LBD-506-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	255	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.2%	1.2%	
506-09	LBD-506-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	255	AL 500MCM	CU #2	294	209.9	0.3%	0.5%	0.4%	1.2%	1.3%	
506-10	LBD-506-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	422	262.4	0.4%	0.8%	0.4%	1.7%	1.7%	1.2%
506-11	LBD-506-11	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	345	236.2	0.4%	0.6%	0.4%	1.4%	1.4%	
506-12	LBD-506-12	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	258	236.2	0.4%	0.5%	0.4%	1.3%	1.3%	
506-13	LBD-506-13	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	340	AL 500MCM	CU #2	165	236.2	0.4%	0.3%	0.4%	1.1%	1.1%	
506-14	LBD-506-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
506-15	LBD-506-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	325	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	1.0%	1.0%	
506-16	LBD-506-16	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	149	209.9	0.4%	0.2%	0.4%	1.0%	1.1%	
506-17	LBD-506-17	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	325	AL 500MCM	CU #2	211	209.9	0.4%	0.3%	0.4%	1.1%	1.2%	
506-18	LBD-506-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	340	AL 500MCM	CU #2	263	209.9	0.4%	0.4%	0.4%	1.2%	1.3%	
506-19	LBD-506-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	340	AL 500MCM	CU #2	324	209.9	0.4%	0.5%	0.4%	1.3%	1.4%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.600

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

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NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/25/2025	60% ELECTRICAL DESIGN	BH	AAR
2	10/23/2025	90% LAYOUT REVIEW	BH	AAR
3	11/17/2025	100% ELECTRICAL DESIGN	BH	AAR

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INCH BAR IS 1 INCH ON ORIGINAL DRAWING
RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	OCPD SIZE [A]	CONDUCTORS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH (FT) (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSENGER WIRE)	LENGTH (FT) (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
601-01	LBD-601-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
601-02	LBD-601-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.1%	1.1%	
601-03	LBD-601-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	185	AL 500MCM	CU #2	165	262.4	0.2%	0.3%	0.4%	0.9%	1.0%	
601-04	LBD-601-04	19	1132.3	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	185	AL 500MCM	CU #2	88	249.5	0.2%	0.2%	0.4%	0.8%	0.8%	
601-05	LBD-601-05	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	185	AL 500MCM	CU #2	88	236.2	0.2%	0.2%	0.4%	0.8%	0.8%	
601-06	LBD-601-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	185	AL 500MCM	CU #2	165	262.4	0.2%	0.3%	0.4%	0.9%	1.0%	
601-07	LBD-601-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	205	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
601-08	LBD-601-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	294	209.9	0.3%	0.5%	0.4%	1.1%	1.2%	
601-09	LBD-601-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	361	209.9	0.3%	0.6%	0.4%	1.2%	1.3%	
601-10	LBD-601-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	205	AL 500MCM	CU #2	422	209.9	0.3%	0.7%	0.4%	1.3%	1.4%	
601-11	LBD-601-11	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	745	AL 500MCM	CU #2	711	157.4	0.7%	0.8%	0.4%	1.9%	2.0%	1.4%
601-12	LBD-601-12	10	1132.7	15.79	157.9	197.4	250	1	AL 600MCM	CU #2	745	AL 500MCM	CU #2	618	131.2	0.6%	0.6%	0.4%	1.6%	1.6%	
601-13	LBD-601-13	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	745	AL 500MCM	CU #2	536	236.2	0.9%	0.9%	0.4%	2.2%	2.3%	
601-14	LBD-601-14	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	760	AL 500MCM	CU #2	455	236.2	0.9%	0.8%	0.4%	2.1%	2.1%	
601-15	LBD-601-15	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	760	AL 500MCM	CU #2	361	236.2	0.9%	0.6%	0.4%	1.9%	2.0%	
601-16	LBD-601-16	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	760	AL 500MCM	CU #2	258	236.2	0.9%	0.5%	0.4%	1.7%	1.8%	
601-17	LBD-601-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	760	AL 500MCM	CU #2	165	262.4	1.0%	0.3%	0.4%	1.7%	1.7%	
601-18	LBD-601-18	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	635	AL 500MCM	CU #2	194	236.2	0.7%	0.2%	0.4%	1.4%	1.4%	
601-19	LBD-601-19	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	635	AL 500MCM	CU #2	278	236.2	0.7%	0.5%	0.4%	1.6%	1.7%	
601-20	LBD-601-20	12	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	635	AL 500MCM	CU #2	345	157.4	0.6%	0.4%	0.4%	1.4%	1.5%	
601-21	LBD-601-21	13	1132.7	15.79	205.3	256.6	315	1	AL 600MCM	CU #2	635	AL 500MCM	CU #2	402	170.6	0.7%	0.5%	0.4%	1.6%	1.6%	
602-01	LBD-602-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	324	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
602-02	LBD-602-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	247	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
602-03	LBD-602-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	210	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
602-04	LBD-602-04	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	200	AL 500MCM	CU #2	82	196.8	0.2%	0.1%	0.4%	0.7%	0.8%	
602-05	LBD-602-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.8%	0.9%	
602-06	LBD-602-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
602-07	LBD-602-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	200	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
602-08	LBD-602-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
602-09	LBD-602-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	386	262.4	0.3%	0.8%	0.4%	1.4%	1.5%	
602-10	LBD-602-10	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	215	AL 500MCM	CU #2	474	262.4	0.3%	0.9%	0.4%	1.6%	1.6%	1.3%
602-11	LBD-602-11	18	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	215	AL 500MCM	CU #2	580	209.9	0.3%	0.8%	0.4%	1.5%	1.5%	
602-12	LBD-602-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	620	AL 500MCM	CU #2	309	262.4	0.8%	0.6%	0.4%	1.8%	1.8%	
602-13	LBD-602-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	620	AL 500MCM	CU #2	232	262.4	0.8%	0.5%	0.4%	1.6%	1.7%	
602-14	LBD-602-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	620	AL 500MCM	CU #2	148	262.4	0.8%	0.3%	0.4%	1.5%	1.5%	
602-15	LBD-602-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	630	AL 500MCM	CU #2	82	262.4	0.8%	0.2%	0.4%	1.4%	1.4%	
602-16	LBD-602-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	620	AL 500MCM	CU #2	98	262.4	0.8%	0.2%	0.4%	1.4%	1.4%	
602-17	LBD-602-17	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	630	AL 500MCM	CU #2	180	249.5	0.8%	0.3%	0.4%	1.5%	1.5%	
602-18	LBD-602-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	630	AL 500MCM	CU #2	309	209.9	0.8%	0.5%	0.4%	1.7%	1.7%	
602-19	LBD-602-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	630	AL 500MCM	CU #2	438	209.9	0.8%	0.7%	0.4%	1.9%	1.9%	
603-01	LBD-603-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	260	AL 500MCM	CU #2	386	262.4	0.3%	0.8%	0.4%	1.5%	1.5%	
603-02	LBD-603-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	260	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.4%	
603-03	LBD-603-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.2%	1.2%	
603-04	LBD-603-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.1%	
603-05	LBD-603-05	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	82	223.0	0.3%	0.1%	0.4%	0.8%	0.8%	
603-06	LBD-603-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	82	262.4	0.3%	0.2%	0.4%	0.9%	0.9%	
603-07	LBD-603-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	260	AL 500MCM	CU #2	149	262.4	0.3%	0.3%	0.4%	1.0%	1.1%	
603-08	LBD-603-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	260	AL 500MCM	CU #2	227	262.4	0.3%	0.4%	0.4%	1.2%	1.2%	
603-09	LBD-603-09	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	260	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.4%	
603-10	LBD-603-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	260	AL 500MCM	CU #2	371	209.9	0.3%	0.6%	0.4%	1.3%	1.4%	1.1%
603-11	LBD-603-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
603-12	LBD-603-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.2%	1.3%	
603-13	LBD-603-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.0%	1.1%	
603-14	LBD-603-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	0.9%	
603-15	LBD-603-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	285	AL 500MCM	CU #2	98	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
603-16	LBD-603-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	270	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
603-17	LBD-603-17	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	270	AL 500MCM	CU #2	232	209.9	0.4%	0.4%	0.4%	1.1%	1.1%	
603-18	LBD-603-18	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	270	AL 500MCM	CU #2	294	209.9	0.4%	0.5%	0.4%	1.2%	1.2%	
603-19	LBD-603-19	15	1132.7	15.79	236.9	296.1	315	1	AL 600MCM	CU #2	285	AL 500MCM	CU #2	340	196.8	0.4%	0.5%	0.4%	1.2%	1.3%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.610

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PROJECT # TX-PS-2701

PAGE SIZE: 36" x 24"

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PURE POWER ENGINEERING, 1111 RIDER STREET, HUBBARD, TX 76648, WWW.PUREPOWER.COM

NO	BY	DATE	DESCRIPTION
1	BH	09/25/2023	60% ELECTRICAL DESIGN
2	BH	10/20/2023	90% ELECTRICAL DESIGN
3	BH	11/17/2023	100% ELECTRICAL DESIGN

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RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS. CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

DC FEEDER SCHEDULE

OVERALL CIRCUIT PARAMETERS									FEEDER UNDERGROUND			FEEDER ON MESSENGER WIRE			VOLTAGE DROP CALCS						
DC FEEDER ID	COMBINER BOX NUMBER	QTY OF STRINGS	OPERATING VOLTAGE Vmp [V]	STRING MAXIMUM CURRENT, SIMULATED Isc [A]	FEEDER MAXIMUM CURRENT [A]	FEEDER MAXIMUM CURRENT X 1.25 [A]	OCPD SIZE [A]	CONDUCTOTS PER POLE	CONDUCTOR SIZE (UNDERGROUND)	MINIMUM GROUND SIZE (UNDERGROUND)	LENGTH [FT] (UNDERGROUND)	CONDUCTOR SIZE (MESSENGER WIRE)	MINIMUM GROUND SIZE (MESSINGER WIRE)	LENGTH [FT] (MESSENGER WIRE)	FEEDER OPERATING CURRENT (STRING Imp) [A]	SEGMENT VOLTAGE DROP [%] (UNDERGROUND)	SEGMENT VOLTAGE DROP [%] (MESSENGER WIRE)	SEGMENT VOLTAGE DROP [%] (STRING TO FEEDER)	TOTAL VOLTAGE DROP [%]	TOTAL WATT LOSS [%]	WEIGHTED AVERAGE PCS VOLTAGE DROP [%]
604-01	LBD-604-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	120	AL 500MCM	CU #2	706	262.4	0.2%	1.4%	0.4%	1.9%	2.0%	
604-02	LBD-604-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	120	AL 500MCM	CU #2	623	262.4	0.2%	1.2%	0.4%	1.8%	1.8%	
604-03	LBD-604-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	125	AL 500MCM	CU #2	541	262.4	0.2%	1.1%	0.4%	1.6%	1.7%	
604-04	LBD-604-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	130	AL 500MCM	CU #2	458	262.4	0.2%	0.9%	0.4%	1.5%	1.5%	
604-05	LBD-604-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	130	AL 500MCM	CU #2	371	262.4	0.3%	0.7%	0.4%	1.3%	1.3%	
604-06	LBD-604-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	135	AL 500MCM	CU #2	288	262.4	0.2%	0.6%	0.4%	1.1%	1.2%	
604-07	LBD-604-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	140	AL 500MCM	CU #2	201	262.4	0.2%	0.4%	0.4%	1.0%	1.0%	
604-08	LBD-604-08	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	140	AL 500MCM	CU #2	118	249.3	0.2%	0.2%	0.4%	0.8%	0.8%	
604-09	LBD-604-09	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	530	AL 500MCM	CU #2	139	236.2	0.6%	0.2%	0.4%	1.3%	1.3%	
604-10	LBD-604-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	530	AL 500MCM	CU #2	201	209.9	0.7%	0.3%	0.4%	1.4%	1.4%	1.5%
604-11	LBD-604-11	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	535	AL 500MCM	CU #2	258	209.9	0.7%	0.4%	0.4%	1.5%	1.5%	
604-12	LBD-604-12	17	1132.7	15.79	189.5	236.9	250	1	AL 600MCM	CU #2	540	AL 500MCM	CU #2	304	157.4	0.5%	0.4%	0.4%	1.3%	1.3%	
604-13	LBD-604-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	540	AL 500MCM	CU #2	381	262.4	0.7%	0.7%	0.4%	1.8%	1.9%	
604-14	LBD-604-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	545	AL 500MCM	CU #2	458	262.4	0.7%	0.9%	0.4%	2.0%	2.0%	
604-15	LBD-604-15	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	580	AL 500MCM	CU #2	633	236.2	0.7%	1.1%	0.4%	2.2%	2.2%	
604-16	LBD-604-16	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	585	AL 500MCM	CU #2	536	236.2	0.7%	0.9%	0.4%	2.0%	2.1%	
604-17	LBD-604-17	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	585	AL 500MCM	CU #2	433	249.3	0.7%	0.8%	0.4%	1.9%	2.0%	
604-18	LBD-604-18	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	590	AL 500MCM	CU #2	283	236.2	0.7%	0.5%	0.4%	1.6%	1.6%	
604-19	LBD-604-19	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	595	AL 500MCM	CU #2	139	209.9	0.8%	0.2%	0.4%	1.4%	1.4%	
605-01	LBD-605-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.2%	1.2%	
605-02	LBD-605-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.1%	
605-03	LBD-605-03	17	1132.7	15.79	268.4	335.5	350	1	AL 750MCM	CU #2	230	AL 500MCM	CU #2	88	223.0	0.3%	0.1%	0.4%	0.8%	0.8%	
605-04	LBD-605-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	72	262.4	0.3%	0.1%	0.4%	0.8%	0.9%	
605-05	LBD-605-05	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	149	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
605-06	LBD-605-06	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	232	262.4	0.3%	0.5%	0.4%	1.2%	1.2%	
605-07	LBD-605-07	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	245	AL 500MCM	CU #2	399	262.4	0.5%	0.6%	0.4%	1.3%	1.4%	
605-08	LBD-605-08	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	582	262.4	0.4%	1.1%	0.4%	1.9%	2.0%	
605-09	LBD-605-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	295	AL 500MCM	CU #2	505	209.9	0.4%	0.8%	0.4%	1.6%	1.6%	
605-10	LBD-605-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	295	AL 500MCM	CU #2	438	209.9	0.4%	0.7%	0.4%	1.5%	1.5%	1.2%
605-11	LBD-605-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	376	262.4	0.4%	0.7%	0.4%	1.5%	1.6%	
605-12	LBD-605-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	399	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
605-13	LBD-605-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	232	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
605-14	LBD-605-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.0%	1.1%	
605-15	LBD-605-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
605-16	LBD-605-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	98	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
605-17	LBD-605-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
605-18	LBD-605-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	247	262.4	0.4%	0.5%	0.4%	1.3%	1.3%	
605-19	LBD-605-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	324	262.4	0.4%	0.6%	0.4%	1.4%	1.5%	
606-01	LBD-606-01	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	235	AL 500MCM	CU #2	386	262.4	0.3%	0.8%	0.4%	1.4%	1.5%	
606-02	LBD-606-02	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	235	AL 500MCM	CU #2	309	262.4	0.3%	0.6%	0.4%	1.3%	1.3%	
606-03	LBD-606-03	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	242	262.4	0.3%	0.5%	0.4%	1.1%	1.2%	
606-04	LBD-606-04	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	165	262.4	0.3%	0.3%	0.4%	1.0%	1.0%	
606-05	LBD-606-05	18	1132.7	15.79	284.2	355.3	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	82	236.2	0.3%	0.1%	0.4%	0.8%	0.8%	
606-06	LBD-606-06	19	1132.7	15.79	300.0	375.0	400	1	AL 750MCM	CU #2	220	AL 500MCM	CU #2	82	249.3	0.3%	0.2%	0.4%	0.8%	0.9%	
606-07	LBD-606-07	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	235	AL 500MCM	CU #2	134	209.9	0.3%	0.2%	0.4%	0.9%	0.9%	
606-08	LBD-606-08	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	235	AL 500MCM	CU #2	196	209.9	0.3%	0.3%	0.4%	1.0%	1.0%	
606-09	LBD-606-09	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	235	AL 500MCM	CU #2	263	209.9	0.3%	0.4%	0.4%	1.1%	1.1%	
606-10	LBD-606-10	16	1132.7	15.79	252.6	315.8	350	1	AL 600MCM	CU #2	235	AL 500MCM	CU #2	324	209.9	0.5%	0.5%	0.4%	1.2%	1.2%	1.1%
606-11	LBD-606-11	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	386	262.4	0.4%	0.8%	0.4%	1.5%	1.6%	
606-12	LBD-606-12	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	
606-13	LBD-606-13	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	227	262.4	0.4%	0.4%	0.4%	1.2%	1.3%	
606-14	LBD-606-14	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	149	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
606-15	LBD-606-15	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
606-16	LBD-606-16	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	82	262.4	0.4%	0.2%	0.4%	0.9%	1.0%	
606-17	LBD-606-17	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	165	262.4	0.4%	0.3%	0.4%	1.1%	1.1%	
606-18	LBD-606-18	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	280	AL 500MCM	CU #2	242	262.4	0.4%	0.5%	0.4%	1.2%	1.3%	
606-19	LBD-606-19	20	1132.7	15.79	315.8	394.8	400	1	AL 750MCM	CU #2	295	AL 500MCM	CU #2	309	262.4	0.4%	0.6%	0.4%	1.4%	1.4%	

1 DC FEEDER SCHEDULES
SCALE: NONE

NO	DWG	DES
1	10/25/2023	BA
2	04/22/2024	BA
3	04/11/2025	BA

NO	DATE	REVISION DESCRIPTION
1	10/25/2023	60% ELECTRICAL DESIGN
2	04/22/2024	90% LAYOUT REVIEW
3	04/11/2025	90% ELECTRICAL DESIGN

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PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE: DC FEEDER SCHEDULES

DRAWING #: E3.620

RULER IN INCHES

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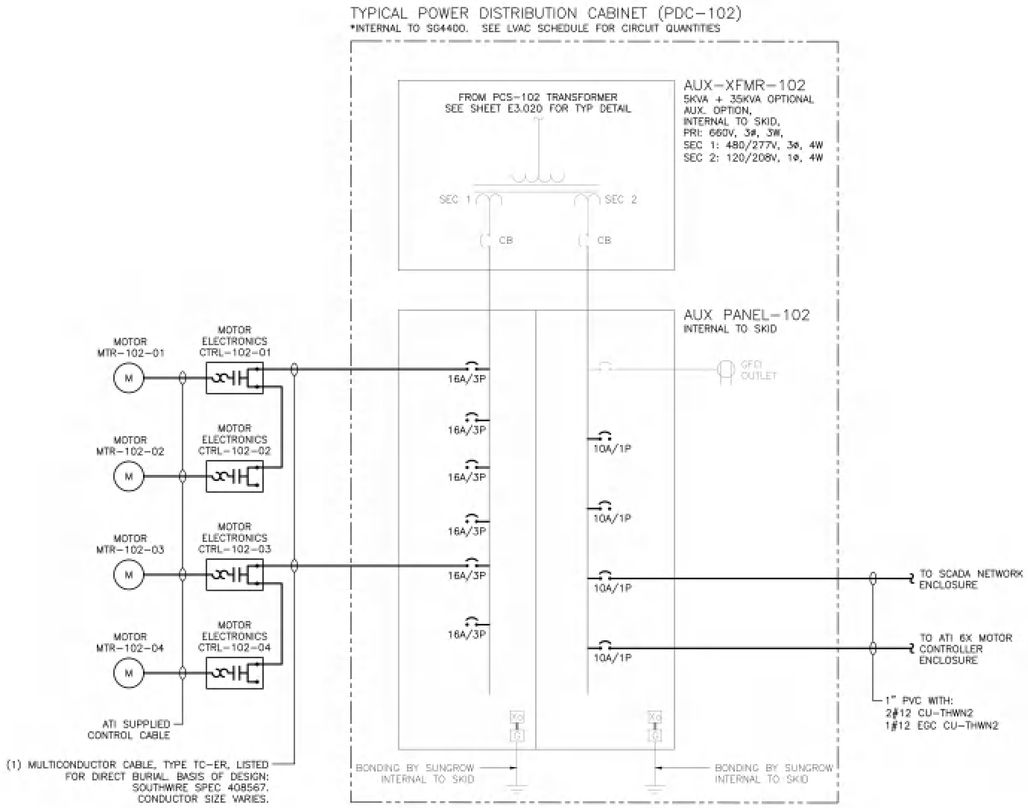
TYPICAL POWER DISTRIBUTION CABINET (PDC-102)
*INTERNAL TO SG4400. SEE LVAC SCHEDULE FOR CIRCUIT QUANTITIES



AUXILIARY EQUIPMENT SCHEDULES

	PCS TO TRACKER MOTOR	ATI 6X CONTROLLER	ATI SITE DATA CONTROLLER	SCADA NETWORK ENCLOSURE	MET STATION
PCS-101	2	1		1	1
PCS-102	2	1		1	
PCS-103	1	1		1	
PCS-104	3	1		1	
PCS-105	2	1		1	
PCS-106	3	1		1	
PCS-107	3	1		1	
PCS-201	2	1	1	1	
PCS-202	4	1		1	
PCS-203	2	1		1	
PCS-204	3	1		1	
PCS-205	3	1		1	
PCS-206	1	1		1	1
PCS-207	1	1		1	
PCS-301	2	1		1	1
PCS-302	3	1		1	
PCS-303	2	1		1	
PCS-304	2	1		1	
PCS-305	0	0		1	
PCS-306	3	1		1	
PCS-307	1	1		1	
PCS-401	2	1		1	
PCS-402	2	1		1	
PCS-403	2	1		1	1
PCS-404	1	1		1	
PCS-405	1	1		1	
PCS-406	2	1		1	
PCS-407	2	1		1	
PCS-501	1	1		1	
PCS-502	3	1		1	
PCS-503	1	1		1	
PCS-504	2	1		1	
PCS-505	3	1		1	
PCS-506	2	1		1	1
PCS-601	2	1		1	1
PCS-602	2	1		1	
PCS-603	2	1		1	
PCS-604	2	1	1	1	
PCS-605	2	1		1	
PCS-606	2	1		1	

1 LVAC SINGLE LINE DIAGRAM
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: LVAC SINGLE LINE DIAGRAM
DRAWING #: E3.800

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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PM	DRAWN	CHK
REVISION DESCRIPTION	DATE
60% ELECTRICAL DESIGN	09/05/2025	BA	AAR	EL
60% LAYOUT REVIEW	09/23/2025	BA	AAR	EL
30% ELECTRICAL DESIGN	11/11/2025	BA	SH	EL

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PLOT DATE: 11/11/2025 3:58 PM
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1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

LVAC CIRCUIT SCHEDULE

POC REFERENCE	EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS 'FLA'	FLA x 1.25	OCPD SIZE (A)	PVC CONDUIT STUB UP SIZE	GROUND SIZE	CONDUCTORS PER PHASE	PHASE CONDUCTOR SIZE	90° AMPACITY WITH C.O.U.	MOTOR CONTROL CABLE (FEET)	MOTOR POWER CABLE (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
PDC-101	MTR-101-01	PDC-101	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	445	445	0.60%	0.60%
	MTR-101-02	PDC-101	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	555	555	1.49%	1.49%
	MTR-101-03	MTR-101-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	570	30	0.77%	2.26%
	MTR-101-04	PDC-101	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	345	345	0.93%	0.93%
	MTR-101-05	MTR-101-04	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	360	30	0.48%	1.41%
PDC-102	MTR-102-01	PDC-102	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	415	15	0.56%	0.56%
	MTR-102-02	MTR-102-01	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	430	430	1.15%	1.71%
	MTR-102-03	PDC-102	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	235	235	0.63%	0.63%
	MTR-102-04	MTR-102-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	250	30	0.34%	0.97%
PDC-103	MTR-103-01	MTR-103-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	425	30	0.57%	1.67%
	MTR-103-02	PDC-103	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	410	410	1.10%	1.10%
	MTR-103-03	PDC-103	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	1045	1045	2.81%	2.81%
	MTR-103-04	MTR-103-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1060	30	1.42%	4%
PDC-104	MTR-104-01	PDC-104	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	80	80	0.11%	0.11%
	MTR-104-02	PDC-104	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	565	565	1.52%	1.52%
	MTR-104-03	MTR-104-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	565	35	0.76%	2.28%
	MTR-104-04	PDC-104	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1205	1205	1.62%	1.62%
PDC-105	MTR-105-01	PDC-105	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	235	235	0.32%	0.32%
	MTR-105-02	PDC-105	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	615	615	1.65%	1.65%
	MTR-105-03	MTR-105-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	630	30	0.85%	2.50%
PDC-106	MTR-106-01	PDC-106	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	325	325	0.44%	0.44%
	MTR-106-02	PDC-106	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	735	735	0.99%	0.99%
	MTR-106-03	PDC-106	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	765	765	2.05%	2.05%
	MTR-106-04	MTR-106-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	780	30	1.05%	3%
PDC-107	MTR-107-01	PDC-107	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	815	815	1.09%	1.09%
	MTR-107-02	PDC-107	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	455	455	1.22%	1.22%
	MTR-107-03	MTR-107-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	470	30	0.63%	1.85%
	MTR-107-04	PDC-107	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	845	845	2.27%	2.27%
	MTR-107-05	MTR-107-04	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	845	35	1.14%	3%
PDC-201	MTR-201-01	PDC-201	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	160	160	0.43%	0.63%
	MTR-201-02	MTR-201-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	175	30	0.24%	0.97%
	MTR-201-03	PDC-201	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	640	640	1.72%	1.01%
	MTR-201-04	MTR-201-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	655	30	0.88%	1.53%
PDC-202	MTR-202-01	PDC-202	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	260	260	0.70%	0.62%
	MTR-202-02	MTR-202-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	275	30	0.37%	0.95%
	MTR-202-03	PDC-202	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	320	320	0.86%	0.82%
	MTR-202-04	MTR-202-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	335	30	0.45%	1.25%
	MTR-202-05	PDC-202	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	315	315	0.42%	0.42%
	MTR-202-06	PDC-202	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	390	390	0.53%	0.48%
PDC-203	MTR-203-01	PDC-203	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	315	315	0.85%	1.38%
	MTR-203-02	MTR-203-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	330	30	0.44%	2.84%
	MTR-203-03	PDC-203	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	1085	1085	2.91%	1.92%
	MTR-203-04	MTR-203-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1105	30	1.48%	2.89%
PDC-204	MTR-204-01	PDC-204	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	845	845	1.14%	1.02%
	MTR-204-02	PDC-204	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	285	285	0.77%	0.77%
	MTR-204-03	MTR-204-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	300	30	0.40%	1.17%
	MTR-204-04	PDC-204	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	340	340	0.91%	0.97%
	MTR-204-05	MTR-204-04	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	355	30	0.48%	1.47%
PDC-205	MTR-205-01	PDC-205	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	275	275	0.37%	0.34%
	MTR-205-02	PDC-205	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	480	480	1.29%	1.22%
	MTR-205-03	MTR-205-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	495	30	0.66%	1.85%
	MTR-205-04	PDC-205	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	205	205	0.28%	0.25%
PDC-206	MTR-206-01	PDC-206	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	235	235	0.63%	0.93%
	MTR-206-02	MTR-206-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	235	35	0.32%	1.56%
	MTR-206-03	PDC-206	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1000	1000	1.35%	2.90%
PDC-207	MTR-207-01	PDC-207	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	230	230	0.31%	0.37%
	MTR-207-02	PDC-207	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	960	960	2.58%	2.05%
	MTR-207-03	MTR-207-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	975	30	1.31%	2.90%

1 LVAC SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: LVAC SCHEDULES

DRAWING #: E3.810

PM	DWG
BH	AAR
BH	AAR
BH	EL
BH	EL

DATE	REVISION / DESCRIPTION
09/05/2025	40% ELECTRICAL DESIGN
09/22/2025	60% LAYOUT REVIEW
10/22/2025	90% ELECTRICAL DESIGN
11/17/2025	

ENGINEER:
PUREPOWER ENGINEERING
111 RYAN STREET, HUBBARD, NJ
WWW.PUREPOWER.COM

PREPARED FOR:
LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
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PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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PLOT DATE: 11/17/2025 8:14 PM

RULER IN INCHES

SHEET NOTES:
1. DISTANCES ARE ONE-WAY ESTIMATES GENERATED FOR ENGINEER'S CALCULATIONS, CONTRACTOR IS RESPONSIBLE FOR OWN MEASUREMENTS AND TAKEOFFS.

LVAC CIRCUIT SCHEDULE

PDC REFERENCE	EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS 'FLA'	FLA x 1.25	OCPD SIZE [A]	PVC CONDUIT STUB UP SIZE	GROUND SIZE	CONDUCTORS PER PHASE	PHASE CONDUCTOR SIZE	90° AMPACITY WITH C.O.U.	MOTOR CONTROL CABLE (FEET)	MOTOR POWER CABLE (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
PDC-301	MTR-301-01	PDC-301	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	225	225	0.60%	0.37%
	MTR-301-02	PDC-301	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	885	885	2.38%	1.99%
	MTR-301-03	MTR-301-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	900	30	1.21%	2.82%
	MTR-301-04	PDC-301	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	605	605	1.62%	1.62%
	MTR-301-05	MTR-301-04	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	625	30	0.84%	2.47%
PDC-302	MTR-302-01	PDC-302	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	310	310	0.42%	0.42%
	MTR-302-02	PDC-302	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	245	245	0.33%	0.17%
	MTR-302-03	PDC-302	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	820	820	2.20%	1.10%
	MTR-302-04	MTR-302-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	835	30	1.12%	2.22%
PDC-303	MTR-303-01	PDC-303	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	1220	1220	3.28%	1.47%
	MTR-303-02	MTR-303-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1235	30	1.66%	2.63%
	MTR-303-03	PDC-303	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	770	770	2.07%	1.14%
	MTR-303-04	MTR-303-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	785	30	1.06%	1.73%
PDC-304	MTR-304-01	PDC-304	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	505	505	1.36%	1.49%
	MTR-304-02	MTR-304-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	525	30	0.71%	2.26%
	MTR-304-03	PDC-304	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	1055	1055	2.83%	1.88%
	MTR-304-04	MTR-304-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1070	30	1.44%	2.84%
PDC-306	MTR-306-01	PDC-306	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	300	300	0.40%	0.40%
	MTR-306-02	PDC-306	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	310	310	0.83%	0.83%
	MTR-306-03	MTR-306-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	325	30	0.44%	0.84%
	MTR-306-04	PDC-306	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	740	740	1.93%	1.93%
	MTR-306-05	MTR-306-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	745	30	1.00%	1.84%
PDC-307	MTR-307-01	PDC-307	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	405	405	1.09%	1.14%
	MTR-307-02	MTR-307-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	420	30	0.57%	1.71%
PDC-401	MTR-401-01	PDC-401	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	645	645	0.87%	0.87%
	MTR-401-02	PDC-401	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	240	240	0.64%	0.64%
	MTR-401-03	MTR-401-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	255	30	0.34%	0.99%
PDC-402	MTR-402-01	PDC-402	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	645	645	0.87%	0.87%
	MTR-402-02	PDC-402	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	365	365	0.98%	0.98%
	MTR-402-03	MTR-402-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	380	30	0.51%	1.49%
PDC-403	MTR-403-01	PDC-403	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	995	995	2.67%	2.67%
	MTR-403-02	MTR-403-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	1010	30	1.36%	4%
	MTR-403-03	PDC-403	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	435	435	1.17%	1.17%
	MTR-403-04	MTR-403-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	450	30	0.61%	1.77%
PDC-404	MTR-404-01	PDC-404	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	320	320	0.86%	0.86%
	MTR-404-02	MTR-404-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	335	30	0.45%	1.31%
PDC-405	MTR-405-01	PDC-405	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	535	535	1.44%	1.44%
	MTR-405-02	MTR-405-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	550	30	0.74%	2.18%
PDC-406	MTR-406-01	PDC-406	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	270	270	0.72%	0.72%
	MTR-406-02	MTR-406-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	285	30	0.38%	1.11%
	MTR-406-03	PDC-406	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	830	830	2.23%	2.23%
	MTR-406-04	MTR-406-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	845	30	1.14%	3%
PDC-407	MTR-407-01	PDC-407	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	370	370	0.99%	0.99%
	MTR-407-02	MTR-407-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	385	30	0.52%	1.51%
	MTR-407-03	PDC-407	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	530	530	1.42%	1.42%
	MTR-407-04	MTR-407-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	545	30	0.73%	2.16%

1 LVAC SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: LVAC SCHEDULES

DRAWING #: E3.820

NO	DATE	REVISION DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

ENGINEER: PURE POWER ENGINEERING, 111 RYER STREET, HUBBARD, NJ, WWW.PUREPOWERNJ.COM

PREPARED FOR: LANGAN, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

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LVAC CIRCUIT SCHEDULE

POC REFERENCE	EQUIPMENT SUPPLIED	FED FROM	VOLTAGE	FULL LOAD AMPS 'FLA'	FLA x 1.25	OCPD SIZE [A]	PVC CONDUIT STUB UP SIZE	GROUND SIZE	CONDUCTORS PER PHASE	PHASE CONDUCTOR SIZE	90° AMPACITY WITH C.O.U.	MOTOR CONTROL CABLE (FEET)	MOTOR POWER CABLE (FEET)	SEGMENT VOLTAGE DROP AT FLA	TOTAL VOLTAGE DROP AT FLA
PDC-501	MTR-501-01	PDC-501	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	435	435	1.17%	1.17%
	MTR-501-02	MTR-501-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	450	30	0.61%	1.77%
PDC-502	MTR-502-01	PDC-502	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	985	985	1.32%	1.32%
	MTR-502-02	PDC-502	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	750	750	2.01%	2.01%
	MTR-502-03	MTR-502-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	765	30	1.03%	3%
	MTR-502-04	PDC-502	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	265	265	0.71%	0.71%
	MTR-502-05	MTR-502-04	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	280	30	0.38%	1.09%
PDC-503	MTR-503-01	PDC-503	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	375	375	1.01%	1.01%
	MTR-503-02	MTR-503-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	390	30	0.53%	1.53%
PDC-504	MTR-504-01	PDC-504	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	230	230	0.31%	0.31%
	MTR-504-02	PDC-504	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	340	340	0.46%	0.46%
PDC-505	MTR-505-01	PDC-505	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	320	320	0.43%	0.43%
	MTR-505-02	PDC-505	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	500	500	1.34%	1.34%
	MTR-505-03	MTR-505-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	520	30	0.70%	2.04%
	MTR-505-04	PDC-505	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	640	640	1.72%	1.72%
	MTR-505-05	MTR-505-04	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	655	30	0.88%	2.60%
PDC-506	MTR-506-01	PDC-506	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	465	465	1.25%	1.25%
	MTR-506-02	MTR-506-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	480	30	0.65%	1.89%
	MTR-506-03	PDC-506	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	595	595	1.60%	1.60%
	MTR-506-04	MTR-506-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	595	55	0.80%	2.40%
PDC-601	MTR-601-01	PDC-601	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	370	370	0.99%	0.99%
	MTR-601-02	MTR-601-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	385	30	0.52%	1.51%
	MTR-601-03	PDC-601	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	875	875	2.35%	2.35%
	MTR-601-04	MTR-601-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	895	30	1.21%	4%
PDC-602	MTR-602-01	PDC-602	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	535	535	1.44%	1.44%
	MTR-602-02	MTR-602-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	555	30	0.75%	2.18%
	MTR-602-03	PDC-602	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	665	665	1.79%	1.79%
	MTR-602-04	MTR-602-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	680	30	0.92%	2.70%
PDC-603	MTR-603-01	MTR-603-02	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	750	30	1.01%	2.98%
	MTR-603-02	PDC-603	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	735	735	1.97%	1.97%
	MTR-603-03	PDC-603	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	805	805	2.16%	2.16%
	MTR-603-04	MTR-603-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	820	30	1.10%	3%
PDC-604	MTR-604-01	PDC-604	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	970	970	2.60%	2.60%
	MTR-604-02	MTR-604-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	985	30	1.33%	4%
	MTR-604-03	PDC-604	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	410	410	1.10%	1.10%
	MTR-604-04	MTR-604-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	425	30	0.57%	1.67%
PDC-605	MTR-605-01	PDC-605	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	420	420	1.13%	1.13%
	MTR-605-02	MTR-605-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	435	30	0.59%	1.71%
	MTR-605-03	PDC-605	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	385	385	1.03%	1.03%
	MTR-605-04	MTR-605-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	400	30	0.54%	1.57%
PDC-606	MTR-606-01	PDC-606	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	280	280	0.75%	0.75%
	MTR-606-02	MTR-606-01	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	295	30	0.40%	1.15%
	MTR-606-03	PDC-606	480	6.2	8	16	3/4"	CU #10	1	CU #10	40	425	425	1.14%	1.14%
	MTR-606-04	MTR-606-03	480	3.1	4	16	3/4"	CU #10	1	CU #10	40	440	30	0.59%	1.73%

1 LVAC SCHEDULES
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE	DRAWING #
LVAC SCHEDULES	E3.830

PROJECT
SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PAGE SIZE	PROJECT #
36" x 24"	TX-PS-2701

PREPARED FOR: LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

ENGINEER:
PURE POWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWERPE.COM

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BH	AAR
2	09/23/2025	60% LAYOUT REVIEW	BH	AAR
3	10/17/2025	30% ELECTRICAL DESIGN	BH	AAR

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PLOT DATE: 10/9/2025 9:18 PM

RULER IN INCHES

FENCE GATES TO BE GROUNDED (TYPICAL) SEE 1/E4.110

FENCE TO BE GROUNDED AT ANY LOCATION WHERE MV CONDUCTORS CROSS THE FENCE (TYPICAL) SEE 3/E4.110

SUBSTATION AND POI

MET-101 SB-102 MVSC-102

MVSC-101 SB-101

MVSC-201 SB-201 MET-301

MET-206

MET-403

MVSC-401 SB-401 MVSC-501 SB-501 MVSC-601 SB-601

SB-402 MVSC-402 MVSC-502 SB-502

SB-602 MVSC-602 MET-601

MET-506

ALBEDO-103 ALBEDO-304 ALBEDO-501

CTL-201-01 CTL-604-01

FEEDER 100 FEEDER 200 FEEDER 300 FEEDER 400 FEEDER 500 FEEDER 600

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FENCE
- UTILITY SETBACK
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION & AUX RACK
- MV SECTIONALIZER CABINET (MVSC)

1 GROUNDING SITE PLAN
SCALE: 1" = 350'

N

NOT FOR CONSTRUCTION

DRAWING TITLE: GROUNDING SITE PLAN

DRAWING #: E4.000

PM	DRC
BA	ARR
BA	ARR
BA	JH

DATE	REVISION DESCRIPTION
09/05/2025	60% ELECTRICAL DESIGN
10/23/2025	90% LAYOUT REVIEW
11/11/2025	30% ELECTRICAL DESIGN

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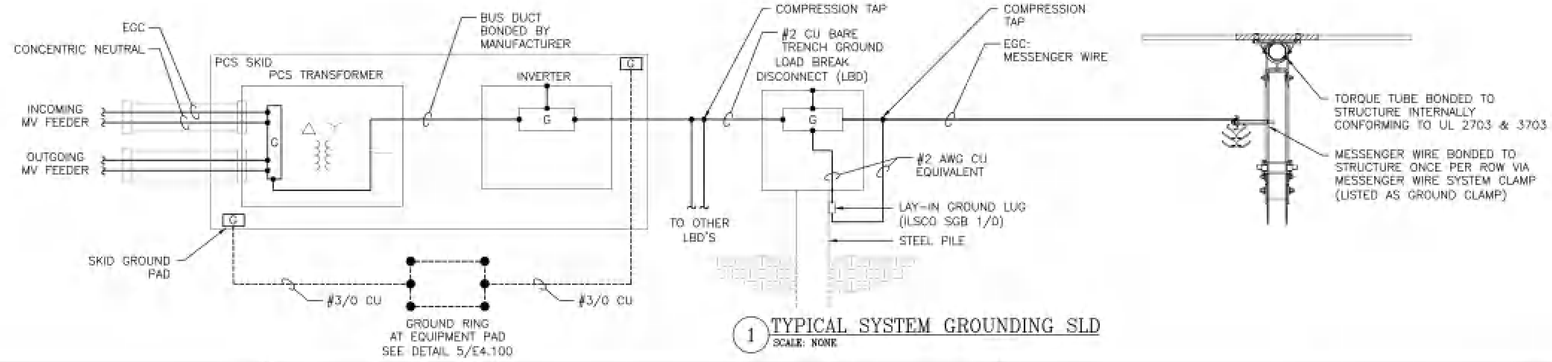
PREPARED FOR: LANGAN

PAGE SIZE: 36" x 24"

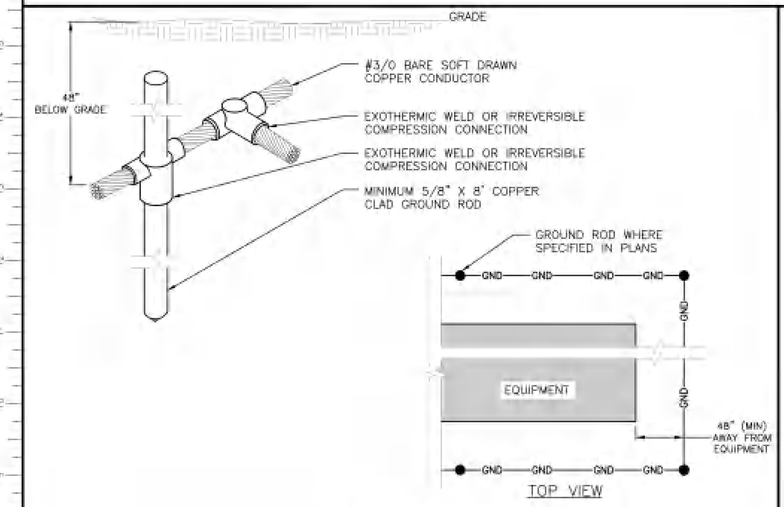
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

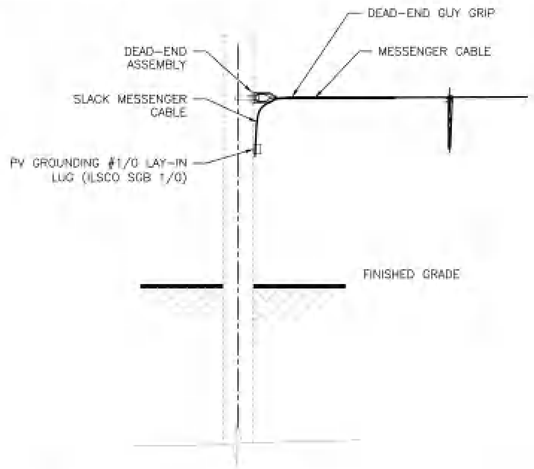
RULER IN INCHES



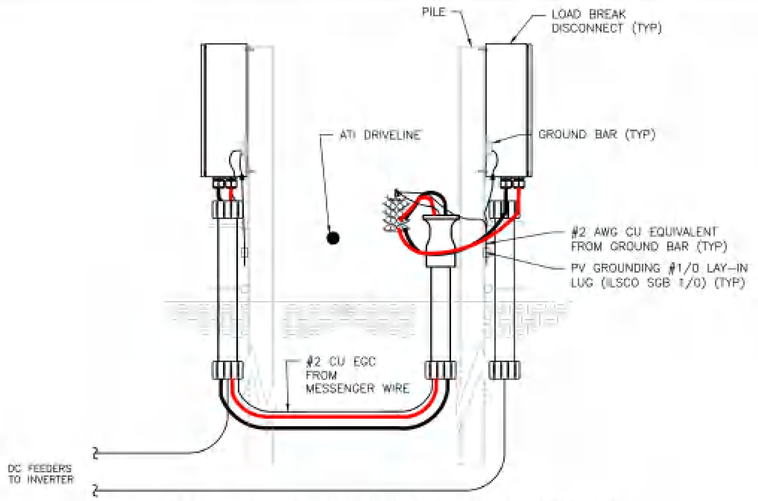
1 TYPICAL SYSTEM GROUNDING SLD
SCALE: NONE



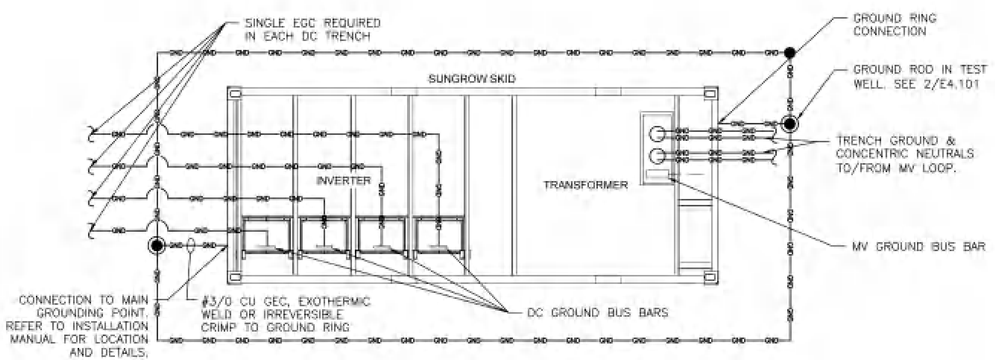
2 GROUND RING
SCALE: NONE



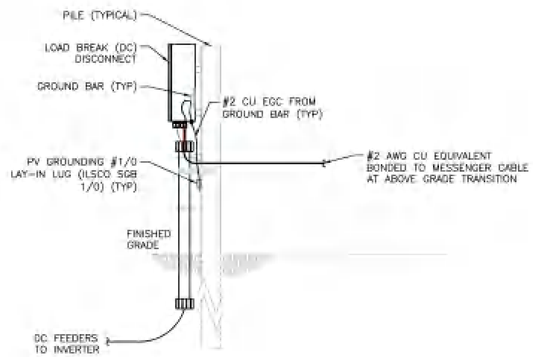
3 MESSENGER DEAD END GROUNDING
SCALE: NONE



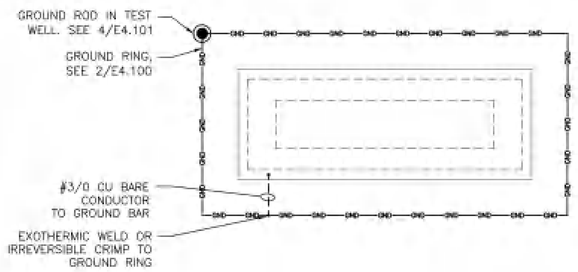
4 LOAD BREAK DISCONNECT (LBD) GROUNDING
SCALE: NONE



5 TYPICAL PCS GROUNDING
SCALE: NONE



6 LOAD BREAK DISCONNECT (LBD) GROUNDING (END OF ROW)
SCALE: NONE



7 MV SECTIONALIZER GROUNDING
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: GROUNDING DETAILS

DRAWING #: E4.100

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

LANGAN, LLC 840 GESSNER ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

PURE POWER ENGINEERING 111 RIVER STREET, HOBOKEN, NJ WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	60% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	EL

SIZE: 36" x 24" PROJECT #: TX-PS-2701

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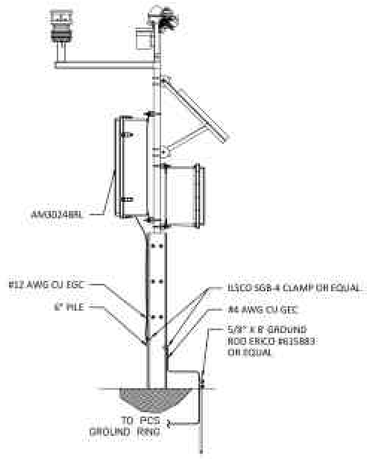
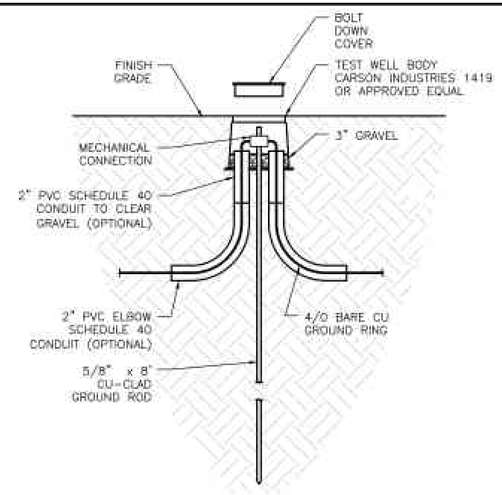
RULER IN INCHES



FINAL MET STATION DESIGN PENDING SCADA DESIGN.

1 MET STATION GROUNDING
SCALE: NONE



2 GROUND TEST WELL
SCALE: NONE

NO	DATE	REVISION DESCRIPTION	BY	CHK
04	09/05/2023	60% ELECTRICAL DESIGN	BA	AAR
03	06/23/2023	SITE LAYOUT REVIEW	BA	AAR
02	04/11/2023	30% ELECTRICAL DESIGN	BA	CH

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PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

NOT FOR CONSTRUCTION

DRAWING TITLE
GROUNDING DETAILS

DRAWING #
E4.101

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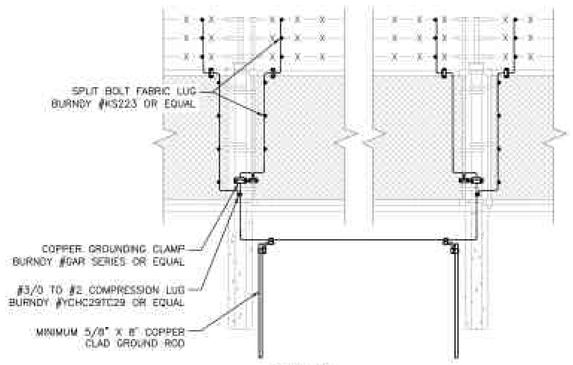
PLOT DATE: 9/5/2023 9:16 PM

RULER IN INCHES: 0 1 2 3 4 5 6 7 8 9 10

FENCE GROUNDING NOTES:
(1) COORDINATE EXACT GROUNDING HARDWARE REQUIREMENTS WITH FENCE CONTRACTOR. GROUNDING HARDWARE SHALL BE COMPATIBLE WITH PHYSICAL ASPECTS OF THE FENCE DESIGN (I.E. POST DIAMETER).
(2) DETAILS ARE SHOWN FOR ELECTRICAL GROUNDING COORDINATION ONLY. REFER TO CIVIL DRAWINGS FOR FENCE SPECIFICATIONS.



ELEVATION

1 GROUNDED FENCE GATE
SCALE: NONE

NOTES:
1. SURVEYOR SHALL MARK ALL ENDS OF ALL GROUNDED FENCE SEGMENTS WITH WOODEN STAKE PRIOR TO CONSTRUCTION.
2. FENCE SECTIONS SHALL BE GROUNDED WHEN HV OVERHEAD TRANSMISSION LINE IS WITHIN 100' OF ANY PART OF FENCE.
3. ALL FENCE GATES SHALL BE GROUNDED PER DETAIL 1/E411.

NO	DATE	REVISION DESCRIPTION	BY	CHKD
0	05/05/2025	60% ELECTRICAL DESIGN	BA	AAR
1	06/23/2025	SITE LAYOUT REVIEW	BA	AAR
2	08/11/2025	90% ELECTRICAL DESIGN	BA	AAR

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PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE
FENCE GROUNDING DETAILS

DRAWING #
E4.110

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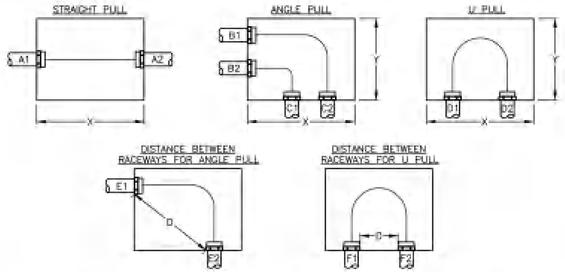
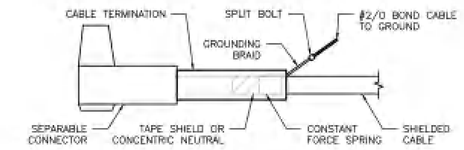
PLOT DATE: 8/5/2025 9:54 PM
RULER IN INCHES



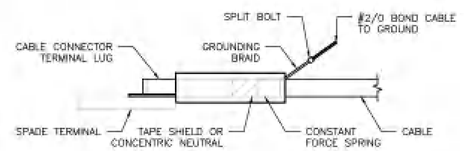
NEC 314.28(A)(1)–(3) PULL BOX SIZING (UP TO 1000V)			
BOX TYPE	LENGTH (X)	HEIGHT (Y)	DISTANCE (D)
STRAIGHT PULL	8 X LARGEST OF A1 & A2	AS NEEDED	N/A
ANGLE PULL	6 X (LARGEST OF B1 & B2) + SUM OF OTHER CONDUIT ENTERING THE SAME WALL	6 X (LARGEST OF C1 & C2) + SUM OF OTHER CONDUIT ENTERING THE SAME WALL	6 X LARGEST OF E1 & E2
U PULL	AS NEEDED	6 X (LARGEST OF D1 & D2) + SUM OF OTHER CONDUIT ENTERING THE SAME WALL	6 X LARGEST OF F1 & F2

NOTE:
REFER TO NEC 314.28 FOR ADDITIONAL REQUIREMENTS.

1 PULL BOX & JUNCTION BOX SIZING
SCALE: NONE

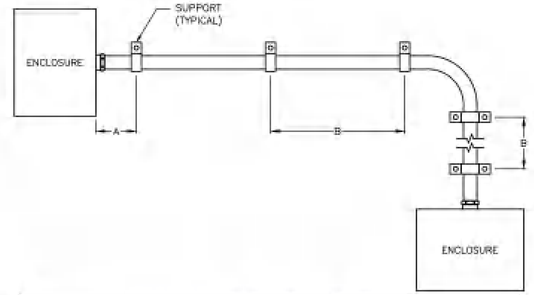


DEAD FRONT MV TERMINATION



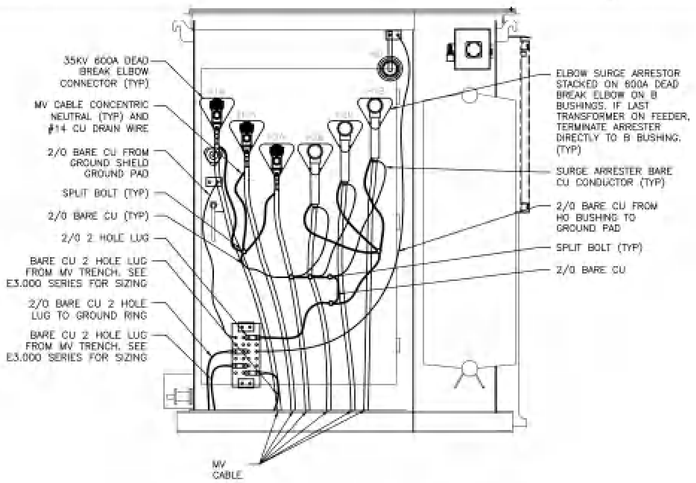
LIVE FRONT MV TERMINATION

2 MV CABLE TERMINATION
SCALE: NONE

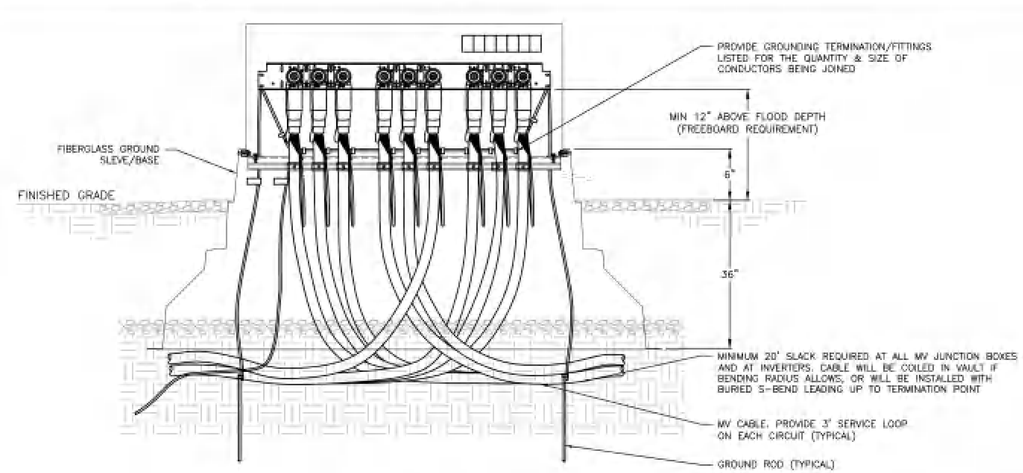


MAXIMUM CONDUIT HARDWARE SPACING			
CONDUIT TYPE	ENCLOSURE TO SUPPORT (A)	SUPPORT TO SUPPORT (B)	NEC ARTICLE
ELECTRICAL METALLIC TUBING (EMT)	3'	10'	358
INTERMEDIATE METAL CONDUIT (IMC)	3'	10'	342
RIGID METAL CONDUIT (RMC)	3'	10'	344
LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)	1'	4.5'	350
PVC (SCH40 & 80) [0.5" - 1"]	3'	3'	352
PVC (SCH40 & 80) [1.25" - 2"]	3'	5'	352
PVC (SCH40 & 80) [2.5" - 3"]	3'	6'	352
PVC (SCH40 & 80) [3.5" - 5"]	3'	7'	352
PVC (SCH40 & 80) [6"]	3'	8'	352

3 CONDUIT SUPPORT SPACING
SCALE: NONE



4 PCS MV TERMINATION
SCALE: NONE



5 TYPICAL MV JUNCTION BOX CABINET
SCALE: NONE

NO.	DESCRIPTION	DATE	BY
0	30% ELECTRICAL DESIGN	10/13/2023	EL
1	60% LAYOUT REVIEW	09/05/2023	AAR
2	60% ELECTRICAL DESIGN	10/13/2023	AAR
3	90% ELECTRICAL DESIGN	11/17/2023	EL

ISSUED FOR:

PREPARED BY:
PUREPOWER ENGINEERING
111 RYAN STREET, HUBBARD, NJ
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PREPARED FOR:
LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
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PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

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DRAWING TITLE:
ELECTRICAL DETAILS

DRAWING #:
E4.200

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PLOT DATE: 6/5/2025 8:49 AM
RULER IN INCHES

MV/DC CROSSING INDEX								
CROSSING INDEX	CASE	OBSTACLE CROSSED	TYPE (TRENCH/BORE)	BORE FEEDER QTY	TRENCH FEEDER QTY	RACEWAY TYPE	DETAIL (SHEET E4.310)	FEEDER ID
MV-01	3A	ONCOR EASEMENT	TRENCH	N/A	2	DIRECT BURIED	1	MVF-MVSC-101, MVF-PCS-301
MV-02	3B	WETLAND	TRENCH	N/A	4	DIRECT BURIED	4	MVF-PCS-203, MVF-MVSC-402, MVF-MVSC-502, MVF-MVSC-602

LINETYPE LEGEND

- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FENCE
- FENCE SETBACK
- UTILITY SETBACK
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

1 UNDERGROUND CROSSING SITE PLAN
SCALE: 1" = 350

NOT FOR CONSTRUCTION

DRAWING TITLE: UNDERGROUND CROSSING SITE PLAN

DRAWING # E4.300

PN	DWG	DES
REVISION DESCRIPTION		
6/4	AJR	E.L.
6/4	AJR	E.L.
6/4	SH	E.L.

DATE	
09/05/2025	40% ELECTRICAL DESIGN
10/22/2025	60% LAYOUT REVIEW
11/17/2025	30% ELECTRICAL DESIGN

ENGINEER:

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PREPARED FOR: LANGAN

LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

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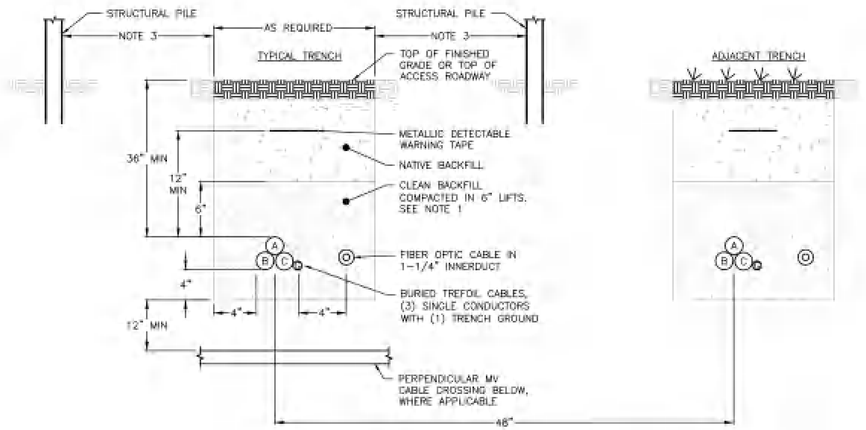
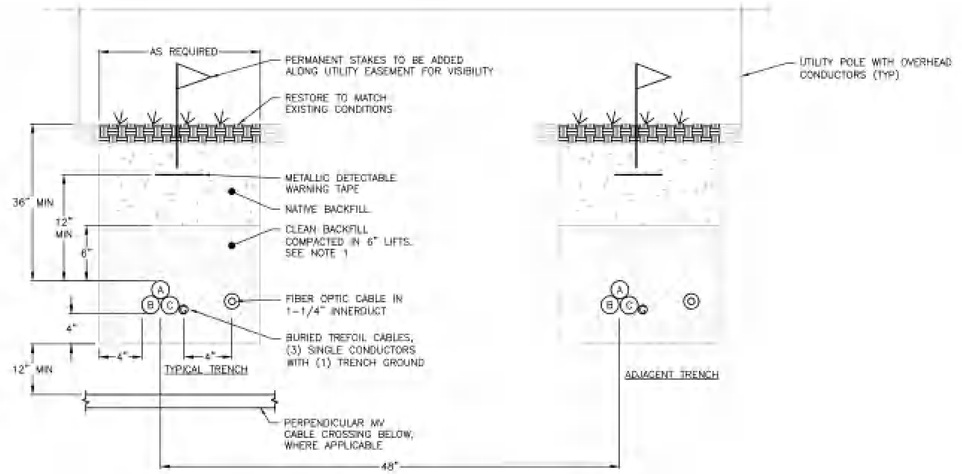
PLOT DATE: 11/17/2025 3:53 PM

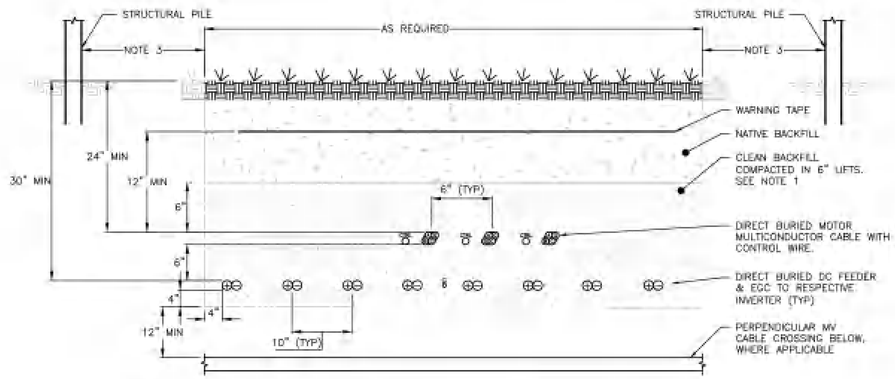
BAR MEASURES 1" IF NOT 1" ADJUST SCALES ACCORDINGLY



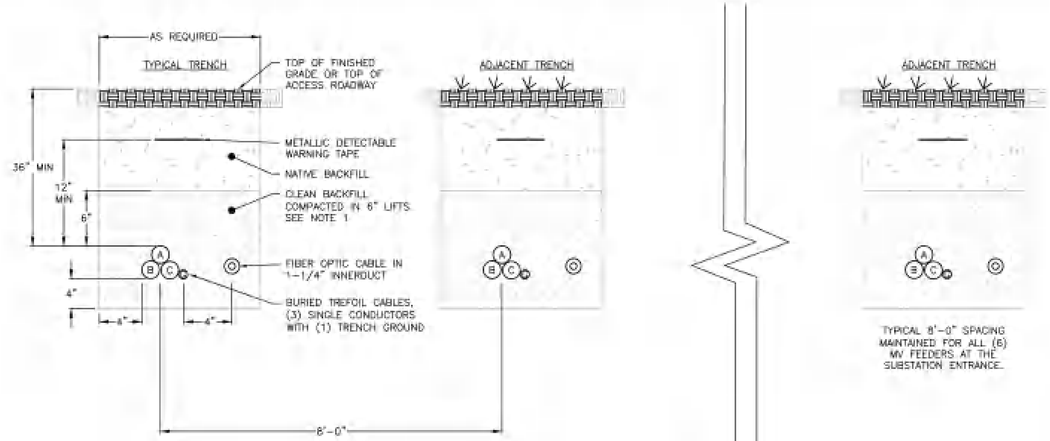
1 TYPICAL MV CONDUCTOR TRENCH
SCALE: NONE



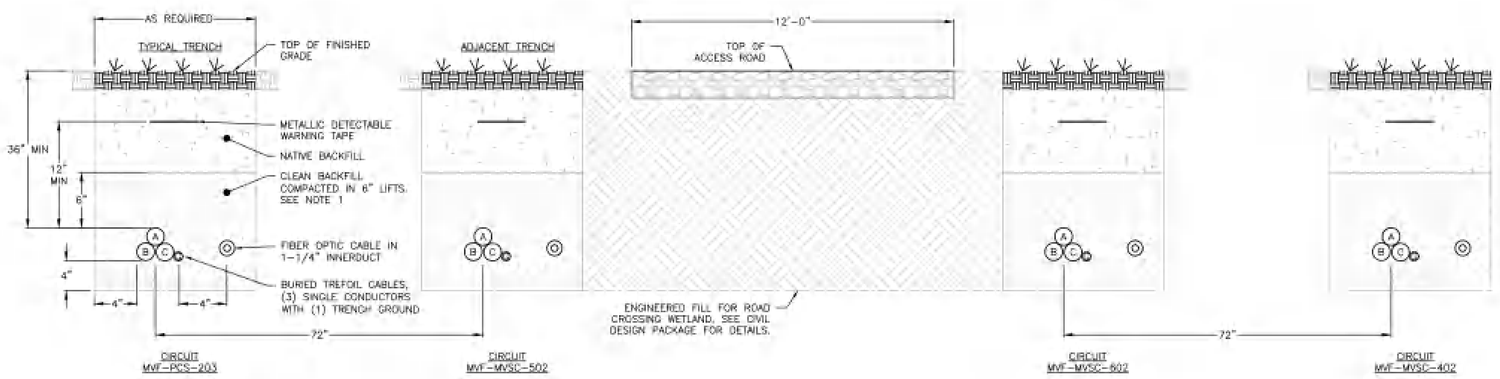
2 MV CONDUCTOR TRENCH – OVERHEAD UTILITY CROSSING
SCALE: NONE



3 TYPICAL DC/LVAC TRENCH
SCALE: NONE



4 MV CONDUCTOR SUBSTATION ENTRANCE
SCALE: NONE



5 PARALLEL TRENCHES ALONGSIDE ROAD – STREAM & WETLAND CROSSING – SECTION
SCALE: NONE

SHEET NOTES:
1. NATIVE BACKFILL CONTAINING NO ROCKS LARGER THAN 3/4", FREE FROM SHARP ANGULAR SUBSTANCES AND ORGANIC MATERIAL, SHALL BE COMPACTED IN THE FOLLOWING MANNER:
   1.1. NON-ROADWAYS: 85% STANDARD PROCTOR
   1.2. ACCESS ROADWAYS: 95% STANDARD PROCTOR BELOW THE STABILIZED SUBGRADE. REFER TO GEOTECHICAL REPORT AND CIVIL DRAWINGS FOR ACCESS ROADWAY CONSTRUCTION REQUIREMENTS.
   1.3. AS AN ALTERNATE, PLOW INSTALLATION IS ALLOWED.
2. WHERE MV CABLE CROSSES ANOTHER OBJECT, ROUTE BELOW AS SHOWN AND TRANSITION FIBER HORIZONTALLY ADJACENT TO THE CABLE THROUGHOUT THE LENGTH OF THE CROSSING.
3. TRENCH EDGE SHALL BE BE LOCATED A HORIZONTAL DISTANCE AWAY FROM ANY STRUCTURAL ELEMENT EQUAL TO OR GREATER THAN THE DEPTH OF THE TRENCH.
4. ALL INNERDUCTS/BORE CONDUITS SHALL BE HDPE, SDR-13.5.
5. SUBSTATION ENTRANCE PLAN VIEW TO BE INCORPORATED IN 60% DESIGN PACKAGE.

NOT FOR CONSTRUCTION

DRAWING TITLE: TRENCH DETAILS

DRAWING #: E4.310

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 266, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" x 24" | PROJECT #: TX-PS-2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 DESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PURE POWER ENGINEERING, 111 RYAN STREET, HUBBARD, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	APP.	E.I.
3	09/25/2025	60% ELECTRICAL DESIGN	BH	JWR	E.I.
2	08/22/2025	60% LAYOUT REVIEW	BH	JWR	E.I.
1	04/11/2025	30% ELECTRICAL DESIGN	BH	JWR	E.I.

DESIGNED BY:

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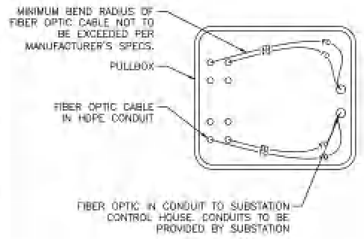
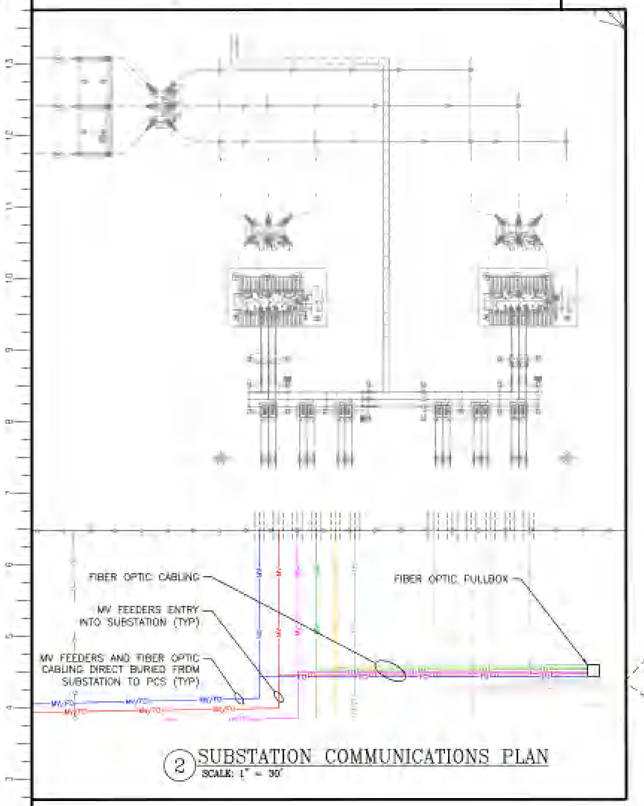
PLOT DATE: 9/8/2025 9:57 PM

BY/EP IN INCHES

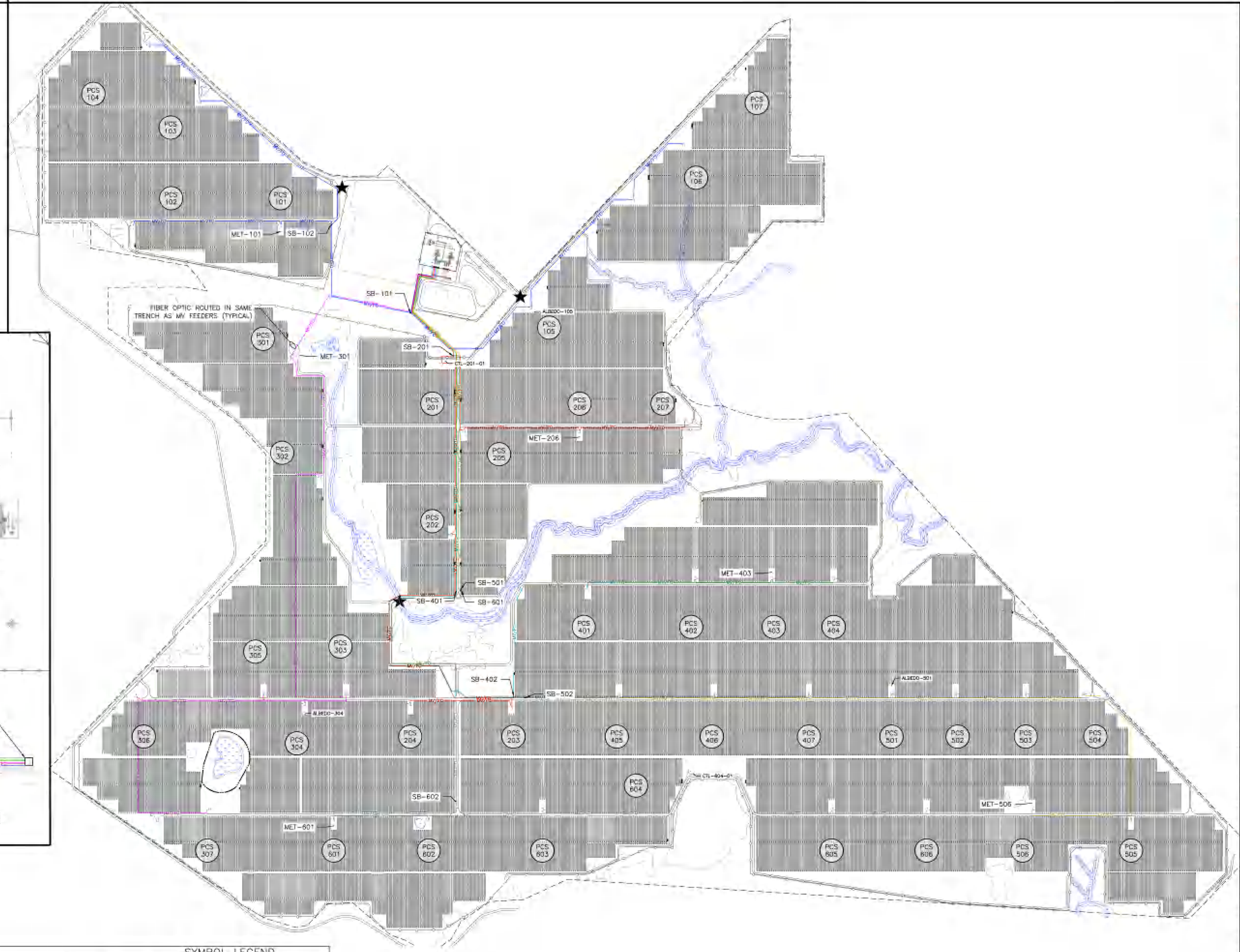
NOTES:
1. ROUTING IS FOR DIAGRAMMATIC PURPOSES AND IS NOT A PHYSICAL REPRESENTATION.
2. COORDINATE SIZE AND LOCATION OF CONDUITS COMING FROM SUBSTATION WITH SUBSTATION ENGINEER. CONTRACTOR SHALL PULL THE FIBER OPTIC CABLE INTO THE CONTROL HOUSE AND TERMINATE.
3. PULL BOX SHALL BE MINIMUM 24" X 24". COORDINATE EXACT LOCATION WITH SUBSTATION ENGINEER.
4. SEE SHEETS E6.010–E6.020 FOR SLD.



3 FIBER OPTIC PULLBOX
SCALE: 1" = 1'-0"



2 SUBSTATION COMMUNICATIONS PLAN
SCALE: 1" = 30'



LINETYPE LEGEND
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FENCE
- PROPERTY BOUNDARY
- UTILITY SETBACK
- STREAM
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND
- POWER CONVERSION STATION
- PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)
- SPLICE BOX (SB)
- SITE ACCESS POINT
- MET STATION

1 COMMUNICATIONS SITE PLAN
SCALE: 1" = 350'

N

NOT FOR CONSTRUCTION

NO.	DESCRIPTION	DATE	PM	CHK
	60% ELECTRICAL DESIGN	09/05/2025	BA	MR
	90% ELECTRICAL DESIGN	10/23/2025	BA	MR
	30% ELECTRICAL DESIGN	11/11/2025	BA	EL

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111 MAIN STREET HUDSON, NJ
WWW.PUREPOWER.COM

ENGINEER

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PREPARED FOR: LANGAN

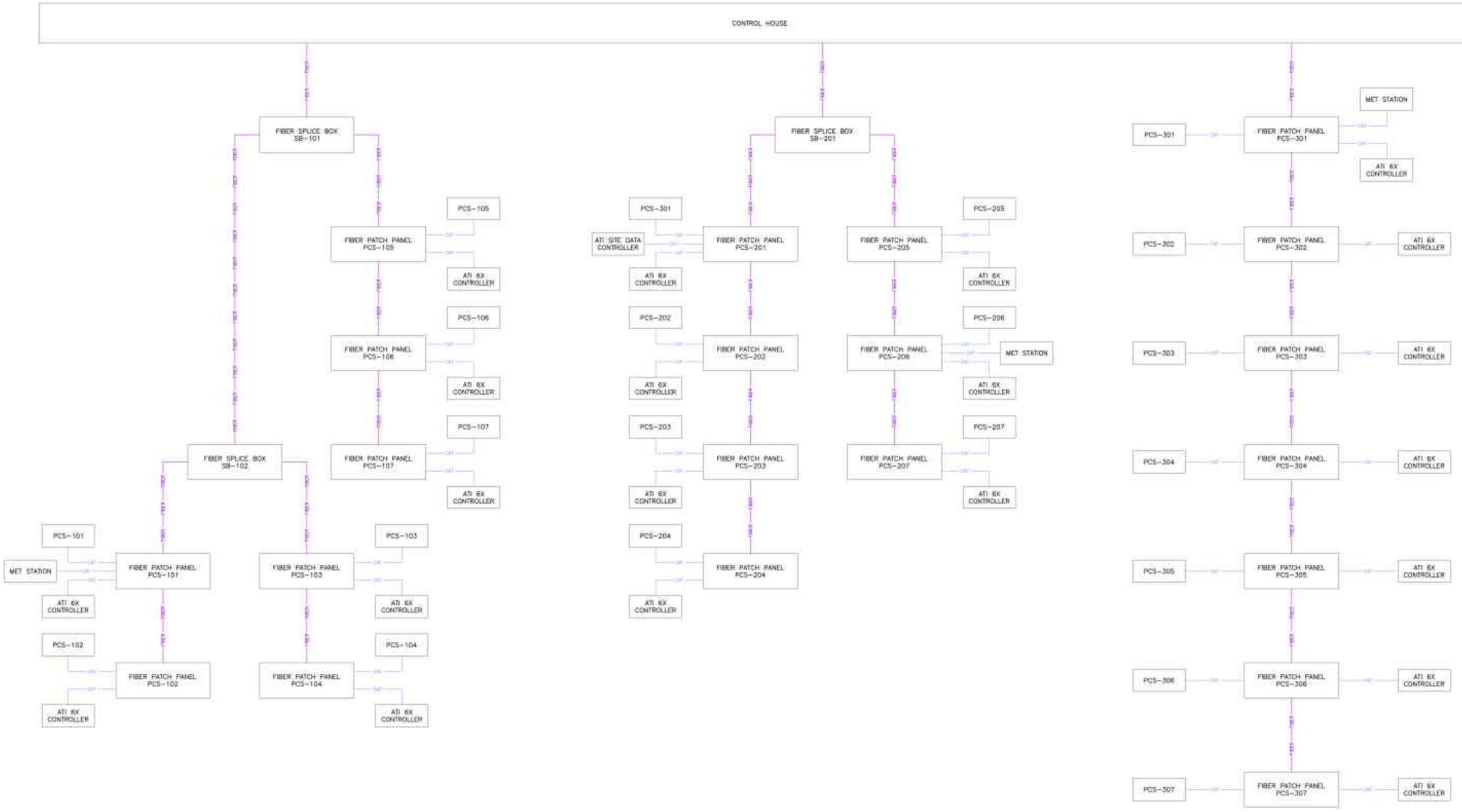
PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

DRAWING TITLE
COMMUNICATIONS SITE PLAN

DRAWING #
E6.000

RULER IN INCHES



12C, MM FIBER CABLE OM4

SHIELDED CAT6 (ETHERNET)

CONDUIT SCHEDULE	
CABLE TYPE	CONDUIT SIZE
FIBER OPTIC	1"
CAT6	1"

1 COMMUNICATIONS ONE LINE DIAGRAM
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: COMMUNICATIONS ONE LINE DIAGRAM

DRAWING #: E6.010

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	09/23/2025	SITE LAYOUT REVIEW	BA	AAR
3	11/11/2025	90% ELECTRICAL DESIGN	BA	AAR

ENGINEER: PUREPOWER ENGINEERING, 111 MAIN STREET, HANOVER, NJ, WWW.PUREPOWERPE.COM

PREPARED FOR: LANGAN

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PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX-PS-2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

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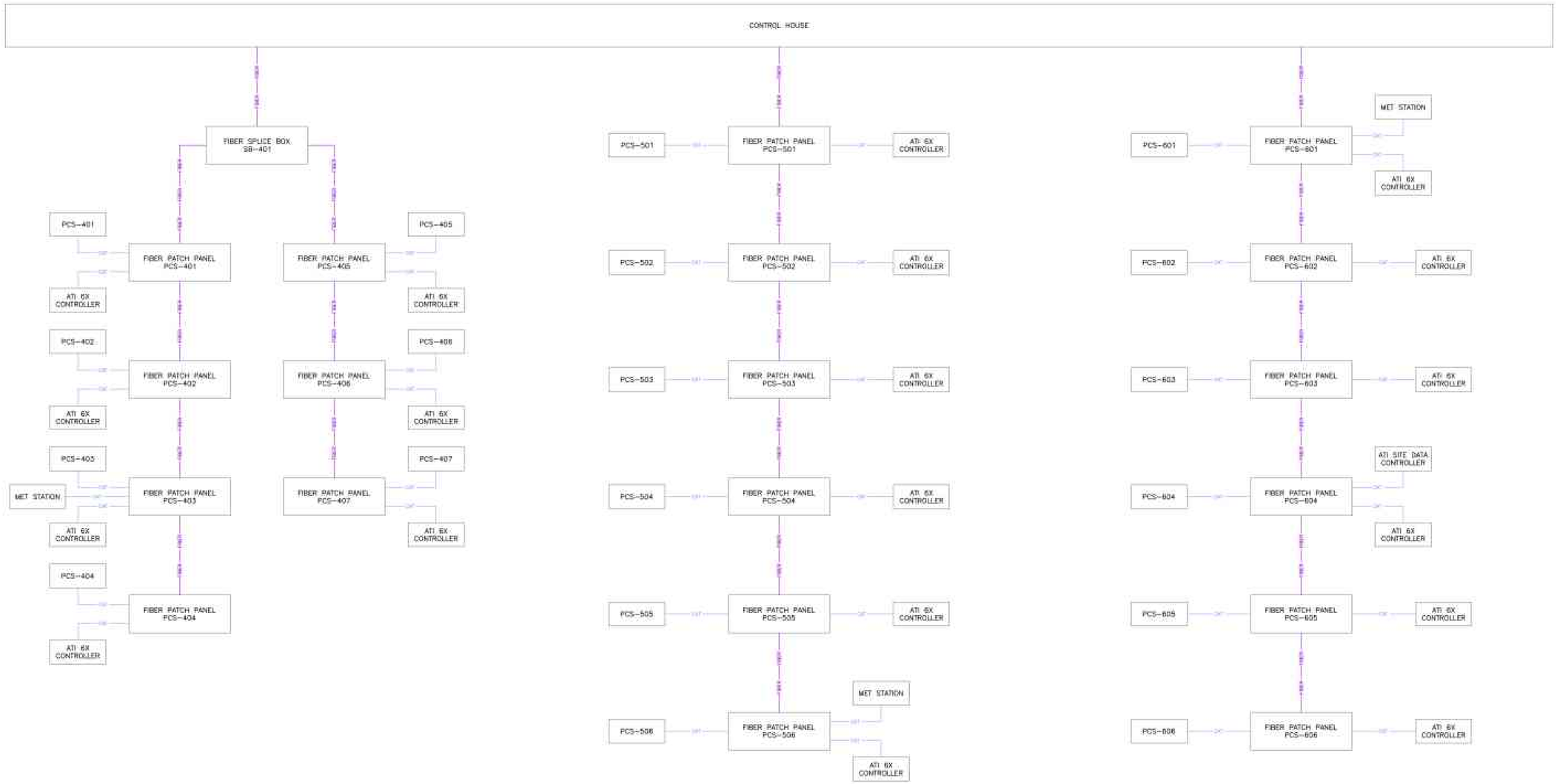
RULER IN INCHES



12C, MM FIBER CABLE OM4

SHIELDED CAT6 (ETHERNET)

CONDUIT SCHEDULE	
CABLE TYPE	CONDUIT SIZE
FIBER OPTIC	1"
CAT6	1"

1 COMMUNICATIONS ONE LINE DIAGRAM
SCALE: NONE

NOT FOR CONSTRUCTION

DRAWING TITLE: COMMUNICATIONS ONE LINE DIAGRAM

DRAWING #: E6.020

NO	DATE	REVISION DESCRIPTION	BY	CHK
1	09/05/2023	60% ELECTRICAL DESIGN	BA	AMR
2	09/22/2023	SITE LAYOUT REVIEW	BA	AMR
3	10/11/2023	90% ELECTRICAL DESIGN	BA	CH

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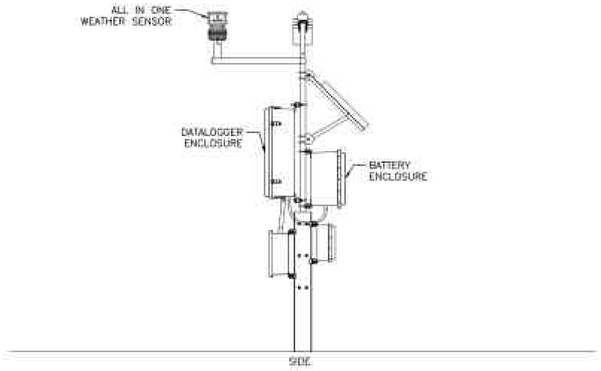
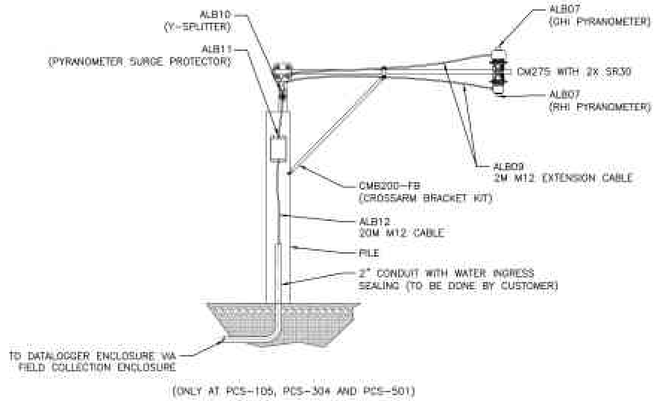
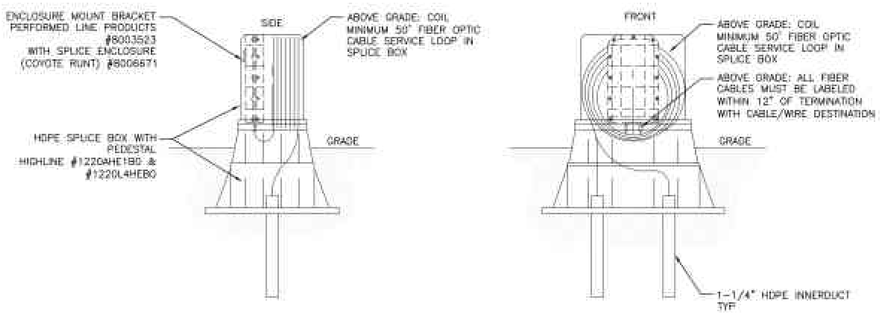


1 MET STATION ELEVATION
SCALE: NONE



(ONLY AT PCS-105, PCS-304 AND PCS-501)

2 ALBEDO STATION ELEVATION
SCALE: NONE



3 SPLICE BOX DETAIL
SCALE: NONE

NOTES:
1. REFER TO ATI AND/OR SCADA DESIGN PACKAGE FOR ADDITIONAL MOUNTING DETAILS.

1 COMMUNICATION DETAILS
SCALE: NONE

NOT FOR CONSTRUCTION

NO	DATE	REVISION DESCRIPTION	BY	CHK
04	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
03	06/23/2025	60% LAYOUT REVIEW	BA	AAR
02	04/11/2025	30% ELECTRICAL DESIGN	BA	CH
01				

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PREPARED FOR
LANGAN

PAGE SIZE: 36" x 24"
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PROJECT
SOLAR GENERATION SYSTEM AT
CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

DRAWING TITLE
COMMUNICATION DETAILS

DRAWING #
E6.210

RULER IN INCHES

SG4400UD-MV-US

MV One-connected PV Inverter for 1500Vdc System

HIGH YIELD

- Advanced three-level technology
- Full power operation at 40 °C (104 °F)
- Effective cooling, wide operation temperature

EASY O&M

- Integrated current, voltage and MV parameters monitoring function for fast analysis and trouble shooting
- Modular design, easy maintenance

SAVED INVESTMENT

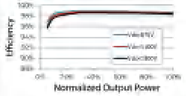
- Low transportation and installation cost due to 2H-foot container packaging
- DC 1500V system, low system cost
- 0.5 at night

GRID SUPPORT

- Compliance with multiple UL1741/UL1741 SA/SB, IEEE 1547, Rule 21 and REC now
- Low / High voltage ride through (0.00s/0.16s/0.32s/1.00s/1.20s/1.60s/2.00s/3.00s/10.00s/20.00s/30.00s/60.00s/300.00s/600.00s/3600.00s/7200.00s/10800.00s/ adjustable) / over voltage ride through (0.00s/0.16s/0.32s/1.00s/1.20s/1.60s/2.00s/3.00s/10.00s/20.00s/30.00s/60.00s/300.00s/600.00s/3600.00s/7200.00s/10800.00s/ adjustable) / stop
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM

EFFICIENCY CURVE



MEDIUM VOLTAGE CABLES

PowerGuard® Al 35 kV 100% TR-XLPE CN XLPE UL Type MV-105, AEIC CS8 - Physical Properties (Compact)

APPLICATIONS

PowerGuard® cables are intended for use in wet or dry locations for distribution of single or three phase medium-voltage power. These cables may be installed in ducts, exposed to sunlight or direct buried.

CONSTRUCTION

Single conductor cable with filled strand blocked conductors, triple-extrusion, dry-cured insulation system consisting of a semi-conducting conductor shield, high dielectric strength PowerGuard® XL, non-retarded, cross-linked polyethylene (TR-XLPE) insulation, then metal-free, semi-conducting insulation shield, water swellable tape and water blocking agents, black, encapsulating cross-linked polyethylene (XLPE) jacket.

Conductor:

1,000 kcmil and Smaller - Compact stranded aluminum alloy 1350.

Larger than 1,000 kcmil - Compressed round stranded aluminum alloy 1350.

Stranded conductors are water-blocked to conductor filling compound.

Conductor Shield:

Extruded semi-conducting, semi-conducting cross-linked polyethylene (XLPE) shield which is then bonded from the conductor shield to the insulation.

Insulation:

Polyolefin, Tree Retardant Cross-linked Polyethylene (TR-XLPE) - 100% insulation level.

Insulation Shield:

Extruded semi-conducting, semi-conducting cross-linked polyethylene (XLPE) shield with non-stick adhesion to the insulation, providing the required bonding between insulation integrity and ease of stripping.

Metallic Shield:

Solid bare annealed copper wires helically applied and uniformly spaced.

Water-blocking agents:

Applied over the insulation shield and around the concentric neutral wires to resist longitudinal water penetration. Longitudinal water penetration shall be tested in accordance with the latest edition of ICEA T-34-664 except that the moisture requirement is 15 psig for 1 hour.

Outer jacket:

An extruded black, UV-protected, cross-linked polyethylene (XLPE) jacket, meeting the physical requirements of Table 1, below, when tested by the methods specified in ANSI/ICEA S-94-649. The jacket shall be free-stripping and not interfere with an intimate contact between the metallic wires and the underlying extruded insulation shield. The jacket is sunlight-resistant and marked. The jacket shall contain a print legend marking, sequential length (meter or feet) marking and three longitudinal extruded ridges.

Typical Tensile Strength and Elongation Properties
Unaged Tensile Strength, minimum (PSI)	1800
Aged** Tensile Strength, minimum retention (%)	75
Unaged Elongation, minimum (%)	300
Aged Elongation, minimum retention (%)	75
Heat Distortion 1 hr @ 130°C, Maximum (%)	30

* Aged for 168 hrs @ 121°C

Typical Electrical Properties
Voltage	105°C
Emergency*	140°C
Short-Circuit – Insulated Conductors	250°C
Short-Circuit – Bared Wires	150°C

* Operation at the emergency overload temperature shall not exceed 1,000 hours cumulative during the lifetime of the cable.

STANDARDS

These cables are manufactured and tested to meet or exceed the following standards:

- ASTM B400 – Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors.
- ASTM B231 – Concentric-Lay-Stranded Aluminum 1350 Conductors.
- ASTM B3 – Soft or Annealed Copper Wire.
- ICEA S-94-649 – Concentric Neutral Cables Rated 5 Through 46 kV.
- ICEA T-33-690 – Test Method for Conducting Longitudinal Water Penetration Resistance Tests on Sealed Conductors.
- ICEA T-34-664 – Test Method for Conducting Longitudinal Water Penetration Resistance Tests on Longitudinal Water Blocked Cables.
- ICEA P-45-482 – Short Circuit Performance of Metallic Shields and Sheaths on Insulated Cable.
- AEIC CS8 – Extruded Dielectric Shielded Power Cables Rated 5 Through 46 kV.
- UL 1072 – Medium-Voltage Power Cables.

LISTINGS AND CERTIFICATIONS

- UL Listed as Type MV-105 – File E179691

MEDIUM VOLTAGE CABLES

PowerGuard® Al 35 kV 100% TR-XLPE CN XLPE UL Type MV-105, AEIC CS8 - Physical Properties (Compact)

Conductor Size	Conductor Stranding	Conductor Diameter	Conductor Shield Thickness	Insulation Thickness	Insulation Shield Thickness	Overall Diameter	Approximate Weight	Approximate Weight	Approximate Weight
AWG or kcmil	Class	Inches	Mils	Mils	Mils	Inches	Lbs/1000 ft	Lbs/1000 ft	Lbs/1000 ft
A1/350-61U350GT1105	1/0	Full	15	105	15	1.166	1,166	1,166	1,166
A1/350-61U350GT1205	1/0	Full	15	120	15	1.206	1,206	1,206	1,206
A1/350-61U350GT1405	1/0	Full	15	140	15	1.266	1,266	1,266	1,266
A1/350-61U350GT1655	1/0	Full	15	165	15	1.346	1,346	1,346	1,346
A1/350-61U350GT1805	1/0	Full	15	180	15	1.386	1,386	1,386	1,386
A1/350-61U350GT2005	1/0	Full	15	200	15	1.446	1,446	1,446	1,446
A1/350-61U350GT2205	1/0	Full	15	220	15	1.506	1,506	1,506	1,506
A1/350-61U350GT2405	1/0	Full	15	240	15	1.566	1,566	1,566	1,566
A1/350-61U350GT2605	1/0	Full	15	260	15	1.626	1,626	1,626	1,626
A1/350-61U350GT2805	1/0	Full	15	280	15	1.686	1,686	1,686	1,686
A1/350-61U350GT3105	1/0	Full	15	310	15	1.776	1,776	1,776	1,776
A1/350-61U350GT3405	1/0	Full	15	340	15	1.866	1,866	1,866	1,866
A1/350-61U350GT3705	1/0	Full	15	370	15	1.956	1,956	1,956	1,956
A1/350-61U350GT4005	1/0	Full	15	400	15	2.046	2,046	2,046	2,046
A1/350-61U350GT4405	1/0	Full	15	440	15	2.166	2,166	2,166	2,166
A1/350-61U350GT4805	1/0	Full	15	480	15	2.286	2,286	2,286	2,286
A1/350-61U350GT5205	1/0	Full	15	520	15	2.406	2,406	2,406	2,406
A1/350-61U350GT5605	1/0	Full	15	560	15	2.526	2,526	2,526	2,526
A1/350-61U350GT6005	1/0	Full	15	600	15	2.646	2,646	2,646	2,646
A1/350-61U350GT6605	1/0	Full	15	660	15	2.826	2,826	2,826	2,826
A1/350-61U350GT7205	1/0	Full	15	720	15	3.006	3,006	3,006	3,006
A1/350-61U350GT7805	1/0	Full	15	780	15	3.186	3,186	3,186	3,186
A1/350-61U350GT8405	1/0	Full	15	840	15	3.366	3,366	3,366	3,366
A1/350-61U350GT9005	1/0	Full	15	900	15	3.546	3,546	3,546	3,546
A1/350-61U350GT9605	1/0	Full	15	960	15	3.726	3,726	3,726	3,726
A1/350-61U350GT1005	1/0	Full	15	1000	15	3.846	3,846	3,846	3,846

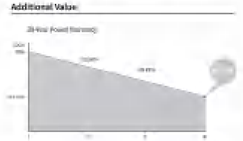
NOTES

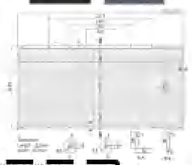
1. Dimensions and weights are subject to standard manufacturing tolerances and are subject to change without notice.
2. Cables are manufactured, tested and marked to meet or exceed the requirements in ANSI/ICEA S-94-649 for concentric neutral cable rated 5-46 kV in the latest revision of AEIC CS8.
3. The concentric neutral size is calculated based on the equivalent short circuit capabilities for 1/3 PE jacketed cable (ICEA P-45-482).
4. Utilizing a 105°C normal operating conductor temperature will increase cable ampacity rating, but will reduce the cable fault capability. If the user plan is an operating these cables at 105°C conductor temperature for normal operation and 140°C for emergency overload, please contact American Wire Group for the applicable cable ampacity and shield fault capability ratings.
5. Migration of soil moisture away from the cable is more likely at the higher operating conductor temperature and can result in an increase in soil thermal resistivity, resulting in an increase in conductor and soil temperature.

Hi-MO 5 Ice-Shield — LR5-72HBD 540~560M

21.7%	0~3%	<2%	0.45%	HALF-CELL
MAX MODULE EFFICIENCY	POWER TOLERANCE	FIRST YEAR POWER DEGRADATION	YEAR 2-30 POWER DEGRADATION	Lower operating temperature

Additional Value:





Mechanical Parameters

Cell Type	144 Half-cells
Dimensions	1961×1134×30mm (77.2×44.6×1.18 inch)
Weight	24.5kg (54.0 lbs)
Front Glass	2.0mm (0.08 inch) Anti-reflection Coating
Frame	Anodized Aluminum Alloy
J-Box	IP68 Rated
Cables	4mm² (0.006 inch²), 300mm (11.8 inch)
Connector	MC4-EVO2

Electrical Characteristics STC / AM1.5 1000W/m² 25°C NOCT / AM1.5 800W/m² 20°C 2m/s

Model Type	LR5-72HBD 540M	LR5-72HBD 545M	LR5-72HBD 550M	LR5-72HBD 555M	LR5-72HBD 560M
Nominal Power (Pmax)	540	545	550	555	560
Maximum Power Voltage (Vmp)	41.05	41.21	41.37	41.53	41.69
Maximum Power Current (Imp)	13.16	13.23	13.30	13.37	13.43
Open-circuit Voltage (Voc)	49.51	49.67	49.83	49.99	50.15
Short-circuit Current (Isc)	13.85	13.92	13.99	14.06	14.13
Module Efficiency (%)	20.5	20.7	20.9	21.1	21.3

Electrical characteristics with different rear side power gain (reference to 550W front)

Power (W)	Gain	Vmp (V)	Imp (A)	Pmax (W)
550	+5%	41.37	13.30	550
550	+10%	41.37	13.30	550
550	+15%	41.37	13.30	550
550	+20%	41.37	13.30	550
550	+25%	41.37	13.30	550

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ +3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Safety Class	Class II
Fire Rating	UL61730 TYPE 29 / IEC61730 CLASS A

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at Impact Velocity of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.250%/°C
Temperature Coefficient of Pmax	-0.300%/°C

LONGi

Warranty: www.longi.com

Specifications included in this datasheet are subject to change without notice. LONGi reserves the right of final interpretation. STC: 1000 W/m² irradiance, AM1.5 G spectrum, 25°C cell temperature. NOCT: 800 W/m² irradiance, AM1.5 G spectrum, 20°C ambient temperature, 2m/s wind speed. Per UL module.

SUNGROW
Clean power for all

MEDIUM VOLTAGE CABLES

PowerGuard® Al 35 kV 100% TR-XLPE CN XLPE UL Type MV-105, AEIC CS8 - Physical Properties (Compact)

Conductor Size	Conductor Stranding	Conductor Diameter	Conductor Shield Thickness	Insulation Thickness	Insulation Shield Thickness	Overall Diameter	Approximate Weight	Approximate Weight	Approximate Weight
AWG or kcmil	Class	Inches	Mils	Mils	Mils	Inches	Lbs/1000 ft	Lbs/1000 ft	Lbs/1000 ft
#1/0-01U035GT1015	1/0	Full	15	105	15	1.166	1,166	1,166	1,166
#1/0-01U035GT1205	1/0	Full	15	120	15	1.206	1,206	1,206	1,206
#1/0-01U035GT1405	1/0	Full	15	140	15	1.266	1,266	1,266	1,266
#1/0-01U035GT1655	1/0	Full	15	165	15	1.346	1,346	1,346	1,346
#1/0-01U035GT1805	1/0	Full	15	180	15	1.386	1,386	1,386	1,386
#1/0-01U035GT2005	1/0	Full	15	200	15	1.446	1,446	1,446	1,446
#1/0-01U035GT2205	1/0	Full	15	220	15	1.506	1,506	1,506	1,506
#1/0-01U035GT2405	1/0	Full	15	240	15	1.566	1,566	1,566	1,566
#1/0-01U035GT2605	1/0	Full	15	260	15	1.626	1,626	1,626	1,626
#1/0-01U035GT2805	1/0	Full	15	280	15	1.686	1,686	1,686	1,686
#1/0-01U035GT3105	1/0	Full	15	310	15	1.776	1,776	1,776	1,776
#1/0-01U035GT3405	1/0	Full	15	340	15	1.866	1,866	1,866	1,866
#1/0-01U035GT3705	1/0	Full	15	370	15	1.956	1,956	1,956	1,956
#1/0-01U035GT4005	1/0	Full	15	400	15	2.046	2,046	2,046	2,046
#1/0-01U035GT4405	1/0	Full	15	440	15	2.166	2,166	2,166	2,166
#1/0-01U035GT4805	1/0	Full	15	480	15	2.286	2,286	2,286	2,286
#1/0-01U035GT5205	1/0	Full	15	520	15	2.406	2,406	2,406	2,406
#1/0-01U035GT5605	1/0	Full	15	560	15	2.526	2,526	2,526	2,526
#1/0-01U035GT6005	1/0	Full	15	600	15	2.646	2,646	2,646	2,646
#1/0-01U035GT6605	1/0	Full	15	660	15	2.826	2,826	2,826	2,826
#1/0-01U035GT7205	1/0	Full	15	720	15	3.006	3,006	3,006	3,006
#1/0-01U035GT7805	1/0	Full	15	780	15	3.186	3,186	3,186	3,186
#1/0-01U035GT8405	1/0	Full	15	840	15	3.366	3,366	3,366	3,366
#1/0-01U035GT9005	1/0	Full	15	900	15	3.546	3,546	3,546	3,546
#1/0-01U035GT9605	1/0	Full	15	960	15	3.726	3,726	3,726	3,726
#1/0-01U035GT1005	1/0	Full	15	1000	15	3.846	3,846	3,846	3,846

NOT FOR CONSTRUCTION

DRAWING TITLE: EQUIPMENT DATA SHEET

DRAWING #: E7.000

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR – TX–PS–2701, 8987 CR 268, BROWN & MILLS COUNTY, TX 76801

PAGE SIZE: 36" × 24" | PROJECT #: TX–PS–2701

PREPARED FOR: LANGAN

LANGAN, LLC, 840 GESSNER ROAD, SUITE 740, HOUSTON, TX 77024, WWW.LANGAN.COM

PURE POWER ENGINEERING, 111 RYAN STREET, HARRISON, NJ, WWW.PUREPOWER.COM

NO	DATE	REVISION / DESCRIPTION	BY	CHK
1	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR
2	10/03/2025	90% LAYOUT REVIEW	BA	AAR
3	11/17/2025	30% ELECTRICAL DESIGN	BA	EJL

DESIGNED: EJL | DRAWN: BA | CHECKED: AAR | APPROVED: EJL

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BY LEP IN INCHES

31-0156-01

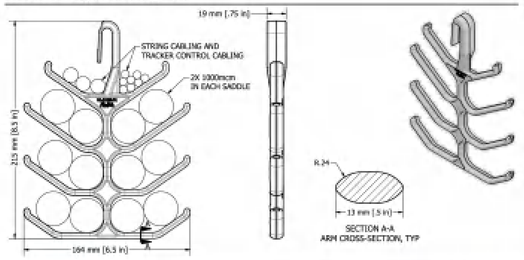
Messenger Cable Hangers

Performance Features

- Safe, reliable, easy-to-install solution for above-ground wire management
- 35+ year lifetime
- Up to 4.5 ft hanger spacing
- One step crimping installation
- Highly customizable to meet various design needs
- Excellent corrosion resistance
- High mechanical strength
- Retention features keeps the cable in the hanger
- Designed with a large radius at every cable contact surface
- Supports up to 1000mcm conductor

Detail	Specification
Part Number	31-0156-01
Material	Corrosion Resistant Die-Cast Aluminum
Messenger Cable Compatibility	1/0 (Ø0.398in) AAAC, ACSR, or AAC
Certified Load Rating	20lbs per saddle
Certifications	UL1565; UL2239; UL2703 Conformance
Cable Capacity	Top Saddles – String Cabling and Tracker Cabling; All other Saddles – 2X 1000mcm each, up to 12 total
Installation Method	Crimp Hanger Hook onto Messenger Cable
Part Weight	0.43 lbs
Shipping and Packaging	100pc per box

Dimensions and typical cable arrangement



Contact: sales@affordablewm.com or visit www.affordablewm.com for more information.
Disclaimer: The information in this datasheet is for informational purposes only.
Information is subject to change at any time without notice.

AWM Affordable Wire Management

31-0158-01

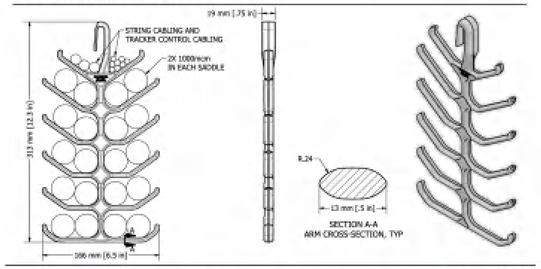
Messenger Cable Hangers

Performance Features

- Safe, reliable, easy-to-install solution for above-ground wire management
- 35+ year lifetime
- Up to 4.5 ft hanger spacing
- One step crimping installation
- Highly customizable to meet various design needs
- Excellent corrosion resistance
- High mechanical strength
- Retention features keeps the cable in the hanger
- Designed with a large radius at every cable contact surface
- Supports up to 1000mcm conductor

Detail	Specification
Part Number	31-0158-01
Material	Corrosion Resistant Die-Cast Aluminum
Messenger Cable Compatibility	1/0 (Ø0.398in) AAAC, ACSR, or AAC
Certified Load Rating	20lbs per saddle
Certifications	UL1565; UL2239; UL2703 Conformance
Cable Capacity	Top Saddles – String Cabling and Tracker Cabling; All other Saddles – 2X 1000mcm each, up to 20 total
Installation Method	Crimp Hanger Hook onto Messenger Cable
Part Weight	0.64 lbs
Shipping and Packaging	72pc per box

Dimensions and typical cable arrangement



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AWM Affordable Wire Management

NO.	DATE	REVISION DESCRIPTION	BY	ENG	CHK
	09/05/2025	60% ELECTRICAL DESIGN	BA	AAR	EL
	09/22/2025	60% LAYOUT REVIEW	BA	AAR	EL
	10/17/2025	30% ELECTRICAL DESIGN	BA	SH	EL

ENGINEER:

PURE POWER ENGINEERING
111 RIVER STREET, HOBOKEN, NJ
WWW.PUREPOWER.COM

PREPARED FOR:

LANGAN
LANGAN, LLC
840 GESSNER ROAD, SUITE 740
HOUSTON, TX 77024
WWW.LANGAN.COM

PAGE SIZE: 36" x 24"
PROJECT #: TX-PS-2701

PROJECT:
SOLAR GENERATION SYSTEM AT
CHISME SOLAR - TX-PS-2701
8987 CR 268
BROWN & MILLS COUNTY, TX 76801

NOT FOR CONSTRUCTION

DRAWING TITLE:
EQUIPEMENT DATA SHEET

DRAWING #:
E7.010

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PLOT DATE: 10/9/2025 9:02 PM

RULER IN INCHES

PVsyst - Simulation report

Grid-Connected System

Project: PPE-11055.01 - Chisme

Variant: 60% - 9/5/25

Tracking system with backtracking

System power: 215.4 MWp

Chisme TX - United States

Author

PUREPOWER ENGINEERING

PVsyst V8.0.9
VC1, Simulation date:
08/09/25 17:07
with V8.0.9

Project summary

Geographical Site	Situation		Project settings	
Chisme TX	Latitude	31.55 °(N)	Albedo	0.20
United States	Longitude	-98.85 °(W)		
	Altitude	435 m		
	Time zone	UTC-6		

Weather data
Chisme TX
Solar Anywhere, satellite data, SUNY model - 1998

System summary

Grid-Connected System — **Tracking system with backtracking**

Orientation #1		Near Shadings		User's needs
Tracking plane, horizontal N-S axis		According to strings	Fast (table)	Unlimited load (grid)
Axis azimuth	0 °	Electrical effect	20 %	
Pitch min / max	-/+ 52 °			
Diffuse shading	central tracker			
Tracking algorithm				
Astronomic calculation				
Backtracking activated				

System information

PV Array		Inverters	
Nb. of modules	391929 units	Nb. of units	90 units
Pnom total	215.6 MWp	Total power	178800 kWac
		Grid power limit	147.0 MWac
		Grid lim. Pnom ratio	1.466

Results summary

Produced Energy	390.12 GWh/year	Specific production	1811 kWh/kWp/year	Perf. Ratio PR	74.76 %

Table of contents

Project and results summary 2
General parameters, PV Array Characteristics, System losses 3
Horizon definition 7
Near shading definition - Iso-shadings diagram 8
Main results 9
Loss diagram 10
Predef. graphs 11

General parameters

Grid-Connected System

Tracking system with backtracking

Orientation #1

Tracking plane, horizontal N-S axis

Axis azimuth	0 °
Phi min / max	-/+ 52 °
Diffuse shading	central tracker

Tracking algorithm

Astronomic calculation	
Backtracking activated	

Field properties

No. of trackers	4028 units
Tracking plane, horizontal N-S axis	

Sizes

Tracker Spacing	9.75 m
Collector width	2.28 m
Average GCR	46.0 %

Backtracking limit angle

Phi limits	+/- 81.3 °

Backtracking parameters

Backtracking pitch	9.74 m
Backtracking width	2.28 m
Left inactive band	0.00 m
Right inactive band	0.00 m
Backtracking GCR	46.0 %
Parameters choice	Selection tracker

Models used

Transposition	Perez
Diffuse	Imported
Circumsolar	separate

Horizon

Average Height	1.2 °

Near Shadings

According to strings	Fixed (table)
Electrical effect	20 %

User's needs

Unlimited load (grid)

Bifacial system definition

Orientation #1

Bifacial system

Model: Unlimited Trackers 2D model

Bifacial model geometry

Tracker Spacing	9.75 m
Tracker width	2.28 m
GCR	46.8 %
Axis height above ground	1.70 m
Nb. of sheds	650 units

Bifacial model definitions

Ground albedo average	0.15
Bifaciality factor	70 %
Rear shading factor	7.8 %
Rear mismatch loss	2.4 %
Shed transparent fraction	1.5 %

Grid power limitation

Active power	167.0 MWac
Pnom ratio	1.465

Monthly ground albedo values

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.13	0.14	0.14	0.15

PV Array Characteristics

Array #1 - Feeder 100

PV module

Manufacturer	Longi Solar
Model	LR5-72HBD-545M (2) Bifacial
(Original PVsyst database)	
Unit Nom. Power	545 Wp
Number of PV modules	8007 units
Nominal (STC)	37.24 MWp
Modules	1853 string x 27 In series
At operating cond. (50°C)	
Pmpp	34.04 MWp
U mpp	1016 V
I mpp	33549 A

Inverter

Manufacturer	Sungrow
Model	SG4400-U/SMV-US
(Original PVsyst database)	
Unit Nom. Power	4400 kWac
Number of inverters	6 units
Total power	26400 kWac
Operating voltage	515-1337 V
Pnom ratio (DC:AC)	1.41
Power sharing within this inverter	

Array #2 - Feeder 200

PV module

Manufacturer	Longi Solar
Model	LR5-72HBD-545M (2) Bifacial
(Original PVsyst database)	
Unit Nom. Power	545 Wp
Number of PV modules	19402 units
Nominal (STC)	10.58 MWp
Modules	720 string x 27 In series
At operating cond. (50°C)	
Pmpp	9684 kWp
U mpp	1024 V
I mpp	9732 A

Inverter

Manufacturer	Sungrow
Model	SG4400-U/SMV-US
(Original PVsyst database)	
Unit Nom. Power	4400 kWac
Number of inverters	2 units
Total power	8800 kWac
Operating voltage	515-1337 V
Pnom ratio (DC:AC)	1.20
Power sharing within this inverter	

PV module

Manufacturer	Longi Solar
Model	LR5-72HBD-550M (2) Bifacial
(Original PVsyst database)	
Unit Nom. Power	550 Wp
Number of PV modules	320980 units
Nominal (STC)	177.9 MWp

Inverter

Manufacturer	Sungrow
Model	SG4400-U/SMV-US
(Original PVsyst database)	
Unit Nom. Power	4400 kWac
Number of inverters	33 units
Total power	145200 kWac

Array #3 - Feeder 300

Number of PV modules	80585 units
Nominal (STC)	44.33 MWp
Modules	2985 string x 27 In series
At operating cond. (50°C)	
Pmpp	40.81 MWp
U mpp	1020 V
I mpp	39917 A

Number of inverters	8 units
Total power	35200 kWac
Operating voltage	515-1337 V
Pnom ratio (DC:AC)	1.42
Power sharing within this inverter	

Array #4 - Feeder 400

Number of PV modules	80585 units
Nominal (STC)	44.33 MWp
Modules	2985 string x 27 In series
At operating cond. (50°C)	
Pmpp	40.81 MWp
U mpp	1020 V
I mpp	39917 A

Number of inverters	8 units
Total power	35200 kWac
Operating voltage	515-1337 V
Pnom ratio (DC:AC)	1.26
Power sharing within this inverter	

PV Array Characteristics

Array #5 - Feeder 500

Number of PV modules	69605 units	Number of inverters	8 units
Nominal (STC)	44.39 MWp	Total power	8000 kWac
Modules	2085 string x 27 in series		
At operating cond. (50°C)		Operating voltage	615-1037 V
Pmpp	40.61 MWp	Pnom ratio (DC:AC)	1.55
U mpp	1029 V	Power sharing within this inverter	
I mpp	39417 A		

Array #6 - Feeder 600

Number of PV modules	69605 units	Number of inverters	8 units
Nominal (STC)	44.39 MWp	Total power	8000 kWac
Modules	2085 string x 27 in series		
At operating cond. (50°C)		Operating voltage	615-1037 V
Pmpp	40.61 MWp	Pnom ratio (DC:AC)	1.55
U mpp	1029 V	Power sharing within this inverter	
I mpp	39417 A		

Total PV power

Nominal (STC)	310428 kWp
Total	391929 modules
Module area	1610529 m²
Cell area	1389036 m²

Total inverter power

Total power	176000 kWac
Number of inverters	80 units
Pnom ratio	1.80

Array losses

Array Soiling Losses

Average loss Fraction 0.6 %

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1.6%	0.7%	0.7%	0.4%	0.2%	0.5%	1.6%	1.7%	0.8%	1.3%	0.6%	1.3%

Thermal Loss factor

Module temperature according to irradiance

Uc (const) 29.0 W/m²K

Uv (wind) 1.2 W/m²K/m/s

LID - Light Induced Degradation

Loss Fraction 1.3 %

Module Quality Loss

Loss Fraction -0.7 %

Module mismatch losses

Loss Fraction 1.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

Incidence effect (IAM): Fresnel, AR coating, n(glass)=1.526, n(AR)=1.290

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.999	0.987	0.962	0.892	0.814	0.673	0.438	0.000

DC wiring losses

Global wiring resistance 0.078 mΩ

Loss Fraction 1.5 % at STC

DC wiring losses

Array #1 - Feeder 100
Global array res. 0.61 mΩ
Loss Fraction 1.3 % at STC

Array #2 - Feeder 200
Global array res. 1.6 mΩ
Loss Fraction 1.3 % at STC

Array #3 - Feeder 300
Global array res. 0.59 mΩ
Loss Fraction 1.3 % at STC

Array #4 - Feeder 400
Global array res. 0.88 mΩ
Loss Fraction 1.3 % at STC

Array #5 - Feeder 500
Global array res. 0.48 mΩ
Loss Fraction 1.3 % at STC

Array #6 - Feeder 600
Global array res. 0.33 mΩ
Loss Fraction 1.3 % at STC

System losses

Auxiliaries loss
constant (loss) 32.0 kW
0.8 kW from Power thresh.
Night aux. cons. 20.0 kW

AC wiring losses

Inv. output line up to MV transfo
Inverter voltage 3x800 Vac tri
Loss Fraction 0.01 % at STC

Inverter: SG4400-UD-MV-US
Wire section (40 Inv.) Alu 40 x 3 x 35 mm²
Average wires length 25 m

MV line up to injection
MV Voltage 34.5 kV
Average each inverter
Wires Alu 3 x 300 mm²
Length 11010 m
Loss Fraction 0.53 % at STC

AC losses in transformers

MV transfo
Medium voltage 34.5 kV

One transfo parameters
Nominal power at STC 5.46 MVA
Iron Loss (24/24 Connection) 5.46 kVA
Iron loss fraction 0.10 % at STC
Copper loss 43.14 kVA
Copper loss fraction 0.80 % at STC
Coils equivalent resistance 3 x 1960 mΩ

Operating losses at STC (full system)
No. identical MV transfos 39
Nominal power at STC 213.1 MVA
Iron loss (24/24 Connection) 212.96 kVA
Copper loss 1918.30 kVA

Horizon definition

Horizon from PVGIS website API, Lat=31°34'41", Long=-98°50'5", Alt=435m

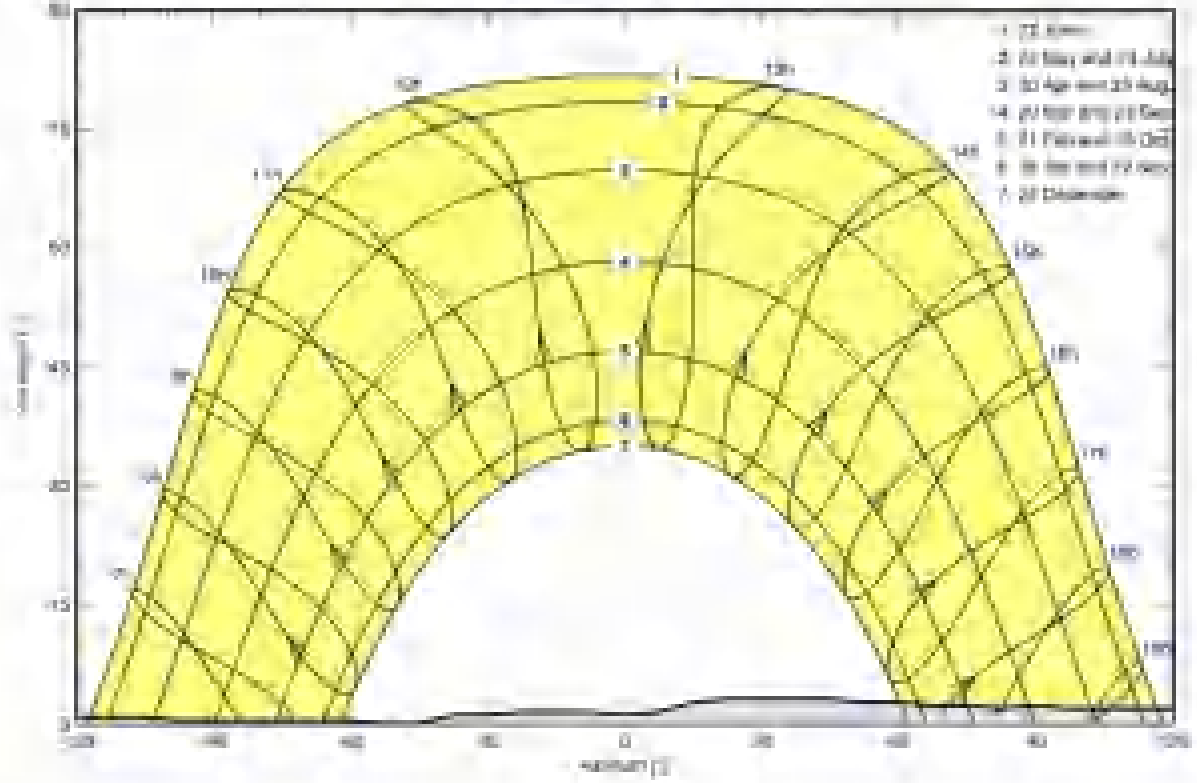
Average Height	1.1°	Albedo Factor	0.98
Diffuse Factor	1.00	Albedo Fraction	50 %

Horizon profile

Azimuth [°]	-180	-128	-120	-105	-98	-90	-83	-45	-38	-30
Height [°]	0.4	0.4	0.5	0.8	0.4	0.4	0.0	0.0	1.1	1.1
Azimuth [°]	-23	-8	-2	8	15	23	45	53	83	98
Height [°]	1.5	1.5	1.1	1.5	2.7	3.1	3.1	2.7	2.7	2.3
Azimuth [°]	75	83	90	98	120	128	135	143	150	180
Height [°]	2.3	1.9	2.3	1.9	1.9	1.5	1.5	0.8	0.4	0.4

Sun Paths (Height / Azimuth diagram)

Orientation #1

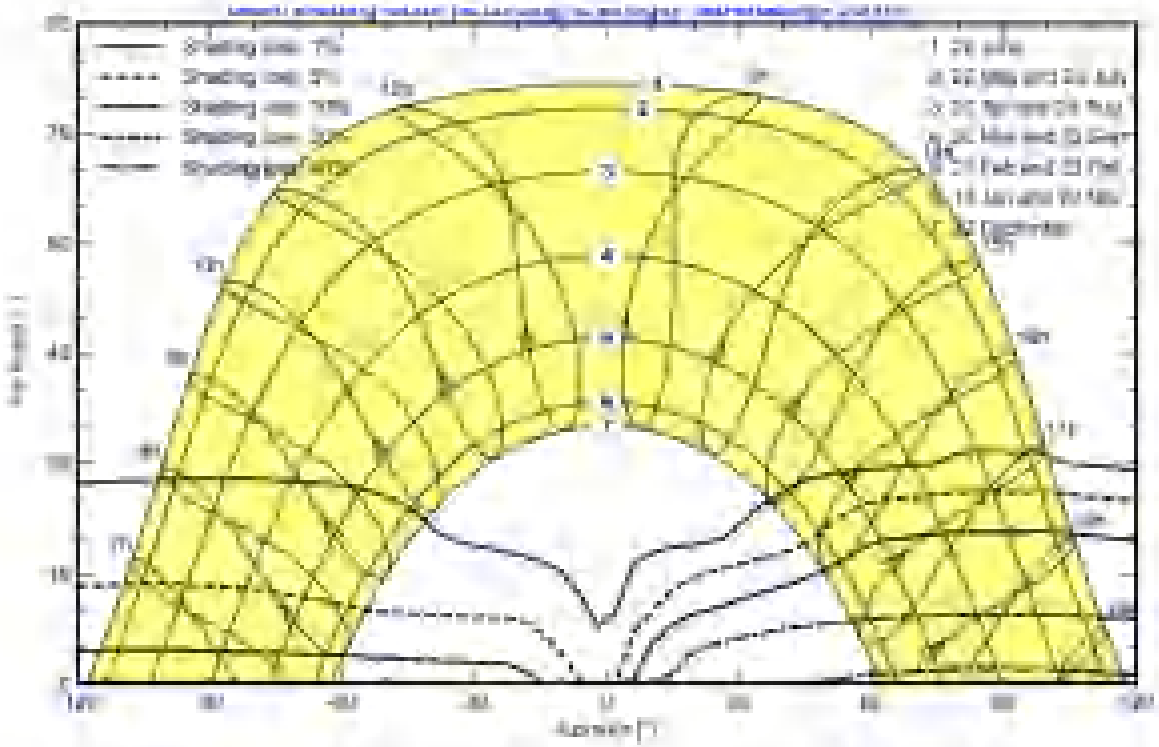


Near shadings parameter

Perspective of the PV-field and surrounding shading scene

Iso-shadings diagram

Orientation #1

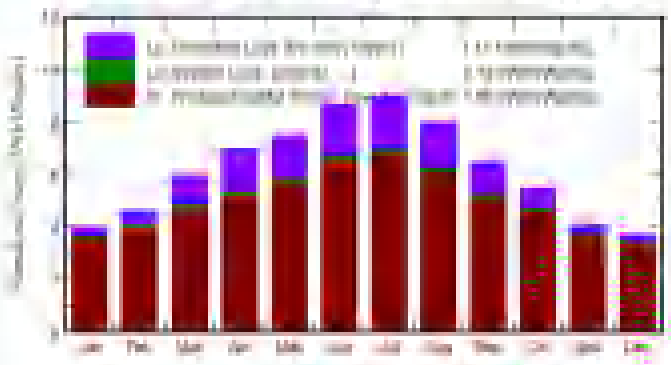


Main results

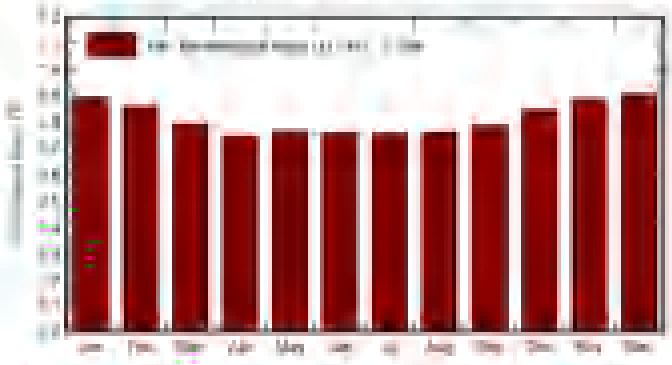
System Production

Produced Energy — [illegible] GWh/year — Specific production — [illegible] kWh/kWp/year
Perf. ratio PR — 28.68 %

Normalized productions (per installed kWp)



Performance Ratio PR



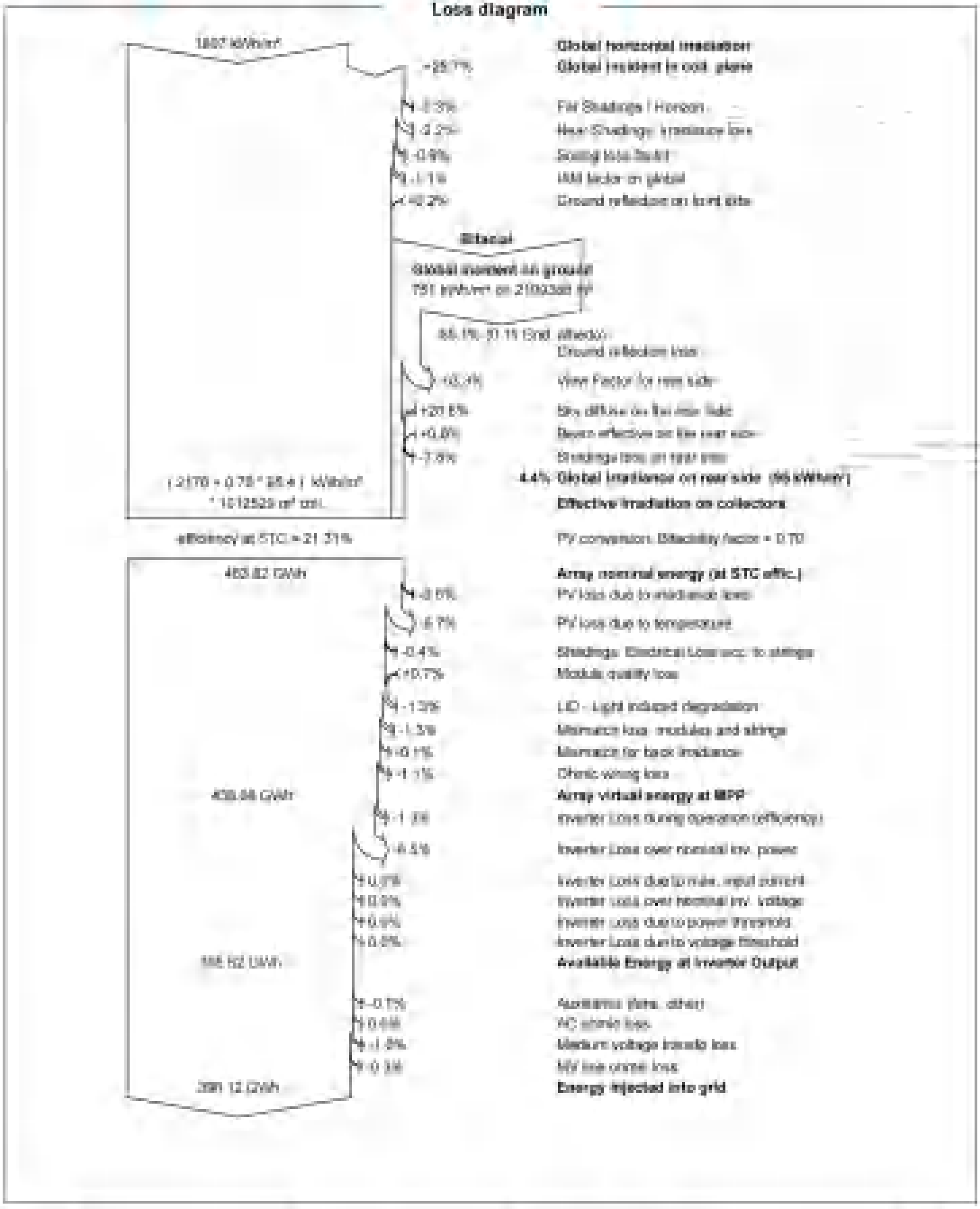
Balances and main results

	GlobHor	DiffHor	T_Amb	Globinc	GlobEff	EArray	E_Grid	PR
	kWh/m²	kWh/m²	°C	kWh/m²	kWh/m²	GWh	GWh	
January	95.7	30.04	8.73	124.2	[illegible]	[illegible]	[illegible]	[illegible]
February	102.9	34.69	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
March	148.1	51.79	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
April	168.3	56.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
May	190.4	74.62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
June	208.9	69.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
July	222.5	67.33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
August	189.5	59.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
September	154.5	47.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
October	133.2	42.49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
November	95.8	32.53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
December	89.3	31.64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Year	1805.9	696.03	16.69	3370.4	2175.8	401.86	696.12	0.709

Legends

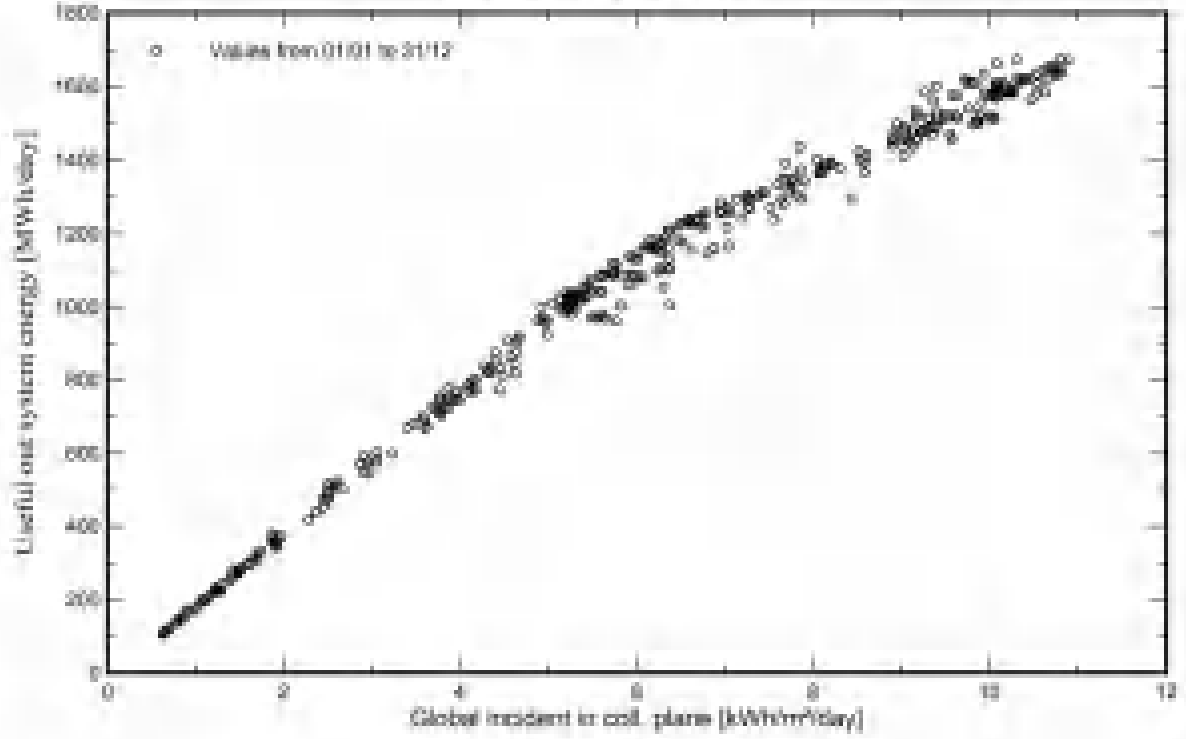
GlobHor	Global horizontal irradiation
DiffHor	Horizontal diffuse irradiation
T_Amb	Ambient Temperature
Globinc	Global incident in coll. plane
GlobEff	Effective Global, corr. for IAM and shadings
EArray	Effective energy at the output of the array
E_Grid	Energy injected into grid
PR	Performance Ratio

Loss diagram

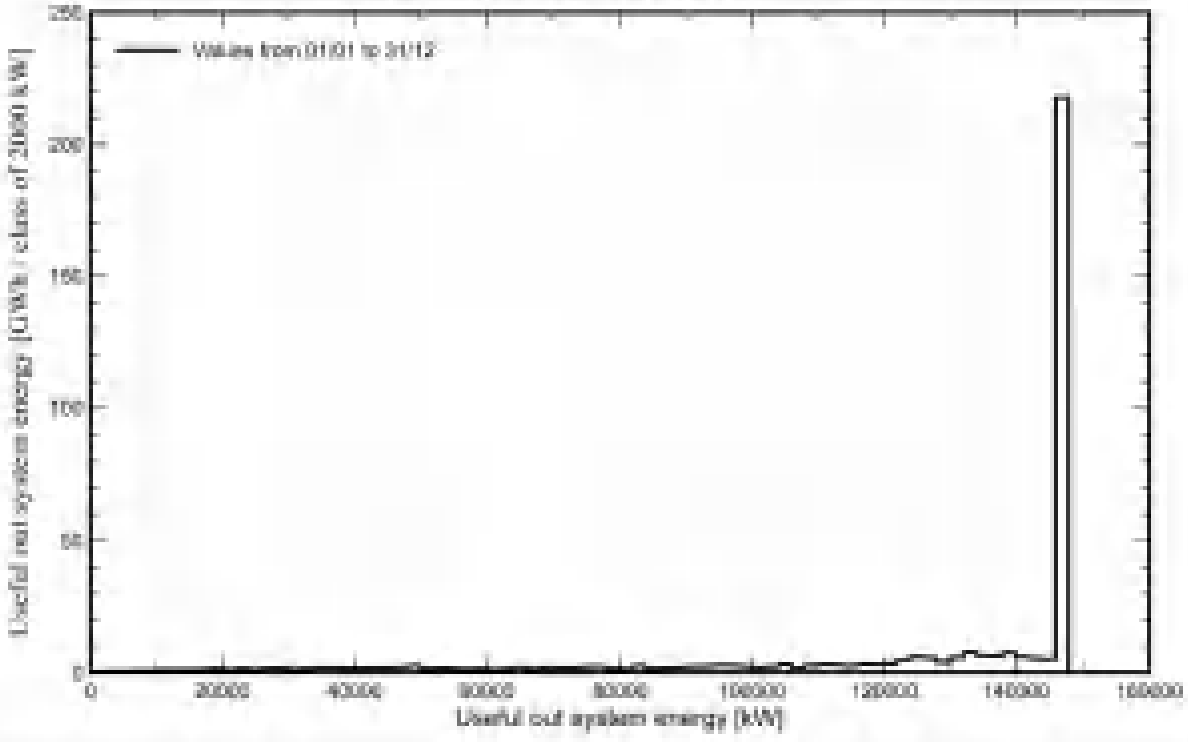


Predef. graphs

Daily Input/Output diagram



System Output Power Distribution



PURE POWER ENGINEERING, INC.
111 RIVER STREET, SUITE 1110
HOBOKEN, NJ 07030

CABLE AMPACITY STUDY
FOR
CHISME SOLAR AND STORAGE - 8987 CR 268
BROWN COUNTY, TEXAS
31.578332° -98.834972°
SEPTEMBER 5, 2025

PRELIMINARY

Pure Power Engineering Project Number: PPE-11056

Project Owner/EPC: Red River Clean Energy

Study commissioned by (Client): Langan

Revision History

Date	Revision Description	PM	ENG	CHK
04/11/2025	30% Preliminary Release	BA	MRH	EL
9/5/2025	60% Preliminary Release	BA	MRH	EL

PRELIMINARY

DISCLAIMER

The following report was prepared by Pure Power Engineering utilizing industry-accepted standards and practices and the proprietary methodologies and analysis tools of Pure Power Engineering. Pure Power Engineering assumes no responsibility for inaccuracies in data provided by others.

This document has been authorized for release by the engineer whose seal and signature are hereto affixed. Altering this document is unlawful unless performed by or under the direction of a licensed professional engineer. Any changes shall be described and the engineer authorizing such alterations shall seal, sign, and date the revised document.

PRELIMINARY

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PRELIMINARY

1 INTRODUCTION

1.1 SUMMARY

The Project is a 176 MWac/215.47 MWdc/147 MW export limit photovoltaic generating facility.

Equipment ID	Make	Model	Type	Quantity
Module	Longi Solar	LR5-72HBD-545M LR5-72HBD-550M LR5-72HBD-555M	Bifacial	See design drawings
Inverter	SUNGROW	SG4400UD-MV	Central	40

Table 1.1-1: Major Equipment List

The facility utilizes a 34.5kV collector system with direct buried medium voltage (MV) and DC feeders. Strings and trunk bus are installed in an above ground messenger support system.

See Appendix D for applicable codes and standards.

1.2 BACKGROUND AND SCOPE

The purpose of this study is to determine the maximum current a cable can sustain without the deterioration of any of its electrical or mechanical properties. This study along with the Short Circuit study identifies the minimum required MV cable specifications.

The scope of this study will include details of the project-specific analysis of the conductor ampacities for the AC and DC systems associated with the project.

PRELIMINARY

2 METHODOLOGY

Above ground conductors are sized using the NFPA Chapter 3 requirements. The conductors between low voltage and medium voltage cables are sized using the CYMCAP application.

2.1 SOFTWARE

The ampacity analysis was performed using CYMCAP 8.0.

CYMCAP is a Windows based software application designed to perform thermal analysis of cables.

The program utilizes the iterative technique Newton-McGrath method and uses the Neher and McGrath international standards to establish cable ampacity based on load conditions, cable construction, and routing. The program provides the maximum current a cable can carry while not going over a large conductor temperature.

2.2 ENGINEERING DESIGN INPUTS

The design used in CYMCAP models the conductor configuration shown in the Right Width Engineering design drawings. CYMCAP excludes cross sections of circuits and the design drawings are used to identify many sections that represent points in the circuit runs that need to be evaluated. If these points pass the evaluation, then it is assumed the rest of the circuit runs will also pass.

If available for the calculations, the PV/grid annual hourly production estimate is used to obtain and validate the cable loading factor used in the cyclic steady state analysis.

If available for the calculations, the Pure Power Engineering Short Circuit Cable withstand study will be used to provide conductor normal (CN) sizes. In any instances where the short circuit study has not been completed, reasonable values for the LN conductors will be assumed.

2.3 STEADY STATE & TRANSIENT ANALYSIS

2.3.1 Steady State Analysis

The steady state analysis assumes constant current loading. The techniques and formulas outlined in the international standards IEC 60287, IEC 60853 and IEC 60949 issued by the International Electrotechnical Commission are used throughout the calculations. CYMCAP also includes analysis options, computation methods, and cable configurations that are not directly addressed in the IEC standards.

Since generators that like ely do not operate under a steady state condition, a purely steady state analysis of cable loading would be overly conservative. To consider the daily cycling of generators a cyclic loading analysis must be carried out.

2.3.2 Cyclic Loading Analysis

Cyclic loading analysis is a simple way of approximating cable loading diversity by using a cable loading factor (LF) to consider load variations that take place during a period. The LF is the ratio of the average load over a period to the peak load occurring in that period. These load variations allow higher peak loading of the cable since a cooling off period is provided. When performing the cyclic loading analysis, the Neher-McGrath method is used.

For a 10% study or a study where hourly data is not available, a conservative approach using an LF of 0.7 will be used for the analysis. This has been determined from analysis with other customers to provide a reasonably conservative cable loading which is higher than a purely steady state analysis.

The result of the cyclic loading analysis is cable loading in Amps that results in a target cable temperature using the indicated LF. The cable conductor temperature will be less than the cable rated temperature.

2.2.3 Transient Analysis

Transient loading analysis is a more detailed loading analysis than a cyclic loading analysis. In a transient analysis a load profile is constructed that represents the loading of the cable over a period in one-hour increments on a per unit basis. The PV system transient analysis is only performed if PVSyst hourly production data is available.

The data used to build the transient load profile is the PVSyst production data report E_Grid (kW) data as a proxy for current loading in the AC and DC cables. The PVsyst annual hourly production data is analyzed to determine the day with the highest LF and that curve is used to build a load profile over 24 hours.

Asking 24-hour periods together will provide a worst case loading profile for any total period needed.

The initial conductor size, ampacity and temperature for the transient analysis are based on the steady state cyclic analysis. The cyclic LF is adjusted in an iterative process checking that the transient analysis shows that a long-term cable temperature equal to or less than 90% of the cable rated temperature is maintained past the 1,500-hour mark for MV cables and the 500-hour mark for DC conductors. The first level found to result in a cable temperature that will peak at a point equal to or less than 90% of the cable rate temperature in the first 48 hours and never under the cable rating after that. The resulting cable ampacity is typically higher than that found using the cyclic rating analysis alone. Using this analysis technique has been found to provide materially comparable results compared to a full transient study while requiring much less program run time.

2.4 ENVIRONMENTAL INFORMATION

Evaluation of the site environmental conditions for the ampacity simulation and other calculations presented herein contingent upon the environmental data made available in the geotechnical report and industry accepted meteorological datasets. The applicable data will be reviewed to identify the maximum soil temperature at typical cable burial depths, selection of the appropriate soil thermal resistivity (thermal rating) and selection of the ambient air temperatures.

The data sources typically used are the geotechnical report for the site, NOAA (National Oceanic and Atmospheric Administration), and USDA Natural Resources Conservation Service (NRCS) regional SDAN map data.

2.4.1 Soil Data

Soil Temperature

Soil data from the SDAN mapping closest to the project site can be used to find historical soil data. The maximum average temperature found from the hourly mean soil temperature data at a depth chosen to represent the cable installation depth over a historical period.

Soil Moisture

Soil data from the SDAN mapping closest to the project site can be used to find historical soil data, or data from the geotechnical report may be used if available. If the SDAN data is used, then the minimum average moisture is found from the hourly mean soil moisture data at a depth chosen to represent the cable installation depth over a historical period.

Soil Thermal Resistivity

Thermal resistivity data comes from the geotechnical report.

2.4.2 Soil Zones

The site is divided up into three zones:

Zone 1: Native undisturbed soil

Zone 2: Backfill, may be native soil or soil from off site

Zone 3: This zone contains the cables. This is the dry out box where the soil moisture is driven out by the heated cables and a moisture value of 0% is used. The boundaries are 1ft from the center, making the box 2ft on a side.

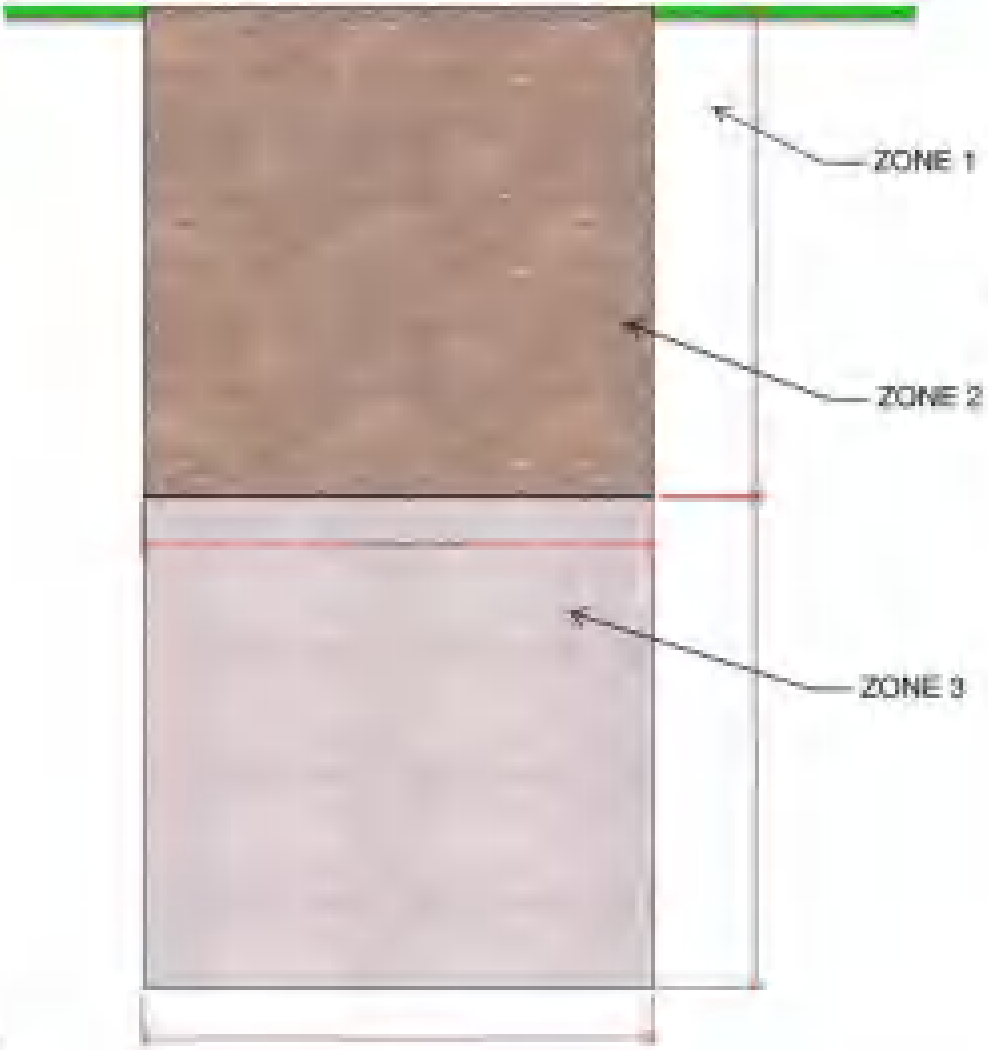


Figure 2.4.2: Soil Zones

2.5 UNDERGROUND CONDUCTOR LOCATION SELECTION

CYMCAP simulates cables in a cross section of the cable run. Therefore, the engineer must select cross sections in the site to simulate which are representative of the worst-case examples for ampacity calculation.

3 STUDY MODEL

3.1 ENGINEERING DESIGN INPUT

The following engineering documents are used as the basis for the CYMCAP model in this study.

- Pure Power Engineering electrical design 2025-09-05 Chisme PV Electrical 60% dated 9/5/2025
- PVSyst 8760 production data PPE-11055_01 - Chisme_30p_8760_4.11.25 dated 4/11/2025
- Pure Power Engineering Short Circuit study 2025-09-05 Chisme Solar - Short Circuit Study – 60% dated 9/5/2025
-

3.2 PROJECT LOCATION

The site location is Brown County, Texas. 31.578332° -98.834972°. The weather station will be selected for SCAN sites nearest to the project location/address.

3.3 SOIL MODEL

3.3.1 Soil Historical Data

The SCAN station used is named Stephenville. Figure 3.3.1-1 shows the location of the Project and the SCAN site.

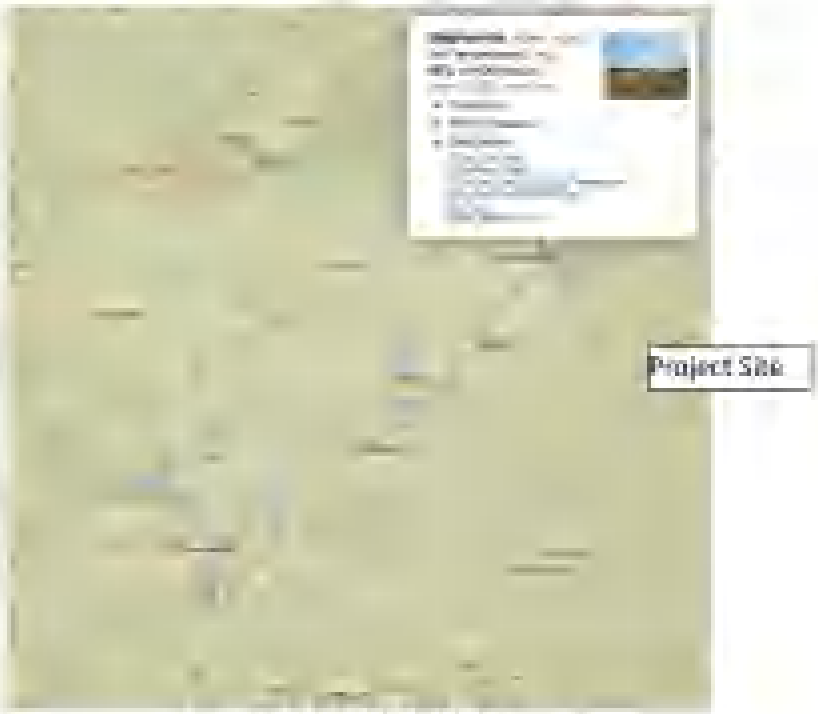


Figure 3.3.1-1: SCAN Station

Soil Temperature

The SCAN site hourly mean soil temperature historical data shown in Figure 3.3.1-2 at a conservative 40-inch depth and shows a maximum mean hourly temperature of 90°F (32.2°C).

Figure 3.3.1-2: Soil Temperature at 40-inch Depth

Soil moisture

The SCAN site hourly mean soil moisture historical data is shown in Figure 3.3.1-3 at a conservative 40-inch depth and shows a minimum average moisture of 8.8%.

Figure 3.3.1-3: Soil Moisture at 40-inch Depth

3.3.2 Soil Zones

Three soil zones are illustrated for installations in the cable ampacity study. Zone 1 is identified as the native soil which is an area around the trench. Zone 2 is the backfill area above the cable dry-out region and the moisture level is estimated to be 1/2 that of zone 1 because the soil is disturbed in the cable installation process, and we will assume it has less moisture than zone 1 soil. Zone 3 is identified as the cable dry-out region. Figure 2.4.2-1 illustrates the various zones.

Table 3.4.2-1 shows the moisture values for the three zones used in the study model.

Zone	Description	Moisture (%)
1	Native Soil	8.2
2	Trench Backfill	4.1
3	Dry-Out Zone	0.0

Table 3.4.2-1: Soil Moisture Values for Zones

3.3.3 Soil Thermal Resistivity

The Thermal Resistivity dry out curve from the Geotech report is shown in Figure 3.3.3-1.

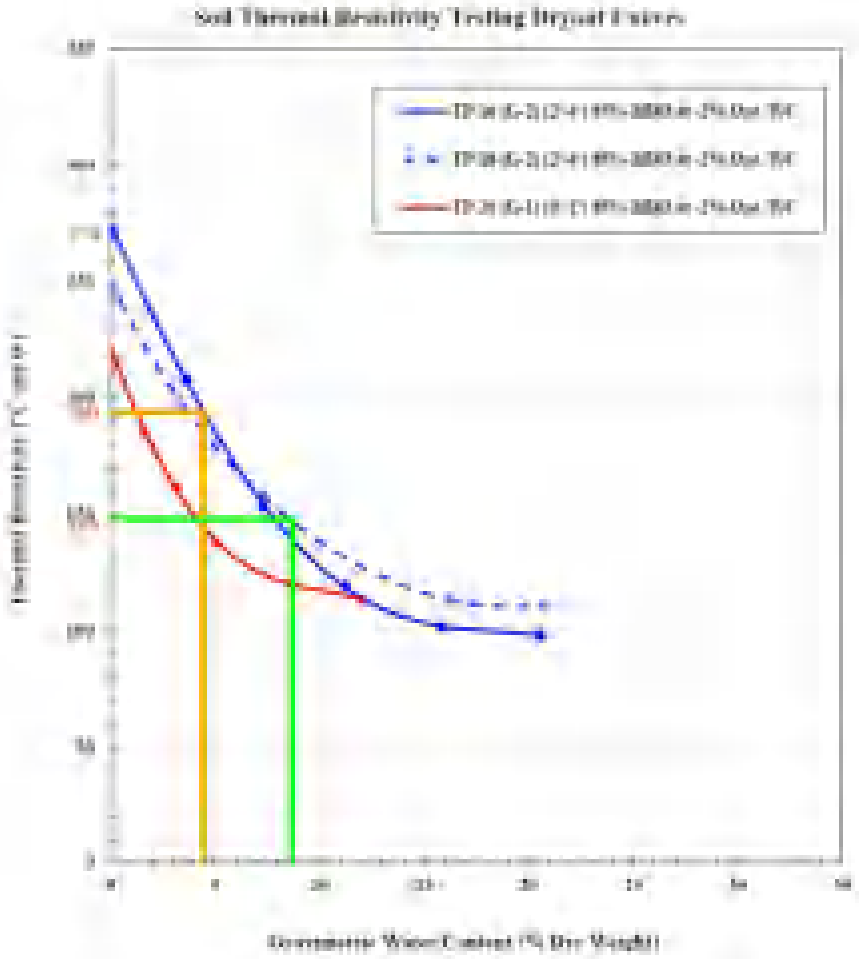


Figure 3.3.3-1; Thermal Resistivity Dry Out Curve

The curve from sample location TP-25 was chosen to represent the site conditions. Since the dry out curve for TP-25 does not extend to 18.4% moisture the maximum moisture value for the curve, 7%, will be used for native soil.

Table 3.3.3-1 shows the RHO values at those moisture levels from the graph in Figure 3.3.3-1.

Zone	Sample	Moisture Content (%)	RHO (cm°C /W)	Soil Compaction (%)
1	Composite of TP 16-& 18	8.8	149	Native
2		4.4	193	85
3		0	276	85

Table 3.3.3-1; RHO Values and Soil Compaction

Refer to Appendix B and the geotechnical report for additional information regarding the dry out curves and boring locations.

3.4 ANALYSIS MODEL

3.4.1 Steady State with Cyclic Load & Transient Analysis

The transient analysis will be used to validate the cyclic cf as described in section 2.5.3.

The PVsyst estimated production data is analyzed per the AIEE-IICEA publication S-135 and P-46-426 to find the day with the highest PVSyst load profile. This PVSyst load profile is only used to identify the day to be used to create the transient load profile. Per the analysis of the 30% PVsyst 8760 data the worst-case daily load profile has been found to be day 157 and that day has been modeled in CYMCAP as shown in Figure 3.4.1-1.

Figure 3.4.1-1; Transient Load Profile

3.5 FEEDER MODELS

3.5.1 Above Ground DC Conductor Sizing

Above ground DC conductor sizing is performed in accordance with NEC conductor sizing requirements. The DC conductor sizes are shown in the electrical design drawing package referenced in Section 3.1 of this study.

3.5.2 Underground DC Conductor Sizing

Installation

The DC combined feeders are located between the load break disconnect (LBD) and the inverter's DC bus bar. DC feeders are run directly buried from the LBD to the inverter. The feeder physical spacing in the ground is identified by case number and detail in the electrical design drawings.

All conductors used in the DC feeder circuit are 2kV DC rated PV-Wire, 90°C based on American Wire Group PV Wire specification. The feeders are evaluated for ampacity at a maximum temperature of 90°C and a LF of 0.71.

Each feeder supports the combined output of all strings connected to a single LBD. The underground conductors must carry the current required by the worst-case scenario found in the electrical design.

Element	Value	Reference
Soil Ambient Temperature (°C)	32.2	Section 3.3.1
Soil Thermal Resistivity (m°C/W)	Zone 1: 1.49	Table 3.3.3-1
	Zone 2: 1.93	
	Zone 3: 2.74	

Table 3.5-2-1: Soil Analysis Parameter Summary

000 MCM and 750 MCM Al cables will be evaluated.

The following worst-case scenario was evaluated wherein it assumed all DC feeders carry the current of 28 strings at 15.19A per string:

- Case DCC1A: DC Feeder homerun co-located in a single trench in a 1X4 installation configuration, 30" below grade, center-to-center spacing of 9"
- Case DCC1B: DC Feeder homerun co-located in a single trench in a 1X4 installation configuration, 30" below grade, center-to-center spacing of 10"

All conductors are equivalent as 2kV PV Wire. The circuits are evaluated for ampacity at a maximum temperature of 90°C and a LF of 0.71 and verified to meet conductor temperature limits by transient study. The maximum allowed ampacity represents the lowest conductor ampacity out of all the conductors in the bundle. The result of the analysis is shown in Table 3.4.2-2.

Circuit	Conductor Size	Max Allowed Ampacity (A)	Design Current (A)	Loading (%)
DCC1A	600 MCM	349.9	315.9	95%
DCC1B	750 MCM	332.5	315.2	95%

Table 3.5-2-2: Analysis Results for DC Combined Feeders

See the CYMCAP analysis reports in Appendix C.

3.5.3 MV AC Cable Sizing

MV AC cables run between the MV inverter transformers and the substation. The transformers are connected in parallel, and each cable may carry the current from more than one inverter transformer. The trench details are in the Trench Details sheet in the design drawings referenced in Section 3.1. The following cases were evaluated:

Case MVC1: Single circuit in individual trench, direct buried, 36" below grade

Case MVC2: Seven circuit in parallel – multi-feeder in individual trenches, 36" below grade, 96" on center spacing, different feeder sizes. Includes a BESS feeder that runs parallel to the PV circuits and is modeled as a 90°C thermal source

Case MVC3A: Six circuits in parallel, 96" separation, multi-feeder in individual trenches, direct buried, 36" below grade, different feeder sizes

Case MVC3B: Four circuits in parallel, 72" separation, multi-feeder in individual trenches, direct buried, 36" below grade, different feeder sizes. For this case the order of the circuits in the trench must be maintained as shown in Table 3.5.3-2 to obtain the required ampacity.

Locations of cases other than Case 1 are shown in Appendix A.

All conductors are modeled with 100% TR-XLPE insulation with concentric neutrals grounded on both ends. At the time of the study an MV cable manufacturer has not been selected; therefore WTEC MV cables are used for the MV cable specification in this study. The circuits are evaluated for ampacity at a maximum conductor of 90°C and a LF of 0.71 and verified in most conductor temperature times by transient study.

Element	Value	Reference
Soil Ambient Temperature (°C)	42.2	Section 3.4.1
Soil Thermal Resistivity (cm°C/W)	Zone 1: 149 Zone 2: 174 Zone 3: 274	Table 3.4.1-1

Table 3.5.3-1: Soil Analysis Parameter Summary

The results of the analysis are shown in Table 3.5.3-2, including each case number, cable size, and the maximum allowable ampacity. The maximum design current comes from the worst-case cable loading for the cable in the design drawings referenced in Section 3.1. CYMCAP analysis reports are in Appendix C.

Case	Circuit	Conductor Size	Concentric Neutral Size	Max Allowed Ampacity (A)	Design Current (A)	Loading (%)
MVC1		4/0 AWG	2/3	226.5	147.3	65%
		500 MCM	1/3	360.5	294.5	81%
		1000 MCM	1/6	509.8	441.8	87%
		1250MCM	1/6	568.6	515.4	91%
MVC2		1000 MCM	1/6	482.3	441.8	92%
		1250 MCM	1/6	536	515.4	96%
MVC3A		500 MCM	1/3	349.4	220.9	63%
		1000 MCM	1/6	485.1	441.8	91%
		1250 MCM	1/6	537.1	515.4	96%
MVC3B	MVT-PCS-203	500 MCM	1/3	343.9	147.3	43%
	MVF-MVSC-502	1000 MCM	1/6	474.7	441.8	93%
	MVF-MVSC-602	1000 MCM	1/6	473.1	441.8	93%
	MVT-MVSC-402	1250 MCM	1/6	541.2	515.4	95%

Table 3.5.3-2; Analysis Results for MV Cables

PRELIMINARY

3.5.4 Special Cases

These scenarios occur for DC feeders crossing or running adjacent to an MV feeder. The worst-case scenarios are evaluated as listed below. Since CYMCAP cannot model multiple crossing conductors the conductors are modeled as running in parallel. This is a more conservative assessment than if modeled as crossing at a 90° angle. The maximum conductor temperature at the design load current was evaluated and the transient study projected the conductor temperatures into the future to verify that they were less than the rated temperature.

Case MVC5: Nine DC circuits in two trenches, five in one and four in the other, 9" separation, direct buried, 30" below grade. Passing underneath them are two MV cables in parallel, 48" separation, multi-feeder in individual trenches, direct buried, 48" below grade. See CYMCAP report in Appendix C for a diagram.

Case	Conductor Size	Concentric Neutral Size	Conductor Temperature (C)	Max Allowed Temperature (C)	Design Current (A)	Loading (%)
MVC5	750 MCM DC		49.3	90	915.8	55%
	500 MCM AC	1/3	48.6	90	147.3	54%
	1000 MCM AC	1/6	75.4	90	441.8	84%

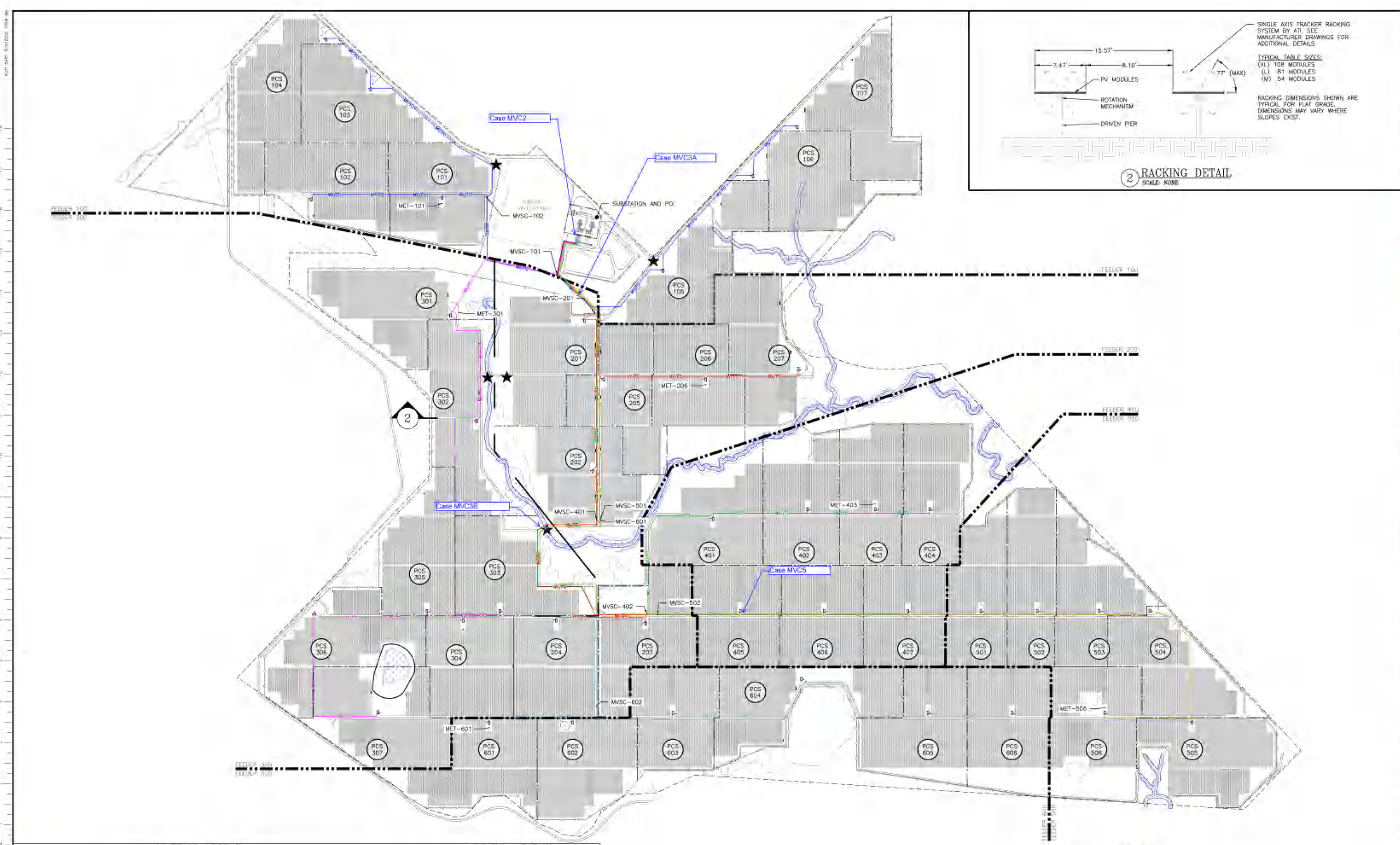
Table 3.5.4-1; Analysis Results for Special Case

4 STUDY RESULTS

The results of the thermal ampacity cable and conductor sizing study demonstrate that the cables and conductors specified are adequately sized based on the information available at the time of this study.

PRELIMINARY

APPENDIX A – CASE LOCATION



2 RACKING DETAIL
SCALE: NONE

LINETYPE LEGEND

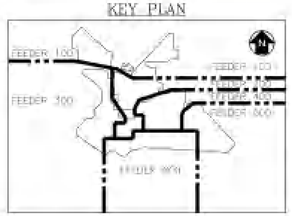
- MV FEEDER 100
- MV FEEDER 200
- MV FEEDER 300
- MV FEEDER 400
- MV FEEDER 500
- MV FEEDER 600
- FENCE
- PROPERTY BOUNDARY
- UTILITY SETBACK
- STREAM
- FEEDER BOUNDARY
- PCS BOUNDARY
- ACCESS ROAD
- LAYDOWN AREA
- WETLANDS

SYMBOL LEGEND

- POWER CONVERSION STATION
- PCS XXX — PCS SEQUENCE #
- MV FEEDER #
- MV SECTIONALIZER CABINET (MVSC)
- SITE ACCESS POINT
- MET STATION

1 OVERALL ELECTRICAL PLAN
SCALE: 1" = 350'

KEY PLAN



NOT FOR CONSTRUCTION

DRAWING TITLE: OVERALL ELECTRICAL PLAN

DRAWING #: E1.000

PROJECT: SOLAR GENERATION SYSTEM AT CHISME SOLAR - TX-PS-2701 8987 CR 268 BROWN & MILLS COUNTY, TX 76801

PREPARED FOR: LANGAN

LANGAN, LLC 840 GESSNER ROAD, SUITE 740 HOUSTON, TX 77024 WWW.LANGAN.COM

PREPARED BY: PURE POWER ENGINEERING 716 RIVER STREET, HUDSON, WI WWW.PUREPOWER.COM

PAGE SIZE: 36" x 24"

PROJECT #: TX-PS-2701

NO	DATE	REVISION / DESCRIPTION	BY	CHK
3	09/25/2025	60% ELECTRICAL DESIGN	BA	AAR
2	08/22/2025	30% LAYOUT REVIEW	BA	AAR
1	04/11/2025	30% ELECTRICAL DESIGN	BA	AAR

RULER IN INCHES

APPENDIX B – GEOTECHNICAL DATA

Alpine Engineering Services, LLC
108 Tradesman Drive, Suite B
Hutto, TX 78634
Tel: (512) 887-1282

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M

Soil Samples & Testing Summary

No.	Boring	Depth	Max. Dry Density	ASTM D698		LL	PL	PI	USCS
				Optimum WC	Minus 200 Sieve				
		ft	pcf	%	%				
1	Bulk-2	0-4	112.4	14.2	63.9	27	13	14	Sandy lean clay (CL)
2	Bulk-4	0-4	97.4	22.8	87.1	43	17	26	Lean clay (CL)
3	Bulk-5	0-4	112.9	13.6	62.5	25	13	12	Sandy lean clay (CL)

Cheng-Wei Chen, Ph.D. 03/13/25
Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the reproduced damages are essential as shown.

Alpine Engineering Services, LLC
195 Diamond Drive, Suite B
Provo, UT 84604
(p) (801) 997-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chiume
(PN: 320102301)

Alpine Project No: 2501017
Test Date: 03/06/25
Tested By: C.M

"Remolded" Soil Thermal Resistivity Testing Summary

No.	Boring	Depth	Remolded Dry Unit Weight	Remolded Dry Unit Weight	Thermal Resistivity at Wet (ASTM D5334)	Thermal Resistivity at Dry (ASTM D5334)
		ft	%	pcf	°C-cm/W	°C-cm/W
1[1]	TP-3 (G-1)	0-2	20.6	82.6	91.3	240.2
2[1]	TP-6 (G-1)	0-2	11.7	96.1	78.5	206.3
3[1]	TP-7 (G-1)	0-2	11.6	96.5	86.2	215.0
4[1]	TP-11 (G-1)	0-2	12.3	95.6	79.9	199.5
5[1]	TP-13 (G-1)	0-2	12.1	95.3	92.7	219.2
6[1]	TP-14 (G-1)	0-2	12.1	95.2	83.8	235.2
7[2]	TP-16 (G-2)	2-4	20.6	82.8	97.9	279.4
8[2]	TP-18 (G-2)	2-4	20.7	84.8	121.5	249.4
9[1]	TP-20 (G-1)	0-2	12.1	95.3	113.2	252.5

Note 1: Testing specimen remolded to 85% of maximum dry unit weight @ ±2% below optimum water content per the request by the client.

[1] Dry Density results of Bulk #1 (0-4 ft). [2] Dry Density results of Bulk #4 (0-4 ft). [3] Dry Density results of Bulk #5 (2-4 ft).

Cheng-Wei Chien, Ph.D. 03/13/25
Reviewed By / Date

This report was performed in accordance with our scope of work. This report and any use of the information contained herein by Alpine Engineering Services, LLC (Alpine) is for the exclusive use of the client and for the purposes stated. Any unauthorized use or distribution is prohibited.

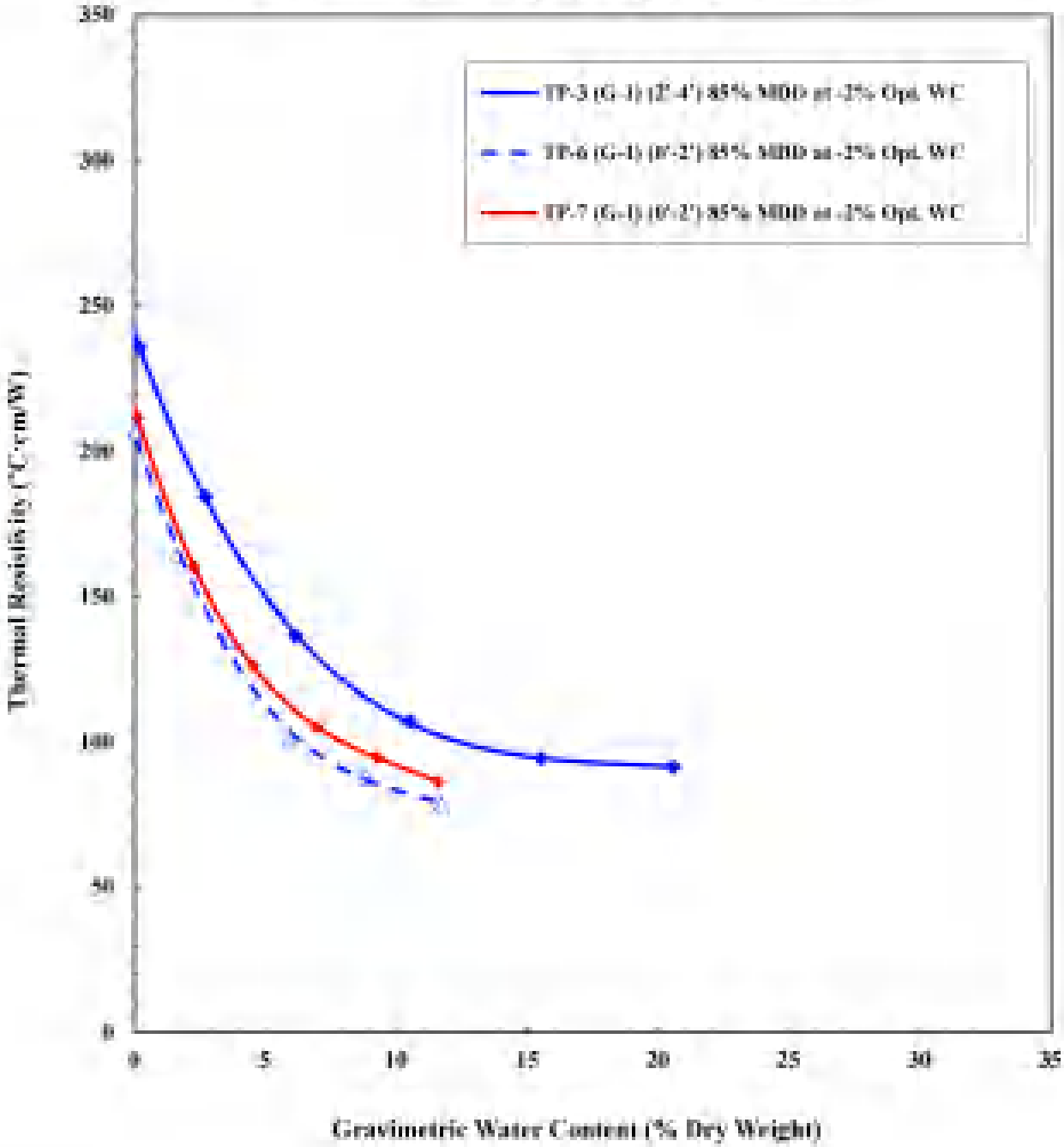
Alpine Engineering Services, LLC
105 Timberwalk Drive, Suite B
Hutto, TX 78634
tel: (512) 365-1585

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No: 2500117
Test Date: 05/08/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

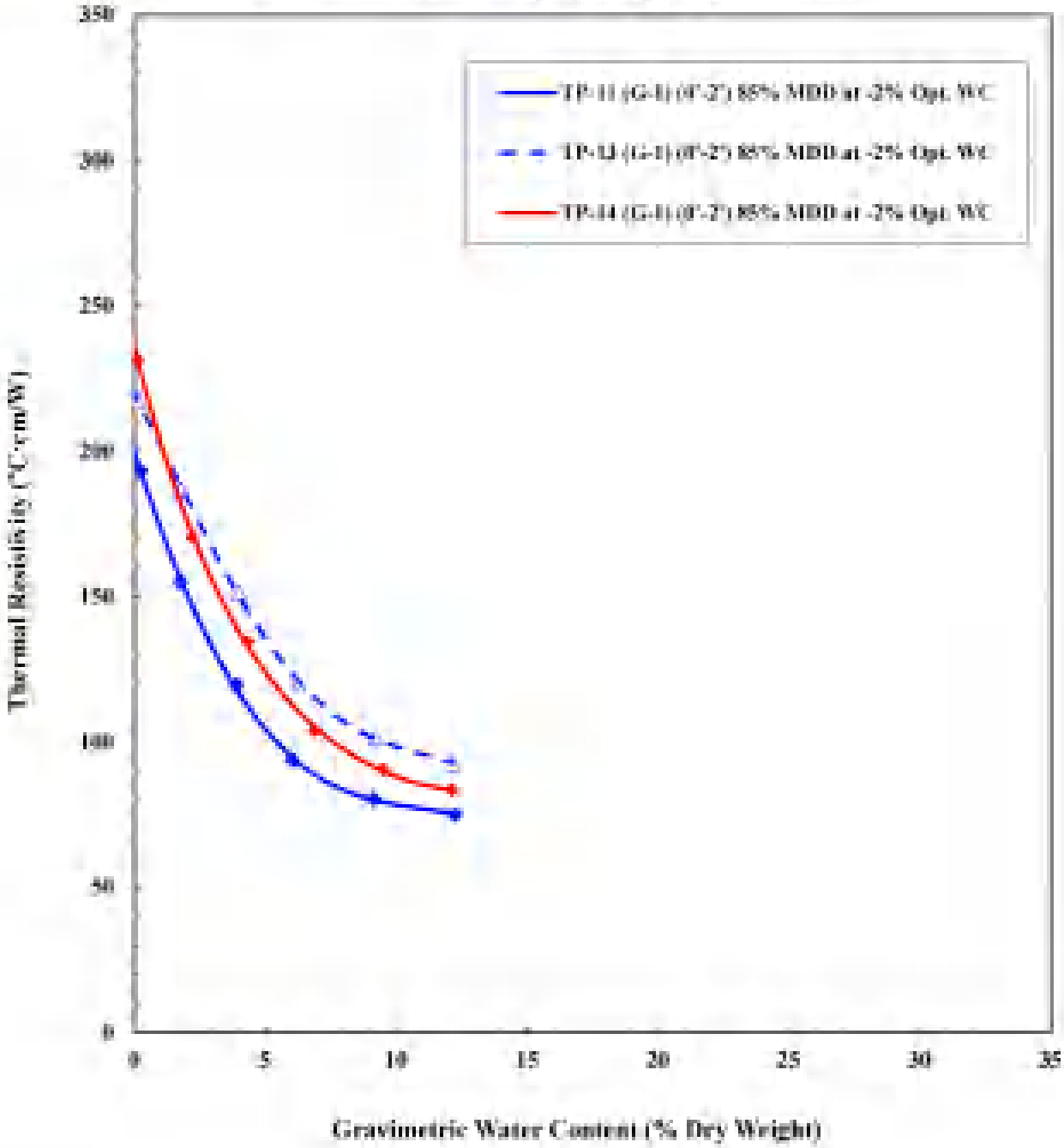
Alpine Engineering Services, LLC
105 Timberwalk Drive, Suite B
Boerne, TX 78006
Tel: (512) 507-1585

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2500117
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

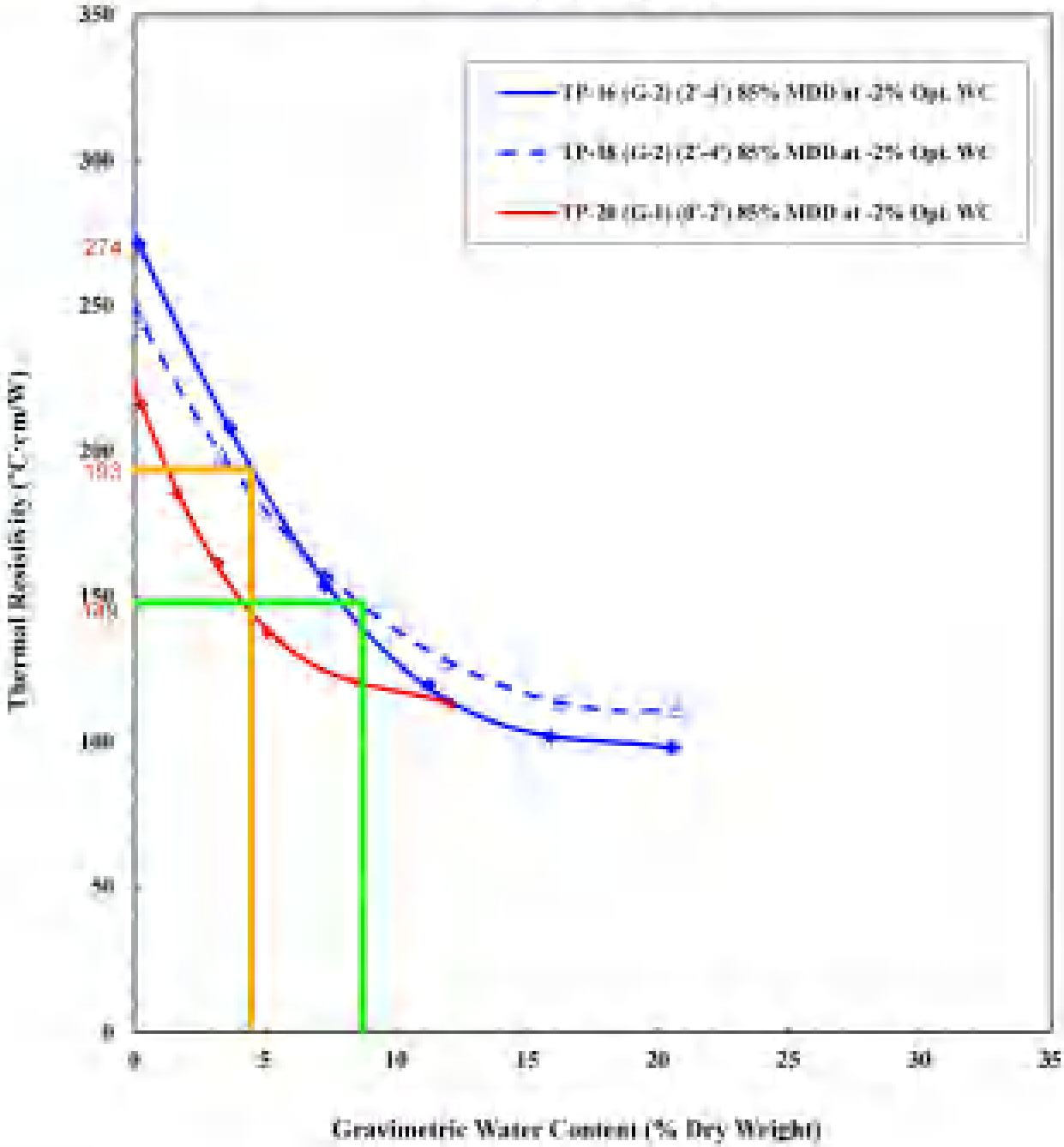
Alpine Engineering Services, LLC
103 Trailwood Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1589

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

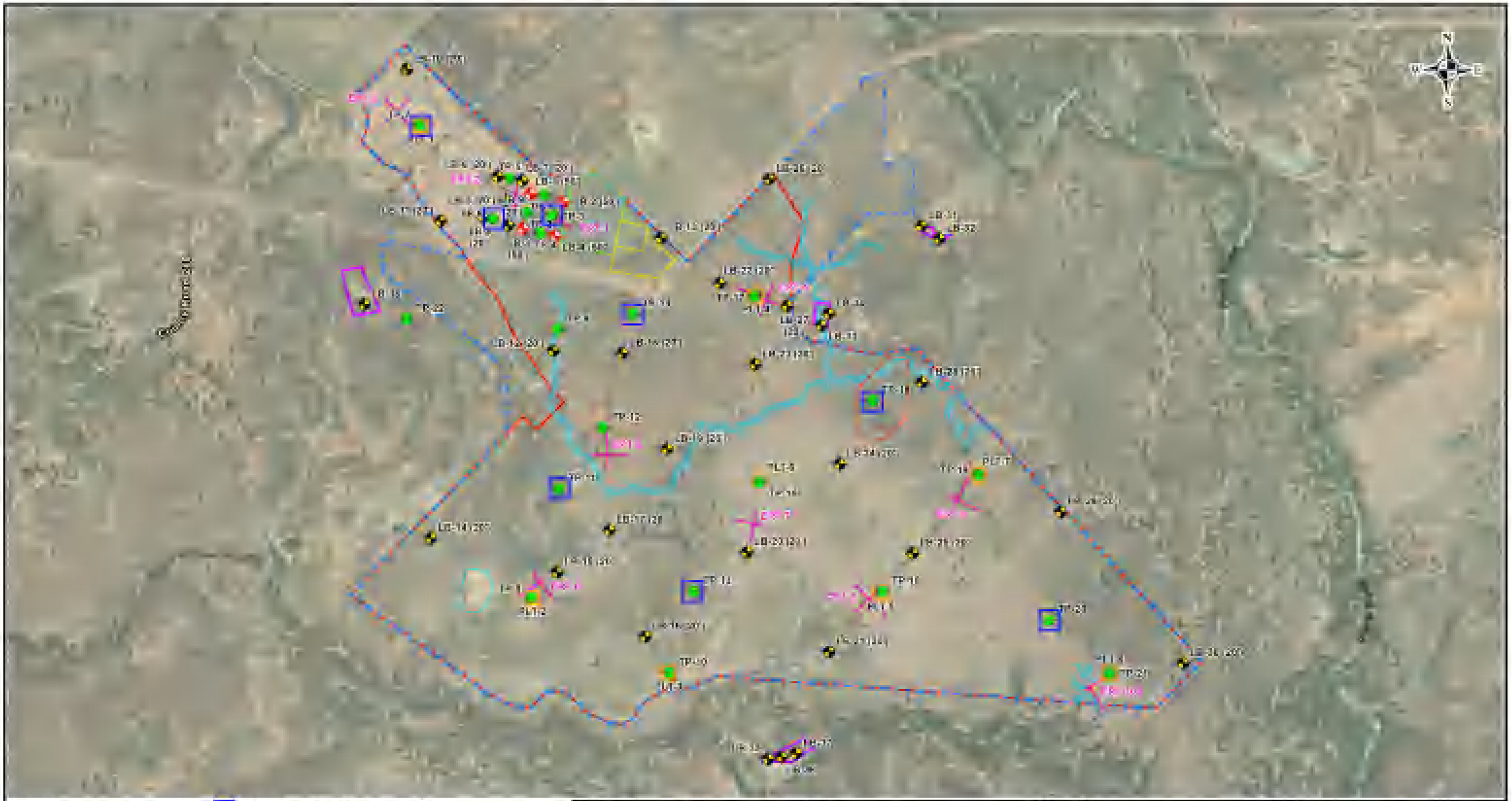
Client: Langan Engineering
Project Name: RRCE - Chesmc
(PN: 520102301)

Alpine Project No.: 25010117
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and for the agreed-upon design professional purposes.



Legend

- Initial Lease Boundary
- Upstream Lease Boundary
- Onsite Substation Footprint
- Proposed Substation and BESS Footprint
- Wetland Boundary
- Thermal Resistivity Test
- ERT Line
- Boring Location - 20'
- Boring Location - 50'
- Pile Load Test
- Test Pit

Notes

1. Aerial imagery sourced through Langan's third-party software subscription and dated [illegible].
2. All features shown are approximate.

1,000 0 1,000
SCALE IN FEET

LANGAN

Langan Engineering and Environmental Services, LLC

1900 N. Akard Expressway, Suite 110
Austin, TX 78752

T: 737.280.7900 F: 737.280.7901 www.langan.com

Project
RRCE CHISME
ZEPHYR
WILLIS COUNTY TEXAS

Figure Title
SUBSURFACE INVESTIGATION PLAN

Project No. 520102301	Figure: 3
Date: 3/25/2025	
Scale: 1"=1,000'	
Drawn By: GS	

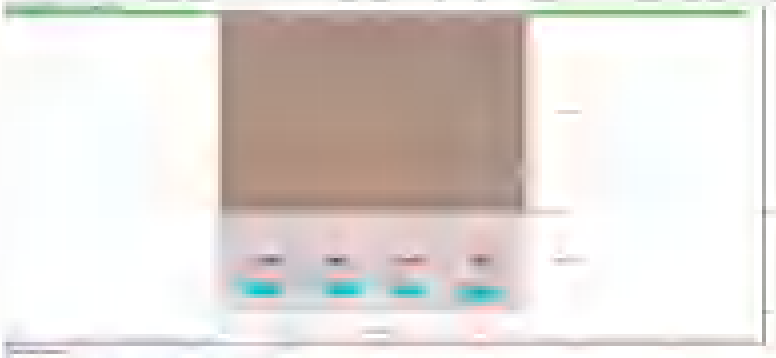
APPENDIX C – CYMCAP ANAYLSIS REPORTS

DC Cases

Case DCC1A; 600 MCM 1X4 in Trench

Simulation Data

Simulation Type: Multiple Outtanks/Backfills



General Cable Information

Detailed Cable Information

General Input Data

1		1						
2		1						
3		1						
4		1						
5		1						
6		1						
7		1						
8		1						

Ambient and Temperatures

1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Electrical Resistance

Order	Cable ID	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jersey Cables Number	Cable Requirement ID	DC Resistance of the conductor at 20°C	Size (Diam) Factor	Proximity (Magnet Factor)	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC determination of Conductor Minimum Operating Temperature	DC Resistance of Armour at Operating Temperature
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	0.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Thermal Resistivity

Order	Cable ID	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dataset Cables Number	Cable Requirement ID	Thermal resistance of conductor	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance between cable and duct	Thermal resistance of the duct	Total heat dissipation of the external cable system	Total external cable thermal resistance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Losses

Cable	Cable ID	W1 (W/m)	W2 (W/m)	Wd (W/m)	W3 (W/m)	W4 (W/m)	λ1	λ2
Cable/Cables Number	Cable Requirement ID	Conductor Losses	Sheath/Screen Losses	Dielectric Losses (Wdiel)	Armour Phase Losses	Filled Losses	Enhancement Factors	Armour Loss Factor – Pipe Loss Factor
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.8	[illegible]	1.00	[illegible]	0.00	[illegible]	[illegible]
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.4	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.4	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.13	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	0.4	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]

Complementary Information

Order	Cable ID	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Design Cables Number	Cable Requirement ID	Temperature rise due to surrounding heat sources	Reduced current on Sheath (Cyclic)	Other Considerations	Design Considerations	Basis/Source of Considerations	[illegible]	Voltage Drop on Cable Phase System
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
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No.	Description	Symbol	1
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[illegible]			
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9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]
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28	[illegible]		[illegible]
29	[illegible]		[illegible]

Translated academic results (Section 6) / Traducción oficial de resultados académicos

Student / Estudiante	
Program / Programa	
Institution / Institución	
Issued / Emitido	

Summary / Resumen

Cumulative GPA / Promedio acumulado	
Credits earned / Créditos obtenidos	
Standing / Estado	

Term work

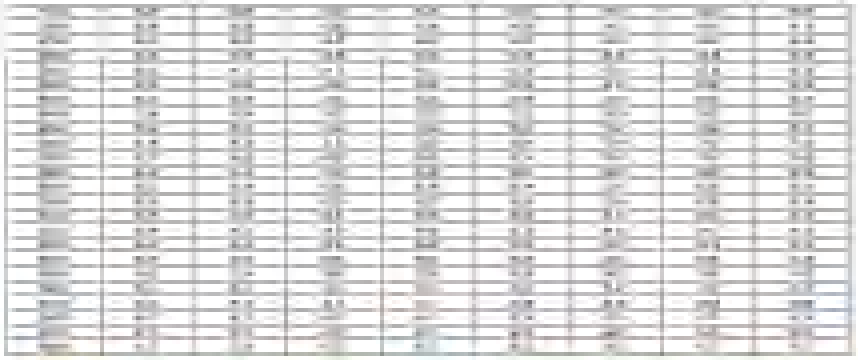
Term	Course	Credits	Grade	Points	Notes

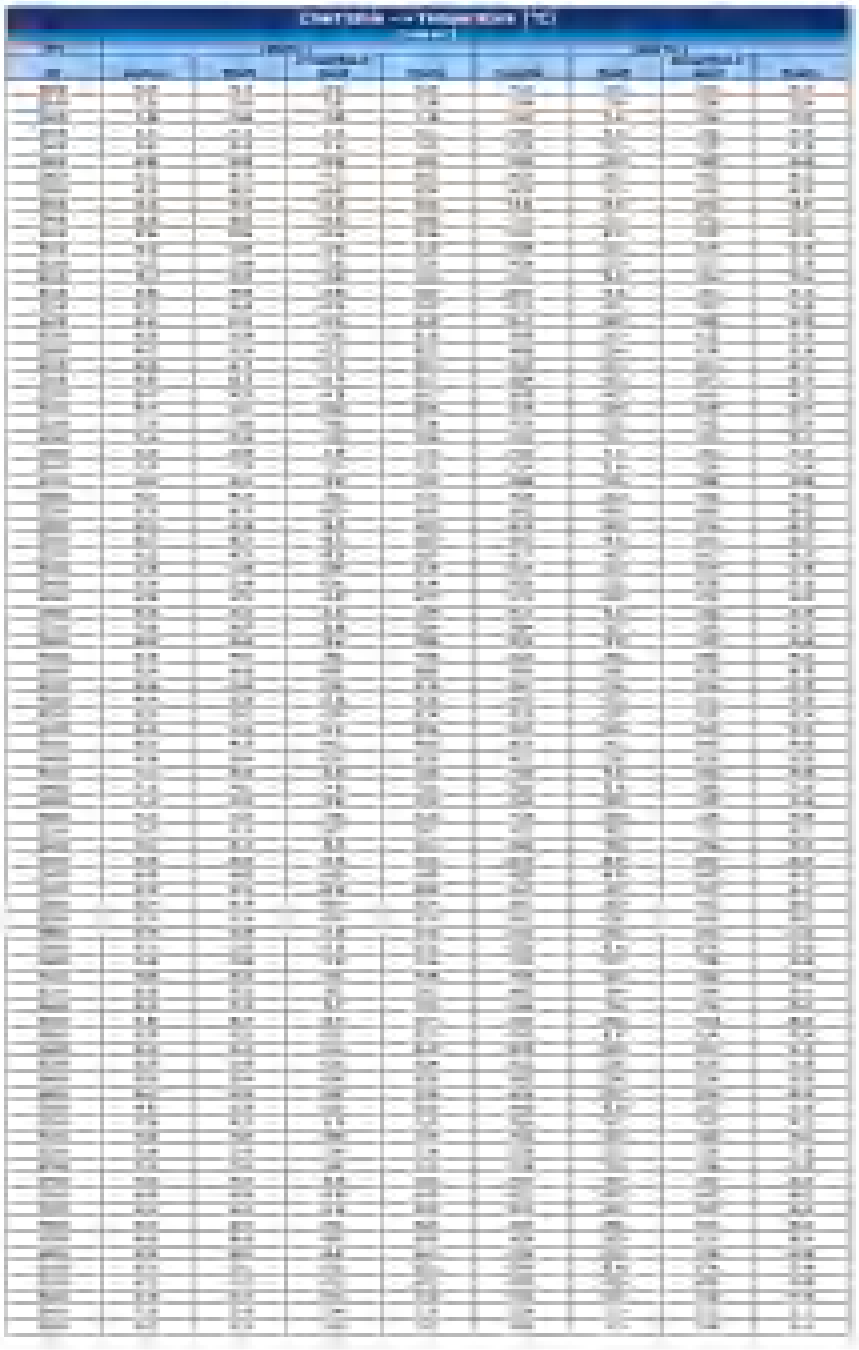
Translated results

Course	Credits	Grade	Points

Class hours — Horas de clase

Day	Course	Time	Room	Instructor





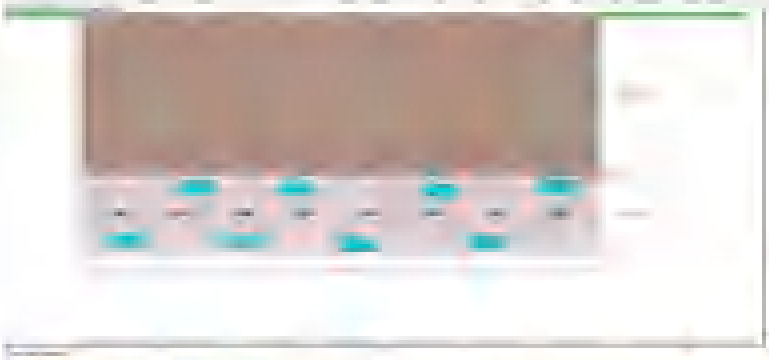
Transport Routes

Chemicals — Temperature (°C)

Case DCC1B; 750 MCM 1XB in Trench

Simulation Data

Installation Type/Installation Environment



General Cable Information

Detailed Cable Information

Electrical Input Data

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16	[illegible]	1.21	[illegible]	0.00	[illegible]	[illegible]	0.00	[illegible]

Complementary Information

Cable	Cable ID	Alert [°C]	[A]	[uH/mile]	[R]	[Ohm/mile]	[Ohm/mile]	[in to feet]
Cable Index Number	Cable Experiment ID	Temperature Value that Is not Exceeding Heat Capacity	Maximum Current of Medium Solvent	Cable Capacitance	Surge Impedance	Resistance of Conductor	Resistance of Insulator [Ohm/mile]	Voltage Drop for Three Phase System
1	[illegible]	24.22	0.00	1.21	1 mile	0.00	0.00	0.21
2	[illegible]	23.43	0.00	1.21	1 mile	0.00	0.00	0.21
3	[illegible]	41.30	0.00	1.21	1 mile	0.00	0.00	0.21
4	[illegible]	40.44	0.00	1.21	1 mile	0.00	0.00	0.21
5	[illegible]	42.44	0.00	1.21	1 mile	0.00	0.00	0.21
6	[illegible]	42.22	0.00	1.21	1 mile	0.00	0.00	0.21
7	[illegible]	43.04	0.00	1.21	1 mile	0.00	0.00	0.21
8	[illegible]	42.44	0.00	1.21	1 mile	0.00	0.00	0.21
9	[illegible]	42.54	0.00	1.21	1 mile	0.00	0.00	0.21
10	[illegible]	42.30	0.00	1.21	1 mile	0.00	0.00	0.21
11	[illegible]	42.30	0.00	1.21	1 mile	0.00	0.00	0.21
12	[illegible]	42.44	0.00	1.21	1 mile	0.00	0.00	0.21
13	[illegible]	40.30	0.00	1.21	1 mile	0.00	0.00	0.21
14	[illegible]	41.30	0.00	1.21	1 mile	0.00	0.00	0.21
15	[illegible]	24.22	0.00	1.21	1 mile	0.00	0.00	0.21
16	[illegible]	24.30	0.00	1.21	1 mile	0.00	0.00	0.21

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

No.	Description	Level	T
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[illegible]			
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No.	Description	Level	T
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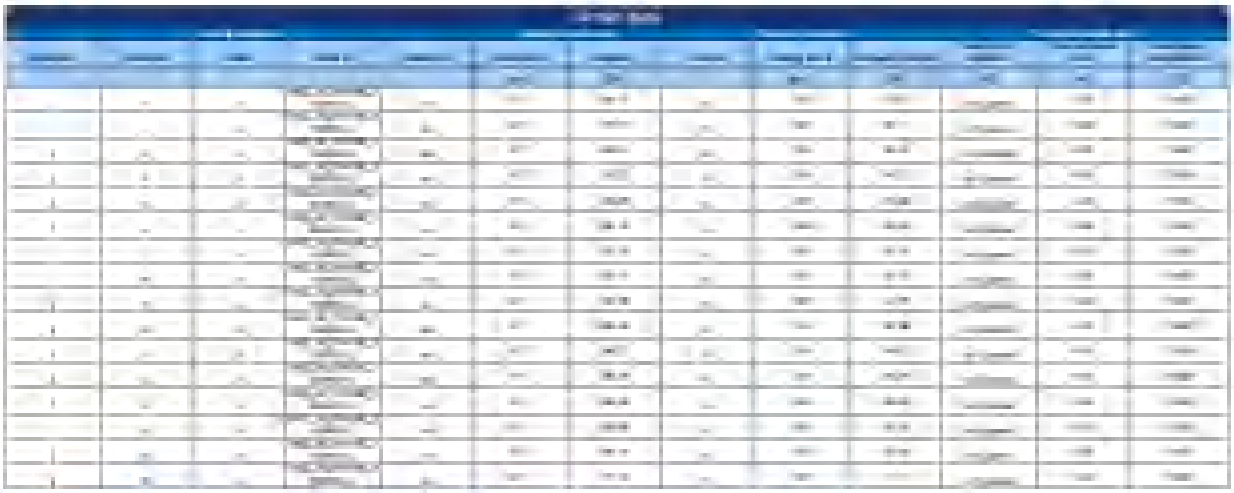
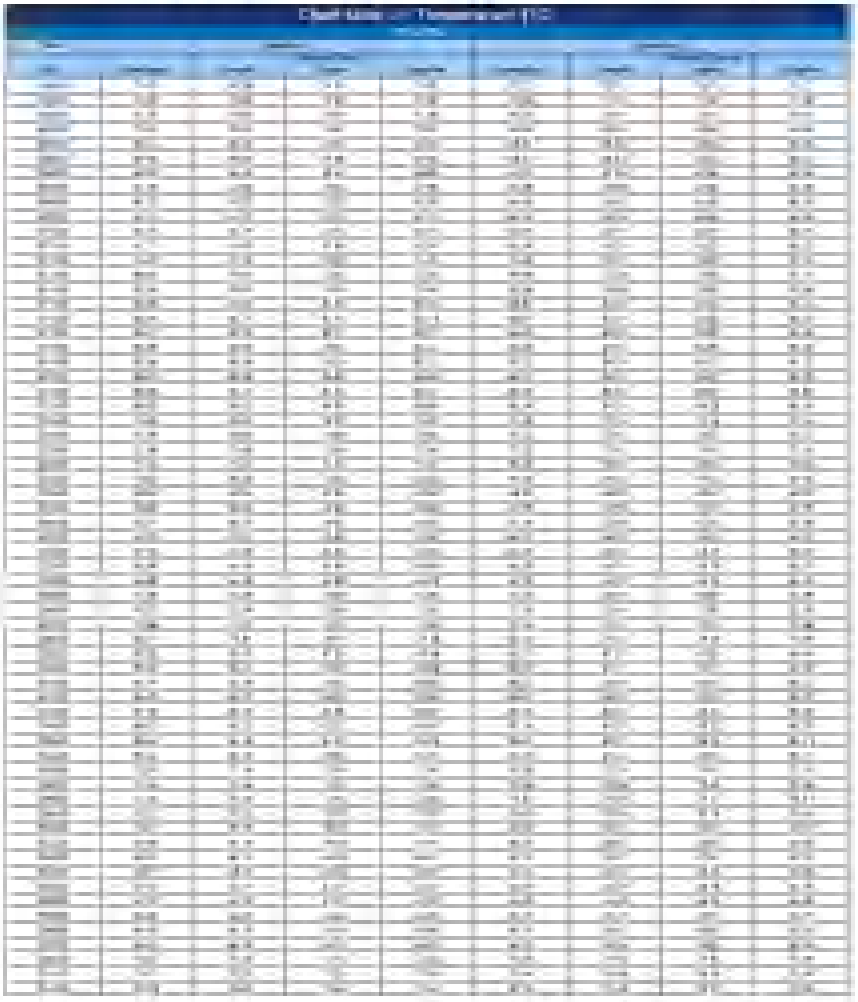
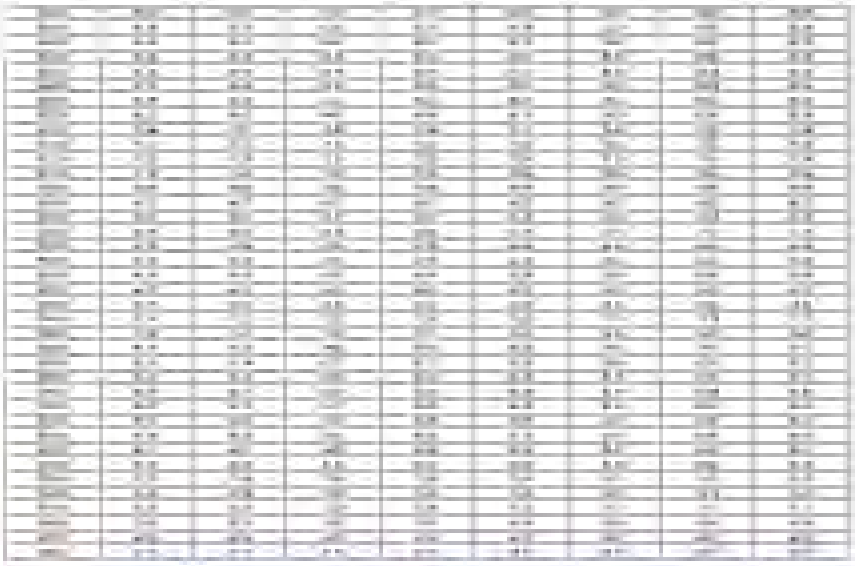
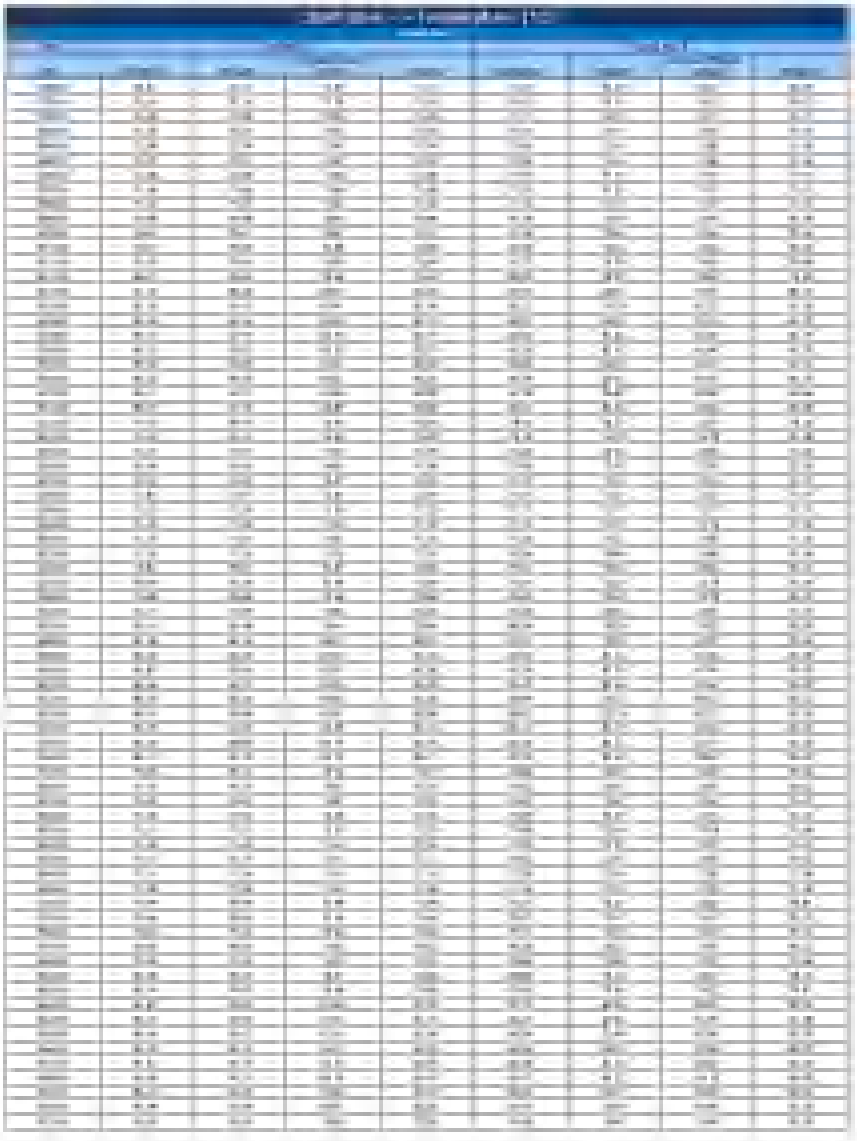
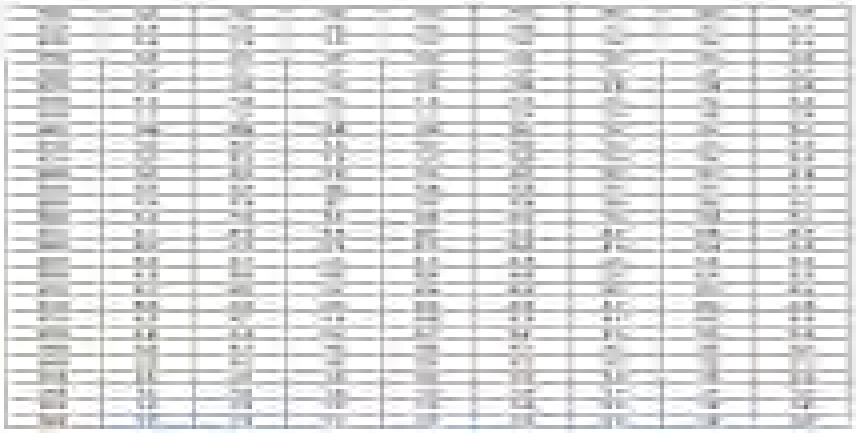
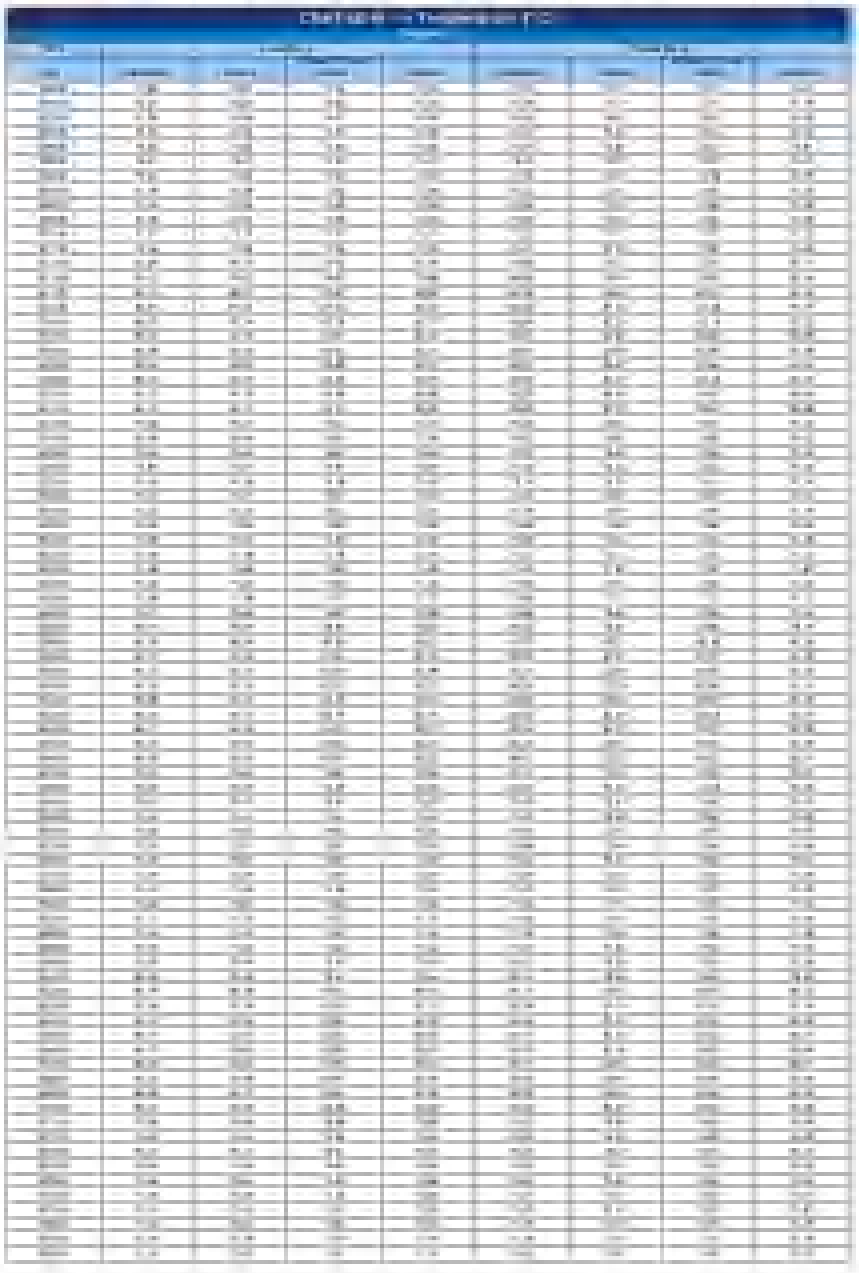


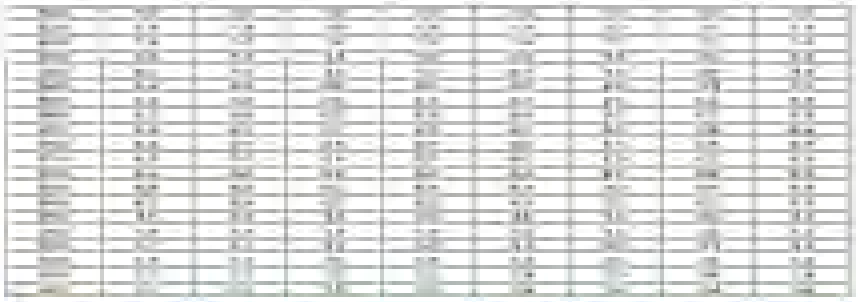


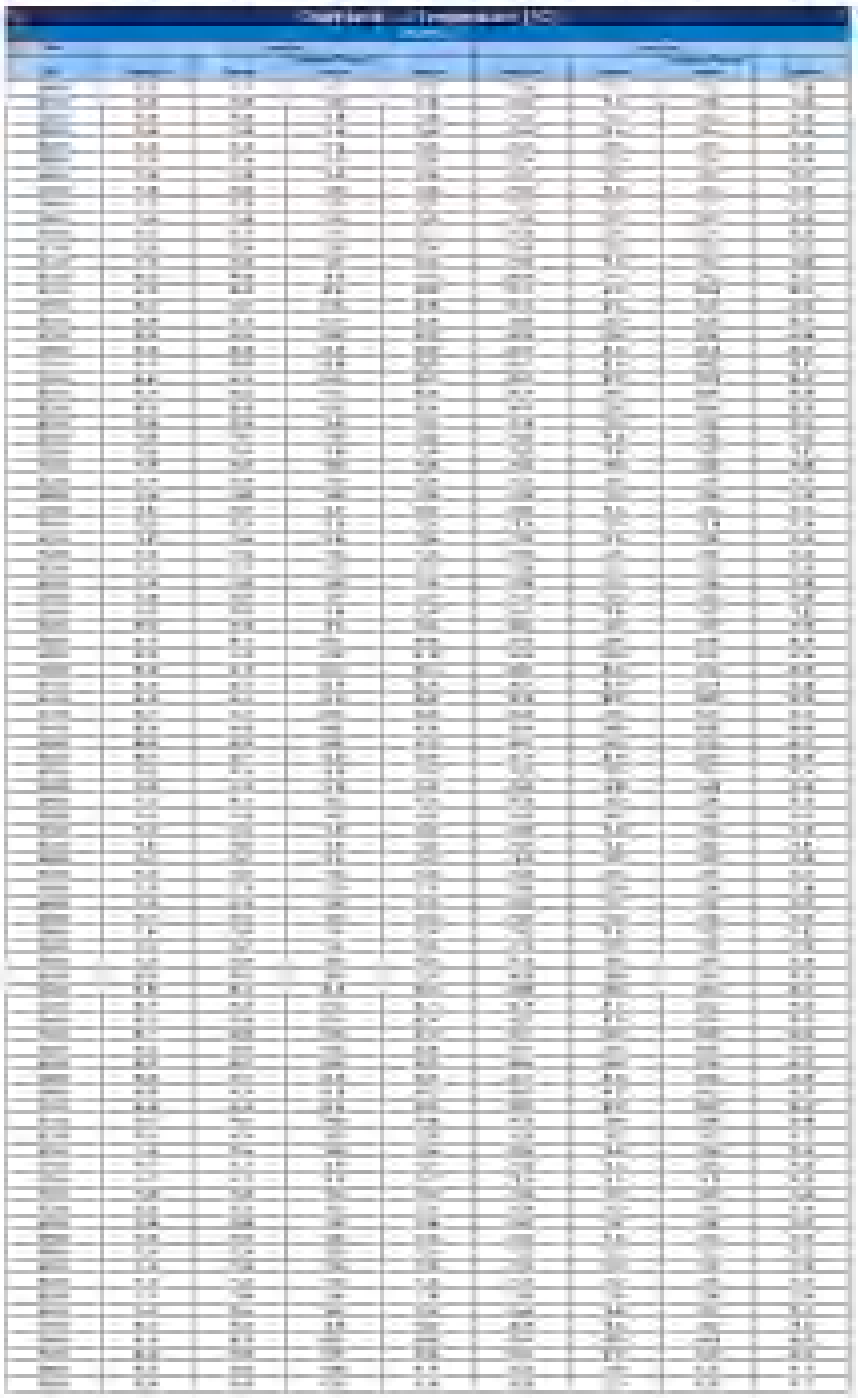


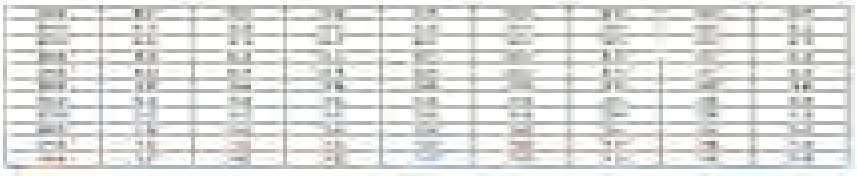


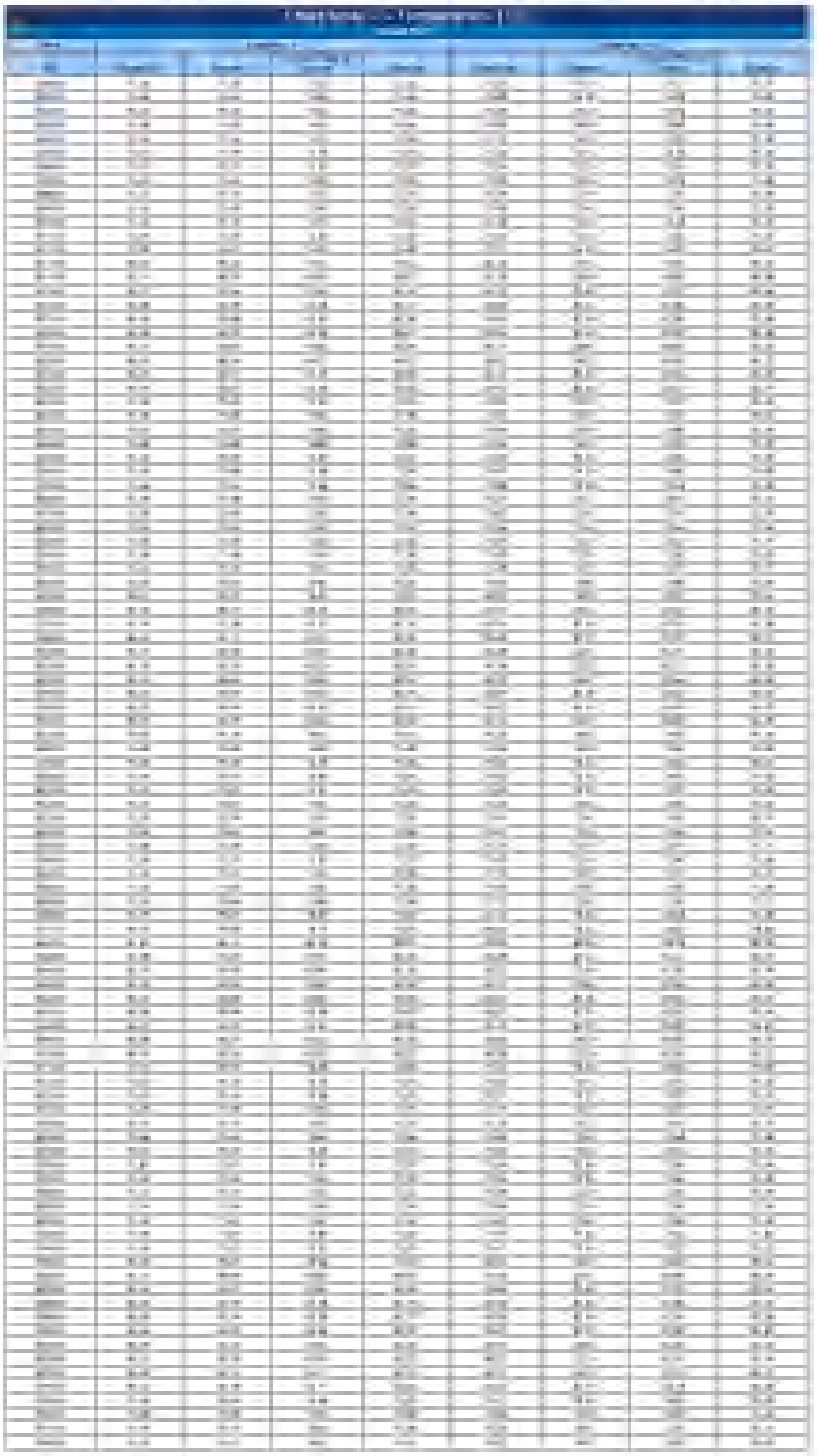


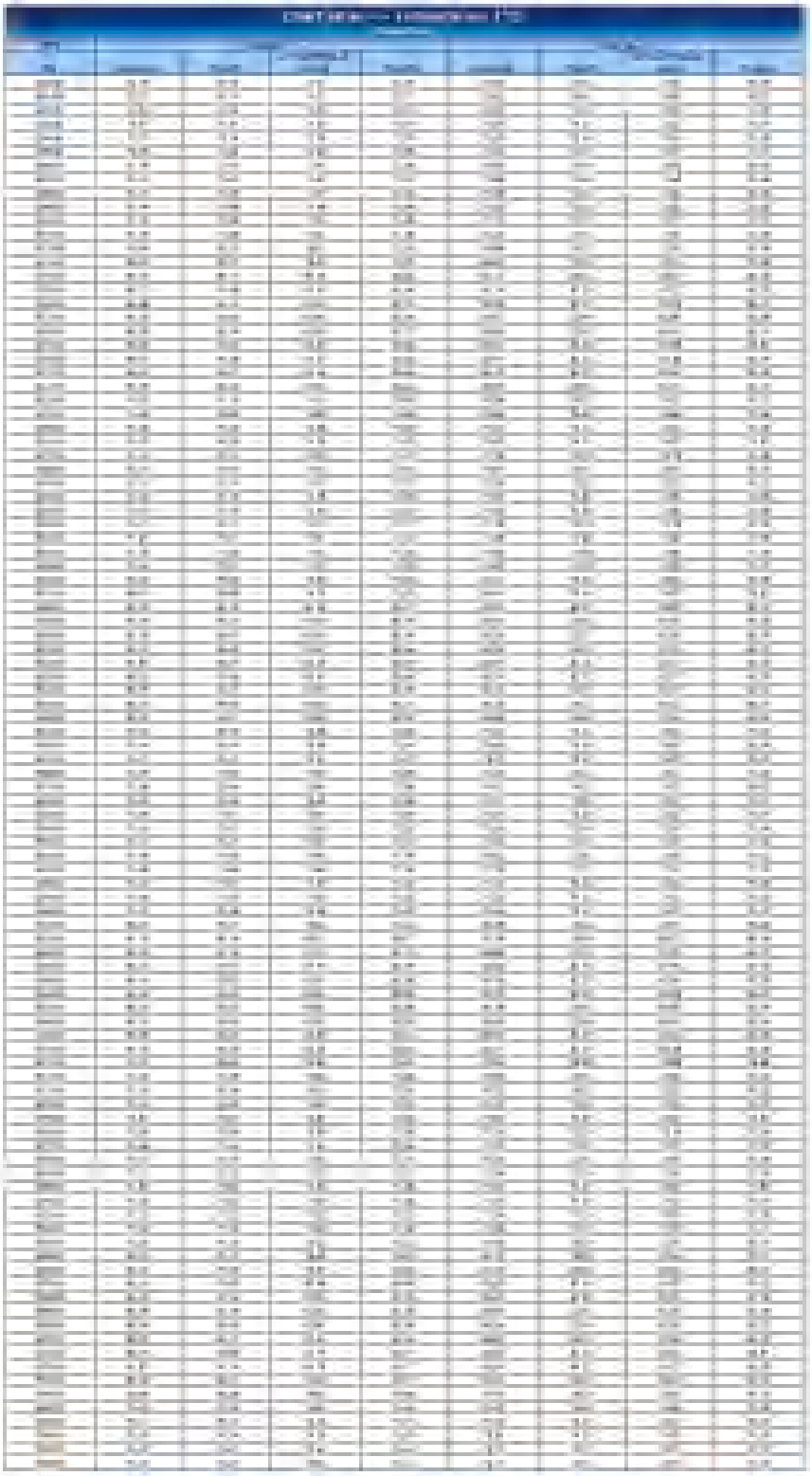


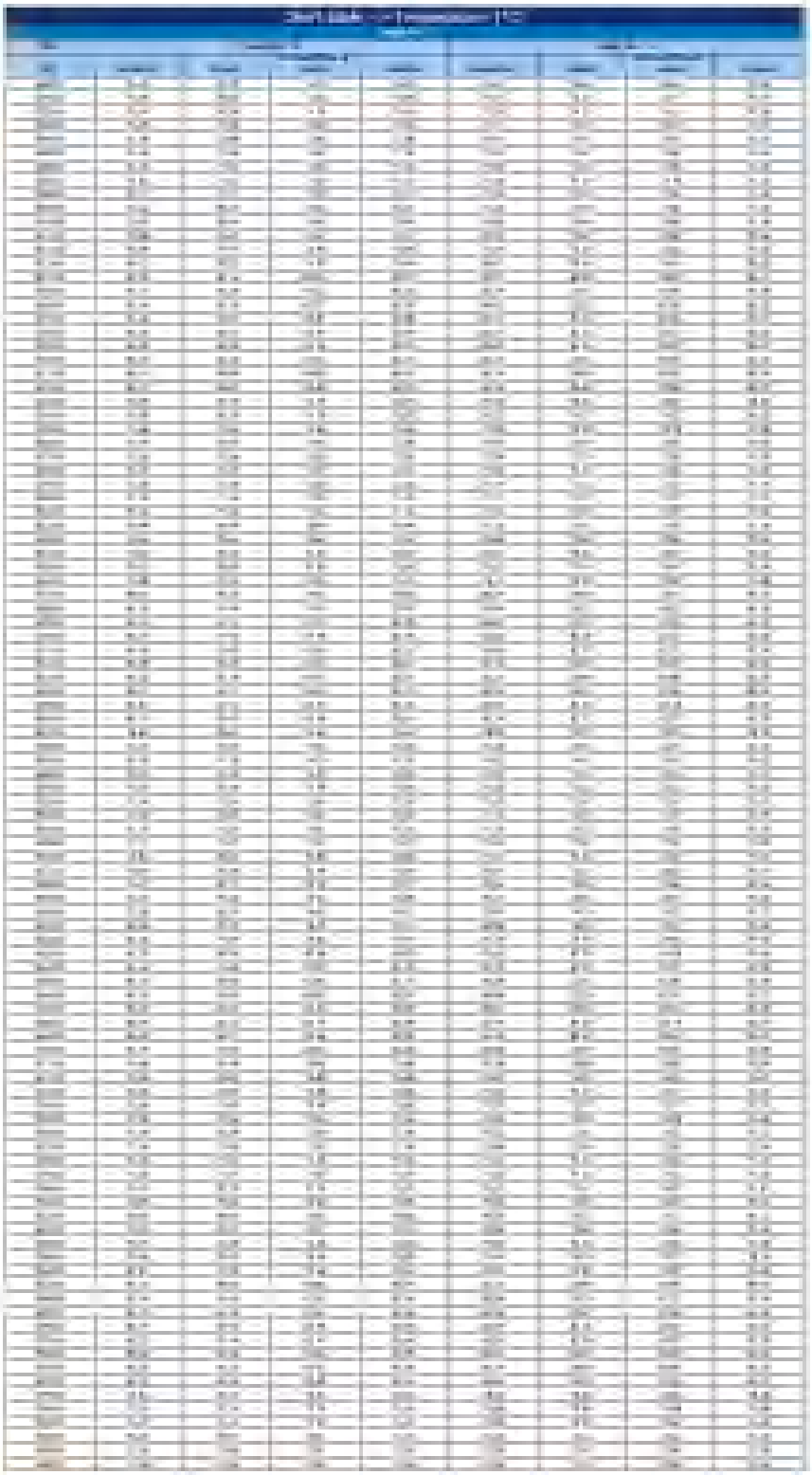


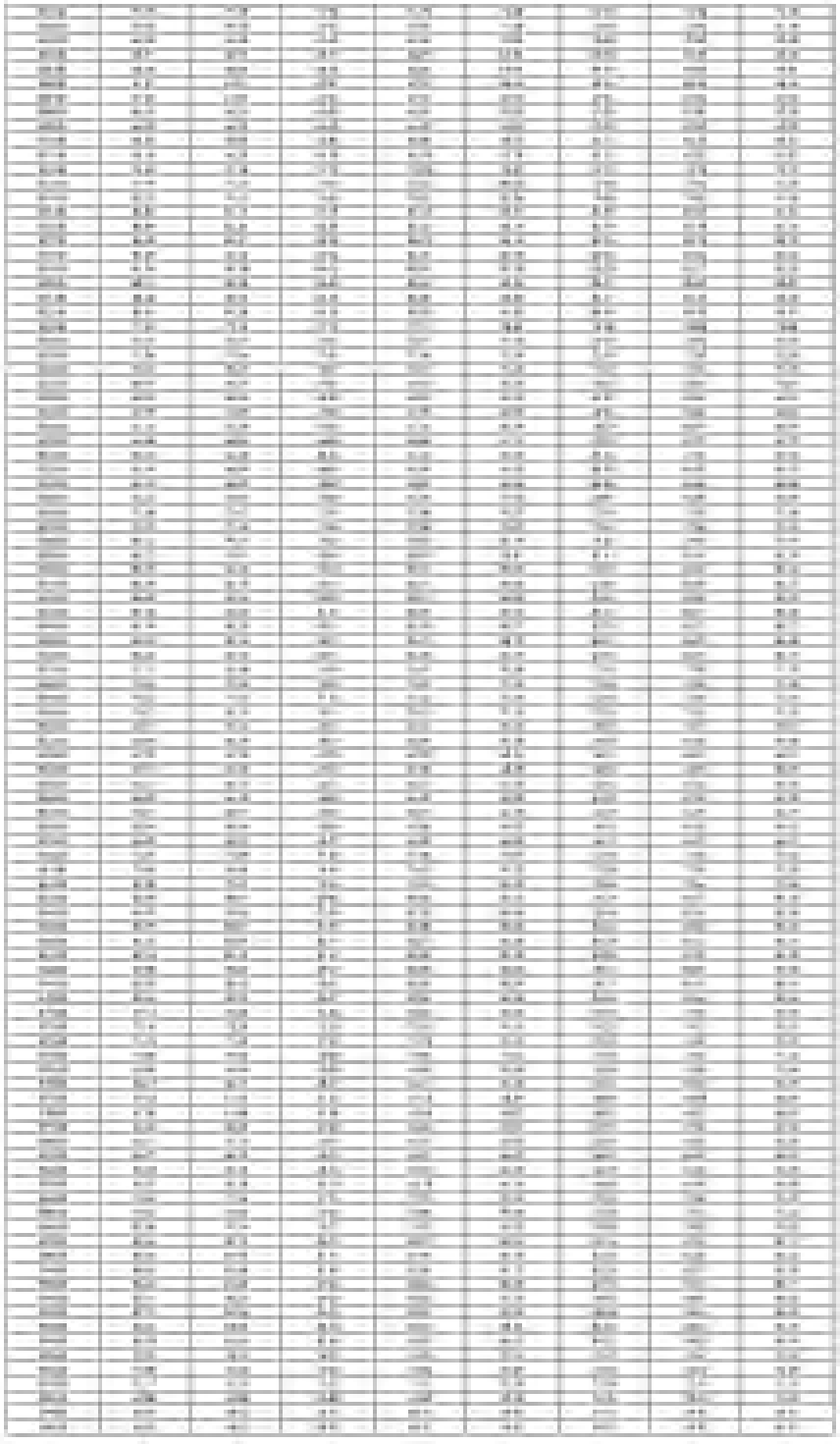






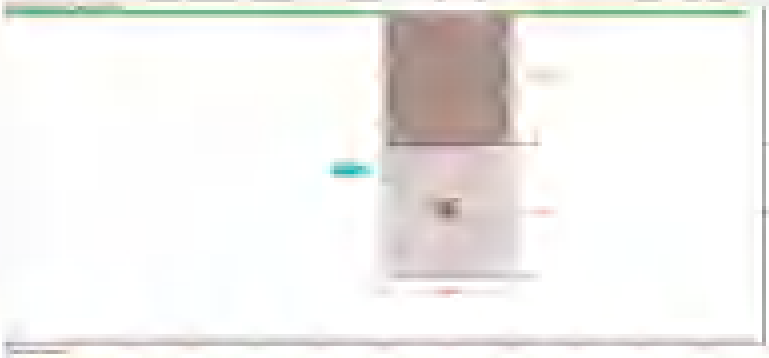


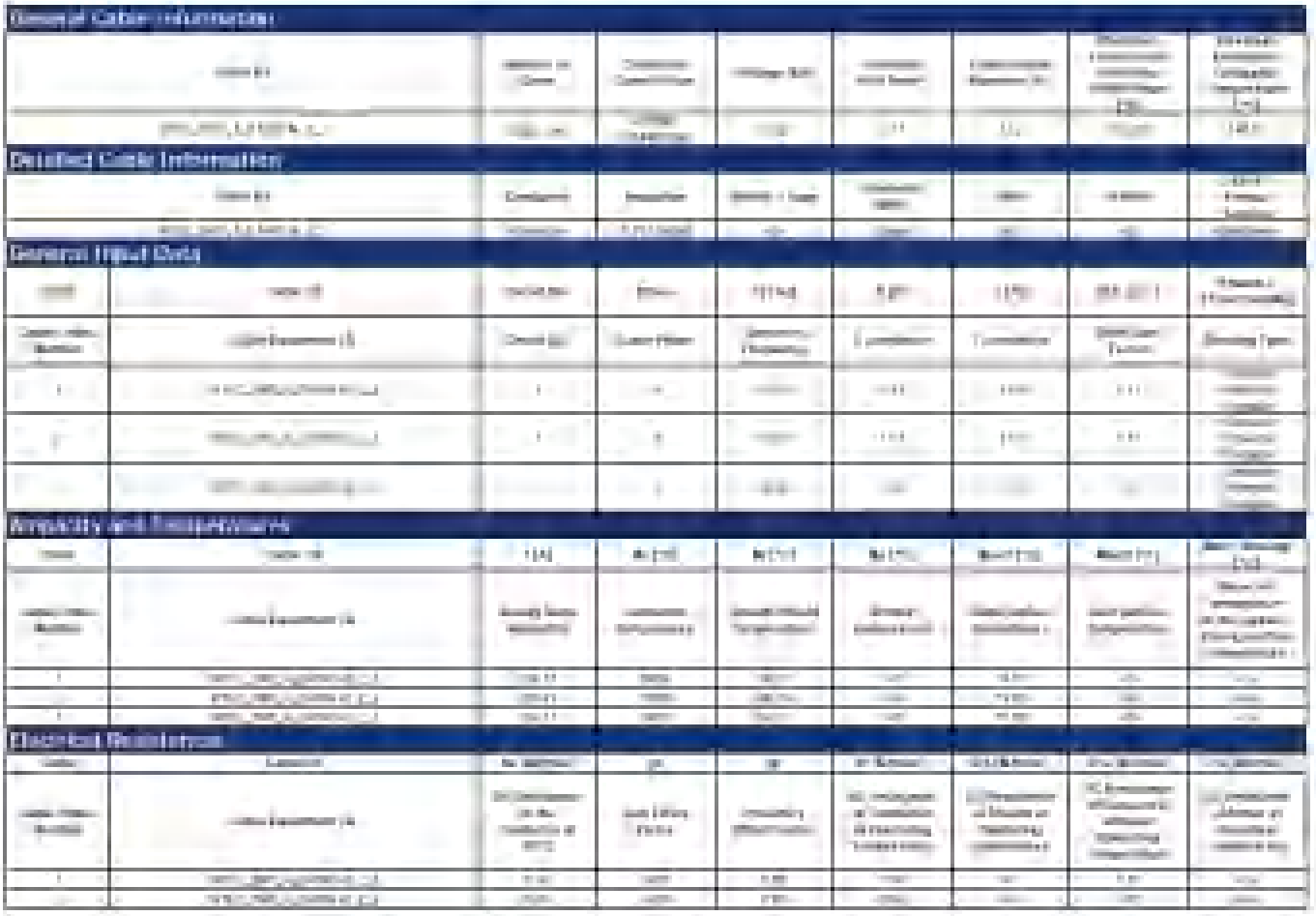




AC Cases

AC Case 1: Single #4/0 AWG in Trench





3	WTC_3kV_3_3 mm sq_1_1	0.43	1000	0.80	1000	n/a	0.91	n/a

Thermal Resistances

Cable	Cable ID	T_1 [K.m/W]	T_2 [K.m/W]	T_3 [K.m/W]	T_4 [K.m/W]	T_5 [K.m/W]	T_6 [K.m/W]	T_7 [K.m/W]
Cable Unique Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance (multi-fire duct)	Thermal resistance of fire duct	Thermal resistance of the external medium	Not in use and Derived resistance
1	WTC_3kV_3_3 mm sq_1_1	0.91	1000	0.80	n/a	n/a	1.08	1.08
2	WTC_3kV_3_3 mm sq_1_1	0.91	1000	0.80	n/a	n/a	1.08	1.08
3	WTC_3kV_3_3 mm sq_1_1	0.91	1000	0.80	n/a	n/a	1.08	1.08

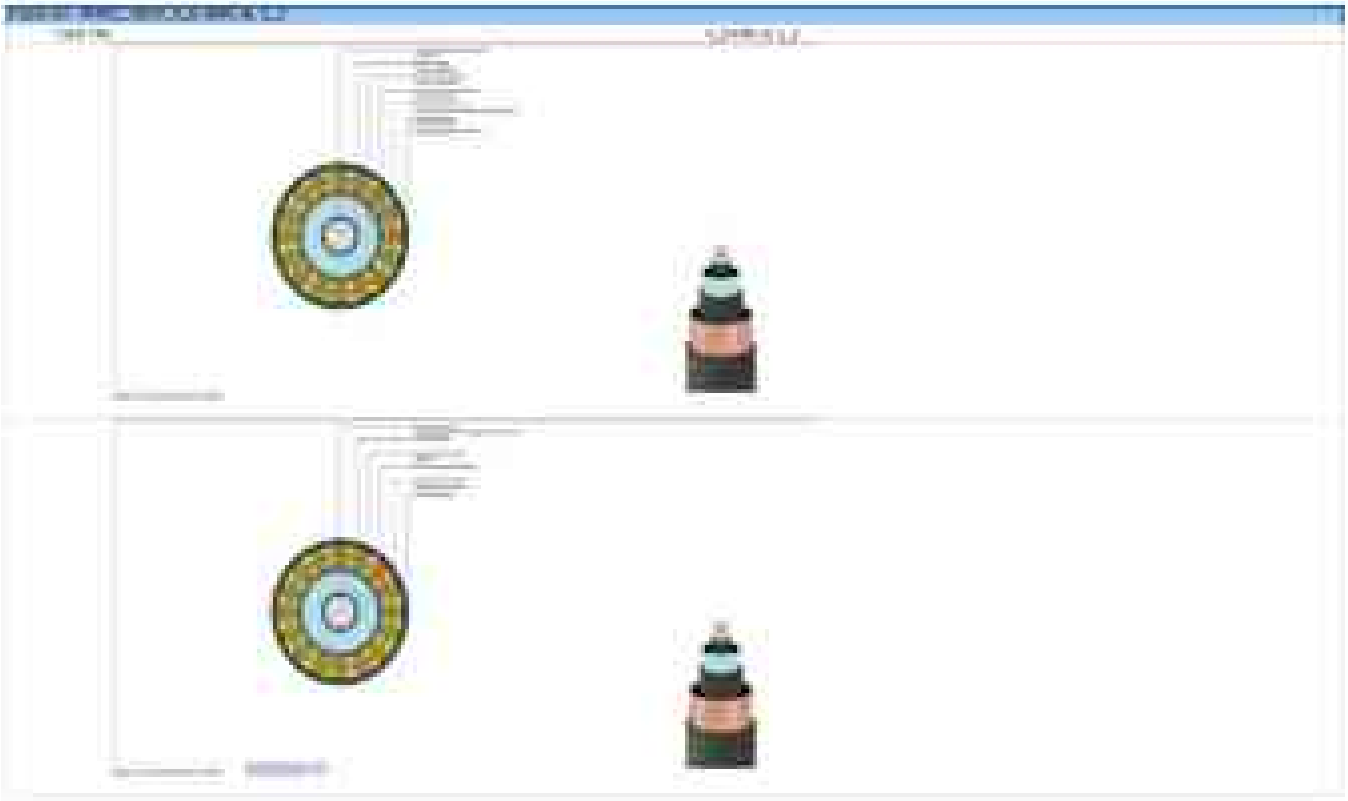
Losses

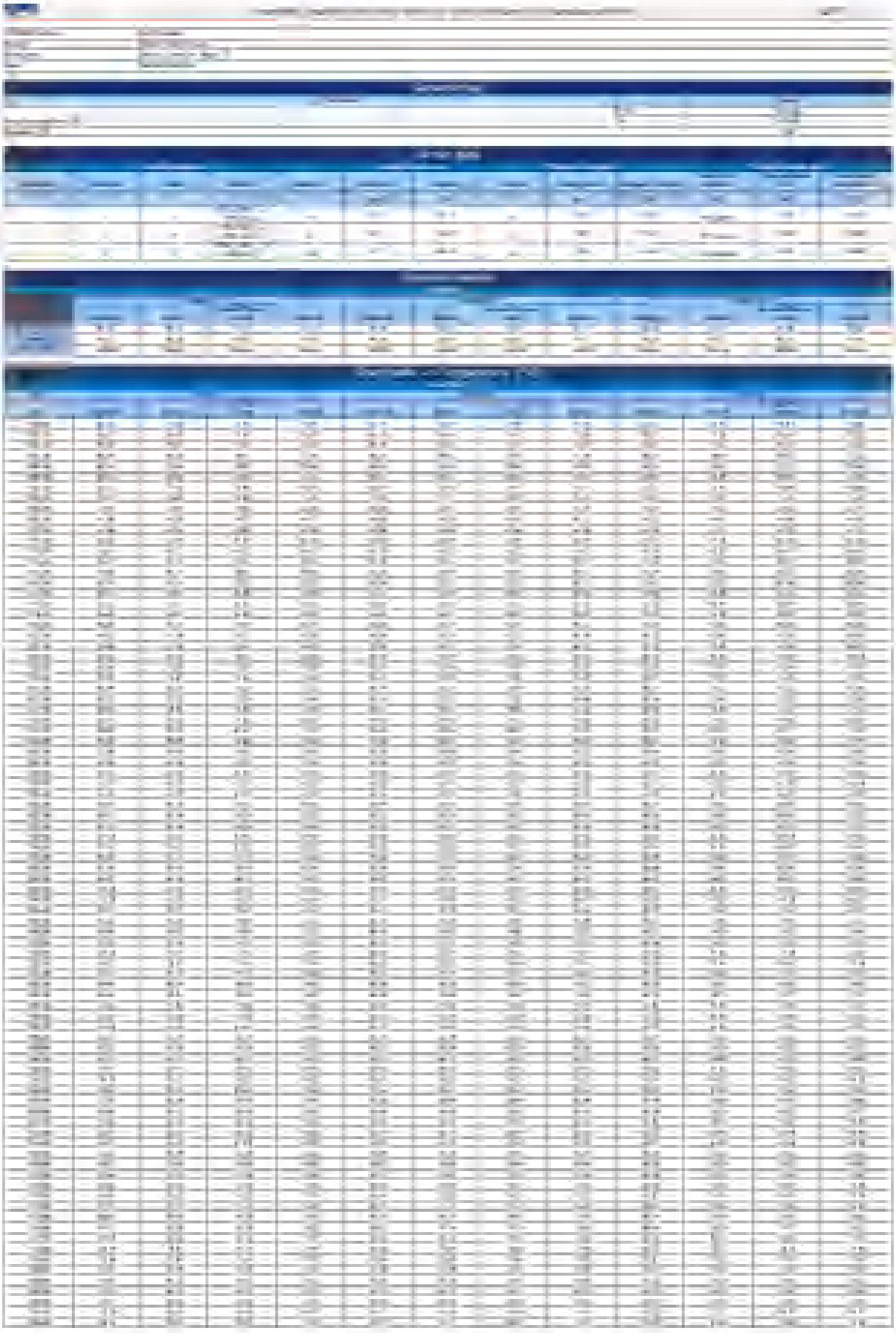
Cable	Cable ID	W_d [W/m]	W_a [W/m]	W_c [W/m]	W_{sh} [W/m]	W_t [W/m]	λ_1	λ_2
Cable Unique Number	Cable Equipment ID	Conductor Losses	Capacitive Losses	Metallic Screen Losses	Armour/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor - (Pipe Loss Factor)
1	WTC_3kV_3_3 mm sq_1_1	5.80	1000	0.77	1000	7.54	0.00	0.000
2	WTC_3kV_3_3 mm sq_1_1	5.80	1000	0.77	1000	7.54	0.00	0.000
3	WTC_3kV_3_3 mm sq_1_1	5.80	1000	0.77	1000	7.54	0.00	0.000

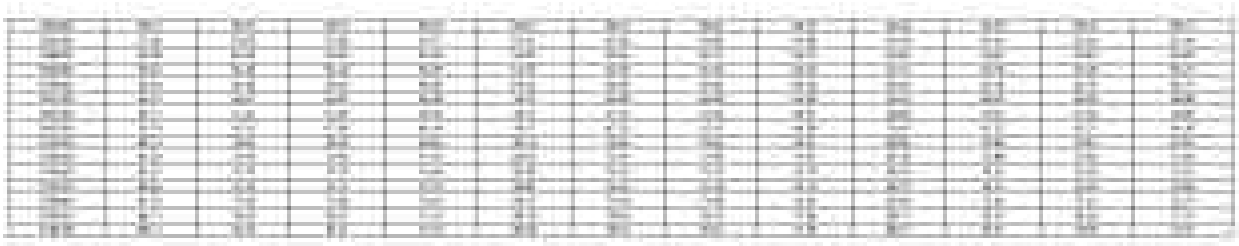
Complementary Information

Cable	Cable ID	$\Delta\theta_{cr}$ [°C]	U_0 [kV]	C_e [F/m/m]	δ_t	D_c [m/m]	D_e [m/m]	ρ_T [K.m/W]
Cable Unique Number	Cable Equipment ID	Conductor to Sheath temperature rise above surrounding soil temperature	Voltage between conductor and Sheath or Screen	Cable Capacitance	Tan δ Dielectric Loss Factor	Diameter of Conductor	Overall Diameter of Electric Shield A	Effective Soil Thermal Resistivity for Three Phase System
1	WTC_3kV_3_3 mm sq_1_1	27.20	13.00	0.25	0.010	0.04	0.10	0.90
2	WTC_3kV_3_3 mm sq_1_1	27.20	13.00	0.25	0.010	0.04	0.10	0.90
3	WTC_3kV_3_3 mm sq_1_1	27.11	13.00	0.25	0.010	0.04	0.10	0.90

Cables Report







AC Case 1; Single 500MCM in Trench

[illegible] General Summary Report

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[illegible] Simulation Tools

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[illegible] Type Movable Cucharón/Gazetta

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[illegible]	[illegible]
[illegible]	[illegible]

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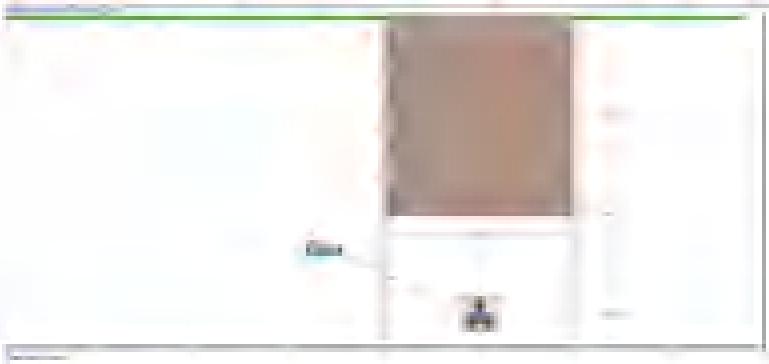

General Cable Information

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Detailed Cable Information

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

General Input Data

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Ampacity and Temperature

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Electrical Resistance

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

2	[illegible]	0.53	1.011	0.161	0.23	n/a	1.241	n/a
3	[illegible]	0.53	1.011	0.161	0.23	n/a	1.241	n/a

Thermal Resistances

Circuit	Cable 1	T_1 [K m/W]	T_2 [K m/W]	T_3 [K m/W]	T_4 [K m/W]	T_5 [K m/W]	T_6 [K m/W]	T_7 [K m/W]
Circuit Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance between cable and duct	Thermal resistance of the duct	Thermal resistance of the soil between cable and duct	Total thermal resistance
1	[illegible]	0.41	0.00	0.00	n/a	n/a	2.40	2.40
2	[illegible]	0.41	0.00	0.00	n/a	n/a	2.40	2.40
3	[illegible]	0.41	0.00	0.00	n/a	n/a	2.40	2.40

Losses

Circuit	Cable 1 W	Wd [W/m]	Wa [W/m]	Wm [W/m]	Wt [W/m]	W_s	k_s
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screens Losses	Armour Pipe Losses	Total losses	Sheath Loss Factor	Armour Loss Factor - (Pipe Loss Factor)
1	[illegible]	5.32	0.00	0.75	0.00	6.07	0.14	0.00
2	[illegible]	5.32	0.00	0.75	0.00	6.07	0.14	0.00
3	[illegible]	5.32	0.00	0.75	0.00	6.07	0.14	0.00

Complementary Information

Circuit	Cable 2 ID	d_{ext} [m]	D_e [m]	ρ_T [K m/W]	T_4 [K m/W]	β [K m/W]	β_{ref} [K m/W]	ρ_{ref} [K m/W]
Cable Index Number	Cable Equipment ID	Thickness of the duct for surrounding fluid (water)	Outside diameter of the cable	Cable Conductor	Temperature	Temperature Correction	Reference of Resistivity (Ground)	Voltage drop for Three Phase System
1	[illegible]	0.13	0.14	0.00	40.00	0.23	0.00	0.40
2	[illegible]	0.13	0.14	0.00	40.00	0.23	0.00	0.40
3	[illegible]	0.13	0.14	0.00	40.00	0.23	0.00	0.40

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

No.	Description	Unit	T
[illegible]			
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2	[illegible]		[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
[illegible]			
8	[illegible]		[illegible]
9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]
14	[illegible]		[illegible]
15	[illegible]		[illegible]
16	[illegible]		[illegible]
17	[illegible]		[illegible]
18	[illegible]	[illegible]	[illegible]
[illegible]			
19	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]
[illegible]			
21	[illegible]		[illegible]
22	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]
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[illegible]			
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41	[illegible]		[illegible]
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43	[illegible]	[illegible]	[illegible]
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[illegible]			
45	[illegible]		[illegible]
46	[illegible]	[illegible]	[illegible]
47	[illegible]	[illegible]	[illegible]
48	[illegible]	[illegible]	[illegible]

No.	Description	Unit	T
[illegible]			
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51	[illegible]		[illegible]
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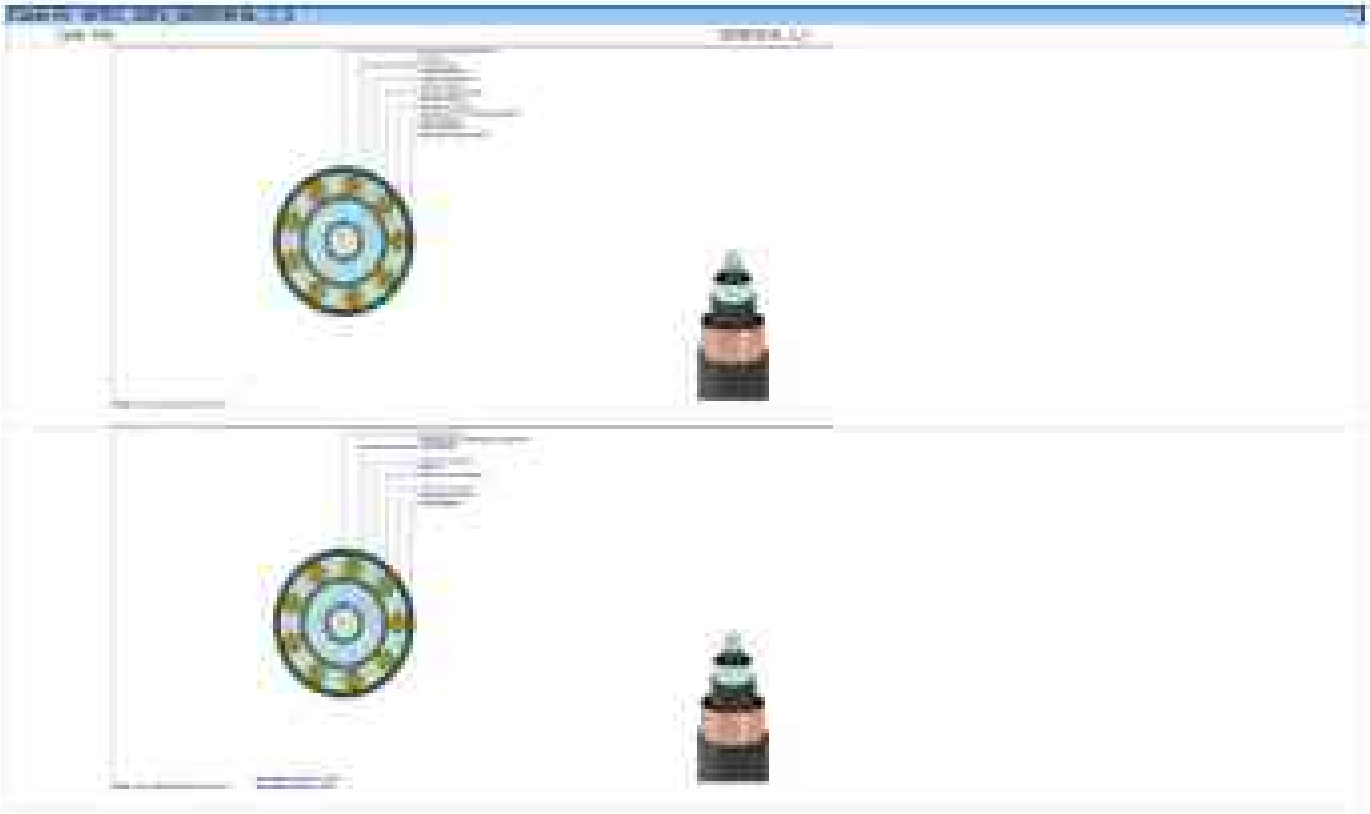
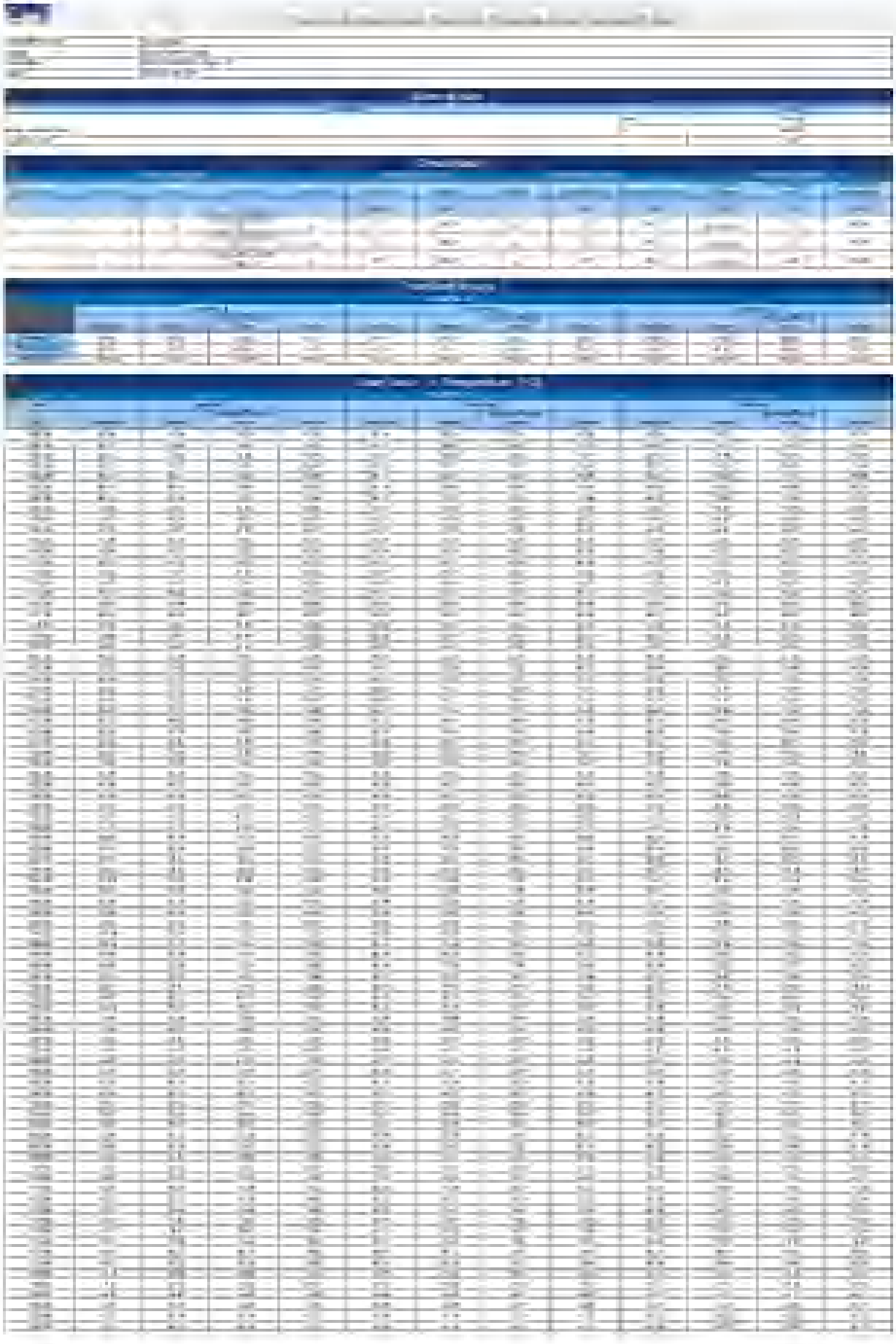
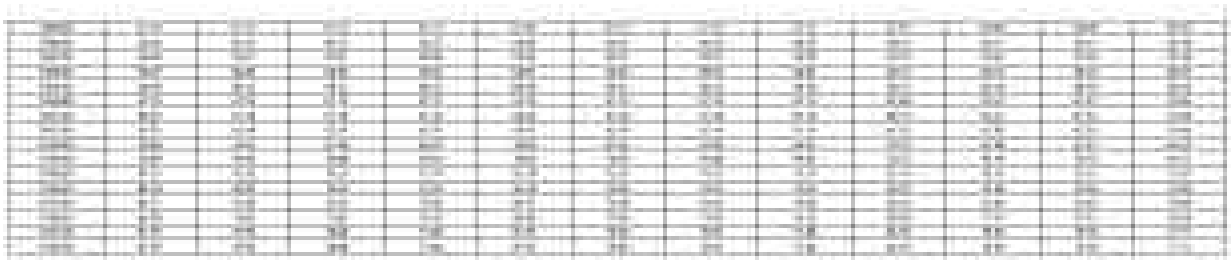




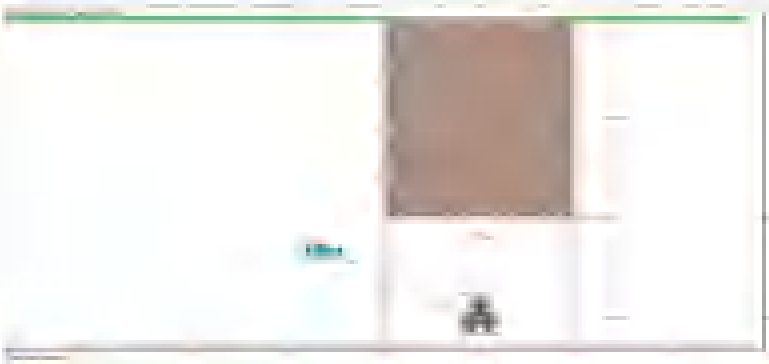


AC Case 1; Single 1000MCM in Trench

Simulation Data

Unit Load / Multiple Customer Information

Load Name	Unit	Qty	Load Type	Phase	Power Factor (Lead or Lag)



General Cable Information

Cable ID	Reference Cable	Construction Code/Voltage	Voltage Rating	Conductor Temp Rating	Conductor Resistance (Ω)	Conductor Reactance (Ω)	Cable Diameter (Inches)

Detailed Cable Information

Cable ID	Conductor	Insulation	Material + Layer	Conductor Size	Cable	Jacket	Cable Diameter (Inches)

General Input Data

Cable Unique Number								

Ampacity and Temperatures

Electrical Resistance

3	[illegible]	0.00	[illegible]	0.00	[illegible]	[illegible]	[illegible]	[illegible]

Thermal Resistances

Cable	Cable ID	T_1 [K·m/W]	T_2 [K·m/W]	T_3 [K·m/W]	T_4 [K·m/W]	T_5 [K·m/W]	T_6 [K·m/W]	T_7 [K·m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Not a natural Derived conductor
1	[illegible]	0.24	0.00	0.00	n/a	n/a	1.22	1.22
2	[illegible]	0.24	0.00	0.00	n/a	n/a	1.22	1.22
3	[illegible]	0.24	0.00	0.00	n/a	n/a	1.22	1.22

Losses

Cable	Cable ID	W_c [W/m]	W_d [W/m]	W_s [W/m]	W_{sa} [W/m]	W_t [W/m]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Sheath/Screen Losses	Armour/Pipe Losses	Total Losses	Ssl Correction Factor	Armour Loss Factor - Pipe Construction
1	[illegible]	5.08	0.00	0.00	0.00	0.00	0.00	0.00
2	[illegible]	5.08	0.00	0.00	0.00	0.00	0.00	0.00
3	[illegible]	5.08	0.00	0.00	0.00	0.00	0.00	0.00

Complementary Information

Cable	Cable ID	$\Delta\theta_{cond}$ [°C]	$\Delta\theta$ [°C]	$\Delta\theta_{cable}$ [°C]	$\Delta\theta_{ij}$ [°C]	$\Delta\theta_{ij}$ [°C]	$\Delta\theta_{ij}$ [°C]	$\Delta\theta_{ij}$ [°C]
Cable Index Number	Cable Equipment ID	Conductor to sheath temperature difference	Difference between cable and air Overall to Ambient	Cable Capacitance	Surge Impedance	Resistance of Conductor	Resistance of Electrode Material	Voltage drop for Three Phase System
1	[illegible]	21.44	11.44	0.42	28.70	0.21	0.42	0.21
2	[illegible]	21.44	11.47	0.42	28.70	0.21	0.42	0.21
3	[illegible]	21.41	11.49	0.42	28.70	0.21	0.42	0.21

Estimate Report

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Date	[illegible]

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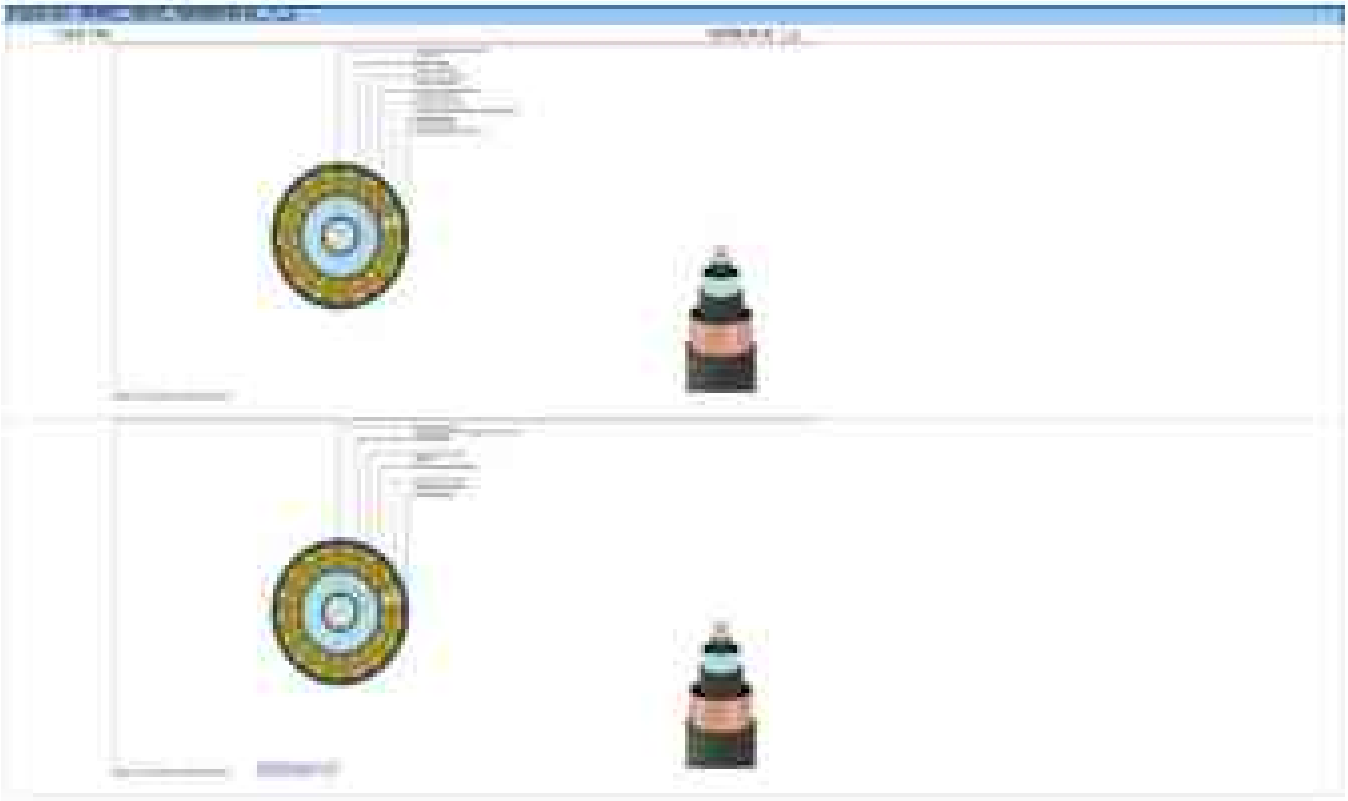
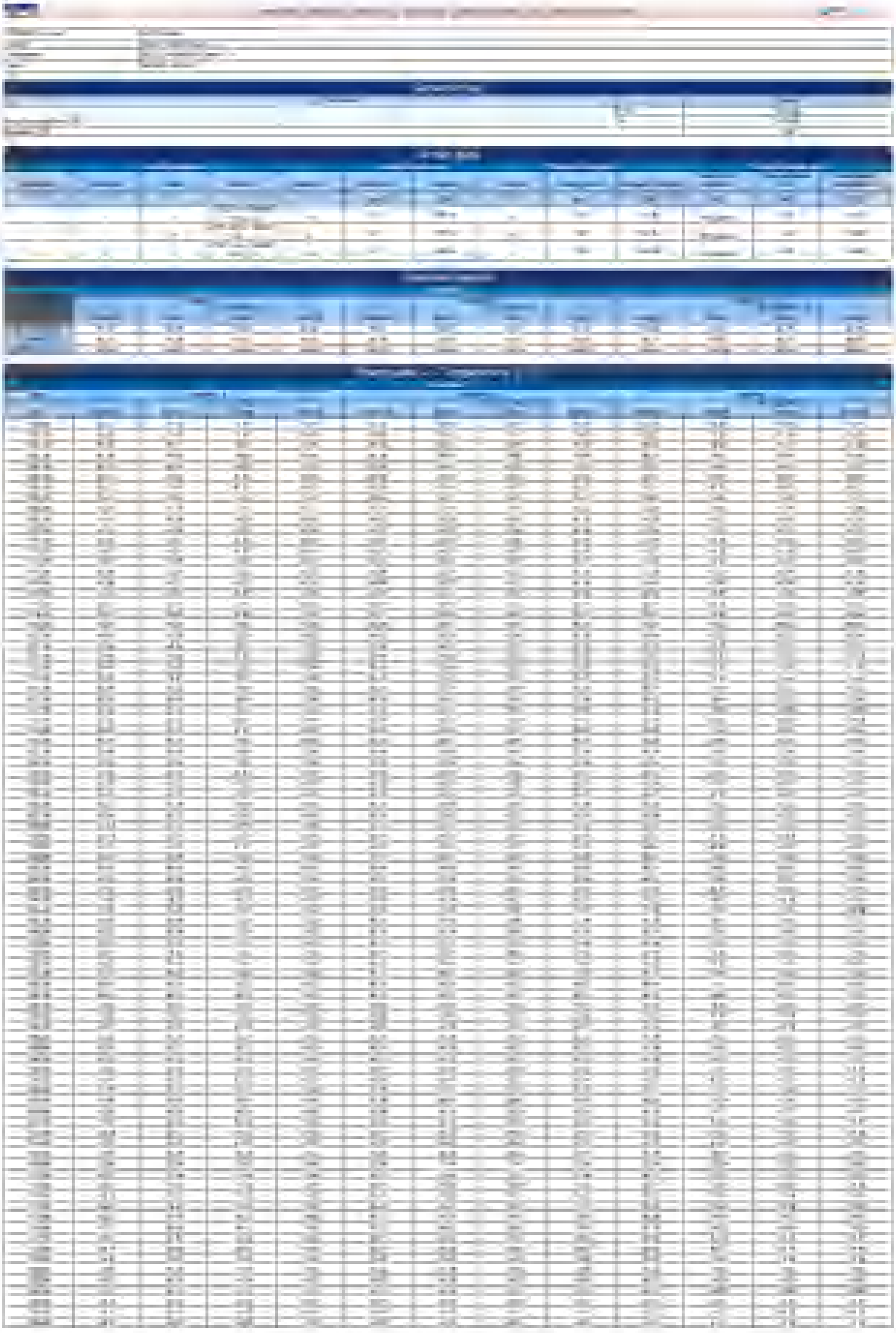
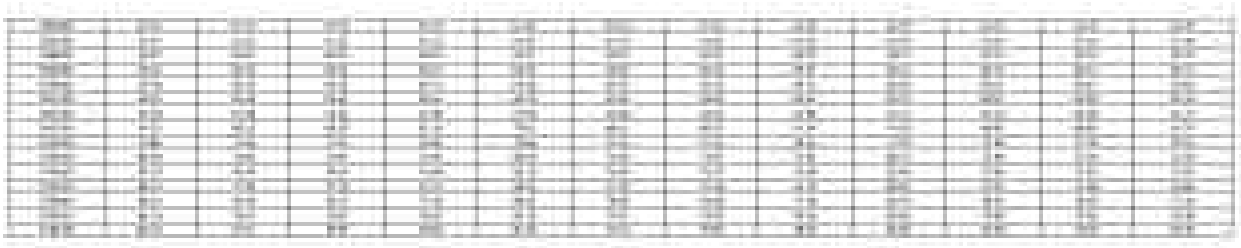
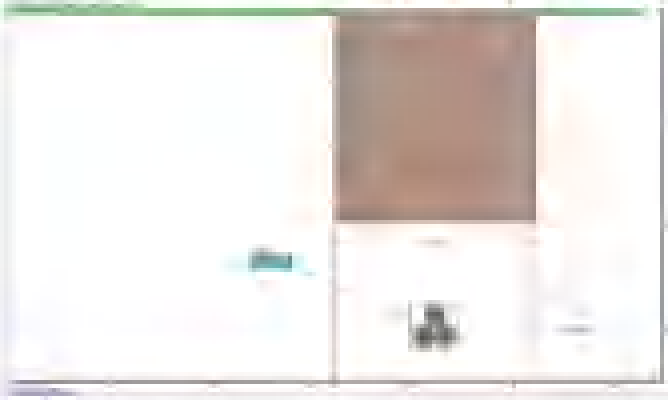






AC Case 1; Single 1250MCM in Trench



General Cable Information

Detailed Cable Information

Conductor Input Data

Temperature and Temperatures

Electrical Resistances

2	[illegible]	0.07	1.00	0.91	0.91	n/a	0.91	n/a
3	[illegible]	0.07	1.00	0.91	0.91	n/a	0.91	n/a

Thermal Resistances

Circuit	Cable 1	r_1 [K·m/W]	r_2 [K·m/W]	r_3 [K·m/W]	r_4 [K·m/W]	r_5 [K·m/W]	r_6 [K·m/W]	r_7 [K·m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance between duct and duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total thermal resistance
1	[illegible]	0.24	0.00	0.09	n/a	n/a	2.27	2.61
2	[illegible]	0.24	0.00	0.09	n/a	n/a	2.27	2.61
3	[illegible]	0.24	0.00	0.09	n/a	n/a	2.27	2.61

Losses

Circuit	Cable 1 N	Wd [W/m]	Ws [W/m]	Wc [W/m]	Wm [W/m]	W [W/m]	K_d	K_s
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armour/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor - (Pipe Loss Factor)
1	[illegible]	0.00	0.00	0.00	0.00	0.00	0.13	0.00
2	[illegible]	0.00	0.00	0.00	0.00	0.00	0.13	0.00
3	[illegible]	0.00	0.00	0.00	0.00	0.00	0.13	0.00

Complementary Information

Circuit	Cable 1 D	d_{ext} [m]	D_e [m]	D_a [m]	D_c [m]	D_{ca} [m]	D_{cs} [m]	D_{cs} [m]
Cable Index Number	Cable Equipment ID	Thickness of the duct wall	Diameter over the metallic screen	Cable Depth of Burial	Duct Temperature	Resistivity of Backfill	Resistivity of Backfill (Ground)	Voltage of the Three Phase System
1	[illegible]	0.15	72.37	0.40	0.00	0.00	0.00	0.00
2	[illegible]	0.15	72.32	0.40	0.00	0.00	0.00	0.00
3	[illegible]	0.15	72.26	0.40	0.00	0.00	0.00	0.00

Cables Report

[illegible]	[illegible]
[illegible]	[illegible]
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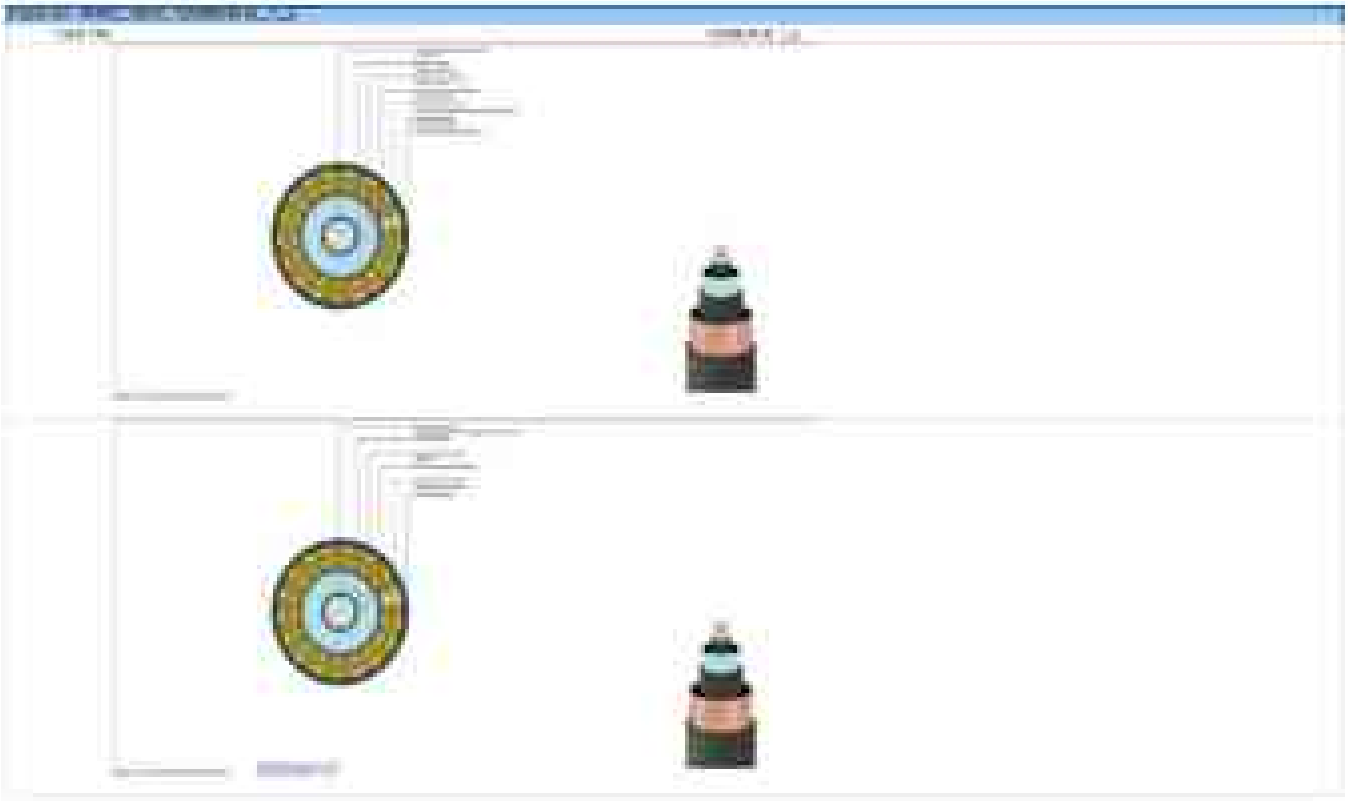
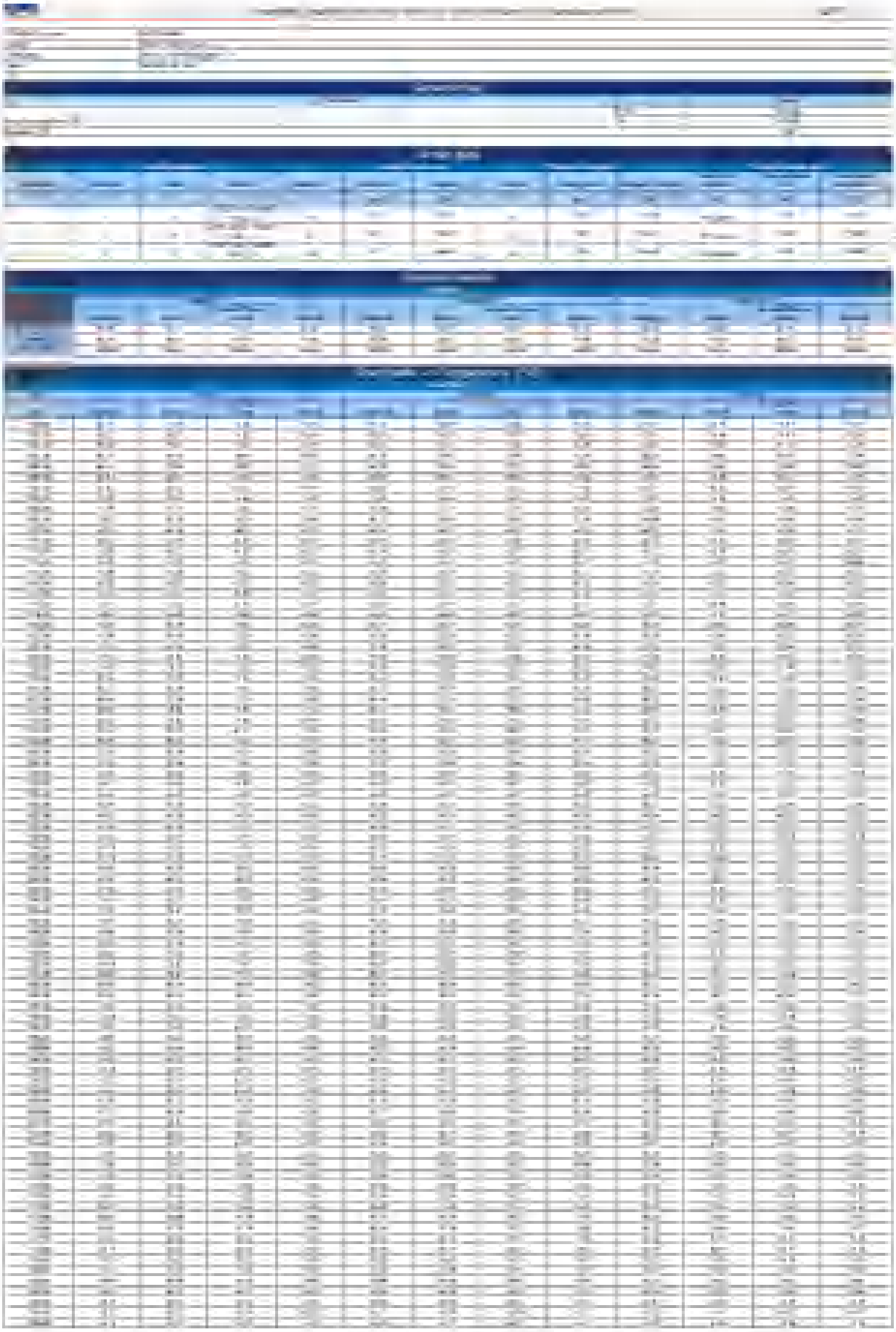
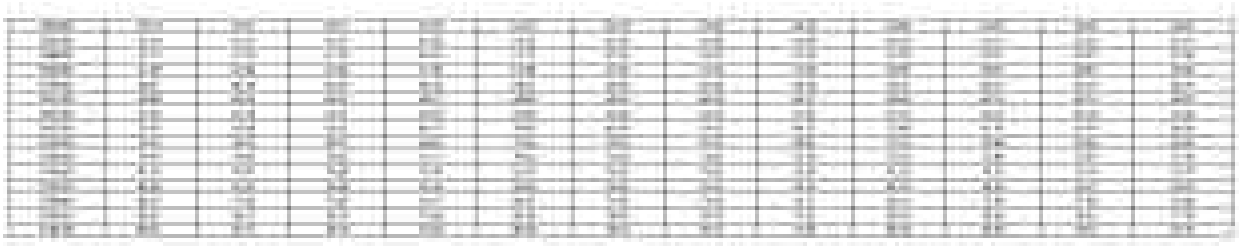


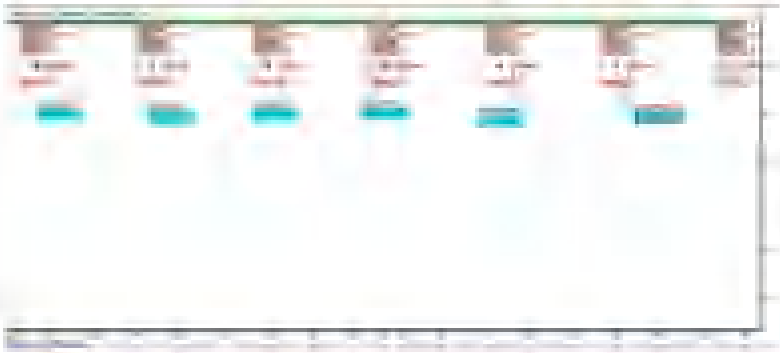




AC Case 2: Seven circuits in parallel – in trenches, 36" below grade, 96" on center spacing. Includes a BESS feeder thermal model.

Simulation Data

Installation Type/Multiple Ductbanks/Backfills



General Cable Information

Detailed Cable Information

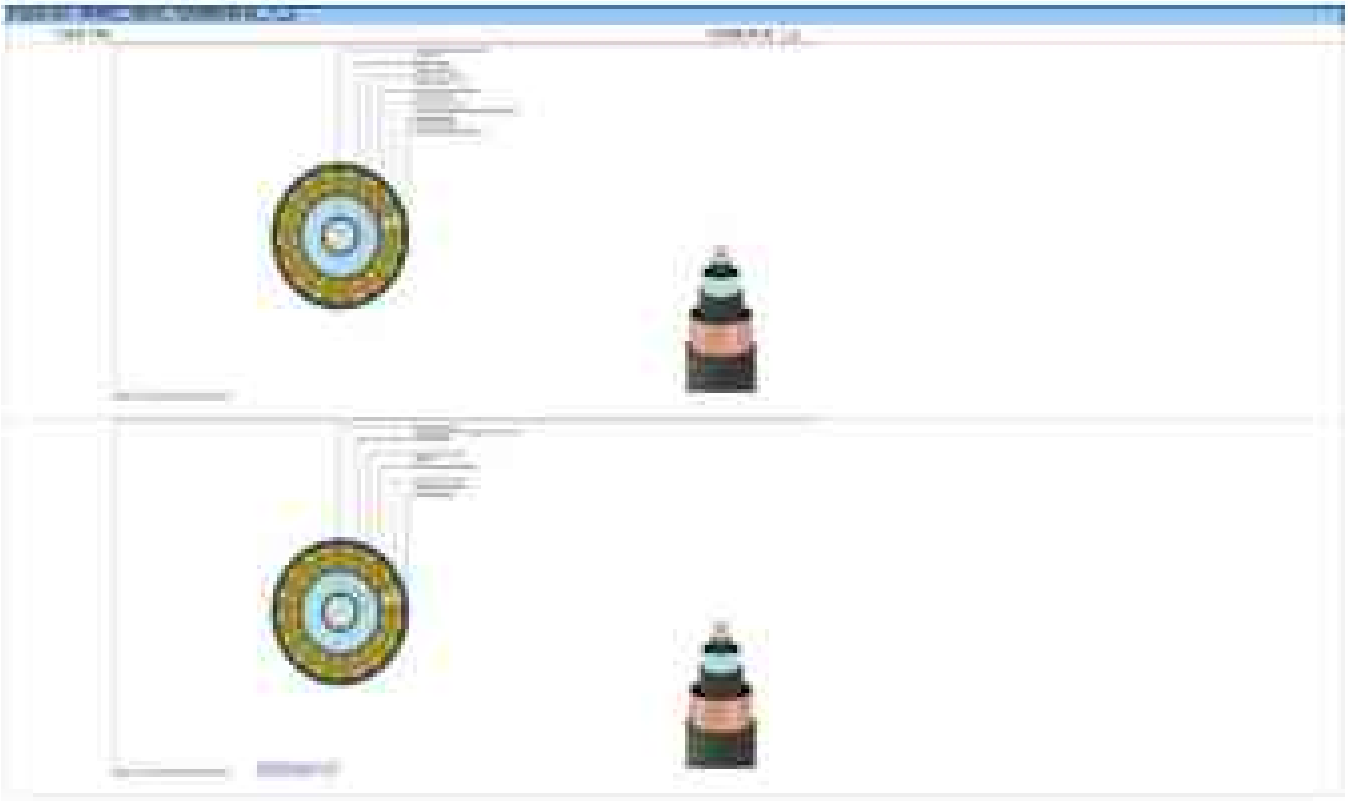
General Input Data

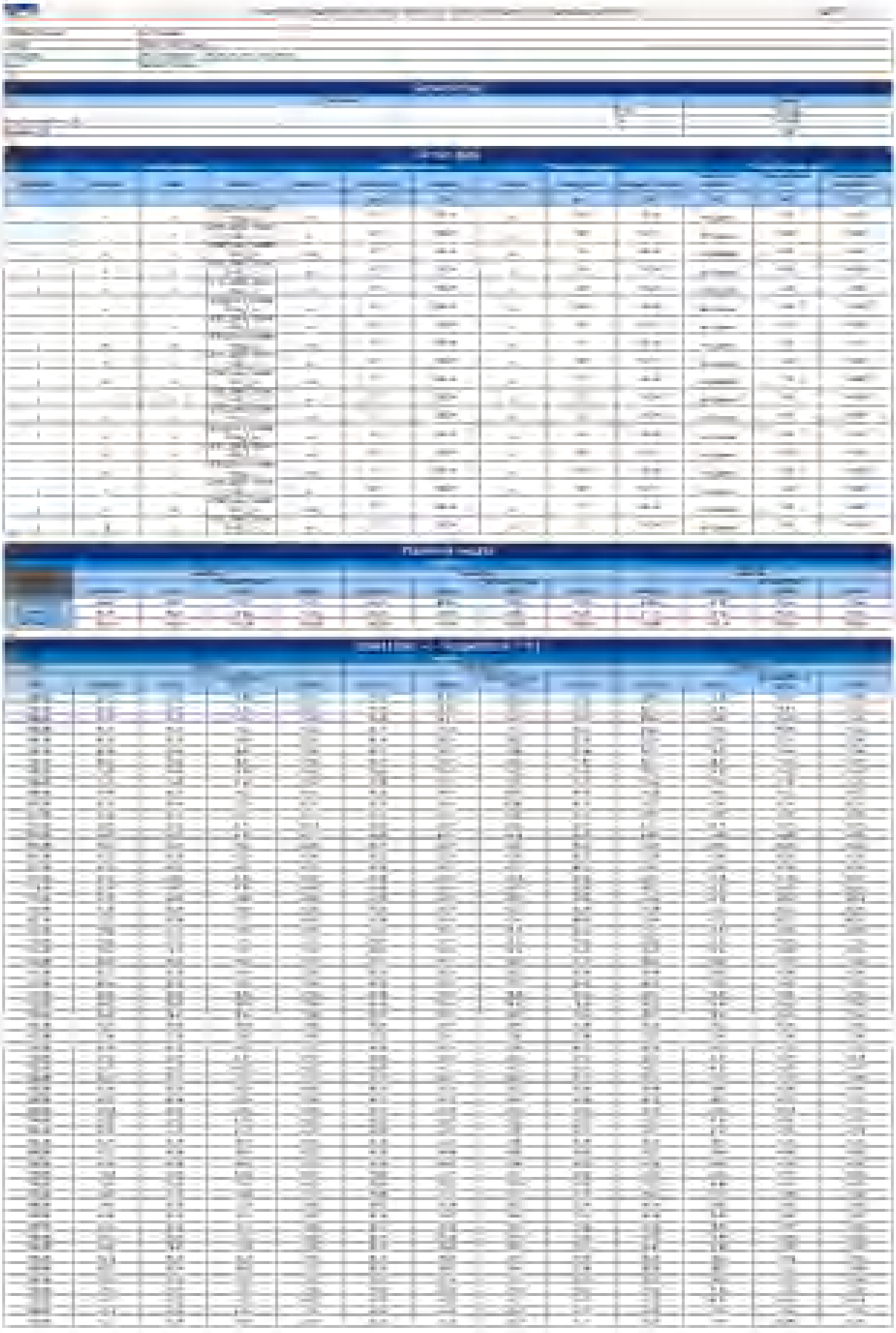
Megapixels Dimensions

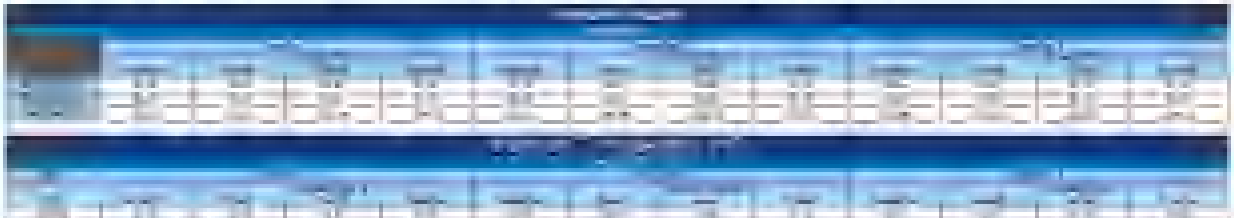
Electrical Resistance

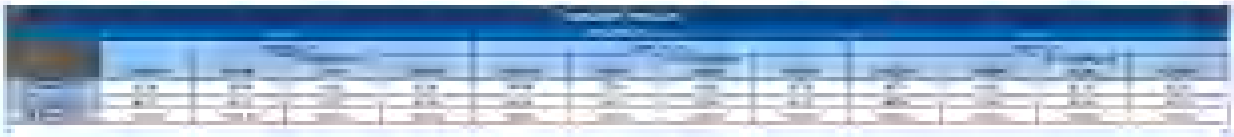
Thermal Resistance

Cables Report







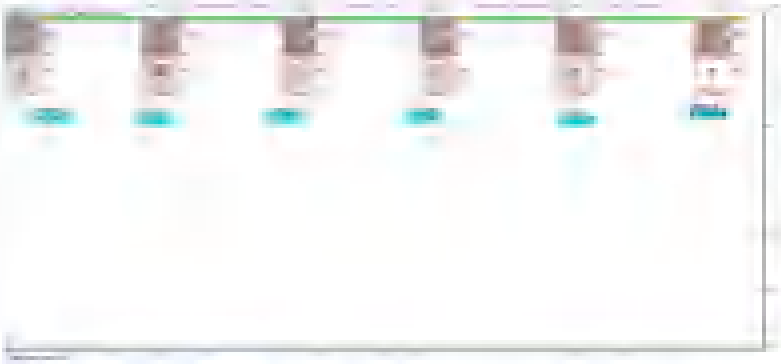


AC Case 3A: Six circuits in parallel, 96" separation, in trenches, 36" below grade

Simulation Data

Insulation Type Multiple Dielectrics/Barriers

Load Name	Q [m]	V [m]	Inside [m]	Height [m]	Phase(s) [ ] [ ] [ ] [ ] [ ] [ ]



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [mm]	Resistance / Reactance / Capacitance / Charging Current / Ampacity [Ω/km]	Resistance / Reactance / Capacitance / Charging Current / Ampacity [ ]

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Wire Armour	Conductor Material	Filler	Jacket	Inner / Outer Sheath

General Input Data

Number	Name	Connection	Phase	Y [Ω/m]	B [nF]	Y [Ω]	Rated Voltage [ ]
Power Station Number	Cable Equipment ID	Circuit No.	Cable Index	Electrically Independent Subsystem	In Service/Out	In Service/Out	Cable Laid Factor

Security and Communication

Cables Report

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[illegible]	[illegible]
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6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
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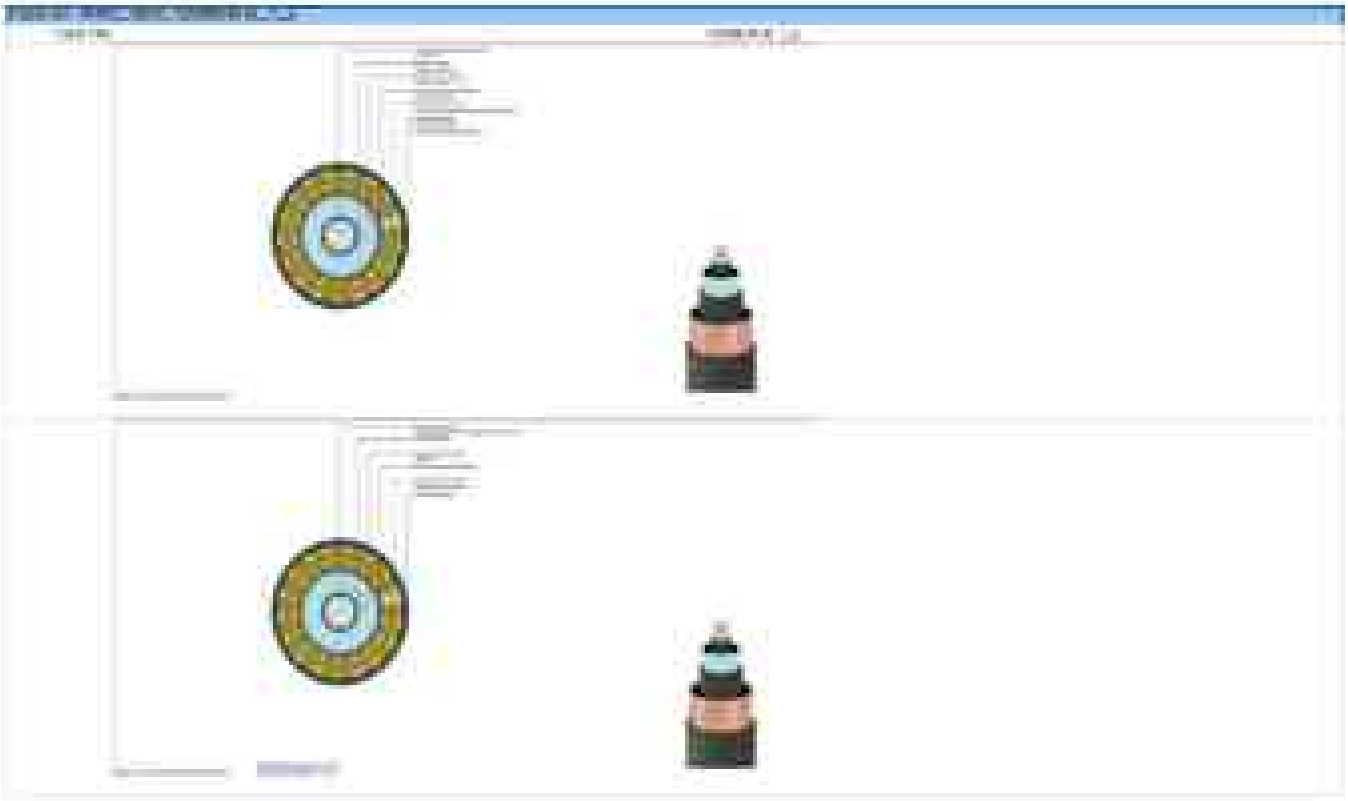
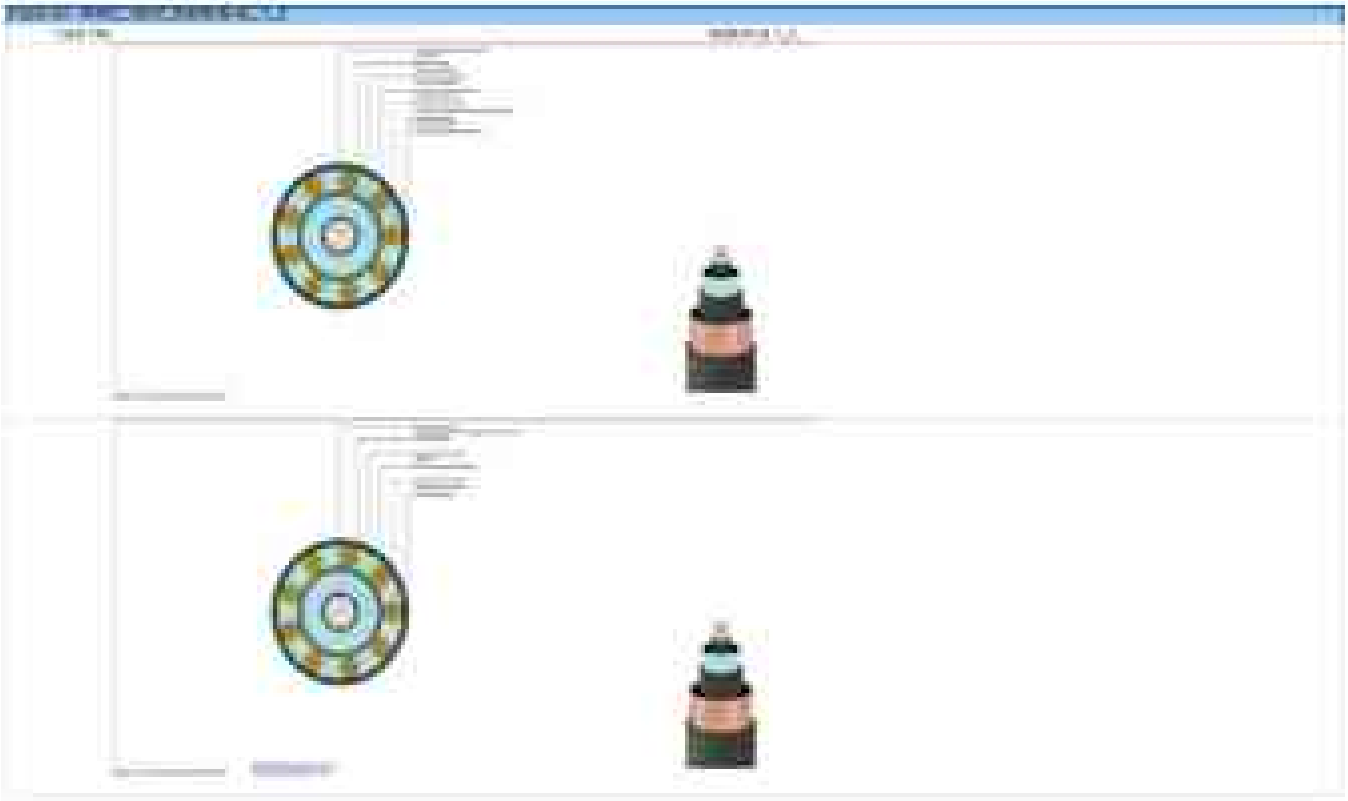


Tables Report



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Item	Description	Unit	$
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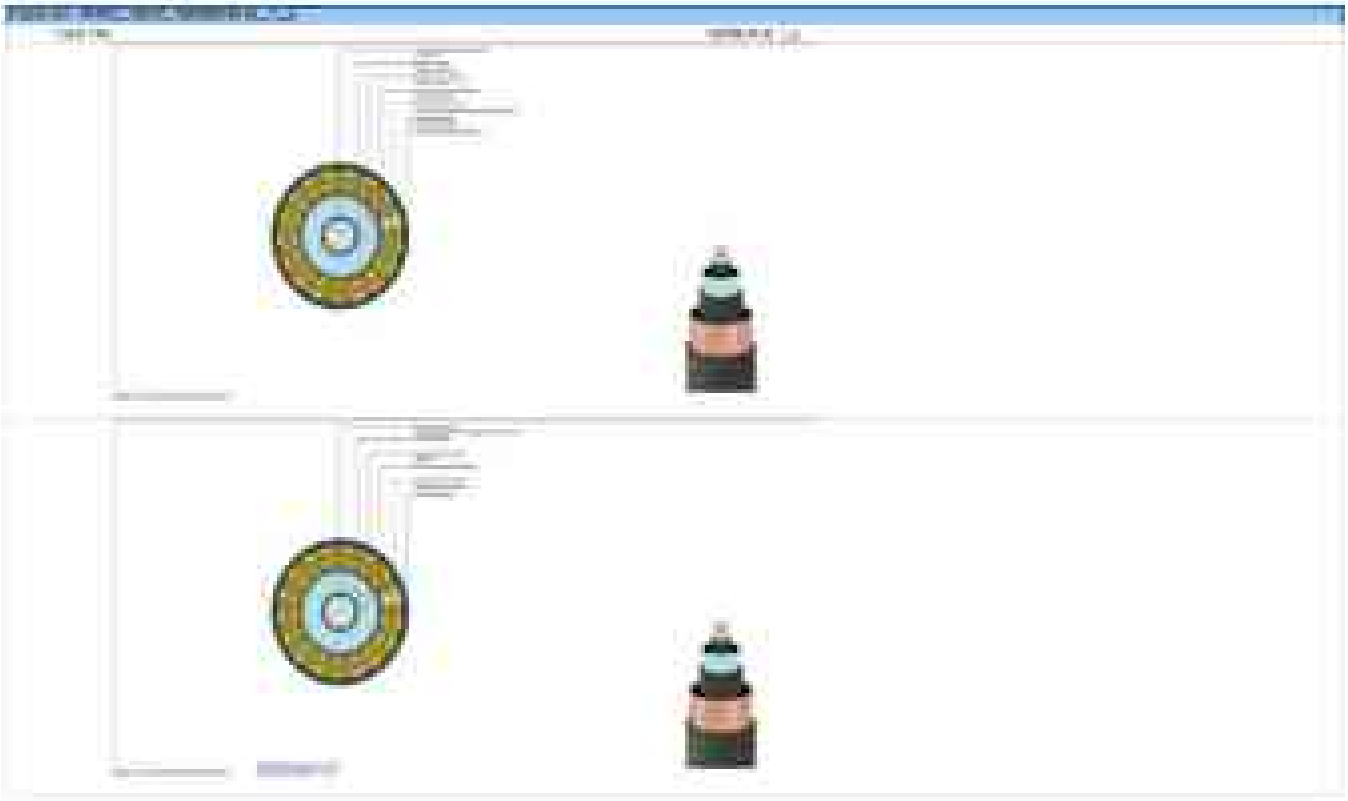

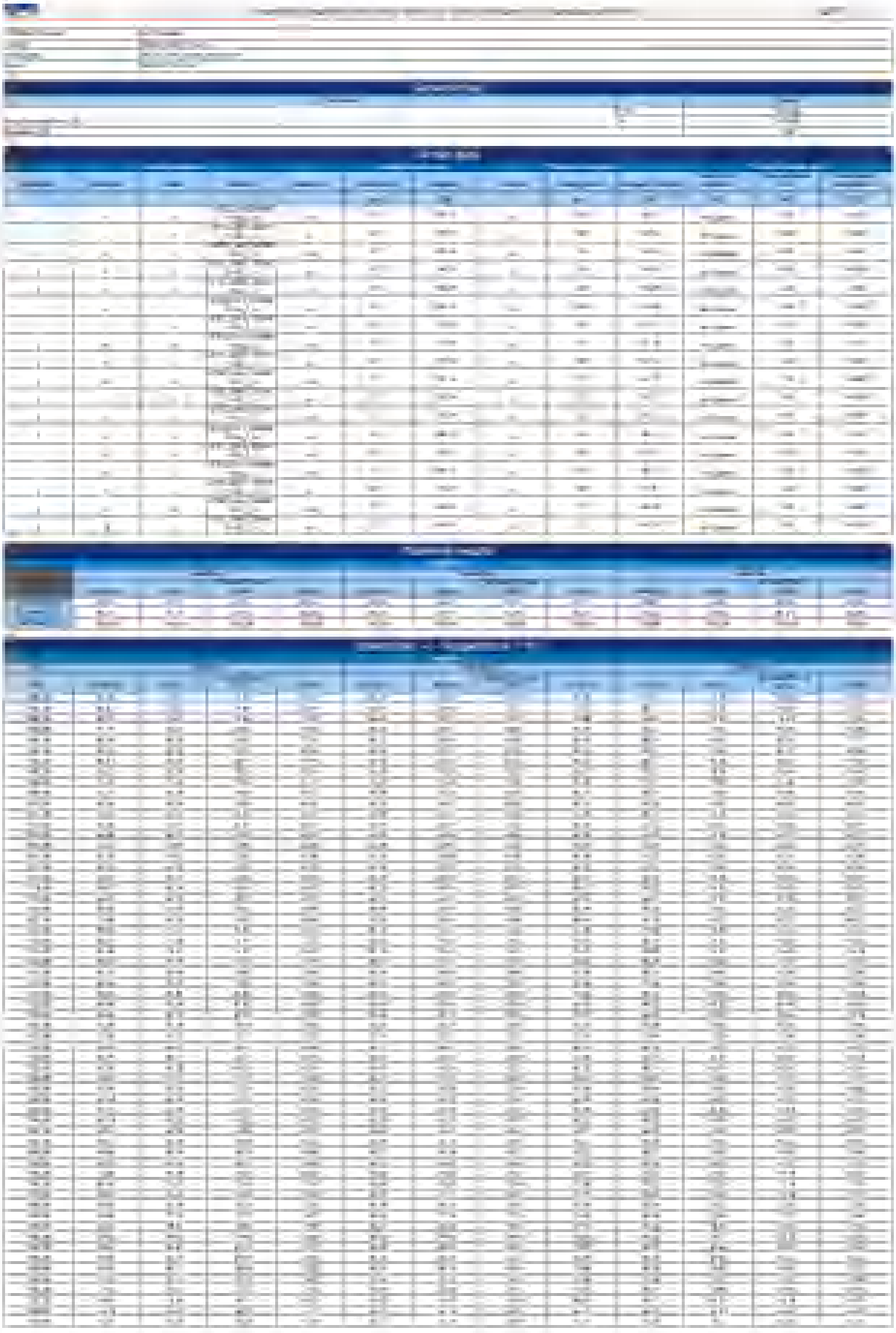

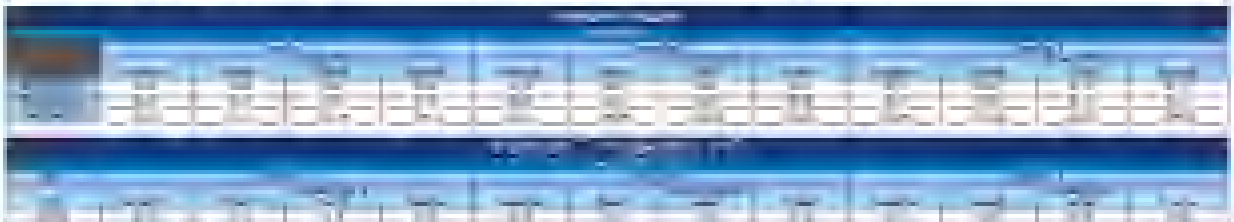

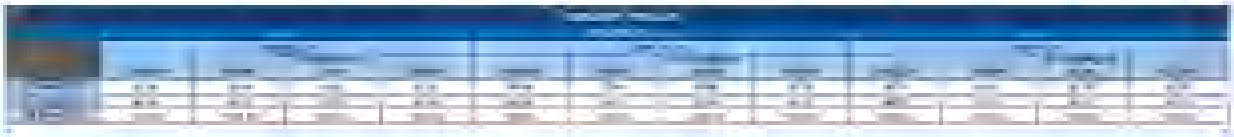

AC Case 38: Four circuits in parallel, 72" separation, in trenches, 36" below grade

General Summary Report

Simulation Data

Ampacity Type: Multiple Ductbanks/Backfills

General Cable Information

Detailed Cable Information

General Input Data

1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Complementary information

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Cables Report

[illegible]	[illegible]
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No.	Description	Unit	T
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[illegible]			
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No.	Description	Unit	T
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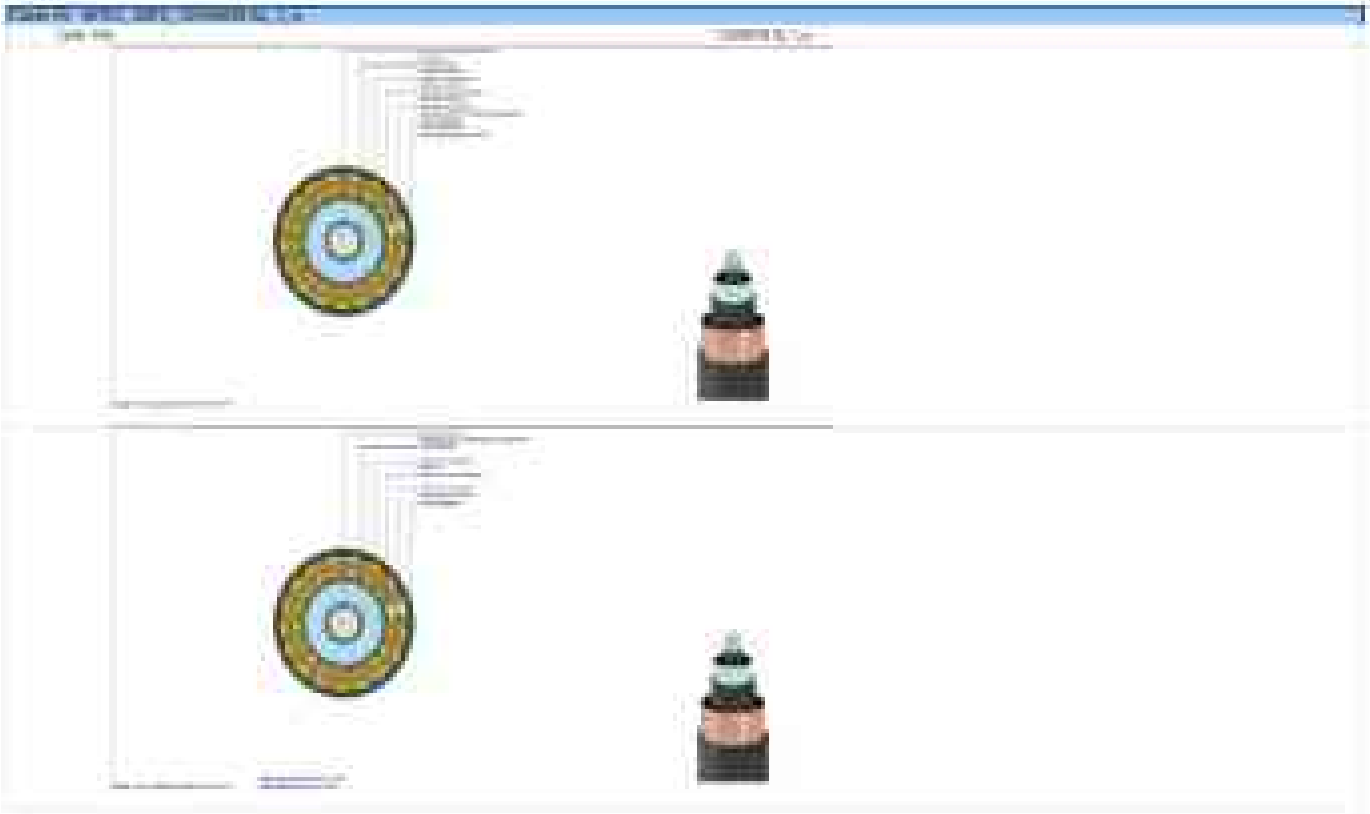

Cables Report

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No.	Description	Unit	T
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No.	Description	Unit	T
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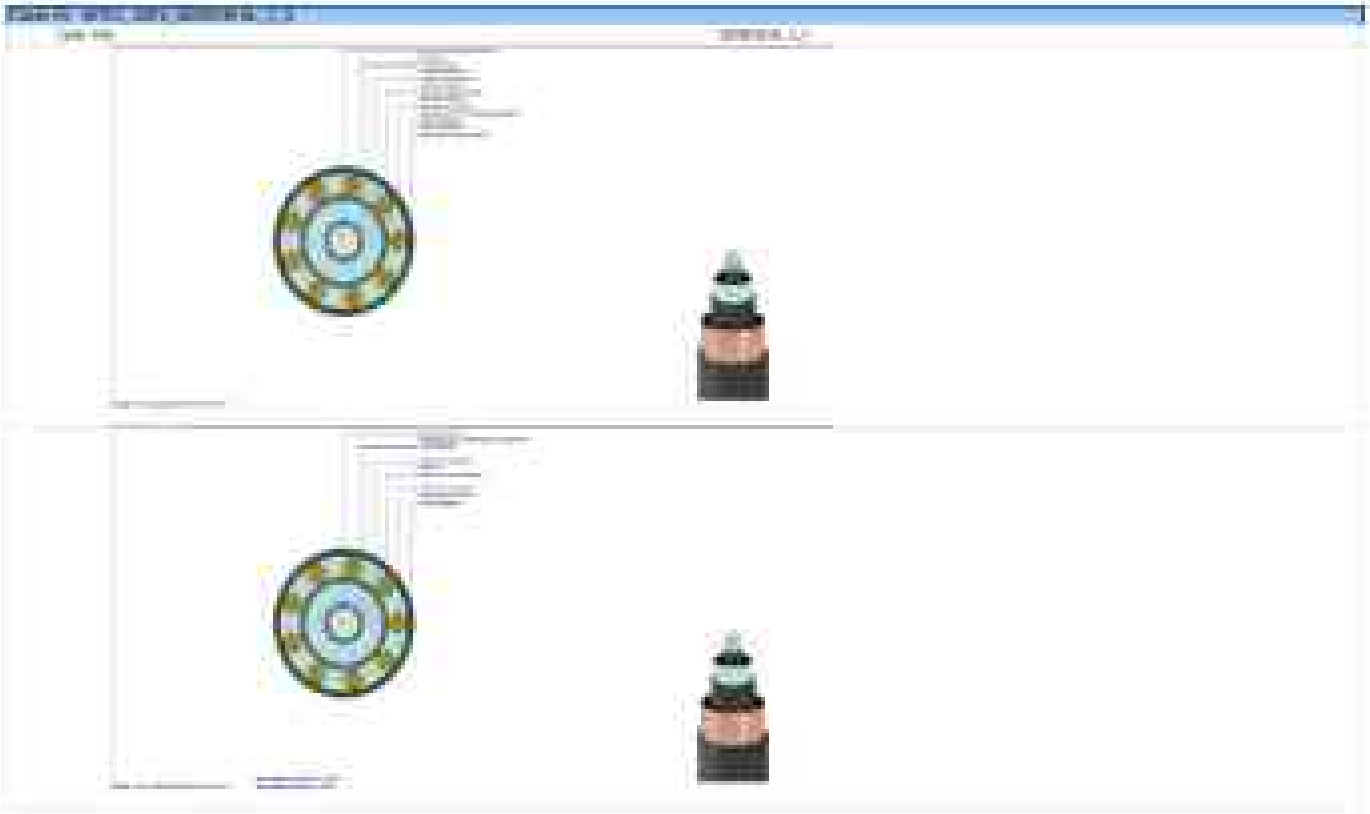

Cables Report

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Pos.	Description	Unit	T
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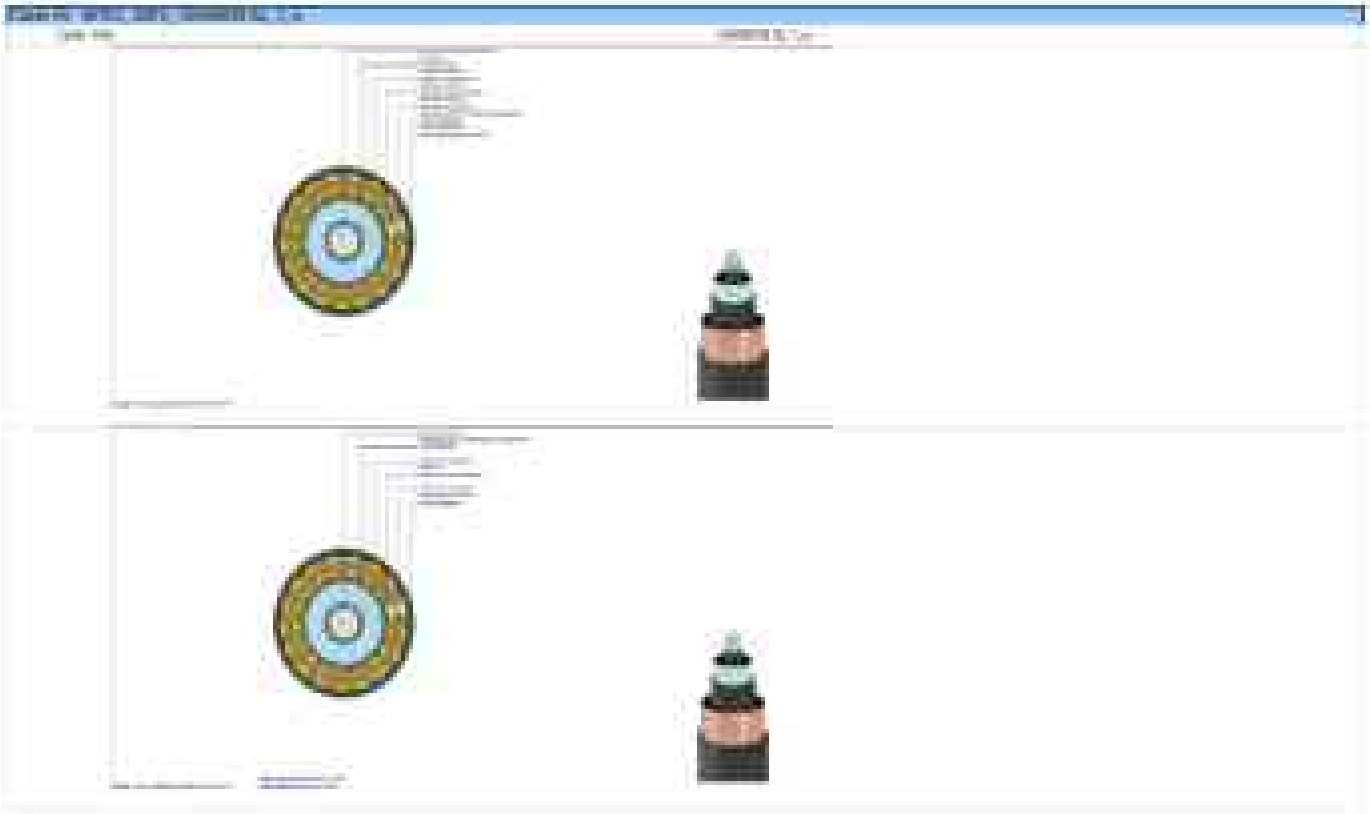
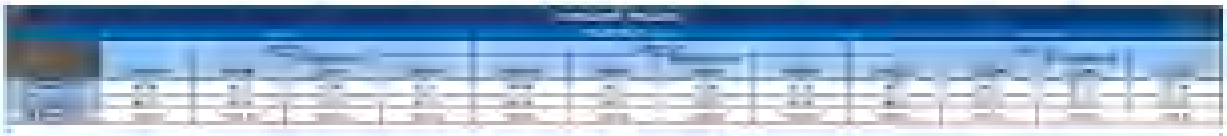
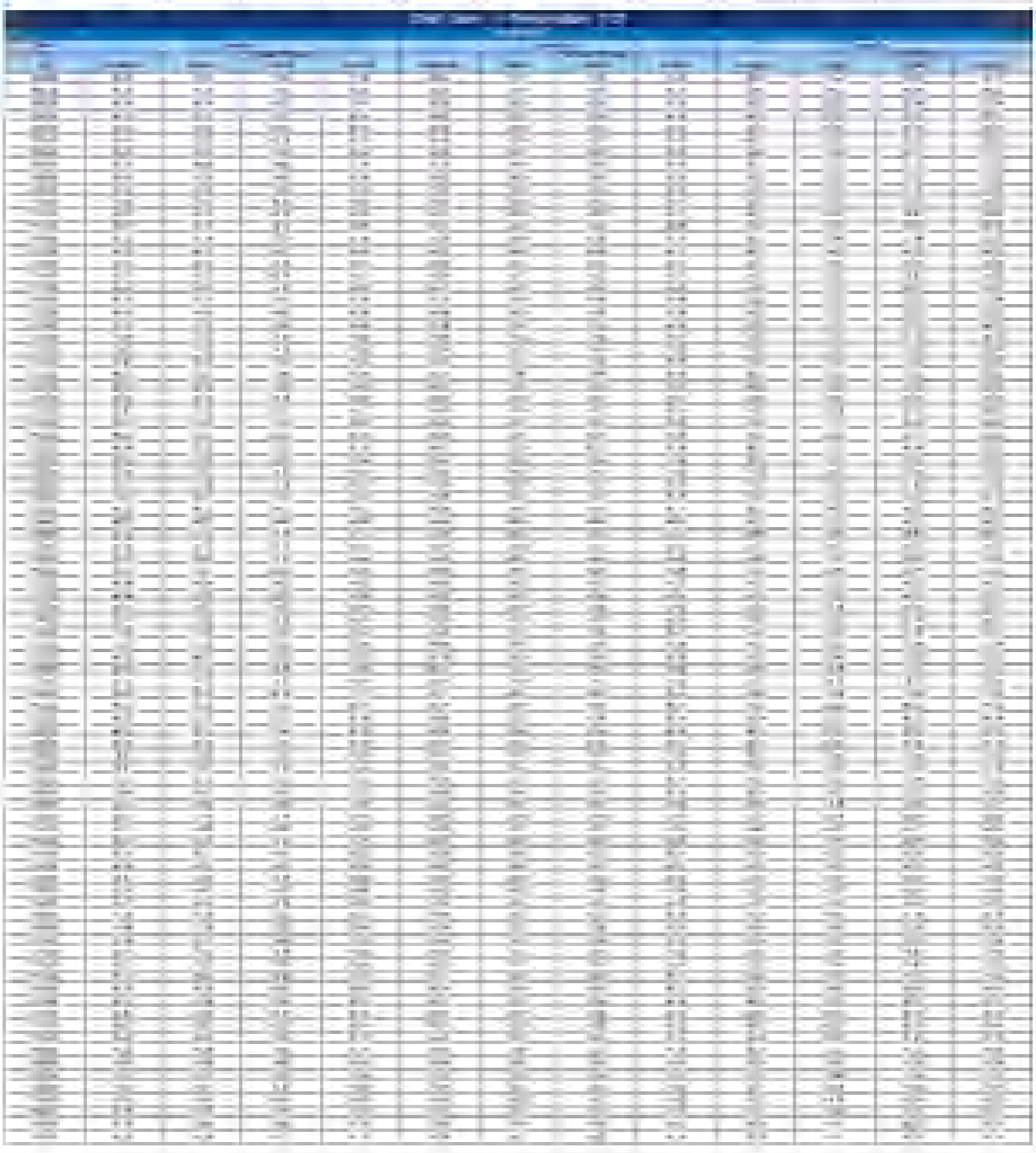
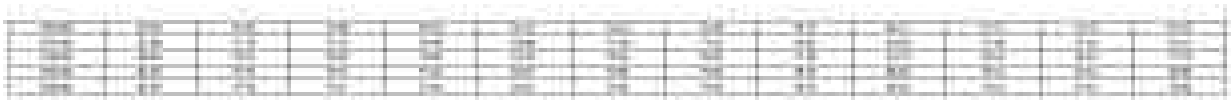






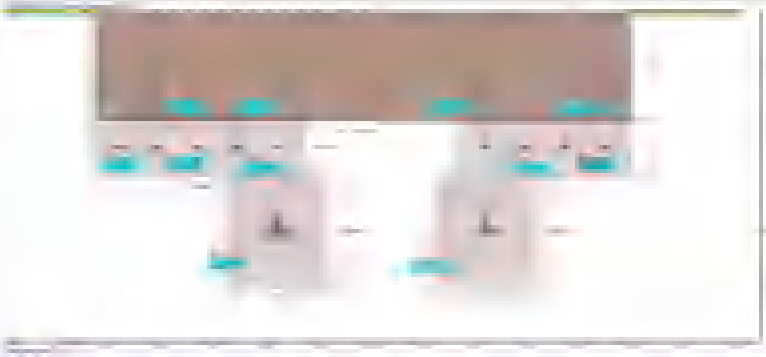


Special Cases

Case MVC5; Nine DC circuits in two trenches, five in one and four in the other, 9" separation, direct buried, 30" below grade. Passing underneath, them are two MV cables in parallel, 48" separation, multi-feeder in individual trenches, direct buried, 48" below grade.

Simulation Data

Installation Type/Shape Dimensions/Remarks



General Cable Information

Detailed Cable Information

Generic Input Data

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Cables Report

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Cables Report

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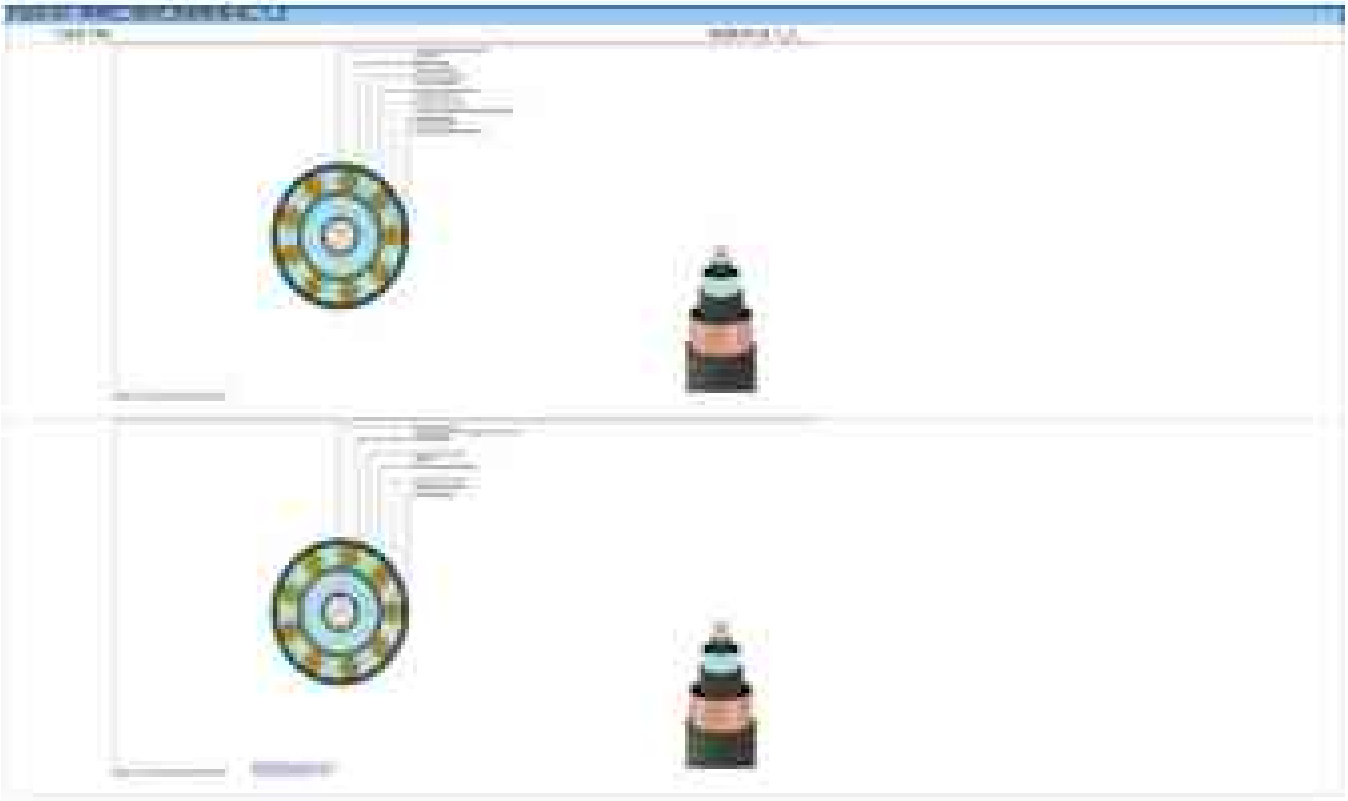

Catalog Report

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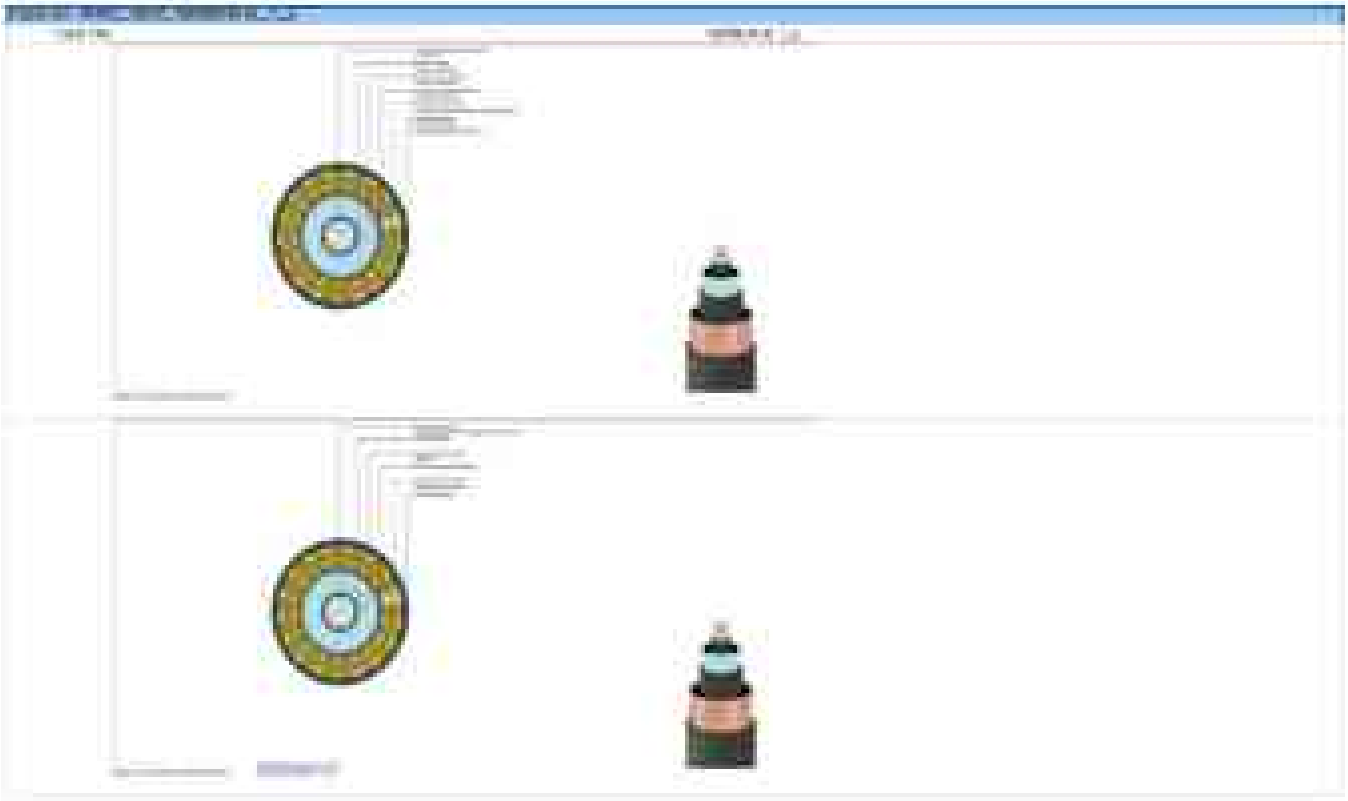

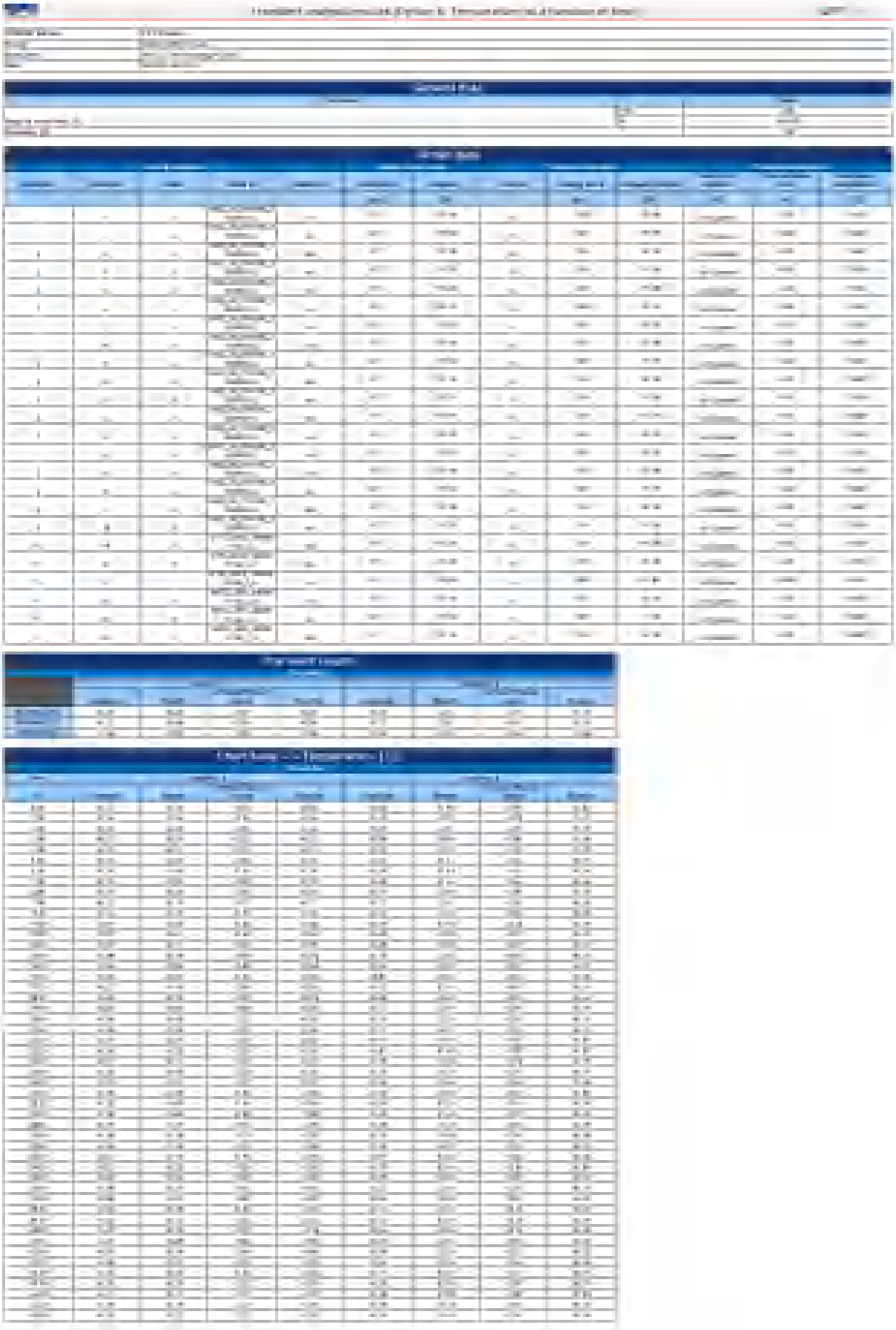

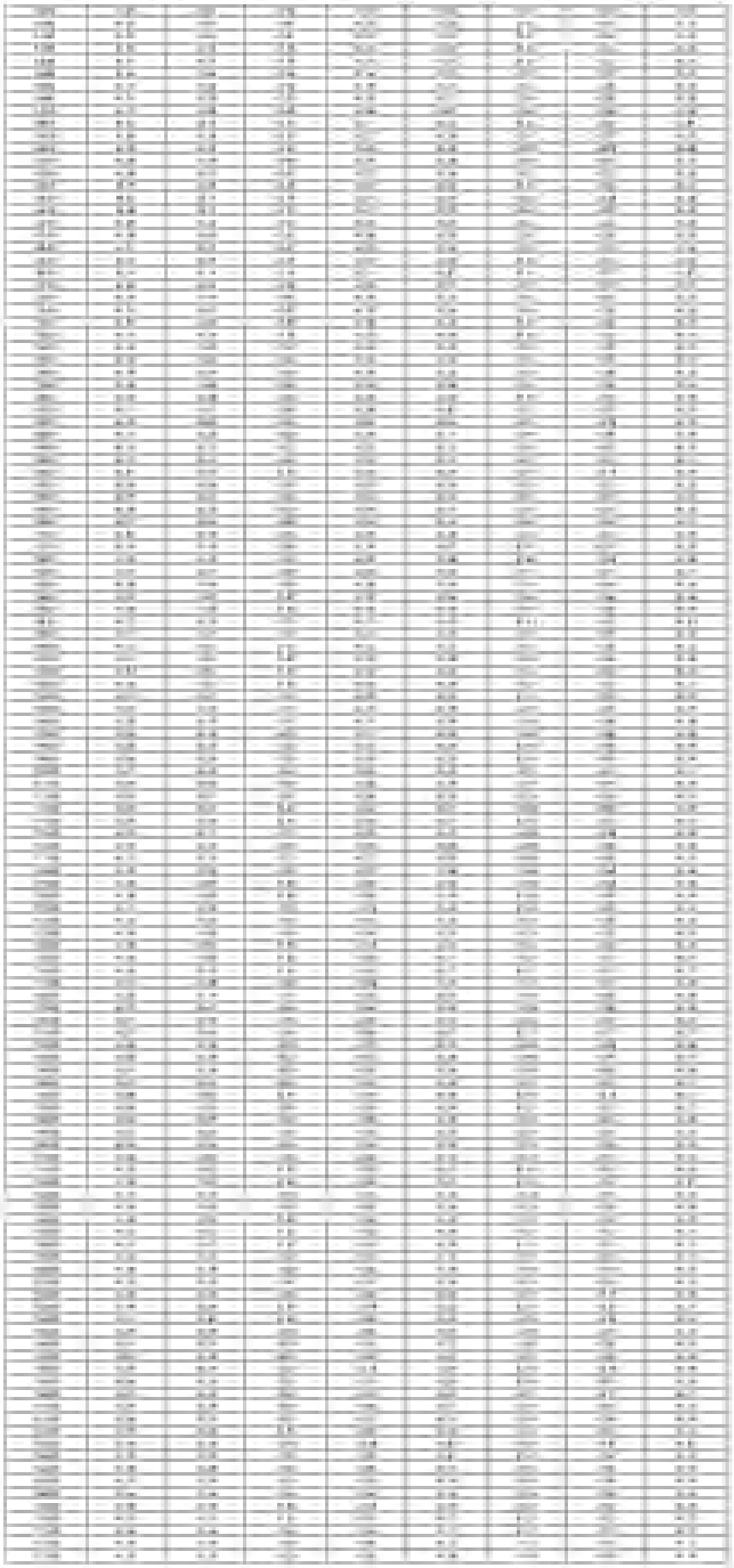

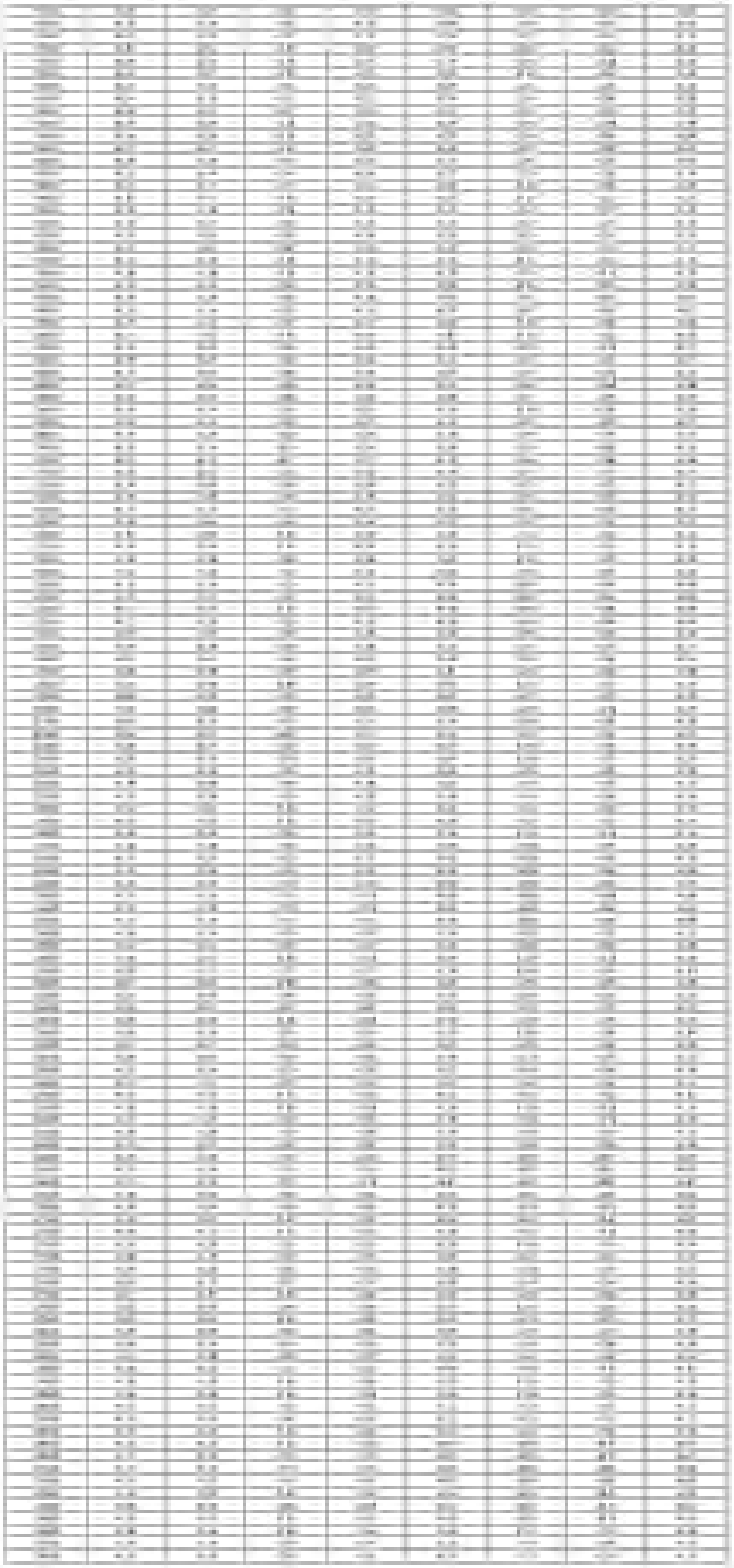

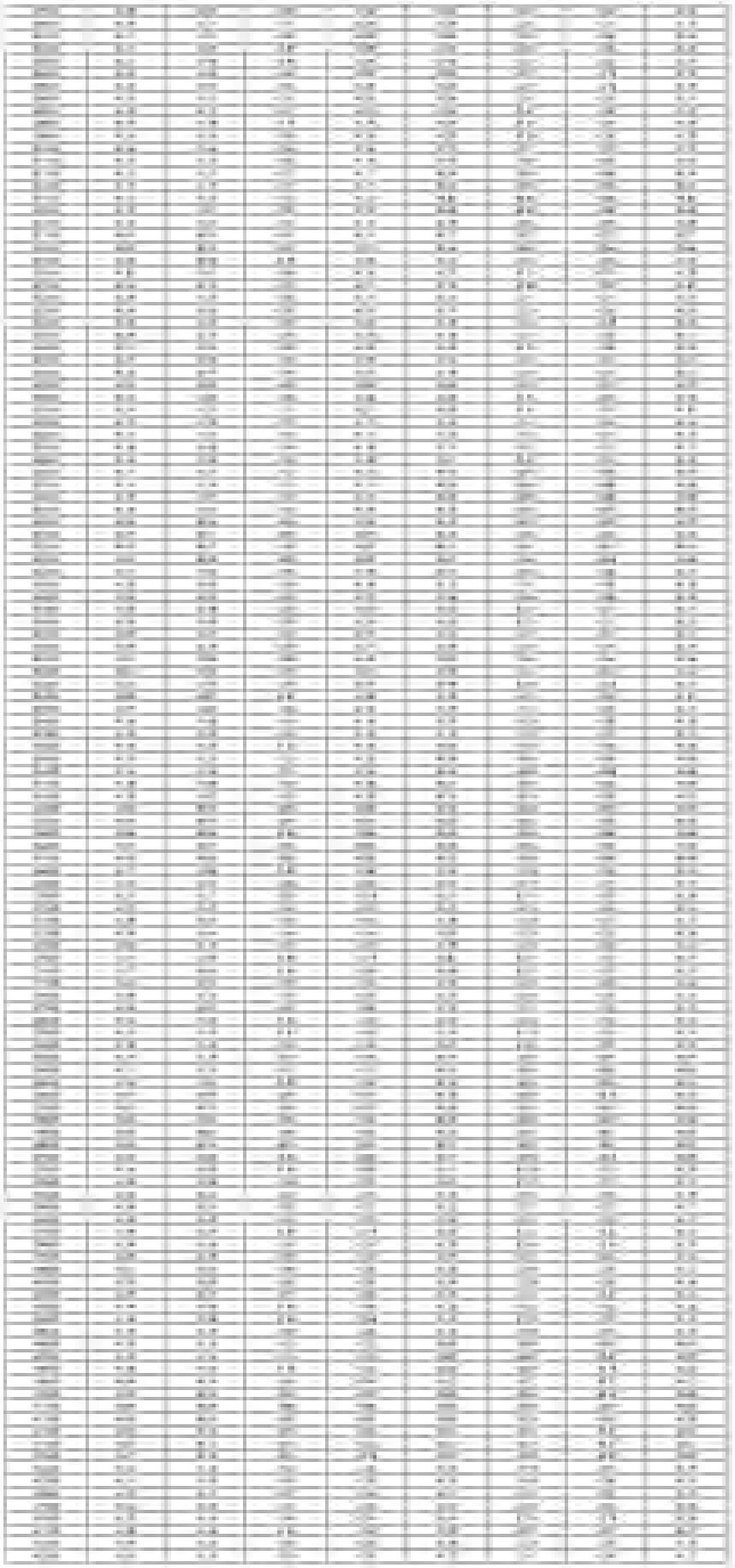

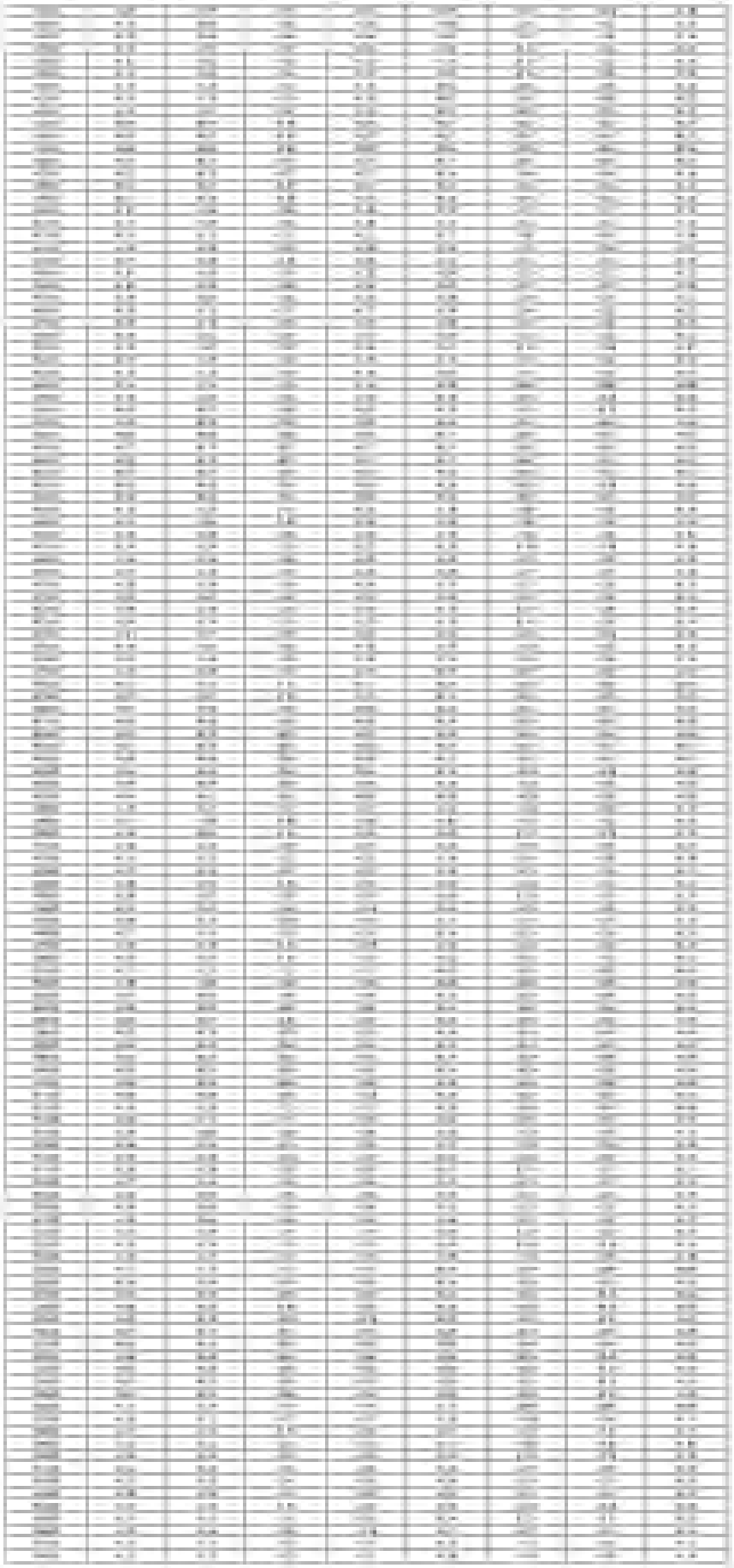

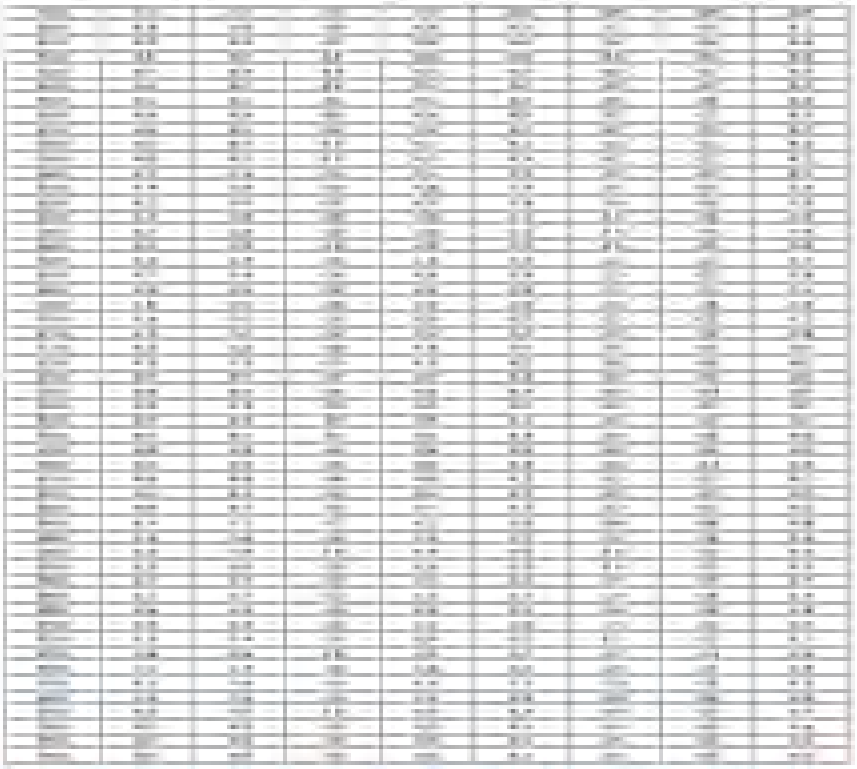

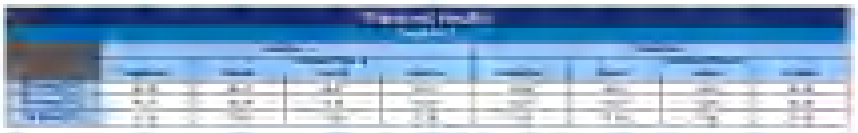

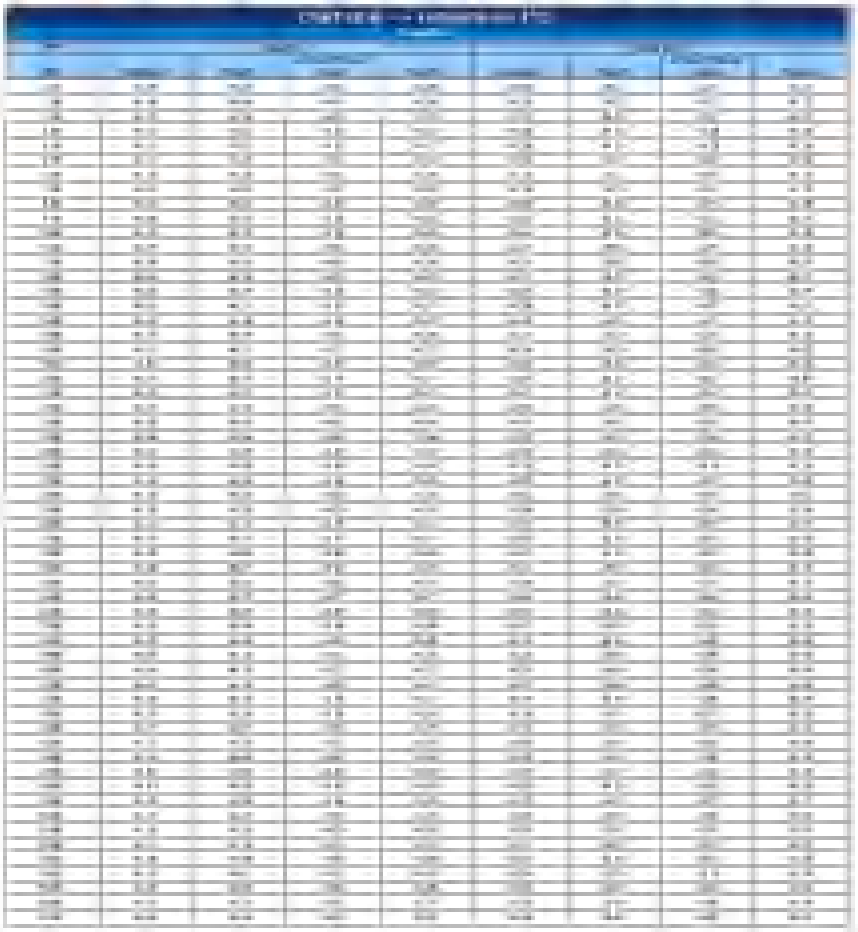

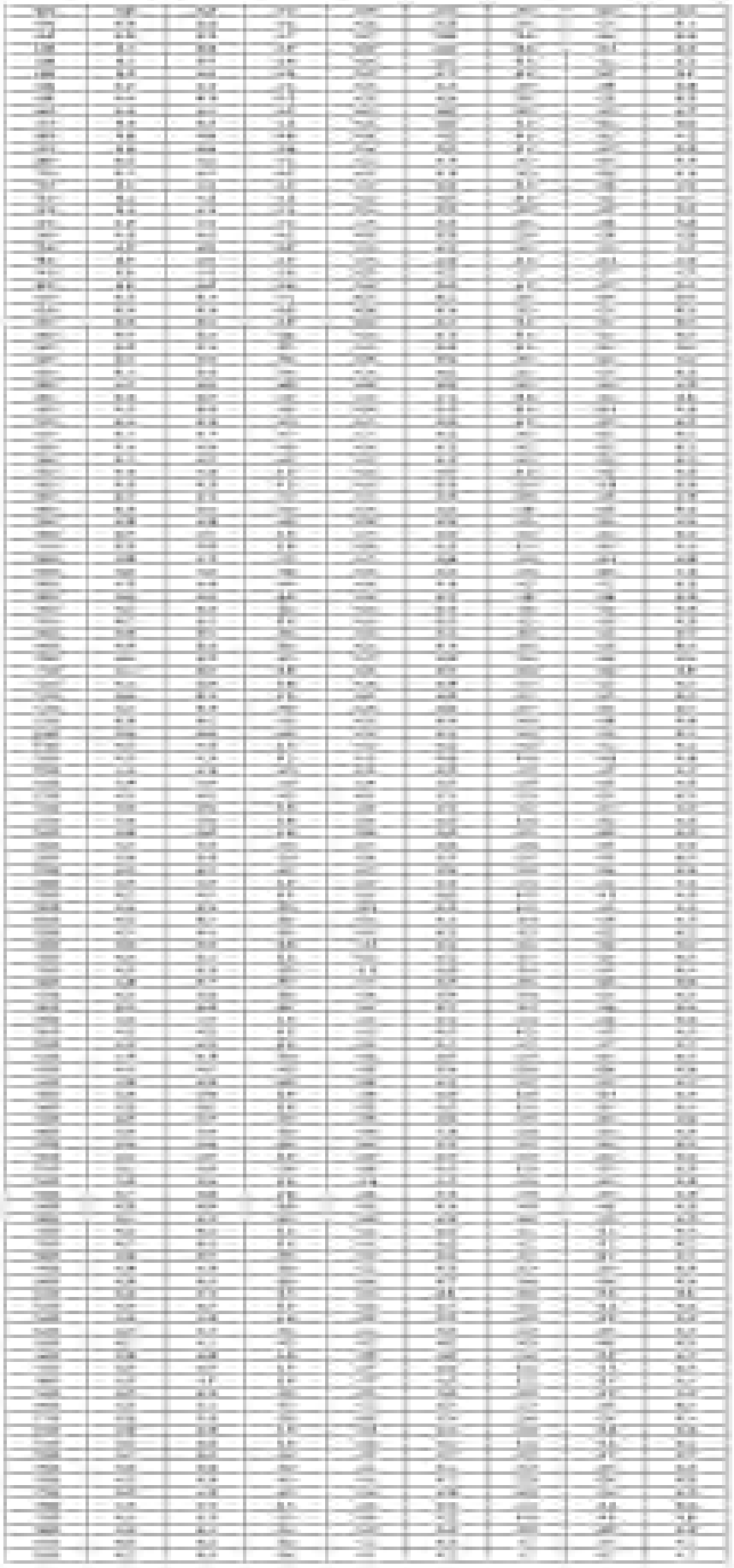

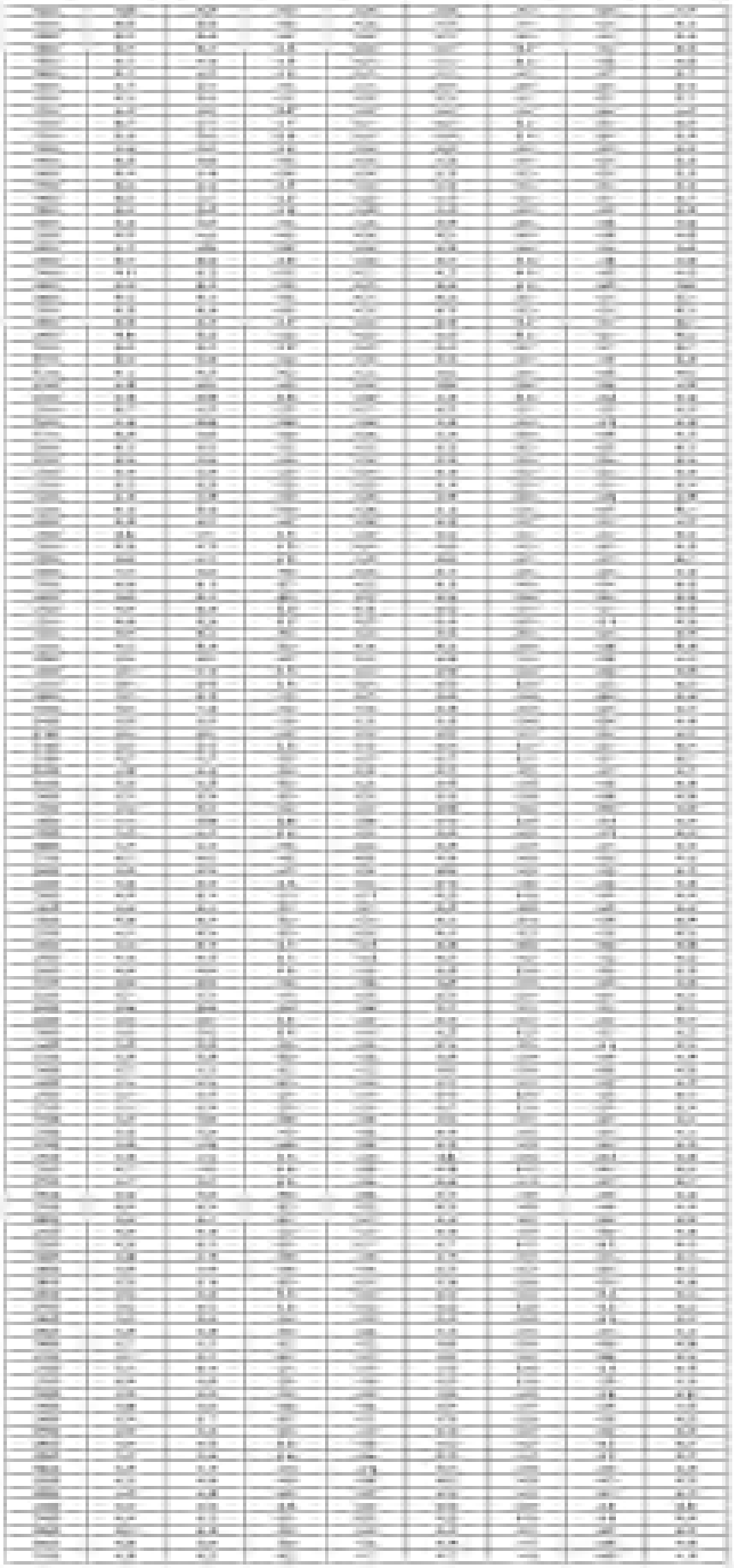

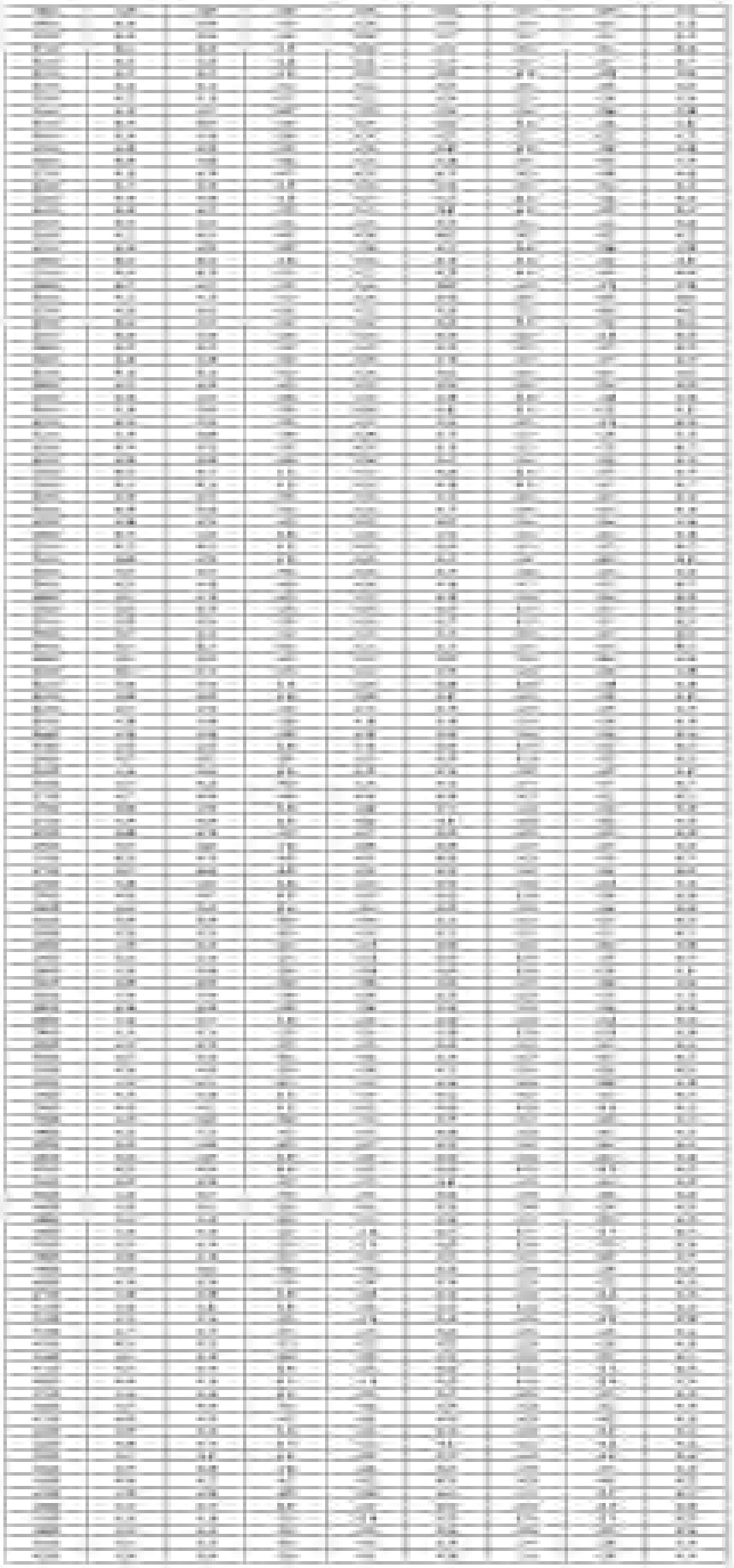

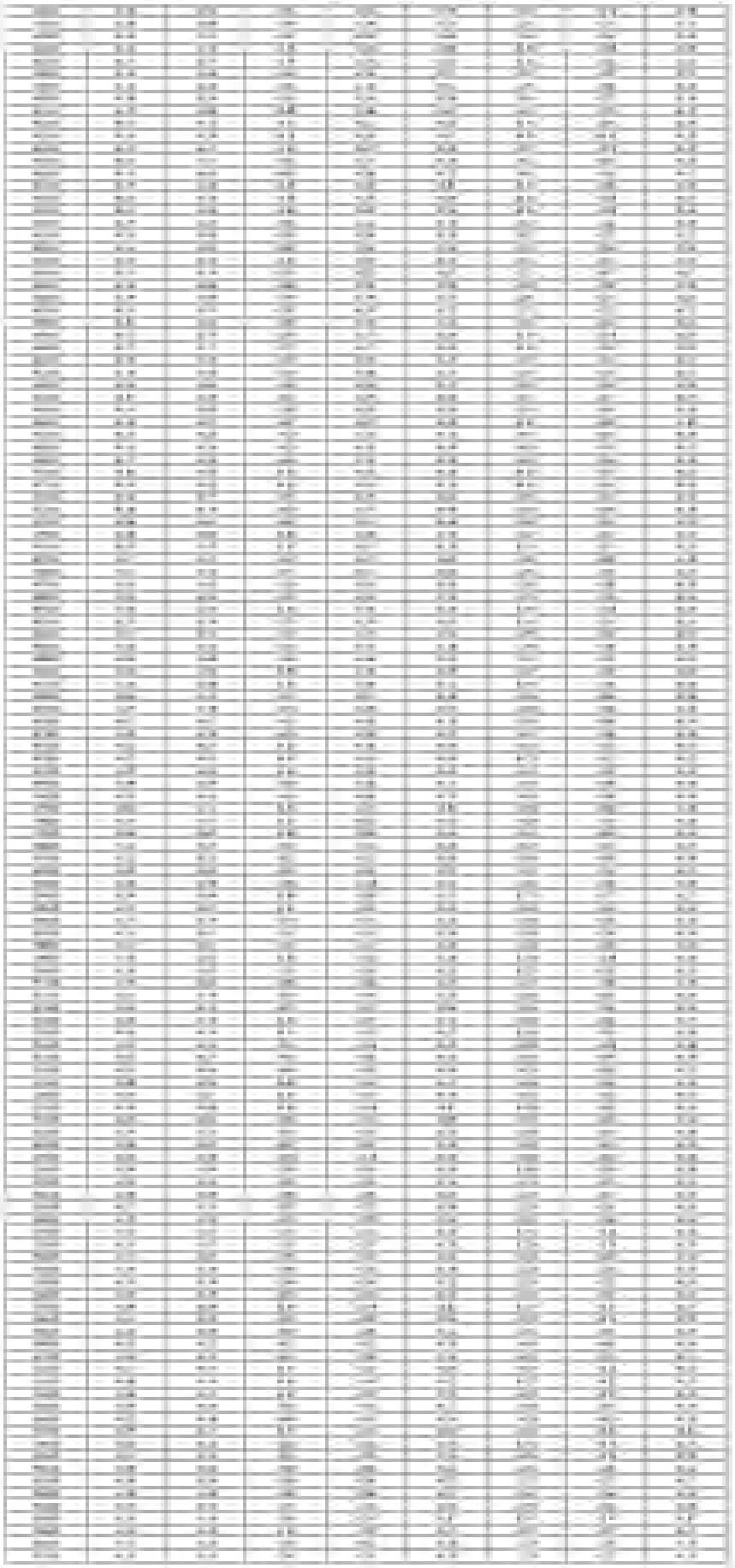

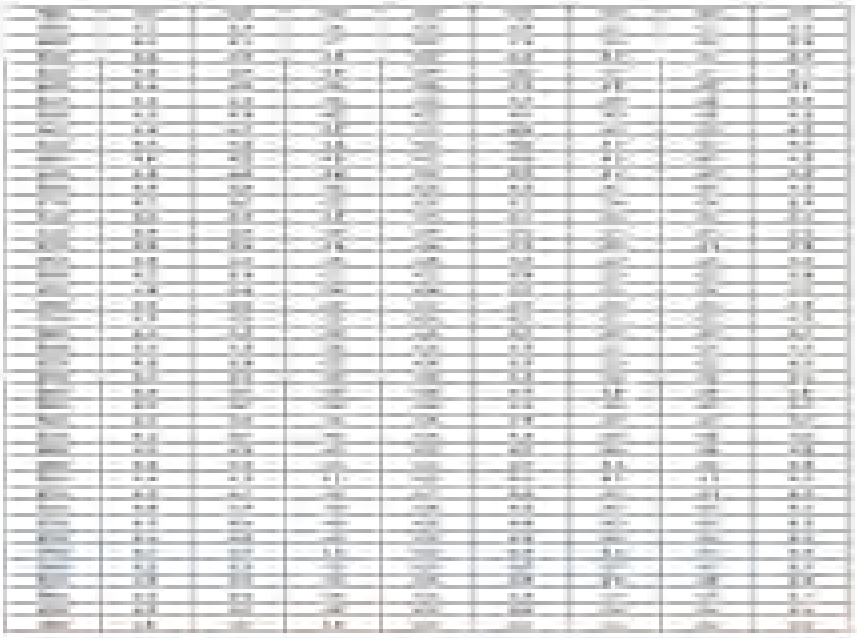

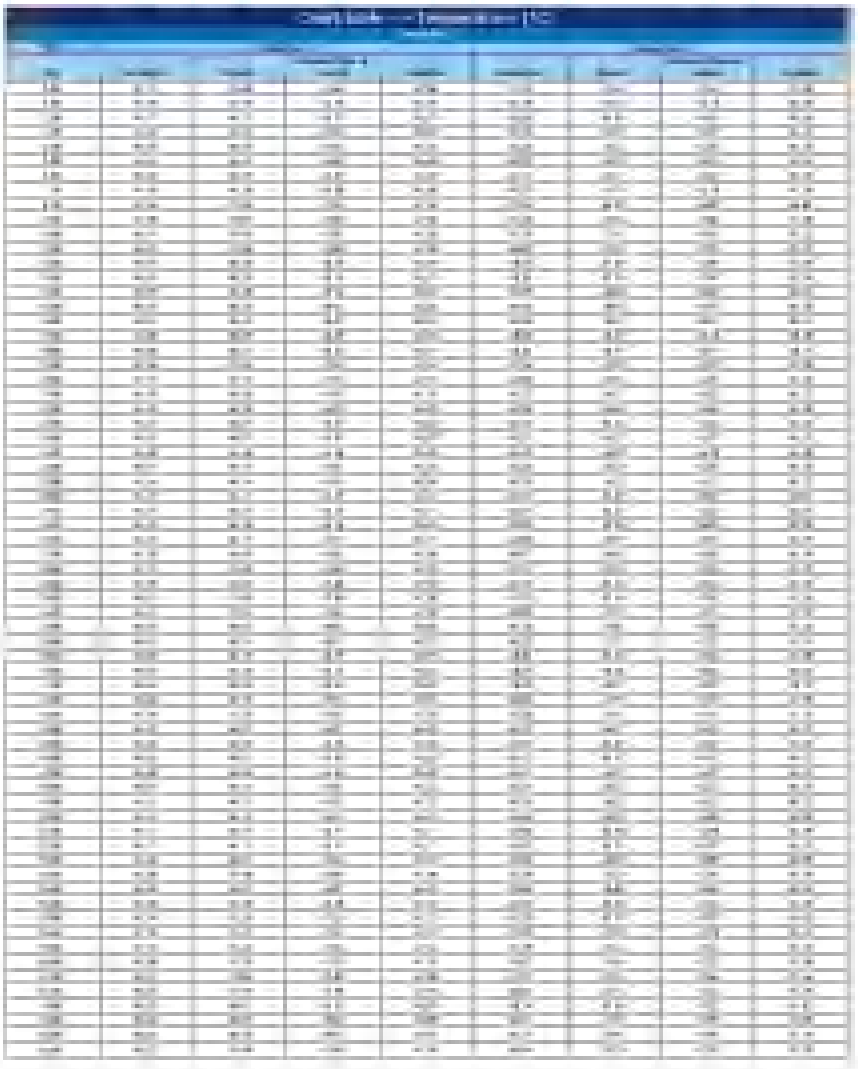

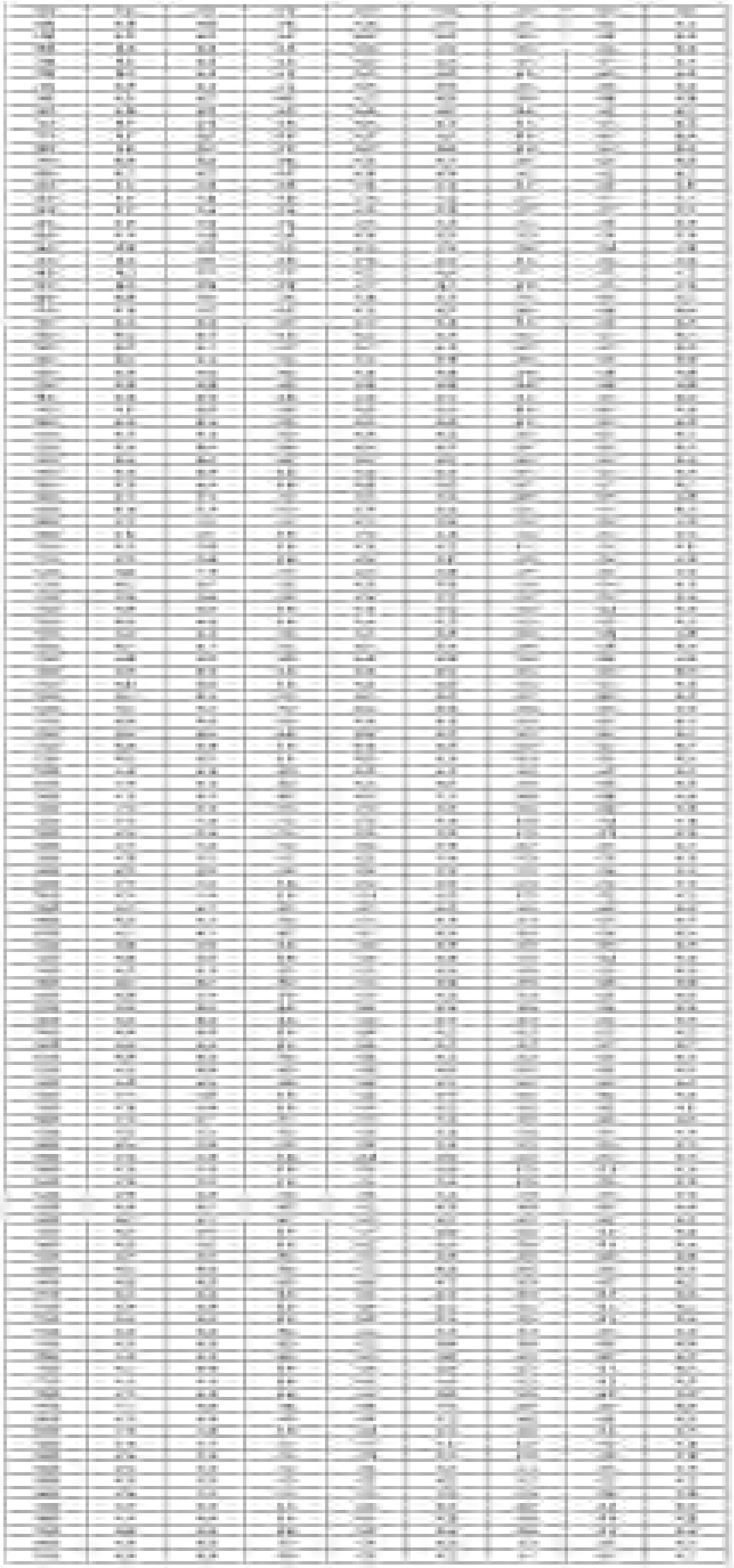

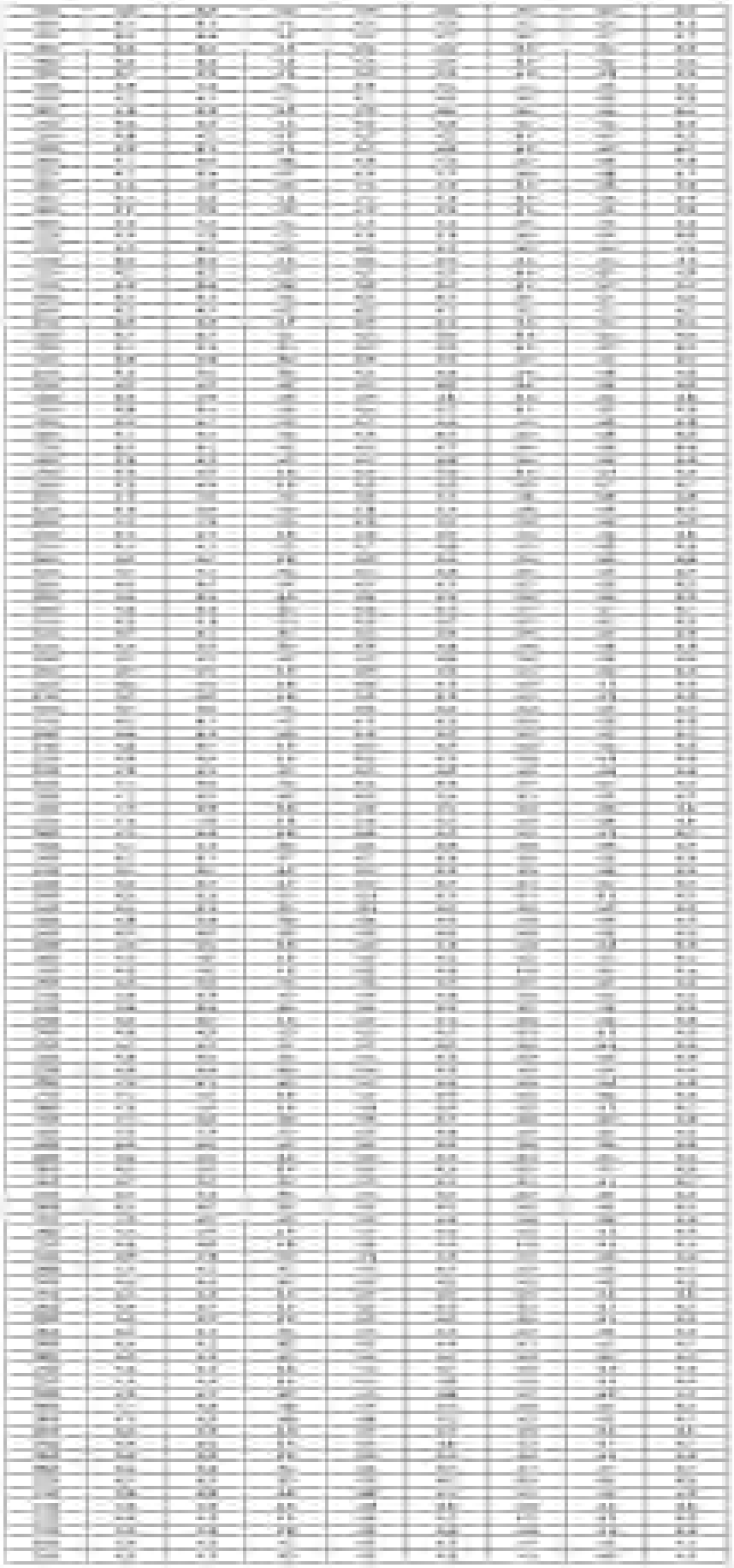

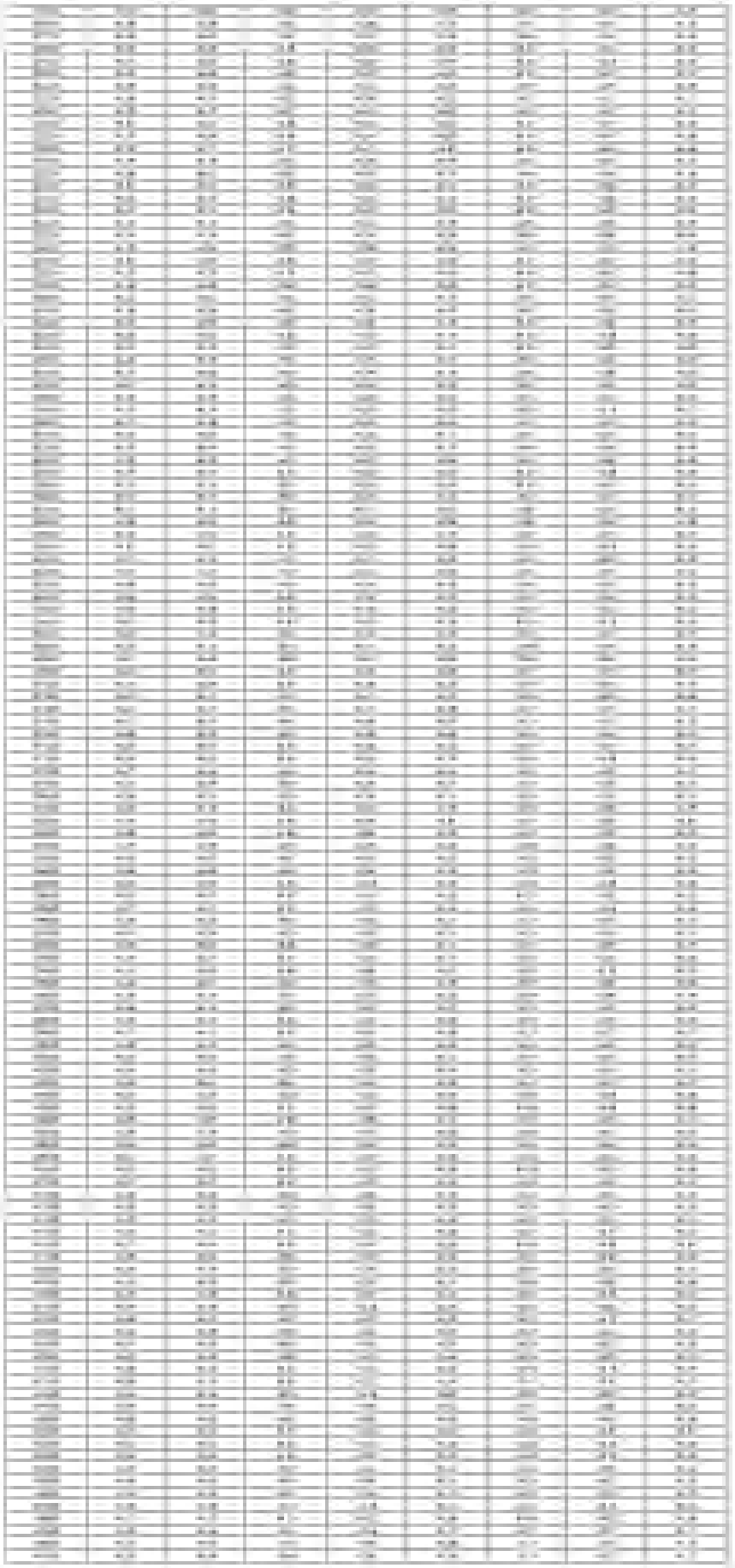

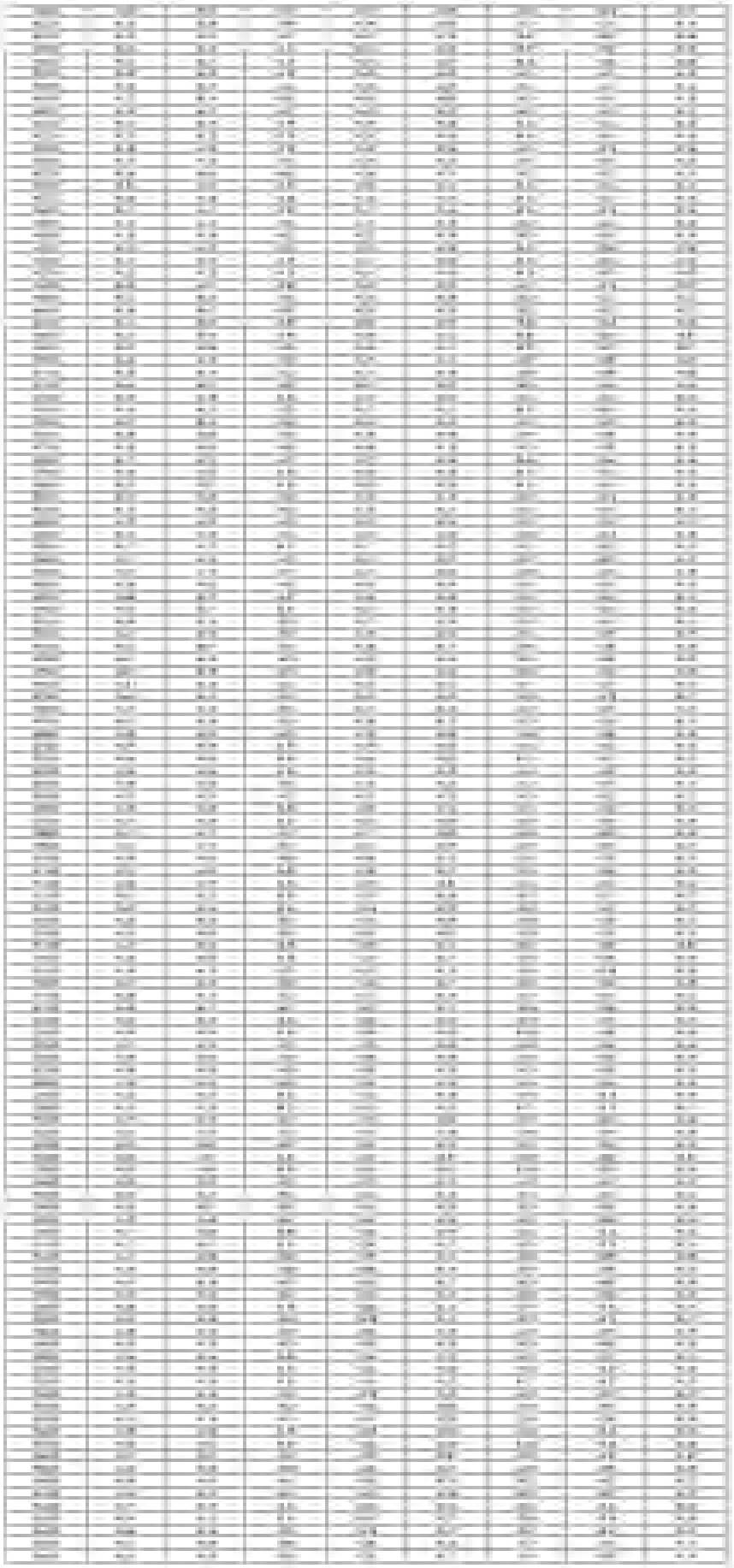

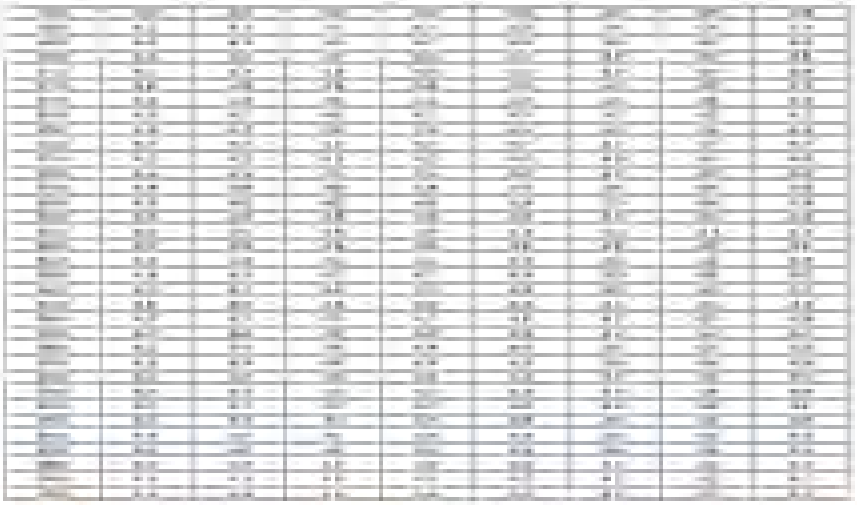

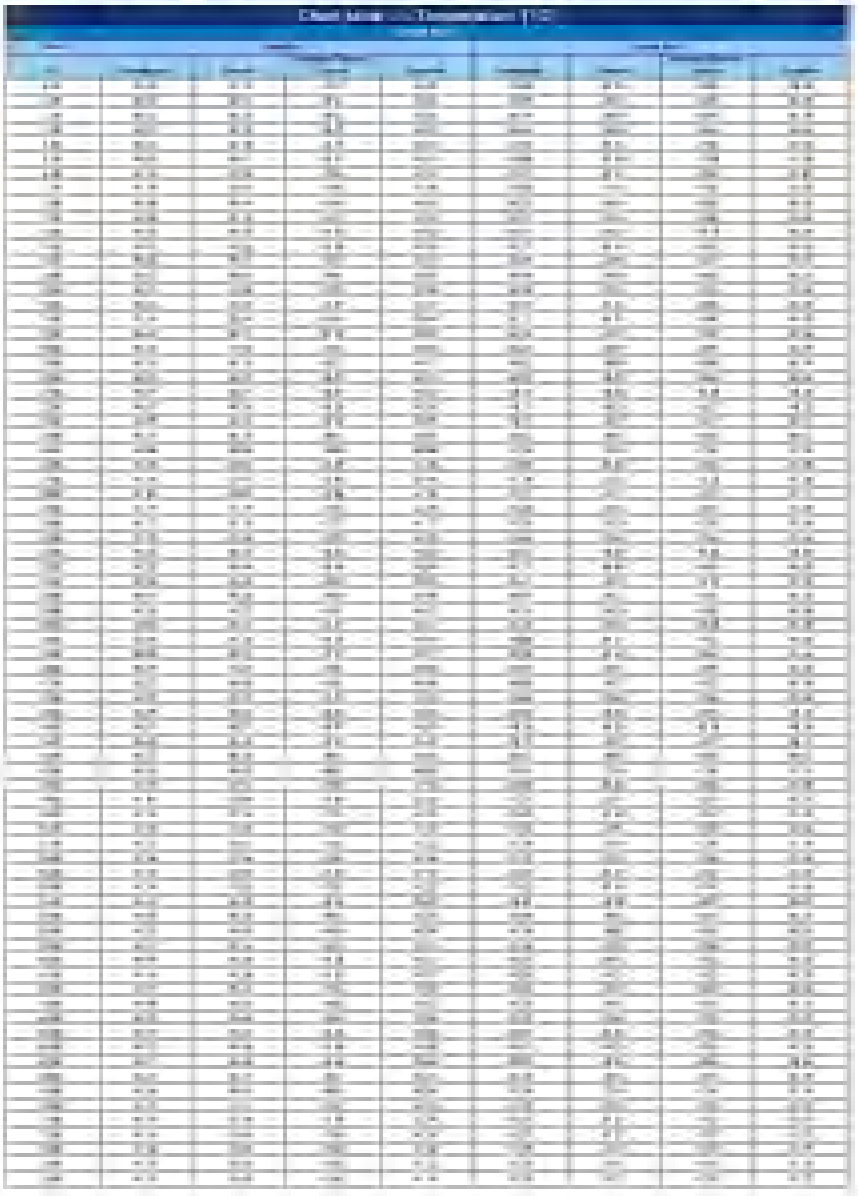

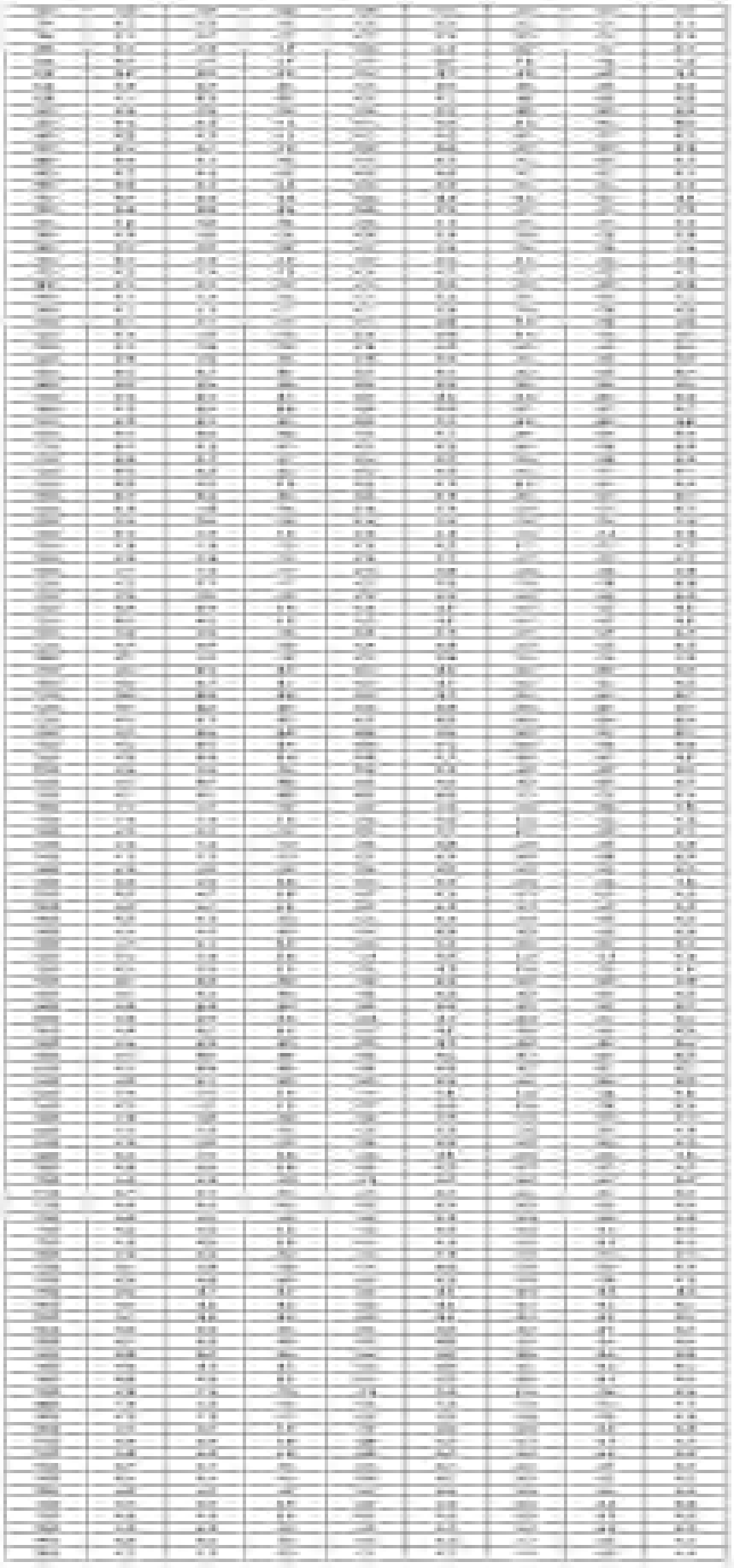

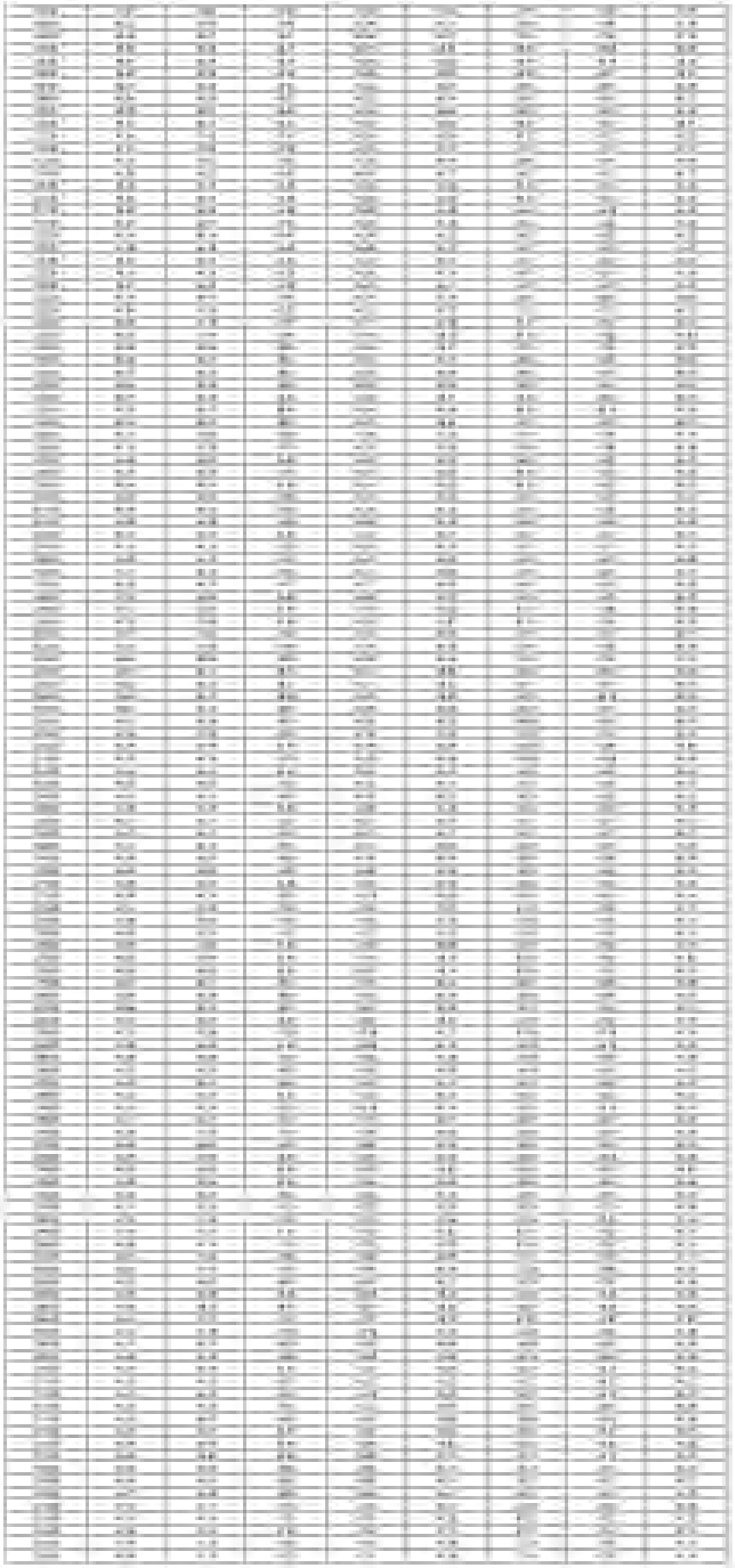

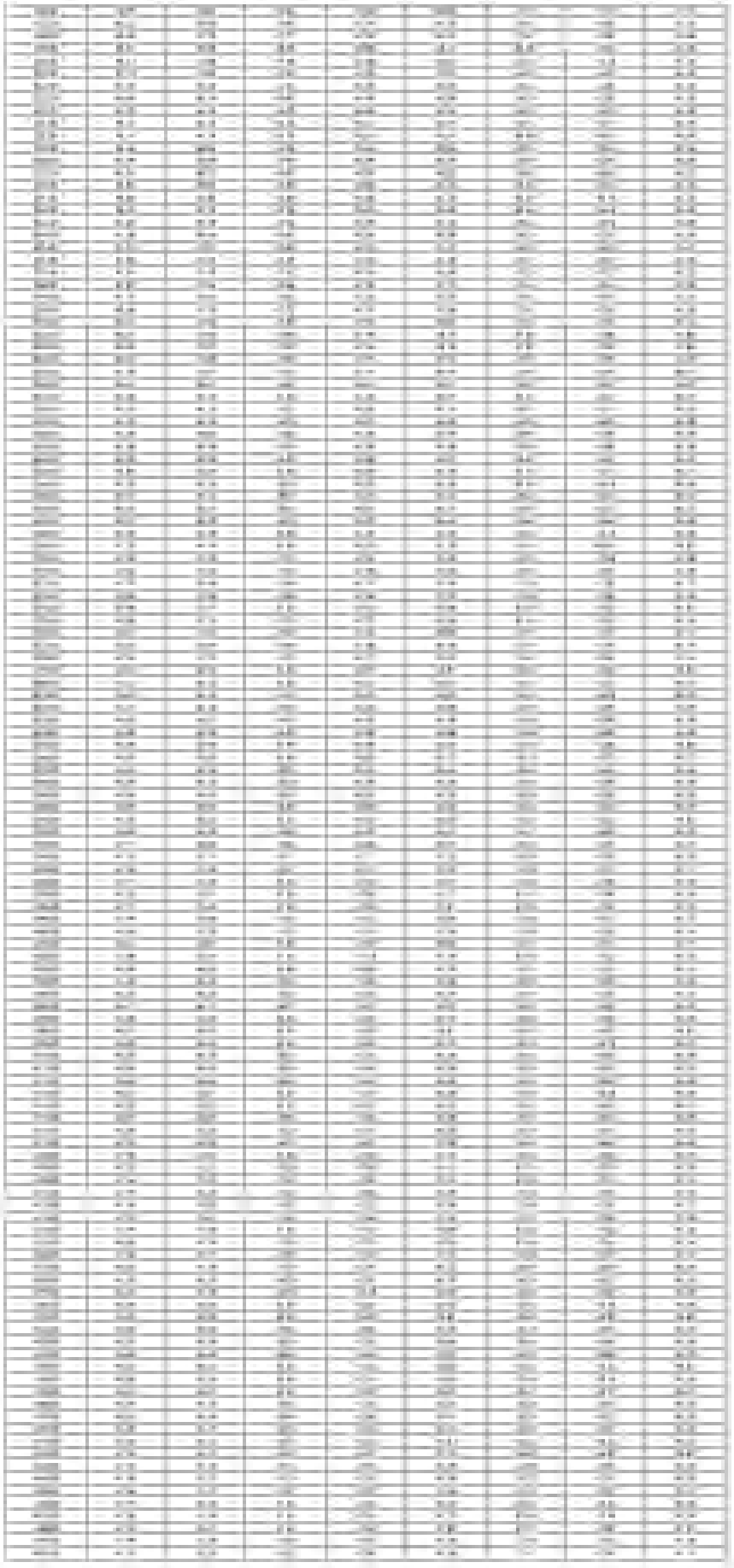

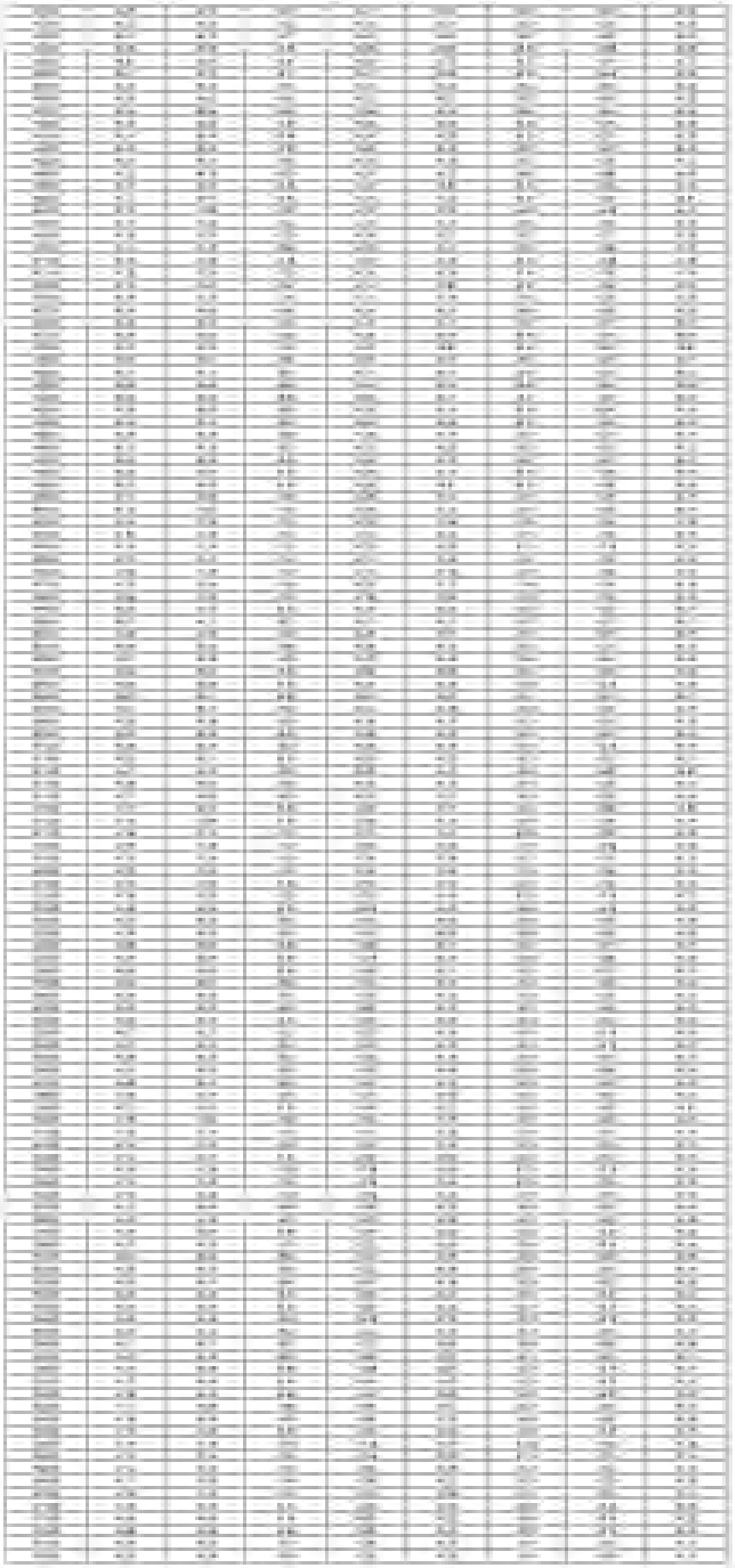

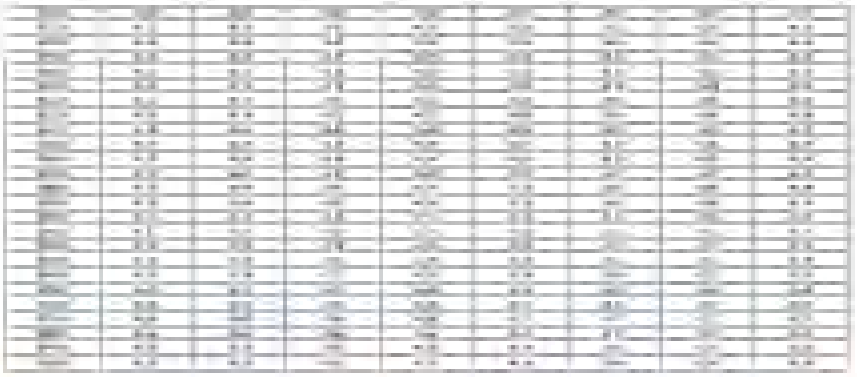

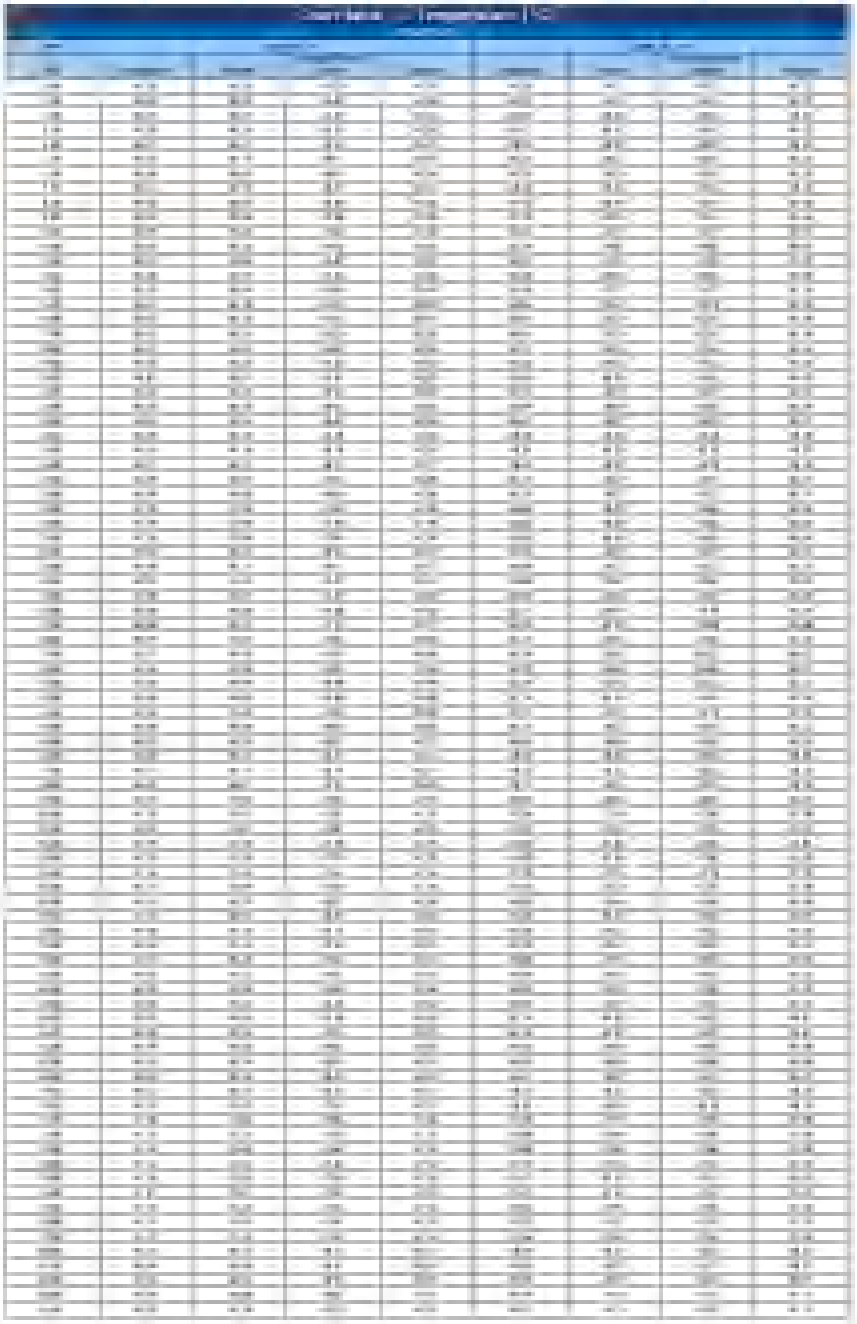

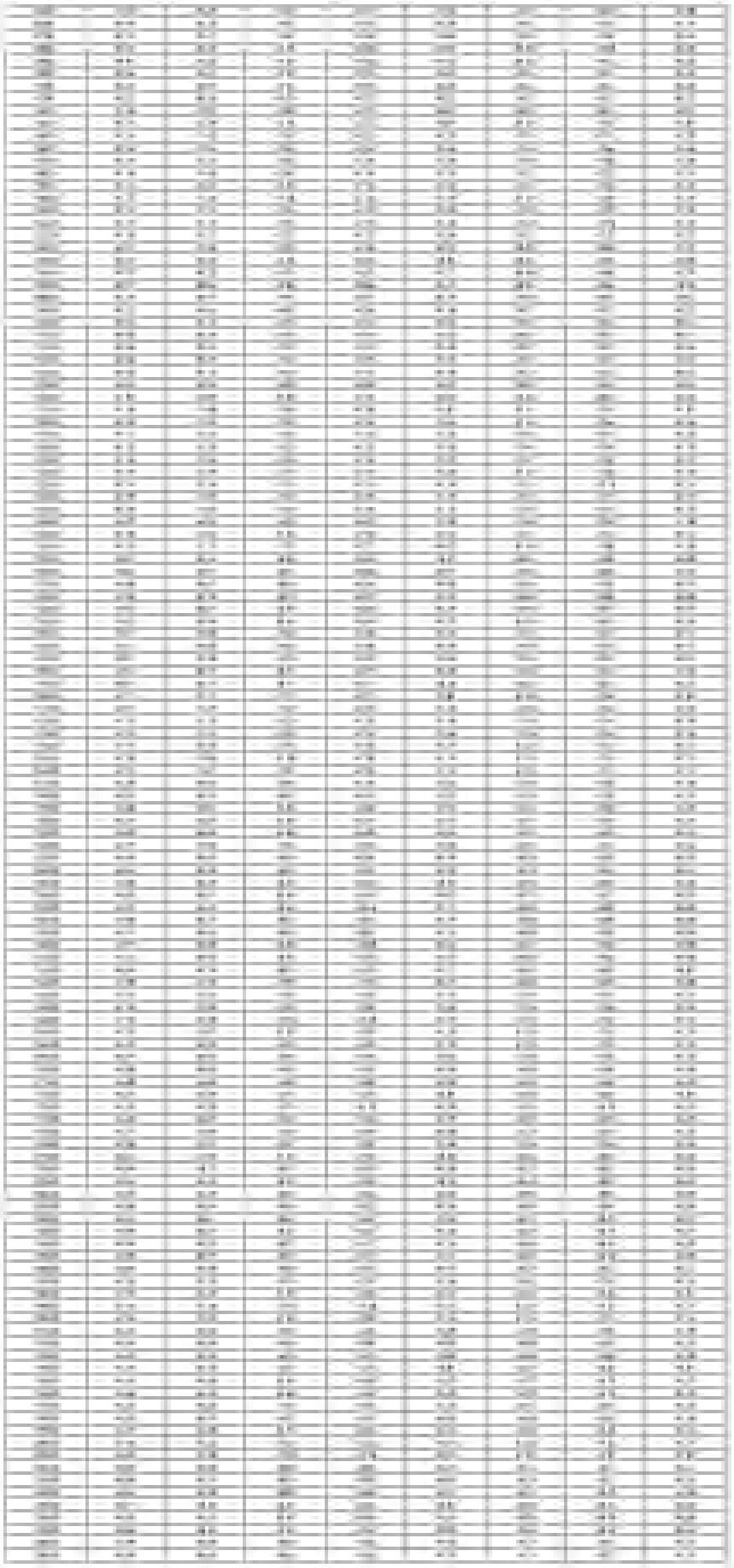

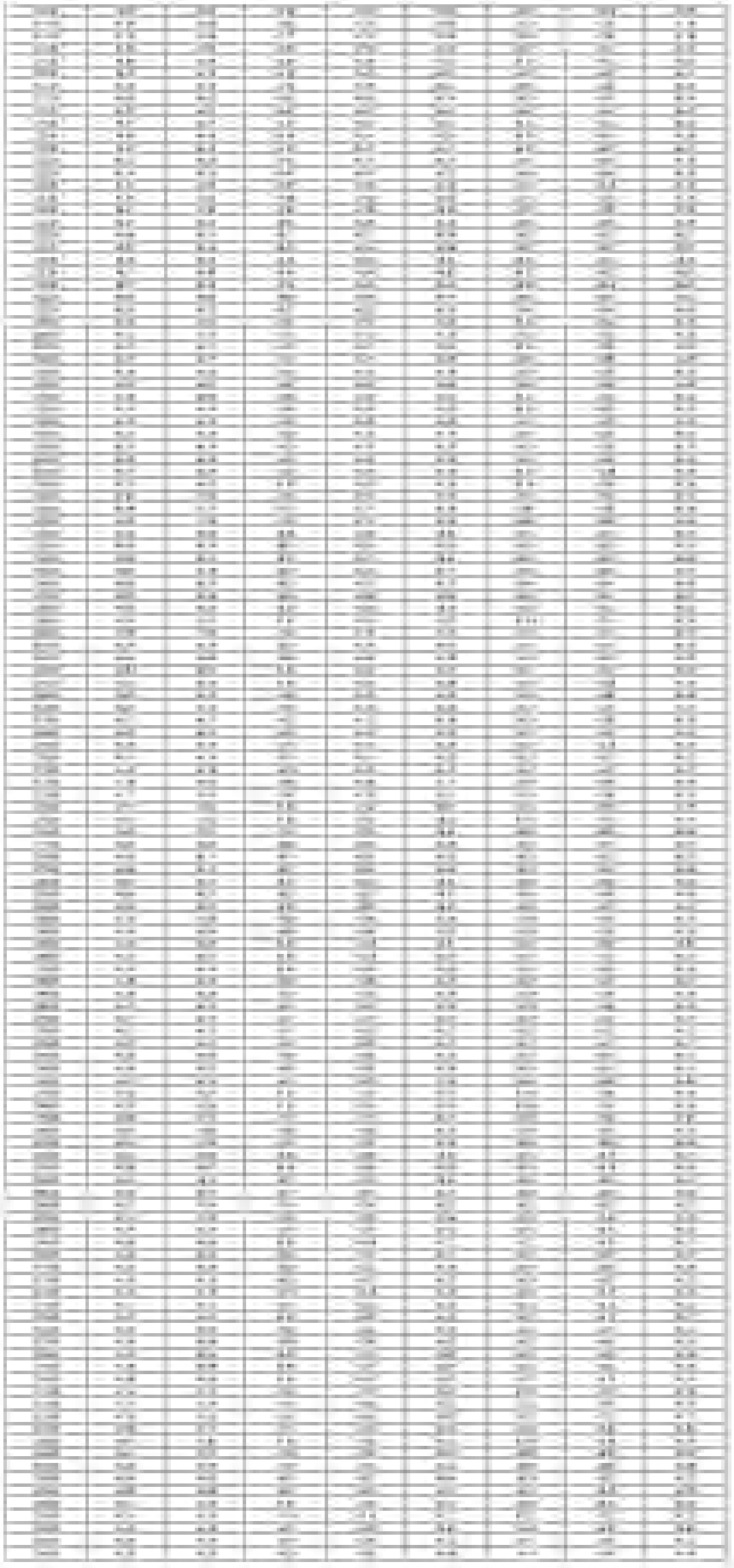

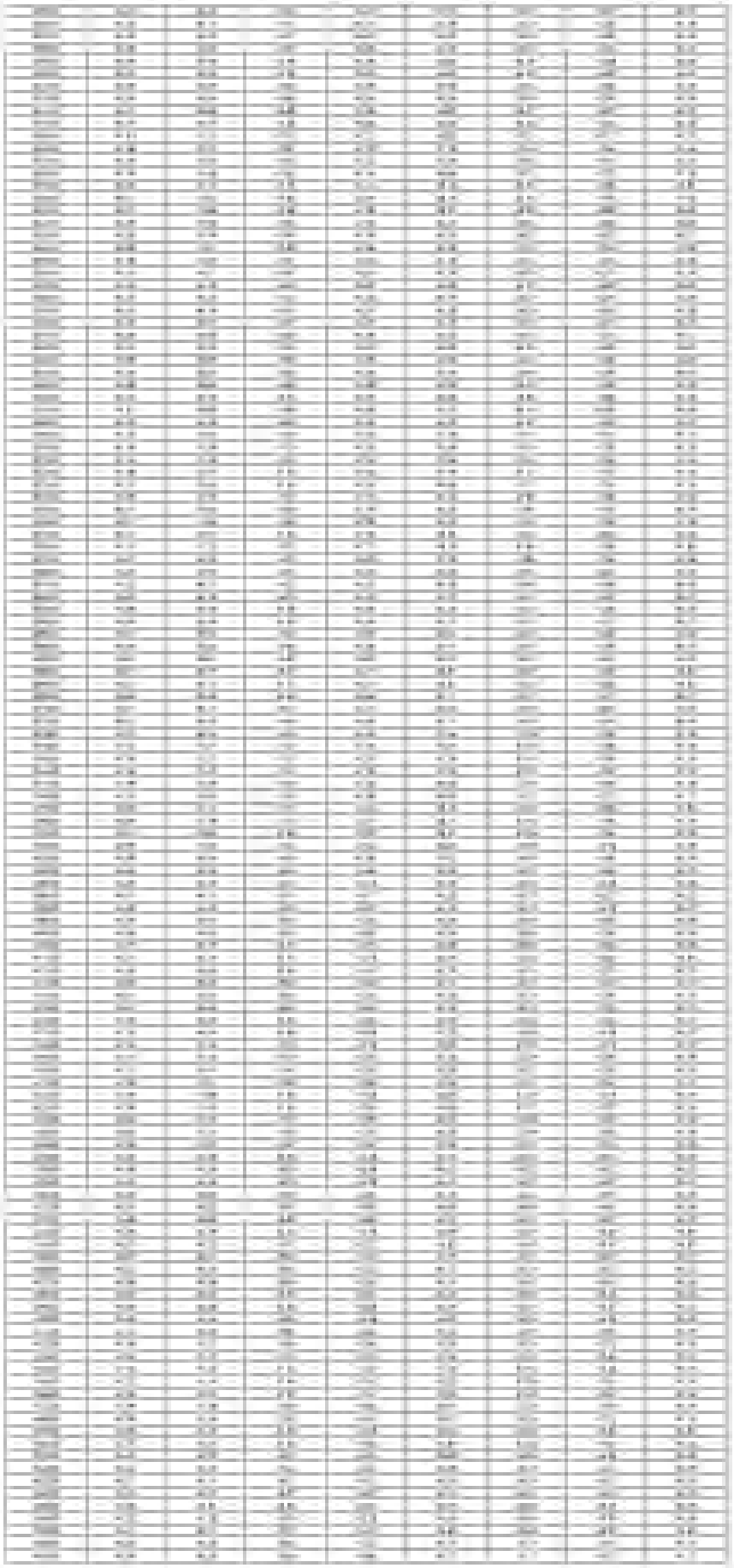

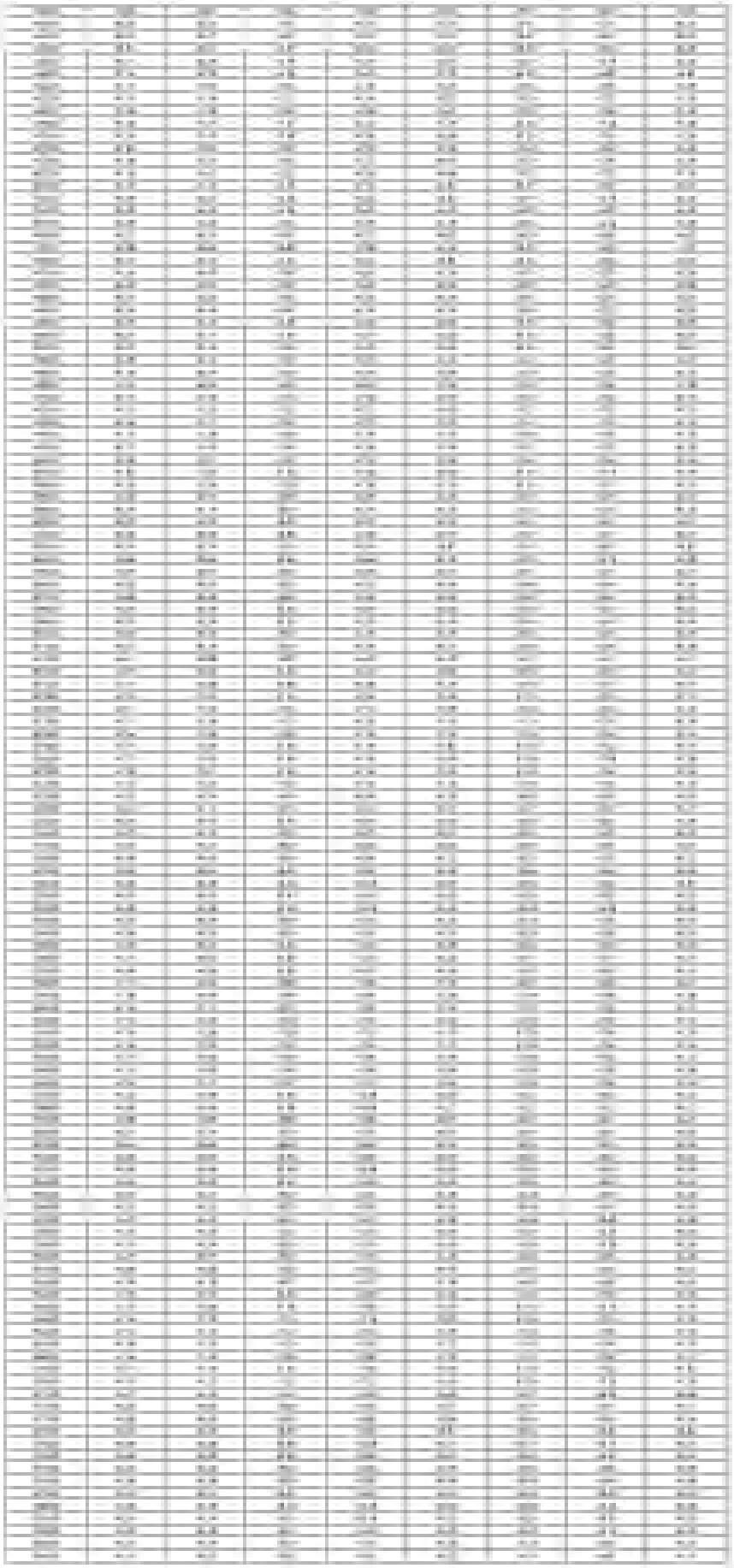

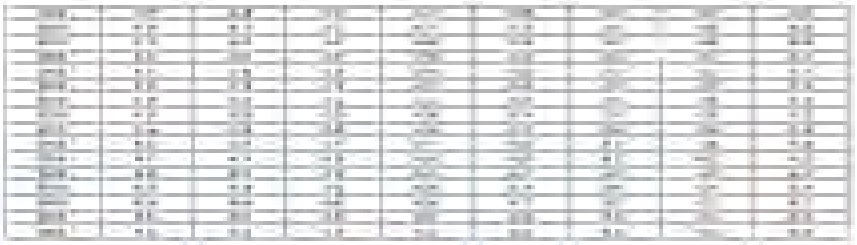

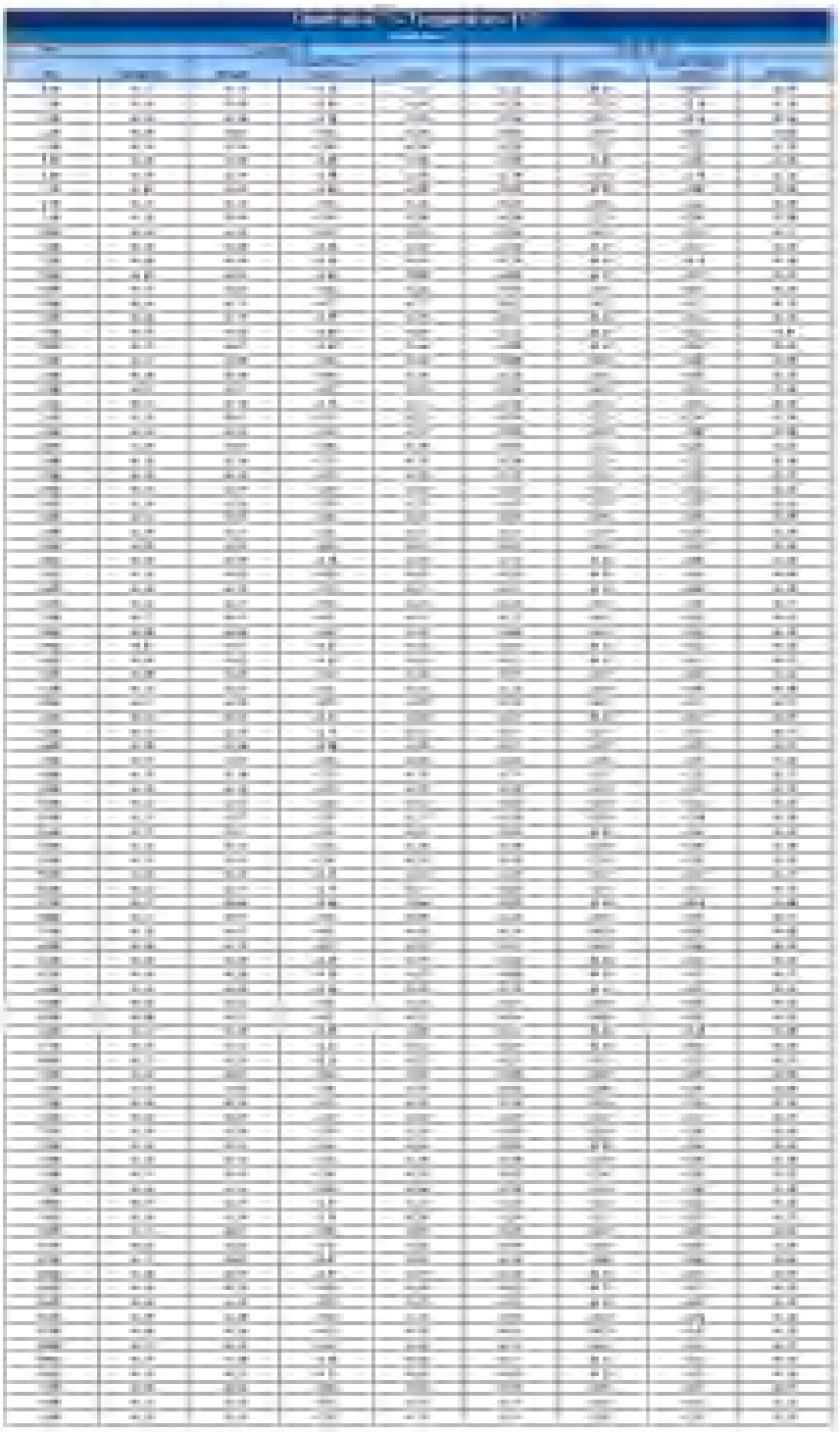

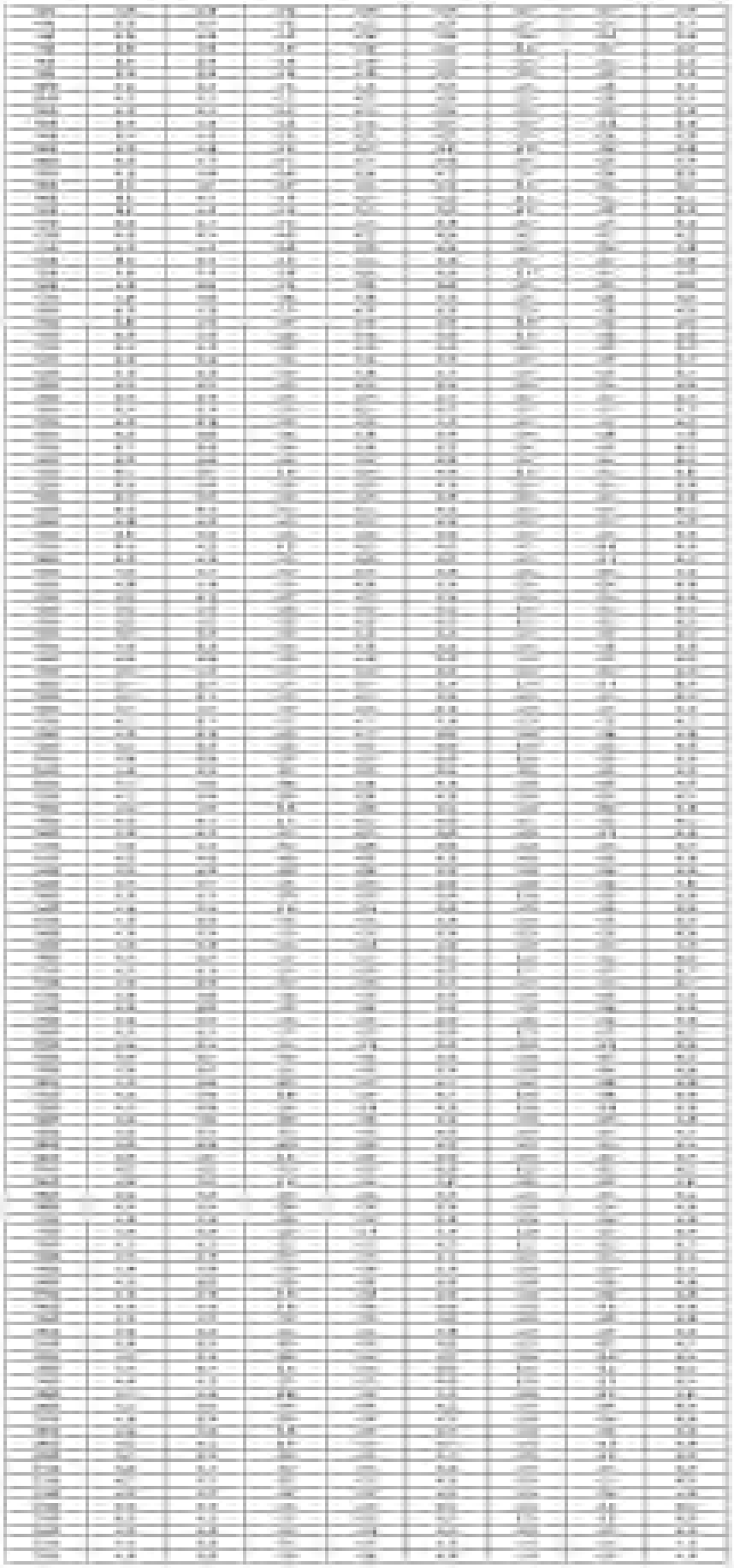

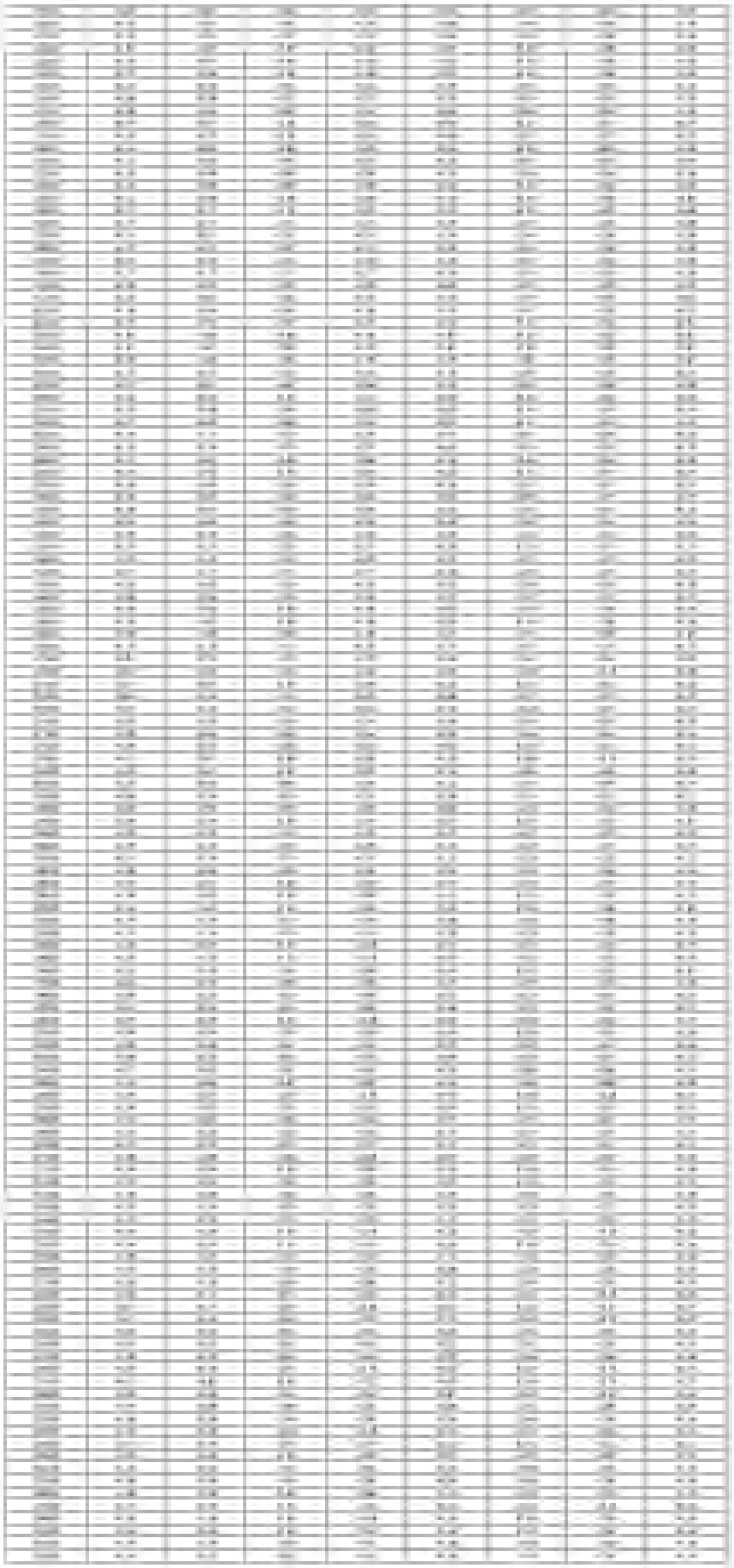

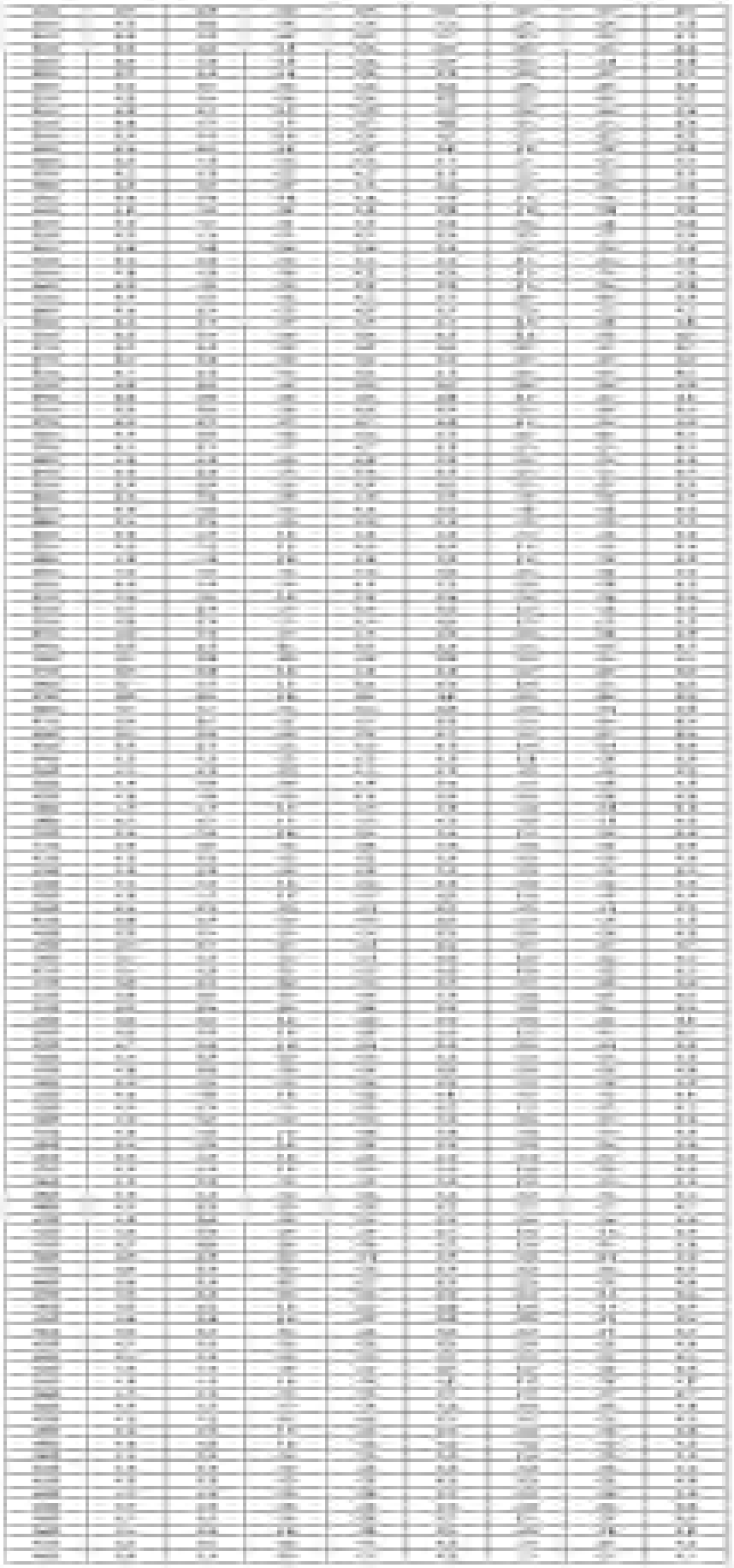

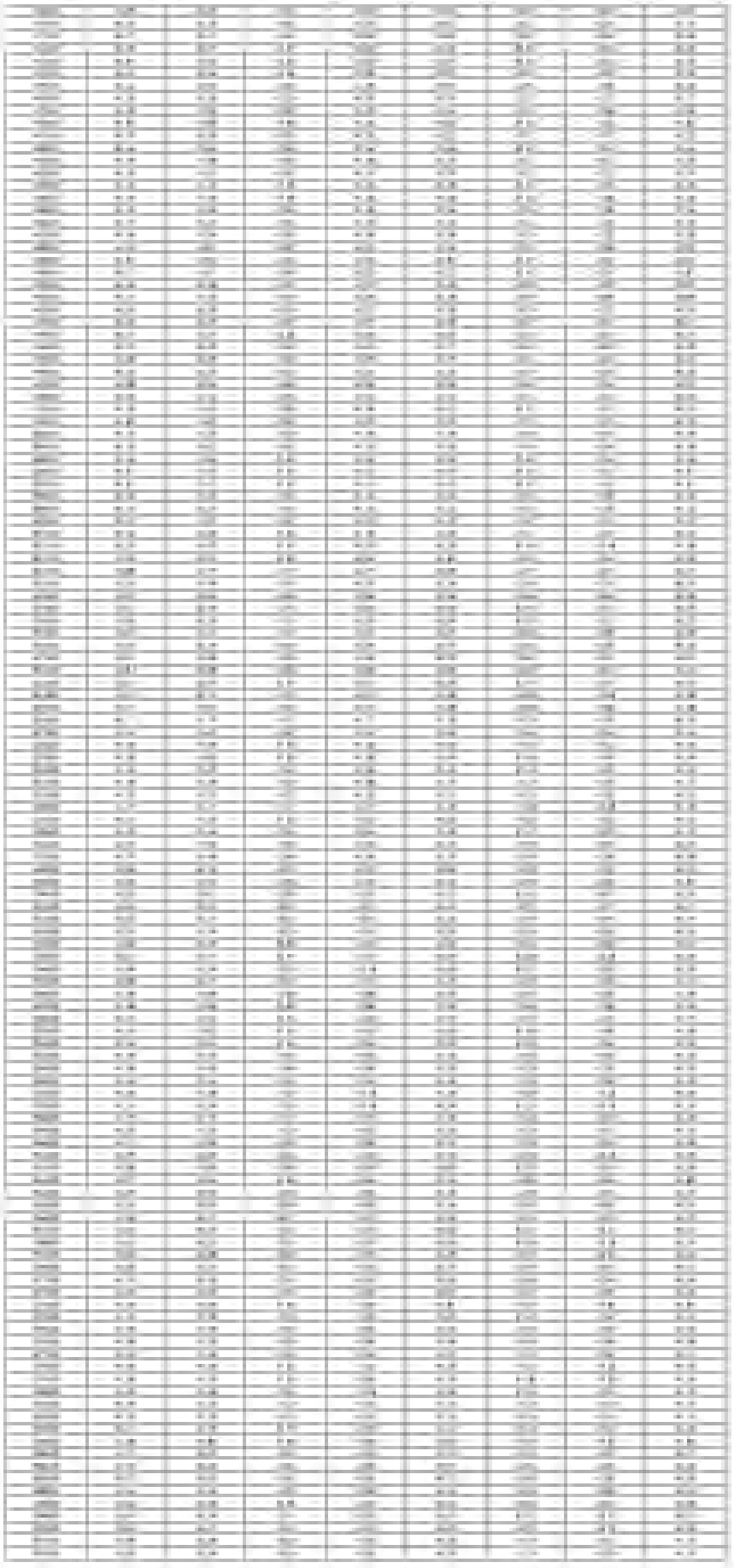

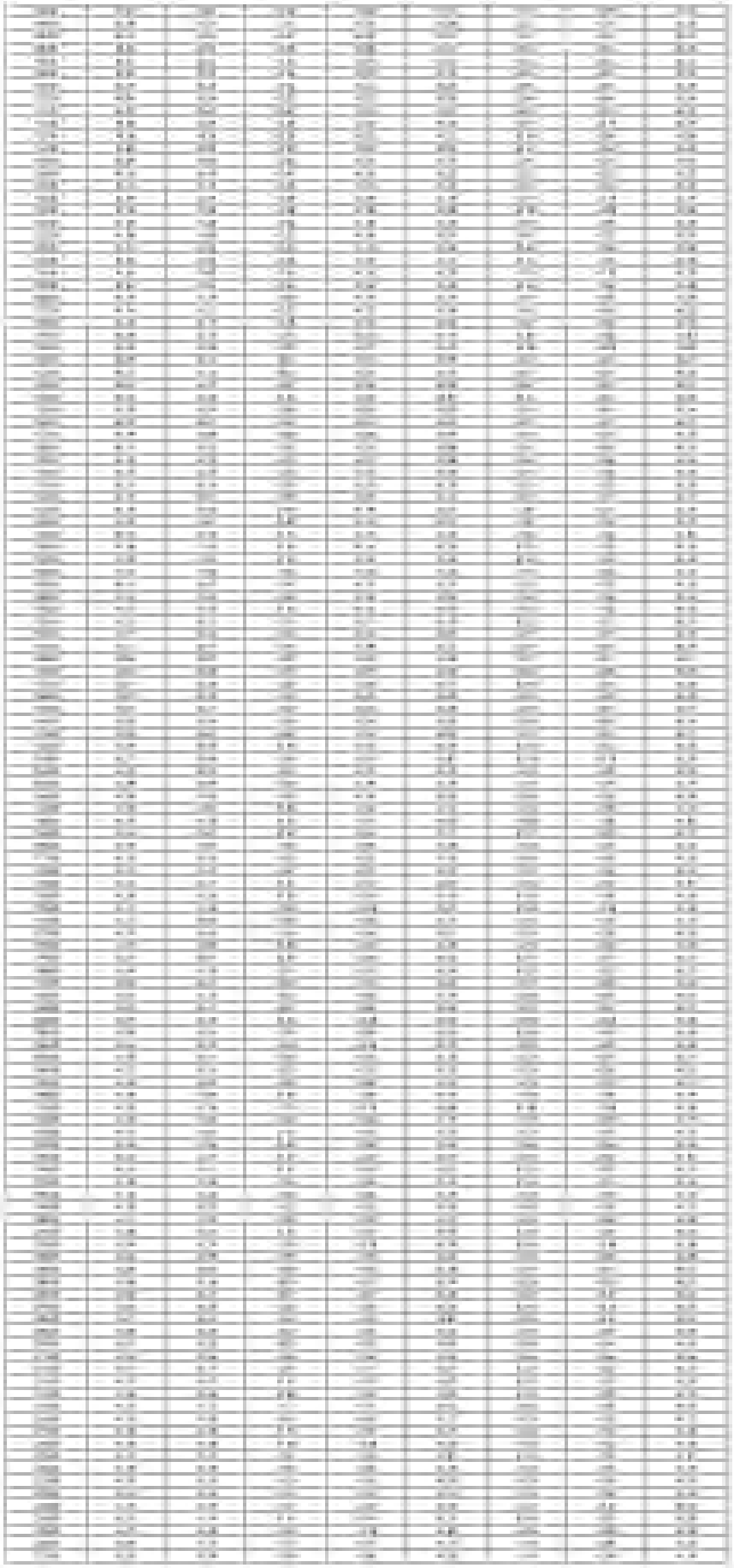

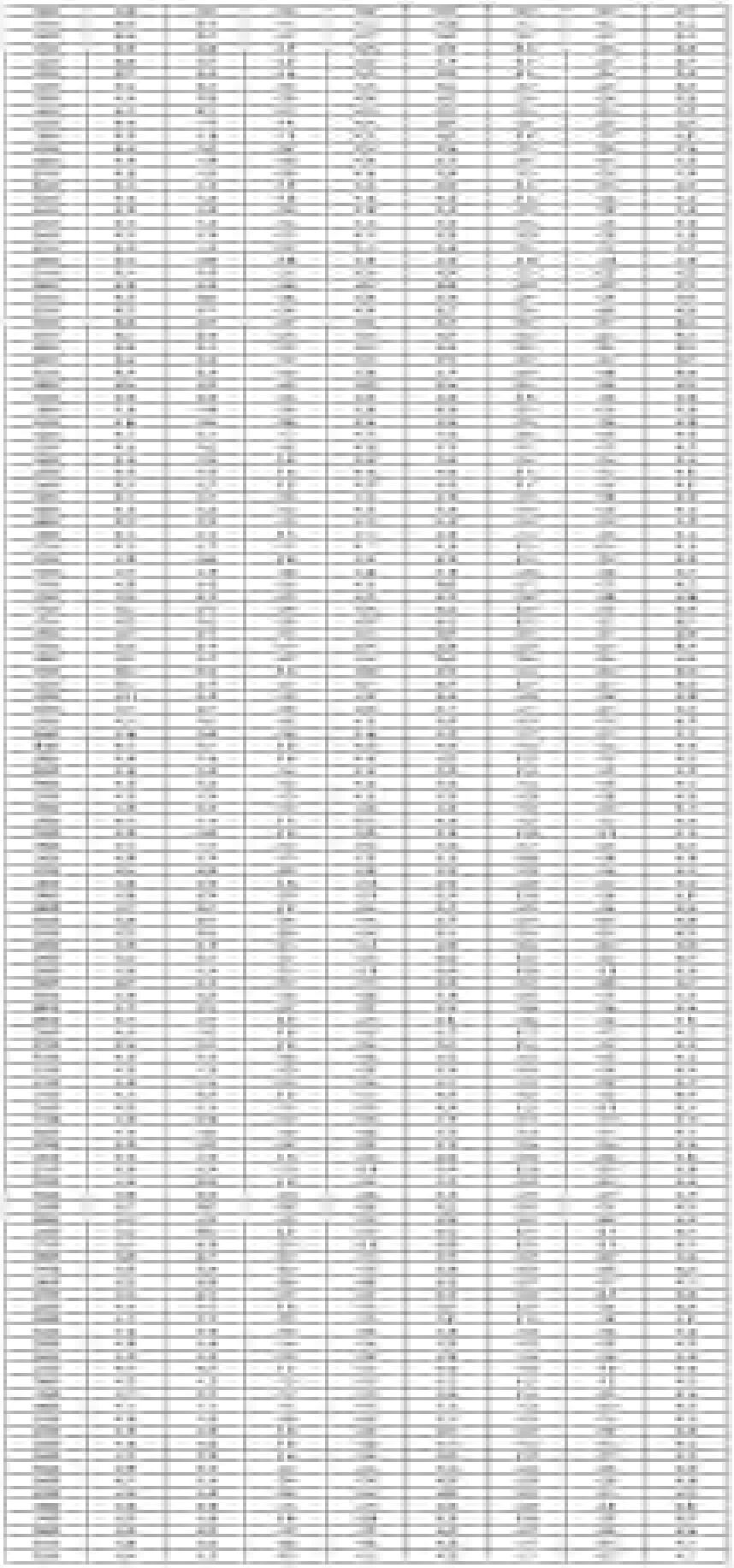

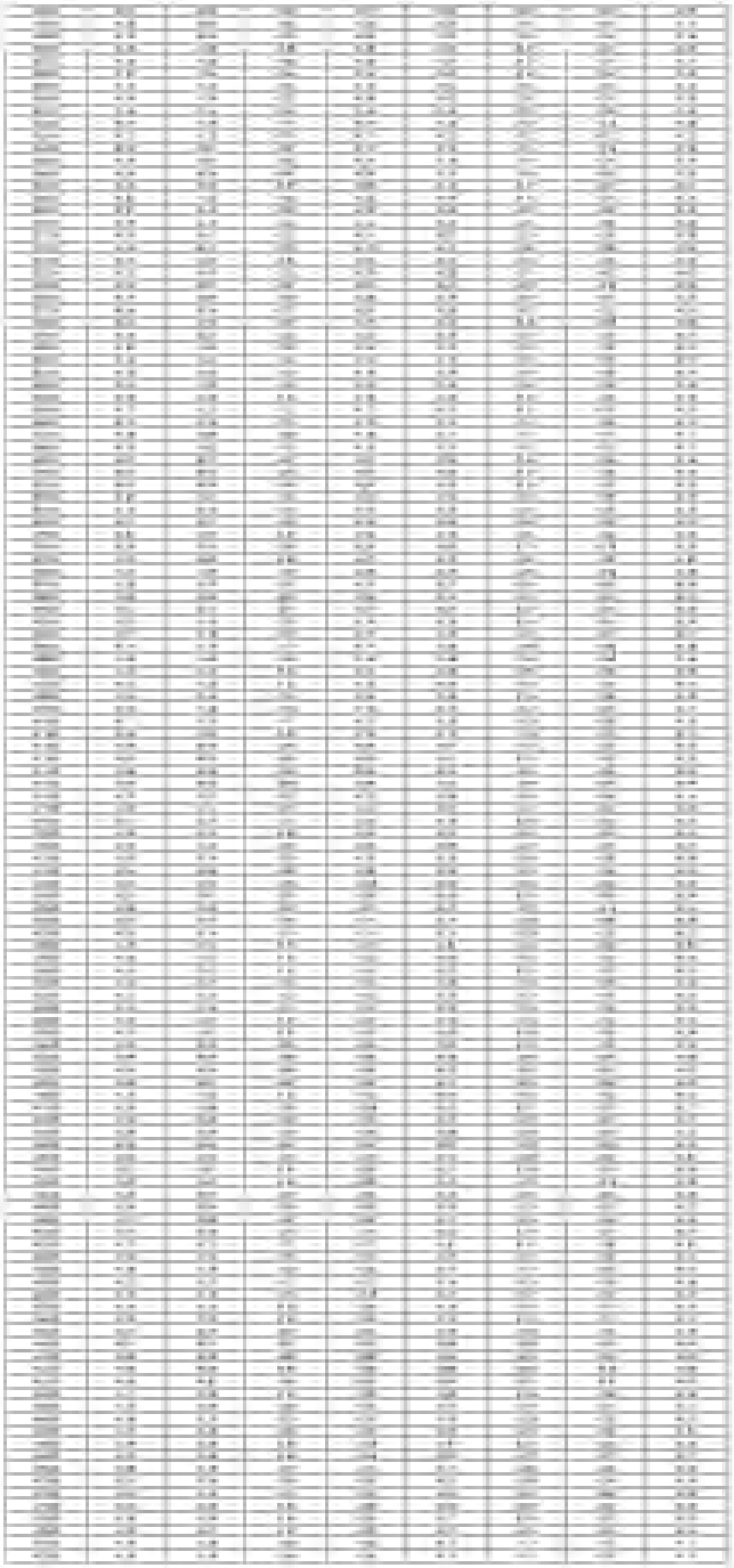

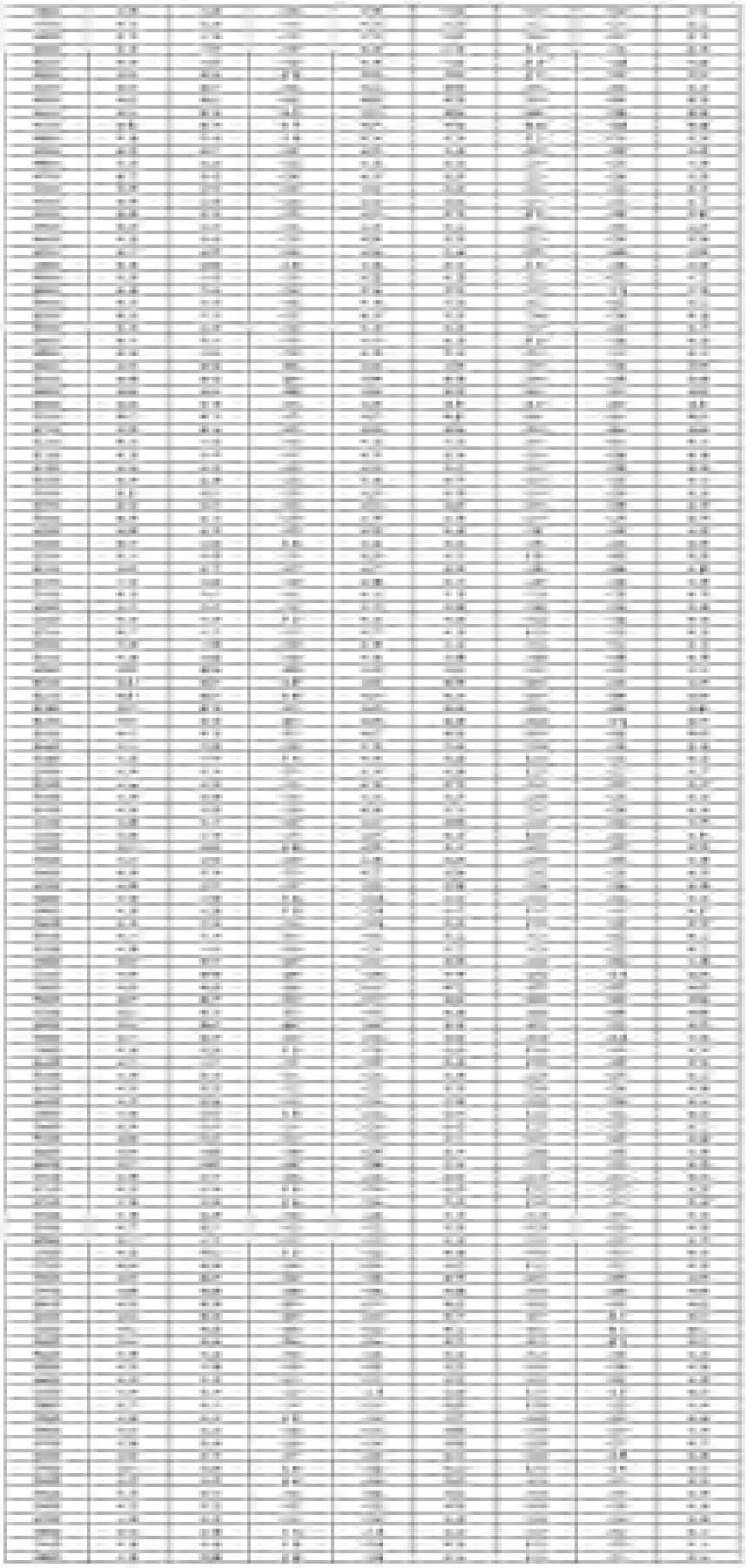

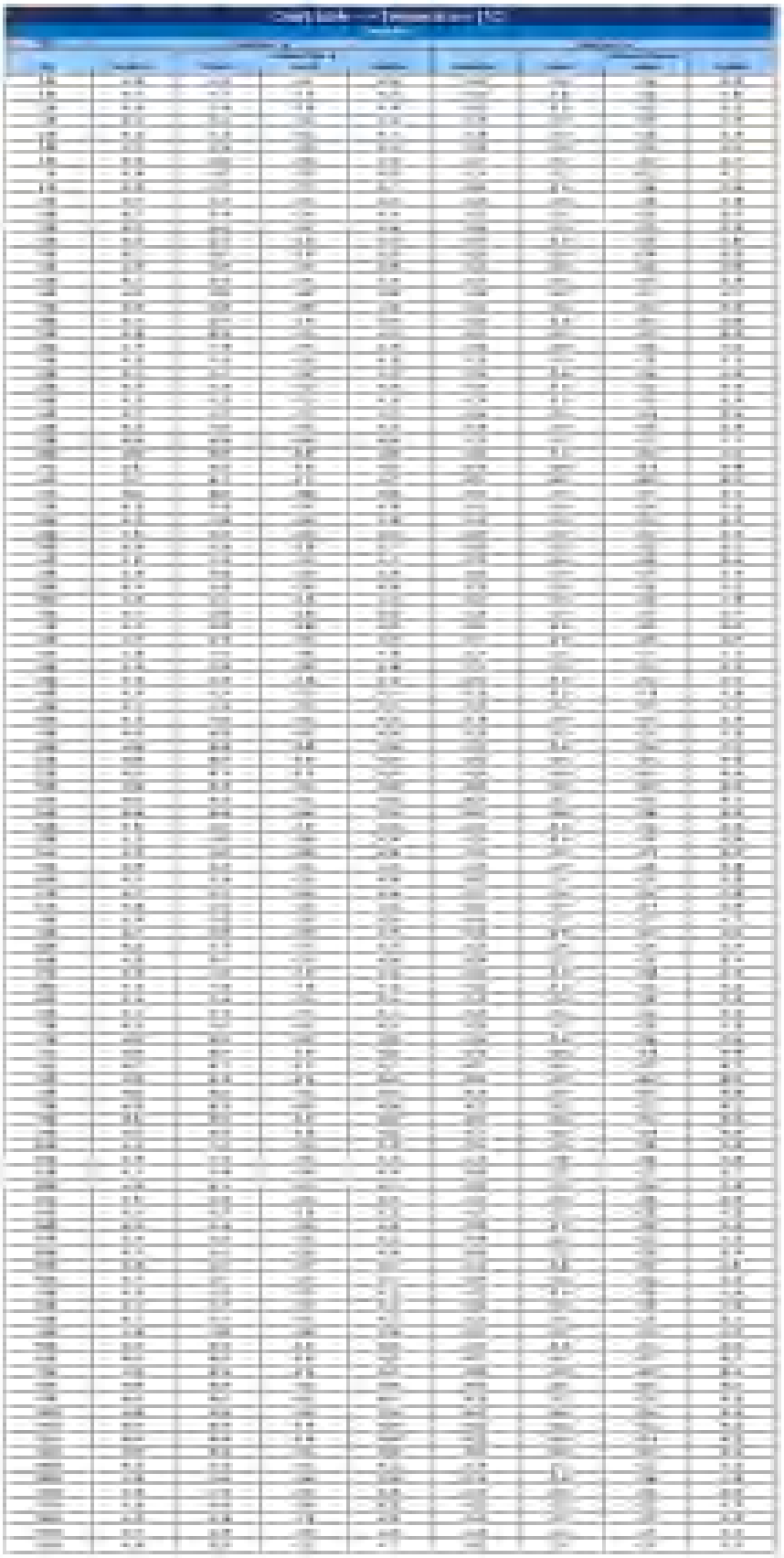

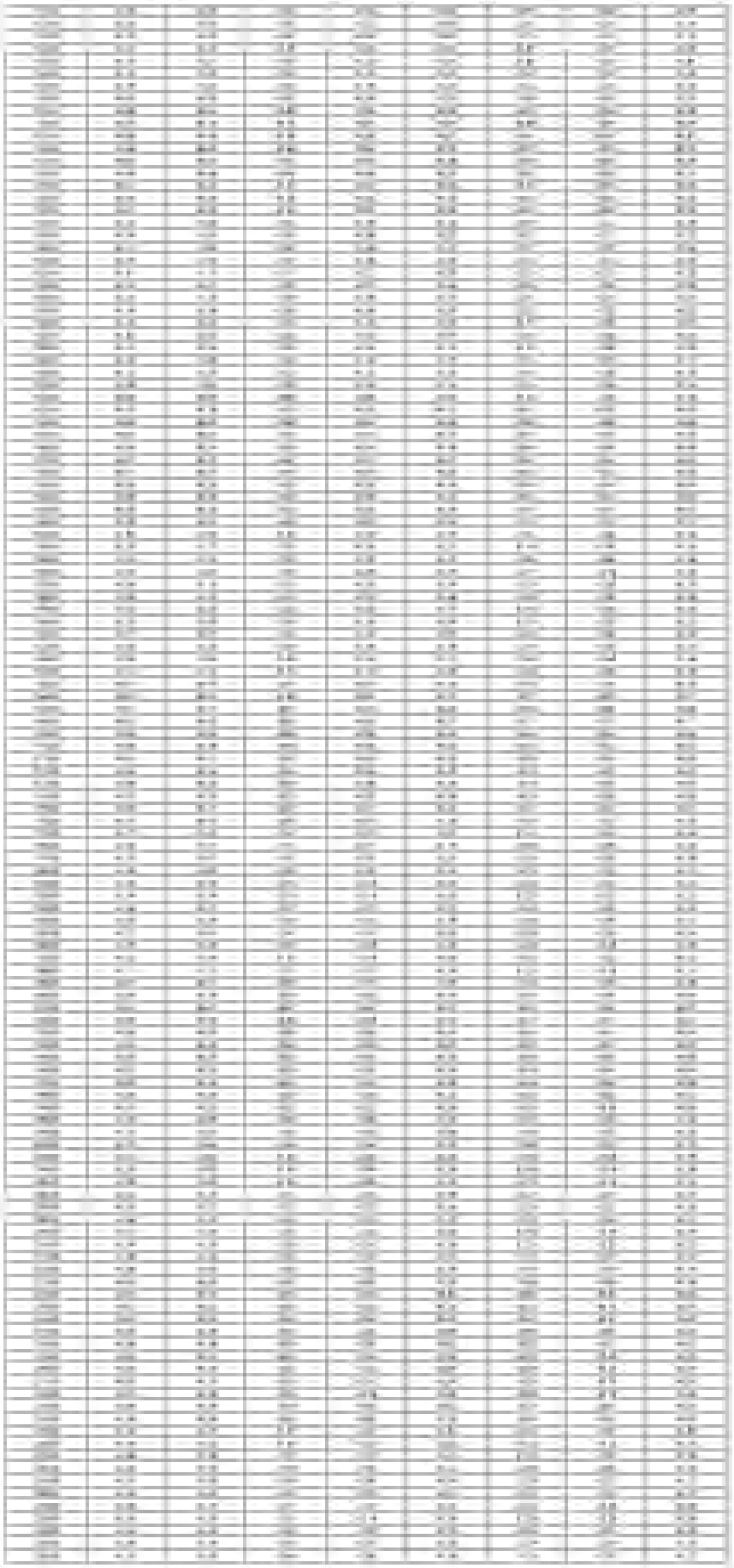

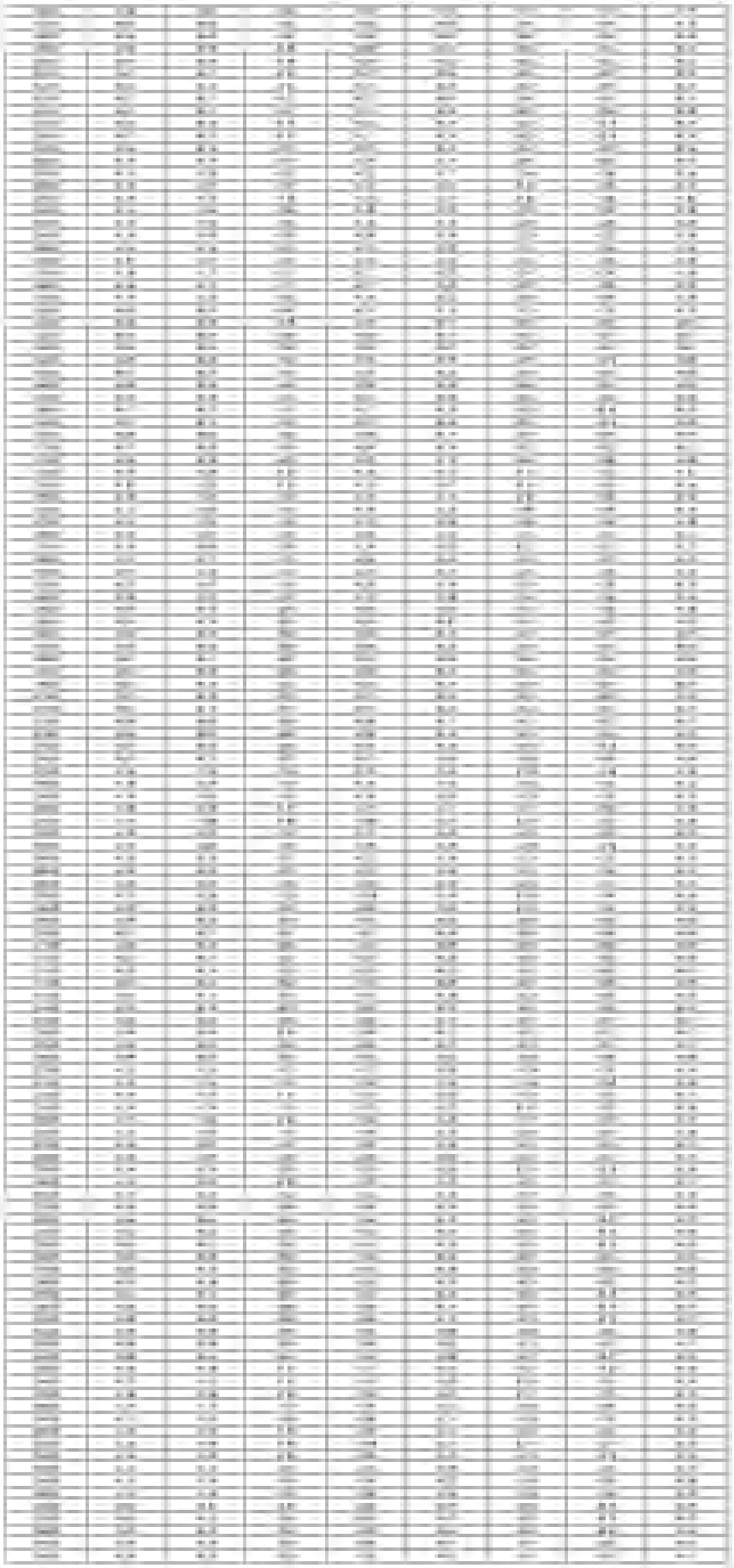

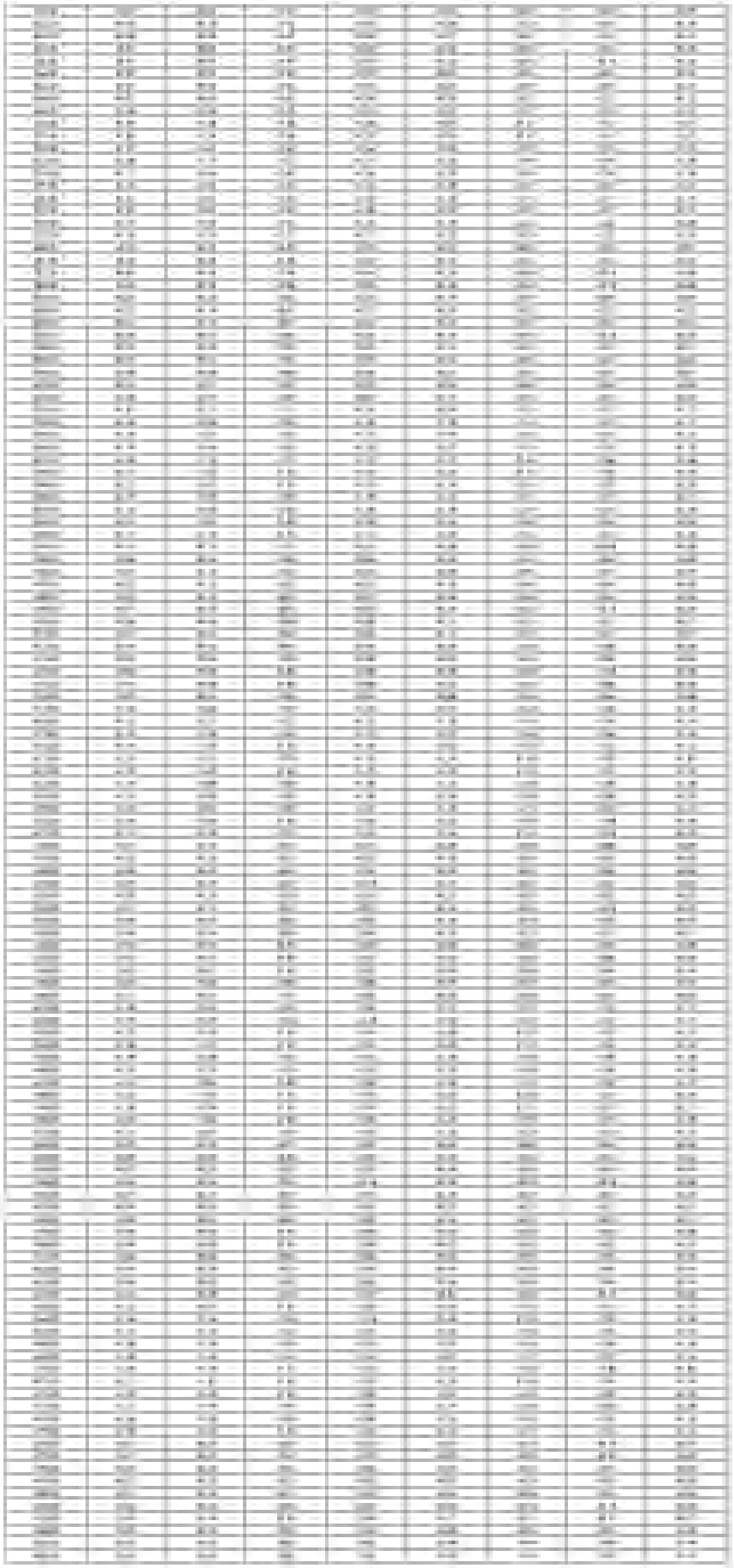

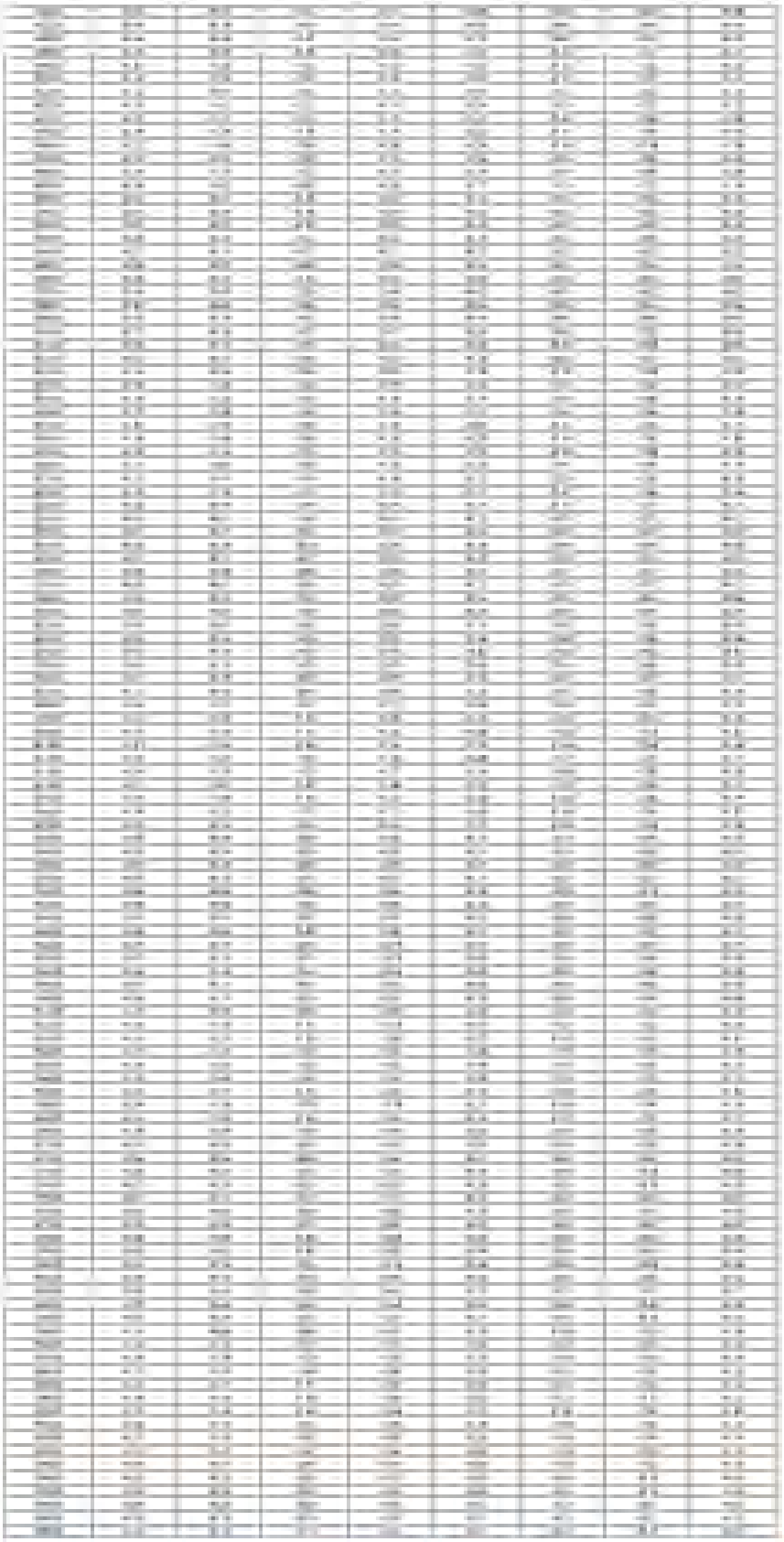

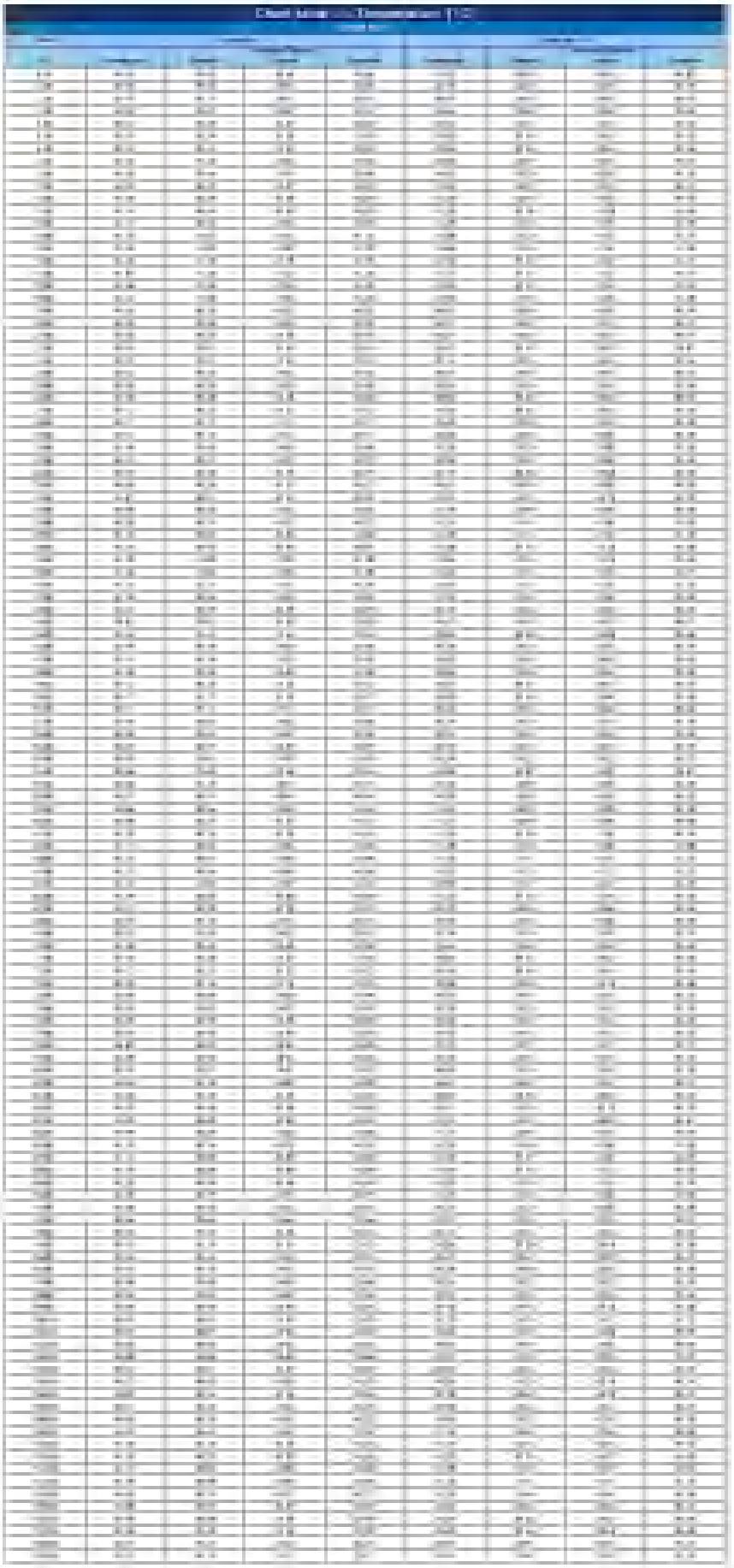

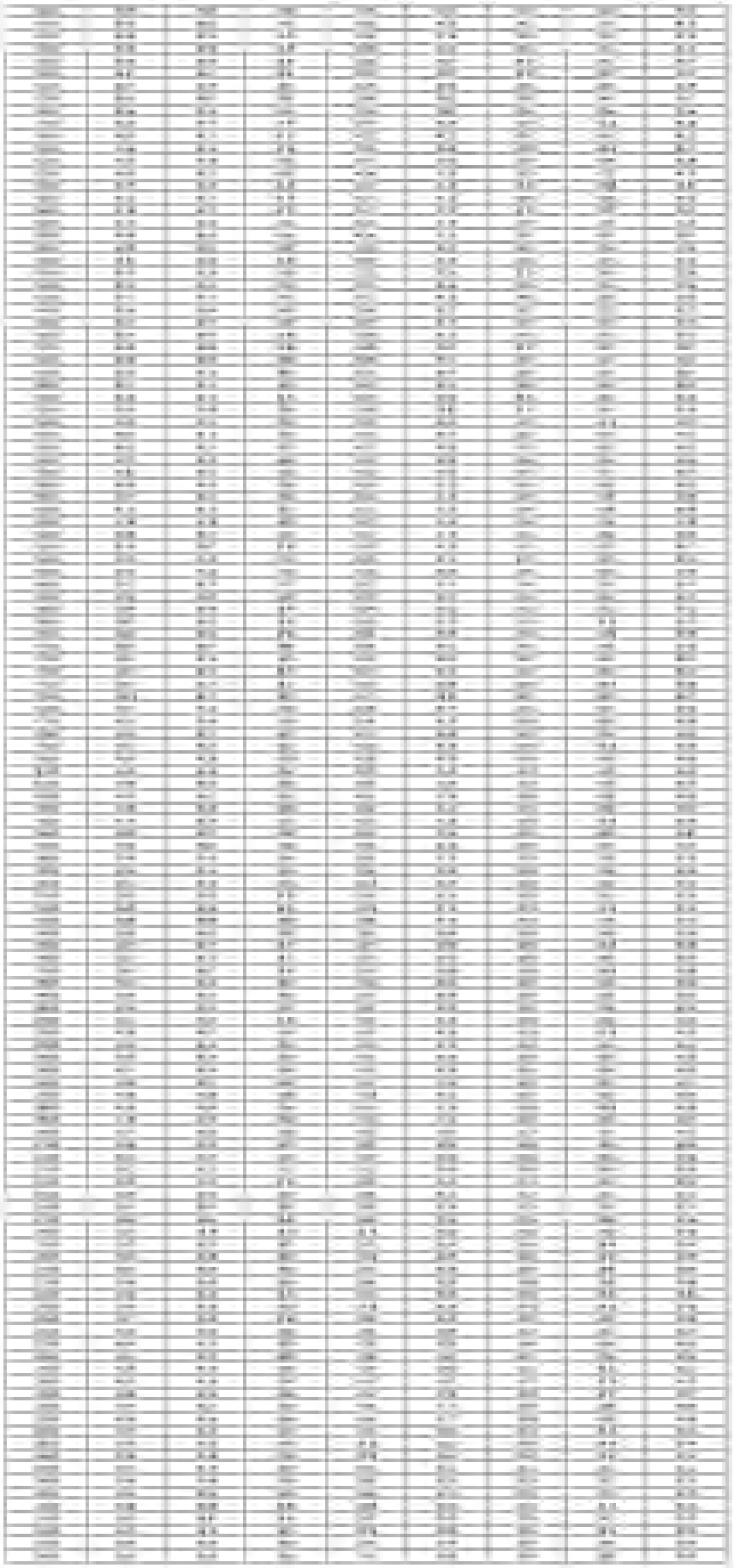

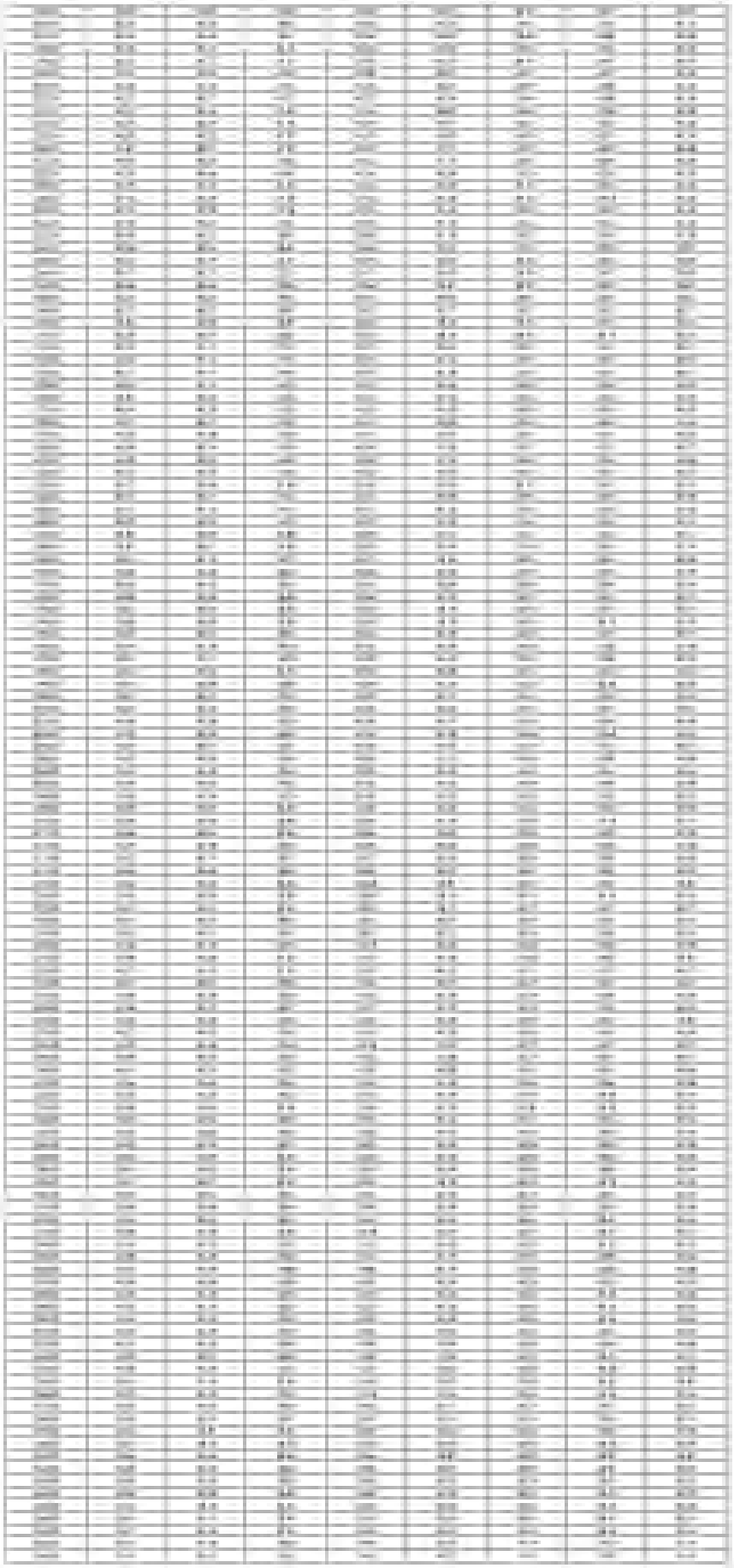

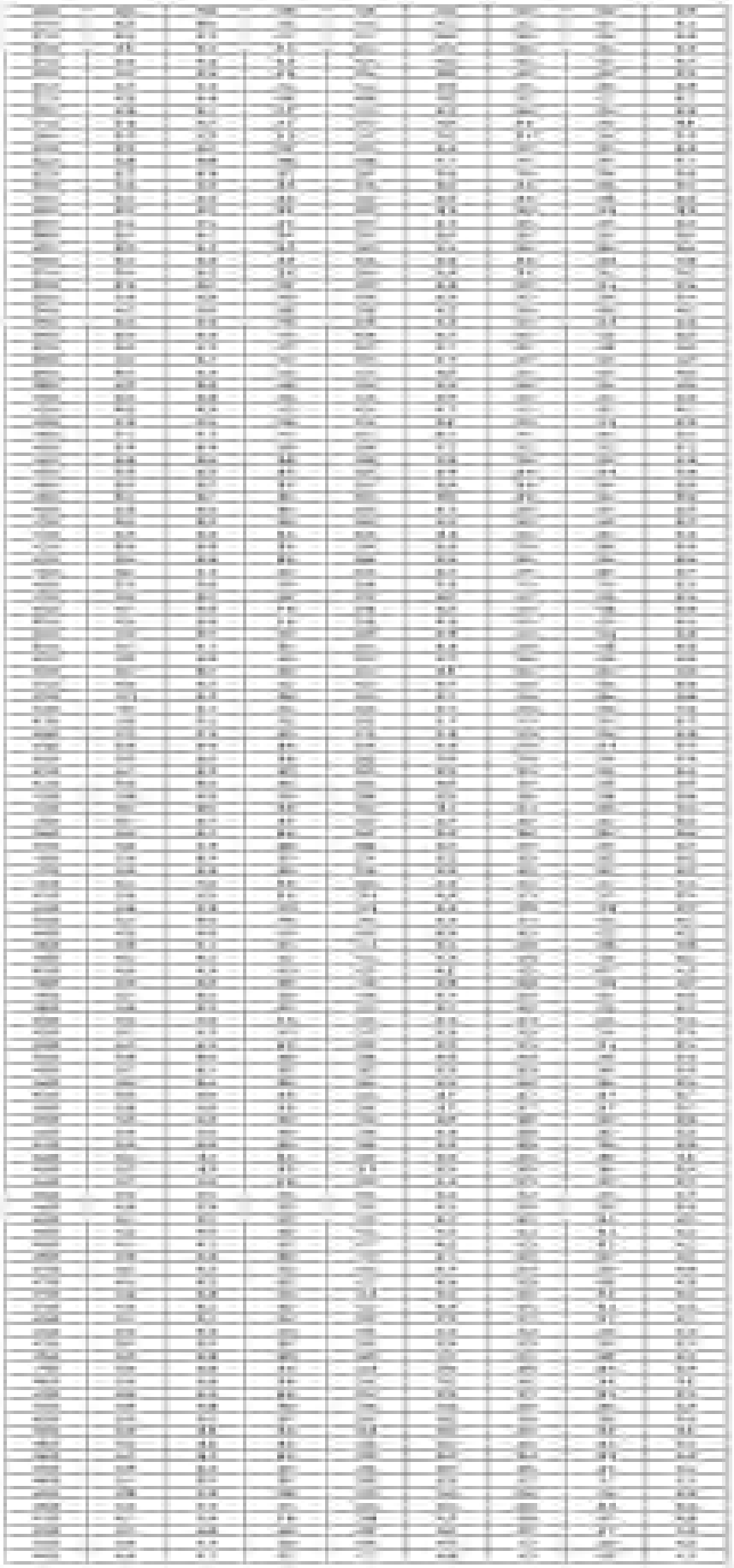

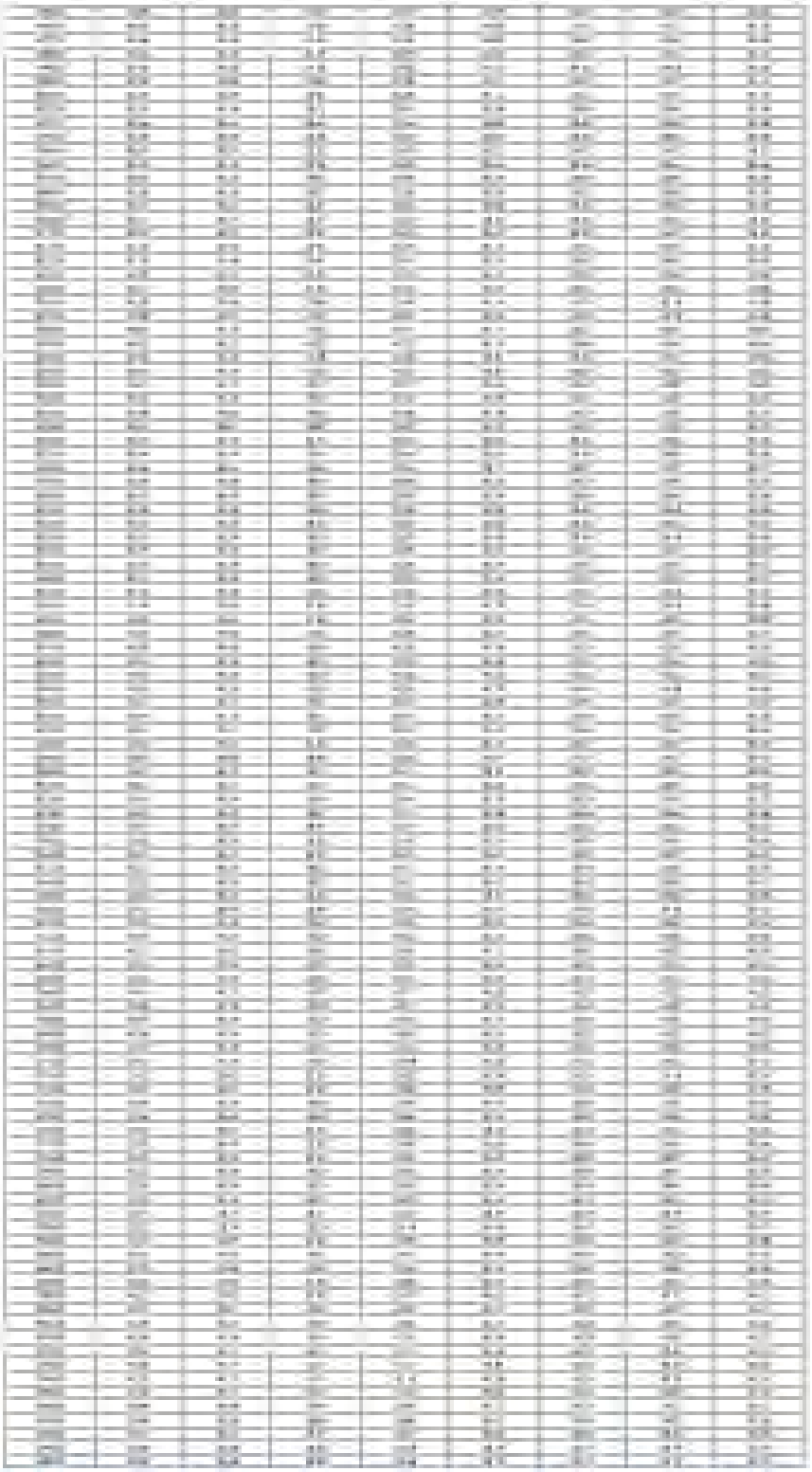

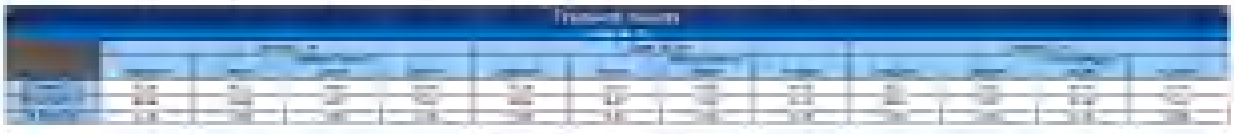

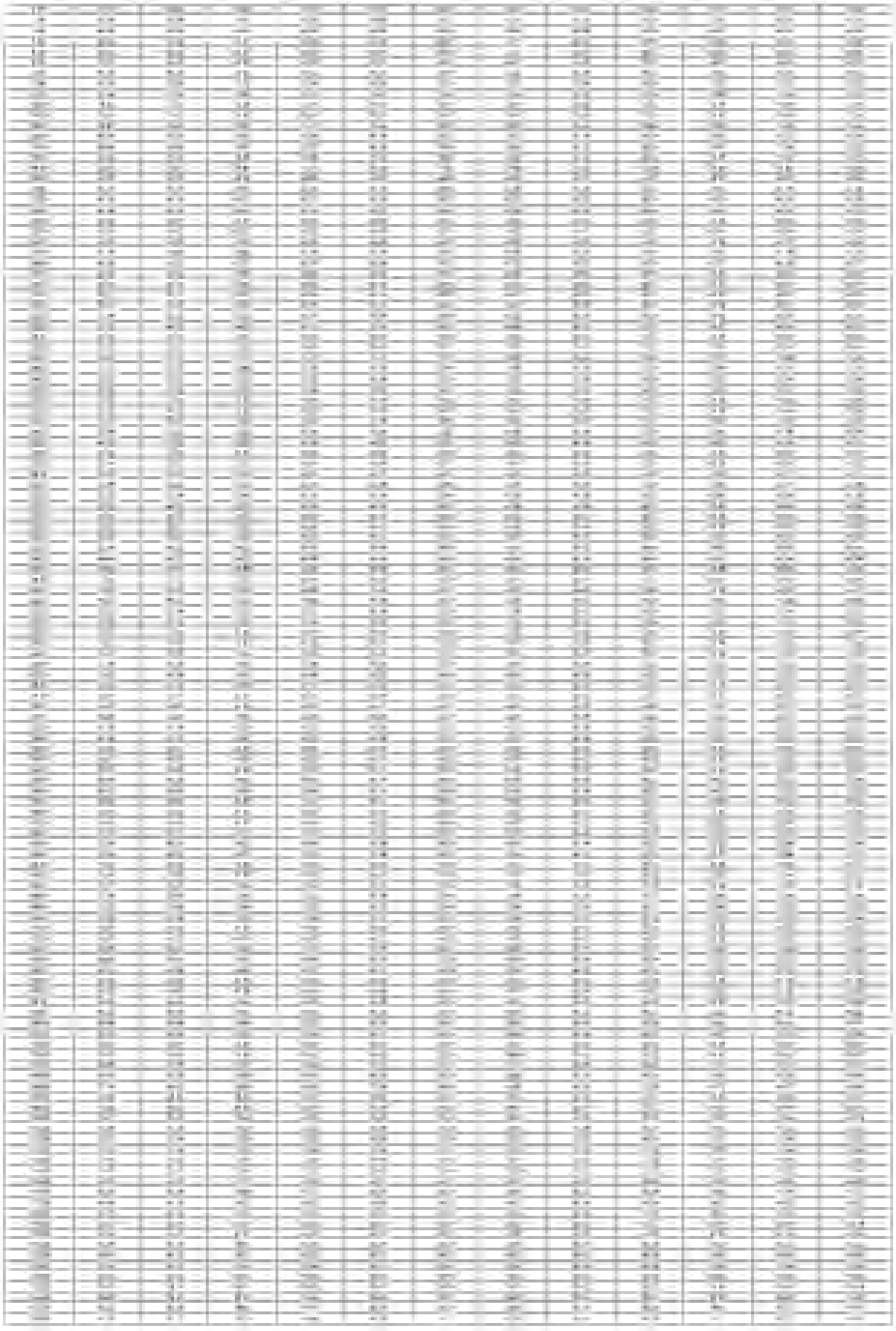

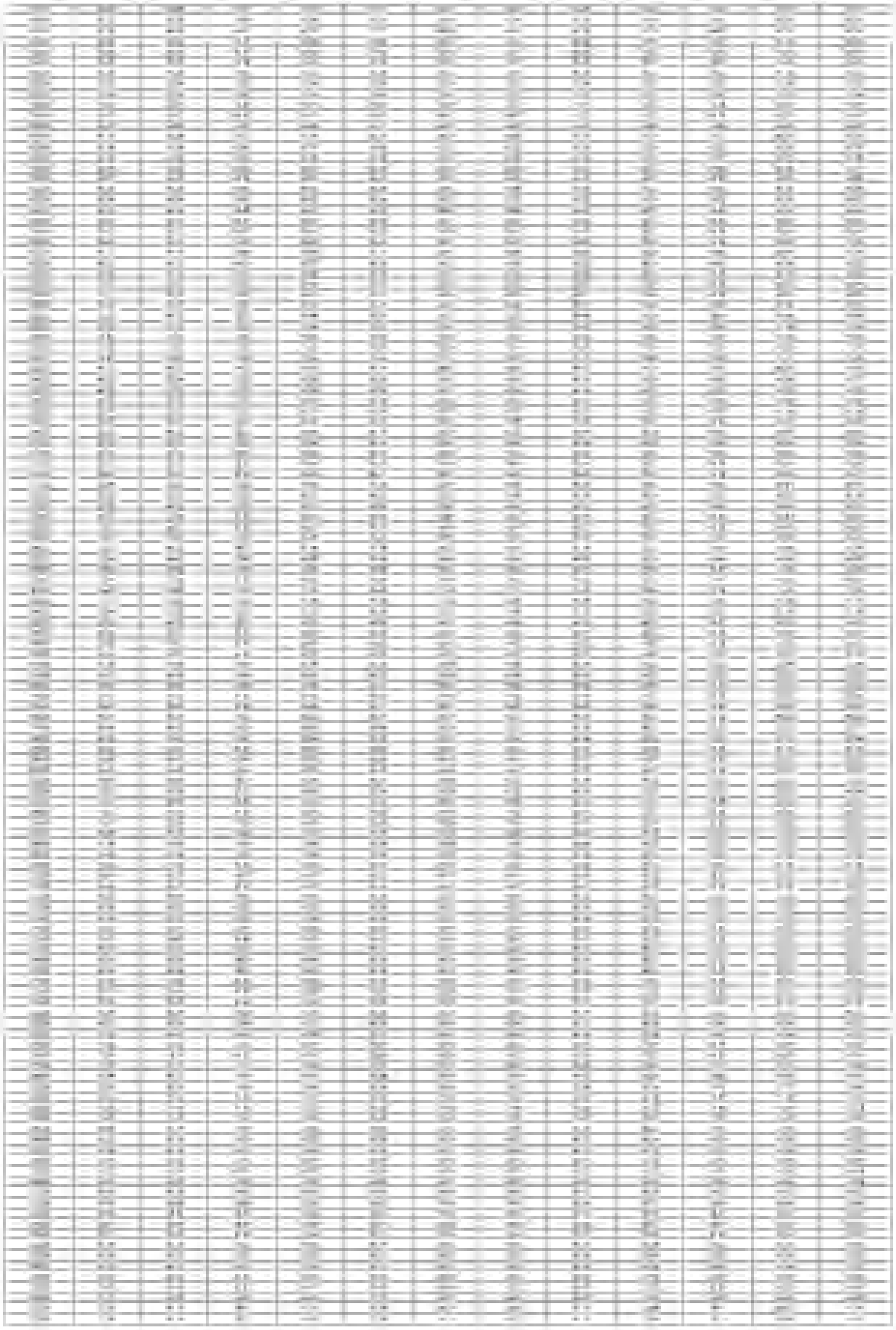

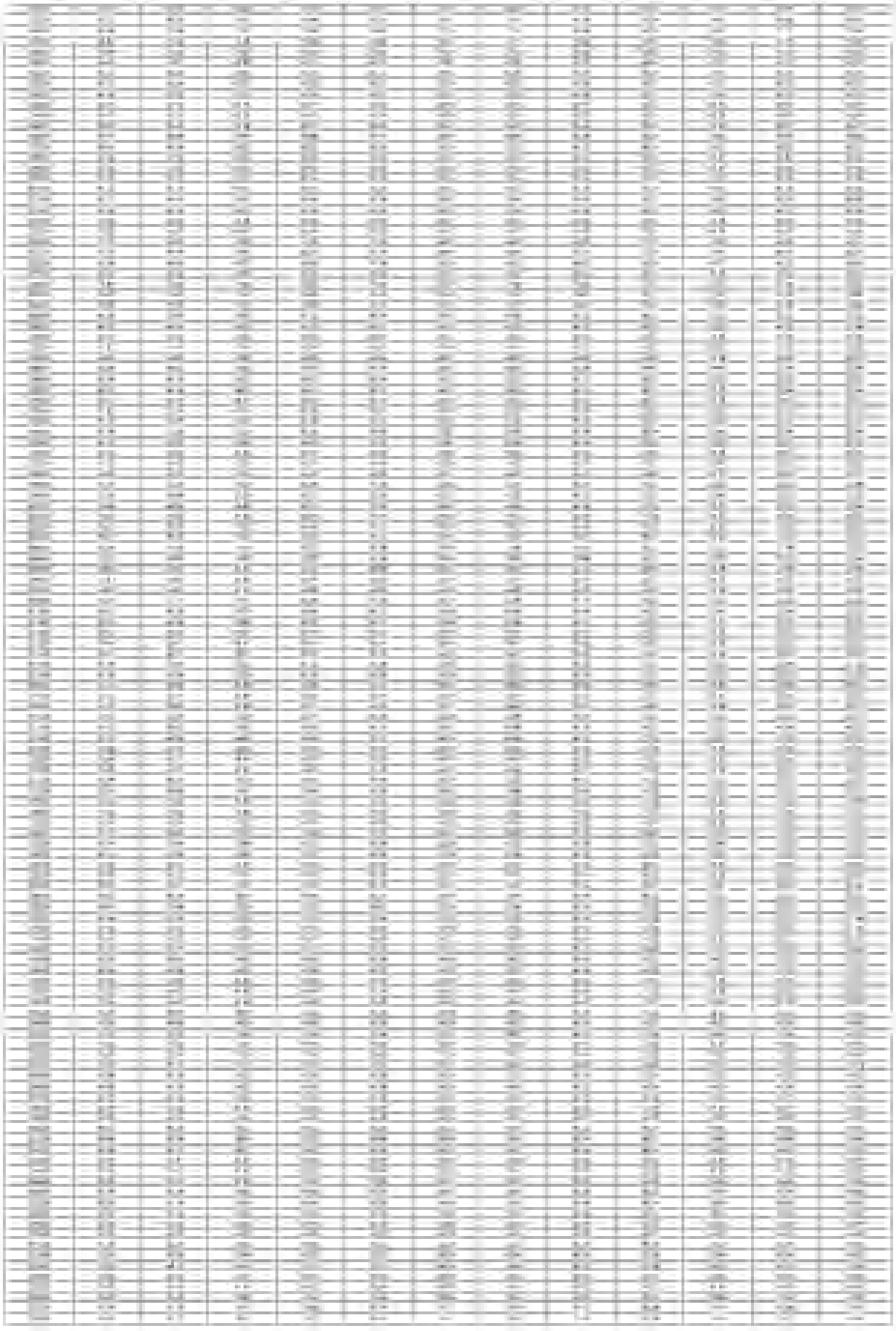

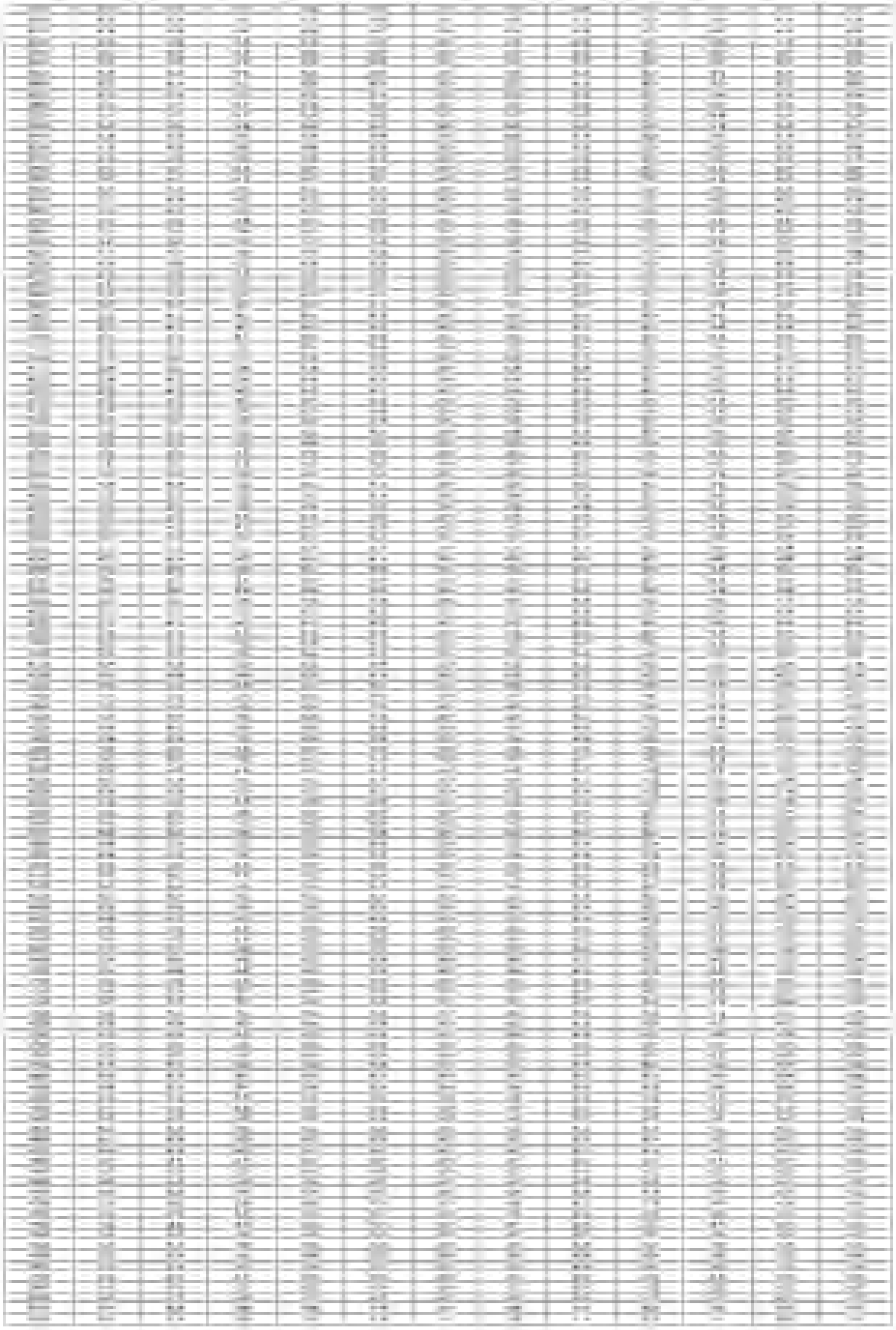

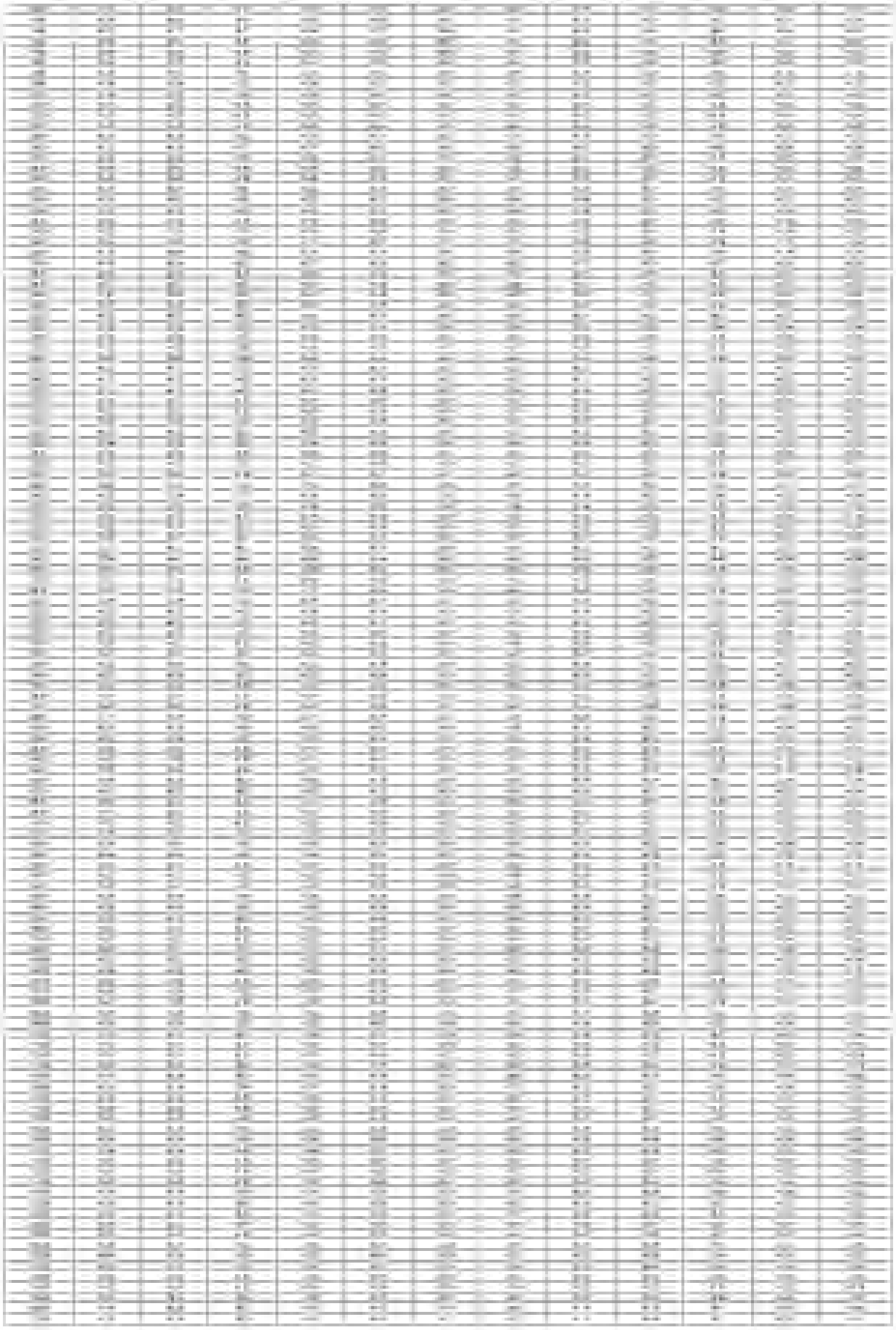

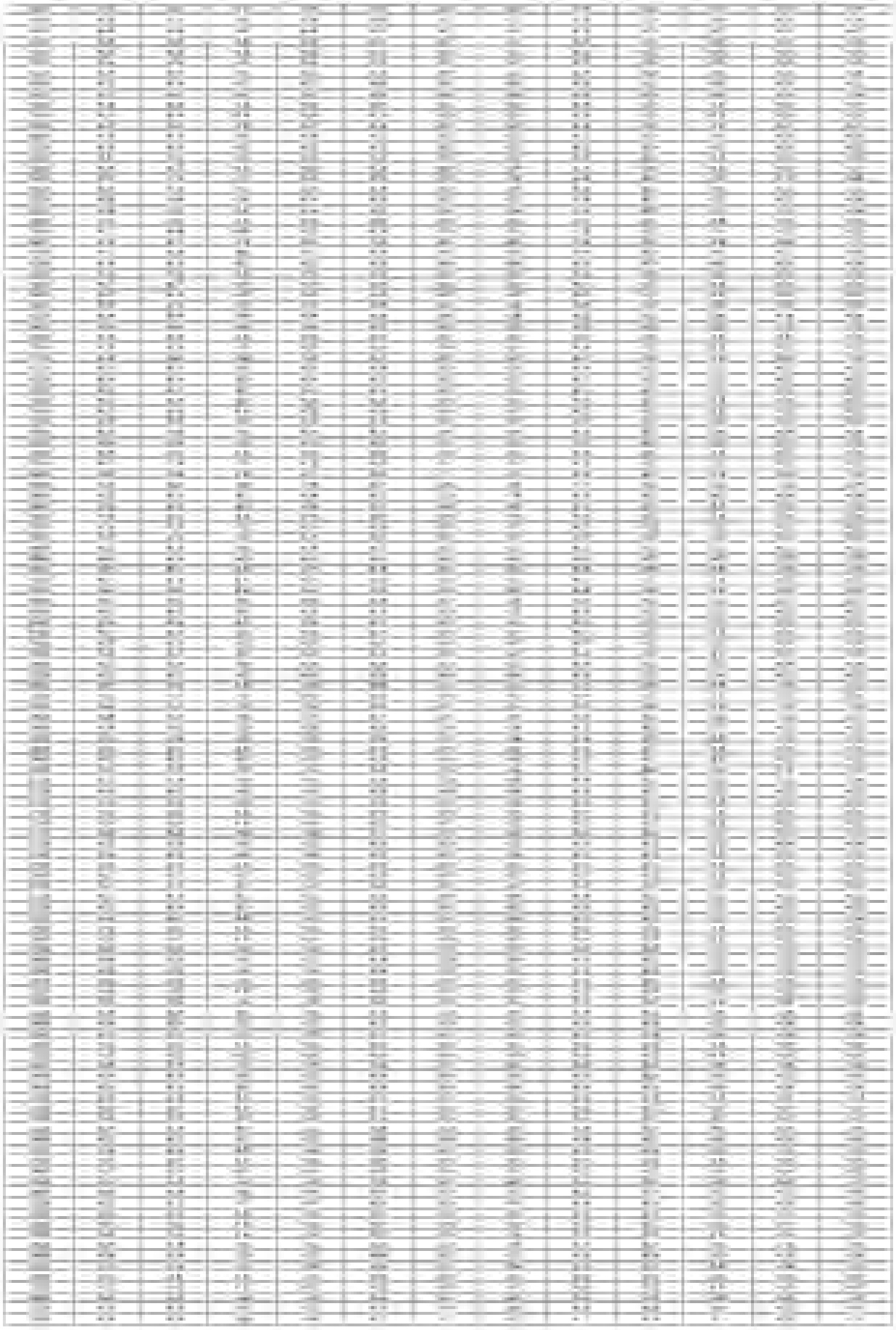

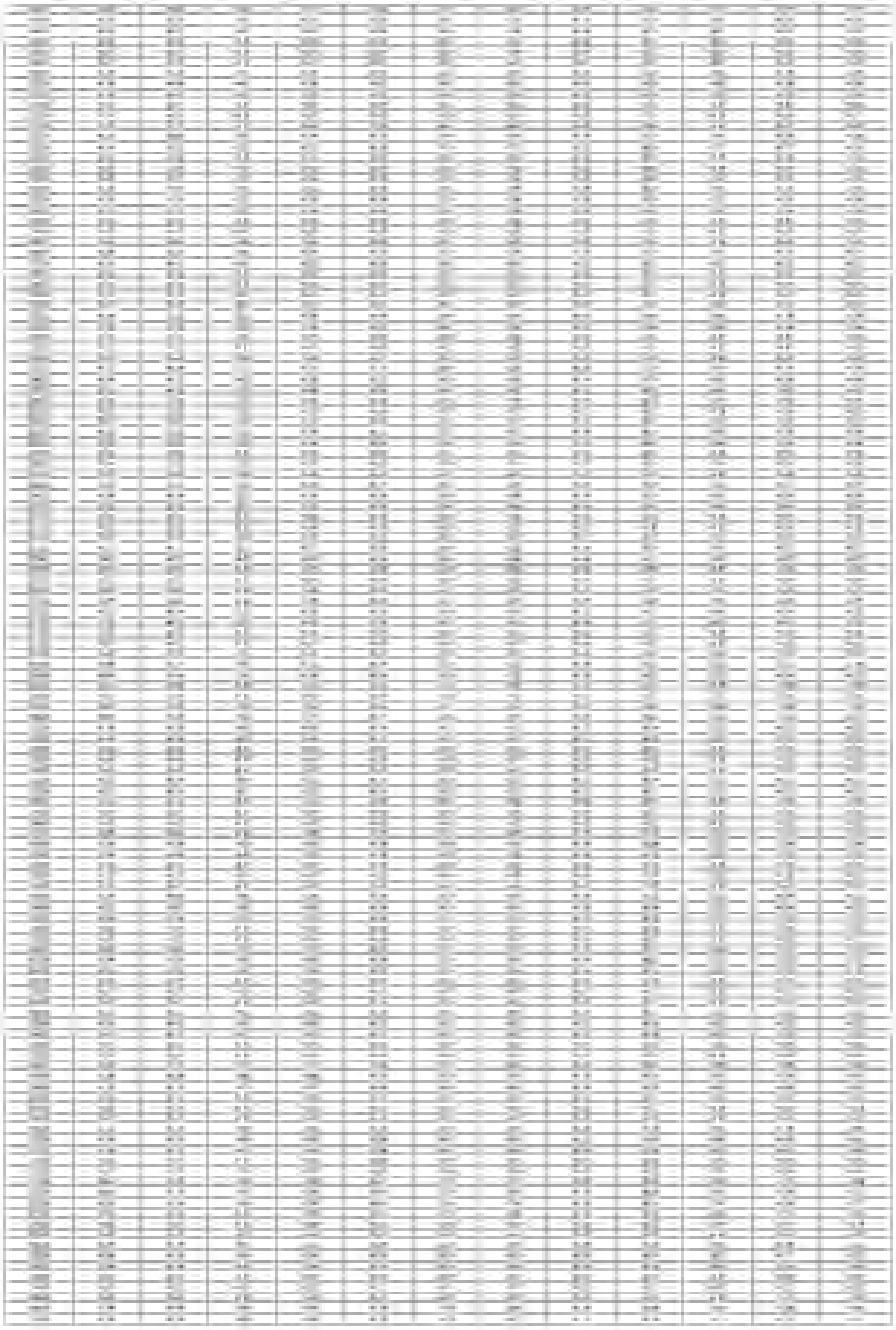

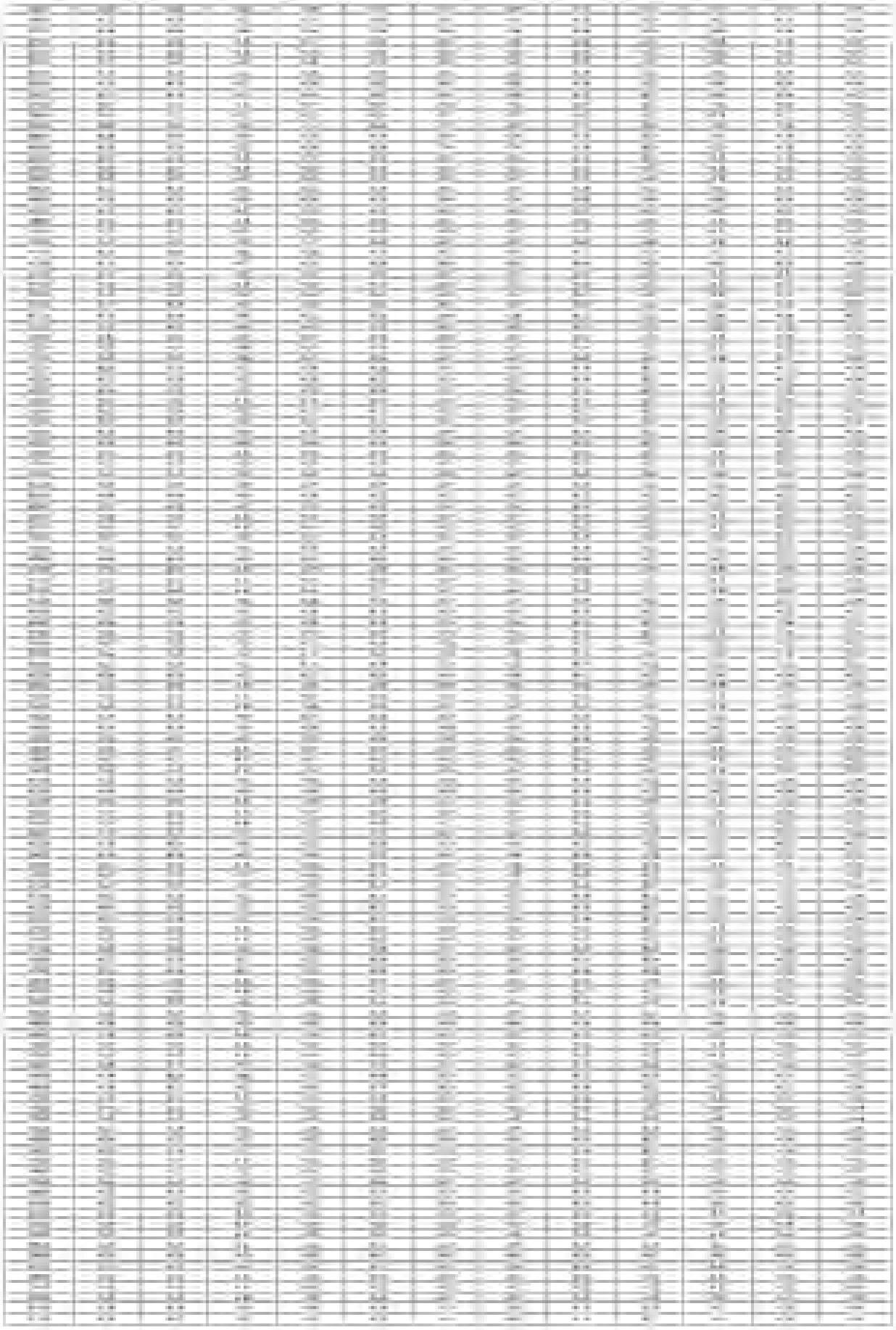

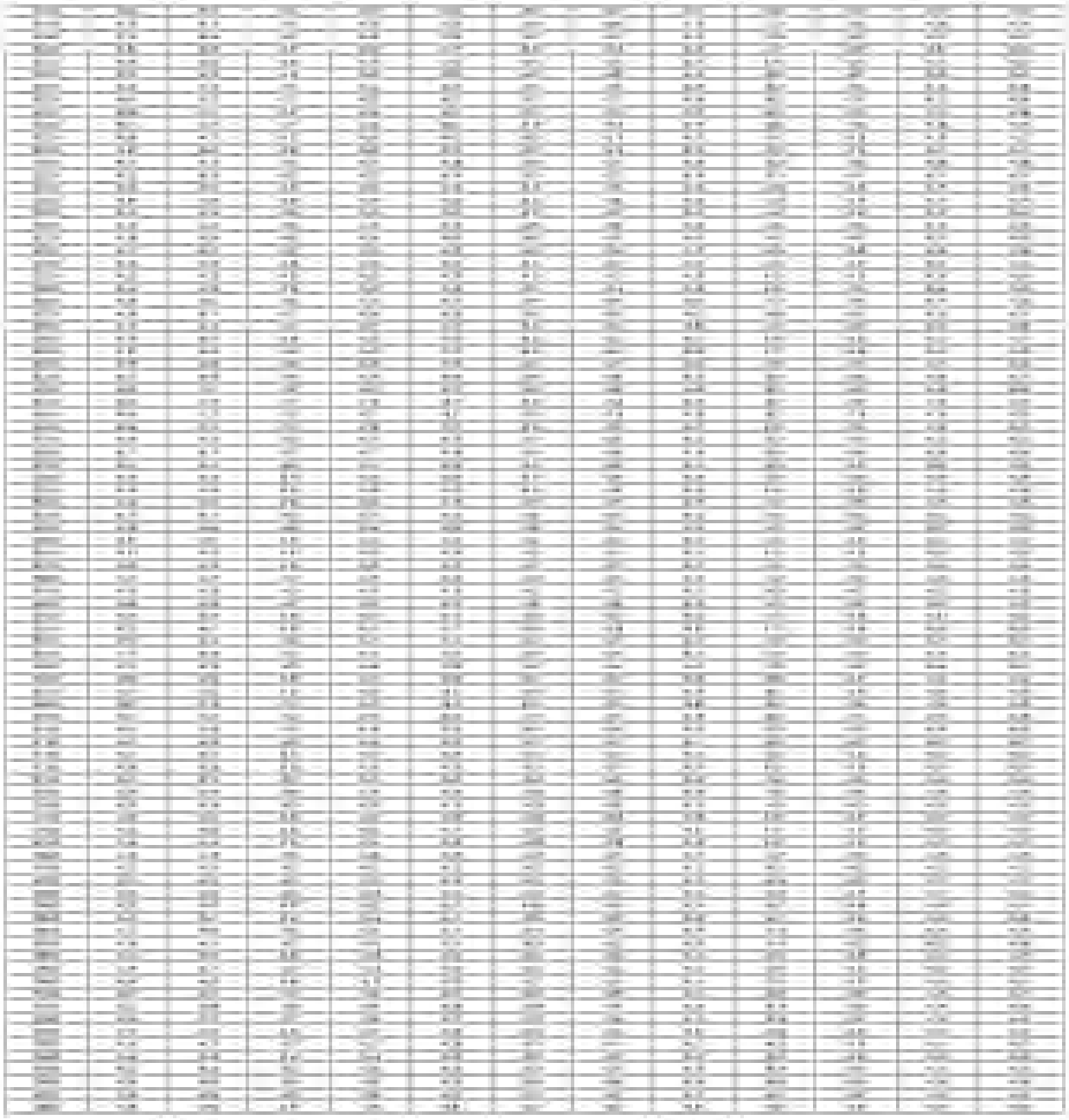

APPENDIX D – REFERENCES

1. NFPA 70: National Electrical Code (NEC), 2020 Edition.
2. CYMCAP Software version 9.0

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HOBOKEN, NJ 07030

SHORT CIRCUIT STUDY
FOR
CHISME SOLAR – TX-PS-2701
8987 CR 268
BROWN AND MILLS COUNTY, TX
31.578332°, -98.834972°
SEPTEMBER 5, 2025

PRELIMINARY

Pure Power Engineering Project Number: 11055

Project Owner/EPC: Red River Clean Energy

Study commissioned by (Client): Langan

Revision History

Date	Revision Description	PM	ENG	CHK
09/05/2025	60% Preliminary Issuance	BA	CS	EL

PRELIMINARY

DISCLAIMER

The following report was prepared by Pure Power Engineering utilizing industry-accepted standards and practices and the proprietary methodologies and analysis tools of Pure Power Engineering. Data used in this study were acquired by Pure Power Engineering through onsite discovery, published information, equipment nameplates, manufacturer ratings, testing, analysis, information provided by others, or other means. Pure Power Engineering assumes no responsibility for inaccuracies in data provided by others.

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PRELIMINARY

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Appendix A – Equipment Data

Appendix B – Short Circuit Single Line Diagrams

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Appendix D – MV Cable Withstand Calculation

Appendix E – Utility Contribution

1 INTRODUCTION

1.1 SUMMARY

The results of the short circuit analysis indicate that the MV cable capacity is suitable for the installation. The maximum 3PH fault current at the MV terminals of the PCS equipment of the inverters in the system is less than the rating of the PCS equipment, therefore all inverters are acceptable for use.

The Project is a 176.00 MWac/ 215.47 MWdc with a 147.00 MWac point of interconnection (POI) fixed tilt solar photovoltaic generating facility. The facility consists of the following equipment:

Equipment	Make	Model	Type	Quantity
Module 1	LONGi Solar	Hi-MO 5 / LR5-72HBD-545M	Bifacial	89,545
Module 2	LONGi Solar	Hi-MO 5 / LR5-72HBD-560M	Bifacial	322,833
Module 3	LONGi Solar	Hi-MO 5 / LR5-72HBD-555M	Bifacial	19,602
Inverter	Sungrow	SG4400UD-MV	Central	40

Table 1.1

The facility utilizes a 34.5 kV collector system with direct buried medium voltage (MV) feeders. The medium voltage transformers for each PCS are connected to the high-voltage substation via six 34.5 kV underground distribution circuits. The distribution circuits are connected to the high-voltage substation via six 35 kV circuit breakers.

Applicable electrical code: National Electrical Code (NEC) 2020 Edition.

1.2 BACKGROUND AND SCOPE

The scope of this study is to identify the maximum available fault currents throughout the facility. This includes medium voltage cables, major electrical equipment, auxiliary systems*, and low voltage inverter terminals. This study along with the Cable Ampacity study identify the minimum required MV cable specifications.

The results of this study are used to ensure equipment has been selected to withstand the calculated fault currents and to ensure that the MV cable phase and concentric neutral conductors can withstand these currents. Additionally, these results are correlated with the thermal and ampacity study.

*Auxiliary or other equipment included within a skid or other assembly provided by others (ie Power Conversion Skid, PCS), is excluded from the scope of this study. Ratings for the equipment shall be provided by the manufacturer of the assembly or integrator and compared to the results of this study.

2 METHODOLOGY

This section discusses the inputs required to model the system, the source of the inputs, and how the inputs impact the results. The information in this section is for descriptive purposes only and does not reflect the inputs to the project in this report. Refer to Section 3 for details specific to this project.

2.1 SOFTWARE

The system was modeled in Etap version 24 by Operation Technology, Inc.

2.2 UTILITY FAULT CURRENT CONTRIBUTION

The basis of a short circuit study is the available fault current provided by the utility. This is usually given at the high voltage side of the substation at the utility point of common coupling (PCCC) and can be supplied by the utility or the substation engineer. It is modeled in Etap using the utility component.

2.3 HIGH-VOLTAGE SUBSTATION DESIGN

The HV substation design is by others however, key elements are included in the ETAP system model as the model needs to include all the electrical components up to the utility PCCC.

2.3.1 Fault Protection Clearing Time

The MV cable withstand calculation is based on the fault clearing time of the HV overcurrent protective devices in the substation. This data is provided by the HV substation design engineer. Increasing the fault clearing time will result in lower cable withstand equipments.

2.3.2 Main Power Transformer (MPT)

The substation MPT model is required for the short circuit study model. This data is provided by the HV substation design engineer.

2.3.3 Neutral Ground Reactor (NGR)

An NGR in the MPT neutral to ground bond may be recommended by this analysis or specified by the HV engineer for a project to reduce the ground fault current.

2.4 POWER CONVERSION SYSTEMS (PCS)

2.4.1 Inverter Short Circuit Contribution

The inverter short circuit contribution may be different for the equipment evaluation and for the cable withstand evaluation. The inverter short circuit currents are provided by the manufacturer. The time the inverter requires to reach steady-state short circuit current is typically much faster than the trip time of an OCPD.

The ground fault current contribution to the MV distribution by the inverters also depends on the PCS MV transformer winding and grounding configuration as some topologies do not pass ground fault current.

2.4.2 PCS Medium Voltage Transformer (GSU)

The PCS GSU wiring configuration will determine if it will source ground fault current. The following is a summation of the possible options:

The inverter can contribute to a three-line fault on the MV side with any winding configuration.

2.5 OVERHEAD DISTRIBUTION SYSTEM

If an overhead power distribution system is part of the project the circuits are included in the model to model the fault current flow in the system. The overhead conductors may or may not be evaluated for short circuit capacity depending on the scope of the study.

2.6 MV CABLE WITHSTAND RATING

To evaluate the MV cable withstand rating the following data is required:

- Available fault current to the MV conductor
- Phase conductor and concentric neutral (CN) conductor withstand ratings
- Fault clearing time
- Split factor of the fault current between the CN and trench ground conductor current paths. If trench ground conductor is not used
- Capacity allowance to allow for a future increase in the fault current

The MV cable manufacturer provides the withstand rating values for the phase and CN conductors based on the cable size, CN size, and the fault clearing time.

The split factor is the percentage of the fault current carried by the CN during a line to ground fault. The values typically used are as follows:

- Trench ground conductor absent – 100% of the fault current on the CN
- Trench ground conductor present – 70% of the fault current on the CN, 30% on the trench ground

The capacity factor is used to add a buffer to the fault current capacity of the MV cables in anticipation of future increases in the utility fault contribution. The utility fault contribution includes a 15% growth factor to account for future system upgrades. As a result, the minimum capacity factor applied is 100%.

Etap is used to calculate the three-phase fault and single line-to-ground fault currents at each MV cable in the system. The ratio of the MV cable withstand rating (both phase conductor and CN) to the fault current needs to be equal to or greater than the chosen capacity factor for the cable to pass.

2.7 EQUIPMENT SCCR

Etap can also compute the available fault current at the terminals of equipment in the project. If the SCCR or AIC rating of the equipment is known, then the equipment can be evaluated on a pass/fail basis.

3 STUDY MODEL

3.1 ENGINEERING DESIGN INPUT

The following engineering documents are used as the basis for the Etap model in this study.

Pure Power Engineering electrical design *2025 09 05 Chisme PV Electrical 60% dated 09/05/2025*

Quanta substation design: *Rilea Chisme Solar & Storage – TX PS 2701 345/34.5kV Substation* dated 12/11/2024 and 03/12/2025

Oncor short circuit study, titled *Chisme Solar & Storage Generation Interconnection Short Circuit Study – 24INR0393 & 24INR0881*, dated 02/28/2024

Note: the above referenced substation design represents the latest available version from the substation engineer, however that does not imply that the contents of the report reflect the most current design

3.2 UTILITY CONTRIBUTION

Per information provided by the utility, the following utility contribution information is used at the 345 kV point of interconnection:

- Service voltage: 345 kV
- 3 Phase short-circuit current: 12,795.1 A
- 1 Phase short-circuit current: 9,191.7 A

A growth factor of 15% is applied, resulting in the following adjusted values:

- 3 Phase short-circuit current: 14,714.4 A
- 1 Phase short-circuit current: 10,570.5 A

The X/R ratio values are as follows:

- Positive-sequence impedance X/R: 18.903
- Zero-sequence impedance X/R: 7.937

The utility contribution details shown in Appendix E.

3.3 HIGH VOLTAGE SUBSTATION DESIGN

3.3.1 Fault Protection Clearing Time

Per discussion with the substation engineer, a clearing time of 18 cycles has been assumed for this analysis. Final coordination is pending and subject to confirmation.

3.3.2 Main Power Transformer

Per the HV substation one-line diagram, there will be two 120/160/200 MVA MPTs designated as 'T1' and 'T2'.

Per information provided by the transformer manufacturer, the MPTs are modeled as shown in Figures 3.3.2-1, 3.3.2-2, and 3.3.2-3. Both MPTs are modeled the same.

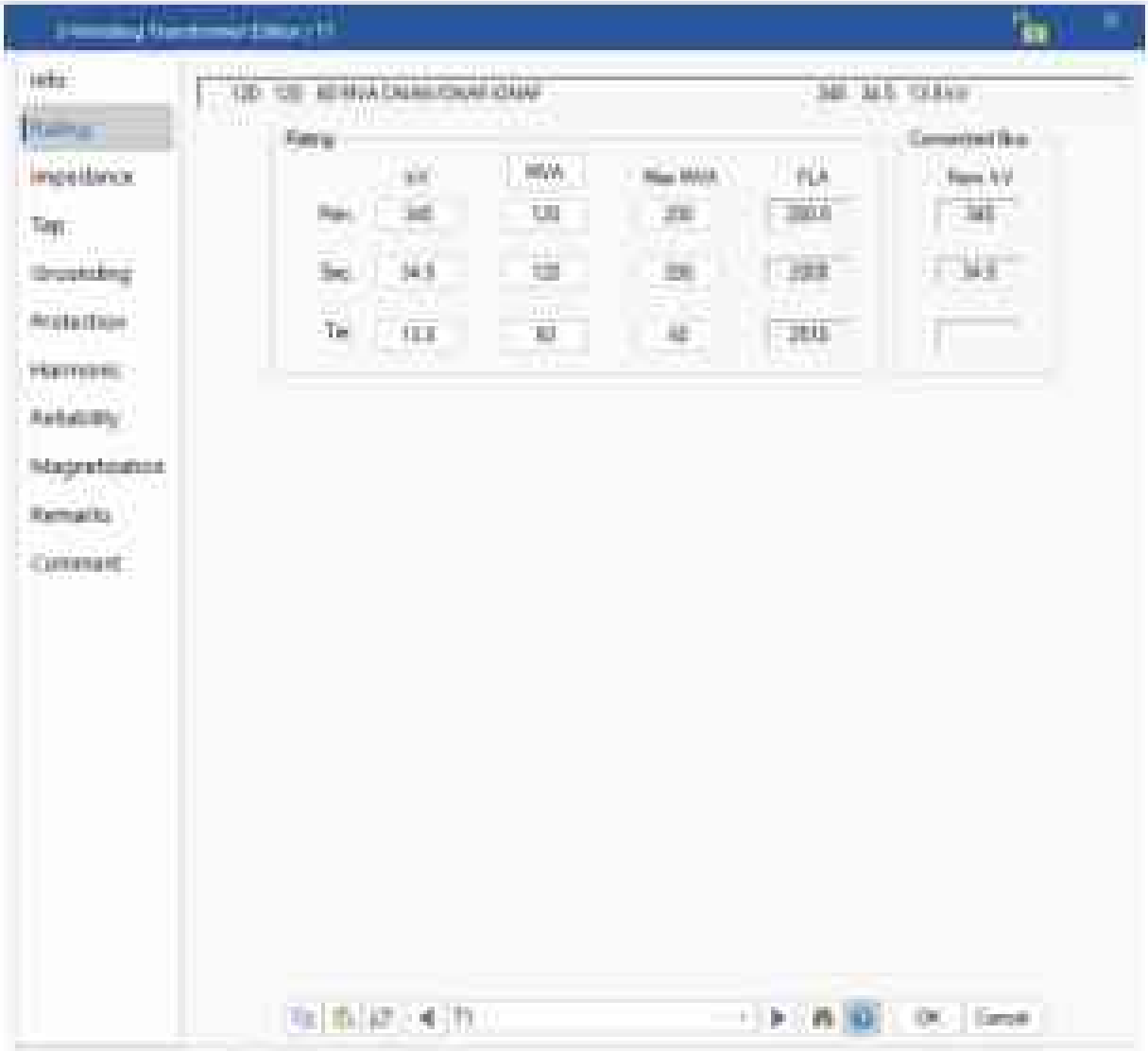

Figure 3.2.2-1: MPT Rating

PRL

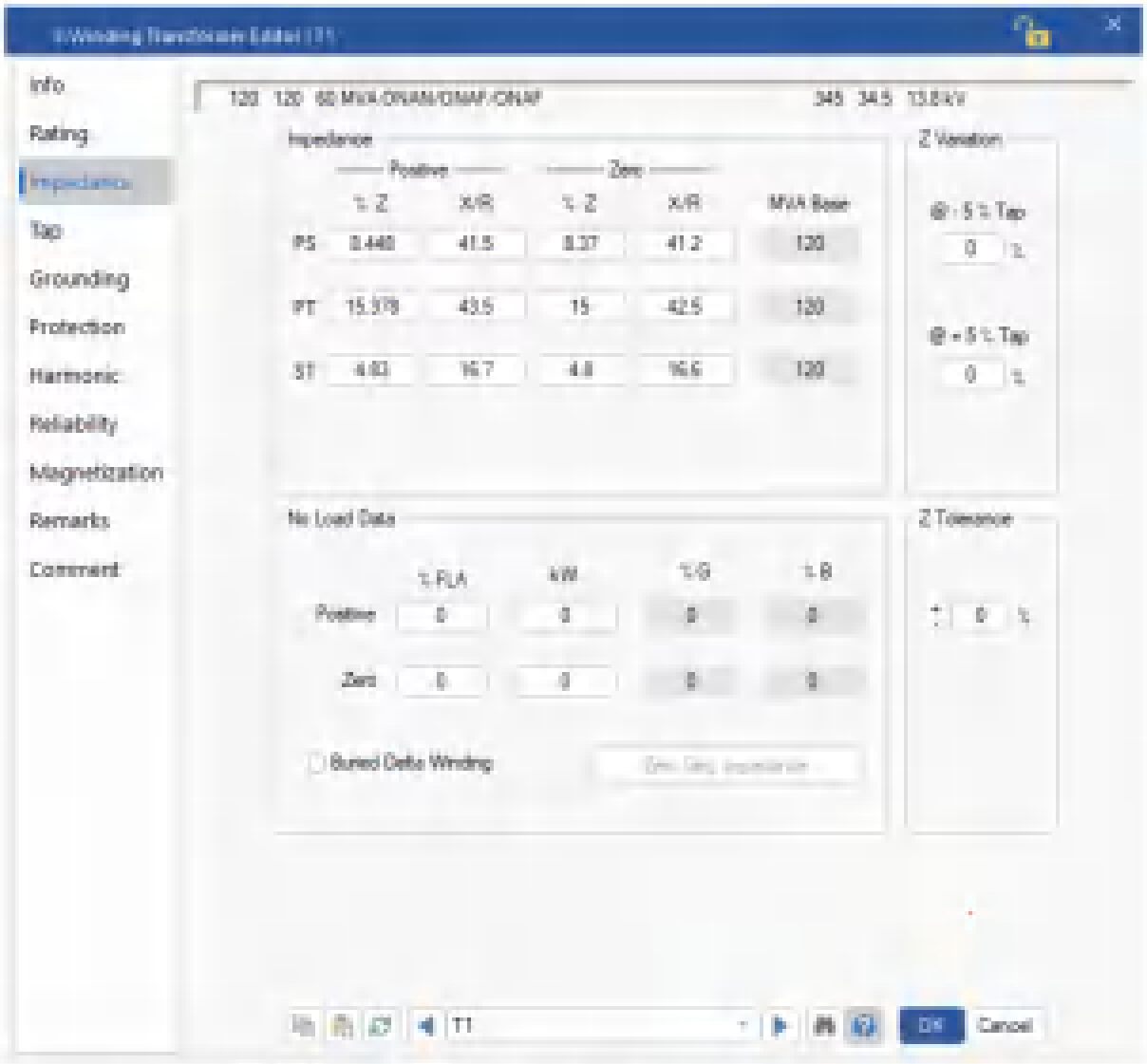

Figure 3.2.2-2: MPT Impedance

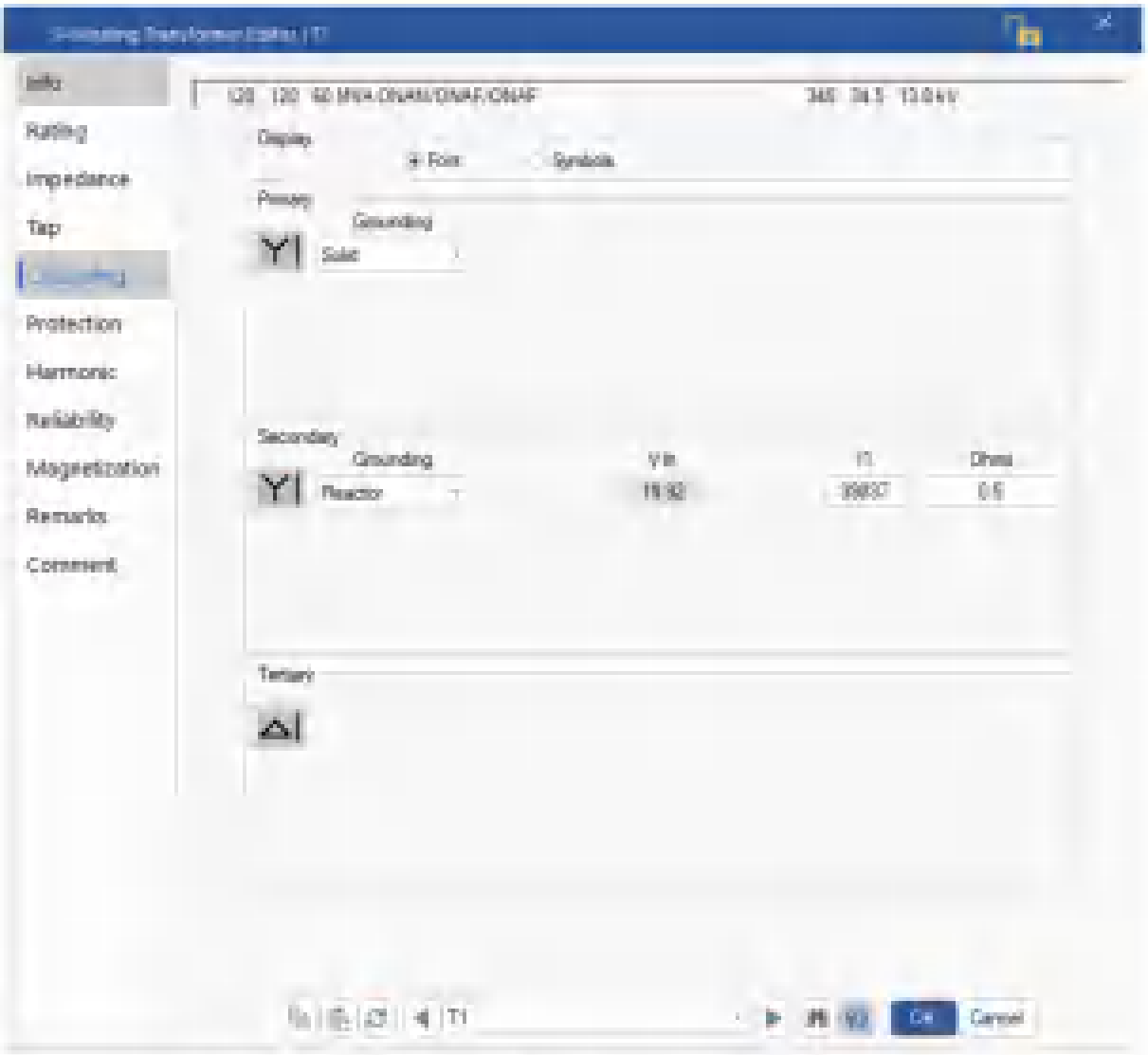

Figure 3.2.2-3: MPT Grounding with NGR

As per the Qualus document titled *34.5 kV Neutral Grounding Reactor Technical Specification 24144-01-ES-NGR*, dated 04/11/2025, a 0.5-ohm NGR is to be installed at each MPT. Therefore, NGRs have been modeled in the system as shown in Figure 3.2.2-3 above. The document also notes that the ratings are to be confirmed. Final coordination is pending and subject to confirmation.

3.4 POWER CONVERSION SYSTEMS

3.4.1 Inverter Short Circuit Contribution

The steady-state fault contribution is used for the cable withstand evaluation, while the peak short-circuit contribution is used for the equipment evaluation. The inverter short-circuit contribution values are based on the *Modeling of SUNGROW SG4400UD PV Inverter for Short Circuit Studies in Aspen OneLiner™* document.

The inverter's three-phase steady-state short-circuit current is approximately 1.06 per unit. The inverter reaches this steady-state fault current in 70 ms. Per PCS, the total modeled short-circuit current input is 4,175 A. This value is used for the inverter cable withstand evaluation, as shown in Figure 3.3.1-1.

The inverter's peak short-circuit current is approximately 2.20 per unit, resulting in a total of approximately 8,665 A for the PCS. This value is used for the inverter equipment evaluation, as shown in Figure 3.3.1-2.

The inverter short circuit modeling document is in Appendix A.

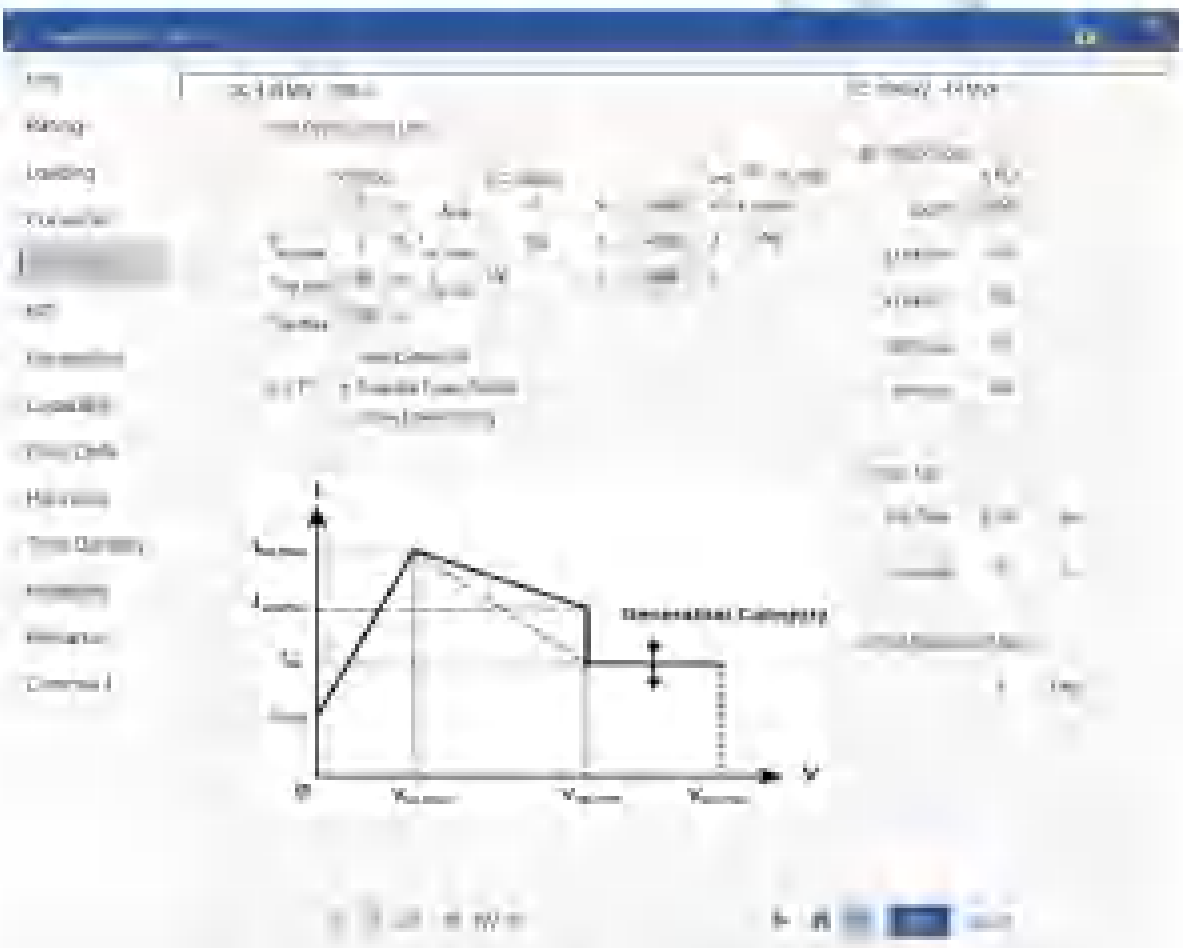

Figure 3.3.1-1: Inverter Short Circuit Model, Steady State

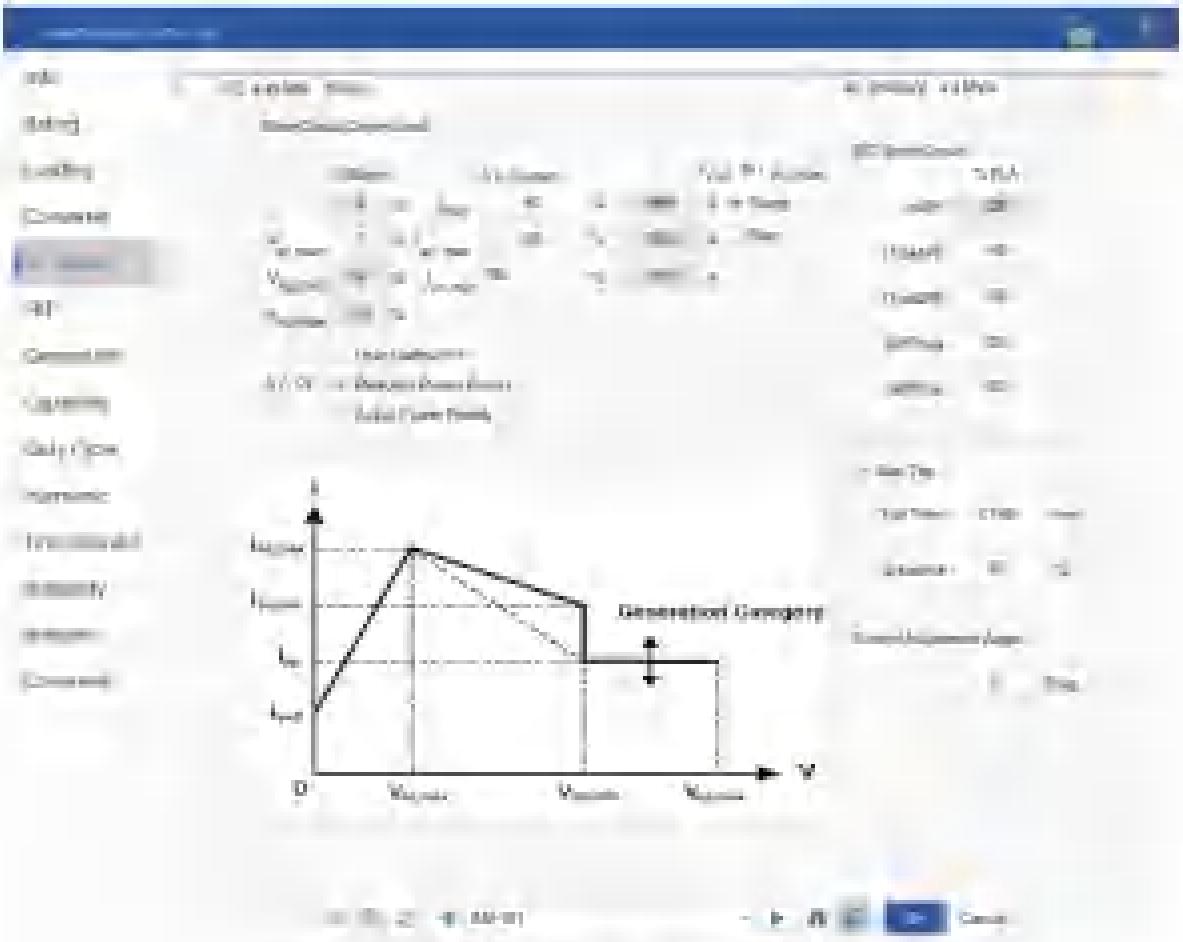

Figure 3.3.1-2: Inverter Short Circuit Model, Peak

3.4.2 PCS Medium Voltage Transformer

The impedance data provided by the inverter manufacturer was used to model all PCS GSU transformers. The positive-sequence impedance was entered directly into the model. While values are also entered for zero-sequence impedance, the transformers are configured as delta-ungrounded wye in Etap, as shown in the Impedance and Grounding tabs (Figures 3.3.2-1 and 3.3.2-2, respectively). For ungrounded transformers, the zero-sequence impedance is considered infinite. As a result, Etap blocks any data entered in the zero-sequence fields, effectively treating the zero-sequence impedance as infinite. This modeling approach is consistent with the configuration specified in the Grounding tab

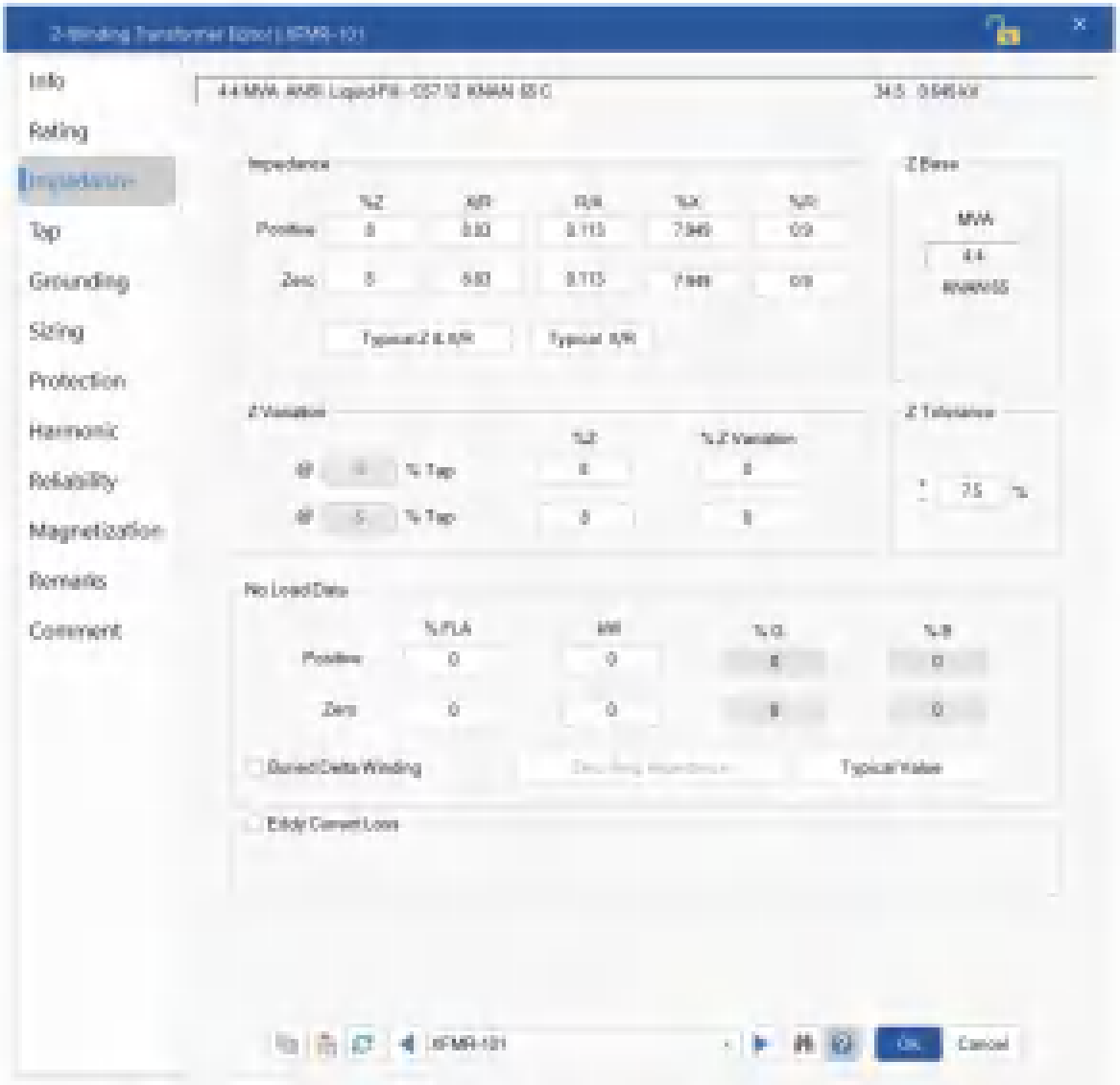

Figure 3.3.2-1: GSU Impedance

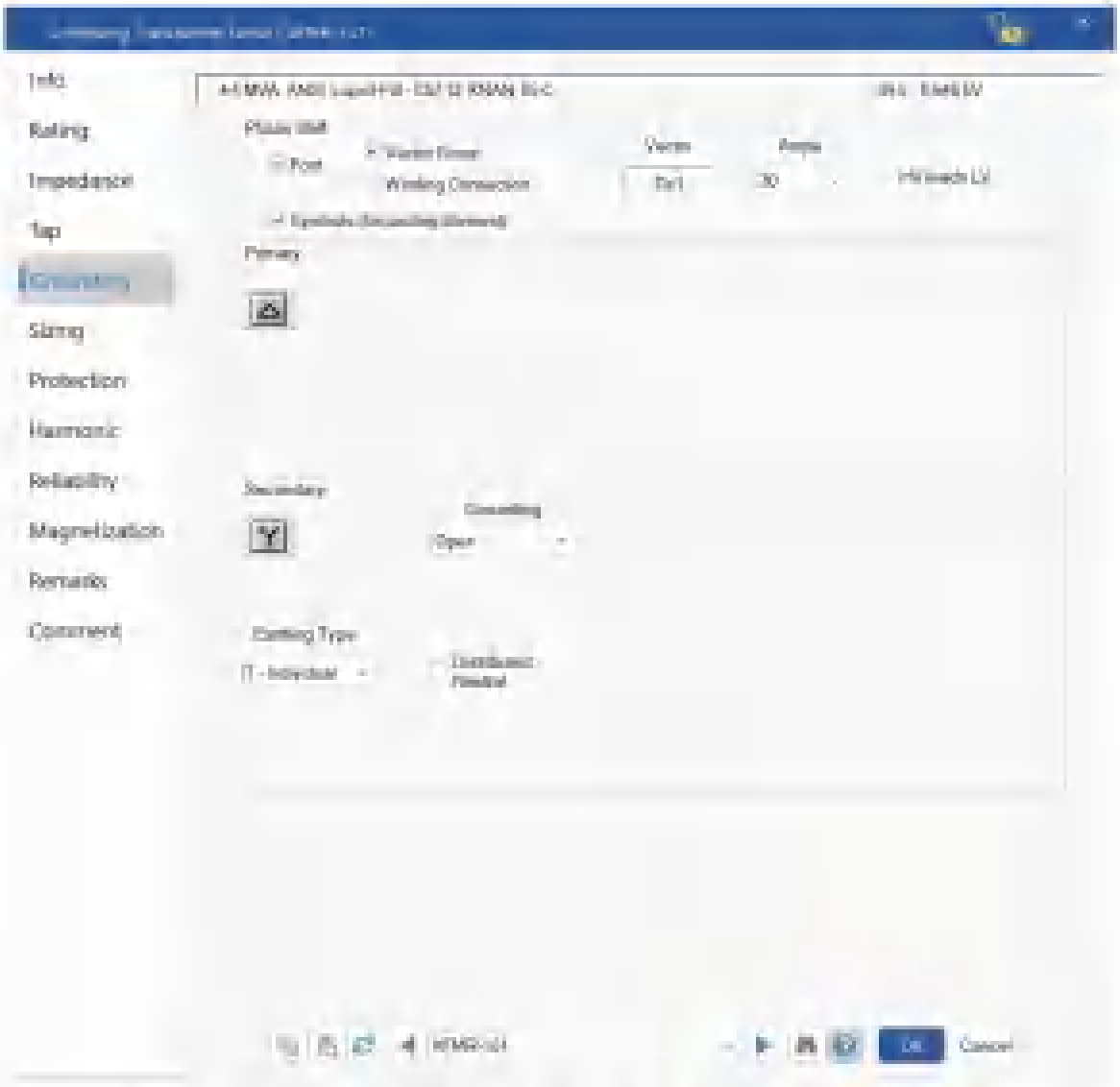

Figure 3.3.2-2: GSU Grounding

3.5 MV CABLE

The MV cable withstand data is provided by the manufacturer and shown in Appendix A. Since the L-G fault current values are in excess of the CN withstand ratings for more than half of the feeders, a trench ground is required.

3.6 EQUIPMENT SCCR

The PCS SCCR data is provided by the manufacturer and shown in Appendix A. Specific data is not available at the time of this study and the following SCCR for the MV sectionalizer cabinets have been assumed to be 25 kA.

4 STUDY RESULTS AND CONCLUSIONS

4.1 MV CABLE WITHSTAND RATING EVALUATION

All the MV cables pass the validation in the study. The results for each MVSC and MV cable are shown in Appendix G.

The final determination of the MV cable vendor for this project has not been made. For the time report, for the report WTEC cables will be utilized. Refer to Appendix A for the cable datasheets.

The worst-case short circuit currents for each cable photo and the corresponding are shown in Table 4.1-1 and 4.1-2.

Cable ID	Cable Size	Concentric Neutral (CN) Size	Total Fault Clearing Time (cycles)	Cable Withstand Rating (A)	3-PH Short Circuit Current (A)
MVF-MVSC-101	1350	1/0	18	109,108	33,425
MVF-MVSC-801	1000	1/0	16	80,887	28,558
MVF-PCS-201	500	1/3	16	48,443	22,088
MVF-PCS-401	4/0	2/3	18	33,176	16,876

Table 4.1-1: Worst-Case Cable 3-Phase Short-Circuit Currents

Cable ID	Cable Size	Concentric Neutral (CN) Size	Total Fault Clearing Time (cycles)	Cable Withstand Rating (A)	L-G Short Circuit Current (A)*
MVF-MVSC-101	1350	1/0	18	94,383	10,534
MVF-MVSC-801	1000	1/0	18	71,631	10,026
MVF-PCS-201	500	1/3	16	43,431	10,683
MVF-PCS-401	4/0	2/3	18	30,338	7,387

Table 4.1-2: Worst-Case Cable L-G Short-Circuit Currents

*L-G Short Circuit Current applies a 70/30 split factor per sections 2.6 and 3.5

4.2 EQUIPMENT SCCR AND AIC EVALUATION

The maximum [illegible] fault current during MV terminal in the PV system is 23,028 kA at 34.5 kV (MVSC-101) which is less than the 35 kA SCCR of both the PCS equipment and the assumed rating for the MV switchgear cabinet. As the maximum peak current is less than the rating provided by the manufacturer, the inverters are acceptable for use.

The maximum current peak current is due to the maximum allowable of 25 kA. The following items will have to be monitored to ensure the fault current at MVSC-101 does not exceed this limit.

- Final MV transformer data will be provided once the EPC has been awarded an EPC for review was available.
- Utility fault current: Per coordination a 15% growth factor is being utilized. Any future increase in fault current from the utility beyond this allowance should be communicated to the owner for evaluation throughout the life of the facility.

- Conductor installation length: Any deviation to the installed MV conductor lengths for the PV system as shown in the drawings shall be submitted to the engineer for review prior to installation.

4.3 CONCLUSION

This study shows that the equipment short circuit current ratings and the cable withstand ratings pass review in this study and are suitable for this project.

PRELIMINARY

APPENDIX A – EQUIPMENT DATA

PRELIMINARY

MPT DATA

Date: 4/1/2025
Project Name: Chisme Solar & Storage - TX-PS-2701
Project Number: PPE-11055
Client: Red River

Main Power Transformer Data

Transformer Name:	T1	
Cooling:	ONAN/ONAF/ONAF	
MVA Ratings:	120/160/200	MVA
H Winding - High Voltage:	345V Wye-G	
X Winding - Low Voltage:	34.5V Wye-G	
Y Winding - Tertiary:	13.8D	
Tertiary MVA Rating:	30	MVA
On Load Tap Changer:	+10% / -10%, 16 step	
H-X MVA Base:	200	MVA
H - X positive sequence impedance:	9.448	%
H - X positive sequence X/R value:	83.9	
H - X zero sequence impedance:	8.57	%
H - X zero sequence X/R value:	43.2	
H-X MVA Base:	200	MVA
H - Y positive sequence impedance:	15.378	%
H - Y positive sequence X/R value:	43.1	
H - Y zero sequence impedance:	15	%
H - Y zero sequence X/R value:	42.6	
Y MVA Base:	30	MVA
X - Y positive sequence impedance:	6.61	%
X - Y positive sequence X/R value:	19.7	
X - Y zero sequence impedance:	4.8	%
X - Y zero sequence X/R value:	16.8	

INVERTER GSU
TRRANSFORMER DATA

Date 4/1/2025 Project Name **Chisme Solar & Storage - TX-PS-2701** Project Number **PPE-11055** Client **Red River**

Inverter GSU Transformer Data		
Transformer Name:	TI-PV	
Cooling:	KNAN	
MVA Ratings:	4.4	**MVA**
H Winding - High Voltage:	34.5 kV Delta	
X Winding - Low Voltage:	.645kV Wye	
Tap Changer:	+5% / -5%, 5 step	
H-X MVA Base	4.4	**MVA**
H - X positive sequence impedance:	8	**%**
H - X positive sequence X/R value:	8.83	
H - X zero sequence impedance:	Infinity	**%**
H - X zero sequence X/R value:	Infinity	

MV CABLE DATASHEETS

WTEC
Energy Innovation

SHORT CIRCUIT PERFORMANCE

1250 KCMIL AL CABLE
345 MILS TR-XLPE (35KV 100% INSULATION LEVEL)
133X14 CONCENTRIC NEUTRAL
105PG XLPE JACKET (MV-105)

CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C:	105	95
Final Temp C:	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	5	8.3	15	24	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.0833	0.1417	0.2500	0.4000	1.0000
		Fault Current (A RMS)								
1250 KCmil	0.932	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9	43944.9
Neutral Size		Cycles								
		0.5	1	2	3	5	8.3	15	24	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.0833	0.1417	0.2500	0.4000	1.0000
		Fault Current (A RMS)								
133 (0.0414)		49110.0	49110.0	49110.0	49110.0	49110.0	49110.0	49110.0	49110.0	49110.0

REVISION	DATE	DESCRIPTION	SUBMITTED BY
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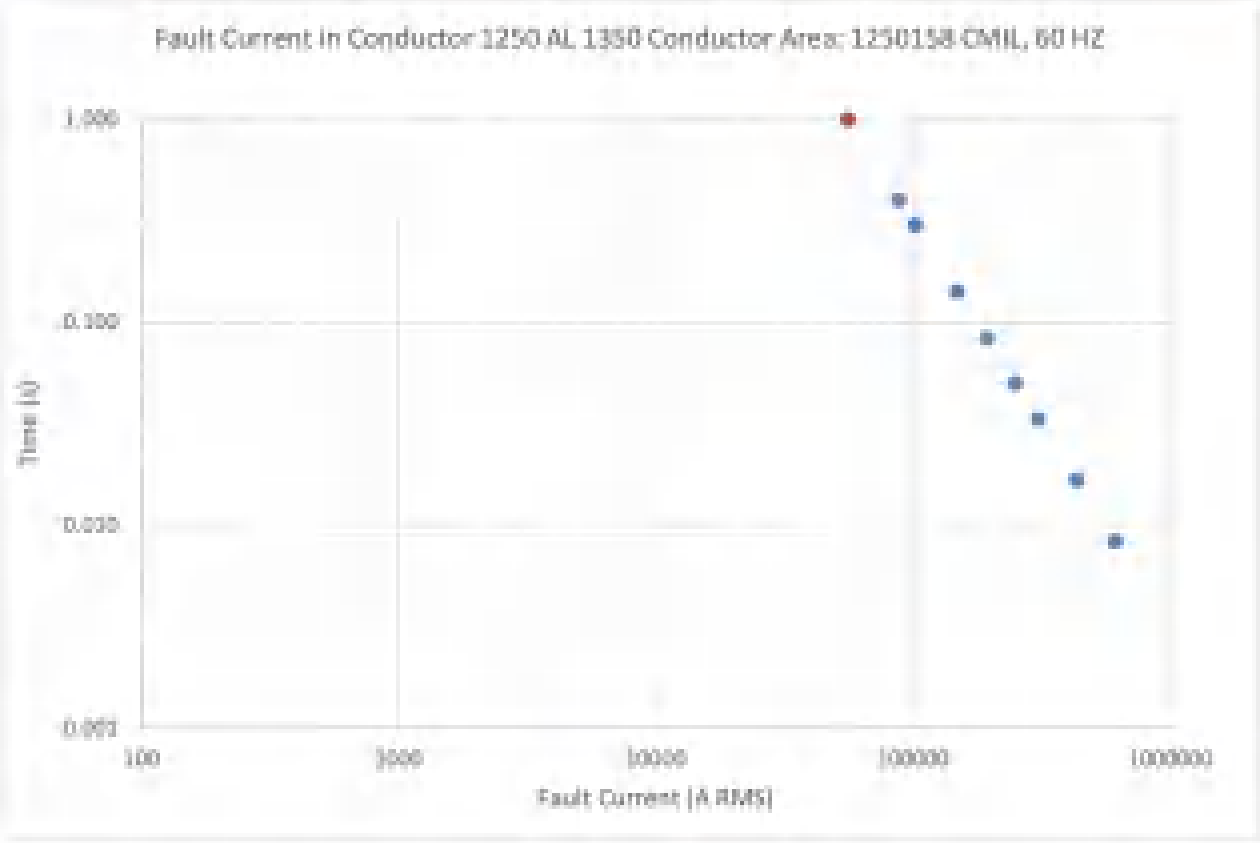

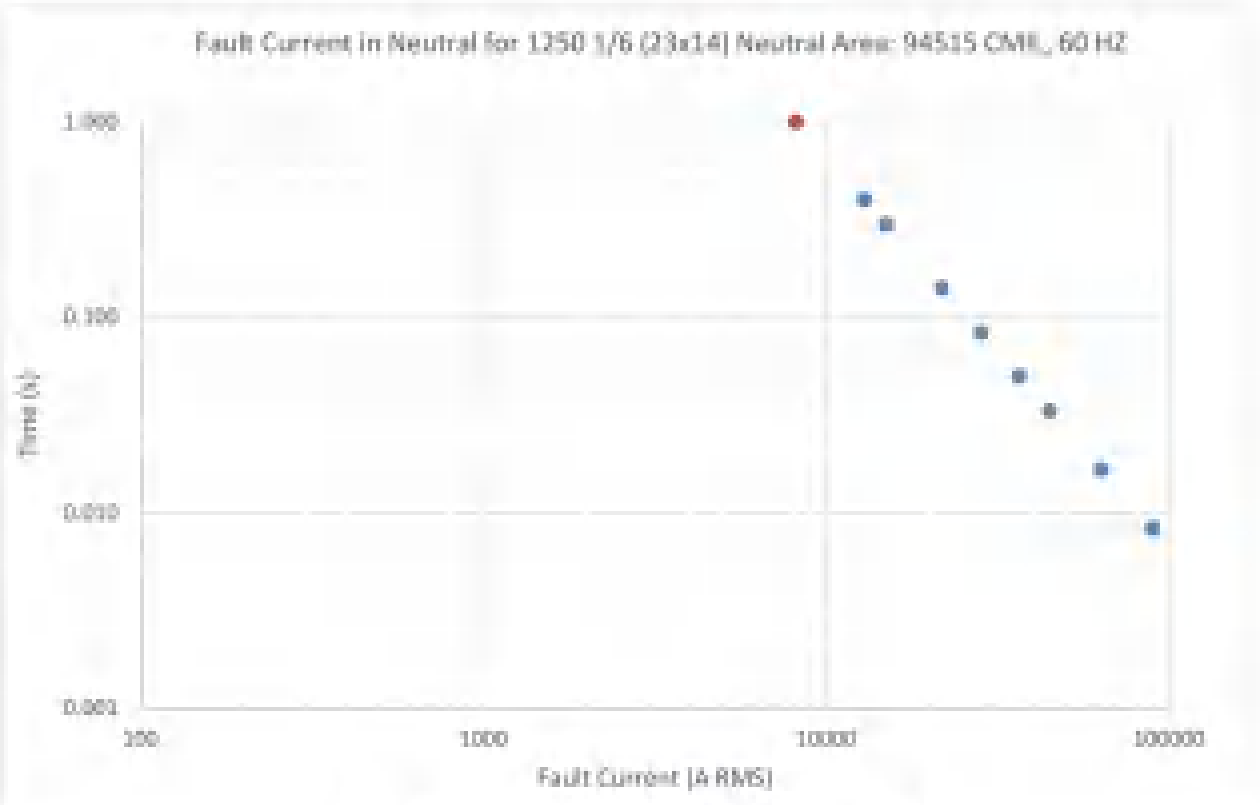

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A4	02/07/2022		JW

WTEC
Energy Innovation

SHORT CIRCUIT PERFORMANCE

1000 KCMIL AL CABLE
345 MILS TR-XLPE (35KV 100% INSULATION LEVEL)
18X14 CONCENTRIC NEUTRAL
105°C XLPE JACKET (MV-105)

CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C	105	95
Final Temp C	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
1000 KCMIL	0.785	465019	340373	248880	198131	140102	99065	80887	62654	44303
Neutral Size		Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
1/0 (19x4)	0.1855	135955	99544	72812	57980	40965	28944	23651	18299	12939

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2	08/09/2023		JW

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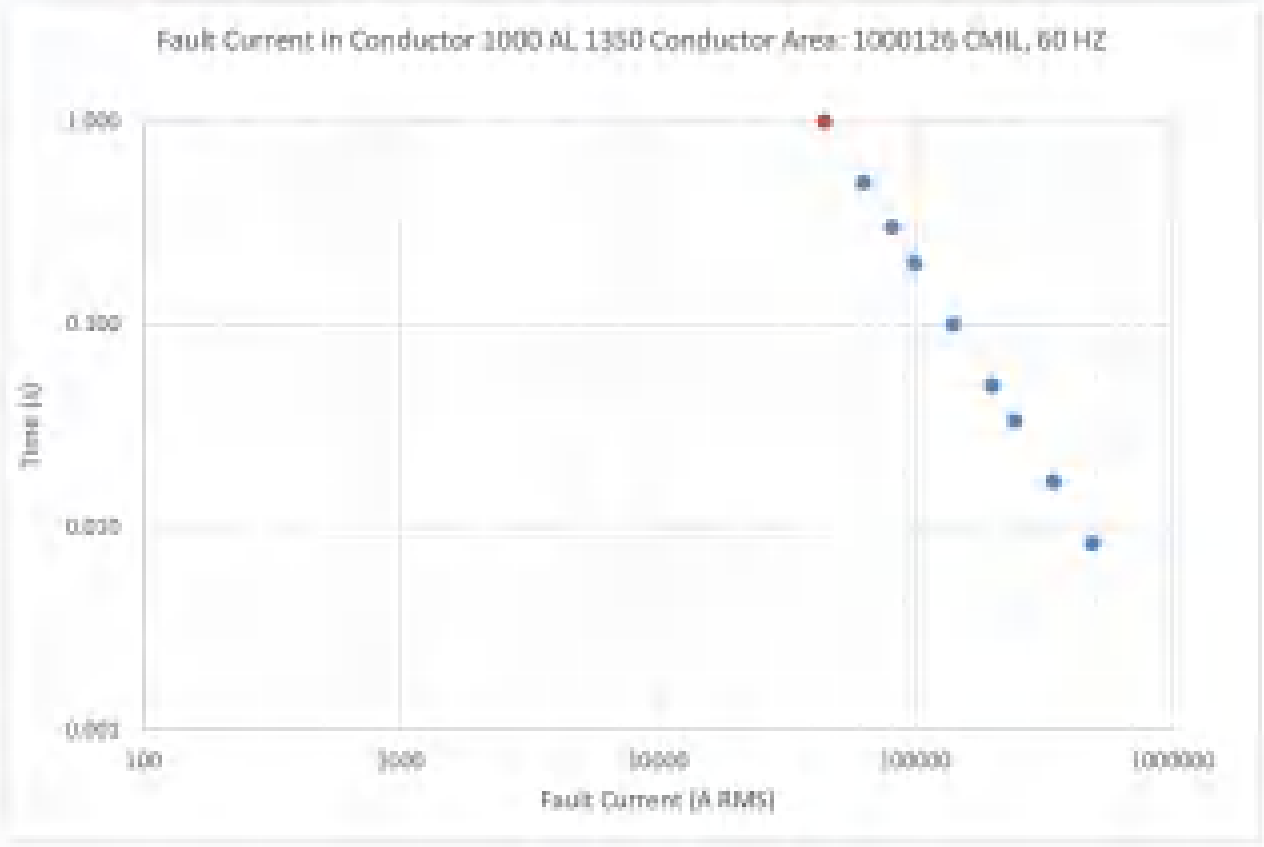

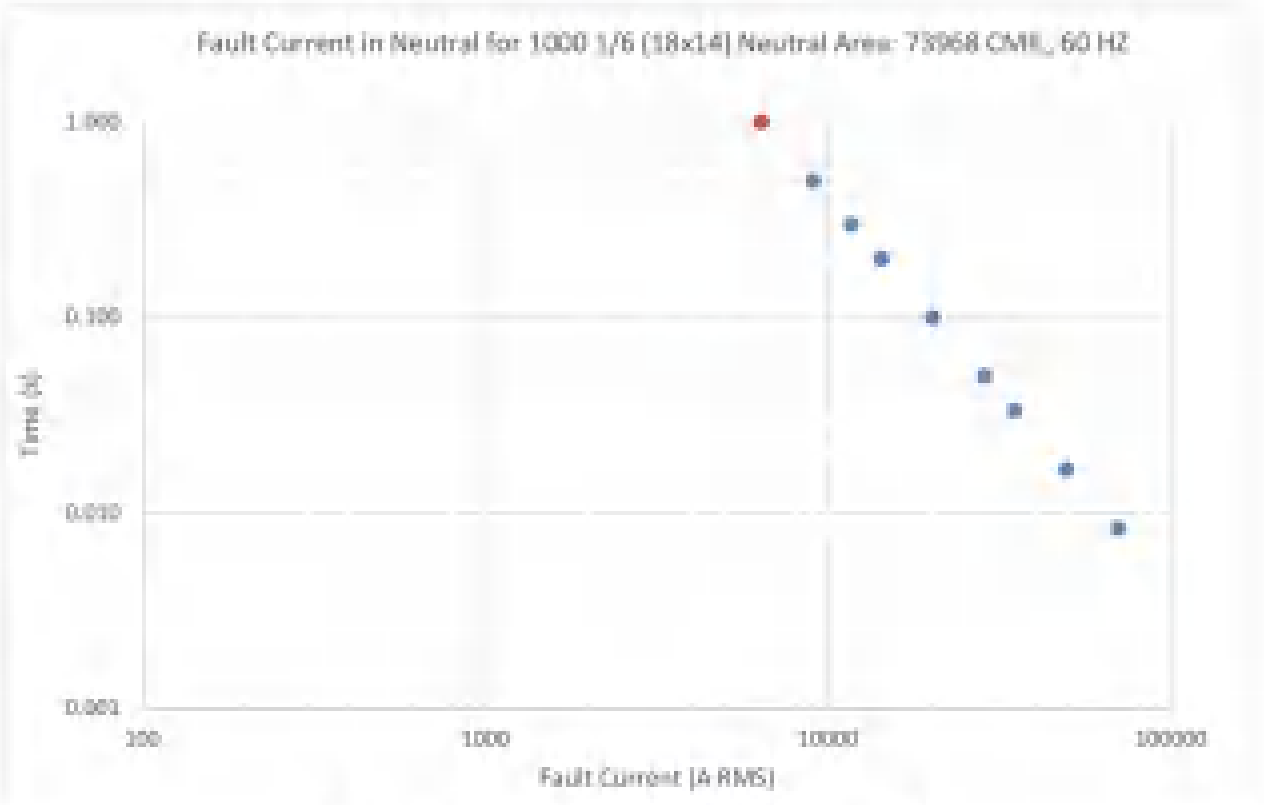

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WTEC
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SHORT CIRCUIT PERFORMANCE

500 KCMIL AL CABLE
345 MILS TR-XLPE (35KV, 100% INSULATION LEVEL)
18X14 CONCENTRIC NEUTRAL
105°C XLPE JACKET (MV-105)

CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C	105	95
Final Temp C	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
500 KCMIL	0.393	242640	171584	121320	99065	70104	49532	40443	31327	22152
Neutral Size		Cycles								
		0.5	1	2	3	6	12	18	30	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.1000	0.2000	0.3000	0.5000	1.0000
		Fault Current (A RMS)								
1/3 (18x14)	0.1553	109755	77604	54812	44801	31685	22394	18291	14170	10017

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2	08/09/2023		JW

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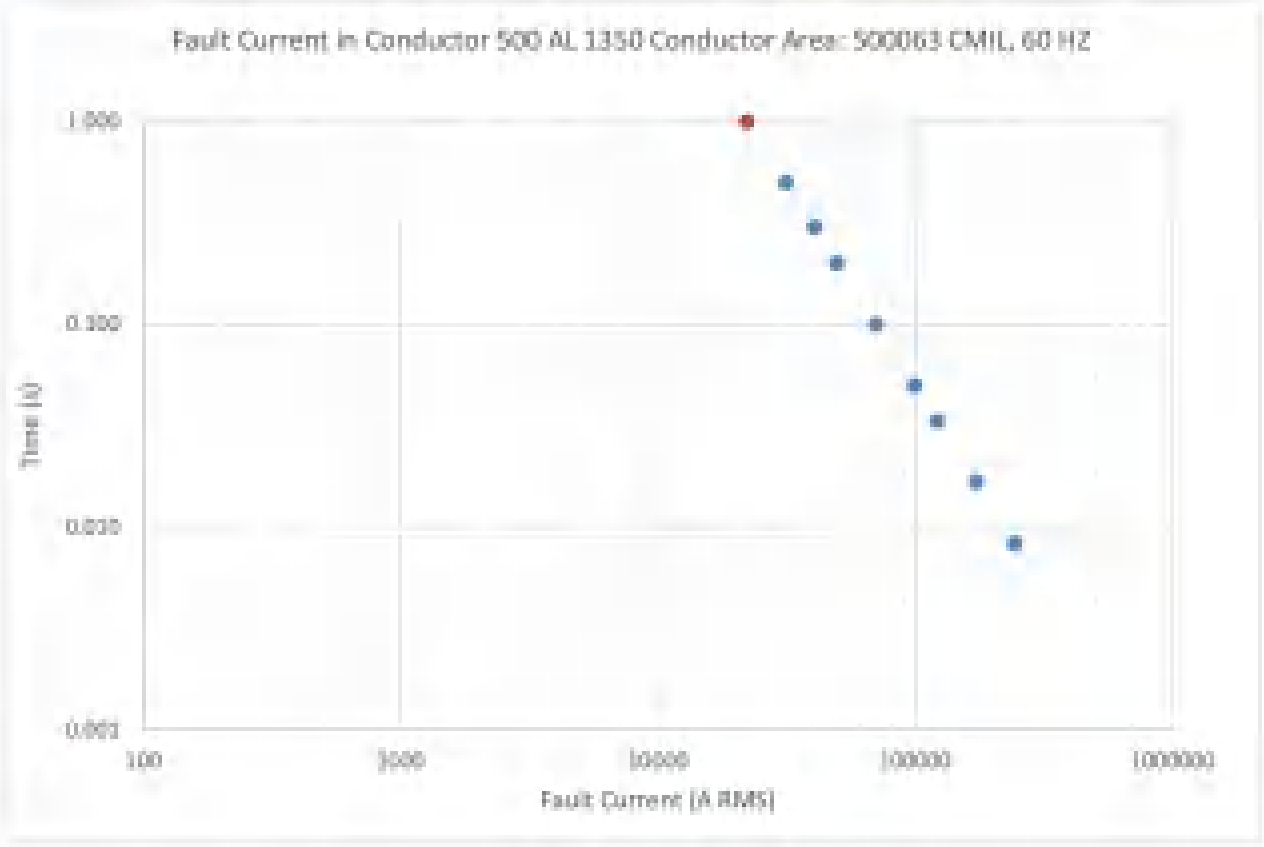

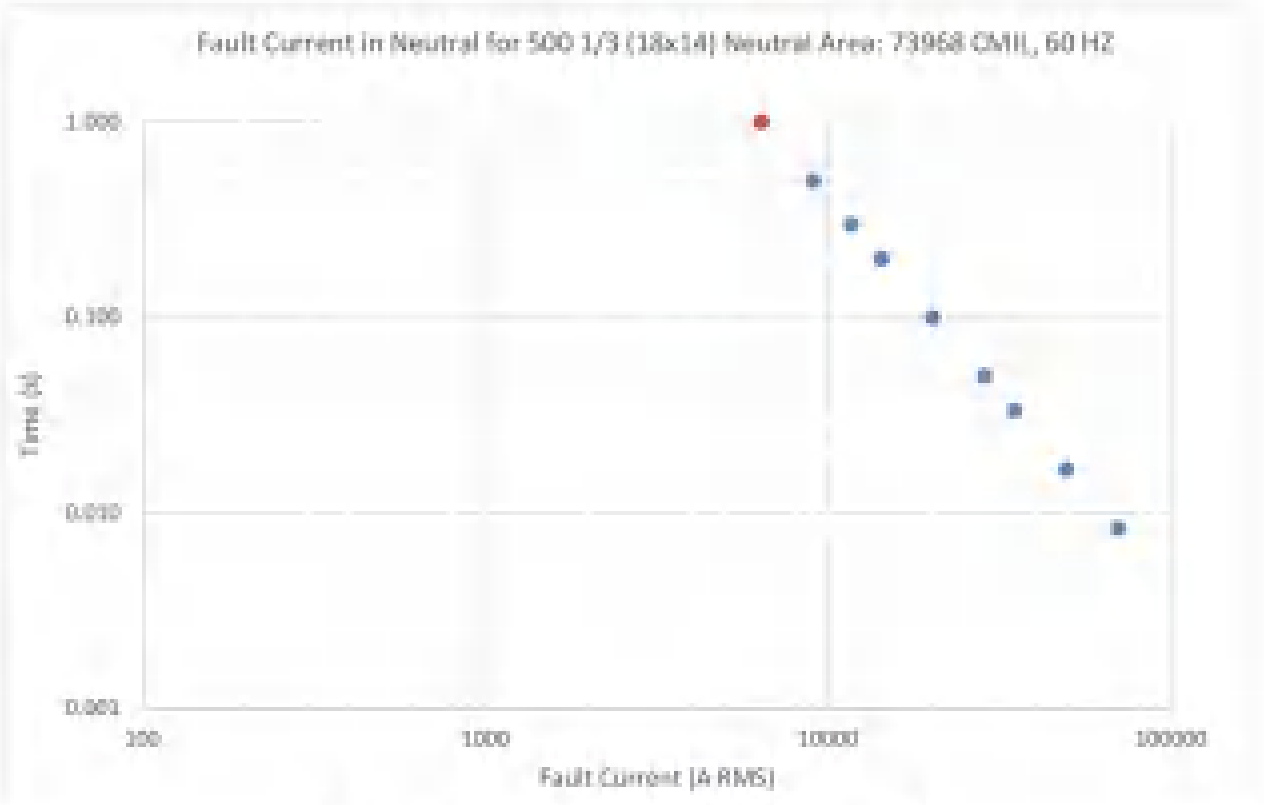

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WTEC
Energy Innovation

SHORT CIRCUIT PERFORMANCE

4/0 AWG AL CABLE
345 MILS TR-XLPE (35KV 100% INSULATION LEVEL)
16X14 CONCENTRIC NEUTRAL
105°C XLPE JACKET (MV-105)

CALCULATION SETTINGS:

FAULT CURRENT	CONDUCTOR	NEUTRAL
Initial Temp C	105	95
Final Temp C	250	350

Conductor Size	Area (in^2)	Cycles								
		0.5	1	2	3	5	8.5	15	22	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.0833	0.1417	0.2500	0.3667	1.0000
		Fault Current (A RMS)								
4/0 AWG	0.316	109684	75615	51387	41905	33405	26907	17116	13480	8286
Neutral Wire		Cycles								
		0.5	1	2	3	5	8.5	15	22	60
		Time (s)								
		0.0083	0.0167	0.0333	0.0500	0.0833	0.1417	0.2500	0.3667	1.0000
		Fault Current (A RMS)								
2/3 (6+1+1)		62030	43962	31015	25323	19615	15044	10348	8201	5063

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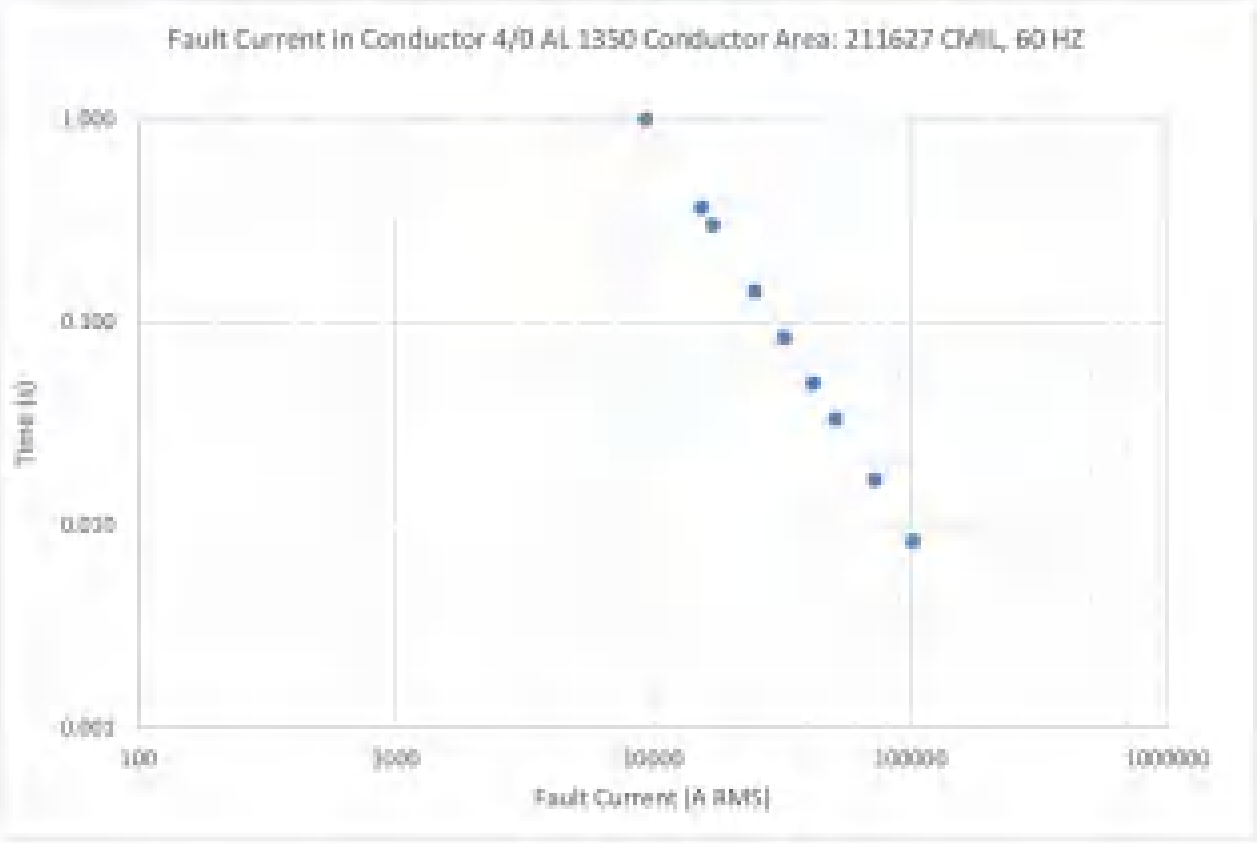

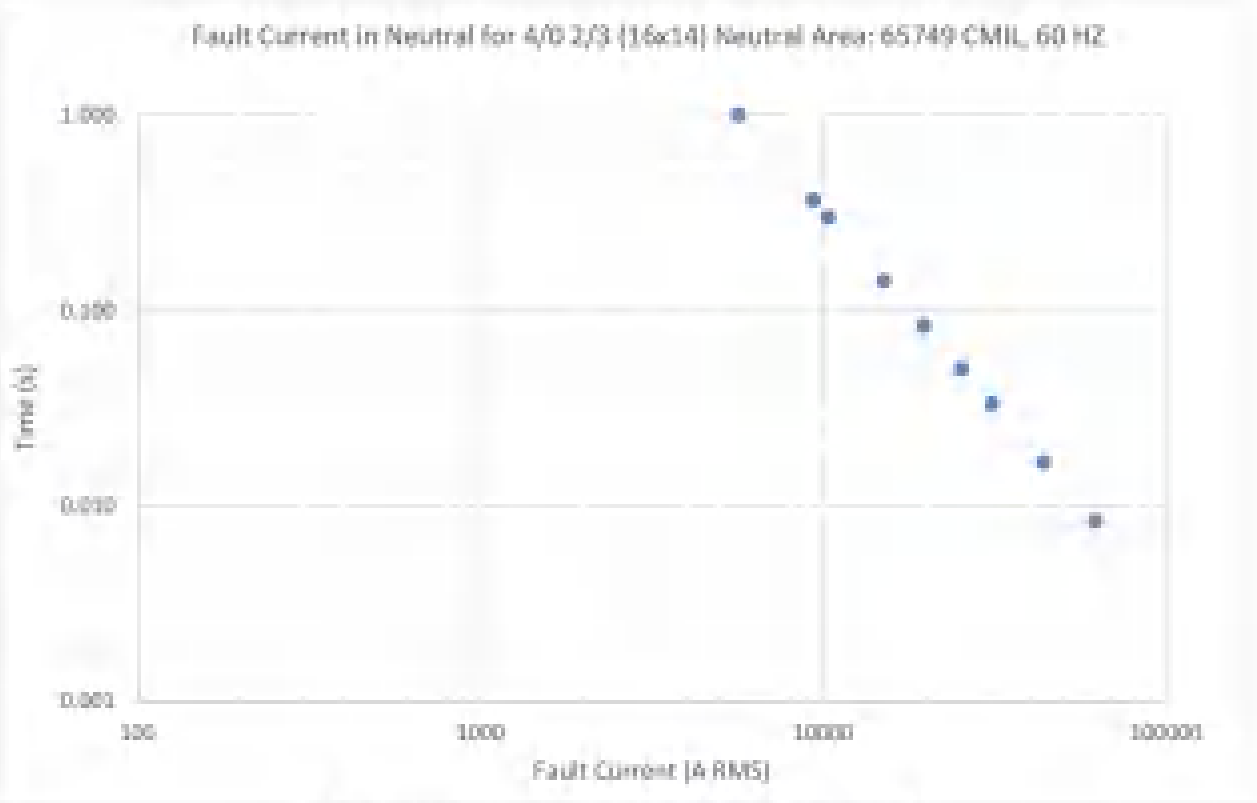

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BESS INVERTER FAULT CONTRIBUTION DATA

SUNGROW

Clean power for all

Short-Circuit Current

SC210HX-US

V1

1 Introduction

This document describes the short-circuit current of SG210HX-US.

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2 Brief Description

Single-phase ground short-circuit, two-phase short-circuit, and three-phase symmetrical short-circuit of the power grid will cause the voltage drop of the power grid. Among them, the three-phase symmetrical short-circuit is the most serious one, which causes the grid voltage to drop to 0. Under this condition, the peak value of the PCS output current and the reactive power support current value surpass the values under other fault types.

When the grid voltage drops, the output current of the PCS will change accordingly. During the first 1 to 2 power frequency cycles, the output current changes abruptly due to the voltage drop, resulting in a current that is significantly higher than the rated value. Then, during the ZVRT period of grid connection, it outputs a relatively stable reactive current to support the grid.

Given the technical requirements of grid connection, such as VDE4110/4120, both peak current impact on the grid and stable reactive current support are important indicators for grid connection. Therefore, it is necessary to provide corresponding parameters when performing grid connection simulation analyses.

IEC 60909 specifies the characteristic values of short-circuit current for the PCS when a short circuit occurs on the grid: peak current I_p, initial symmetrical short-circuit current I''_k, and steady-state short-circuit current I_k, where

Peak short-circuit current I_p: the maximum peak value of instantaneous impulse current at the moment of fault.

Initial symmetrical short-circuit current I''_k: within 1 to 2 cycles after the fault, the RMS

value of the short-circuit current during dynamic adjustment.

Steady-state short-circuit current I_k: the steady value of the reactive current output after the fault is stable.

3 Test Result

When a three-phase symmetrical short-circuit occurs in the power grid, the short-circuit current test waveform of SC210HX-US is shown in the figure below.

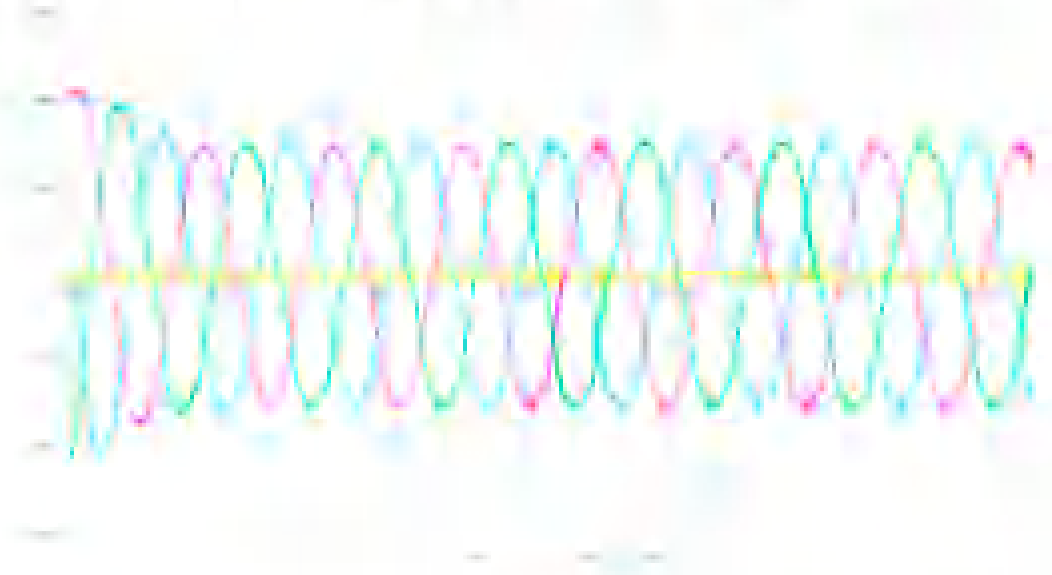


Fig. 1 Short-Circuit Current Waveform

Each characteristic value of the test waveform is shown in the table below.

Fig. 2 Characteristic Values of Short-Circuit Current

Product	Peak Short-circuit Current I_p (A)	Initial Symmetrical Short-Circuit Current I" (A)	Steady-State Short-Circuit Current I_k (A)
SC210HX-US	433A	272A	217A

For ESS composed of several SC210HX-US × 12 such as ST5015UX, each characteristic value can be calculated as N times the characteristic value of SC210HX-US.

PV INVERTER FAULT CONTRIBUTION DATA

Short Circuit Sequence Current Data

The short circuit behavior of the SUNGROW SG440HXUD inverter is analyzed for different types of fault scenarios. Three different types of faults (Line-Line-Line-Ground (3LG), Line-Line (LL) & Line-Ground (LG)) scenarios are simulated to calculate the sequence current and power factor angle values for 1, 3 and 5 cycle periods. In order to replicate the SLG fault behavior, Phase A-to-Ground is considered and for LL fault, Phase A-to-Phase B fault is considered during simulation. The fault scenarios are implemented using the voltage sag method on the SUNGROW SG440HXUD inverter model. Table 1 gives the 1st cycle, 3rd cycle, and 5th cycle short circuit data of the SUNGROW SG440HXUD inverter for the SLG fault. Similarly, Table 2 and Table 3 provide the 1st cycle, 3rd cycle, and 5th cycle short circuit data for the SLG fault and LL fault scenarios respectively.

Table 1: [illegible]

SEQUENCE CURRENT OF THE SUNGROW SG440HXUD INVERTER DURING SLG(G) FAULT				
Fault Voltage (pu)	Positive Sequence Current (p.u.)	Negative Sequence Current (p.u.)	Positive Sequence Power Factor Angle (deg)	Negative Sequence Power Factor Angle (deg)
1 Cycle Time Frame				
0.9	1.055	0.005	0.32	133.78
0.8	1.040	0.010	0.55	133.36
0.7	1.043	0.040	0.81	-68.0
0.6	1.048	0.007	0.91	-41.88
0.5	1.049	0.009	0.93	335.81
0.4	1.053	0.097	1.14	3.74
0.3	1.057	0.103	1.08	1e-32
0.2	1.063	0.116	1.21	-12.89
0.1	1.065	0.113	1.46	133.38
3 Cycle Time Frame				
0.9	1.037	0.007	0.30	207.69
0.8	1.041	0.020	0.16	18.84
0.7	0.967	0.075	-3.36	336.02
0.6	1.027	0.124	267.46	181.73
0.5	1.081	0.145	267.15	180.75
0.4	1.084	0.152	266.52	19.66
0.3	1.083	0.171	262.65	24.08
0.2	1.080	0.171	258.54	29.64
0.1	1.083	0.175	249.68	33.32
5 Cycle Time Frame				
0.9	1.107	0.012	0.04	82.15
0.8	0.930	0.005	-13.09	4.54
0.7	0.159	0.006	-51.17	27.18
0.6	1.028	0.018	268.95	84.53
0.5	1.085	0.040	268.25	94.89
0.4	1.084	0.114	85.34	96.85
0.3	1.079	0.106	268.32	168.39
0.2	1.079	0.048	261.89	170.26
0.1	1.080	0.114	252.97	242.97

SEQUENCE CURRENT OF THE SUNGROW SG4400UD INVERTER DURING SLG FAULT				
Fault Voltage (p.u.)	Positive Sequence Current (p.u.)	Negative Sequence Current (p.u.)	Positive Sequence Power Factor Angle (deg)	Negative Sequence Power Factor Angle (deg)
1 Cycle Time Frame				
0.9	1.022	0.009	0.44	-150.17
0.8	1.039	0.017	0.47	-149.07
0.7	1.053	0.026	0.59	-147.93
0.6	1.058	0.032	0.75	-148.29
0.5	1.060	0.039	0.85	-148.37
0.4	1.057	0.044	1.51	-144.62
0.3	1.054	0.049	2.37	-141.46
0.2	1.037	0.052	2.81	-138.81
0.1	1.039	0.061	3.21	-151.29
3 Cycle Time Frame				
0.9	1.041	0.009	0.16	-155.49
0.8	1.079	0.017	0.28	-155.48
0.7	1.108	0.026	0.25	-154.35
0.6	1.109	0.032	0.39	-152.62
0.5	1.061	0.039	-0.87	-147.64
0.4	1.031	0.055	-0.05	-138.07
0.3	1.014	0.071	-1.25	-131.01
0.2	0.978	0.086	-2.62	-129.89
0.1	0.946	0.104	-4.31	-127.74
5 Cycle Time Frame				
0.9	1.041	0.004	0.13	-85.53
0.8	1.079	0.006	0.25	-81.91
0.7	1.108	0.009	0.29	-80.98
0.6	1.105	0.013	0.20	-83.33
0.5	0.943	0.016	-4.00	-61.79
0.4	0.830	0.018	-13.96	-68.92
0.3	0.750	0.022	-26.39	-71.45
0.2	0.714	0.027	-41.65	-73.07
0.1	0.729	0.032	-36.92	-74.16

SEQUENCE CURRENT OF THE SUNGROW SG4400UD INVERTER DURING LL FAULT				
Fault Voltage (p.u.)	Positive Sequence Current (p.u.)	Negative Sequence Current (p.u.)	Positive Sequence Power Factor Angle (deg)	Negative Sequence Power Factor Angle (deg)
1 Cycle Time Frame				
0.9	1.043	0.011	0.20	-151.79
0.8	1.062	0.019	0.15	-149.36
0.7	1.047	0.027	1.12	-142.31
0.6	1.037	0.053	0.26	-104.82
0.5	1.041	0.072	1.52	-84.77
0.4	1.045	0.085	1.84	-92.27
0.3	1.047	0.114	2.14	-68.58
0.2	1.053	0.126	3.18	92.75
0.1	1.057	0.134	3.58	-99.09
5 Cycle Time Frame				
0.9	1.079	0.009	0.21	-152.65
0.8	1.106	0.016	0.19	-171.68
0.7	1.059	0.032	-0.45	-64.47
0.6	0.978	0.062	-1.08	-59.96
0.5	0.914	0.087	-7.26	-57.34
0.4	1.025	0.113	357.91	-149.07
0.3	1.083	0.132	358.31	-119.13
0.2	1.062	0.148	356.37	-121.6
0.1	1.08	0.163	355.23	-152.62
5 Cycle Time Frame				
0.9	1.079	0.005	0.11	-73.13
0.8	1.106	0.006	0.16	-61.43
0.7	0.83	0.010	-13.89	56.52
0.6	0.714	0.013	-41.14	-56.21
0.5	0.792	0.016	-71.38	-46.62
0.4	1.028	0.024	-89.41	-52.46
0.3	1.085	0.028	-89.29	-53.66
0.2	1.062	0.029	269.19	-54.17
0.1	1.083	0.033	269.02	-50.57

Short Circuit Parameter Calculation

The Short circuit current parameter calculation is carried out on the SUNGROW SG4400UD inverter model. The PSCAD model that has been validated is representative of the actual inverter software. Data is provided for default inverter settings. The inverter is operating at 100% real power output at the unity power factor. Presented data are based on measurements at inverter terminals.

Ip, Ik'', Ik' & Ik are calculated based on the measured inverter current waveforms of SG4400UD PV inverter for a bolted 3LG fault as per the IEC 60909 standard [1] as shown in Figure 5.

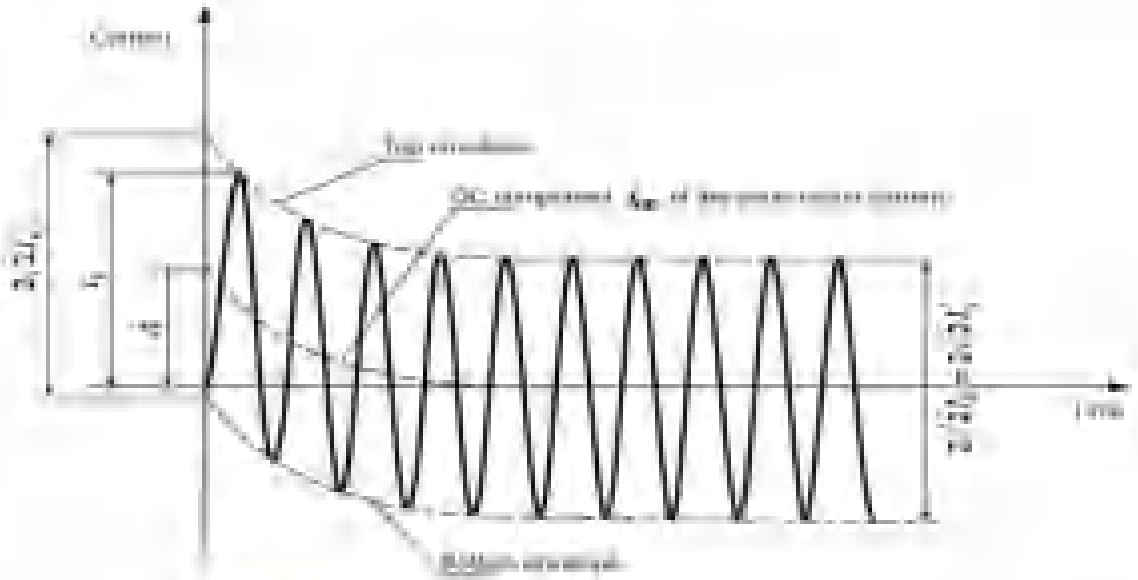


Figure 5: Balanced Current Waveform for Short Circuit Calculation [1]

The per-unit short circuit current parameter and impedance parameters of the SG4400UD PV inverter are listed in Table 7 & Table 8.

Where, Ik'', Initial Symmetrical Short circuit current

Ip, Peak short-circuit current

Ik, Steady-State short-circuit Current

I_{DC}, Decaying d.c. component of short circuit current

A, Initial value of I_{DC}

Table 7: Short Circuit Current Parameters

Short Circuit Current Parameter of SUNGROW SG4400UD PV Inverter				
Current Parameters		Value	Unit	
Ip	First Peak (Ip)	2.7007	p.u.	Peak
Ik''	Subtransient (Ik'')	1.5572	p.u.	RMS
Ik'	Transient (Ik')	1.1085	p.u.	RMS
Ik	Synchronous (Ik)	1.0585	p.u.	RMS
t	Time to reach steady state	70	ms	-

Table 8: Short Circuit Impedance Parameters

Short Circuit Impedance Parameter of SUNGROW SG4400UD Inverter				
Impedance Parameters	**Value (pu based on unit kVA)**			**Unit**
Subtransient	0.000	+j	0.64218	p.u.
Transient	0.000	+j	0.90228	p.u.
Synchronous	0.000	+j	0.94473	p.u.
Negative Sequence	9999.000	+j	9999.000	p.u.
Zero Sequence	9999.000	+j	9999.000	p.u.

PV INVERTER SHORT-CIRCUIT WITHSTAND CAPABILITY DOCUMENTATION

SUNGROW

Clean power for all

July 15, 2024

Subject: SG3600UD-MV & SG4400UD-MV-US Short Circuit Withstand Capability

To Whom It May Concern

The Short Circuit withstand capability of the SG3600UD-MV and SG4400UD-MV-US units are as follows:

SG3600UD-MV			
	Short Circuit Point Location	**Type of Fault**	**Short Circuit Capability**
MV	Between the MV Bushing and the MV load switch & Between the MV load switch and the MV fuse	**Symmetrical**	15kA/4s 25kA/3s 35kA/0.2s 81.85 kA/93.4ms
		Peak	63kA/0.3s
LV	AC Breaker & LV Bus Between Inv. & XFMR	**Symmetrical (Icu)**	75kA
		Peak	150kA

SG4400UD-MV-US			
	Short Circuit Point Location	**Type of Fault**	**Short Circuit Capability**
MV	Between the MV Bushing and the MV load switch & Between the MV load switch and the MV fuse	**Symmetrical**	15kA/4s 25kA/3s 35kA/0.2s 81.85 kA/93.4ms
		Peak	63kA/0.3s
LV	AC Breaker & LV Bus Between Inv. & XFMR	**Symmetrical (Icu)**	57.6kA
		Peak	115.2kA

Best Regards,

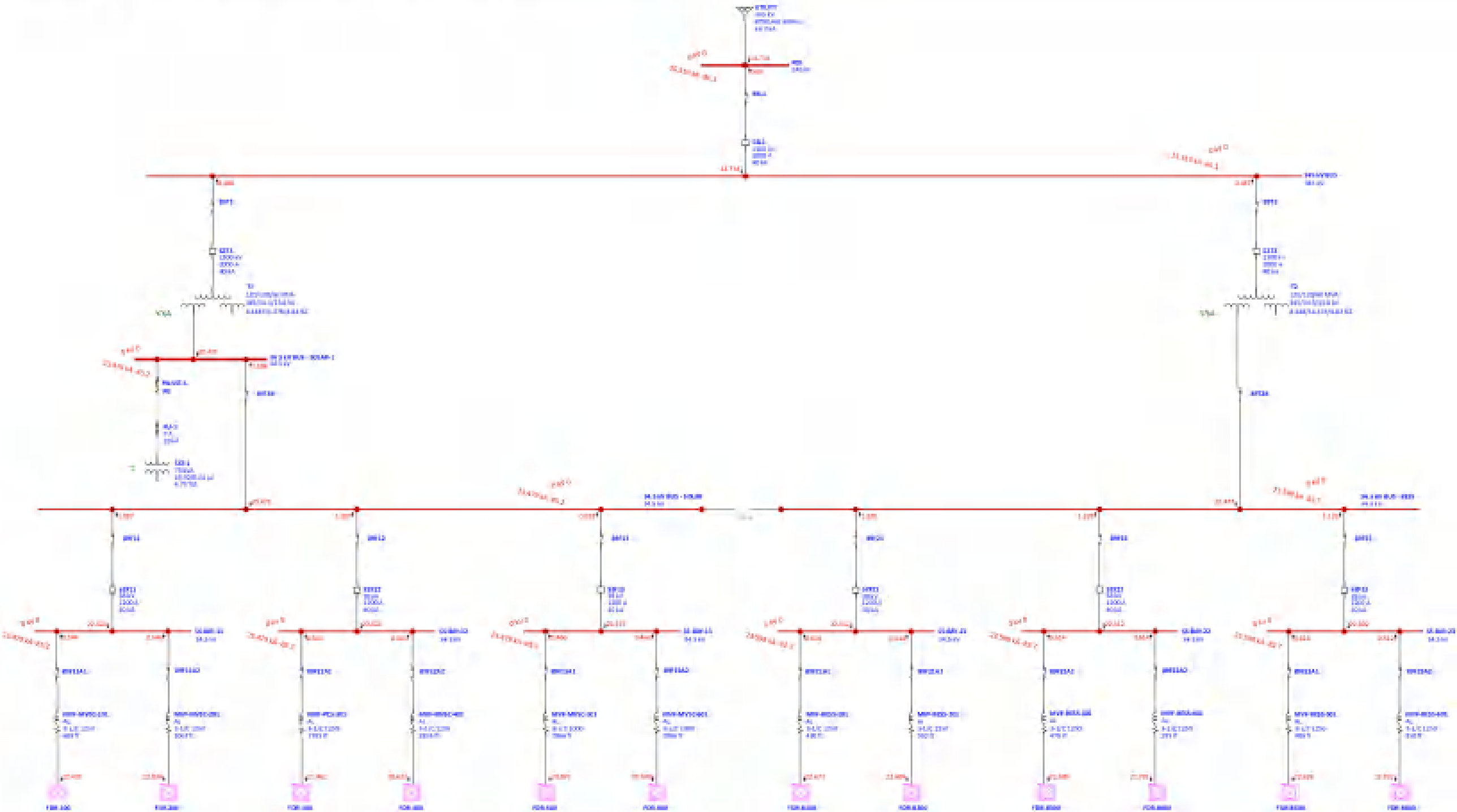
Darshan Venkatesh Babu

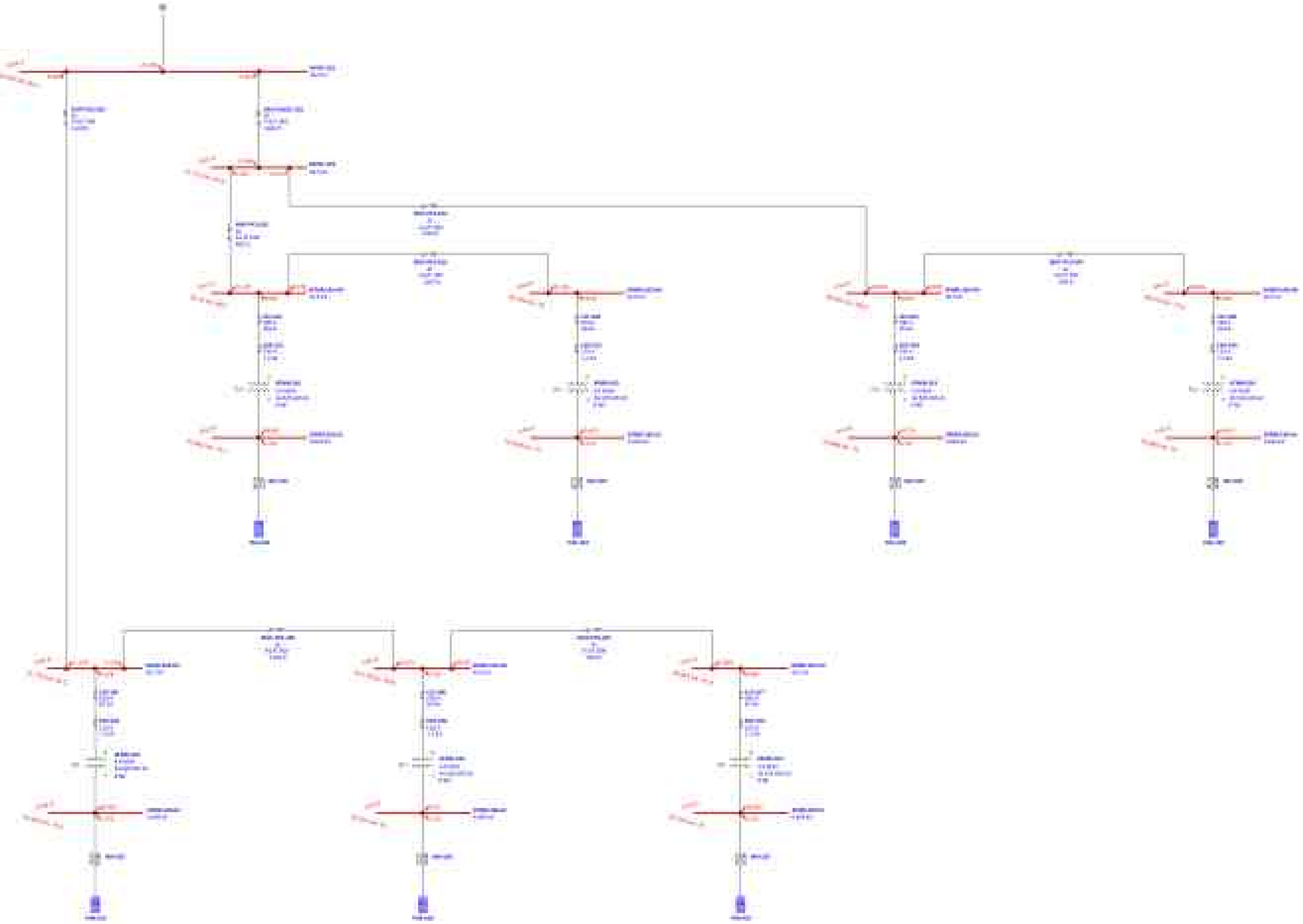
Darshan Venkatesh Babu
Technical Support Line: 1-[illegible]

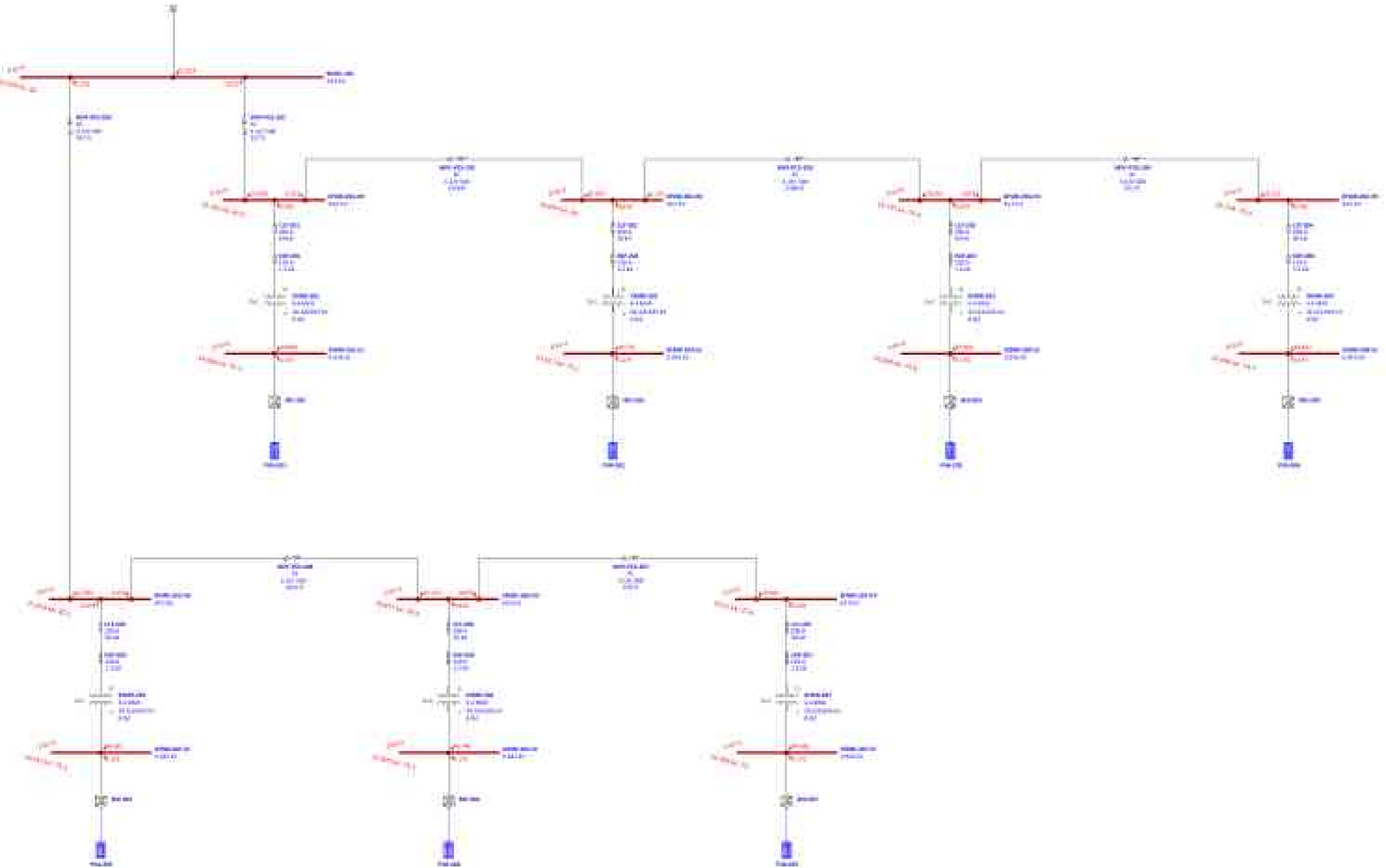
APPENDIX B – SHORT CIRCUIT SINGLE LINE DIAGRAMS

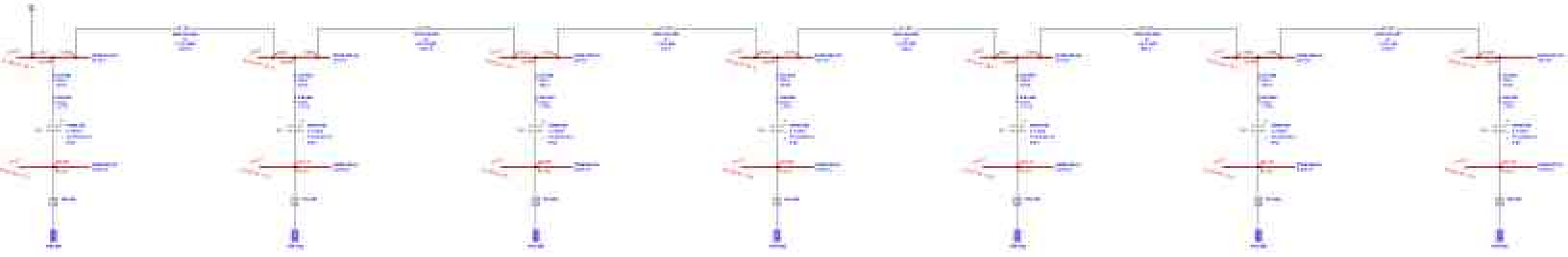
PRELIMINARY

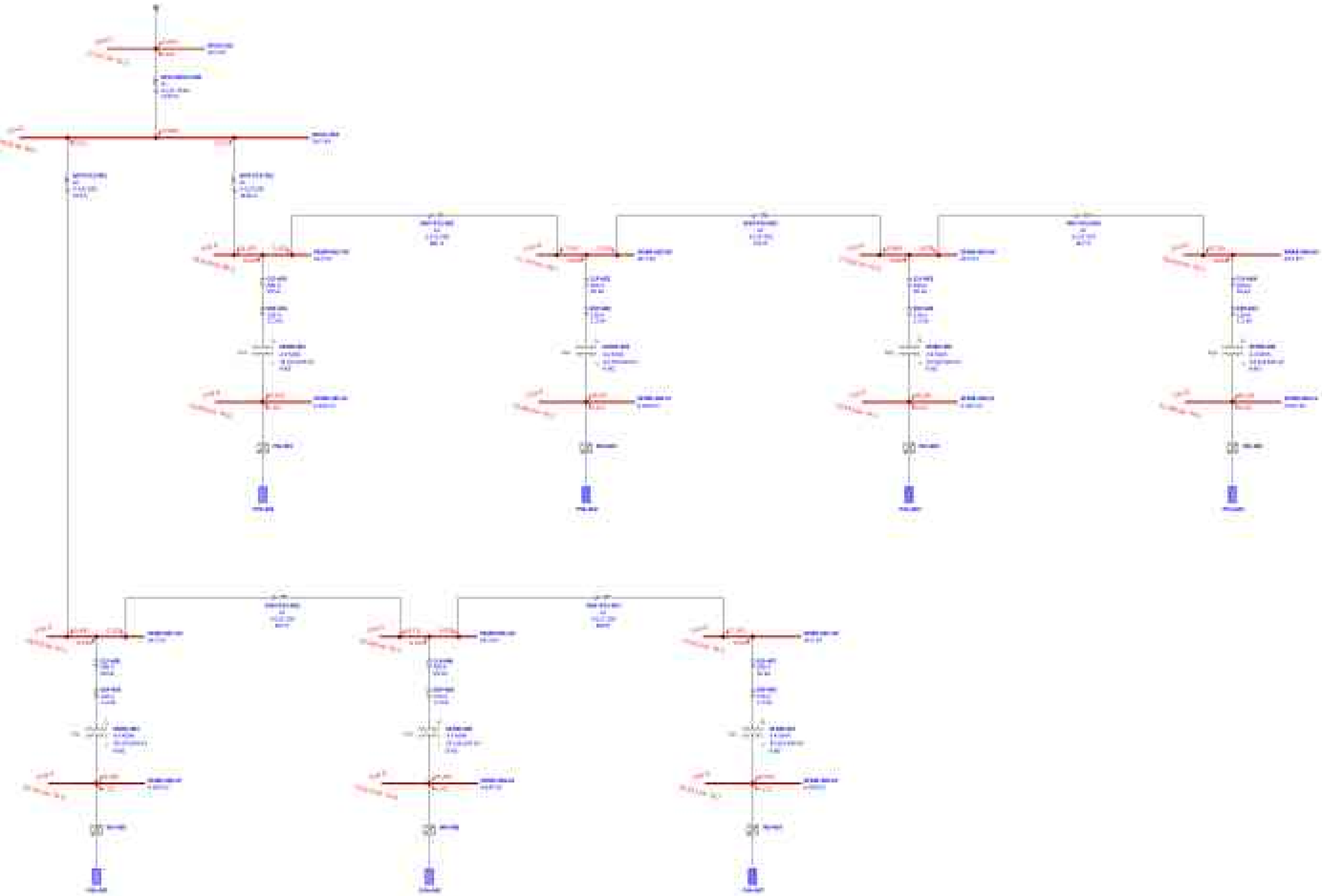
Steady-State 3-Ph Fault Short-Circuit SLDs

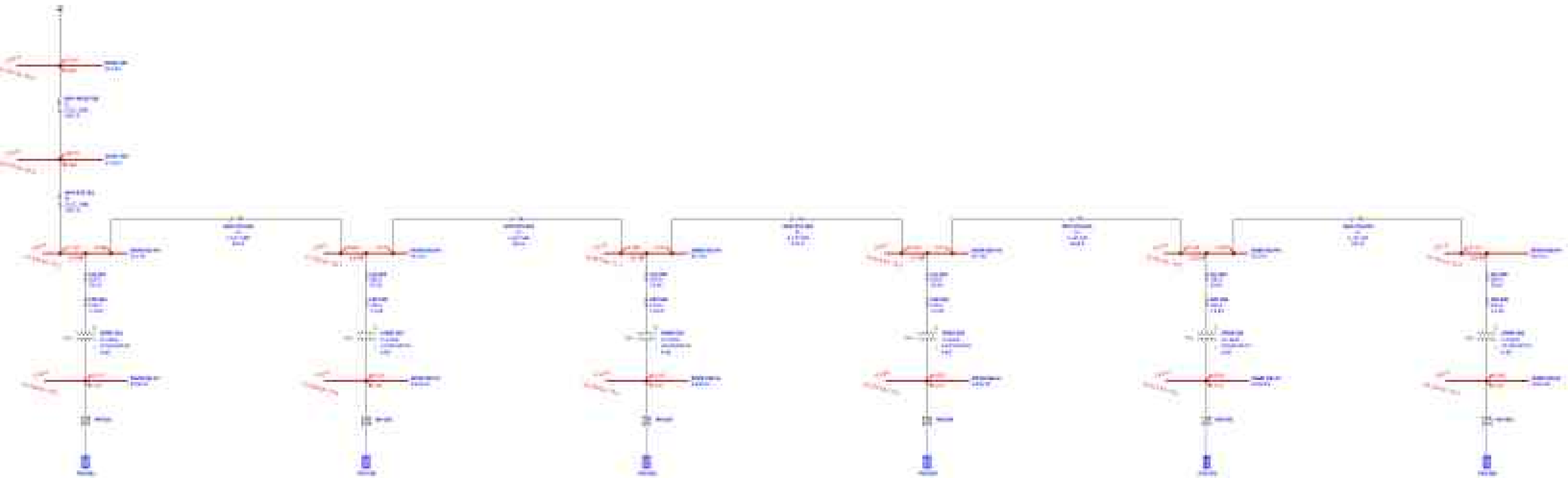


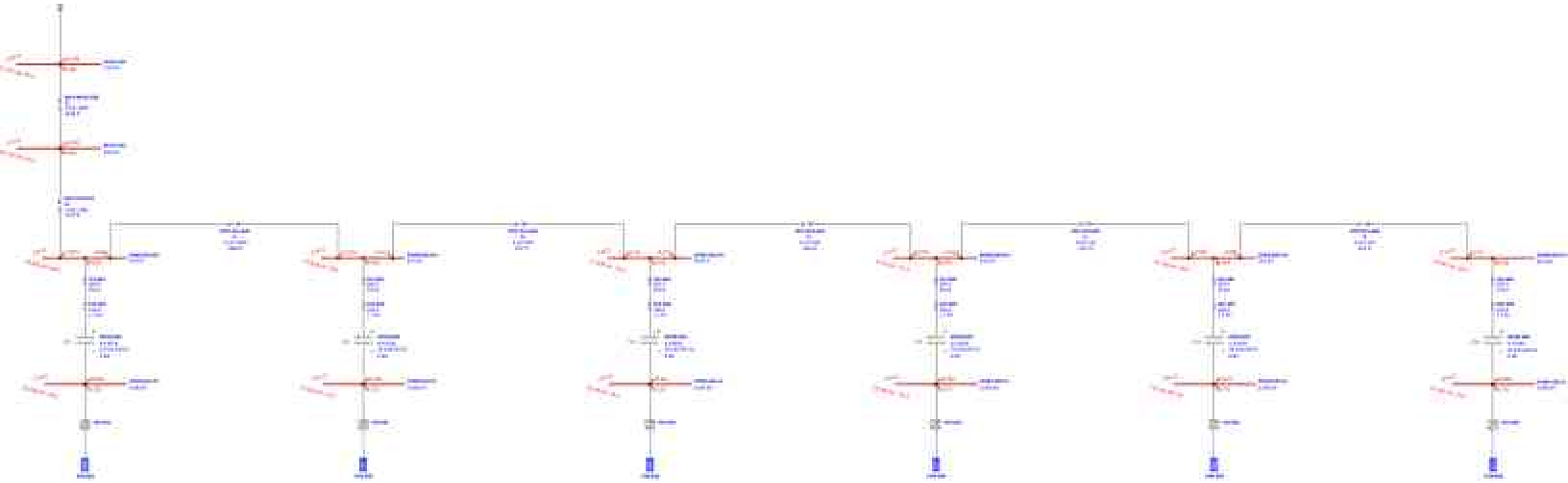


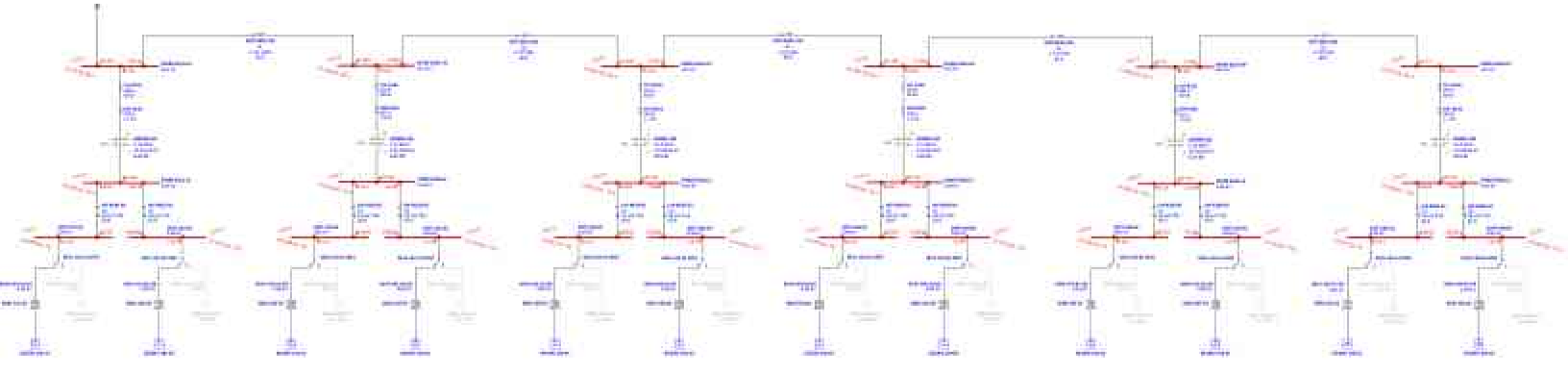


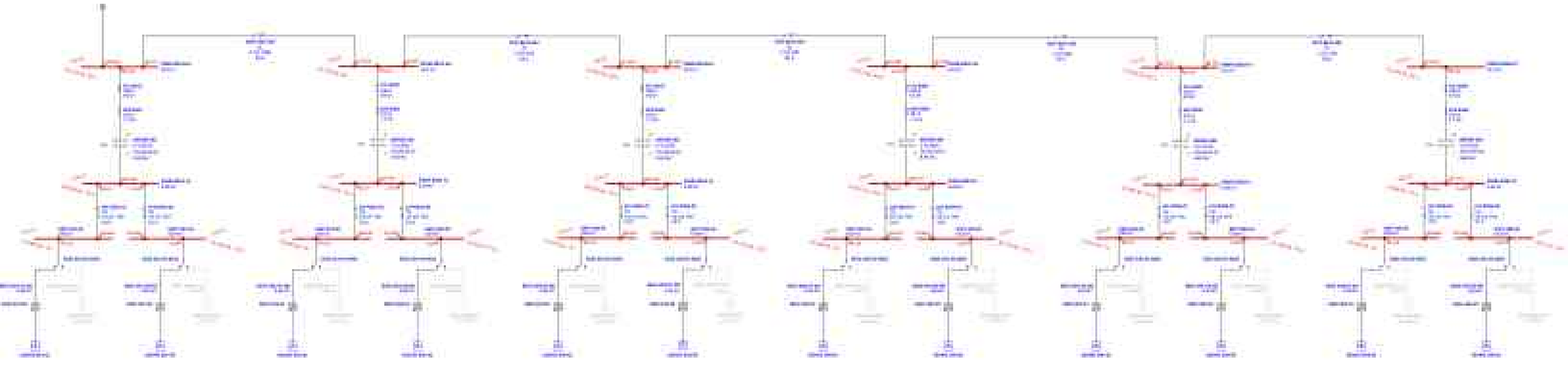


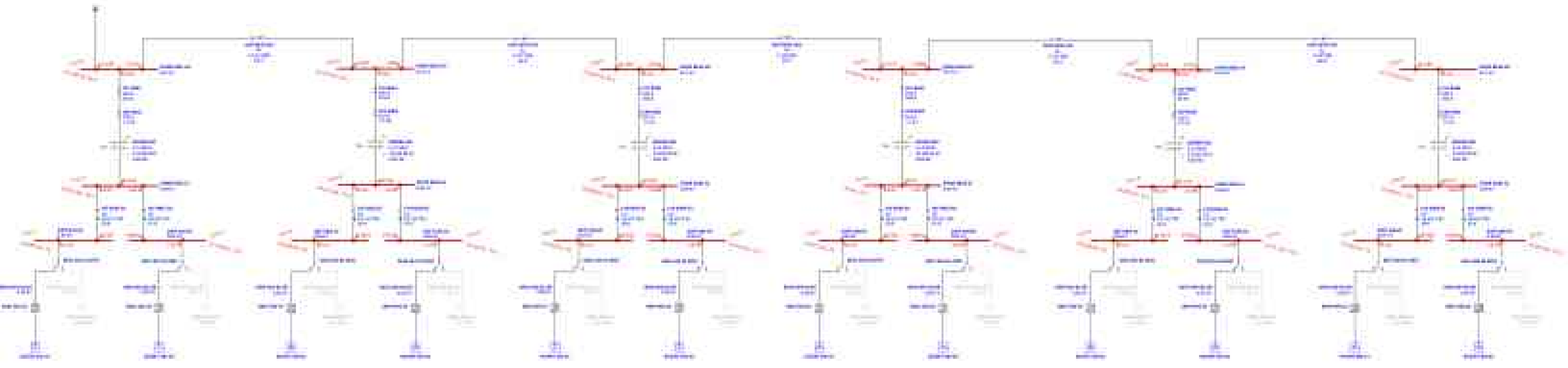


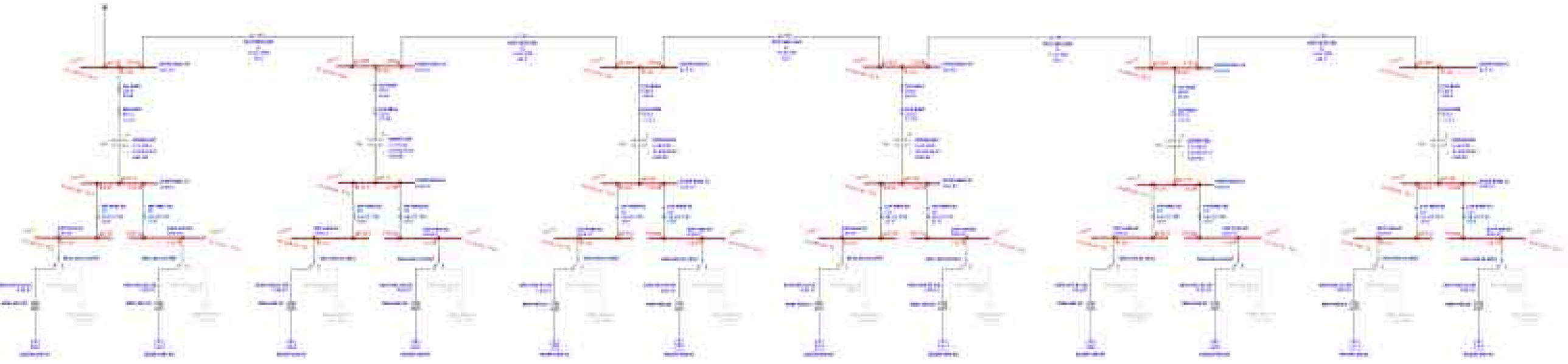


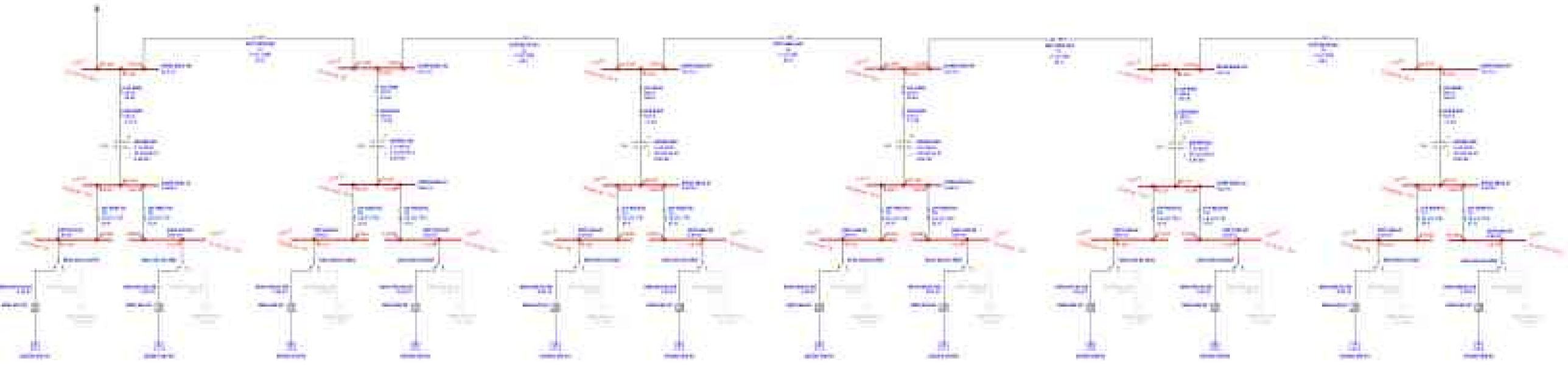


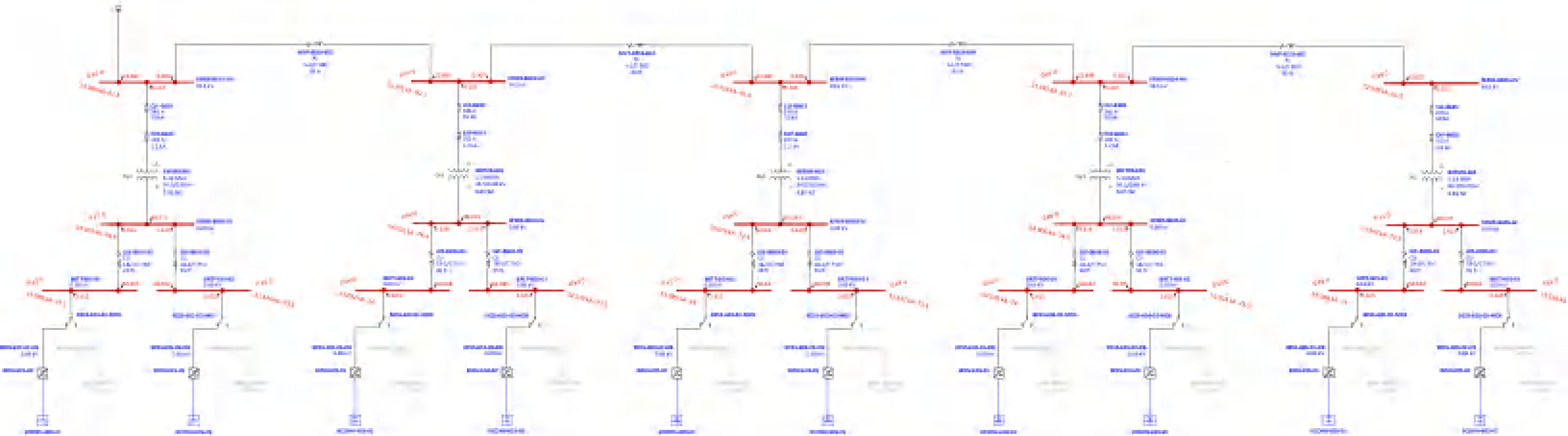




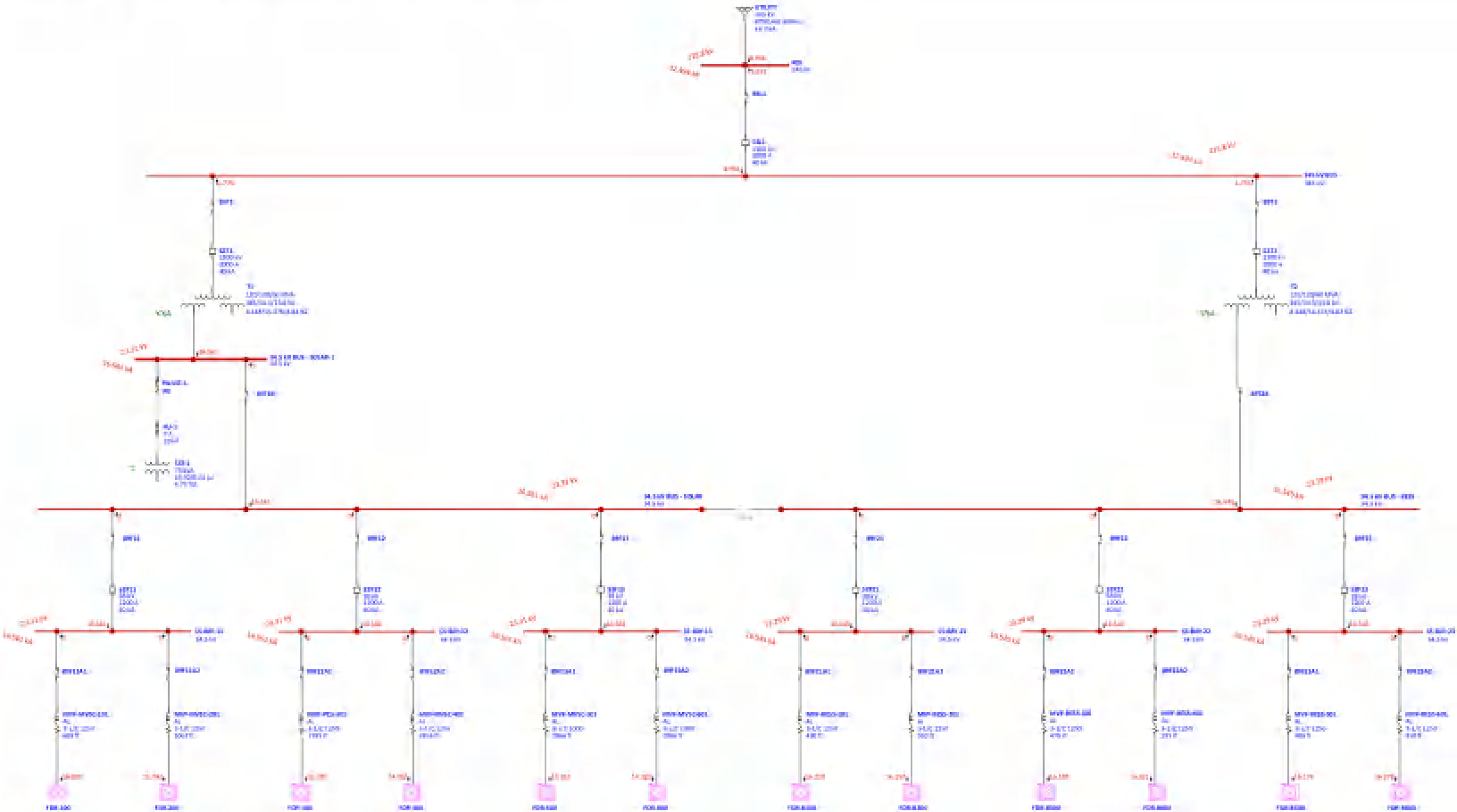


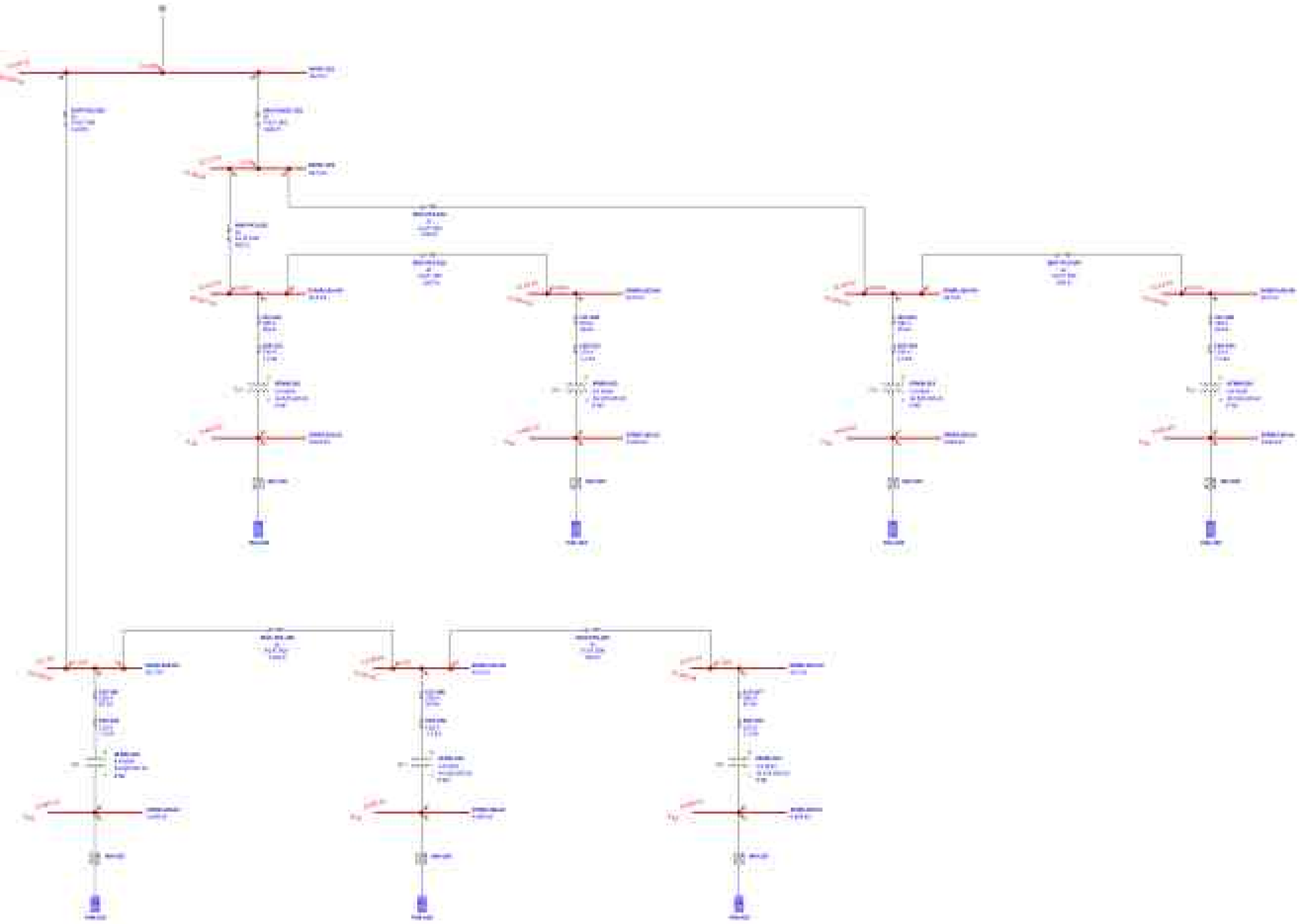


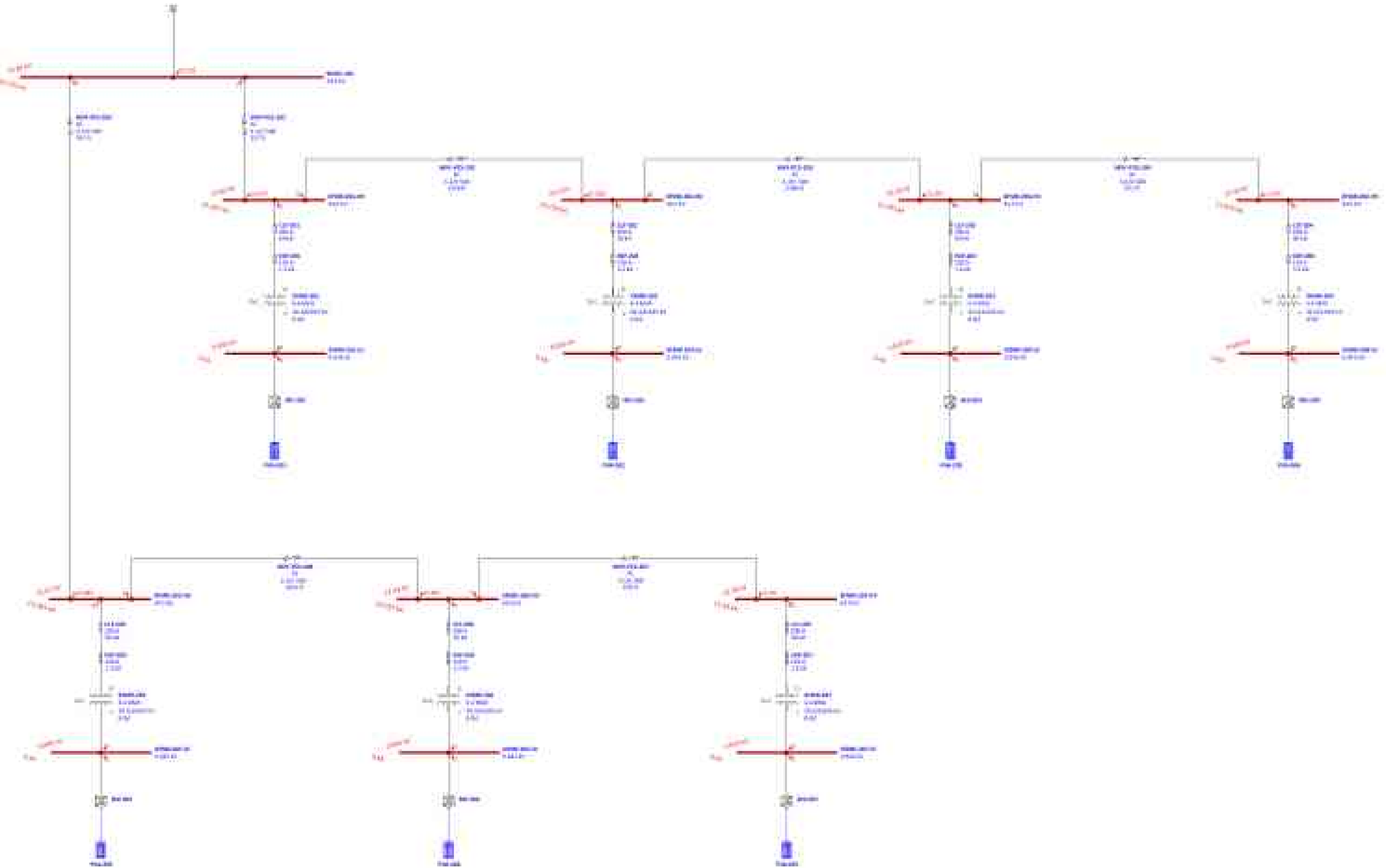


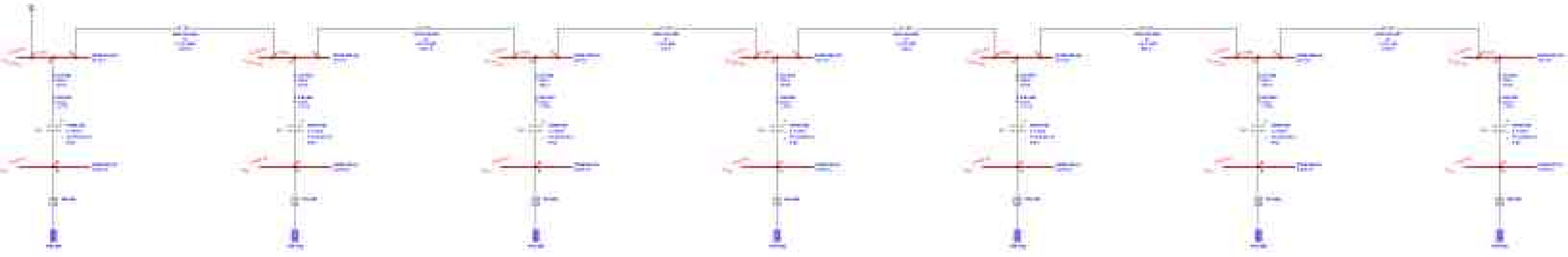


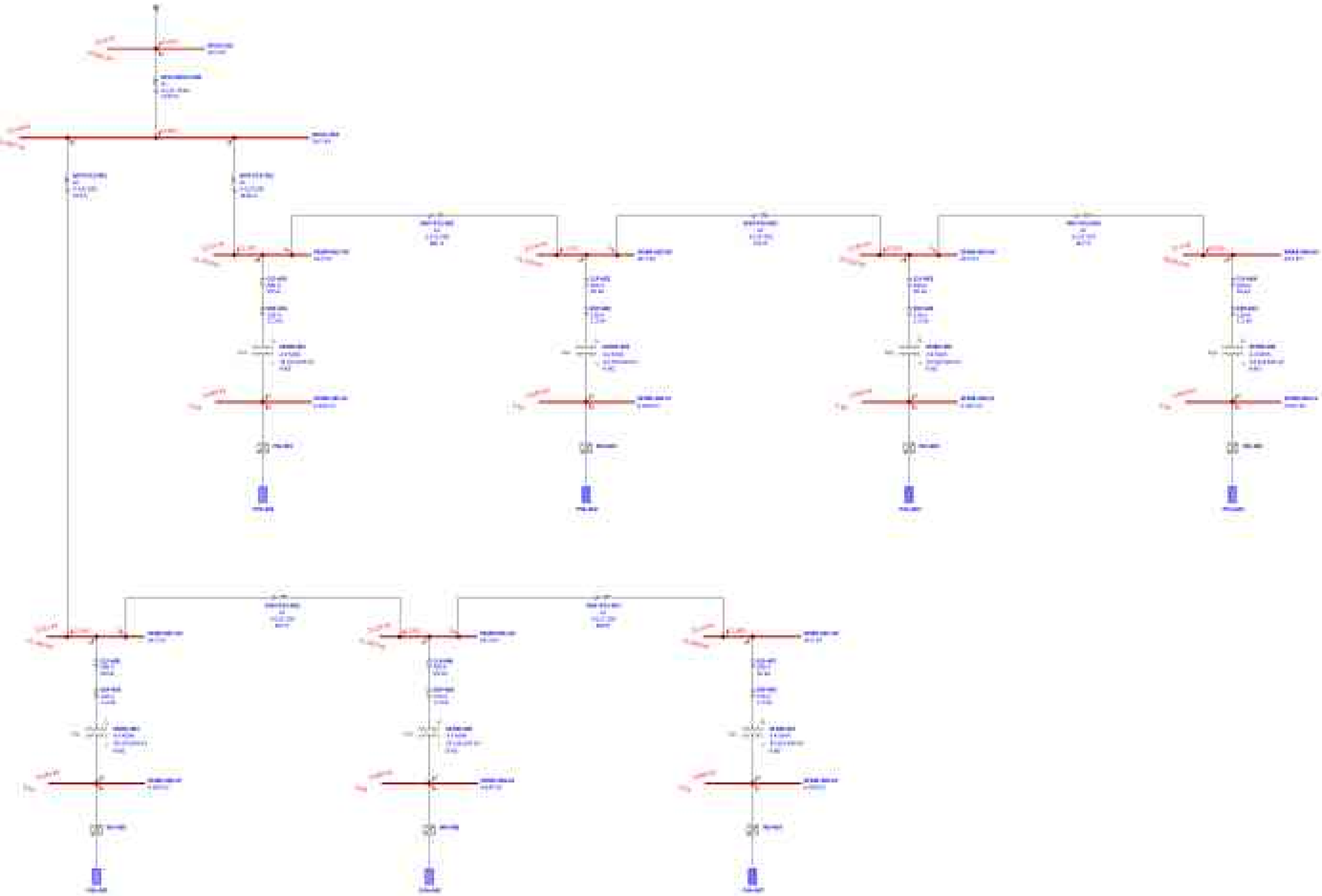
Steady-State L-G Fault Short-Circuit SLDs

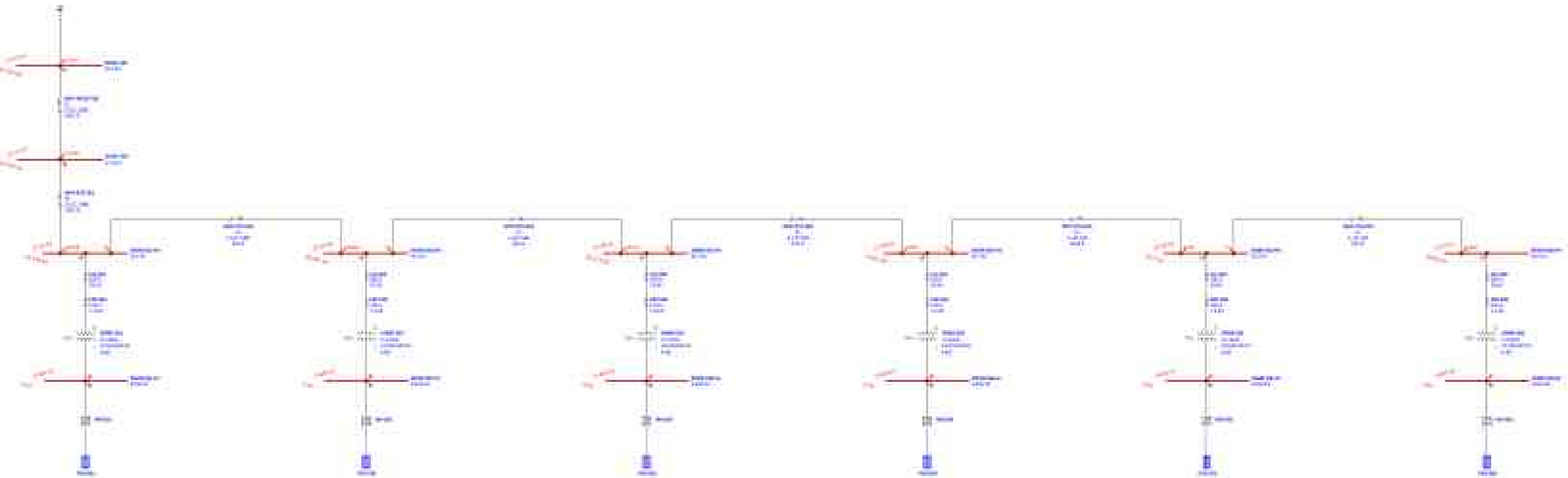


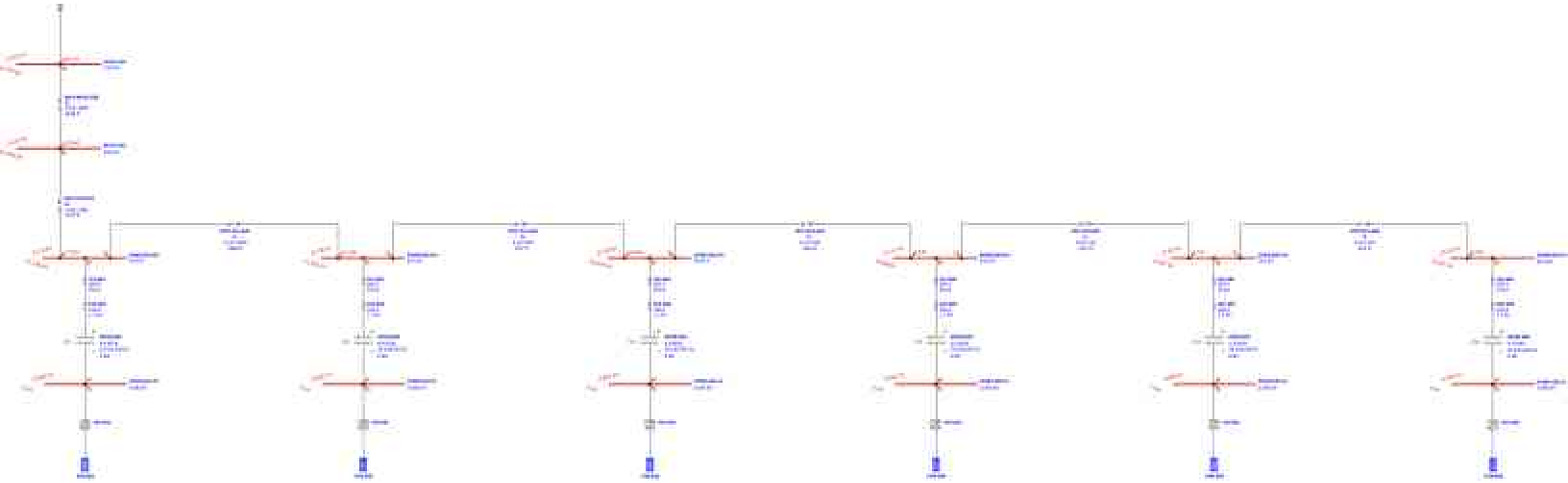


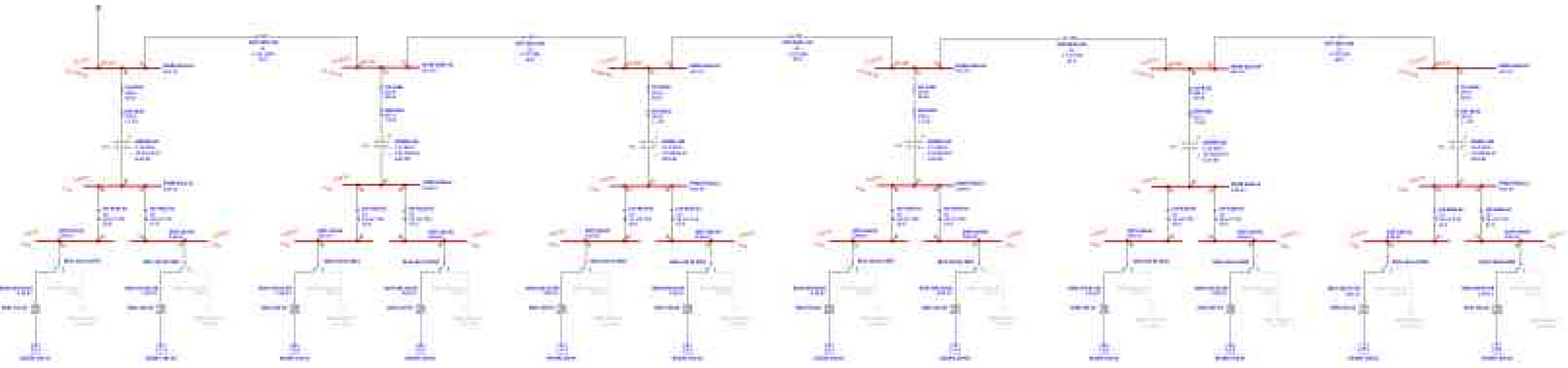


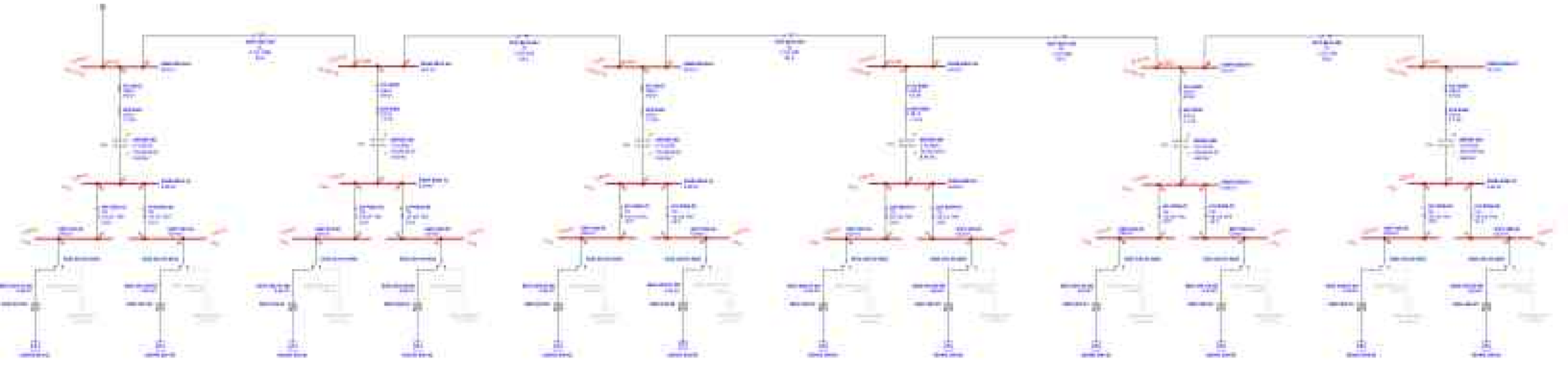


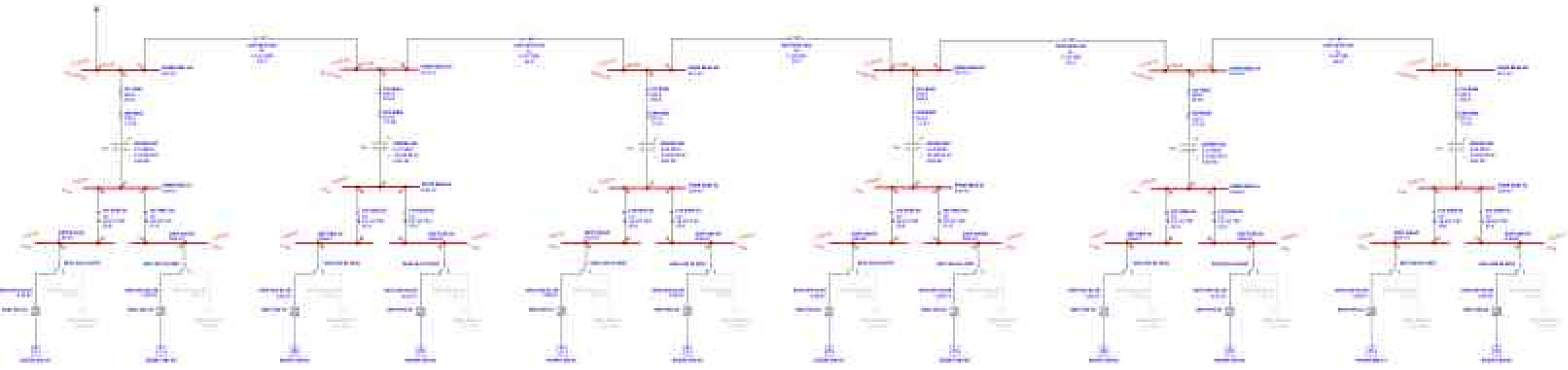


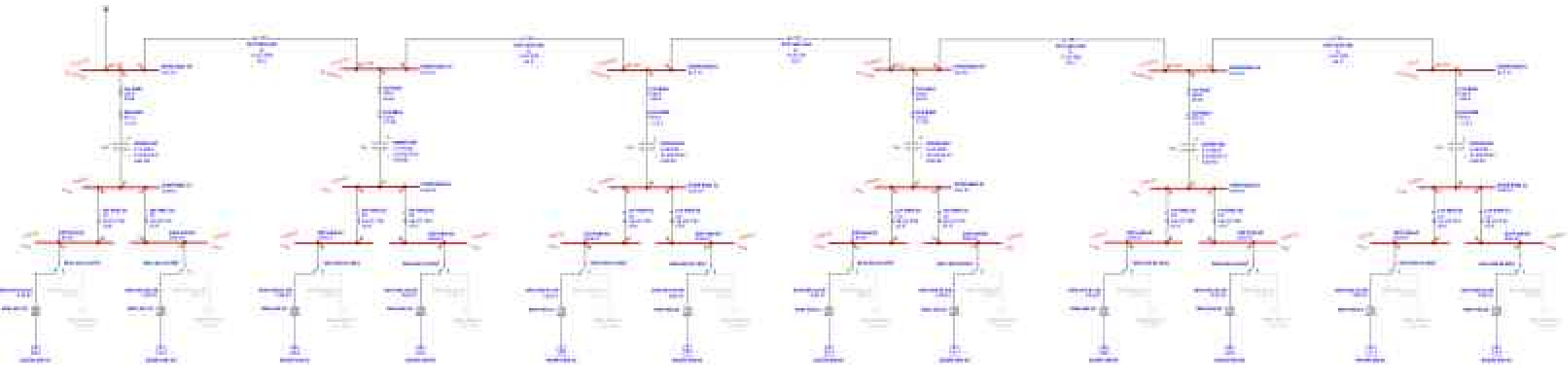


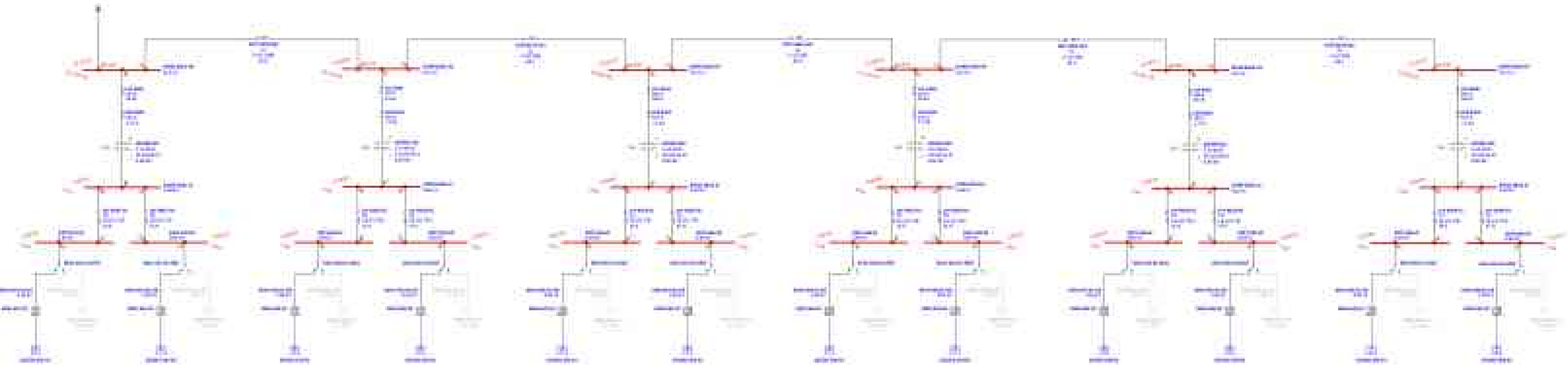


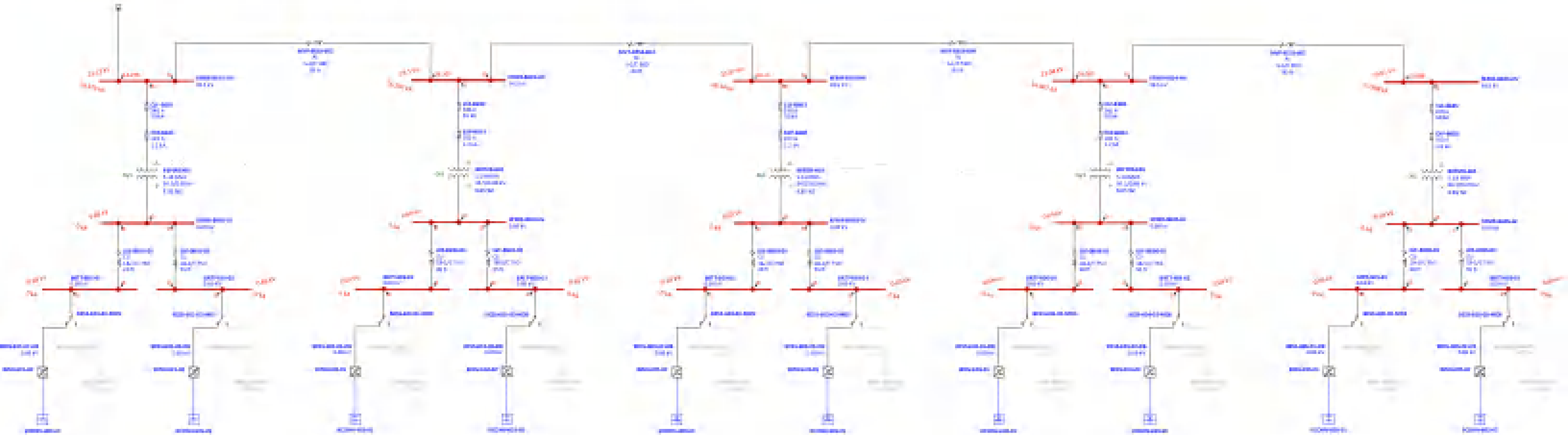




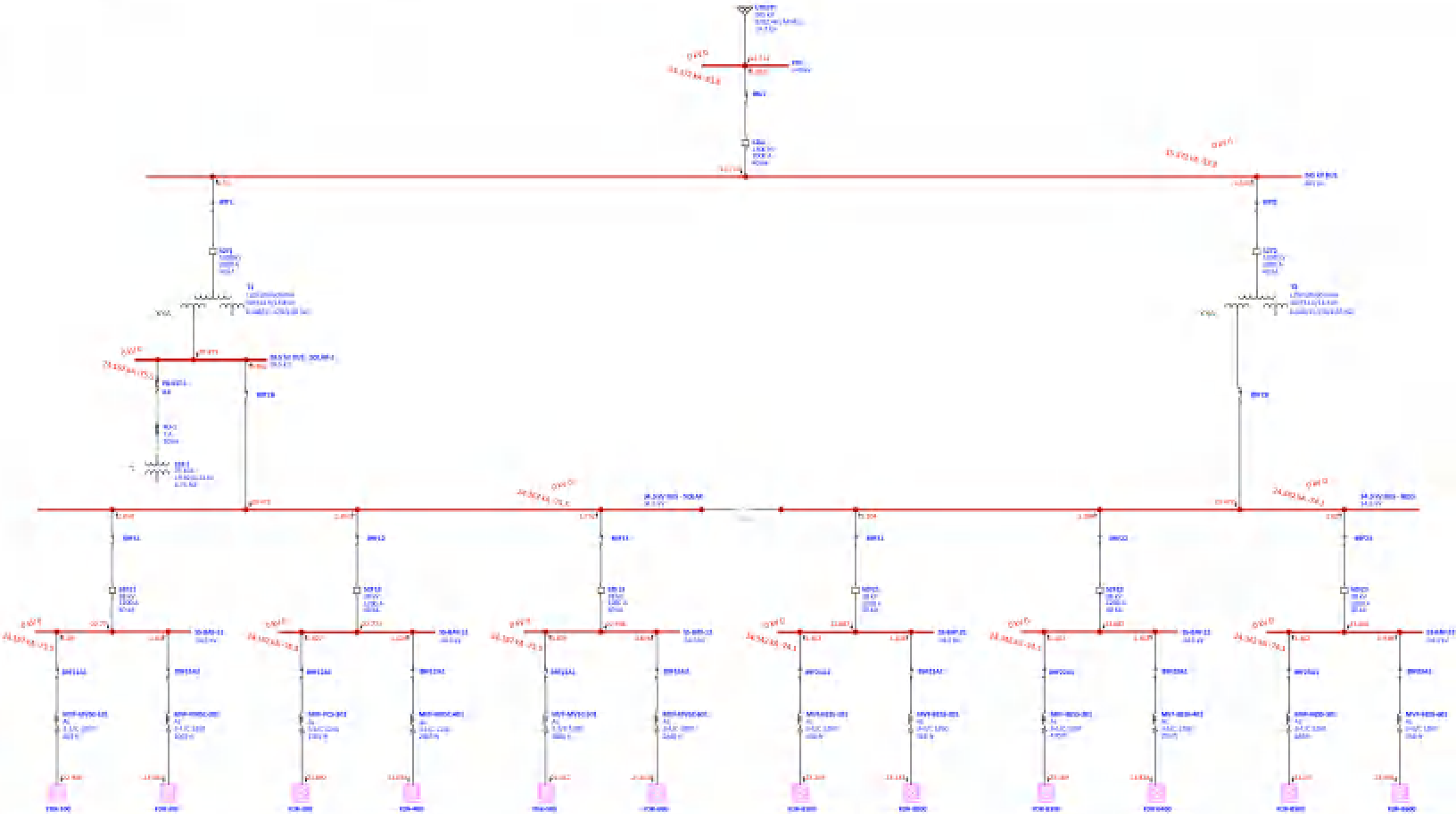


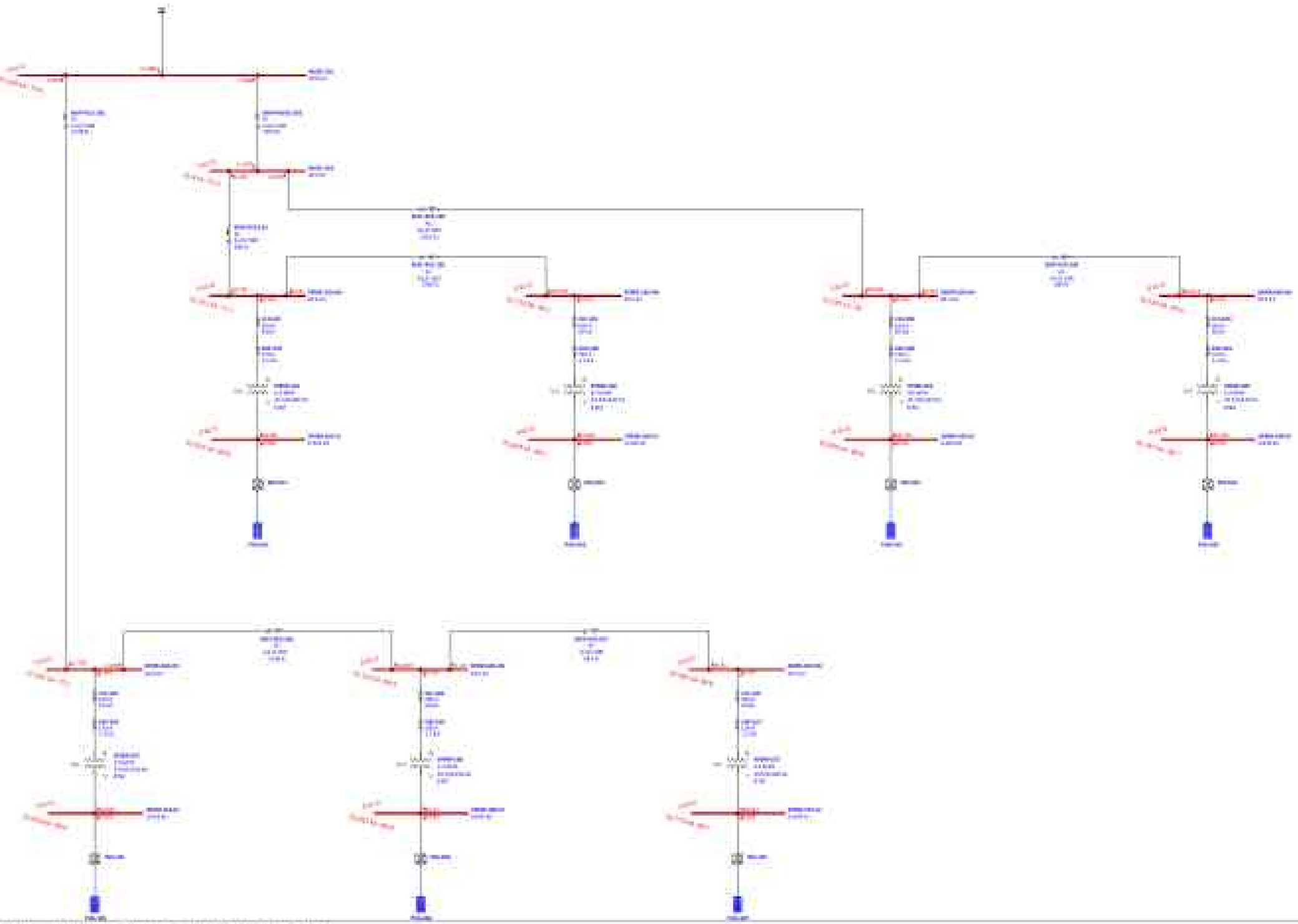


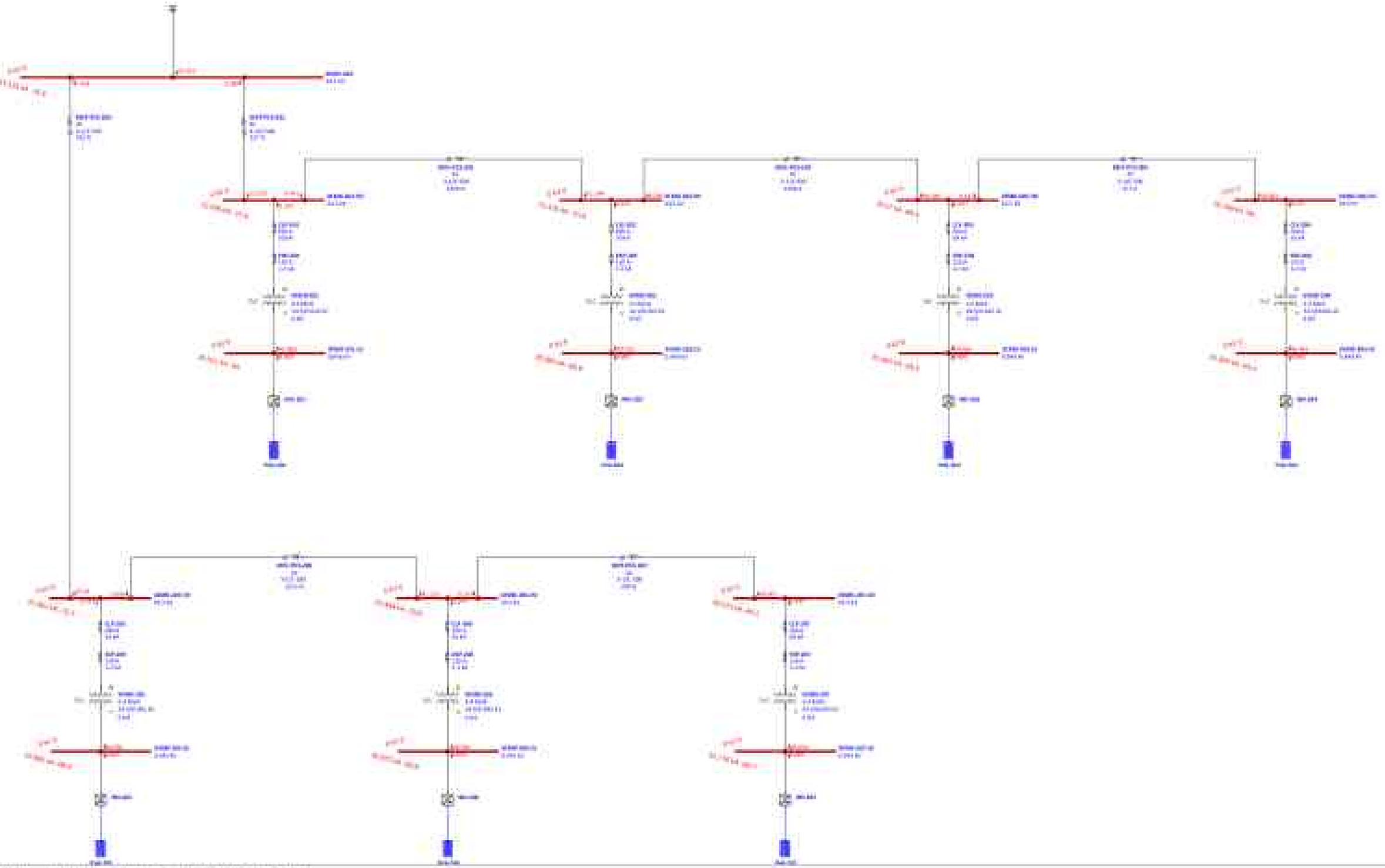


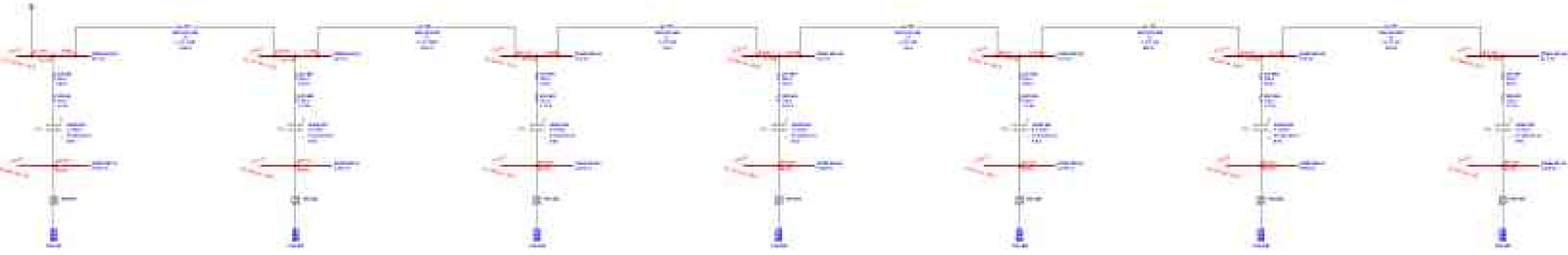


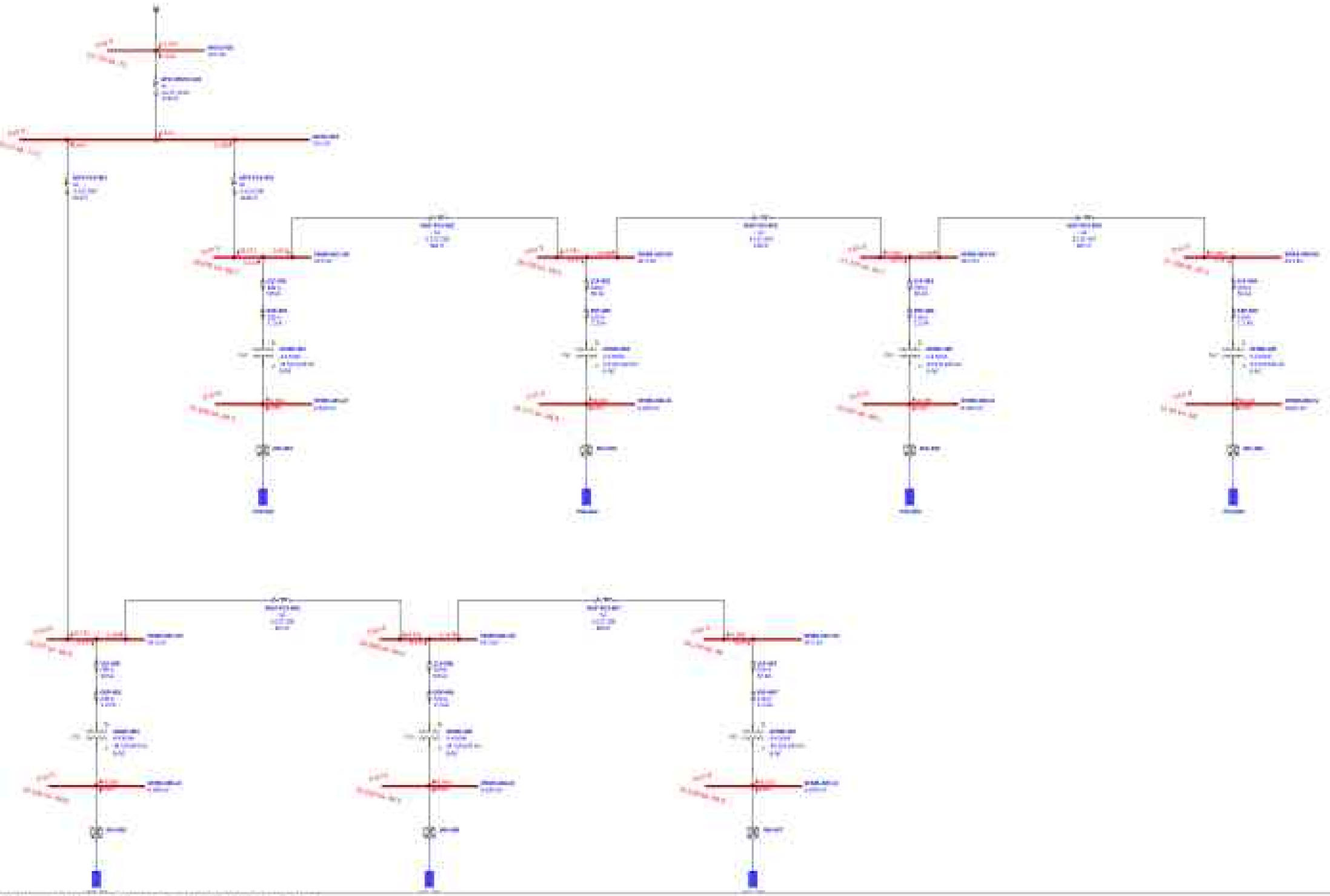
Peak 3-Ph Fault
Short-Circuit SLDs

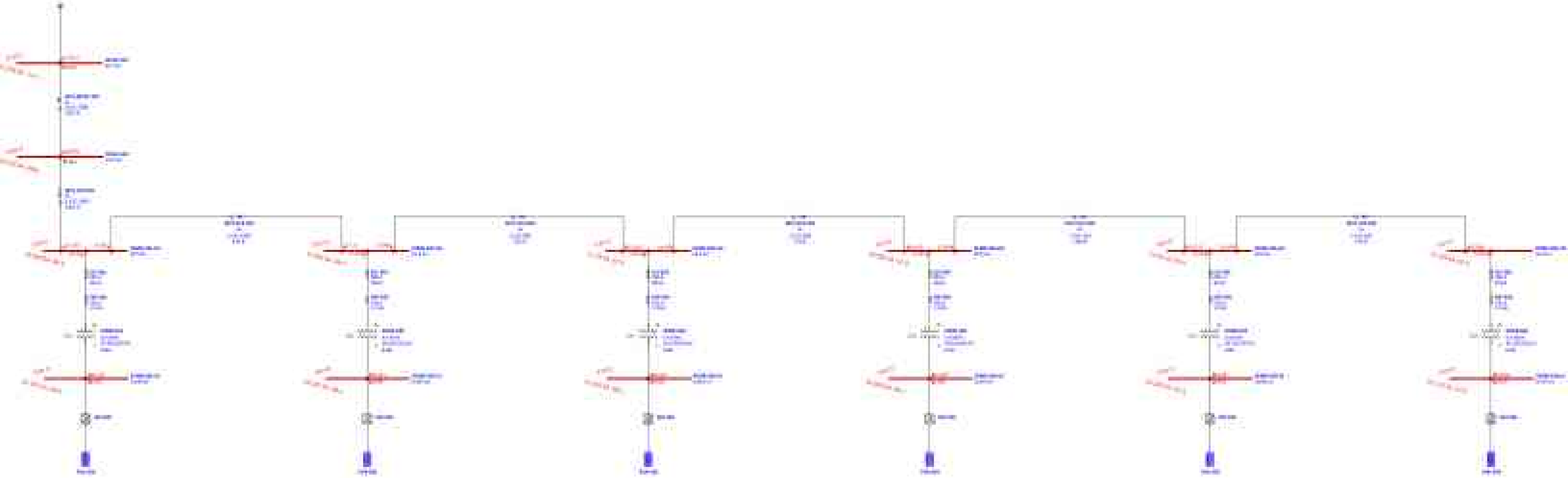


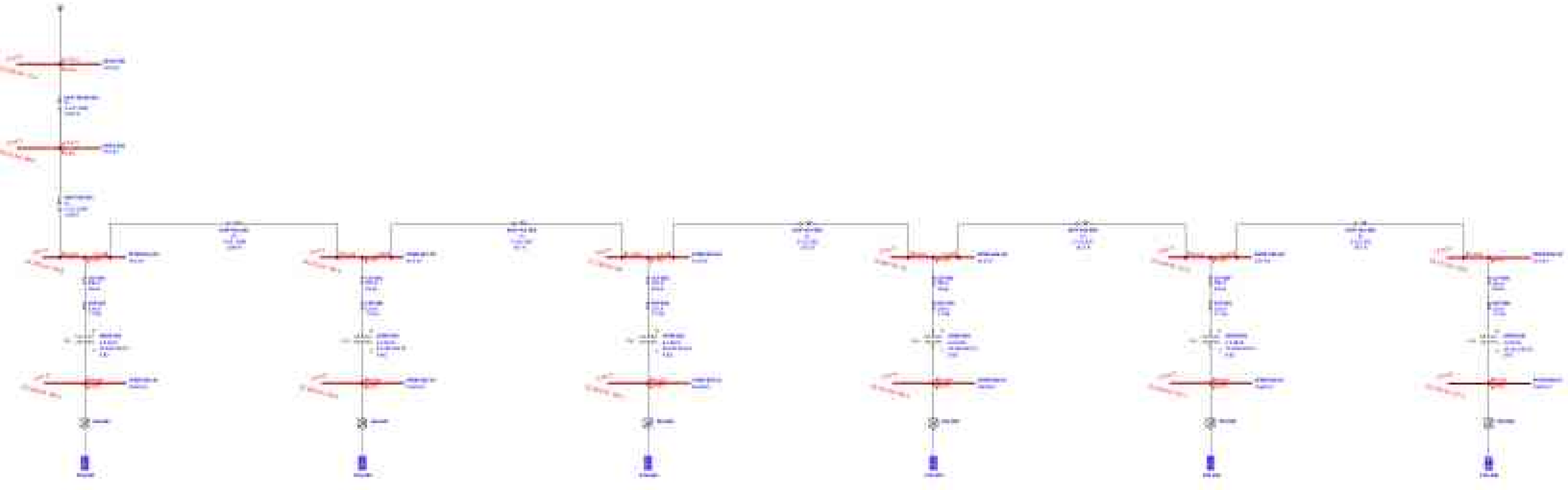


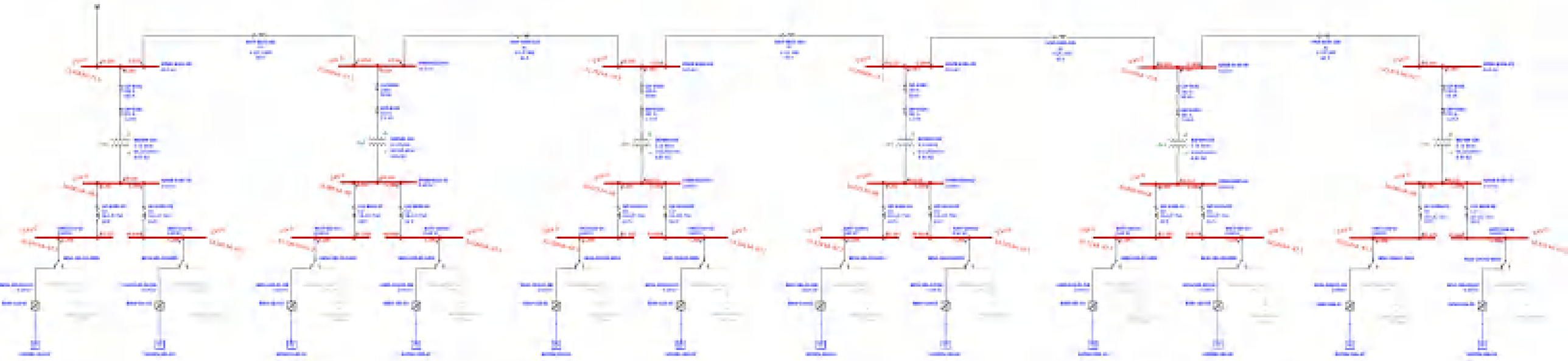


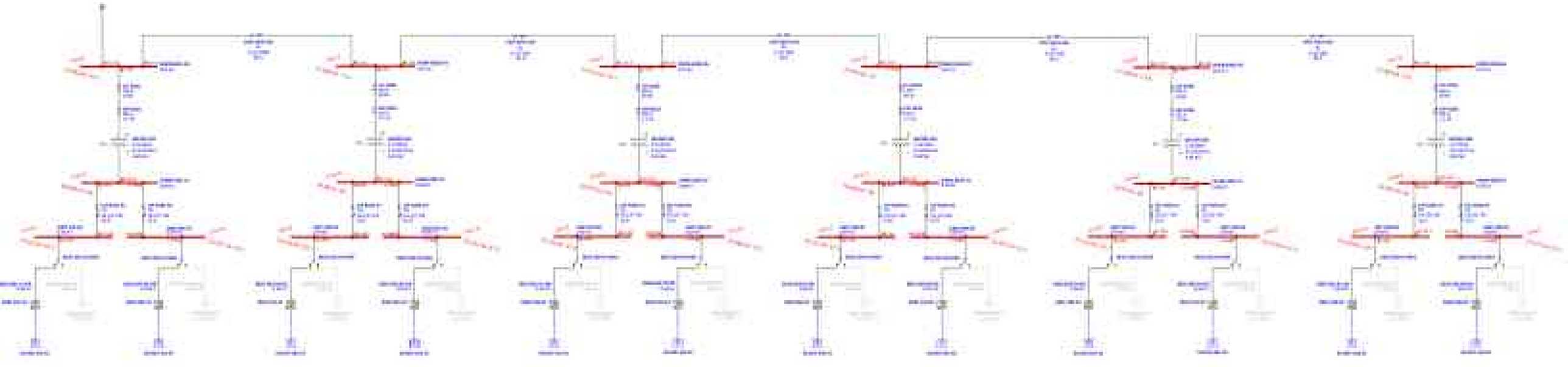


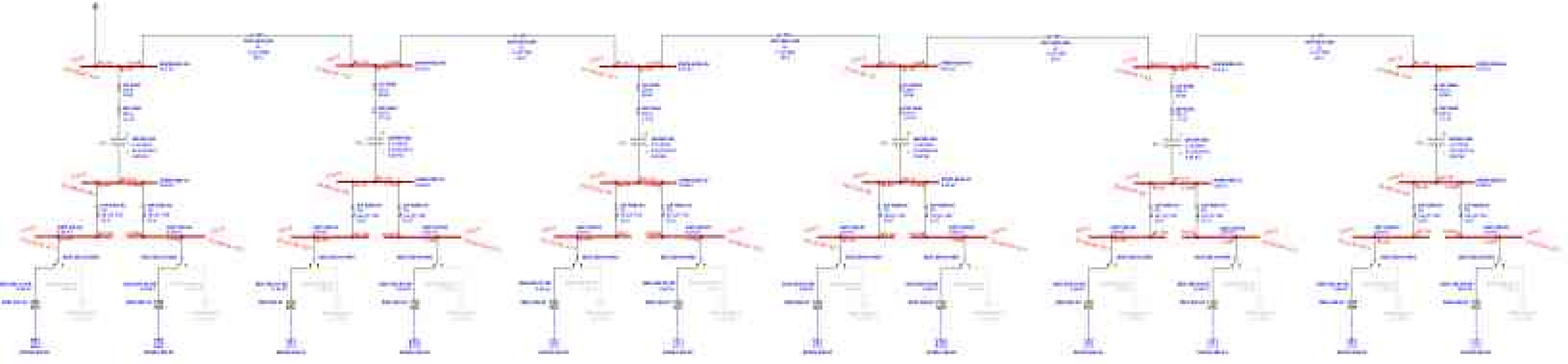


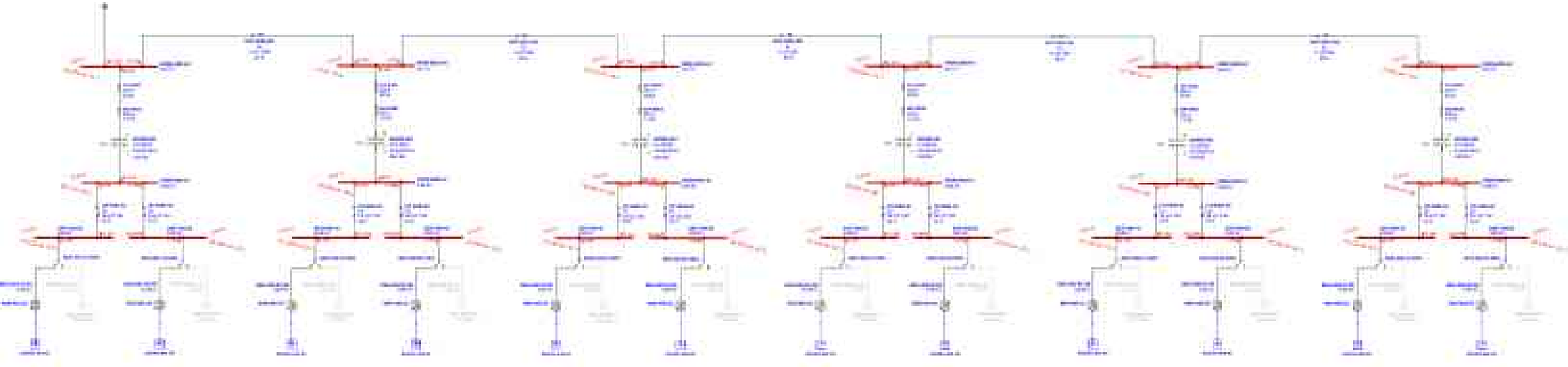


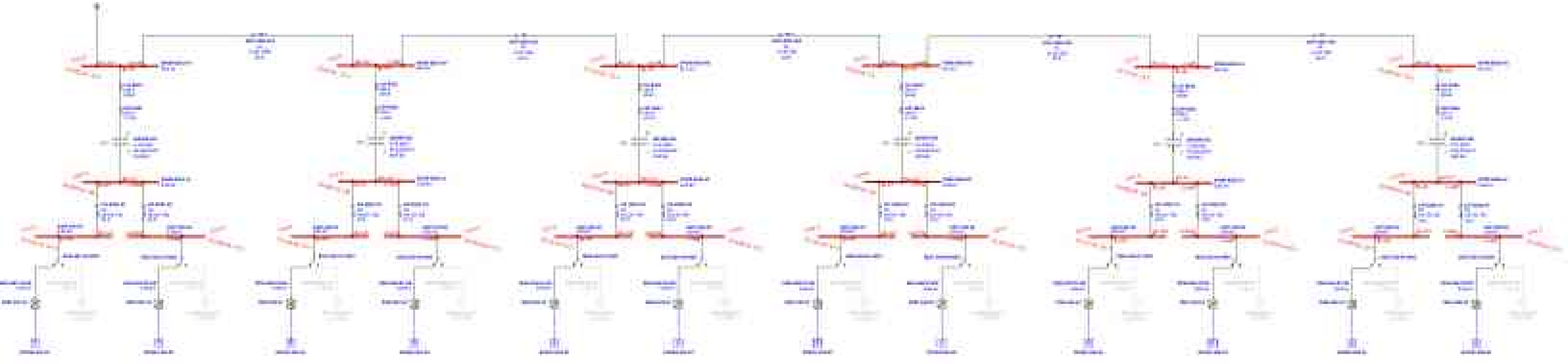


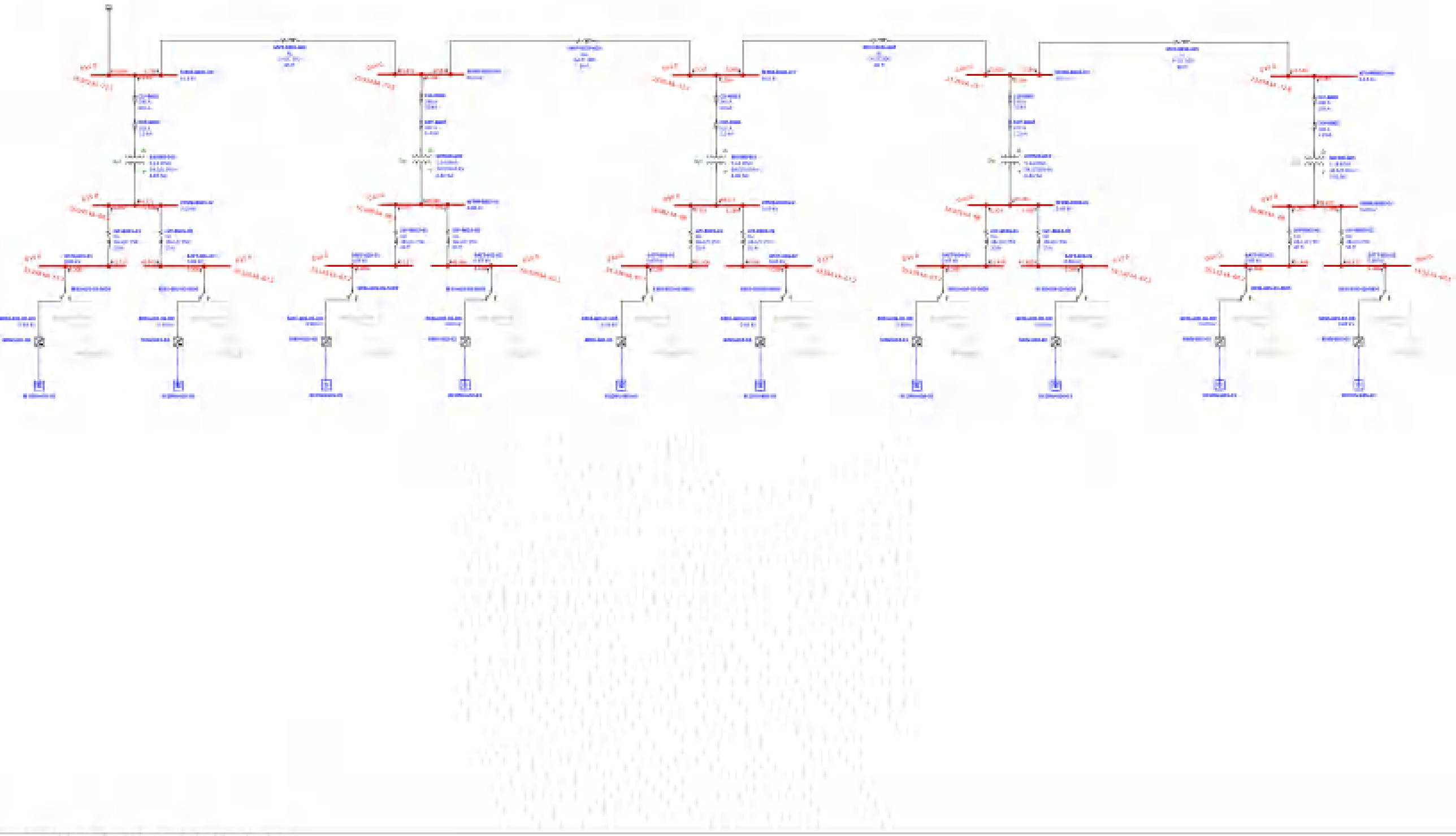




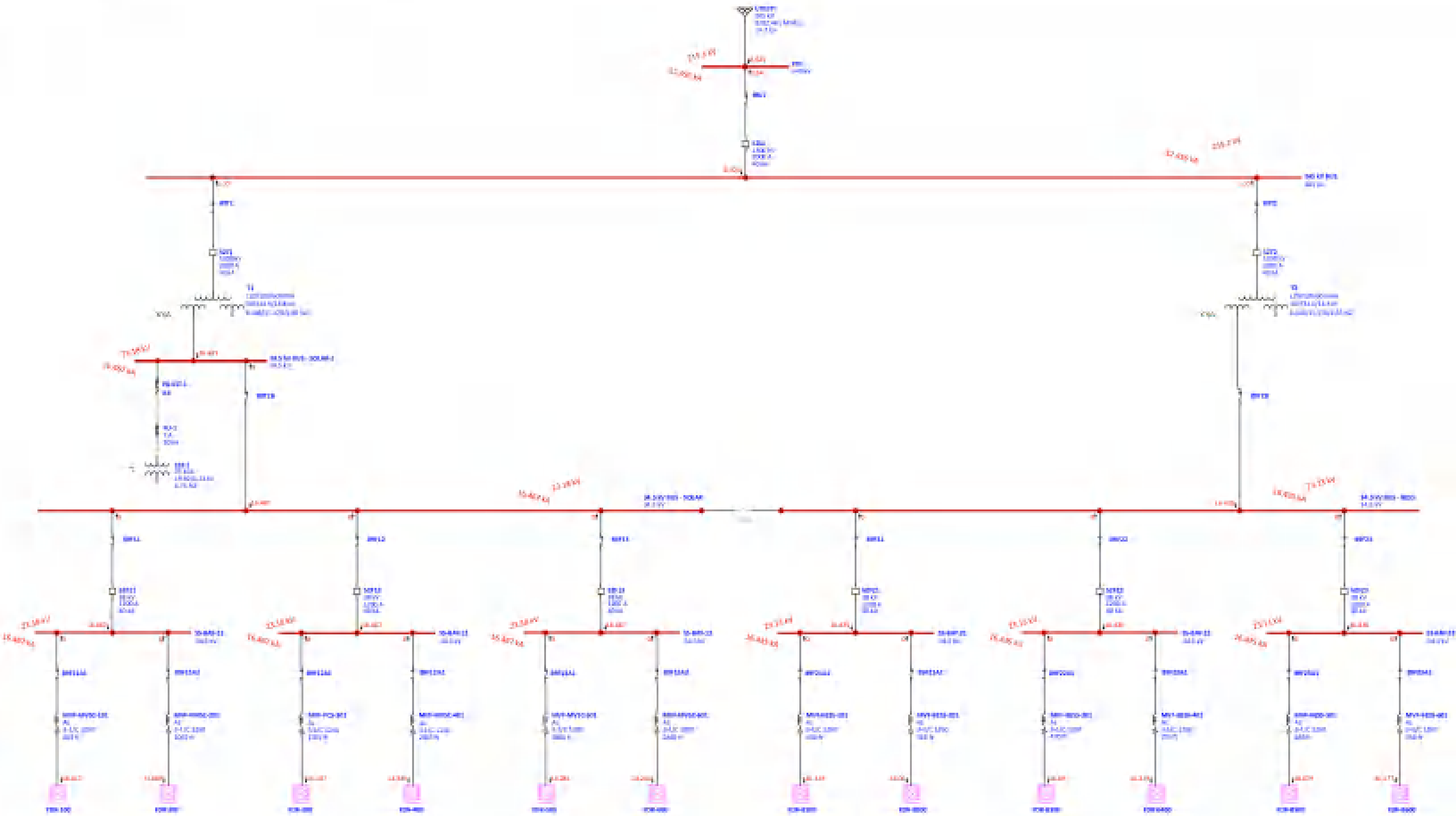


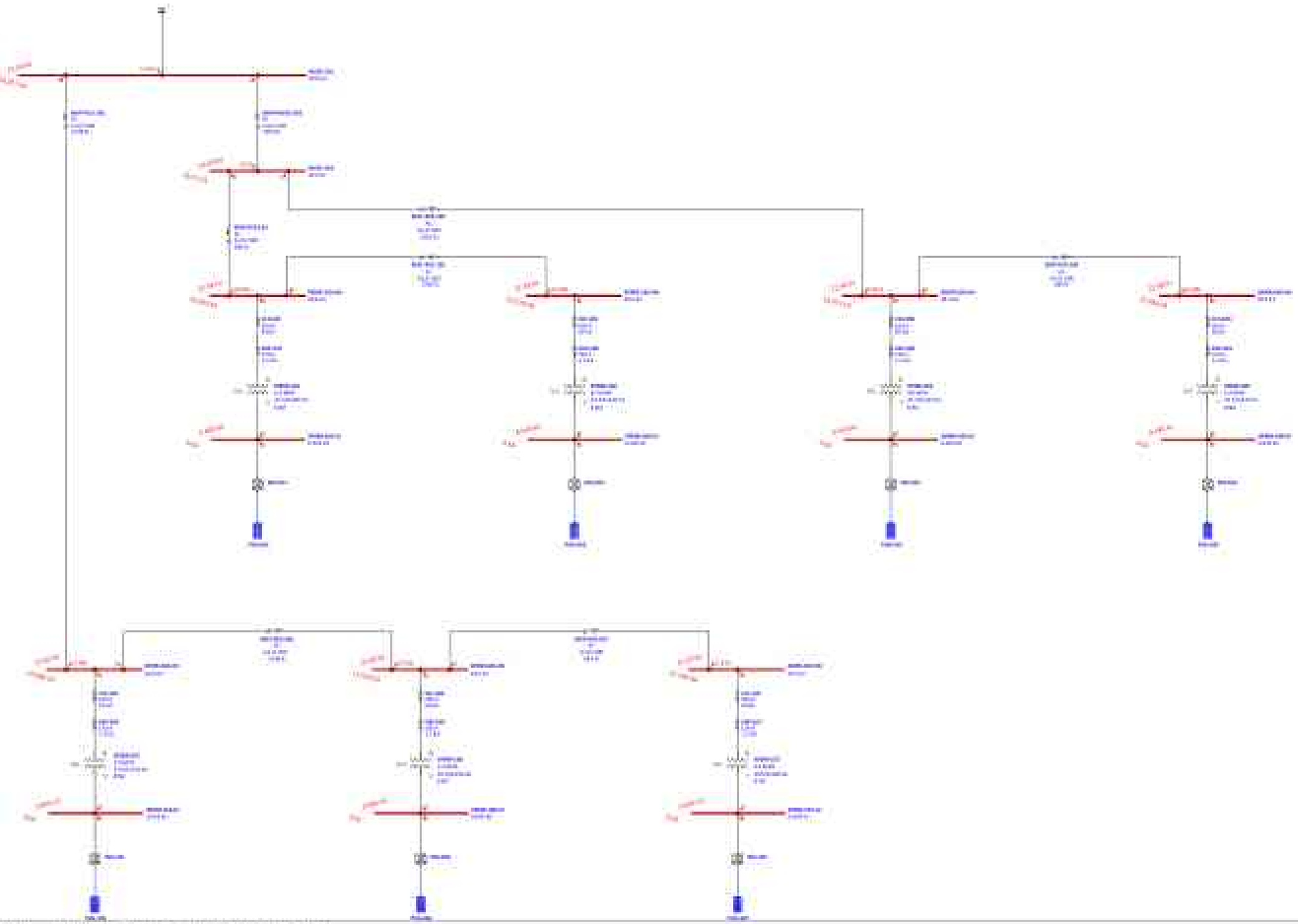


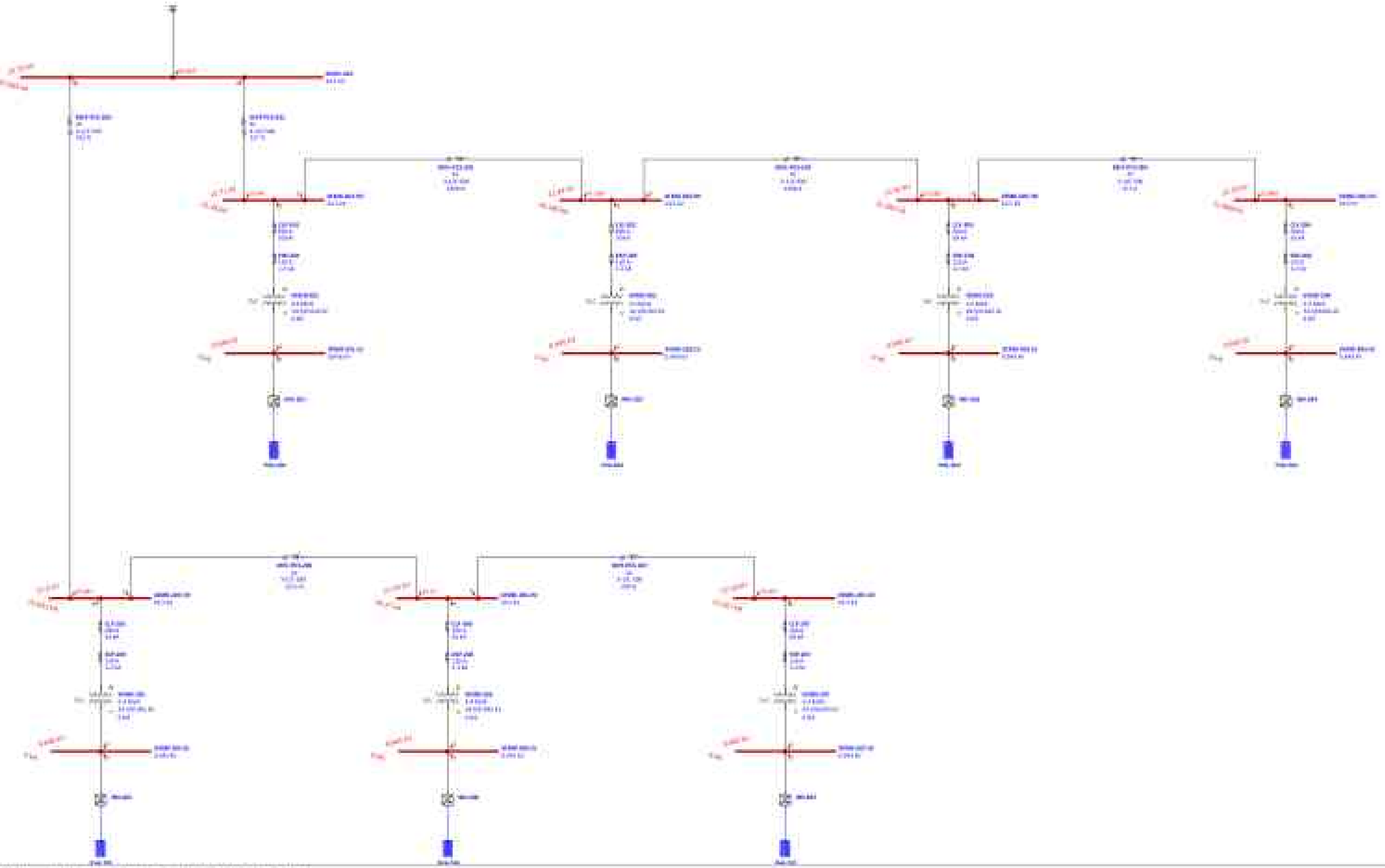


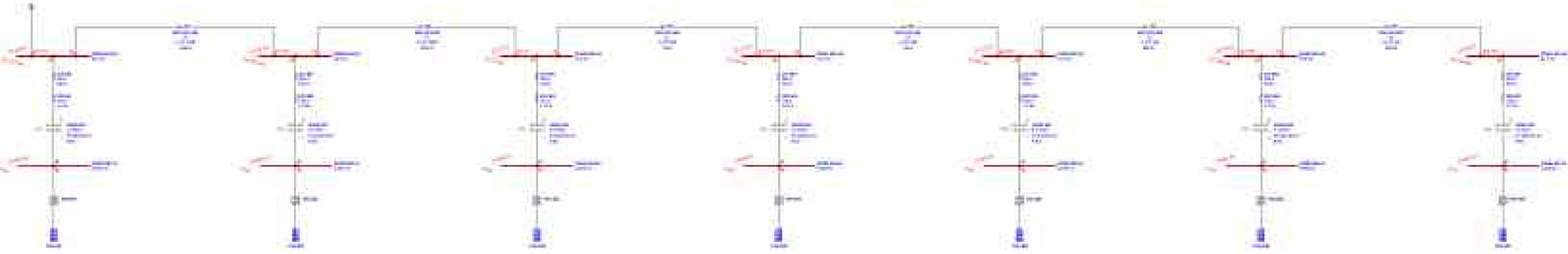


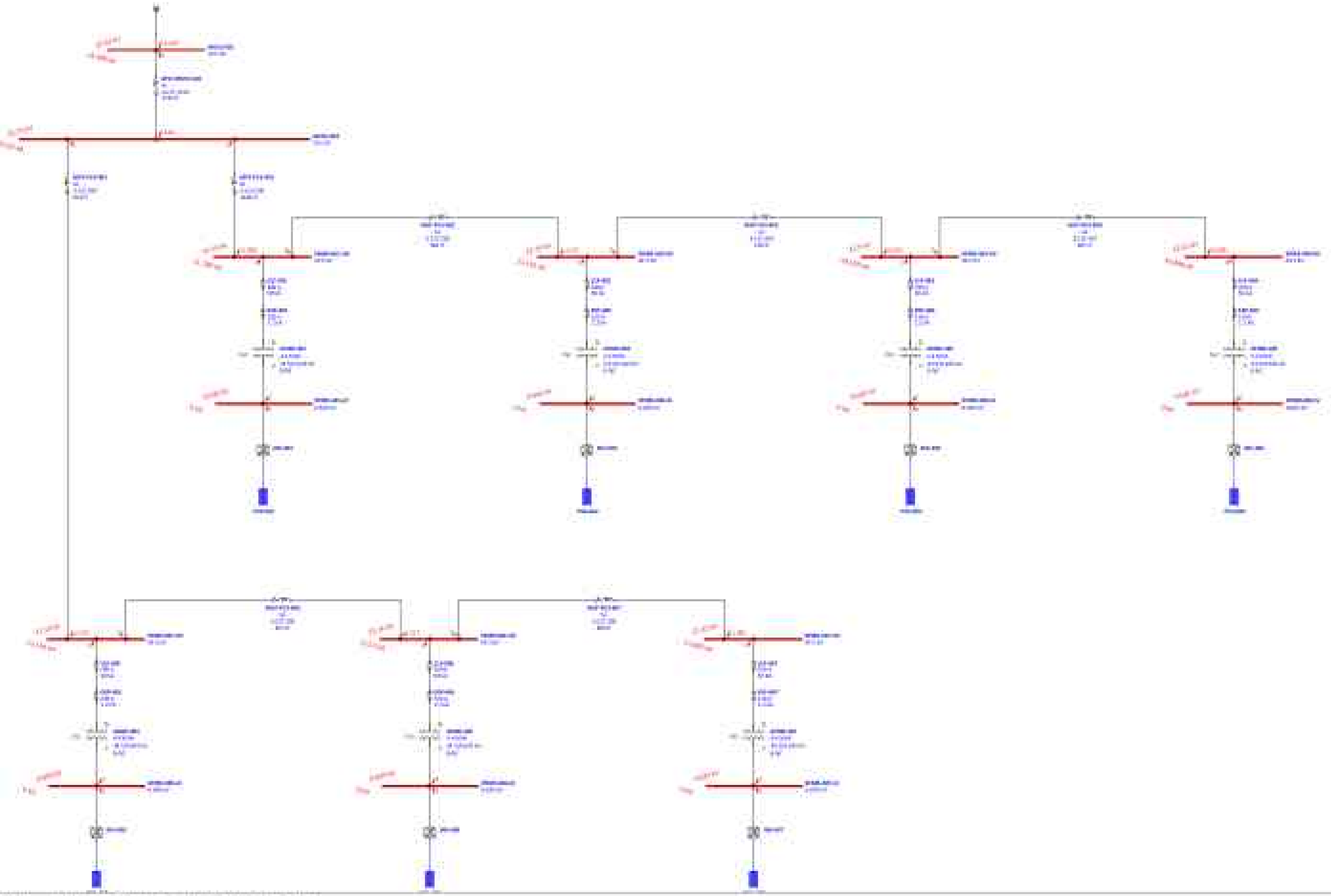
Peak L-G Fault
Short-Circuit SLDs

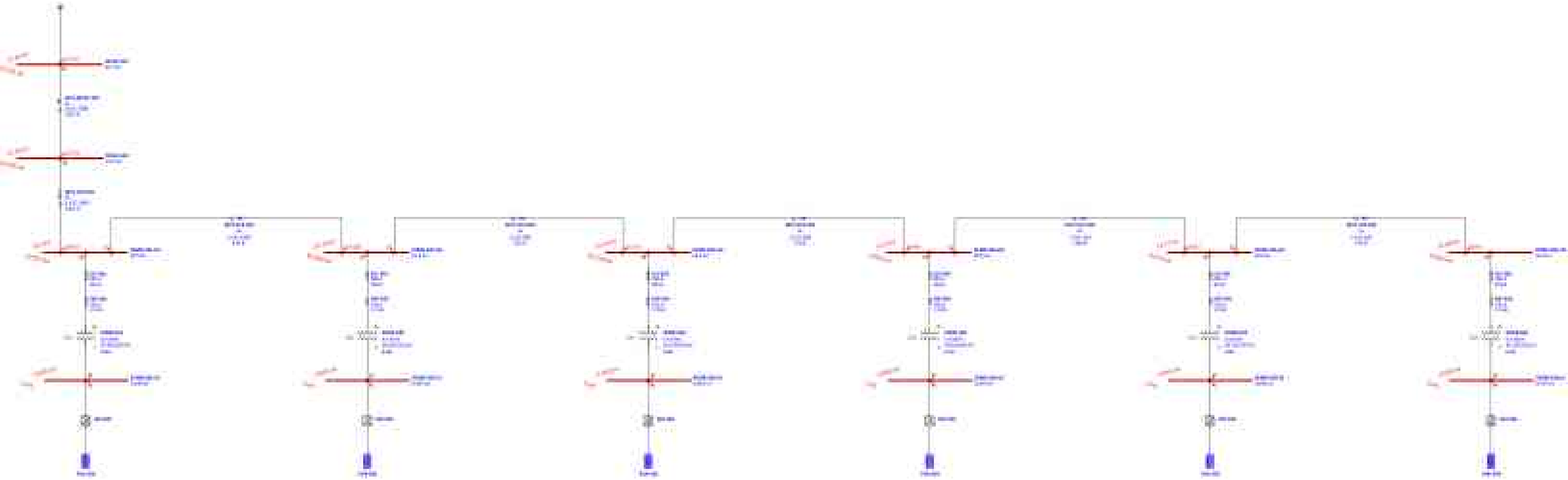


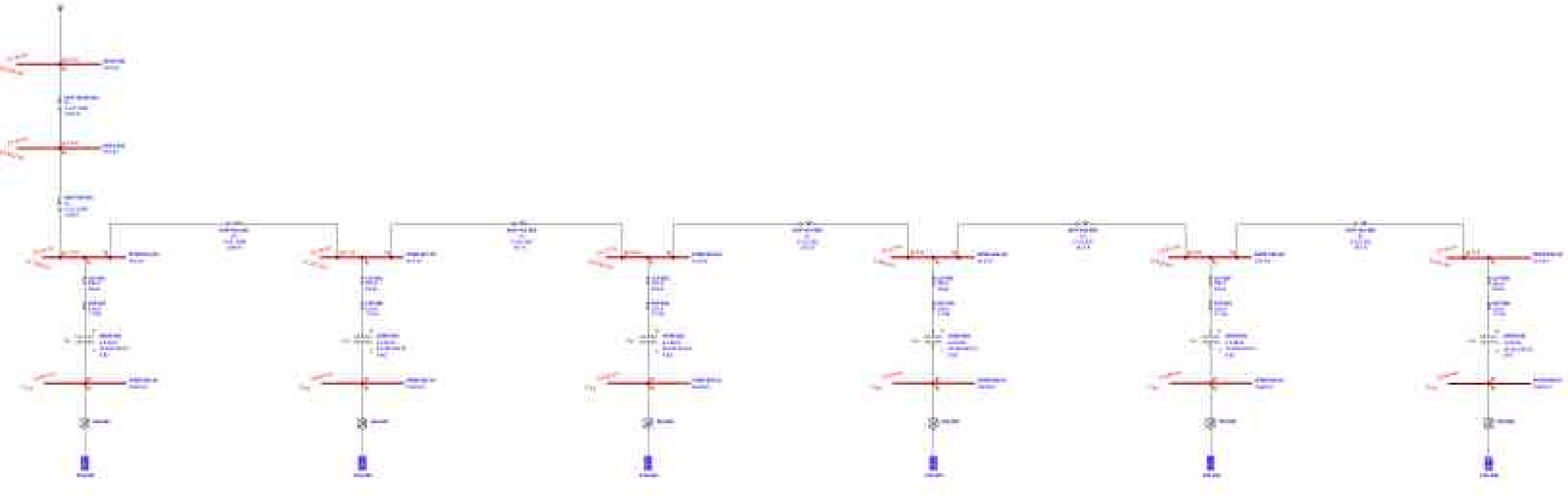




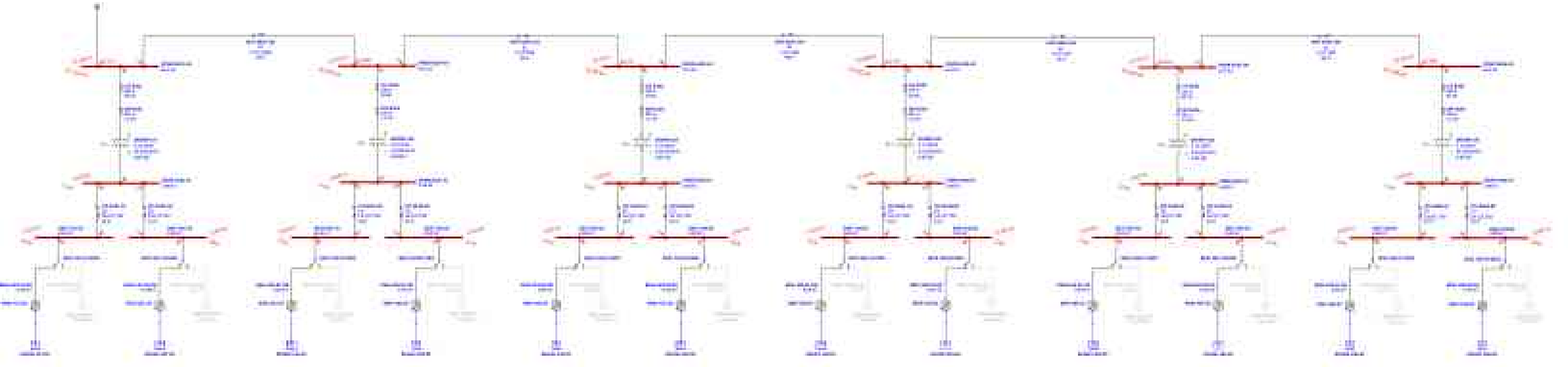


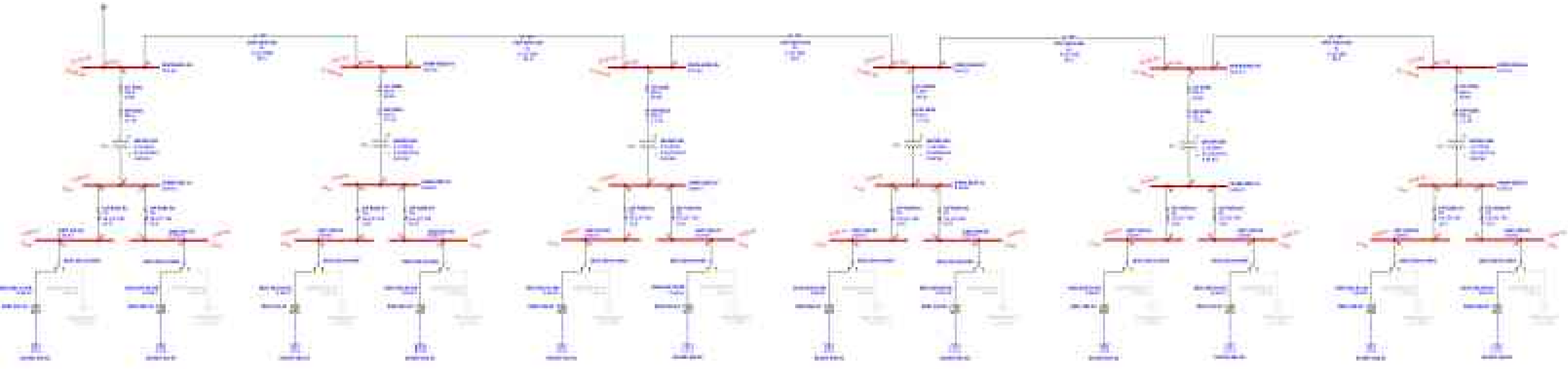


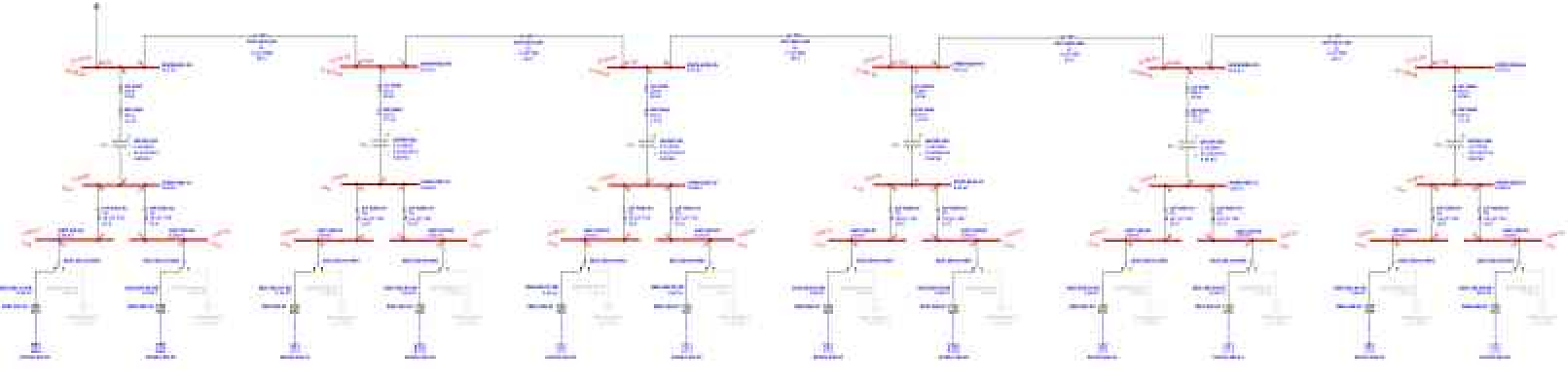


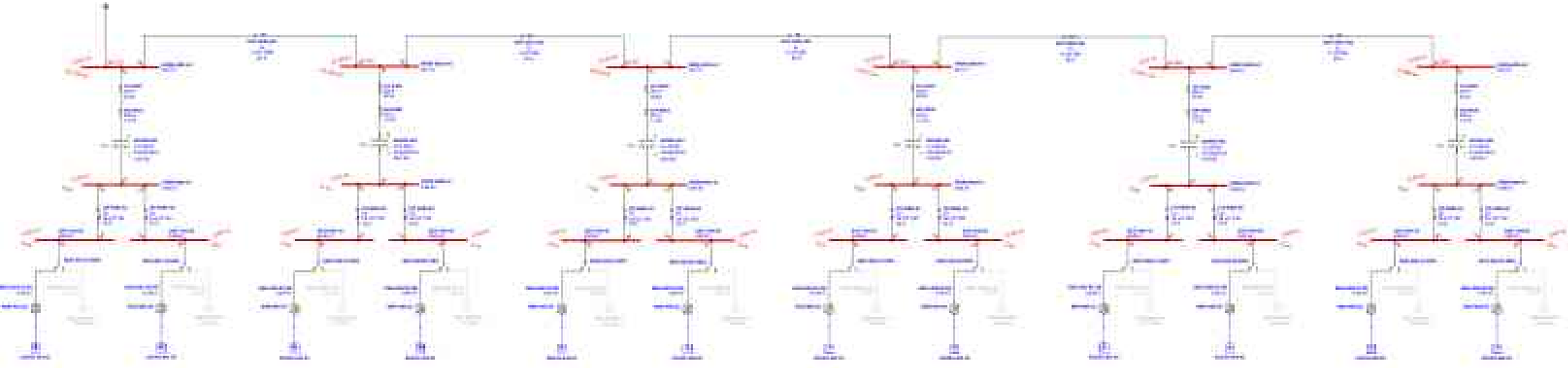


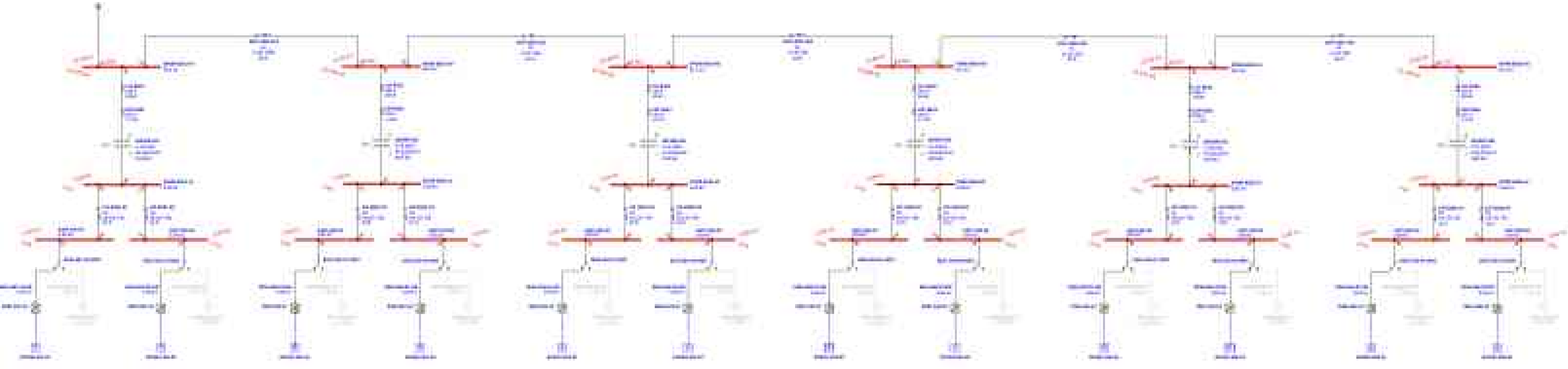
One-Line Diagram - SS->FDR-B100 | Short-Circuit Analysis | SC-Unity PF

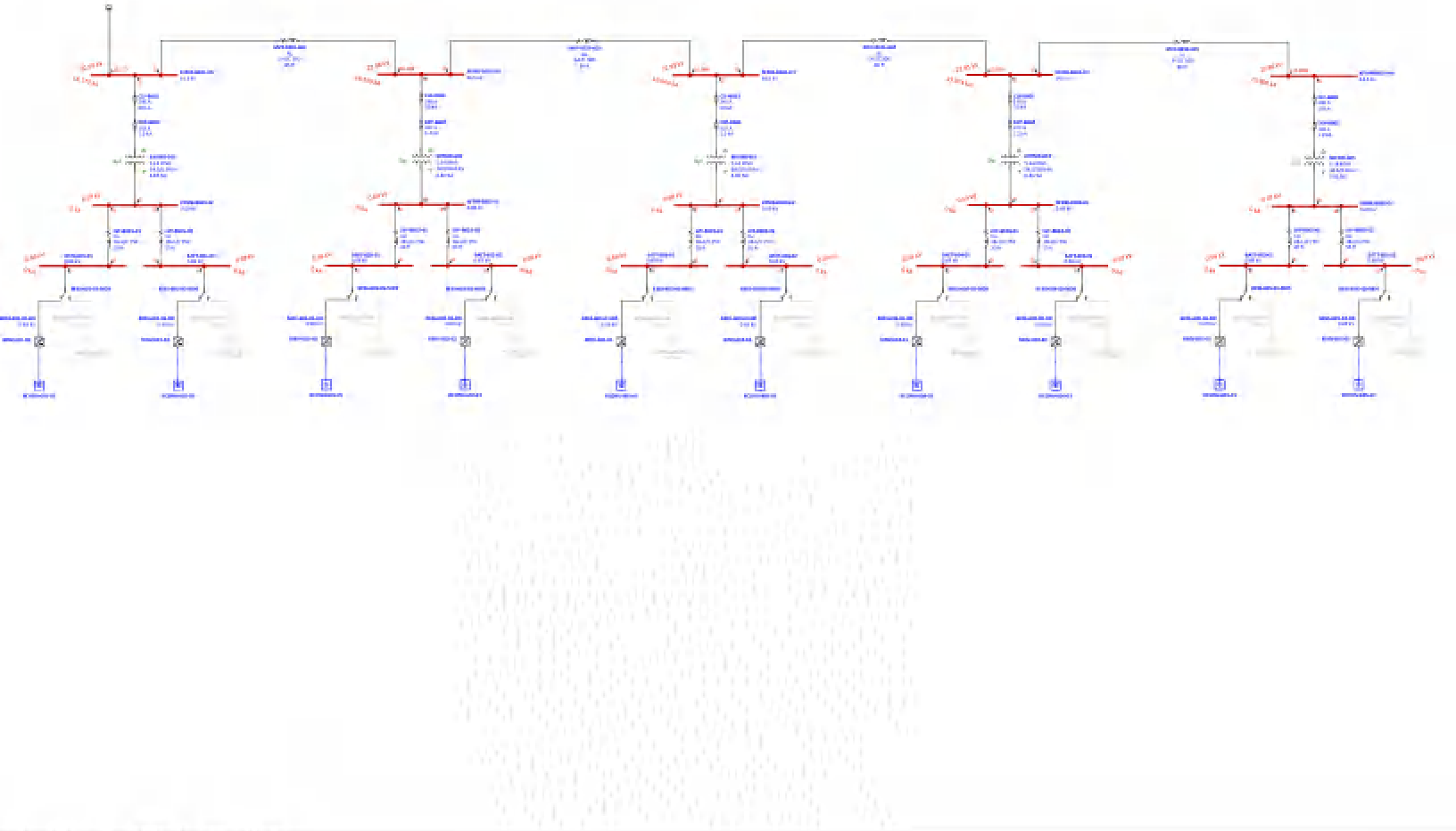












APPENDIX C – SHORT CIRCUIT REPORT

PRELIMINARY

Steady-State
Short-Circuit Report

Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, 1.0, 1.1, & 1.5 Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total
Number of Buses:	1	0	[illegible]	[illegible]

	35 kV	13.8 kV	Mains	Load Center Primary	Secondary	0.4 kV	0.48
Number of Branches:	31	1	0	[illegible]	0	76	0

	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machine	Lumped Load	Inverter	Total
Number of Machines:	0	1	0	0	0	[illegible]	[illegible]

System Frequency: 60.00

Unit System: English

Project Filename: ctgt24_Chevron

Output Filename: [illegible] Kuhl Power Engineering, Inc\Campus - 16.0\1 R&D\1 - Chevron\1 Chevron\ETAP\ETAP\Power Studies\Arc Flash\SC Comp\Arc Flash.AFA

Adjustments

Indicates	Apply Adjustments	Individual Actual	Percent
Transformer Impedance	Yes	Individual	
Reactor Impedance	Yes	Individual	
Overhead Power Transmission	No		
Transformer Tap Setting	No		
Cable / Reactor Length	No		

Temperature Correction	Apply Adjustments	Individual System	Degrees C
Transformer / Line Resistance	Yes	Individual	
Cable / Reactor Resistance	Yes	Individual	

Bus Input Data

		Bus			Initial Voltage	
ID	Type	Nom. kV	Base kV	Subsys.	%Mag.	Ang.
M-1161BUS - BUS6	Load	34.500	34.500	1	100.00	0.00
M-1161BUS - SOLAR	Load	34.500	34.500	1	100.00	0.00
M-1161BUS - SOLAR-1	Load	34.500	34.500	1	100.00	0.00
M1161BUS	Load	345.000	345.000	1	100.00	0.00
BATT-01H1	Load	0.690	0.690	1	100.00	-30.00
BATT-01H2	Load	0.690	0.690	1	100.00	-24.00
BATT-02H1	Load	0.690	0.690	1	100.00	-24.00
BATT-02H2	Load	0.690	0.690	1	100.00	-30.00
BATT-03H1	Load	0.690	0.690	1	100.00	-30.00
BATT-03H2	Load	0.690	0.690	1	100.00	-24.00
BATT-04H1	Load	0.690	0.690	1	100.00	-24.00
BATT-04H2	Load	0.690	0.690	1	100.00	-30.00
BATT-05H1	Load	0.690	0.690	1	100.00	-30.00
BATT-05H2	Load	0.690	0.690	1	100.00	-24.00
BATT-06H1	Load	0.690	0.690	1	100.00	-24.00
BATT-06H2	Load	0.690	0.690	1	100.00	-30.00
BATT-07H1	Load	0.690	0.690	1	100.00	-30.00
BATT-07H2	Load	0.690	0.690	1	100.00	-24.00
BATT-08H1	Load	0.690	0.690	1	100.00	-24.00
BATT-08H2	Load	0.690	0.690	1	100.00	-30.00
BATT-09H1	Load	0.690	0.690	1	100.00	-30.00
BATT-09H2	Load	0.690	0.690	1	100.00	-24.00
BATT-10H1	Load	0.690	0.690	1	100.00	-24.00
BATT-10H2	Load	0.690	0.690	1	100.00	-30.00
BATT-11H1	Load	0.690	0.690	1	100.00	-30.00
BATT-11H2	Load	0.690	0.690	1	100.00	-24.00
BATT-12H1	Load	0.690	0.690	1	100.00	-24.00
BATT-12H2	Load	0.690	0.690	1	100.00	-30.00
BATT-13H1	Load	0.690	0.690	1	100.00	-30.00
BATT-13H2	Load	0.690	0.690	1	100.00	-24.00
BATT-14H1	Load	0.690	0.690	1	100.00	-24.00
BATT-14H2	Load	0.690	0.690	1	100.00	-30.00
BATT-15H1	Load	0.690	0.690	1	100.00	-30.00
BATT-15H2	Load	0.690	0.690	1	100.00	-24.00
BATT-16H1	Load	0.690	0.690	1	100.00	-24.00
BATT-16H2	Load	0.690	0.690	1	100.00	-30.00
BATT-17H1	Load	0.690	0.690	1	100.00	-30.00
BATT-17H2	Load	0.690	0.690	1	100.00	-24.00
BATT-18H1	Load	0.690	0.690	1	100.00	-24.00
BATT-18H2	Load	0.690	0.690	1	100.00	-30.00
BATT-19H1	Load	0.690	0.690	1	100.00	-30.00
BATT-19H2	Load	0.690	0.690	1	100.00	-24.00
BATT-20H1	Load	0.690	0.690	1	100.00	-24.00
BATT-20H2	Load	0.690	0.690	1	100.00	-30.00
BATT-21H1	Load	0.690	0.690	1	100.00	-30.00
BATT-21H2	Load	0.690	0.690	1	100.00	-24.00
BATT-22H1	Load	0.690	0.690	1	100.00	-24.00
BATT-22H2	Load	0.690	0.690	1	100.00	-30.00
BATT-23H1	Load	0.690	0.690	1	100.00	-30.00
BATT-23H2	Load	0.690	0.690	1	100.00	-24.00
BATT-24H1	Load	0.690	0.690	1	100.00	-24.00
BATT-24H2	Load	0.690	0.690	1	100.00	-30.00
BATT-25H1	Load	0.690	0.690	1	100.00	-30.00
BATT-25H2	Load	0.690	0.690	1	100.00	-24.00
BATT-26H1	Load	0.690	0.690	1	100.00	-24.00
BATT-26H2	Load	0.690	0.690	1	100.00	-30.00
BATT-27H1	Load	0.690	0.690	1	100.00	-30.00
BATT-27H2	Load	0.690	0.690	1	100.00	-24.00
BATT-28H1	Load	0.690	0.690	1	100.00	-24.00
BATT-28H2	Load	0.690	0.690	1	100.00	-30.00
BATT-29H1	Load	0.690	0.690	1	100.00	-30.00
BATT-29H2	Load	0.690	0.690	1	100.00	-24.00
BATT-30H1	Load	0.690	0.690	1	100.00	-24.00
BATT-30H2	Load	0.690	0.690	1	100.00	-30.00
BATT-31H1	Load	0.690	0.690	1	100.00	-30.00
BATT-31H2	Load	0.690	0.690	1	100.00	-24.00
BATT-32H1	Load	0.690	0.690	1	100.00	-24.00
BATT-32H2	Load	0.690	0.690	1	100.00	-30.00
BATT-33H1	Load	0.690	0.690	1	100.00	-30.00
BATT-33H2	Load	0.690	0.690	1	100.00	-24.00
BATT-34H1	Load	0.690	0.690	1	100.00	-24.00
BATT-34H2	Load	0.690	0.690	1	100.00	-30.00
BATT-35H1	Load	0.690	0.690	1	100.00	-30.00
BATT-35H2	Load	0.690	0.690	1	100.00	-24.00
BATT-36H1	Load	0.690	0.690	1	100.00	-24.00
BATT-36H2	Load	0.690	0.690	1	100.00	-30.00
BATT-37H1	Load	0.690	0.690	1	100.00	-30.00
BATT-37H2	Load	0.690	0.690	1	100.00	-24.00
BATT-38H1	Load	0.690	0.690	1	100.00	-24.00
BATT-38H2	Load	0.690	0.690	1	100.00	-30.00
BATT-39H1	Load	0.690	0.690	1	100.00	-30.00
BATT-39H2	Load	0.690	0.690	1	100.00	-24.00
BATT-40H1	Load	0.690	0.690	1	100.00	-24.00

Project:	Chisme	ETAP		Page:	4
Location:	Brown and Mills County, TX	24.0.3C		Date:	09-03-2015
Contract:	EX-09-1701			SN:	PURE-POWER2
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisme			Config.:	Normal

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BATT-403-02	Load	0.600	0.600	1	100.00	-30.00
BATT-402-01	Load	0.600	0.600	1	100.00	-24.00
BATT-402-02	Load	0.600	0.600	1	100.00	-30.00
BATT-403-01	Load	0.600	0.600	1	100.00	-36.00
BATT-403-02	Load	0.600	0.600	1	100.00	-48.00
BATT-404-01	Load	0.600	0.600	1	100.00	-24.00
BATT-404-02	Load	0.600	0.600	1	100.00	-24.00
BATT-405-01	Load	0.600	0.600	1	100.00	-36.00
BATT-405-02	Load	0.600	0.600	1	100.00	-48.00
BATT-406-01	Load	0.600	0.600	1	100.00	-24.00
BATT-406-02	Load	0.600	0.600	1	100.00	-30.00
BATT-407-01	Load	0.600	0.600	1	100.00	-36.00
BATT-500-02	Load	0.600	0.600	1	100.00	-48.00
BATT-502-01	Load	0.600	0.600	1	100.00	-24.00
BATT-502-02	Load	0.600	0.600	1	100.00	-24.00
BATT-503-01	Load	0.600	0.600	1	100.00	-36.00
BATT-503-02	Load	0.600	0.600	1	100.00	-24.00
BATT-504-01	Load	0.600	0.600	1	100.00	-30.00
BATT-504-02	Load	0.600	0.600	1	100.00	-36.00
BATT-505-01	Load	0.600	0.600	1	100.00	-48.00
BATT-505-02	Load	0.600	0.600	1	100.00	-24.00
BATT-506-01	Load	0.600	0.600	1	100.00	-24.00
BATT-506-02	Load	0.600	0.600	1	100.00	-30.00
BATT-601-01	Load	0.600	0.600	1	100.00	-36.00
BATT-601-02	Load	0.600	0.600	1	100.00	-24.00
BATT-602-01	Load	0.600	0.600	1	100.00	-30.00
BATT-602-02	Load	0.600	0.600	1	100.00	-36.00
BATT-603-01	Load	0.600	0.600	1	100.00	-48.00
BATT-603-02	Load	0.600	0.600	1	100.00	-24.00
BATT-604-01	Load	0.600	0.600	1	100.00	-24.00
BATT-604-02	Load	0.600	0.600	1	100.00	-30.00
BATT-605-01	Load	0.600	0.600	1	100.00	-24.00
BATT-605-02	Load	0.600	0.600	1	100.00	-30.00
BROK-103-01-DIS	Load	0.600	0.600	1	100.00	-36.00
BROK-103-02-DIS	Load	0.600	0.600	1	100.00	-48.00
BESS-103-01-DIS	Load	0.600	0.600	1	100.00	-24.00
BESS-103-02-DIS	Load	0.600	0.600	1	100.00	-24.00
BROK-104-01-DIS	Load	0.600	0.600	1	100.00	-30.00
BROK-104-02-DIS	Load	0.600	0.600	1	100.00	-36.00
BESS-104-01-DIS	Load	0.600	0.600	1	100.00	-24.00
BESS-104-02-DIS	Load	0.600	0.600	1	100.00	-30.00
BROK-105-01-DIS	Load	0.600	0.600	1	100.00	-36.00
BROK-105-02-DIS	Load	0.600	0.600	1	100.00	-48.00

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BUS9-106-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-106-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-205-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-205-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-205-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-205-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-204-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-204-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-203-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-206-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-206-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS9-201-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-201-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-201-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-202-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-202-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-202-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-203-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-203-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-203-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-208-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-208-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-208-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-207-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-207-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-207-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-210-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-210-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-210-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-209-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-209-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-209-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-212-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-212-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-212-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-211-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-211-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-211-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-214-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-214-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-214-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-213-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-213-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-213-02MH	Load	0.600	0.600	1	100.00	-90.00
BUS9-216-01MH	Load	0.600	0.600	1	100.00	-30.00
BUS6-216-02MH	Load	0.600	0.600	1	100.00	-120.00
BUS5-215-01MH	Load	0.600	0.600	1	100.00	-270.00
BUS8-216-02MH	Load	0.600	0.600	1	100.00	-90.00

ID	Type	Nom. kV	Base kV	Sub-sys	Initial Voltage	
					%Mag.	Ang.
BRSS-SOS-02-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S34-01-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S34-02-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-SOS-01-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-SOS-02-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S06-01-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S06-02-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-S03-01-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-S03-02-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S02-01-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S02-02-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-S05-01-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-S05-02-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S04-01-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S04-02-001	Load	0.600	0.600	1	100.00	-30.00
BRSS-S08-01-001	Load	0.600	0.600	1	100.00	-30.00
BESS-S10-01-001	Load	0.600	0.600	1	100.00	-30.00
MVSC-01	Load	34.500	34.500	1	100.00	-30.00
MVSC-02	Load	34.500	34.500	1	100.00	-30.00
MVSC-03	Load	34.500	34.500	1	100.00	-30.00
MVSC-04	Load	34.500	34.500	1	100.00	-30.00
MVSC-05	Load	34.500	34.500	1	100.00	-30.00
MVSC-06	Load	34.500	34.500	1	100.00	-30.00
MVSC-07	Load	34.500	34.500	1	100.00	-30.00
MVSC-08	Load	34.500	34.500	1	100.00	-30.00
MVSC-09	Load	34.500	34.500	1	100.00	-30.00
MVSC-10	Load	34.500	34.500	1	100.00	-30.00
POI	MVMD	345.000	345.000	1	100.00	0.00
SWGR-11	Load	34.500	34.500	1	100.00	0.00
SWGR-12	Load	34.500	34.500	1	100.00	0.00
SWGR-13	Load	34.500	34.500	1	100.00	0.00
SWGR-21	Load	34.500	34.500	1	100.00	0.00
SWGR-22	Load	34.500	34.500	1	100.00	0.00
SWGR-23	Load	34.500	34.500	1	100.00	0.00
XFMR-01-HV	Load	34.500	34.500	1	100.00	-30.00
XFMR-01-LV	Load	0.600	0.600	1	100.00	-30.00
XFMR-02-HV	Load	34.500	34.500	1	100.00	-30.00
XFMR-02-LV	Load	0.600	0.600	1	100.00	-30.00
XFMR-03-HV	Load	34.500	34.500	1	100.00	-30.00
XFMR-03-LV	Load	0.600	0.600	1	100.00	-30.00
XFMR-04-HV	Load	34.500	34.500	1	100.00	-30.00
XFMR-04-LV	Load	0.600	0.600	1	100.00	-30.00
XFMR-05-HV	Load	34.500	34.500	1	100.00	-30.00
XFMR-05-LV	Load	0.600	0.600	1	100.00	-30.00

ID	Type	Nom. kV	Bus kV	Sub-sys	Voltage	
XFMR-T04-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T04-LV	Load	0.845	0.845	1	0.8789	-24.09
XFMR-T07-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T07-LV	Load	0.845	0.845	1	100.05	-38.09
XFMR-T05-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T05-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T03-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T03-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T09-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T09-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T04-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T04-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T05-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T05-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T06-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T06-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T07-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T07-LV	Load	0.845	0.845	1	100.05	-38.09
XFMR-T01-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T01-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T02-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T02-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T03-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T03-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T04-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T04-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T05-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T05-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T06-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T06-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T07-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T07-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T08-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T08-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T09-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T09-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T10-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T10-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T11-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T11-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T12-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T12-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T13-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T13-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T14-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T14-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T15-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T15-LV	Load	0.845	0.845	1	100.05	-24.09
XFMR-T16-HV	Load	34.500	34.500	1	100.24	-0.68
XFMR-T16-LV	Load	0.845	0.845	1	100.05	-24.09

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-004-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4615-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-507-LV	Load	0.645	0.645	1	100.06	-29.99
XFMR-501-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-503-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-503-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-507-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-503-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-504-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-504-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-504-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-505-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-505-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-506-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-506-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4615-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-501-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-502-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-502-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-503-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-503-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-504-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-504-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-505-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-505-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-506-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-506-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5010-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5010-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5011-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5011-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5012-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5012-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5013-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5013-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5014-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5014-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5015-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5015-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5016-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5016-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5017-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5017-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5018-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5018-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5019-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5019-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-5020-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-5020-LV	Load	0.645	0.645	1	100.00	-29.99

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-0033-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0033-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0034-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0034-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0035-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0035-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0036-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0036-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0101-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0101-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0102-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0102-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0103-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0103-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0104-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0104-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0105-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0105-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0106-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0106-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0401-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0401-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0402-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0402-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0403-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0403-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0404-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0404-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0405-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0405-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0406-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0406-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0501-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0501-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0502-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0502-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0503-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0503-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0504-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0504-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0505-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0505-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0506-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0506-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0601-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0601-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0602-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0602-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0603-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0603-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0604-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0604-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0605-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0605-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0606-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0606-LV	Load	0.690	0.690	1	100.00	-38.09

Project:	Chemir	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Bus

Initial Voltage

ID	Type	Nom. kV	Base kV	Sub-sys	Voltage	Ang.
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]

[illegible] Buses total

All voltages reported by ETAP are in % of bus [illegible] kV.
Bus kV values of buses are calculated and used internally by [illegible]

Project:	Chrome	ETAP		Page:	11
Location:	Bowie and Mills County, TX	20.0.0C		Date:	09/25/2023
Contract:	15-49-1281			SN:	59385-RADIAL
Engineer:	Pure Power Engineering	Study Case: SC-Loadp PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Line/Cable/Busway Input Data

Line/Cable/Busway

ID	Library	Size	Length (ft)	Length (m)	Adjusted	T (°C)	R1	X1	Z1	R0	X0	Z0
LVF-BUS1-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS1-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS2-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS2-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS3-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS3-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS4-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS4-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS5-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS5-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS6-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS6-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS7-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS7-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS8-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS8-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS9-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS9-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS10-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS10-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS11-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS11-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS12-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS12-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS13-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS13-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS14-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS14-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS15-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS15-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS16-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS16-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS17-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS17-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS18-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS18-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS19-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS19-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS20-01	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171
LVF-BUS20-02	1000 CU	750	20.0	6.0	1	75	0.0149344	0.0420433	0.0446367	0.0144433	0.0396973	0.0422171

Project:	Chrome	ETAP		Page:	12
Location:	Brown and Mills Canyon, TX	20.0.0C		Date:	04/01/2023
Contract:	15-49-1281			SN:	59182-BAB682
Engineer:	Pure Power Engineering	Study Case: SC-Loop 59		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Branch connections (per 1000 ft per Conductor) (Cable) or per Phase (Line/Busway)

Line/Cable/Busway ID	Type	Size	Length (ft)	Ampacity	Adjusted	R (Ω)	X (Ω)	Z (Ω)	Y (S)	Vd (%)	Vd (V)
LVC-B46-10	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-11	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-12	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-13	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-14	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-15	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-16	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-17	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-18	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-19	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-20	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-21	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-22	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-23	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-24	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-25	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-26	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-27	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-28	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-29	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-30	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-31	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-32	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-33	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-34	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-35	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-36	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-37	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-38	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-39	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-40	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-41	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-42	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-43	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-44	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-45	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-46	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-47	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-48	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-49	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-50	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-51	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-52	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-53	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-54	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-55	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-56	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-57	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-58	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-59	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-60	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-61	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-62	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-63	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-64	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-65	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-66	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-67	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-68	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-69	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-70	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-71	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-72	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-73	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-74	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-75	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-76	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-77	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-78	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-79	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-80	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-81	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-82	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-83	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-84	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-85	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-86	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-87	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-88	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-89	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-90	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-91	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-92	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-93	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-94	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-95	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-96	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-97	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-98	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-99	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-100	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-101	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-102	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-103	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-104	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-105	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-106	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-107	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-108	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-109	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-110	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-111	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-112	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-113	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-114	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-115	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-116	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-117	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-118	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-119	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-120	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-121	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-122	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-123	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-124	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-125	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-126	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-127	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-128	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-129	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-130	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-131	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-132	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-133	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-134	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-135	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-136	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-137	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-138	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-139	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-140	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-141	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-142	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-143	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-144	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-145	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-146	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-147	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-148	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-149	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-150	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-151	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-152	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-153	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-154	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-155	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-156	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-157	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-158	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-159	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-160	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-161	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-162	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-163	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-164	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-165	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-166	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-167	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-168	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-169	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-170	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-171	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-172	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-173	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-174	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-175	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-176	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-177	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-178	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-179	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-180	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-181	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-182	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-183	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-184	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-185	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-186	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-187	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-188	1/0 CU THHN	750	65.6	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000	0.000000
LVC-B46-189	1/0 CU THHN	750	98.4	0.0	0	0.0	0.000334	0.0024409	0.0024637	0.0000000

Project:	[illegible]	ETAP		Page:	13
Location:	Bowie and Mills County, TX	20.0.0C		Date:	04/03/2023
Contract:	03-49-1201			SN:	59182-RADIAL
Engineer:	Pure Power Engineering	Study Case: SC-Comp 3P		Revision:	Base
Filename:	ofp14_Chisos			Config.:	Normal

Line/Cable/Busway

ID	Length (ft)	Adj. (ft)	Size	Ampacity	T (°C)	R (Ω)	X (Ω)	Y (Ω)	Z (Ω)	Y (S)	Y (S)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chrome	ETAP		Page:	1x
Location:	Brown and Mills Canyon, TX	20.0.0C		Date:	04/25/2023
Contract:	15-49-1281			SN:	59385-RAD602
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Bus Cable/Busway

ID	Type	Size	Length (ft)	Ohm/1000	# of Runs	T (°C)	R (Ω)	X (Ω)	Z (Ω)	R/X	X/R
MSB-MAIN-CB-01	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-MAIN-CB-02	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-MAIN-CB-03	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-01	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-02	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-03	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-04	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-05	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-06	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-07	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-08	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-09	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-10	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-11	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-12	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-13	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-14	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-15	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-16	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-17	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-18	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-19	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-20	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-21	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-22	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-23	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-24	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-25	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-26	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-27	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-28	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-29	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-30	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-31	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-32	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-33	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-34	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-35	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-36	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-37	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-38	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-39	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-40	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-41	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-42	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-43	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-44	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-45	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-46	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-47	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-48	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-49	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-50	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-51	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-52	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-53	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-54	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-55	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-56	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-57	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-58	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-59	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983
MSB-PCB-60	1/0 AL	4/0	0.913 ft	0.01	1	75	0.0004603	0.0000913	0.0004693	5.0400	0.1983

Project:	Chemie	**EVAP**		Page:	11
Licensee:	Bureau und Mehr Courses, TU	[illegible]		Date:	[illegible]
Contract:	[illegible]			Ort:	[illegible]
Engineer:	Rud Power Engineering	Mode Case: [illegible]		Revision:	Base
Filename:	eng[illegible]			Config:	Normal

[illegible] w/ [illegible] per [illegible] Cooldowns [illegible] after or per Phase [illegible]

[illegible]			Length									
[illegible]	[illegible]	[illegible]	Full [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] [illegible] | [illegible] [illegible] [illegible] | [illegible] [illegible] [illegible]

2-Winding Transformer Input Data

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	%Z	X/R	+ Tol	-Tol	%Tol	Prim	Sec	%Z	Type	Angle
BSTMS-138	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-142	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-158	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-164	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-178	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-184	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-198	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-204	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-210	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-220	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-234	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-246	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-250	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-264	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-302	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-308	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-324	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-338	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-342	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-358	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-366	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-378	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-382	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-398	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-404	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-418	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-422	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-438	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-446	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-458	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-464	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-478	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-482	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-498	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-504	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-518	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-522	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-538	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-544	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-558	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-562	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-578	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-582	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-598	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00
BSTMS-604	3.140	34.500	0.660	8.00	30.00	0	5	-15	0	0	8.00	Dy	30.00

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ Sq	- Sq	% Tol	Prim.	Sec.	% Z	Type	Angle
BUSMB-001	5.140	34.500	0.600	8.83	30.00	0	5	-10	0	0	8.83	Dy	30.00
XFMR-110	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-112	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-113	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-114	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-115	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-116	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-117	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-201	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-202	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-203	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-204	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-205	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-206	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-207	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-208	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-209	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-210	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-211	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-212	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-213	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-214	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-215	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-216	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-217	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-218	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-219	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-220	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-221	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-222	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-223	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-224	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-225	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-226	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-227	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-228	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-229	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-230	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-231	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-232	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-233	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-234	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-235	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-236	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-237	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-238	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-239	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-240	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-241	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-242	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-243	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-244	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-245	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-246	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-247	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-248	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-249	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-250	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-251	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-252	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-253	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-254	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-255	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-256	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-257	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-258	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-259	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00
XFMR-260	4.400	34.500	0.600	8.00	8.83	0	5	-10	0	0	7.96	Dy	30.00

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
XFMR-501	4.167	34.500	0.645	8.00	8.00	5	5	0.5	0	0	7.96	Dy	30.00
XFMR-502	4.167	34.500	0.645	8.00	8.00	5	5	0.5	0	0	7.96	Dy	30.00
XFMR-503	4.167	34.500	0.645	8.00	8.00	5	5	0.5	0	0	7.96	Dy	30.00
XFMR-504	4.167	34.500	0.645	8.00	8.00	5	5	0.5	0	0	7.96	Dy	30.00

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Conn	kV	Amp	Ohm	Type	kV	Amp	Ohm
BSTMR-501	3.167	34.500	0.480	DY					Open			
BSTMR-502	3.167	34.500	0.480	DY					Open			
BSTMR-503	3.167	34.500	0.480	DY					Open			
BSTMR-504	3.167	34.500	0.480	DY					Open			
BSTMR-505	3.167	34.500	0.480	DY					Open			
BSTMR-506	3.167	34.500	0.480	DY					Open			
BSTMR-507	3.167	34.500	0.480	DY					Open			
BSTMR-508	3.167	34.500	0.480	DY					Open			
BSTMR-509	3.167	34.500	0.480	DY					Open			
BSTMR-510	3.167	34.500	0.480	DY					Open			
BSTMR-511	3.167	34.500	0.480	DY					Open			
BSTMR-512	3.167	34.500	0.480	DY					Open			
BSTMR-513	3.167	34.500	0.480	DY					Open			
BSTMR-514	3.167	34.500	0.480	DY					Open			
BSTMR-515	3.167	34.500	0.480	DY					Open			
BSTMR-516	3.167	34.500	0.480	DY					Open			
BSTMR-517	3.167	34.500	0.480	DY					Open			
BSTMR-518	3.167	34.500	0.480	DY					Open			
BSTMR-519	3.167	34.500	0.480	DY					Open			
BSTMR-520	3.167	34.500	0.480	DY					Open			
BSTMR-521	3.167	34.500	0.480	DY					Open			
BSTMR-522	3.167	34.500	0.480	DY					Open			
BSTMR-523	3.167	34.500	0.480	DY					Open			
BSTMR-524	3.167	34.500	0.480	DY					Open			
BSTMR-525	3.167	34.500	0.480	DY					Open			
BSTMR-526	3.167	34.500	0.480	DY					Open			
BSTMR-527	3.167	34.500	0.480	DY					Open			
BSTMR-528	3.167	34.500	0.480	DY					Open			
BSTMR-529	3.167	34.500	0.480	DY					Open			
BSTMR-530	3.167	34.500	0.480	DY					Open			
BSTMR-531	3.167	34.500	0.480	DY					Open			
BSTMR-532	3.167	34.500	0.480	DY					Open			
BSTMR-533	3.167	34.500	0.480	DY					Open			
BSTMR-534	3.167	34.500	0.480	DY					Open			
BSTMR-535	3.167	34.500	0.480	DY					Open			
BSTMR-536	3.167	34.500	0.480	DY					Open			

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	ohm	Type	kV	Amp	ohm
BSTMR-502	3.146	34.500	0.690	D/Y					Open			
BSTMR-503	3.146	34.500	0.690	D/Y					Open			
BSTMR-504	3.146	34.500	0.690	D/Y					Open			
BSTMR-505	3.146	34.500	0.690	D/Y					Open			
BSTMR-506	3.146	34.500	0.690	D/Y					Open			
BSTMR-601	3.146	34.500	0.690	D/Y					Open			
BSTMR-602	3.146	34.500	0.690	D/Y					Open			
BSTMR-603	3.146	34.500	0.690	D/Y					Open			
BSTMR-604	3.146	34.500	0.690	D/Y					Open			
BSTMR-605	3.146	34.500	0.690	D/Y					Open			
STMR-101	4.400	34.500	0.665	D/Y					Open			
STMR-102	4.400	34.500	0.665	D/Y					Open			
STMR-103	4.400	34.500	0.665	D/Y					Open			
STMR-104	4.400	34.500	0.665	D/Y					Open			
STMR-105	4.400	34.500	0.665	D/Y					Open			
STMR-106	4.400	34.500	0.665	D/Y					Open			
STMR-107	4.400	34.500	0.665	D/Y					Open			
STMR-201	4.400	34.500	0.665	D/Y					Open			
STMR-202	4.400	34.500	0.665	D/Y					Open			
STMR-203	4.400	34.500	0.665	D/Y					Open			
STMR-204	4.400	34.500	0.665	D/Y					Open			
STMR-205	4.400	34.500	0.665	D/Y					Open			
STMR-206	4.400	34.500	0.665	D/Y					Open			
STMR-207	4.400	34.500	0.665	D/Y					Open			
STMR-301	4.400	34.500	0.665	D/Y					Open			
STMR-302	4.400	34.500	0.665	D/Y					Open			
STMR-303	4.400	34.500	0.665	D/Y					Open			
STMR-304	4.400	34.500	0.665	D/Y					Open			
STMR-305	4.400	34.500	0.665	D/Y					Open			
STMR-306	4.400	34.500	0.665	D/Y					Open			
STMR-307	4.400	34.500	0.665	D/Y					Open			
STMR-401	4.400	34.500	0.665	D/Y					Open			

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
XFMR-002	4.000	34.500	0.480	D/Y					Open			
XFMR-003	4.000	34.500	0.480	D/Y					Open			
XFMR-004	4.000	34.500	0.480	D/Y					Open			
XFMR-005	4.000	34.500	0.480	D/Y					Open			
XFMR-006	4.000	34.500	0.480	D/Y					Open			
XFMR-007	4.000	34.500	0.480	D/Y					Open			
XFMR-008	4.000	34.500	0.480	D/Y					Open			
XFMR-009	4.000	34.500	0.480	D/Y					Open			
XFMR-010	4.000	34.500	0.480	D/Y					Open			
XFMR-011	4.000	34.500	0.480	D/Y					Open			
XFMR-012	4.000	34.500	0.480	D/Y					Open			
XFMR-013	4.000	34.500	0.480	D/Y					Open			
XFMR-014	4.000	34.500	0.480	D/Y					Open			
XFMR-015	4.000	34.500	0.480	D/Y					Open			
XFMR-016	4.000	34.500	0.480	D/Y					Open			
XFMR-017	4.000	34.500	0.480	D/Y					Open			
XFMR-018	4.000	34.500	0.480	D/Y					Open			
XFMR-019	4.000	34.500	0.480	D/Y					Open			
XFMR-020	4.000	34.500	0.480	D/Y					Open			
XFMR-021	4.000	34.500	0.480	D/Y					Open			
XFMR-022	4.000	34.500	0.480	D/Y					Open			
XFMR-023	4.000	34.500	0.480	D/Y					Open			
XFMR-024	4.000	34.500	0.480	D/Y					Open			

3-Winding Transformer Input Data

Transformer	Rating			Tap	Impedance				Z Variation		Phase Shift	
ID	Rating	MVA	kV	%	% Z	X/R	MVA	% Tol	+ 5%	-5%	Type	Angle
T1	Primary	120.000	345.000	0	Zps =	8.45	48.58	120.000	0	0	0	
	Secondary	120.000	34.500	0	Zpt =	15.26	65.54	120.000	0			Std Pos Seq	0.0
	Tertiary	90.000	13.800	0	Zst =	4.85	16.78	120.000	0			Std Pos Seq	-30.0
T2	Primary	120.000	345.000	0	Zps =	8.45	48.58	120.000	0	0	0		
	Secondary	120.000	34.500	0	Zpt =	15.26	65.54	120.000	0			Std Pos Seq	0.0
	Tertiary	90.000	13.800	0	Zst =	4.85	16.78	120.000	0			Std Pos Seq	-30.0

2-Winding Transformers Exceeding Input Limits

Transformer		Rating		Class		Loading		
ID	Rating	MVA	kV	Type	Type	kV	Amp	Amp
T1	Primary	[illegible]	[illegible]	Bus	Solid			
	Secondary	[illegible]	[illegible]	Bus	Bus		1187.2	1.1187
	Tertiary	[illegible]	[illegible]	Bus				
T2	Primary	[illegible]	[illegible]	Bus	Solid			
	Secondary	[illegible]	[illegible]	Bus	Bus		1187.2	1.1187
	Tertiary	[illegible]	[illegible]	Bus				

Project:	Chisme	ETAP		Page:	22
Location:	Brown and Mills County, TX	Dr.A.M.		Date:	09/03/2013
Contract:	EX-09-1701			SN:	PURE-POWER
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp74_Chisme			Config.:	Normal

Branch Connections

CKT Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
XFMR-101	2W XFMR	XFMR01 [13.8 kV]	XFMR-BUS1 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-102	2W XFMR	XFMR02 [13.8 kV]	XFMR-BUS2 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-103	2W XFMR	XFMR03 [13.8 kV]	XFMR-BUS3 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-104	2W XFMR	XFMR04 [13.8 kV]	XFMR-BUS4 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-105	2W XFMR	XFMR05 [13.8 kV]	XFMR-BUS5 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-106	2W XFMR	XFMR06 [13.8 kV]	XFMR-BUS6 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-201	2W XFMR	XFMR07 [13.8 kV]	XFMR-BUS7 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-202	2W XFMR	XFMR08 [13.8 kV]	XFMR-BUS8 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-203	2W XFMR	XFMR09 [13.8 kV]	XFMR-BUS9 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-204	2W XFMR	XFMR10 [13.8 kV]	XFMR-BUS10 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-205	2W XFMR	XFMR11 [13.8 kV]	XFMR-BUS11 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-206	2W XFMR	XFMR12 [13.8 kV]	XFMR-BUS12 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-301	2W XFMR	XFMR13 [13.8 kV]	XFMR-BUS13 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-302	2W XFMR	XFMR14 [13.8 kV]	XFMR-BUS14 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-303	2W XFMR	XFMR15 [13.8 kV]	XFMR-BUS15 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-304	2W XFMR	XFMR16 [13.8 kV]	XFMR-BUS16 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-305	2W XFMR	XFMR17 [13.8 kV]	XFMR-BUS17 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-306	2W XFMR	XFMR18 [13.8 kV]	XFMR-BUS18 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-401	2W XFMR	XFMR19 [13.8 kV]	XFMR-BUS19 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-402	2W XFMR	XFMR20 [13.8 kV]	XFMR-BUS20 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-403	2W XFMR	XFMR21 [13.8 kV]	XFMR-BUS21 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-404	2W XFMR	XFMR22 [13.8 kV]	XFMR-BUS22 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-405	2W XFMR	XFMR23 [13.8 kV]	XFMR-BUS23 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-406	2W XFMR	XFMR24 [13.8 kV]	XFMR-BUS24 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-501	2W XFMR	XFMR25 [13.8 kV]	XFMR-BUS25 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-502	2W XFMR	XFMR26 [13.8 kV]	XFMR-BUS26 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-503	2W XFMR	XFMR27 [13.8 kV]	XFMR-BUS27 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-504	2W XFMR	XFMR28 [13.8 kV]	XFMR-BUS28 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-505	2W XFMR	XFMR29 [13.8 kV]	XFMR-BUS29 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-506	2W XFMR	XFMR30 [13.8 kV]	XFMR-BUS30 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-601	2W XFMR	XFMR31 [13.8 kV]	XFMR-BUS31 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-602	2W XFMR	XFMR32 [13.8 kV]	XFMR-BUS32 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-603	2W XFMR	XFMR33 [13.8 kV]	XFMR-BUS33 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-604	2W XFMR	XFMR34 [13.8 kV]	XFMR-BUS34 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-605	2W XFMR	XFMR35 [13.8 kV]	XFMR-BUS35 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-606	2W XFMR	XFMR36 [13.8 kV]	XFMR-BUS36 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-701	2W XFMR	XFMR37 [13.8 kV]	XFMR-BUS37 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-702	2W XFMR	XFMR38 [13.8 kV]	XFMR-BUS38 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-703	2W XFMR	XFMR39 [13.8 kV]	XFMR-BUS39 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-704	2W XFMR	XFMR40 [13.8 kV]	XFMR-BUS40 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-705	2W XFMR	XFMR41 [13.8 kV]	XFMR-BUS41 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-706	2W XFMR	XFMR42 [13.8 kV]	XFMR-BUS42 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-801	2W XFMR	XFMR43 [13.8 kV]	XFMR-BUS43 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-802	2W XFMR	XFMR44 [13.8 kV]	XFMR-BUS44 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-803	2W XFMR	XFMR45 [13.8 kV]	XFMR-BUS45 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-804	2W XFMR	XFMR46 [13.8 kV]	XFMR-BUS46 [0.5 kV]	1.0.63	1.58.05	194.25	
XFMR-805	2W XFMR	XFMR47 [13.8 kV]	XFMR-BUS47 [0.5 kV]	1.0.50	1.58.50	193.57	
XFMR-806	2W XFMR	XFMR48 [13.8 kV]	XFMR-BUS48 [0.5 kV]	1.0.99	1.58.99	193.57	
XFMR-01	2W XFMR	XFMR-01 [13.8V]	XFMR-01 [0.5V]	1.0.99	197.11	968.38	
XFMR-02	2W XFMR	XFMR-02 [13.8V]	XFMR-02 [0.5V]	1.0.99	197.11	968.38	

Project:	Chisos	ETAP		Page:	15
Location:	Brown and Mills County, TX	Dickie		Date:	06/03/2015
Contract:	TX-99-1701			SN:	P1585-ROAD2
Engineer:	Pure Power Engineering	Study Case:	SC-Unity PF	Revision:	Base
Filename:	etp74_Chisos			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
XFMR-301	2W XFMR	XFMR-301-LV	XFMR-301-HV	1.0000	8.0000	8.0623	12.4035
XFMR-302	2W XFMR	XFMR-302-LV	XFMR-302-HV	1.0000	8.0000	8.0623	12.4035
XFMR-303	2W XFMR	XFMR-303-LV	XFMR-303-HV	1.0000	8.0000	8.0623	12.4035
XFMR-304	2W XFMR	XFMR-304-LV	XFMR-304-HV	1.0000	8.0000	8.0623	12.4035
XFMR-305	2W XFMR	XFMR-305-LV	XFMR-305-HV	1.0000	8.0000	8.0623	12.4035
XFMR-306	2W XFMR	XFMR-306-LV	XFMR-306-HV	1.0000	8.0000	8.0623	12.4035
XFMR-307	2W XFMR	XFMR-307-LV	XFMR-307-HV	1.0000	8.0000	8.0623	12.4035
XFMR-308	2W XFMR	XFMR-308-LV	XFMR-308-HV	1.0000	8.0000	8.0623	12.4035
XFMR-309	2W XFMR	XFMR-309-LV	XFMR-309-HV	1.0000	8.0000	8.0623	12.4035
XFMR-310	2W XFMR	XFMR-310-LV	XFMR-310-HV	1.0000	8.0000	8.0623	12.4035
XFMR-311	2W XFMR	XFMR-311-LV	XFMR-311-HV	1.0000	8.0000	8.0623	12.4035
XFMR-312	2W XFMR	XFMR-312-LV	XFMR-312-HV	1.0000	8.0000	8.0623	12.4035
XFMR-313	2W XFMR	XFMR-313-LV	XFMR-313-HV	1.0000	8.0000	8.0623	12.4035
XFMR-314	2W XFMR	XFMR-314-LV	XFMR-314-HV	1.0000	8.0000	8.0623	12.4035
XFMR-315	2W XFMR	XFMR-315-LV	XFMR-315-HV	1.0000	8.0000	8.0623	12.4035
XFMR-316	2W XFMR	XFMR-316-LV	XFMR-316-HV	1.0000	8.0000	8.0623	12.4035
XFMR-317	2W XFMR	XFMR-317-LV	XFMR-317-HV	1.0000	8.0000	8.0623	12.4035
XFMR-318	2W XFMR	XFMR-318-LV	XFMR-318-HV	1.0000	8.0000	8.0623	12.4035
XFMR-319	2W XFMR	XFMR-319-LV	XFMR-319-HV	1.0000	8.0000	8.0623	12.4035
XFMR-320	2W XFMR	XFMR-320-LV	XFMR-320-HV	1.0000	8.0000	8.0623	12.4035
XFMR-321	2W XFMR	XFMR-321-LV	XFMR-321-HV	1.0000	8.0000	8.0623	12.4035
XFMR-322	2W XFMR	XFMR-322-LV	XFMR-322-HV	1.0000	8.0000	8.0623	12.4035
XFMR-323	2W XFMR	XFMR-323-LV	XFMR-323-HV	1.0000	8.0000	8.0623	12.4035
XFMR-324	2W XFMR	XFMR-324-LV	XFMR-324-HV	1.0000	8.0000	8.0623	12.4035
XFMR-325	2W XFMR	XFMR-325-LV	XFMR-325-HV	1.0000	8.0000	8.0623	12.4035
XFMR-326	2W XFMR	XFMR-326-LV	XFMR-326-HV	1.0000	8.0000	8.0623	12.4035
XFMR-327	2W XFMR	XFMR-327-LV	XFMR-327-HV	1.0000	8.0000	8.0623	12.4035
XFMR-328	2W XFMR	XFMR-328-LV	XFMR-328-HV	1.0000	8.0000	8.0623	12.4035
XFMR-329	2W XFMR	XFMR-329-LV	XFMR-329-HV	1.0000	8.0000	8.0623	12.4035
XFMR-330	2W XFMR	XFMR-330-LV	XFMR-330-HV	1.0000	8.0000	8.0623	12.4035
XFMR-331	2W XFMR	XFMR-331-LV	XFMR-331-HV	1.0000	8.0000	8.0623	12.4035
XFMR-332	2W XFMR	XFMR-332-LV	XFMR-332-HV	1.0000	8.0000	8.0623	12.4035
XFMR-333	2W XFMR	XFMR-333-LV	XFMR-333-HV	1.0000	8.0000	8.0623	12.4035
XFMR-334	2W XFMR	XFMR-334-LV	XFMR-334-HV	1.0000	8.0000	8.0623	12.4035
XFMR-335	2W XFMR	XFMR-335-LV	XFMR-335-HV	1.0000	8.0000	8.0623	12.4035
XFMR-336	2W XFMR	XFMR-336-LV	XFMR-336-HV	1.0000	8.0000	8.0623	12.4035
XFMR-337	2W XFMR	XFMR-337-LV	XFMR-337-HV	1.0000	8.0000	8.0623	12.4035
XFMR-338	2W XFMR	XFMR-338-LV	XFMR-338-HV	1.0000	8.0000	8.0623	12.4035
XFMR-339	2W XFMR	XFMR-339-LV	XFMR-339-HV	1.0000	8.0000	8.0623	12.4035
XFMR-340	2W XFMR	XFMR-340-LV	XFMR-340-HV	1.0000	8.0000	8.0623	12.4035
XFMR-341	2W XFMR	XFMR-341-LV	XFMR-341-HV	1.0000	8.0000	8.0623	12.4035
XFMR-342	2W XFMR	XFMR-342-LV	XFMR-342-HV	1.0000	8.0000	8.0623	12.4035
XFMR-343	2W XFMR	XFMR-343-LV	XFMR-343-HV	1.0000	8.0000	8.0623	12.4035
XFMR-344	2W XFMR	XFMR-344-LV	XFMR-344-HV	1.0000	8.0000	8.0623	12.4035
XFMR-345	2W XFMR	XFMR-345-LV	XFMR-345-HV	1.0000	8.0000	8.0623	12.4035
XFMR-346	2W XFMR	XFMR-346-LV	XFMR-346-HV	1.0000	8.0000	8.0623	12.4035
XFMR-347	2W XFMR	XFMR-347-LV	XFMR-347-HV	1.0000	8.0000	8.0623	12.4035
XFMR-348	2W XFMR	XFMR-348-LV	XFMR-348-HV	1.0000	8.0000	8.0623	12.4035
XFMR-349	2W XFMR	XFMR-349-LV	XFMR-349-HV	1.0000	8.0000	8.0623	12.4035
XFMR-350	2W XFMR	XFMR-350-LV	XFMR-350-HV	1.0000	8.0000	8.0623	12.4035
XFMR-351	2W XFMR	XFMR-351-LV	XFMR-351-HV	1.0000	8.0000	8.0623	12.4035
XFMR-352	2W XFMR	XFMR-352-LV	XFMR-352-HV	1.0000	8.0000	8.0623	12.4035
XFMR-353	2W XFMR	XFMR-353-LV	XFMR-353-HV	1.0000	8.0000	8.0623	12.4035
XFMR-354	2W XFMR	XFMR-354-LV	XFMR-354-HV	1.0000	8.0000	8.0623	12.4035
XFMR-355	2W XFMR	XFMR-355-LV	XFMR-355-HV	1.0000	8.0000	8.0623	12.4035
XFMR-356	2W XFMR	XFMR-356-LV	XFMR-356-HV	1.0000	8.0000	8.0623	12.4035
T1	3W XFMR	[illegible]	[illegible]	0.00	0.00	0.00	0.00

Project:	Chisos	ETAP		Page:	24
Location:	Brown and Mills County, TX	24.0.0C		Date:	08/31/2023
Contract:	TX-99-1701			SN:	PURE-ROG602
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisos			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
	600 Xfmr	[illegible]	T1-1	4.46	44.67	111	
	PV Xfmr	[illegible]	T1-2	0.26	1.87	1.88	
T1	PV Xfmr	[illegible]	[illegible]	0.85	8.62	8.66	
	600 Xfmr	[illegible]	T1-1	4.46	44.67	111	
	PV Xfmr	[illegible]	T1-7	0.26	1.87	1.88	
CPV-B018-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CPV-B018-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CPV-A102-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-B018-02	Cable	[illegible]	[illegible]	0.66	4.39	4.44	0.0001107
CPV-B019-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-A103-02	Cable	[illegible]	[illegible]	3.65	8.37	8.99	0.0000137
CPV-B019-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CPV-B019-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CPV-A104-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-B019-02	Cable	[illegible]	[illegible]	0.66	4.39	4.44	0.0001107
CPV-B020-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-A105-02	Cable	[illegible]	[illegible]	3.65	8.37	8.99	0.0000137
CPV-B020-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CPV-B020-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CPV-A106-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-B020-02	Cable	[illegible]	[illegible]	0.66	4.39	4.44	0.0001107
CPV-B021-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-A107-02	Cable	[illegible]	[illegible]	3.65	8.37	8.99	0.0000137
CPV-B021-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CPV-B021-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CPV-A108-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-B021-02	Cable	[illegible]	[illegible]	0.66	4.39	4.44	0.0001107
CPV-B022-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-A109-02	Cable	[illegible]	[illegible]	3.65	8.37	8.99	0.0000137
CPV-B022-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CPV-B022-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CPV-A110-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CPV-B022-02	Cable	[illegible]	[illegible]	0.66	4.39	4.44	0.0001107

Project:	Chisme	ETAP		Page:	25
Location:	Brown and Mills County, TX	20.0.0C		Date:	06/03/2023
Contract:	EX-09-1701			SN:	PORT-PC64822
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp74_Chisme			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
CBL-0106-01	Cable	WAMS0106-LV	BAT-106-01	1.31	3.07	12.1	0.0000826
CBL-B008-02	Cable	TRMS0109-LV	BAT-109-02	3.93	8.17	8.91	0.0000112
CBL-B008-03	Cable	TRMS0108-LV	BAT-108-03	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
CBL-0460-01	Cable	WAMS0460-LV	BAT-460-01	1.31	3.07	12.1	0.0000826
CBL-B402-01	Cable	TRMS0402-LV	BAT-402-01	3.93	8.17	8.91	0.0000112
CBL-B008-01	Cable	TRMS0108-LV	BAT-108-01	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
CBL-0460-01	Cable	WAMS0460-LV	BAT-460-01	1.31	3.07	12.1	0.0000826
CBL-B402-01	Cable	TRMS0402-LV	BAT-402-01	3.93	8.17	8.91	0.0000112
CBL-B008-01	Cable	TRMS0108-LV	BAT-108-01	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
CBL-0460-01	Cable	WAMS0460-LV	BAT-460-01	1.31	3.07	12.1	0.0000826
CBL-B402-01	Cable	TRMS0402-LV	BAT-402-01	3.93	8.17	8.91	0.0000112
CBL-B008-01	Cable	TRMS0108-LV	BAT-108-01	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
CBL-0460-01	Cable	WAMS0460-LV	BAT-460-01	1.31	3.07	12.1	0.0000826
CBL-B402-01	Cable	TRMS0402-LV	BAT-402-01	3.93	8.17	8.91	0.0000112
CBL-B008-01	Cable	TRMS0108-LV	BAT-108-01	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
CBL-0460-01	Cable	WAMS0460-LV	BAT-460-01	1.31	3.07	12.1	0.0000826
CBL-B402-01	Cable	TRMS0402-LV	BAT-402-01	3.93	8.17	8.91	0.0000112
CBL-B008-01	Cable	TRMS0108-LV	BAT-108-01	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
CBL-0460-01	Cable	WAMS0460-LV	BAT-460-01	1.31	3.07	12.1	0.0000826
CBL-B402-01	Cable	TRMS0402-LV	BAT-402-01	3.93	8.17	8.91	0.0000112
CBL-B008-01	Cable	TRMS0108-LV	BAT-108-01	1.31	2.99	12.1	0.0000826
CBL-0460-02	Cable	WAMS0460-LV	BAT-460-02	4.65	8.17	9.93	0.0000101
CBL-B402-03	Cable	TRMS0402-LV	BAT-402-03	1.55	2.87	3.23	0.0000309
CBL-B400-02	Cable	TRMS0402-LV	BAT-400-02	3.93	8.19	8.93	0.0000112
XFMR-0055-01	Cable	WAMS0055-MV	SWGR-01-LV	0.98	5.51	5.71	0.0030303
XFMR-B056-02	Cable	TRMS0056-MV	SWGR-B2-02-LV	0.42	3.93	3.95	0.0012195
XFMR-B056-03	Cable	TRMS0056-MV	SWGR-B3-03-LV	0.07	3.52	3.53	0.0015306

Project:	Chisos	ETAP		Page:	25
Location:	Brown and Mills County, TX	24.0.0C		Date:	09-03-2023
Contract:	TX-99-1701			SN:	19185-ROM02
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisos			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-BUS6-T04	Cable	BUS6-GEN1	BUS6-MAIN	0.01	0.11	1.04	0.9623184
MVT-BUS6-T05	Cable	BUS6-PV4	BUS6-PV5	0.01	0.01	0.10	9.9015909
UNT-BUS6-T06	Cable	BUS6-T03	BUS6-BUS6-T07	0.07	0.32	3.24	0.3085184
MVT-BUS6-T08	Cable	BUS6-GEN1	Bus-Gen 12	0.05	0.16	1.68	0.5952368
MVT-BUS6-T09	Cable	BUS6-BUS3	BUS6-BUS4	0.02	0.03	0.32	3.0931592
UNT-BUS6-T10	Cable	BUS6-T02	BUS6-BUS5-T11	0.07	0.32	3.24	0.3085184
MVT-MVSC-T01	Cable	MVSC-B1	BUS-MAV-11	0.15	1.59	15.97	0.0626295
MVT-MVSC-T02	Cable	MVSC-B2	MVSC-B1	0.00	0.01	0.11	9.0636363
MVT-MVSC-T03	Cable	MVSC-T1	BUS-MAV-11	0.19	0.21	0.28	3.5714119
UNT-MVSC-T04	Cable	MVSC-B1	BUS-MAV-12	0.12	0.09	1.51	0.6711809
MVT-MVSC-T05	Cable	MVSC-B2	MVSC-B1	0.00	0.01	0.11	9.0636363
MVT-MVSC-T06	Cable	MVSC-T2	BUS-MAV-12	0.19	0.21	0.28	3.5714119
UNT-MVSC-T07	Cable	MVSC-B1	MVSC-T01	0.12	0.09	1.51	0.6711809

Project:	Chisme	ETAP		Page:	27
Location:	Brown and Mills County, TX	Dr.K.M.		Date:	06/01/2023
Contract:	TX-99-1701			SN:	PURE-ROG602
Engineer:	Pure Power Engineering	Study Case:	SC-Unity PF	Revision:	Base
Filename:	etp14_Chisme			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
MVT-MVSC-001	Cable	MVSC-001	Section 11	0.66	0.07	1.12	0.111186
MVT-MVSC-002	Cable	MVSC-002	MVSC-001	0.58	0.05	1.11	0.106091
UNT-PCS-001	Cable	500MW-0.1-MV	MVSC-002	0.45	0.05	0.26	0.034691
MVT-PCS-002	Cable	500MW-0.1-MV	500MW-SLC-001	0.43	0.03	0.43	0.040163
MVT-PCS-003	Cable	MVSC-001	500MW-0.1-MV	0.59	0.03	0.60	0.057654
UNT-PCS-004	Cable	500MW-0.1-MV	500MW-SWGR-001	0.48	0.05	0.28	0.036900
MVT-PCS-005	Cable	500MW-0.1-MV	MVSC-001	0.54	0.04	0.47	0.051231
MVT-PCS-006	Cable	500MW-0.1-MV	500MW-SLC-001	0.5	0.03	0.48	0.047760
UNT-PCS-007	Cable	500MW-0.6-MV	500MW-SWGR-001	0.48	0.05	0.27	0.036946
MVT-PCS-008	Cable	500MW-0.1-MV	MVSC-001	0.58	0.04	0.52	0.060623
MVT-PCS-009	Cable	500MW-0.1-MV	500MW-SWGR-001	0.62	0.05	0.33	0.047326
UNT-PCS-010	Cable	500MW-0.1-MV	500MW-SWGR-001	0.49	0.05	1.01	0.054303
MVT-PCS-011	Cable	500MW-0.1-MV	500MW-SWGR-001	0.53	0.05	0.31	0.042667
MVT-PCS-012	Cable	500MW-0.1-MV	MVSC-001	0.54	0.07	0.61	0.070457
UNT-PCS-013	Cable	500MW-0.1-MV	500MW-SWGR-001	0.45	0.06	2.05	0.058651
MVT-PCS-014	Cable	500MW-0.6-MV	500MW-SWGR-001	0.48	0.05	0.33	0.039323
MVT-PCS-015	Cable	500MW-0.1-MV	500-MV-T	0.52	0.08	0.54	0.073443
UNT-PCS-016	Cable	500MW-0.1-MV	500MW-SWGR-001	0.48	0.07	0.80	0.069944
MVT-PCS-017	Cable	500MW-0.6-MV	500MW-SLC-001	0.46	0.06	0.46	0.060123
MVT-PCS-018	Cable	500MW-0.1-MV	500MW-SWGR-001	0.49	0.06	0.32	0.044323
UNT-PCS-019	Cable	500MW-0.1-MV	500MW-SWGR-001	0.45	0.06	2.40	0.060177
MVT-PCS-020	Cable	500MW-0.6-MV	500MW-SLC-001	0.53	0.05	0.44	0.054865
MVT-PCS-021	Cable	500MW-0.1-MV	500MW-SWGR-001	1.66	0.63	1.07	0.063486
UNT-PCS-022	Cable	500MW-0.1-MV	MVSC-002	0.59	0.02	0.78	0.041914
MVT-PCS-023	Cable	500MW-0.1-MV	500MW-SLC-001	0.46	0.05	0.31	0.036562
MVT-PCS-024	Cable	500MW-0.1-MV	500MW-SWGR-001	0.59	0.06	0.77	0.069167
UNT-PCS-025	Cable	500MW-0.1-MV	500MW-SWGR-001	0.57	0.24	2.42	0.111527
MVT-PCS-026	Cable	500MW-0.1-MV	MVSC-002	0.57	0.23	0.46	0.070305
MVT-PCS-027	Cable	500MW-0.1-MV	500MW-SWGR-001	0.55	0.23	0.40	0.059959
UNT-PCS-028	Cable	500MW-0.6-MV	500MW-SLC-001	0.57	0.57	0.49	0.026254
MVT-PCS-029	Cable	500MW-0.1-MV	MVSC-002	0.46	0.46	1.14	0.134333
MVT-PCS-030	Cable	500MW-0.1-MV	500MW-SWGR-001	0.16	0.27	0.25	0.033963
UNT-PCS-031	Cable	500MW-0.1-MV	500MW-SWGR-001	0.27	0.22	0.27	0.039859
MVT-PCS-032	Cable	500MW-0.6-MV	500MW-SWGR-001	0.52	0.28	0.33	0.031126
MVT-PCS-033	Cable	500MW-0.1-MV	500MW-SWGR-001	1.19	0.83	1.26	0.078734
UNT-PCS-034	Cable	500MW-0.1-MV	500MW-SWGR-001	0.57	0.25	0.49	0.071968
MVT-PCS-035	Cable	500MW-0.6-MV	MVSC-002	0.52	0.38	0.46	0.046163
MVT-PCS-036	Cable	500MW-0.1-MV	500MW-SLC-001	0.54	0.34	0.42	0.045934
UNT-PCS-037	Cable	500MW-0.1-MV	500MW-SWGR-001	0.55	0.29	0.44	0.054084

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
34WT-PCS-034	Cable	XFMR-GSU-34.5kV	XFMR-PCS-034-LV	0.56	6.51	6.77	0.0410294
34WT-PCS-035	Cable	XFMR-GSU-34.5kV	XFMR-PCS-035	1.35	8.17	1.61	0.0111769
34WT-PCS-036	Cable	XFMR-GSU-34.5kV	XFMR-PCS-036	2.05	2.35	3.08	0.0156555
3201	Sy Breaker	34.5 kV Bus - SWR_A8	SS-BAY-1				
3301	Sy Breaker	34.5 kV Bus - SWR_A9	SS-BAY-2				
3401	Sy Breaker	34.5 kV Bus - SWR_A10	SS-BAY-3				
3501	Sy Breaker	34.5 kV Bus - BUS1	SS-BAY-4				
3701	Sy Breaker	34.5 kV Bus - BUS2	SS-BAY-5				
3801	Sy Breaker	34.5 kV Bus - BUS3	SS-BAY-6				
3201	Sy Breaker	345	345 kV Bus				
4071	Sy Switch	34.5 kV Bus - SWR_A8-1	34.5 kV Bus - SWR_A9				
BESS-301-35-4WDG	Sy Generator	BATT-301-01	BESS-301-35-4BU				
BESS-301-02-4WDG	Sy Generator	BATT-301-02	BESS-301-02-4BU				
BESS-302-01-4WDG	Sy Generator	BATT-302-01	BESS-302-01-4BU				
BESS-302-35-4WDG	Sy Generator	BATT-302-02	BESS-302-02-4BU				
BESS-303-01-4WDG	Sy Generator	BATT-303-01	BESS-303-01-4BU				
BESS-303-02-4WDG	Sy Generator	BATT-303-02	BESS-303-02-4BU				
BESS-304-35-4WDG	Sy Generator	BATT-304-01	BESS-304-35-4BU				
BESS-304-02-4WDG	Sy Generator	BATT-304-02	BESS-304-02-4BU				
BESS-305-01-4WDG	Sy Generator	BATT-305-01	BESS-305-01-4BU				
BESS-305-02-4WDG	Sy Generator	BATT-305-02	BESS-305-02-4BU				
BESS-306-01-4WDG	Sy Generator	BATT-306-01	BESS-306-01-4BU				
BESS-306-35-4WDG	Sy Generator	BATT-306-02	BESS-306-35-4BU				
BESS-307-35-4WDG	Sy Generator	BATT-307-01	BESS-307-35-4BU				
BESS-307-02-4WDG	Sy Generator	BATT-307-02	BESS-307-02-4BU				
BESS-308-01-4WDG	Sy Generator	BATT-308-01	BESS-308-01-4BU				
BESS-308-35-4WDG	Sy Generator	BATT-308-02	BESS-308-35-4BU				
BESS-309-35-4WDG	Sy Generator	BATT-309-01	BESS-309-35-4BU				
BESS-309-02-4WDG	Sy Generator	BATT-309-02	BESS-309-02-4BU				
BESS-310-01-4WDG	Sy Generator	BATT-310-01	BESS-310-01-4BU				
BESS-310-35-4WDG	Sy Generator	BATT-310-02	BESS-310-35-4BU				
BESS-311-35-4WDG	Sy Generator	BATT-311-01	BESS-311-35-4BU				
BESS-311-02-4WDG	Sy Generator	BATT-311-02	BESS-311-02-4BU				
BESS-312-01-4WDG	Sy Generator	BATT-312-01	BESS-312-01-4BU				
BESS-312-35-4WDG	Sy Generator	BATT-312-02	BESS-312-35-4BU				

Project:	Chisma	ETAP		Page:	29
Location:	Brown and Mills County, TX	20.0.0C		Date:	06/21/2023
Contract:	EX-99-1701			SN:	PORT-POWER2
Engineer:	Port Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	chp54_Chisma			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]				

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

CKT Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Synchgen	[illegible]	[illegible]				
[illegible]	Synchgen	[illegible]	[illegible]				
[illegible]	Synchgen	[illegible]	[illegible]				

Power Grid Input Data

Power Grid	Connected Bus	Rating		% Positive Seq. Impedance (100 MVA Base)			Grounding	% Zero Seq. Impedance (100 MVA Base)		
ID	ID	[illegible]	kV	R	R	X	Type	R	R	X
[illegible]	Bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

SHORT-CIRCUIT REPORT

Fault at bus: **34.5 kV BUS - BUS6**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ra	Yr	Xc	kA Symm. rms Ia	3I0	R1	X1	R0	X0
34.5 kV BUS - BUS6	Total	0.00	22.598	0.00	100.00	100.00	16.543	16.543	2.368+000	9.079+000	7.760+001	1.505+004
#1 345 kV BUS	34.5 kV BUS - BUS6	86.14	25.691	99.99	99.25	99.67	17.110	0.125	4.988+000	6.520+000	1.781+002	4.000+004
#1 G-1	34.5 kV BUS - BUS6	13.77	3.171	83.92	69.06	100.82	6.933	16.421 *	6.999+000	3.080+001	3.150+001	3.599+004
XFMR-BUS1-HV	BUS6-TV-21	3.06	0.634	0.00	100.95	100.99	0.579	0.000	1.548+002	2.258+002		
XFMR-BUS2-HV	BUS6-TV-21	3.04	0.532	0.00	100.99	100.97	0.433	0.000	1.808+002	2.798+002		
XFMR-BUS3-HV	BUS6-TV-22	3.06	0.634	0.00	100.99	100.99	0.579	0.000	1.668+002	2.298+002		
XFMR-BUS4-HV	BUS6-TV-22	3.04	0.634	0.00	100.99	100.97	0.579	0.000	1.548+002	2.258+002		
XFMR-BUS5-HV	BUS6-TV-21	3.06	0.634	0.00	100.99	100.99	0.579	0.000	1.548+002	2.258+002		
XFMR-BUS6-HV	BUS6-TV-21	3.07	0.634	0.00	100.99	100.99	0.579	0.000	1.548+002	2.258+002		

\# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
34.5 kV BUS - SOLAR	Total	0.00	23.479	0.00	117.00	116.99	36.261	36.261	2.308+008	8.078+009	1.760+001	1.508+009
4.160 kV BUS	34.5 kV Bus - SOLAR-1	86.33	23.604	50.48	99.22	99.67	15.887	6.131	5.918+008	6.928+009	1.710+002	4.668+009
XFM-1	34.5 kV Bus - SOLAR-1	10.76	3.133	84.00	30.11	100.94	8.931	30.431 *	8.918+009	3.980+001	8.710+001	2.508+009
M-FSC-001	004BAY-13	0.31	0.466	0.30	117.25	116.31	0.445	0.000	1.148+002	3.448+002		
M-FSC-002	004BAY-14	0.31	0.466	0.30	117.25	116.31	0.445	0.000	1.148+002	3.448+002		
M-FSC-003	004BAY-15	0.33	0.443	0.32	117.25	116.32	0.419	0.000	9.768+008	2.928+002		
XFMR-001-001	004BAY-12	0.23	0.344	0.20	117.15	116.22	0.319	0.000	9.778+008	2.928+002		
M-FSC-101	004BAY-9	0.97	0.344	0.97	117.07	116.11	0.319	0.000	9.788+008	2.928+002		
M-FSC-201	004BAY-5	0.92	0.344	0.92	117.19	116.15	0.319	0.000	9.788+008	2.928+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chisme	ETAP		Page:	34
Location:	Brown and Mills County, TX	24.0.2C		Date:	09-03-2015
Contract:	TX-99-1701			SN:	PURE-PC04102
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisme			Config.:	Normal

Fault at bus: **34.5 kV BUS - SOLAR-1**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of bus kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
34.5 kV BUS - SOLAR-1	Total	0.00	23.479	0.00	117.01	116.99	36.261	36.261	2.308+008	8.078+009	1.760+001	1.508+008
0.345 kV BUS	34.5 kV Bus - SOLAR-1	86.33	23.004	90.48	99.22	89.67	0.887	6.131	5.918+008	6.928+009	1.710+002	4.668+008
T1-1	34.5 kV Bus - SOLAR-1	10.76	3.121	84.00	30.11	160.94	8.931	30.431 *	9.918+009	3.980+001	8.710+001	2.568+004
M1NC-001	30MBAV-13	0.31	0.466	0.30	117.25	116.31	0.445	0.000	1.148+002	3.948+002		
M1ND-001	30MBAV-13	0.31	0.466	0.30	117.25	116.31	0.445	0.000	1.148+002	3.948+002		
M1NC-001	30MBAV-13	0.33	0.441	0.32	117.20	116.30	0.319	0.000	9.768+008	2.928+002		
SEMB-001-001	30MBAV-12	0.21	0.344	0.20	117.15	116.22	0.319	0.000	9.978+008	2.928+002		
M1ND-101	30MBAV-9	0.97	0.344	0.97	117.07	116.11	0.319	0.000	9.788+008	2.928+002		
M1NC-201	30MBAV-9	0.92	0.344	0.92	117.19	116.15	0.319	0.000	9.788+008	2.928+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: [illegible]	Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **340 kV BUS**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
[illegible]	Infinite	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chemic	**ETAP**		Page:	26
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [0141]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	17
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmave			Config:	Normal

Fault at bus: **B421 [0.48 kV]**

Prefault voltage = 0.480 kV = [illegible] % of nominal bus kV (0.480 kV)
= [illegible] % of Base kV (0.480 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	3I0	R1	X1	R0	X0
B421 [0.48 kV]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemir	**ETAP**		Page:	16
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: [illegible]	Revision:	Base
Filename:	rpe2.2.1.lexus			Config:	Normal

Fault at bus: **84TT4824H**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj14_2.lfanalyz			Config:	Normal

Fault at bus: **84TT-HOLE**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms,	I/c Symm. rms	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemic	**ETAP**		Page:	44
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lexus			Config:	Normal

Fault at bus: **B427 [0.4]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427 [0.4]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus kA	Ik Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
B427 [illegible]	Total	[illegible]	12.355	[illegible]	111.0	170.2	0.000	[illegible]	1.868+j0.000	2.758+j0.000		
[illegible]	B427 [illegible]	7.23	10.472	[illegible]	111.0	170.2	0.000	[illegible]	0.268+j0.000	0.268+j0.000		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	111.0	[illegible]	0.000	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	42
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfanse			Config:	Normal

Fault at bus: **BAT1 (0.48 kV)**

Prefault voltage = 0.480 kV = [illegible] % of nominal bus kV (0.480 kV)
= [illegible] % of Base kV (0.480 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus 3a	3b	3c	I" k Symm Amp 3a	3b	R1	X1	R0	X0
BAT1 0.48 kV	Total	0.000	0.0 0.0	0.000	111.32	111.32	0.000	0.000	1.7788+j0.000	1.7788+j0.000		
[illegible]	BAT1 Bus14	1.87	0.0 0.0	0.000	111.32	111.32	0.000	0.000	1.7788+j0.000	1.7788+j0.000		
[illegible]	[illegible]	0.00	0.0 0.0	0.000	111.32	111.32	0.000	0.000				

- Indicates fault current contribution is from three winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
B427 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84251-105 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421-10P-H**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm Amp	% Voltage at From Bus			X/R Symm Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. F connection)

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421 (0640)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemir	**ETAP**		Page:	47
Location:	Bowie and Mills County, TX			Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGJRG-PC0722
Engineer:	Real Power Engineering	Study Case: SC-Comp-3Ø		Revision:	Base
Filename:	rpg2-4-2.lfmdw			Config:	Normal

Fault at bus: **B-GT1 (46.0)**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of bus kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase (kA)	Ik 3-phase (kA)	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. (kA) 3a	3b	R1	X1	R0	X0
B-GT1 (46.0)	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.978+j0.000	1.758+j0.000		
B-GT2 (46.0)	B-GT1 (46.0)	1.24	64.433	0.00	120.00	120.00	0.000	0.000	1.978+j0.000	1.758+j0.000		
B-GT2 (46.0)	Bus1 (46.0)	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y transformer

Project:	Chemic	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe24_2.lfmxm			Config:	Normal

Fault at bus: **B421 [0.0 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm. ratio	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I_R Symm. amp A	I_R Symm. amp B	R1	X1	R0	X0
B421 [0.0 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7500+j0.000	1.7500+j0.000		
B1008 [0.0 kV]	B421 [0.0 kV]	1.87	0.000	0.00	120.00	120.00	0.000	0.000	0.2600+j0.000	0.2600+j0.000		
B1009 [0.0 kV]	B1008 [0.0 kV]	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator, Static, or Motor

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [0.0 0]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus			3I0 Symm. mag.		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	3I0	R1	X1	R0	X0
B427 [0.0 0]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	04/25/2019
Contract:	CB-PS-270			SN:	PGBG-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B4T138 H1**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	Ia Symm. Amp A	B	R1	X1	R0	X0
B4T138 H1	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7780+j0.000	1.7780+j0.000		
B4T138 B3 (1) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (2) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (3) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (4) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (5) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (6) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (7) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (8) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (9) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (10) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (11) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (12) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (13) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (14) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (15) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (16) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (17) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (18) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (19) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (20) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (21) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (22) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (23) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (24) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (25) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (26) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (27) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (28) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (29) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (30) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (31) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (32) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (33) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (34) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (35) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (36) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (37) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (38) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (39) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (40) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (41) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (42) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (43) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (44) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (45) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (46) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (47) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (48) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (49) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (50) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (51) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (52) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (53) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (54) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (55) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (56) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (57) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (58) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (59) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (60) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (61) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (62) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (63) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (64) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (65) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (66) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (67) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (68) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (69) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (70) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (71) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (72) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (73) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (74) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (75) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (76) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (77) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (78) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (79) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (80) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (81) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (82) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (83) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (84) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (85) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (86) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (87) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (88) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (89) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (90) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (91) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (92) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (93) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (94) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (95) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (96) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (97) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (98) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (99) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (100) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (101) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (102) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (103) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (104) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (105) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (106) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (107) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (108) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (109) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (110) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (111) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (112) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (113) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (114) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (115) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (116) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (117) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (118) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (119) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (120) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (121) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (122) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (123) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (124) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (125) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (126) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (127) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (128) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (129) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (130) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (131) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (132) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (133) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (134) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (135) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (136) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (137) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (138) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (139) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (140) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (141) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (142) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (143) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (144) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (145) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (146) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (147) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (148) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (149) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (150) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (151) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (152) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (153) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (154) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (155) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (156) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (157) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (158) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (159) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (160) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (161) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (162) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (163) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (164) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0.000	0.000	0.2667+j0.000	0.2667+j0.000		
B4T138 B3 (165) 1	B4T138 H1	1.87	10.636	0.00	120.00	120.00	0

Project:	Chemin	**ETAP**		Page:	11
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B4T1 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault Current	ip Peak Fault Current	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault Current A	3I0 Symm. Fault Current B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemir	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX			Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGBE-PAPSE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lexone			Config:	Normal

Fault at bus: **B421 [0.0 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of bus kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
B421 [0.0 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7500+j0.000	1.7500+j0.000		
B1000 [0.0 kV]	B421 [0.0 kV]	0.87	0.87	0.00	120.00	120.00	0.000	0.000	0.2500+j0.000	0.2500+j0.000		
B1001 [0.0 kV]	B1000 [0.0 kV]	0.00	0.00	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	33
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B421 [0.48 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 80		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [0441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpe2.4.2.lfxmx			Config:	Normal

Fault at bus: **B421 [B4 0]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus 0 V (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. rms Ia	Ib	R1	X1	R0	X0
B421 [B4 0]	Total	0.00	0.0 kA	0.00	0.0	0.0	0.0 kA	0.0 kA	1.978+j0.000	1.758+j0.000		
B1008 [B1011 0]	B421 [B4 0]	7.27	10.0 kA	0.00	0.0	0.0	0.0 kA	0.0 kA	0.248+j0.000	0.248+j0.000		
B1011 [B4 0]	B421 [B4 0]	0.00	0.0 kA	0.00	0.0	0.0	0.0 kA	0.0 kA				

- Indicates fault current contribution is from three winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	16
Location:	Borger and Mills County, TX			Date:	04/25/2019
Contract:	CB-PS-2701			SN:	PGBG-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg2-4-2.lfmdw			Config:	Normal

Fault at bus: **B427-Def-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
B427-Def-01	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B7008-B5121-3	B427-Def-01	1.87	18.111	0.00	120.00	120.00	0.000	0.000	0.278+j0.000	0.000+j0.000		
B5121-Def-01	B5121-Def-01 Bus	0.00	0.111	0.00	120.00	120.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	17
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B417-Def-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B417-Def-01	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.00	1.978+j0.000	1.978+j0.000		
B7008 @13.8 kV	B417-Def-01	7.127	10.000	0.00	120.00	120.00	0.000	0.00	0.278+j0.000	0.278+j0.000		
B8000 @13.8 kV	B417-Def-01	0.000	0.000	0.00	120.00	120.00	0.000	0.00				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	26
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfanalysis			Config:	Normal

Fault at bus: **B421 [B6-0]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	24
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC-Comp-BM		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B-GT1 (Bus4)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CapaBuses		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	3I0	% Voltage at From Bus V1	V2	3I0	V0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [B14]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. 3a	3b	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current contribution (1%) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427 [B4 0]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CooperBusses		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip 3-phase [illegible]	3I0	% Voltage at From Bus V1	V2	V0	3I0 [illegible]	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution [illegible] from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427 24241**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	16.0.0C		Date:	04/25/2019
Contract:	CB-09c2781			SN:	WORKSHOP02
Engineer:	Real Power Engineering	Study Case: SC Comp 3ph		Revision:	Base
Filename:	ngl14_2.etap			Config:	Normal

Fault at bus: **B4T1302 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B3T1 6.9 kV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.00	1.906+j0.000	1.758+j0.000		
B3T2 6.9 kV	B3T1 6.9 kV	7.221	6.619	0.00	120.00	120.00	0.000	0.00	0.728+j0.000	1.648+j0.000		
B3T3 6.9 kV	B3T2 6.9 kV	0.000	0.000	0.00	120.00	120.00	0.000	0.00				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y transformer

Project:	Chemie	**ETAP**		Page:	4.0
Location:	Borger and Mills County, TX	16.0.0C		Date:	04/25/2019
Contract:	CB-PS-2701			SN:	PGBG-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421303-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of bus kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
B421-04-01	Total	0.00	0.000	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1508-B421-01	B421-01-01	0.87	0.000	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1509-B421-01	B421-01-01-SUB	0.00	0.000	0.00	0.00	0.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **84211 [illegible] 4E**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus			3I0 Symm. comp. [illegible]		% Impedance on [illegible] MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a generator, Power Grid, or motor

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 10		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427 38441**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)		R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	47
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [illegible] 0**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	B	C	3I0 From Bus A	B	R1	X1	R0	X0
B427 [illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemo	**ETAP**		Page:	66
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi2.4.2.lexus			Config:	Normal

Fault at bus: **B423-HV41**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (.[illegible] kV)
= [illegible] % of Base kV (.[illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I+3I0 Angle (deg)	% Voltage at From Bus Va	Vb	Vc	3I0 Real (A)	3I0 Imag (A)	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	##
Location:	Bowie and Mills County, TX	##.# kV		Date:	##/##/####
Contract:	CR-###-2701			SN:	##-###-##-####2
Engineer:	Rust Power Engineering	Study Case: SC Comp ##		Revision:	Base
Filename:	###2-#_C.lexnw			Config:	Normal

Fault at bus: **B421-##-#1**

Prefault voltage = ###.## kV = ###.## % of nominal bus ## (###.## kV)
= ###.## % of Base kV (###.## kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	% Impedance on 100 MVA base R1	X1	R0	X0
B421-##-#1	Total	#.###	##.###	###.#	###.#	###.#	#.####	###.##	#.#####+###	#.#####+###		
B###-##-#1	B421-##-#1	#.##	##.###	##.#	###.#	###.#	#.####	###.##	#.#####+###	#.#####+###		
B###-##-#1	B###-##-#1 ##-#R	#.##	##.###	##.#	###.#	###.##	#.####	###.##				

B - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	16.0.0C		Date:	04-25-2019
Contract:	CB-09x270			SN:	WGBS-WIN02
Engineer:	Watt Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	wgb14_2.lfmxm			Config:	Normal

Fault at bus: **B427-06-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	Voltage at From Bus A	Voltage at From Bus B	Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
B427-06-01	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7000+000	1.7000+000		
B7008-B2G-01-2	B427-06-01	1.87	10.000	0.00	120.00	120.00	0.000	0.000	6.2000+000	1.0000+000		
B6000-B4G-01	B6008-B4G01-GUB	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemic	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

* - Indicates fault current contribution is from three-winding transformers
\# - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemic	**ETAP**		Page:	32
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **R427-4614-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			kA Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
R427-4614-01	Bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or motor

Project:	Chemic	**ETAP**		Page:	33
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427-4614 02**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

CompleteBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/In Symm rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
B427-4614 02	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	36
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp14_2.lfmxm			Config:	Normal

Fault at bus: **84T1-402-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B427-402 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	ip Crest kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
B427-402 [2]	Total	0.000	0.000	0.00	100.00	100.00	0.000	0.000	1.998+j0.000	1.998+j0.000		
B427-402 [2]	B427-402 [2]	0.00	0.000	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B427-402 [2]	B427-402 [2]	0.00	0.000	0.00	0.00	0.00	0.000	0.000				

B - Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (100) from a generator (Delta, Y-Grounded)

Project:	Chemic	**ETAP**		Page:	76
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B427-4834**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	X/R Ratio A	X/R Ratio B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	77
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B427-403 #2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	78
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lemon			Config:	Normal

Fault at bus: **R427-4H-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I*t From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I*t From Bus A	I*t From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	70
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421-004 #2**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a0	3a1	3a2	3I0	3I0	R1	X1	R0	X0
B421-004 #2	Bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B421-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a grounded Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	80
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 80		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **B421-405 01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I*t Symm. rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	cpj14_2.lfrev			Config:	Normal

Fault at bus: **84214405-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus			3I0 Symm. cmp.		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	42
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-4M-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borden and Milk Counties, TX	19.0.1C		Date:	04/25/2019
Contract:	CB-09x2791			SN:	89-001-89-0032
Engineer:	Real Power Engineering	Study Case: SC	Loop: R4	Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B-GT1-480-02**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of bus kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	R1	X1	R0	X0
B-GT1-480-02	Total	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.978+j0.000	1.758+j0.000		
B-T1-480-02	B-GT1-480-02	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B-T1-480-02	B-T1-480-02-SUB	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: 69	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-PRI-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (nominal bus kV)
= [illegible] % of Base kV (base kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"									
		3-Phase Fault		Line-to-Ground Fault									
From Bus ID	To Bus ID	I"k Symm. kA	ip kA	% Voltage at From Bus			k Symm. kA		R1	X1	R0	X0	

* Indicates fault current contribution is from three-winding transformers
\# Indicates a zero sequence fault current contribution from a grounded Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: R4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **R4T1-PRI-R2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 Symm Amp A	I2 Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	46
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B421-PRI-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. ang	% Voltage at From Bus A	B	C	3I0 Symm. mag A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	17
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-PRI-02**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms,	I/c Symm. rms	% Voltage at From Bus			I/c Symm. rms		R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	66
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **84[illegible]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (kV)

= [illegible] % of Base kV (kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I (kA) From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I (kA) From Bus A	I (kA) From Bus B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	40
Location:	Borger and Mills County, TX			Date:	04/25/2019
Contract:	CB-09c2781			SN:	WORKSHOP02
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp24_2.lfmxm			Config:	Normal

Fault at bus: **B427 [480 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
B427 [480 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.868+j0.000	2.726+j0.000		
B7006 [480 kV]	B427 [480 kV]	7.221	44.871	0.00	120.00	120.00	44.871	0.000	0.268+j0.000	0.268+j0.000		
B8000 [480 kV]	B6000 [480 kV]	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfanse			Config:	Normal

Fault at bus: **84213044 61**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I sc Symm. rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B421 [illegible] 02**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompBusNum		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
Faulted Bus ID	% Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at Faulted Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemtr	**ETAP**		Page:	42
Location:	Bowers and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpe[illegible]			Config:	Normal

Fault at bus: **B421 (Nd 6)**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi14_2.lfrmxm			Config:	Normal

Fault at bus: **B421 [N0-0]**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.0 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Prefault Bus	I"k Symmetrical rms	% Voltage at From Bus A	B	C	3I0 Symmetrical rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	16
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lf36			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3θ	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	46
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **R4T4H4-H**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	3I0 [illegible]	% Voltage at From Bus V1	V2	V0	3I0 [illegible]	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

k - Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **B42T440 #2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompliBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	3I0	Va	Vb	Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemir	**ETAP**		Page:	98
Location:	Bowie and Mills County, TX			Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGMS-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84T1-69241**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	Ik Symm. kA	Ik Symm. kA	% Impedance on 100 MVA base R1	X1	R0	X0
84T1-69241	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7788+j0.000	1.7788+j0.000		
69268-BUS1-1	84T1-69241	1.87	0.000	0.00	120.00	120.00	0.000	0.000	0.2681+j0.000	0.2681+j0.000		
84T1-69241	Medium-voltage Bus	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a value exceeding fault current contribution (100) from a generator (Delta, Y-unearthed)

Project:	Chemin	**ETAP**		Page:	10
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: 10: Comp: 10		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **B4T1-HV2 #2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I_k Symm. rms	% Voltage at From Bus			X/R Ratio		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemic	**ETAP**		Page:	198
Location:	Bowie and Mills County, TX			Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPRE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **R427-69.41**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm kA	3I0 Angle	R1	X1	R0	X0
R427-69.41	Total	0.00	0.000	0.00	120.00	120.00	0.000	0.00	1.7700+j0.0000	1.7700+j0.0000		
R427-69.41	R427-69.41	1.87	0.000	0.00	120.00	120.00	0.000	0.00	0.2687+j0.0000	0.2687+j0.0000		
R427-69.41	Bus1	0.00	0.000	0.00	120.00	120.00	0.000	0.00				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	16.0.0C		Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGIBG-PAPHX
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfstore			Config:	Normal

Fault at bus: **B-GT1-69.0 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ip Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B-GT1-69.0 kV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.906+j0.000	17.705+j0.000		
B-T1-69.0 kV	B-GT1-69.0 kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
B-T1-69.0 kV	Bus Connection 69kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeding fault current interrupting rating (100.0 kA symmetrical). Protective device may be overdutied.

Project:	Chemo	**ETAP**		Page:	112
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-00441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I*k Symm. kA	% Voltage at From Bus A	B	C	I*k Symm. kA A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	16.0.0C		Date:	04/25/2019
Contract:	CB-09c270			SN:	89-001-89-9002
Engineer:	Real Power Engineering	Study Case: SC Comp 89		Revision:	Base
Filename:	rpp14_2.lfmxm			Config:	Normal

Fault at bus: **B423-004 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus 0.0 (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	% Impedance on 100 MVA base R1	X1	R0	X0
B423-004 #2	Bus	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B1000-B423-1	B423-004 #2	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B999-B423-1	B423-004 #2	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemo	**ETAP**		Page:	101
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-600 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault	Ik Symm. Fault	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault A	3I0 Symm. Fault B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	191
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84T1-69 #1**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms					
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or User-Defined

Project:	Chemo	**ETAP**		Page:	3/6
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC Comp 3/4		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: MPAK 001

Prefault voltage = [illegible] kV = [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from bus)	% Voltage at From Bus			I (from bus)		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
MPAK 001	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	107
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC-Comp-BM		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: [illegible]

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	Ik Symm rms	% Voltage at From Bus A	B	C	Ia Symm. rms	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence to this fault current contribution

* Indicates a zero sequence fault current contribution ([illegible] from a grounded [illegible] transformer

Project:	Chemie	**ETAP**		Page:	4.0
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	CB-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lf36mm			Config:	Normal

Fault at bus: **MVAC-2H**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/I	% Voltage at From Bus			I/I Symm. rms		% Impedance on 100 MVA base			
				A	B	C	3I	3I0	R1	X1	R0	X0
MVAC-2H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	MVAC-2H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - [illegible]
* - [illegible]

Project:	Chemin	**ETAP**		Page:	3/8
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **WWAC-4H**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV (.[illegible] kV)
= [illegible] % of Base kV (.[illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase Fault	ip 3 Phase Fault	% Voltage at From Bus Va	Vb	Vc	3I0 Fault mag.		R1	X1	R0	X0
WWAC-4H1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	111
Location:	Borger and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp #4		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **MVAC-481**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase Fault	ip 3 Phase Fault	% Voltage at From Bus A	B	C	Ik A	Ik B	R1	X1	R0	X0
MVAC-481	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates that current contribution is from fuse limiting transformer.
* Indicates a zero sequence fault current contribution (3I0) from a grounded (Delta, Y-Ungrounded

Project:	Chemir	**ETAP**		Page:	11
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **MVAC_Bkr**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Ø Symm. Rms	I" 3-Ø Symm. Ang	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. mag. 3I0	3I0 Ang	R1	X1	R0	X0
MVAC_Bkr	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **MVAC_PRI**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			Ik Symm. rms		R1	X1	R0	X0
				Va	Vb	Vc	Ib	Ic				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	111
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **WWMC-001**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
WWMC-001	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Fault at bus: **WWMC-MS**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (24.000 kV)
= 100.00 % of Base kV (24.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. kA	3I0	R1	X1	R0	X0
WWMC-MS	Total	0.000	0.000	0.000	100.000	100.000	0.000	0.000	1.000+j0.000	0.000+j0.000	1.000+j0.000	1.000+j0.000
WWMC-MS	WWMC-MS	0.000	0.000	0.000	100.000	100.000	0.000	0.000	1.000+j0.000	0.000+j0.000	1.000+j0.000	1.000+j0.000
WWMC-MS	WWMC-MS	0.000	0.000	0.000	100.000	100.000	0.000	0.000	1.000+j0.000	0.000+j0.000	1.000+j0.000	1.000+j0.000

a) Reference bus is converted source bus to From Bus, using transformation.
b) Indicates a zero sequence, both current and voltage (3I0, Vno) symmetrical components.

Project:	Chemo	**ETAP**		Page:	111
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **4W**

Prefault voltage = 345.000 kV = 100.00 % of nominal bus kV (345.000 kV)
= 100.00 % of Base kV (345.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from Bus)	I (from bus)	% Voltage at From Bus			I (from bus)		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
4W	bus	0.00	12.725	0.00	100.00	114.90	12.993	12.993	0.4141E+002	1.4861E+003	2.1750E+001	2.1775E+003
[illegible]	4W	[illegible]	12.725	86.000	200.00	[illegible]	12.993	8.561	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Fault at bus: **SS-BUS-11**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-11	Total	0.00	23.479	0.00	117.00	116.00	36.261	36.261	2.308+003	8.078+000	1.760+001	1.930+001
MSNC-161	SS-BAY-11	0.07	0.344	0.07	117.07	116.11	0.519	0.000	9.78E+000	2.92E+002		
MSNC-201	SS-BAY-11	0.11	0.344	0.11	117.11	116.15	0.519	0.000	9.78E+000	2.92E+002		
4.160 kV BUS -	SS-BUS-1 M.1 kV BUS - SS-BUS-1	86.15	20.464	98.48	99.20	99.87	10.987	6.151	3.261+000	6.420+000	1.710+002	3.000+001
0.23 kV	SS-BUS-1 M.1 kV BUS - SS-BUS-1	10.76	0.171	64.00	60.11	100.94	0.931	80.431 *	6.110+000	3.080+001	4.210+001	2.190+001
MSNC-161	SS-BAY-11	0.31	0.466	0.30	117.31	116.31	0.445	0.000	1.14E+000	3.40E+002		
MSNC-661	SS-BAY-11	0.31	0.466	0.30	117.23	116.31	0.445	0.000	1.14E+002	3.40E+002		
MSNC-901	SS-BAY-12	0.00	0.345	0.00	117.00	116.00	0.519	0.000	9.78E+000	2.92E+002		
XFMR_SS-MT1	SS-BAY-12	0.21	0.344	0.20	117.15	116.22	0.519	0.000	9.77E+000	2.92E+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chisme	ETAP		Page:	113
Location:	Brown and Mills County, TX	24.0.3C		Date:	09-03-2015
Contract:	EX-99-1701			SN:	PURE-POWER
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisme			Config.:	Normal

Fault at bus: **SS-BAY-12**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BAY-12	Total	0.00	23.479	0.00	117.00	116.00	36.261	36.261	2.308+003	8.078+000	1.760+001	1.930+001
MISC-001	SS-BAY-12	0.33	0.343	0.32	117.22	116.32	0.519	0.000	9.59E+004	2.92E+002		
XFMR-001HV	SS-BAY-12	0.21	0.344	0.20	117.13	116.22	0.519	0.000	9.57E+004	2.92E+002		
0.345 kV BUS	34.5 kV BUS - SOLAR-1	86.13	20.464	98.48	99.20	99.67	10.987	6.131	3.26E+000	6.02E+000	1.74E-002	3.06E-001
0.23 kV	34.5 kV BUS - SOLAR-1	19.76	4.171	64.00	60.11	100.94	0.931	30.131 *	6.63E+000	3.08E+001	4.23E-001	2.19E+001
MISC-101	SS-BAY-13	0.31	0.466	0.30	117.20	116.31	0.445	0.000	1.14E+005	3.49E+002		
MISC-601	SS-BAY-13	0.31	0.466	0.30	117.23	116.31	0.445	0.000	1.14E+005	3.49E+002		
MISC-101	SS-BAY-9	0.95	0.344	0.97	117.97	116.11	0.519	0.000	9.58E+004	2.92E+002		
MISC-201	SS-BAY-9	0.32	0.344	0.32	117.19	116.17	0.519	0.000	9.59E+004	2.92E+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chrome	ETAP		Page:	118
Location:	Brown and Mills County, TX	24.0.3C		Date:	09-03-2015
Contract:	EX-99-1701			SN:	IN102-POWER2
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chrome			Config.:	Normal

Fault at bus: **SS-BAY-13**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BAY-13	Total	0.00	23.479	0.00	117.00	116.00	36.261	36.261	2.308E+00	8.078E+00	1.760E-01	1.930E-01
MESC-501	SS4BAY-13	0.31	0.466	0.30	117.25	116.31	0.445	0.000	1.14E+02	3.40E+02		
MESC-601	SS6BAY-13	0.31	0.466	0.30	117.25	116.31	0.445	0.000	1.14E+02	3.40E+02		
# 345 kV BUS	M-1 LV BUS -	86.15	20.464	98.48	99.20	99.87	19.987	6.151	3.81E+00	6.42E+00	1.74E-01	3.00E-01
# 13.8 kV	SOLAR-1 M-1 LV BUS -	13.78	0.171	84.00	84.11	100.94	0.931	30.431 *	6.63E+00	3.08E+01	4.23E-01	2.19E+01
MESC-101	SOLAR-1 SS4BAY-13	0.03	0.443	0.02	117.30	116.92	0.219	0.000	4.76E+00	2.82E+02		
XFMR-345/69	SS4BAY-13	0.21	0.344	0.20	117.15	116.22	0.319	0.000	9.57E+00	2.82E+02		
MESC-101	SS4BAY-13	0.07	0.344	0.07	117.07	116.31	0.319	0.000	9.78E+00	2.82E+02		
MESC-201	SS4BAY-13	0.12	0.344	0.12	117.19	116.17	0.319	0.000	9.76E+00	2.82E+02		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-21**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
				% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	3a	3b	3c	3a	3b	R1	X1	R0	X0
SS-BUS-21	Total	0.00	23.099	0.00	166.92	113.94	36.043	36.043	2.388+000	8.078+000	1.760+001	1.938+001
XFMR-B101-HV	SS-BAY-21	0.06	0.634	0.05	166.95	113.99	0.519	0.000	1.548+002	2.258+002		
XFMR-B201-HV	SS-BAY-21	0.07	0.634	0.06	166.95	113.99	0.519	0.000	1.548+002	2.258+002		
# 345 kV BUS	34.5 kV BUS - BR01	86.14	20.407	98.89	99.28	99.87	18.195	6.324	2.988+000	6.020+000	1.760+001	1.938+001
# T2-3	34.5 kV BUS - BR01	16.77	5.171	61.92	65.36	160.84	0.932	30.421 *	6.96E+000	3.98E+001	4.24E+001	2.29E+001
XFMR-B301-HV	SS-BAY-21	0.06	0.634	0.05	166.95	113.99	0.519	0.000	1.548+002	2.258+002		
XFMR-B601-HV	SS-BAY-21	0.04	0.532	0.05	166.96	115.97	0.432	0.000	1.82E+002	2.78E+002		
XFMR-B101-HV	SS-BAY-22	0.06	0.634	0.05	166.95	113.99	0.519	0.000	1.548+002	2.258+002		
XFMR-B601-HV	SS-BAY-22	0.04	0.634	0.05	166.96	113.97	0.519	0.000	1.548+002	2.258+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-22**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-22	Total	0.00	23.099	0.00	166.92	113.94	36.043	36.043	2.308+003	8.078+000	1.760+001	1.938+001
XFMR-BUS14-HV	SS-BUS-22	0.06	0.634	0.05	166.95	113.95	0.519	0.000	1.548+002	2.250+002		
XFMR-BUS1-HV	SS-BUS-22	0.04	0.634	0.05	166.95	113.97	0.519	0.000	1.548+002	2.250+002		
# 345 kV BUS	34.5 kV BUS - BUS1	86.14	20.407	90.89	99.28	99.87	18.196	6.324	2.988-006	6.420+000	1.760-002	1.938-001
# T2-3	34.5 kV BUS - BUS3	16.77	5.171	61.92	65.06	150.84	8.932	30.421 *	6.96E+000	3.16E+001	4.24E-001	2.39E+001
XFMR-BUS3-HV	SS-BUS-23	0.06	0.634	0.05	166.95	113.95	0.519	0.000	1.548+002	2.250+002		
XFMR-BUS4-HV	SS-BUS-23	0.04	0.532	0.05	166.96	113.97	0.433	0.000	1.82E+002	2.78E+002		
XFMR-BUS5-HV	SS-BUS-23	0.06	0.634	0.05	166.95	113.95	0.519	0.000	1.548+002	2.250+002		
XFMR-BUS6-HV	SS-BUS-23	0.07	0.634	0.06	166.95	113.95	0.519	0.000	1.548+002	2.250+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-13**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-13	Total	0.00	23.999	0.00	166.92	113.94	36.043	36.043	2.388+003	8.078+000	1.760+001	1.938+001
XFMR-BUS14W	SS4BAY-23	0.06	0.634	0.05	166.95	113.95	0.570	0.000	1.548+002	2.258+002		
XFMR-BUS14W	SS4BAY-23	0.04	0.352	0.05	166.95	113.97	0.633	0.000	1.858+002	2.798+002		
# 345 kV BUS	34.5 kV BUS - BUS	86.14	20.407	90.89	99.28	99.87	10.196	6.324	2.988-006	6.020+000	1.760-002	1.938-001
# T2 - 3	34.5 kV BUS - BUS	16.77	5.171	61.92	65.36	150.84	6.932	30.421 *	6.968+000	3.168+001	4.510-001	2.398-001
XFMR-BUS14W	SS4BAY-22	0.06	0.634	0.05	166.95	113.95	0.570	0.000	1.548+002	2.258+002		
XFMR-BUS14W	SS4BAY-22	0.04	0.634	0.05	166.96	113.97	0.570	0.000	1.548+002	2.258+002		
XFMR-BUS14W	SS4BAY-21	0.06	0.634	0.05	166.95	113.95	0.570	0.000	1.548+002	2.258+002		
XFMR-BUS14W	SS4BAY-21	0.07	0.634	0.06	166.95	113.95	0.570	0.000	1.548+002	2.258+002		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	12
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR-HV-01**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	Ik Symm rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm rms Ia	Ib	R1	X1	R0	X0
XFMR-HV-01	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus voltage is less than specified minimum bus voltage.
* Bus voltage is greater than specified maximum bus voltage. [IEEE Std. 141-1993, Section 4.3 and IEEE Std. 399-1997, Section 4.5]

Project:	Chemin	**ETAP**		Page:	12
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/28/2020
Contract:	CR-PN-2701			SN:	PGBELPOWER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF900-4H-LV**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	Ik Symm. rms.	% Voltage at From Bus			kA Symm. rms.		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900-4-LV-S	Total	0.00	0.00 kA	0.00	111.32	111.32	0.000	0.000	2.208+j0.000	7.354+j0.000		
XF900-4-LV-1	SF7000-4-LV-1-T	10.77	10.80 kA	86.000	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
SF7000-4-LV-1-T	SF7000-4-LV-1-P	0.00	0.00 kA	0.00	111.32	111.32	0.000	0.000				

Bus contributes short-circuit current to its own three-phase bolted fault.
* Indicates a current contribution from a synchronous machine (SM) or an asynchronous motor (IM). For synchronous

Fault at bus: **XF908-HV-III**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/In Symm rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. rms Ia	Ib	R1	X1	R0	X0
XF908-HV-III	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-LV-III	XF908-LV-III*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-HV-A	XF908-LV-III*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the fault via a three winding transformer.

* Indicates a current contribution from a non-rotating impedance (YPD from a grounded-Delta, Y-impedance)

Project:	Chemin	**ETAP**		Page:	12
Location:	Bowie and Mills Counties, TX			Date:	04/28/2020
Contract:	CR-PN-2701			SN:	PGJRS-PC-PDT2
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14.2.7.lesmo			Config:	Normal

Fault at bus: **XF900-HV-LV**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF900-HV-LV	Total	0.000	0.000	0.00	111.11	111.11	0.000	0.00	0.0000+	0.0000		
XF900-LV-LV1	SF7464-LV-LV	0.000	0.000	100.00	100.00	0.00	0.000	0.00	0.0000+	0.0000		
SF7464-LV	SF7464-LV-LV	0.000	0.000	0.00	0.00	0.00	0.000	0.00				

Bus contributes fault current to the fault location through a transformer.

Bus contributes current to the fault location through a transformer (180) from a grounded-Delta or Y-ungrounded

Project:	Chemie	**ETAP**		Page:	10
Location:	Ransom and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj2-4_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-HV-BB**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Phase Symm. [illegible]	Ik Symm. [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. [illegible] Ia	Ib	R1	X1	R0	X0
XFMR-HV-BB	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer.

Project:	Chemtr	**ETAP**		Page:	127
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Mode: Case: 10	Config: 84	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-HS-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Faulted Bus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus			Ik Symm. kA		R1	X1	R0	X0
				A	B	C	A	3I0				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	118
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **XF908-004-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CurrentBasics		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. [illegible]	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]
[illegible]
[illegible]
[

Fault at bus: **XF908 004 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0
				A	B	C	A	B				
XF908 004 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 004 LV	XF908 004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 LV	XF908 004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	139
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 89		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XFMR-89 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from Motor or Motor Operated Valve
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	13
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPRE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **EP908 (69.0 kV)**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	Ik Symm. rms.	% Voltage at From Bus			kA Symm. rms.		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible] Bus contribution [illegible] Bus, Name, Ir rating, Ik/Ir ratio

[illegible] Line/transformer, Bus contribution [illegible] From, Ir rating, Ik/Ir ratio

Project:	Chemo	**ETAP**		Page:	111
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfmxm			Config:	Normal

Fault at bus: **EP908 (04 H)**

Prefault voltage = [illegible] kV = [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus			3I0 Fault		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
EP908 (04 H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP908 (04 H)	EP908 (04 H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP908 (04 H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908 (04 H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution from bus being analyzed
* - Indicates a zero impedance fault current contribution (100 from a grounded Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **XF908-B4-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus			I in From Bus		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF908-B4-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B4-LV	XF908-B4-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B4-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	134
Location:	Bowen and Mills Corner, TX			Date:	04/25/2019
Contract:	CB-09x2781			Std:	IEC/ANSI 50/51
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	cgi2.4.2.lemew			Config:	Normal

Fault at bus: **EP908 (07-11)**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (= 34.500 kV)
= 100.00 % of bus kV (= 34.500 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. kA Ia	Ib	R1	X1	R0	X0
EP908 (11111)	Total	0.000	0.000	0.00	122.98	122.12	0.000	0.000	1.4496+j0.0000	9.4962+j0.0000	2.7780+j0.0000	7.3224+j0.0000
EP908 (14-111)	EP908 (11111)	0.000	0.000	0.00	122.98	122.12	0.000	0.000	1.4496+j0.0000	9.4962+j0.0000	2.7780+j0.0000	7.3224+j0.0000
EP908 (1474)	EP908 (11111)	7.921	8.278	79.36	79.49	108.83	6.333	6.000	1.4496+j0.0000	9.4962+j0.0000		

# Indicates fault current contribution is from three winding transformers

Indicates current contribution from connected motors (100% from synchronous/20% from induction)

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF908-107-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0
XF908-107-LV	Total	[illegible]	12.751	[illegible]	111.11	170.21	0.000	[illegible]	2.266+j0.0	1.778+j0.0		
XF908-107-HV	XF908-107-HV	91.27	10.133	86.000	100.00	149.96	0.000	[illegible]	1.270+j0.0	1.780+j0.0		
[illegible]	XF908-107-HV	[illegible]	0.000	0.000	111.11	170.21	0.000	[illegible]				

[illegible] Indicates fault current contribution is from three-winding transformers

[illegible] Indicates current contribution from common grounded [illegible] transformers

Project:	Chemie	**ETAP**		Page:	139
Location:	Ransom and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XFMR_BUS1**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Anom Sym.	Ik Anom. rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. rms Ia	Ib	R1	X1	R0	X0
XFMR_BUS1HV	Infeed	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_BUS1HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR_BUS1LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and/or positive sequence fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	123
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR_BUS 1 3**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
XFMR_BUS 1 3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR_BUS 1 3 [illegible]	XFMR_BUS 3 4 1 3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XFMR_BUS 3 4 1 3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	178
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XF900 J12 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm. Fault	I" k Symm. Fault	% Voltage at From Bus			3I0 Symm. Fault		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF900 J12 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900 J12 HV	XF900 J12 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900 J12 HV	XF900 J12 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 J12 LV	XF900 J12 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Bus is initially excluded.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Fault at bus: **XF900 J02 LV**

Prefault voltage = 0.943 kV = [illegible] % of nominal bus kV (0.943 kV)
= [illegible] % of Base kV (0.943 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	Ik 3-phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 J02 LV	Total	0.000	10.111	0.00	115.32	115.32	0.000	0.000	0.278+j0.000	1.186+j0.000		
XF900 J02 LV	XF900 J02 LV	10.111	10.111	100.00	100.00	100.00	0.000	0.000	0.278+j0.000	1.186+j0.000		
XF900 J02	XF900 J02 LV	0.000	0.000	0.00	115.32	115.32	0.000	0.000				

Bus contributes fault current to the fault. Bus is not faulted.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y transformer

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Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **XF900_HV 69**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (= 24.000 kV)
= 100.00 % of Base kV (= 24.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symmetrical	kA Peak	% Voltage at From Bus			kA Symmetrical		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900_HV 69	Total	0.00	0.000	0.00	112.77	112.53	0.000	0.000	2.158+j0.000	9.908+j0.000	2.158+j0.000	9.908+j0.000
XF900_HV 69	XF900_LV 0.48	14.42	36.703	16.13	111.76	111.53	25.000	25.000	1.440+j0.000	6.608+j0.000	1.870+j0.000	7.683+j0.000
XF900_HV 69	XF900_LV 0.48	0.00	0.000	0.00	111.76	111.53	0.000	0.000	1.440+j0.000	6.608+j0.000		
XF900_HV 69	XF900_LV 0.48	0.00	0.000	0.00	111.76	111.53	0.000	0.000	1.440+j0.000	6.608+j0.000		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

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Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cap2.2.1.lmsxx			Config:	Normal

Fault at bus: **XF900_HA-LV**

Prefault voltage = 0.941 kV = [illegible] % of nominal bus kV (0.941 kV)
= [illegible] % of Base kV (0.941 kV)

CompRefBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	Va	Vb	Vc	Ia	R1	X1	R0	X0
XF900_HA-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900_HA-LV	XF900_HA-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900_HA-LV	XF900_HA-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

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Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfanse			Config:	Normal

Fault at bus: **XF900 J04 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF900 J04 HV	Total	[illegible]	[illegible]	[illegible]	112.77	[illegible]	[illegible]	112.77	[illegible]	[illegible]	[illegible]	[illegible]
XF900 J04 HV	XF900 J04 HV	1.77	[illegible]	1.11	112.77	117.14	[illegible]	112.61	[illegible]	[illegible]	[illegible]	[illegible]
XF900 J04 HV	XF900 J04 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

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Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC-Comp-3Ø		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF900 J04 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (1.040 kV)
= [illegible] % of Base kV (4.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF900 J04 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 J04 LV	XF900 J04 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 J04 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

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Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900_HV 101**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus kA	ip Symm. peak kA	% Voltage at From Bus			3I0 Symm. mag. kA		% Impedance on 100 MVA base			
				3p	1Ph	2p	3p	1Ph	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemie	**ETAP**		Page:	151
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **EP908 J69 LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	Va	Vb	Vc	Ia	R1	X1	R0	X0
EP908 J69 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908 J69 LV	EP908 J69 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP908 J69 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

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Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF900_[illegible]H**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	ip Peak Amp	Ia	Ib	Ic	3I0 Symm. Amp	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF900 Bkr LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	Ik Symm. rms.	% Voltage at From Bus			3I0 Symm. rms.		R1	X1	R0	X0
				A	B	C	A	B				
XF900 Bkr LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 Bkr LV	XF900 Bkr LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 Bkr LV	XF900 Bkr LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

* Indicates fault current contribution is from three winding transformers
** Indicates current contribution from unknown sources (Utility, Generator, or Motor)

Fault at bus: **XF908 [H7-H]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF908 [H7-H]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [H7-H]	XF908 [H7-HP]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [H7-H]	XF908 [H7-HP]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution exceeds 1% of bus fault current
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Fault at bus: **XF900 J07-13**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm kA	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I" k Symm neg. A	I" k Symm neg. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 J07-13	Total	0.961	62.779	0.000	173.205	173.205	0.000	0.000	2.208+j0.000	j 1.776+j0.000		
XF900 J07-13	XF900 J07-13	61.26	62.779	0.000	300.00	0.000	0.000	0.000	2.208+j0.000	j 1.776+j0.000		
[illegible]	XF900 J07-13	0.00	0.000	0.000	173.21	173.21	0.000	0.000				

Bus contributes fault current to fault in From Bus - wrong transformer
^ Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y transformer

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Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XFMR_BUS1H**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp	3I0 Angle	R1	X1	R0	X0
XFMR_BUS1H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

A - Indicates fault current contribution from Bus or from Swing machine connected to Bus

* - Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

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Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR_Bus13**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip 3-phase [illegible]	3I0	1 to 3 cycles	Fault Bus	R1	X1	R0	X0	R1	X1	R0	X0
XFMR-[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
XFMR-[illegible]	XFMR_[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
[illegible]	XFMR_[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						

[illegible]

[illegible]

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Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908_B2 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus with motor contribution
* Indicates a zero sequence fault current contribution ([illegible] from a grounded-[illegible] transformer

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900_BG LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm. Amp	I_k Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

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Location:	Ransom and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **XFMR_B4 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/In Symm rms	% Voltage at From Bus A	B	C	3I0 Symm rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution ([illegible] from a grounded-[illegible] transformer

Project:	Chemin	**ETAP**		Page:	151
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **XF900_Bl4 C3**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRefBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	3I0 kA	% Voltage at From Bus A	B	C	3I0 Symm. comp. kA	R1	X1	R0	X0
XF900-Bl4 C3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900_Bl4 C3	XF900_Bl4 C3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900_Bl4 C3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	19
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe2-4_2.lfmdw			Config:	Normal

Fault at bus: **XFMR_B04-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

A - Individual fault current contribution from bus exceeds 1% of total fault current
* - Individual current contribution exceeds 1% of total current (IEC Class 4 protective device breaking capacity)

Project:	Chemic	**ETAP**		Page:	13
Location:	Bowie and Mills County, TX			Date:	04/28/2020
Contract:	CR-PN-2701			SN:	PGBG-PAPRE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxm			Config:	Normal

Fault at bus: **XF900_H4-LV**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

CompRelation		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	B	C	3I0 Symm. kA A	B	R1	X1	R0	X0
XF900-H4-LV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.208+j0.000	2.208+j0.000		
XF900_H4-LV	XF900_H4-LV	10.127	10.127	100.000	100.000	100.000	0.000	0.000	2.208+j0.000	2.208+j0.000		
XF900_H4-LV	XF900_H4-LV	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

Bus contributes fault current to the fault. Bus is missing from the one-line diagram.

* Indicates a current contribution from a motor or generator. (IEC) Power grid modeled as Ideal bus. R, X in parentheses

Fault at bus: **XFMR_B0 (0)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)					
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	139
Location:	Bowen and Mills Counties, TX			Date:	04/25/2019
Contract:	CB-09x278			Git:	09:00 PM PST
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfnew			Config:	Normal

Fault at bus: **EP908_BUS1**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus EP_1 (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"								
Contributions		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		R1	X1	R0	X0

Adjustments Applied to Current Magnitudes

Project:	Chemo	**ETAP**		Page:	191
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR_BUS 111**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA 3-Phase Symm.	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

A - Indicates fault current contribution from Bus A to the fault, during unbalanced conditions.
* - Indicates a zero sequence fault current contribution. (3I0) from a grounded (Delta, Y-Solidified)

Project:	Chemie	**ETAP**		Page:	101
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe2.4.2.lemew			Config:	Normal

Fault at bus: **EP908_Bus13**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
EP908-Bus13	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908-Bus1111	EP908_Bus1111	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908-Bus	EP908-Bus13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	1.1
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			Git:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ntp14_2.lfmxml			Config:	Normal

Fault at bus: **EP008_BUS1**

Prefault voltage = [illegible] kV = [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR_BUS_LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemin	**ETAP**		Page:	101
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR-4H-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I_k Symm rms	% Voltage at From Bus Va	Vb	Vc	I_k Symm rms Ia	Ib	R1	X1	R0	X0
XFMR-4H-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4H-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-4H-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj14_2.lfmxm			Config:	Normal

Fault at bus: **XF908-480.0 V**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

CompRefMotor		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm kA	I/In Symm rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. rms A	3I0 Symm. rms B	R1	X1	R0	X0
XF908-480.0 V	Total	0.000	0.0 at 0%	0.000	115.32	115.32	0.000	0.000	0.0000+j0.000	0.0000+j0.000		
XF908-480.0 V	XF908-480.0 V	0.000	0.0 at 0%	0.000	115.32	115.32	0.000	0.000	0.0000+j0.000	0.0000+j0.000		
Bus 480	XF908-480.0 V	0.000	0.0 at 0%	0.000	115.32	115.32	0.000	0.000				

Bus contributes fault current to the fault at its own bus during unbalanced faults.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	100
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900-402 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution. (XFMR Zero sequence[illegible]Delay Y Grd/Delta)

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900-402 LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF900-402 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-402 LV	XF900-402 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
Bus402	XF900-402 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	198
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-4H HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being initially interrupted.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-[illegible] transformer.

Project:	Chemin	**ETAP**		Page:	105
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900-4KV-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF900-4KV-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-4KV-LV	XF900-4KV-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
From Bus	XF900-4KV-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a current contribution from common grounded Delta-Y transformers

Project:	Chemie	**ETAP**		Page:	179
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR-4H-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm Amp	3I0 Angle	R1	X1	R0	X0
XFMR-4H-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4H-LV1	XFMR-4H-LV1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4H-LV2	XFMR-4H-LV2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemtr	**ETAP**		Page:	17
Location:	Bowers and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Mode: Case: 10	Comp: Bf	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-464-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I (kA) From Bus	% Voltage at From Bus A	B	C	3I0 (kA) A	B	R1	X1	R0	X0
XF908-464-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-464-LV	XF908-464-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908-464-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

Bus contributes [illegible] current to fault. Bus is missing transformer data.

Bus has a zero sequence [illegible] current contribution [illegible] from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	172
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-400 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp A	B	R1	X1	R0	X0
XF900-400 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF900-460.V**

Prefault voltage = 0.941 kV = [illegible] % of nominal bus kV (0.941 kV)
= [illegible] % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF900-460.V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-460.V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

Project:	Chemic	**ETAP**		Page:	179
Location:	Ponce and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR-404 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp A	B	R1	X1	R0	X0
XFMR-404 (H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-404 (H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-404 (H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-404 (H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes much more fault current than the rating of the bus
* Bus contributes more than 100% of the rating of the bus

Fault at bus: **XFMR-R4-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-R4-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemin	**ETAP**		Page:	179
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmdw			Config:	Normal

Fault at bus: **XFMR-407-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
XFMR-407-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the fault via three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	777
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-407-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			X/R Symm. Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	3I0	R1	X1	R0	X0
XFMR-407-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-407-HV1	XFMR-407-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
Bus407	XFMR-407-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

Symmetrical fault current is from "Bus" before fault.
* Indicates a current contribution (fault current contribution [illegible] from a generator/Delta-Y transformer)

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Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp24_2.lfanalyzer			Config:	Normal

Fault at bus: **XFMR 004 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Faulted Bus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
				% Voltage at From Bus					% Impedance on 100 MVA base			
From Bus ID	To Bus ID	I" Symm. Rms	Ik Symm. rms	Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus, Non-zero breaking current duty.
* Indicates a zero sequence fault current contribution. (XFR Conn: [illegible])

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Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR Bus 13**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chevron	**ETAP**		Page:	191
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **XFMR 002 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XFMR 002 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 001 HV	XFMR 001 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 003 HV	XFMR 003 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR 004 HV	XFMR 004 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer.

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR 0612-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CurrentBasics		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
XFMR 0612-LV	Load	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR 0612-HV	SITMEL 0.5 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	SITMEL [illegible] kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	192
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfimmr			Config:	Normal

Fault at bus: **XF908 004 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	ip From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 004 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 002 HV	XF908_T2 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 003 HV	XF908_T3 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 001 HV	XF908_T1 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	101
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **EP908 0kV CP**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm, mag A	3I0 Symm, mag B	R1	X1	R0	X0
EP908 0kV CP	Total	0.000	0.000	0.00	100.00	100.00	0.000	0.000	2.156+j0.000	2.156+j0.000		
EP908 34.5 kV	EP908_T1 LV	0.126	0.126	99.00	100.00	100.00	0.000	0.000	4.758+j0.000	4.758+j0.000		
EP908 34.5 kV	EP908_T2 LV	0.126	0.126	99.00	100.00	100.00	0.000	0.000				

Bus contributes fault current to the fault. Bus is missing branch data.
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y impedance

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Location:	Borden and Milk Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC-Comp-BM		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-BM-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-HV#1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-LV1#1	SCMBL-NA-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV#1	SCMBL-NA-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-HV#2	SCMBL-NA-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution current is from Delta-connected source(s).
* Indicates a zero sequence fault current contribution. (Per Study Case Preferences)

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpe[illegible]			Config:	Normal

Fault at bus: **XF900 004 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm. Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900 004 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 004 LV	XF900_004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900_004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	19
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **XF908 000 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp A	B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 000 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 000 HV	XF908_T1 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 000 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 000 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates that current source is from fault study
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX			Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGJRS-PC-PJ02
Engineer:	Rod Power Engineering	Study Case: SC-Comp-PF		Revision:	Base
Filename:	cgi2-4-2.lfmxml			Config:	Normal

Fault at bus: **LP909 069.1P**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
LP909 069.1P	Total	0.000	0.000	0.00	111.32	110.23	0.000	0.000	2.388 mOhm	17.786 mOhm		
LP909 069.1P	SP7MSL1A 0.1P	10.16	25.871	66.00	100.00	100.00	0.000	0.000	6.568 mOhm	1.784 mOhm		
SP7MSL1A 0.1P	SP7MSL1A 0.1P	0.00	0.000	0.00	111.32	110.23	0.000	0.000				

Bus contributes short-circuit current to fault. Bus is missing branch data.

* Indicates a zero sequence, line-to-ground or line-to-line (120) fault, a positive sequence, or a special contribution.

Fault at bus: **EP008 004 01**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
EP008 004 01	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP008 003 01	EP008_003_01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP008 004 01	EP008_004_01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Fault at bus: **XF908 Bkr 13**

Prefault voltage = 0.941 kV = [illegible] % of nominal bus kV (0.941 kV)
= [illegible] % of Base kV (0.941 kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	Ik 3-phase kA	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
XF908 Bkr13	Total	0.000	12.333	0.000	111.32	111.32	0.000	0.000	2.286+j0.000	17.786+j0.000		
XF908 Bkr13	XF908_Bkr13	31.782	28.516	100.00	300.00	300.00	0.000	0.000	2.478+j0.000	17.786+j0.000		
XF908 Bus	XF908_Bkr13	0.000	0.000	0.000	111.32	111.32	0.000	0.000				

Bus contributes fault current to the fault, Bus is missing from the system, or Bus is the faulted bus.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y transformer

Project:	Chemo	**ETAP**		Page:	191
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-480-HV**

Prefault voltage = 24.00 kV = 100.00 % of nominal bus kV (= 24.00 kV)
= 100.00 % of Base kV (= 24.00 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I"k Zero seq. kA	3I"k Negative seq. kA	R1	X1	R0	X0
XFMR-480-HV	Total	0.00	0.00	0.00	122.50	122.50	0.000	0.000	1.7E+000	1.0E+001	1.3E+000	2.2E+000
[illegible]	[illegible]	0.0	0.00	0.0	122.50	122.50	0.000	0.000	1.7E+000	9.9E+000	1.3E+000	2.2E+000
XFMR-480-HV	[illegible]	0.00	0.000	0.00	122.50	122.50	0.000	0.000	1.7E+000	9.9E+000		
XFMR-480-HV	[illegible]	0.00	0.00	0.00	122.50	122.50	0.000	0.000	1.7E+000	9.9E+000		

A - Indicates fault current contribution from Motor, Static Starting, Capacitor Bank
* - Indicates a zero impedance fault current contribution (100 Ohms grounding/Delta-Y transformer)

Project:	Chemtr	**ETAP**		Page:	19
Location:	Bowen and Mills Counties, TX			Date:	04/25/2019
Contract:	CR-PN-2701			SN:	PGBG-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-480-13**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
XFMR-480-13	Total	0.961	0.961	0.00	111.32	111.32	0.000	0.000	2.266+j0.000	1.778+j0.000		
XFMR-480-13	SFMR-0.5-13.2	0.961	0.961	100.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
SFMR-0.5	SFMR-0.5-13.2	0.961	0.961	0.00	111.32	111.32	0.000	0.000				

Bus contributes fault current to fault in From Bus, but no remaining branch contributions

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y-grounded transformer

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Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-HV1 (1)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault	ip Peak Fault	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault A	3I0 Symm. Fault B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900-460 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus			3I0 Symm. comp. [illegible]		% Impedance on 100 MVA base			
				3I0	V0	V1	R1	X1	R1	X1	R0	X0
XF900-460 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-460 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	199
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	ip From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedances on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **XFMR-463 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	199
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-604-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF908-604-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-647-HV1	XF908-[illegible]-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-647-HV2	XF908-[illegible]-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-[illegible]-C	XF908-[illegible]-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution ([illegible] from a grounded-[illegible] transformer

Project:	Chemtr	**ETAP**		Page:	191
Location:	Bowers and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Mode: Case: 10	Comp: Bf	Revision:	Base
Filename:	cgi[illegible]			Config:	Normal

Fault at bus: **XFMR-004-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (0.480 kV)
= [illegible] % of Base kV (0.480 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/I	% Voltage at From Bus			I/I Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XFMR-004-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-004-LV	BUS6-004-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	BUS6-004-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	118
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lamon			Config:	Normal

Fault at bus: **XFMR-600 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	199
Location:	Bonnie and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus [illegible]
= [illegible] % of Base kV (0.600 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I" k Symm Amp A	I" k Symm Amp B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	298
Location:	Bowen and Mills Corners, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kiel Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cgi[illegible]			Config:	Normal

Fault at bus: **XFMR-4H-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-4H-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4H-LV1	XFMR-4H-LV	7.8x	12.5x	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4H-LV2	XFMR-4H-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the fault in this Base rating classification.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemtr	**ETAP**		Page:	291
Location:	Bowers and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-466 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I_k Symm rms	% Voltage at From Bus A	B	C	3I0 Symm rms A	B	R1	X1	R0	X0
XFMR-466 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-466 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	101
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus			I in From Bus					
				A	B	C	A	3I0	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	333
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **LF909-B480-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 fault mag. A	3I0 fault mag. B	R1	X1	R0	X0
[illegible]	Utility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus voltage is below user-defined threshold for this study (initial conditions).
* Indicates a zero or negative fault current contribution. (IEC Zero sequence/Ultimate Symmetrical)

Fault at bus: **XFMR-HV2-HV**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
XFMR-HV2-HV1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV2-HV1	XFMR-HV2-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV2-HV1	XFMR-HV2-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-HV2-LV1	XFMR-HV2-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from user-defined model.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	200
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF909-B402-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	ip Peak Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF909-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF909-B402-LV	M-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus, Being contributing transformer.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	298
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-8400-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-8400-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-8400-LV1	SWGR-8411-BUS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-8400-LV2	SWGR-8412-BUS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-8400-LV3	SWGR-8413-BUS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied three-phase bus
* Indicates a zero sequence fault current contribution. (Per IEEE Std. 3 recommended Practice for Protection

Project:	Chemo	**ETAP**		Page:	207
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-B600 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (3.600 kV)
= [illegible] % of Base kV (3.600 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	1/2 Cycle	1.5 Cycle	% Voltage at From Bus			1.5 Cycle - only		% Impedance on 100 MVA base			
				A	B	C	3I0	3I0	R1	X1	R0	X0
XF900-B600 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	2/8
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-B4H-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-B4H-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B4H-LV1	XFMR-B4H-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B4H-MV	XFMR-B4H-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B4H-LV2	XFMR-B4H-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution exceeds 1% of bus fault current
* Bus contributes [illegible] % of bus fault current and exceeds 1.0% limit [illegible] Transformer

Project:	Chemo	**ETAP**		Page:	208
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF909-B104-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (1.000 kV)
= [illegible] % of Base kV (1.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms Ia	kA Symm. rms 3I0	R1	X1	R0	X0
XF909-B104-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **LF908 0449 41V**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus A	B	C	I/c Symm. rms A	B	R1	X1	R0	X0
LF908 0449 41V	Total	0.00	12.394	0.00	111.97	118.06	12.443	11.443	1.228+j0.000	8.000+j0.000	1.000+j0.000	1.175+j0.000
LF908 0449 41V	SF908 0449 00B	5.61	12.71	0.00	111.97	118.06	12.800	11.743	1.462+j0.000	7.200+j0.000	1.000+j0.000	1.175+j0.0
LF908 0449 00B	SF908 0449 00B	0.00	0.00	0.00	111.97	118.06	0.000	0.000	0.000+j0.000	0.000+j0.000		
LF908 0449 00B	SF908 0449 00B	0.00	0.00	0.00	111.97	118.06	0.000	0.000	0.000+j0.000	0.000+j0.000		

# Indicates fault current contribution from studied three-phase bus
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	33
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-B400-LV**

Prefault voltage = [illegible]

= [illegible]% of Nominal bus kV (400-LV)
= [illegible]% of Base kV (400-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	R1	X1	R0	X0
XF900-B4CP1-3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B4CP1-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B4CP1-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B4CP1-3	XF900-B4CP1-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus voltage drops under fault are less than acceptable limits.

* Indicates a pre-existing condition not due to the fault. (IEC Does not consider Positive & Zero Sequence Impedances)

Project:	Chemin	**ETAP**		Page:	212
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Mode: Case: SC Comp: [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus [illegible] ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	B	C	3I0 in From Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible] Bus current contribution is from [illegible] winding transformer.
[illegible] current contribution [illegible] from a grounded Delta-Y transformer

Fault at bus: **EP909-B106-LV**

Prefault voltage = [illegible]

= [illegible]% of Nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
EP909-B106-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Fault at bus: **XFMR-RDN-HV**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	ip Peak	% Voltage at From Bus			3I0 Symm. mag.		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XFMR-RDN-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **EP908 (KB6-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (EP908 LV)
= [illegible] % of Base kV (EP908 LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
EP908 KB6 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
KA17 (LV-1)	EP908 KB6 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
KT17 (LV-1)	EP908 KB6 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908 KB6 LV	EP908 KB6 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from Motor Starting Acceleration
* Indicates a zero sequence fault current contribution (XFMR from a grounded Delta or Y, Generator

Fault at bus: **XF908 8X0.415**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Phase Sym.	I/X	% Voltage at From Bus			3I0 Symm. comp.		% Impedance on 100 MVA base			
				3a	3b	3c	3I	3R	R1	X1	R0	X0
XF908 8X0.415	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 8X0.415	XF908-8X0.415	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 8X0.415	XF908-8X0.415	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 8X0.415	XF908-8X0.415	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Sum of branch contributions may not equal total fault current.

* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Fault at bus: **EP908 4160.0 kV**

Prefault voltage = 4160.0 kV = [illegible] % of Nominal bus kV (4160 kV)
= [illegible] % of Base kV (4160 kV)

		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
				% Voltage at From Bus								
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	A	B	C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
EP908 4160.0 kV	Total	0.000	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
BUS1 [illegible]	EP908 4160.0 kV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
BUS2 [illegible]	EP908 4160.0 kV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
[illegible]	EP908 4160.0 kV	0.00	0.000	0.00	100.00	100.00	0.000	0.000	1.000+j0.000	0.000+j0.000		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (Yes, it is grounded through a Y-transformer)

Fault at bus: **XF908 (H20 4H)**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	Ik Symm. kA A	Ik Symm. kA B	R1	X1	R0	X0
XF908 (H20 4H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 (H20 4H)	XF908 (H20 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 (H20 4H)	XF908 (H20 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 (H20 4H)	XF908 (H20 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution. (SLG fault or unbalanced 3-Phase-to-Ground fault)

Fault at bus: **EP908 B200 4.5V**

Prefault voltage = [illegible]

= [illegible]% of Nominal bus kV (4.500 kV)
= [illegible]% of Base kV (4.500 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	3I0 kA	% Voltage at From Bus A	% Voltage at From Bus B	X/R Ratio A	X/R Ratio B	R1	X1	R0	X0
EP908 B200 4.5	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	220
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-RDM-01Y**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	B	C	3I0 in From Bus A	B	R1	X1	R0	X0
XFMR-RDM-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

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Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF908 [8264 kV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (8400 kV)
= [illegible] % of Base kV (8400 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)					
				A	B	C	A	B	R	X	R0	X0
XF908 [8264 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908 [8264 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908 [8264 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908 [8264 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	[illegible]
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuo Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (100 kV) = [illegible] % of base kV (34.5 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm mult	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 To Symm mag A	I2 To Symm mag B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemin	**ETAP**		Page:	221
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **XF900 (R269 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900 (R269 kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemin	**ETAP**		Page:	324
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-HIGH-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus 3I0	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	222
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp24_2.lf36mod			Config:	Normal

Fault at bus: **EP908 (Elbw-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus EP_1 (0.600 kV)
= [illegible] % of Base kV (0.600 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. amp	% Voltage at From Bus A	B	C	3I_0 Symm. amp A	B	R1	X1	R0	X0
EP908 (Elbw-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

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Location:	Ranson and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **UP908-BRK-01V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus A	B	C	I/c Symm Amp A	B	R1	X1	R0	X0
UP908-BRK-01V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (three-phase or line-to-ground).
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye X-winding.

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Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XF908 (Bfr)-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 (Bfr)-LV	Total	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
BUS1 (0.48 kV)	XF908 (Bfr)-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
BUS2 (0.48 kV)	XF908 (Bfr)-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF908 (Bfr) (P)	XF908 (Bfr)-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

Bus contribution current is from Ilmig motor(s).
* Indicates a pre-existing fault current contribution. (IEC Does not consider Pre-Fault Conditions)

Project:	Chemo	**ETAP**		Page:	228
Location:	Ramon and Milli Cuevas, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lamx			Config:	Normal

Fault at bus: **XF908-BS02-01V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
XF908-BS02-01V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BS02-01V	XF908-BS02-02V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BS02-02V	XF908-BS02-03V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BS02-03V	XF908-BS02-04V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus is being faulted.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-Wye-Y transformer

Fault at bus: **EP908 (kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. Amp	% Voltage at From Bus			X/R Ratio		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
EP908 (kV) 1 V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus [illegible] has [illegible] contributions from fixed-speed motors in the fault-clearing equivalent.
* Indicates a zero sequence, line-to-ground, or line-to-line-to-ground (LLG) fault current contribution. (LLG Fault current is the sum of the absolute values of the phase currents.)

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Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF908 (EB3 4H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/In	% Voltage at From Bus			I/3I0 Symm. Rms		% Impedance on 100 MVA base			
				A	B	C	A	3I0	R1	X1	R0	X0
XF908 (EB3 4H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 (EB3 4H)	XF908 (EB3 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 (EB3 4H)	XF908 (EB3 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 (EB3 4H)	XF908 (EB3 4H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus, Mutual coupling not included.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	231
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900-BS01-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
XF900-BS01-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-BS01-LV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2-BS01-LV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-BS01-MV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from Motor or Static starting/accelerating
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	222
Location:	Ransom and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **UP908 (UH4-01)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus A	B	C	I/c Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. [illegible] Zero sequence [illegible] Positive & Zero Impedances

Fault at bus: **XF900 (kV)**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 (kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemin	**ETAP**		Page:	234
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908 (ESP-41)**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF908-BUS1-01	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS1-01	XF908-BUS1-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS1-01	XF908-BUS1-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BUS1-01	XF908-BUS1-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye X-transformer

Project:	Chemo	**ETAP**		Page:	233
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900-HSP-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (XF900-LV)
= [illegible] % of Base kV (XF900-LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ik" kA	3I0 kA	Ik" kA	R1	X1	R1	X1	R0	X0
XF900-HSP-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates that current flows from the bus to the fault.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	226
Location:	Bowers and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **XFMR-BRK-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-BRK-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BRK-LV	XFMR-BRK-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BRK-LV	XFMR-BRK-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	227
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **LF908 (Elbo-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (LF908 LV)
= [illegible] % of Base kV (LF908 LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Loads	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	2.56
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Bus	I/c Symm. amp	% Voltage at From Bus A	B	C	I/c Symm. amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. [illegible] Zero sequence [illegible] Impedances

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Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **EP908-B400-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (EP908-B400-LV)
= [illegible] % of Base kV (EP908-B400-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative Seq. kA	3I0 Negative Seq. kA	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	246
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-BUS1 HV**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Faulted Bus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Real kA	3I0 Imag. kA	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates that current contribution is from fuse limiting calculations.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer.

Project:	Chemo	**ETAP**		Page:	20
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XF900-B402-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (1.000 kV)
= [illegible]% of Base kV (1.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF900-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B402-LV	M-B402-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution is less than 1% of total fault current.
* Indicates a zero sequence fault current contribution. (XF0 from a grounded-Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	242
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp24_2.lfanalyzer			Config:	Normal

Fault at bus: **XFMR-B460-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-B460-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B460-LV1	XFMR-B460-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B460-LV2	XFMR-B460-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B460-LV3	XFMR-B460-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus is both source and load. Bus is in the faulted substation.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-[illegible] transformer

Project:	Chemo	**ETAP**		Page:	291
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XF998-B403-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Bus is being faulted.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	244
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-B4414H**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-B4414H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B4414H	XFMR-B4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B4414H	XFMR-B4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B4414H	XFMR-B4414H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from study existing installations.
* Indicates a zero sequence fault current contribution. (XFMR Zero sequence[illegible] Delta, Y Ungrounded)

Project:	Chemo	**ETAP**		Page:	2#1
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp #4		Revision:	Base
Filename:	rpg14_2.lfanalysis			Config:	Normal

Fault at bus: **XFMR-B4414-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-B4414-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B4414-4.16 kV	XFMR-B4414-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B4414-480 kV	XFMR-B4414-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B4414-LV	XFMR-B4414-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes more than 1% to fault if this bus is removed from the system.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Wye to A substation)

Project:	Chemo	**ETAP**		Page:	246
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-460P-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. ang	% Voltage at From Bus A	B	C	3I0 Symm. mag A	B	R1	X1	R0	X0
XFMR-460P-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-460P-HV	XFMR-460P-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-460P-HV	XFMR-460P-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-460P-HV	XFMR-460P-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus, being considered in the calculation.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	297
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XF908-B409-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA From bus A	kA From bus B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908-B4C3-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B4[illegible]	M-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	246
Location:	Borger and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpp24_2.lfmdw			Config:	Normal

Fault at bus: **XFMR-BAR-01V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
XFMR-BAR-01V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BAR-01V	XFMR-BAR-04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BAR-01V	XFMR-BAR-05	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Fault at bus: **EP909-B446-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia kA	Ib kA	Ic kA	3I0 Real kA	3I0 Imag kA	R1	X1	R0	X0
EP909-B446-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed.
* Indicates a pre-existing fault current contribution. (IEC Case, ignored) (ANSI, Y Substitute)

Project:	Chemin	**ETAP**		Page:	270
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	271
Location:	Borger and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **EP909-4H90-LV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus EP_1 (4160 kV)
= [illegible] % of Base kV (4160 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia	Ib	Ic	3I0 Real	3I0 Imag	R1	X1	R0	X0
EP909-4H90-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0 from a grounded Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	222
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **XF908-BUS1HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF908-BUS1HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS1LV	XF908-BUS1-XF	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-BUS1LV	XF908-BUS2-XF	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-BUS2LV	XF908-BUS3-XF	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus, Bus coupling or substation bus.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Fault at bus: **EP909 4160.0 V**

Prefault voltage = [illegible]

= [illegible]% of nominal bus EP_1 [illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from cap)	% Voltage at From Bus			3I0 Symm. cap		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
EP909 4160.0 V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemie	**ETAP**		Page:	234
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XF900-BUS-01V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Bus is initially unfaulted.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-[illegible] transformer.

Project:	Chemo	**ETAP**		Page:	231
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **EP908-BUS1-LV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus EP_1 908-LV)
= [illegible] % of Base kV (0.600 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I (from unit) A	I (from unit) B	R1	X1	R0	X0
EP908-BUS1-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-0.6 kV	SP600-BUS1-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-0.6 kV	SP600-BUS2-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908-BUS1-LV	SP600-BUS2-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	256
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus. Bus is being faulted.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-Wye-Y transformer.

Project:	Chemo	**ETAP**		Page:	225
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalysis			Config:	Normal

Fault at bus: **EP909-BR44-LV**

Prefault voltage = [illegible]

= [illegible]% of Nominal bus EP_1 (0.600 kV)
= [illegible]% of Base kV (0.600 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia	Ib	Ic	3I0 Real	3I0 Imag	R1	X1	R0	X0
EP909-BR44-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	278
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfimmr			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus kA	ip Symm. kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. kA Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Fault at bus: **EP909-B569-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1909-LV1
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	Contribution from From Bus		Contribution from To Bus						
				3I0	1R0	3I0	R	X	R1	X1	R0	X0
EP909-B4CP1-3	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000+j0.000	0.000+j0.000		
B4TT-B4Z1-1	EP909-B4TT-LV	0.00	0.00	0.000	0.00	0.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B4TT-B4Z1-2	EP909-B4TT-LV	0.00	0.00	0.000	0.00	0.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
EP909-B4CP1-3	EP909-B4TT-LV	0.00	0.00	0.000	0.00	0.00	0.000	0.000	1.000+j0.000	0.000+j0.000		

Bus contributes more than one percent of fault current
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	290
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I" k Symm Angle	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm Mag A	3I0 Symm Mag B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	20
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault	Ik Symm. Fault	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Fault A	3I0 Symm. Fault B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	242
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **EP908 4kV LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (4160 kV)
= [illegible]% of Base kV (4160 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	A in From Leg	B in From Leg	R1	X1	R0	X0
EP908 4kV LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye X-winding.

Project:	Chemo	**ETAP**		Page:	294
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-B602.415**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus 415. ([illegible] V)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault	ip Peak Fault	% Voltage at From Bus			3I0 Symm. Fault		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF908-B602.415	Utility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B602.415	XF908-B602.208	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B602.415	XF908-B602.208	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B602.415	XF908-B602.208	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Bus is initially unfaulted.
* Indicates a zero impedance fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	241
Location:	Bowen and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **XF900-B602-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	% Impedance on 100 MVA base R1	X1	R0	X0
XF900-B602-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B602-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B602-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900-B602-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both pre-arc and post-fluid current to fault, during breaking duty calculations
* Bus has a pre-fault voltage [illegible] % of bus nominal kV

Project:	Chemo	**ETAP**		Page:	298
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908 [illegible] 41V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF908 [illegible] 41V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [illegible] 41V	XF908 [illegible] 41V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [illegible] 41V	XF908 [illegible] 41V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 [illegible] 41V	XF908 [illegible] 41V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Sum of rotating machine contributions.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded (Wye) Y transformer.

Project:	Chemo	**ETAP**		Page:	247
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900 [illegible] LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 [illegible] LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 [illegible] LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 [illegible] LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 [illegible] LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	298
Location:	Ranson and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			Rev:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: 10: Comp: 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chevron	**ETAP**		Page:	249
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe24_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-86044-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRadius		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	Ik Symm rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. rms Ia	Ib	R1	X1	R0	X0
XFMR-86044-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	276
Location:	Bureau and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			I/In Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	271
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **LF900 (kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (LF900 kV)
= [illegible] % of Base kV (LF900 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chisme	ETAP		Page:	272
Location:	Brown and Mills County, TX	Dr.A.M.		Date:	08-03-2023
Contract:	EX-09-1281			SN:	PORT-PC09022
Engineer:	Port Power Engineering	Study Case: SC-Loop PP		Revision:	Base
Filename:	ehp14_Chisme			Config.:	Normal

Short-Circuit Summary Report

1/2 Cycle - 4 Phase, 3LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of nominal bus kV

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
4.16 kV Bus 4	4.160	1.857	-21.681	21.758	2.197	-19.451	19.571	-18.115	-9.130	19.380	18.861	9.190	21.161
34.5 kV Bus 8 - 46 ft, 6/0	34.500	1.971	-22.998	23.079	2.330	-20.337	20.471	-19.548	-9.859	19.602	19.258	9.441	21.581
34.5 kV Bus 8 - 604.5 ft, 1	34.500	1.971	-23.190	23.279	2.330	-20.505	20.641	-19.548	-9.859	19.602	19.258	9.441	21.581
69 kV Bus 6	69.000	1.958	-23.081	23.167	1.156	-23.014	23.044	-19.944	-9.158	19.999	19.761	9.179	21.785
Bus10	0.480	10.206	-31.648	33.248	0.000	0.000	0.000	-41.461	-21.715	45.208	42.481	19.711	44.814
Bus13	0.480	10.645	-45.810	47.041	0.000	0.000	0.000	-47.658	-27.528	55.038	52.979	23.816	57.884
Bus14	0.480	14.603	-31.686	34.885	0.000	0.000	0.000	-44.474	-27.777	52.460	43.874	27.777	51.940
Bus15	0.480	14.551	-47.195	49.412	0.000	0.000	0.000	-52.521	-32.888	61.961	53.551	32.878	62.858
Bus16	0.480	14.602	-31.636	34.841	0.000	0.000	0.000	-51.467	-32.723	61.040	53.467	32.723	62.690
Bus17	0.480	13.611	-45.177	47.177	0.000	0.000	0.000	-47.515	-31.826	57.217	-28.013	-13.826	31.257
Bus18	0.480	14.628	-31.631	34.834	0.000	0.000	0.000	-54.484	-32.782	63.581	-41.824	-32.712	53.139
Bus19	0.480	14.628	-31.570	34.781	0.000	0.000	0.000	-53.454	-31.834	62.821	-42.863	-32.843	53.761
Bus20	0.480	14.627	-31.630	34.840	0.000	0.000	0.000	-51.627	-32.759	61.279	-43.687	-32.759	54.339
Bus21	0.480	14.577	-45.979	48.231	0.000	0.000	0.000	-51.055	-31.858	60.614	-41.991	-32.858	53.358
Bus22	0.480	14.551	-28.999	32.451	0.000	0.000	0.000	-49.630	-27.348	56.704	-41.834	-27.744	50.204
Bus23	0.480	13.606	-44.301	46.326	0.000	0.000	0.000	-41.961	-31.847	52.667	-44.968	-31.841	54.990
Bus24	0.480	14.603	-47.831	50.010	0.000	0.000	0.000	-42.858	-27.717	51.056	-42.814	-27.711	50.990
Bus25	0.480	14.603	-45.468	47.815	0.000	0.000	0.000	-43.821	-27.854	51.901	-43.821	-27.849	51.934
Bus26	0.480	13.608	-31.631	34.492	0.000	0.000	0.000	-41.961	-31.722	52.591	-32.967	-27.552	43.219
Bus27	0.480	14.607	-44.961	47.262	0.000	0.000	0.000	-50.677	-31.822	59.828	-43.913	-31.822	54.178
Bus28	0.480	13.608	-31.631	34.519	0.000	0.000	0.000	-41.608	-31.550	52.209	-32.419	-27.551	43.248
Bus29	0.480	14.624	-31.631	34.536	0.000	0.000	0.000	-51.441	-32.196	61.279	-43.816	-32.751	54.228
Bus30	0.480	14.610	-45.581	47.915	0.000	0.000	0.000	-51.998	-32.650	61.993	-43.998	-32.828	54.555
Bus31	0.480	14.631	-31.631	34.550	0.000	0.000	0.000	-51.446	-32.761	61.251	-43.845	-32.761	54.171
Bus32	0.480	14.574	-45.531	47.819	0.000	0.000	0.000	-51.900	-32.643	61.361	-43.989	-32.842	54.959
Bus33	0.480	14.607	-28.999	32.451	0.000	0.000	0.000	-49.631	-27.734	56.861	-41.941	-27.748	50.267
Bus34	0.480	14.594	-45.263	47.550	0.000	0.000	0.000	-41.960	-27.541	51.169	-41.960	-27.541	51.003
Bus35	0.480	14.609	-31.643	34.603	0.000	0.000	0.000	-54.478	-32.753	63.581	-41.879	-32.727	53.209
Bus36	0.480	13.611	-45.810	47.918	0.000	0.000	0.000	-43.537	-31.826	53.951	-28.013	-23.826	43.157
Bus37	0.480	14.603	-31.677	34.874	0.000	0.000	0.000	-54.471	-32.779	63.581	-41.871	-32.779	53.179

42 Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			*Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
B4TS-1G2-01	0.600	14.609	-49.467	51.611	0.000	0.000	0.000	-42.826	-11.851	44.441	42.818	-12.851	44.696
B4TS-1G4-01	0.600	14.614	-49.521	51.670	0.000	0.000	0.000	-42.862	-11.728	44.507	42.862	-12.728	44.697
B4TS-1P4-02	0.480	14.644	-49.591	51.626	0.000	0.000	0.000	-42.799	-11.833	44.502	-42.809	-12.833	44.674
B4TS-1G4-01	0.600	14.605	-49.511	51.671	0.000	0.000	0.000	-42.841	-11.714	44.506	-42.813	-12.714	44.674
B4TS-1G4-02	0.600	14.679	-49.586	51.611	0.000	0.000	0.000	-42.904	-11.836	44.569	-42.891	-12.836	44.634
B4TS-1G4-03	0.600	14.629	-49.536	51.661	0.000	0.000	0.000	-42.844	-11.734	44.521	-42.841	-12.734	44.629
B4TS-1G-02	0.480	14.677	-49.579	51.711	0.000	0.000	0.000	-42.902	-11.840	44.568	-42.897	-12.840	44.581
B4TC-2B4-01	0.600	14.631	-49.506	51.654	0.000	0.000	0.000	-42.858	-11.760	44.534	-42.874	-12.760	44.566
B4TS-1P4-02	0.480	14.662	-49.606	51.654	0.000	0.000	0.000	-42.868	-11.848	44.554	-42.881	-12.848	44.604
B4TS-1P4-03	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-01	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-04	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-05	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-06	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-07	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-08	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-09	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-10	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-11	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-12	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-13	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-14	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-15	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-16	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-17	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-18	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-19	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-20	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-21	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-22	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584
B4TS-1P4-23	0.480	14.647	-49.621	51.650	0.000	0.000	0.000	-42.858	-11.828	44.545	-42.858	-12.828	44.595
B4TS-1P4-24	0.480	14.599	-49.564	51.636	0.000	0.000	0.000	-42.832	-11.795	44.513	-42.850	-12.795	44.584

Project:	Chrome	ETAP		Page:	224
Location:	Brown and Mills County, TX	Dr.A.M.		Date:	09/01/2023
Contract:	TX-09-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

LF Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisholm	ETAP		Page:	127
Location:	Brown and Mills County, TX	Study Case:		Date:	04/01/2023
Contract:	ES-45-1281			SN:	19182-8A3602
Engineer:	Pure Power Engineering	Revision:	SC Cases.IPP	Revision:	Base
Filename:	chp14_Chisholm			Config.:	Normal

Bus Voltage = 100.0 % of Bus Rated Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
XBRK-07115	13.800	13.888	-10.258	17.267	-0.000	0.000	0.000	-14.754	-11.000	18.389	14.124	-12.614	18.938
XBRK-07118	34.500	1.843	-20.280	20.364	3.697	-21.807	22.121	-30.111	-9.158	31.475	-19.216	7.199	20.526
XBRK-07119	13.800	13.888	-10.257	17.267	-0.000	0.000	0.000	-14.756	-11.000	18.389	-14.756	12.749	19.515
XBRK-07120	34.500	1.843	-18.453	18.543	3.756	-12.962	13.494	-11.648	-3.833	12.262	-13.767	5.464	14.810
XBRK-07140	13.800	13.888	-10.833	17.774	-0.000	0.000	0.000	-14.861	-12.789	19.599	-14.861	13.799	20.276
XBRK-07181	34.500	1.843	-22.091	22.141	3.696	-16.089	16.507	-13.134	-3.535	13.601	-16.814	7.194	20.306
XBRK-07145	13.800	13.736	-21.261	25.315	-0.000	0.000	0.000	-24.488	-13.060	27.753	-24.488	21.982	32.911
XBRK-07183	34.500	3.441	-26.177	26.407	5.246	-13.728	14.697	-16.870	-4.215	17.393	-23.485	15.616	27.230
XBRK-07146	13.800	13.883	-10.191	17.197	-0.000	0.000	0.000	-14.842	-12.191	19.210	-14.842	13.211	19.871
XBRK-07149	34.500	1.448	-19.423	19.477	4.318	-19.643	20.111	-14.333	-4.185	14.933	-17.978	8.139	19.744
XBRK-07145	13.800	13.894	-21.363	25.507	-0.000	0.000	0.000	-24.489	-13.859	28.131	-24.489	23.891	34.210
XBRK-07148	34.500	1.828	-17.828	18.047	-0.000	-0.000	0.000	-14.891	-4.288	15.501	-17.274	7.814	17.956
XBRK-07144	13.800	13.834	-21.191	25.306	-0.000	0.000	0.000	-24.594	-13.913	28.262	-24.594	23.911	34.313
XBRK-07183	34.500	2.871	-23.833	24.026	4.878	-14.964	15.741	-17.928	-5.234	18.684	-20.971	13.616	25.008
XBRK-07142	13.800	13.710	-20.262	24.471	-0.000	0.000	0.000	-24.911	-13.948	28.549	-24.734	23.643	34.219
XBRK-07188	34.500	3.864	-29.191	29.477	6.520	-15.282	16.611	-18.911	-6.268	19.916	-24.089	16.878	29.440
XBRK-07147	13.800	13.838	-21.243	25.377	-0.000	0.000	0.000	-24.634	-13.797	28.240	-24.634	23.777	34.218
XBRK-07181	34.500	3.451	-26.996	27.210	5.798	-17.913	18.826	-21.568	-6.699	22.607	-28.771	19.756	34.896
XBRK-07162	13.800	13.834	-21.484	25.554	-0.000	0.000	0.000	-24.833	-13.777	28.434	-24.833	23.777	34.316
XBRK-07148	34.500	2.567	-23.533	23.591	4.286	-14.550	15.170	-17.952	-5.348	18.819	-23.787	15.647	28.181
XBRK-07115	13.800	13.758	-10.225	17.151	-0.000	0.000	0.000	-14.801	-11.053	18.470	-14.782	13.031	19.710
XBRK-07148	34.500	2.599	-28.864	28.978	5.048	-17.299	18.023	-21.601	-7.218	22.567	-29.604	21.681	37.197
XBRK-07151	13.800	13.834	-20.219	24.511	-0.000	0.000	0.000	-24.834	-13.897	28.504	-24.834	23.897	34.324
XBRK-07153	34.500	3.837	-31.183	31.411	5.635	-21.612	22.321	-27.141	-9.139	29.084	-34.386	24.443	42.199
XBRK-07114	13.800	13.948	-21.438	25.568	-0.000	0.000	0.000	-24.877	-13.824	28.536	-24.877	23.864	34.536
XBRK-07187	34.500	3.708	-31.031	31.251	5.756	-21.151	21.921	-26.879	-9.329	28.913	-33.913	23.923	41.508
XBRK-07147	13.800	13.999	-21.991	25.911	-0.000	0.000	0.000	-24.960	-13.933	28.707	-24.960	-7.937	34.202
XBRK-07183	34.500	3.616	-30.896	31.151	5.556	-21.692	22.411	-26.921	-9.830	29.209	-33.791	24.697	41.717
XBRK-07185	13.800	13.834	-21.818	25.777	-0.000	0.000	0.000	-24.884	-13.882	28.658	-24.884	23.882	34.373
XBRK-07186	34.500	3.431	-27.823	28.034	-5.431	-5.383	13.461	-14.834	-4.728	15.490	-17.521	-4.691	17.144
XBRK-07115	13.800	13.897	-21.251	25.354	-0.000	0.000	0.000	-24.638	-13.958	28.310	-24.638	23.958	34.243
XBRK-07149	34.500	4.484	-34.418	34.707	6.279	-9.916	10.251	-10.234	-3.894	11.925	-19.261	13.891	23.977
XBRK-07116	13.800	13.702	-21.263	25.331	-0.000	0.000	0.000	-24.761	-13.308	27.999	-24.761	23.308	34.189
XBRK-07184	34.500	1.029	-19.045	19.811	3.870	-13.675	14.791	-19.611	-3.697	19.121	-17.944	14.529	17.544

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Brown and Mills County, TX	20.0.0C		Date:	04/01/2023
Contract:	15-456-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	ehp14_Chrome			Config.:	Normal

3-Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Bowie and Mills County, TX	20.0.0C		Date:	04/01/2023
Contract:	03-49-1281			SN:	59182-RADIAL
Engineer:	Pine Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	rdpf14_Chisos			Config.:	Normal

AC Cable - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Bowie and Mills County, TX	Dr.A.C.		Date:	04/03/2013
Contract:	15-45-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Cases.IP		Revision:	Base
Filename:	ntp14_Chisos			Config.:	Normal

3-Ø Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chevron	ETAP		Page:	279
Location:	Bureau and Mills Concrete, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

[illegible] - 3 Phase, LG, LL, LL-G Fault Currents

Prefault Voltage = [illegible] % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chisma	ETAP		Page:	249
Location:	Brown and Mills County, TX	20.0.0C		Date:	06/03/2023
Contract:	EX-99-1701			SN:	PURE-PAWEL
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisma			Config.:	Normal

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohms)			Negative Seq. Imp. (ohms)			Zero Seq. Imp. (ohms)			Fault Z (ohms)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Project:	Chisos	ETAP		Page:	24
Location:	Brown and Mills County, TX	Dr.A.C.		Date:	04/01/2023
Contract:	03-49-1281			SN:	19182-RAM02
Engineer:	Pure Power Engineering	Study Case: SC Cases PF		Revision:	Base
Filename:	chp14_Chisos			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault Z1 (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Bexar and Wilson County, TX	Study M		Date:	[illegible]
Contract:	[illegible]			Time:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC Cases 25		Revision:	Base
Filename:	[illegible]			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Grid 25 (ohm)		
ID	Ck	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	287
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pace Power Engineering	Study Case: SC Cases 3P		Revision:	Base
Filename:	[illegible]			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault-ZT (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	284
Location:	Bexar and Wilbarger, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering			Revision:	Base
Filename:	[illegible]			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Unbal. 3Φ (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault Z1 (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]

Peak
Short-Circuit Report

Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, 1-Ø, L-L, & L-L-G Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total
Number of Buses:	1	0	[illegible]	[illegible]

	[illegible]	[illegible]	Reactor	Load/Cable Plenum	Impedance	Tie PD	Total
Number of Branches:	[illegible]	1	0	[illegible]	0	76	[illegible]

	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machines	Lumped Load	Inverter	Total
Number of Machines:	0	1	0	0	0	[illegible]	[illegible]

System Frequency:	60.00
Unit System:	English
Project Filename:	ctgt24_Chevron
Output Filename:	C:\Data\Kuhl Power Engineering\ctgt24_Chevron\Short-Circuit Chevron\[illegible]

Adjustments

Indicates	Apply Adjustments	Individual Adjustment	Percent
Transformer Impedance	Yes	Individual	
Reactor Impedance	Yes	Individual	
Overhead Power Transmission	No		
Transformer Tap Setting	No		
Cable / Reactor Length	No		

Temperature Correction	Apply Adjustments	Individual / Global	Degrees C
Transformer / Line Resistance	Yes	Individual	
Cable / Reactor Resistance	Yes	Individual	

Bus Input Data

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Subsys.	%Mag.	Ang.
M-1A1-BUS - BUS	Load	34.500	34.500	1	100.00	0.00
M-1A1-BUS - SOLAR	Load	34.500	34.500	1	100.00	0.00
M-1A1-BUS - SOLAR-1	Load	34.500	34.500	1	100.00	0.00
M1A1-BUS	Load	345.000	345.000	1	100.00	0.00
BATT-01-01	Load	0.690	0.690	1	100.00	-30.00
BATT-01-02	Load	0.690	0.690	1	100.00	-24.00
BATT-02-01	Load	0.690	0.690	1	100.00	-24.00
BATT-02-03	Load	0.690	0.690	1	100.00	-36.00
BATT-03-01	Load	0.690	0.690	1	100.00	-30.00
BATT-03-02	Load	0.690	0.690	1	100.00	-24.00
BATT-04-01	Load	0.690	0.690	1	100.00	-24.00
BATT-04-03	Load	0.690	0.690	1	100.00	-36.00
BATT-05-01	Load	0.690	0.690	1	100.00	-30.00
BATT-05-02	Load	0.690	0.690	1	100.00	-24.00
BATT-06-01	Load	0.690	0.690	1	100.00	-24.00
BATT-06-03	Load	0.690	0.690	1	100.00	-36.00
BATT-20-01	Load	0.690	0.690	1	100.00	-30.00
BATT-20-02	Load	0.690	0.690	1	100.00	-24.00
BATT-20-03	Load	0.690	0.690	1	100.00	-24.00
BATT-20-04	Load	0.690	0.690	1	100.00	-30.00
BATT-21-01	Load	0.690	0.690	1	100.00	-24.00
BATT-21-02	Load	0.690	0.690	1	100.00	-24.00
BATT-21-04	Load	0.690	0.690	1	100.00	-36.00
BATT-22-01	Load	0.690	0.690	1	100.00	-30.00
BATT-22-02	Load	0.690	0.690	1	100.00	-24.00
BATT-23-01	Load	0.690	0.690	1	100.00	-24.00
BATT-23-03	Load	0.690	0.690	1	100.00	-36.00
BATT-24-01	Load	0.690	0.690	1	100.00	-30.00
BATT-24-02	Load	0.690	0.690	1	100.00	-24.00
BATT-25-01	Load	0.690	0.690	1	100.00	-24.00
BATT-25-03	Load	0.690	0.690	1	100.00	-36.00
BATT-26-01	Load	0.690	0.690	1	100.00	-30.00
BATT-26-02	Load	0.690	0.690	1	100.00	-24.00
BATT-27-01	Load	0.690	0.690	1	100.00	-24.00
BATT-27-02	Load	0.690	0.690	1	100.00	-24.00
BATT-27-04	Load	0.690	0.690	1	100.00	-36.00
BATT-28-01	Load	0.690	0.690	1	100.00	-30.00
BATT-28-02	Load	0.690	0.690	1	100.00	-24.00
BATT-29-01	Load	0.690	0.690	1	100.00	-24.00
BATT-29-03	Load	0.690	0.690	1	100.00	-36.00
BATT-30-01	Load	0.690	0.690	1	100.00	-30.00
BATT-30-02	Load	0.690	0.690	1	100.00	-24.00
BATT-31-01	Load	0.690	0.690	1	100.00	-24.00
BATT-31-03	Load	0.690	0.690	1	100.00	-36.00
BATT-32-01	Load	0.690	0.690	1	100.00	-30.00
BATT-32-02	Load	0.690	0.690	1	100.00	-24.00
BATT-33-01	Load	0.690	0.690	1	100.00	-24.00
BATT-33-03	Load	0.690	0.690	1	100.00	-36.00
BATT-34-01	Load	0.690	0.690	1	100.00	-30.00
BATT-34-02	Load	0.690	0.690	1	100.00	-24.00
BATT-35-01	Load	0.690	0.690	1	100.00	-24.00

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BATT-003-02	Load	0.690	0.480	1	100.00	-30.00
BATT-003-01	Load	0.690	0.480	1	100.00	-30.00
BATT-003-02	Load	0.690	0.480	1	100.00	-30.00
BATT-003-03	Load	0.690	0.480	1	100.00	-30.00
BATT-003-02	Load	0.690	0.480	1	100.00	-30.00
BATT-004-01	Load	0.690	0.480	1	100.00	-30.00
BATT-004-02	Load	0.690	0.480	1	100.00	-30.00
BATT-005-03	Load	0.690	0.480	1	100.00	-30.00
BATT-005-02	Load	0.690	0.480	1	100.00	-30.00
BATT-006-01	Load	0.690	0.480	1	100.00	-30.00
BATT-006-02	Load	0.690	0.480	1	100.00	-30.00
BATT-007-03	Load	0.690	0.480	1	100.00	-30.00
BATT-008-02	Load	0.690	0.480	1	100.00	-30.00
BATT-008-01	Load	0.690	0.480	1	100.00	-30.00
BATT-008-02	Load	0.690	0.480	1	100.00	-30.00
BATT-008-01	Load	0.690	0.480	1	100.00	-30.00
BATT-008-02	Load	0.690	0.480	1	100.00	-30.00
BATT-008-03	Load	0.690	0.480	1	100.00	-30.00
BATT-009-01	Load	0.690	0.480	1	100.00	-30.00
BATT-009-02	Load	0.690	0.480	1	100.00	-30.00
BATT-009-03	Load	0.690	0.480	1	100.00	-30.00
BATT-009-02	Load	0.690	0.480	1	100.00	-30.00
BATT-010-01	Load	0.690	0.480	1	100.00	-30.00
BATT-010-02	Load	0.690	0.480	1	100.00	-30.00
BATT-010-03	Load	0.690	0.480	1	100.00	-30.00
BATT-010-02	Load	0.690	0.480	1	100.00	-30.00
BATT-011-01	Load	0.690	0.480	1	100.00	-30.00
BATT-011-02	Load	0.690	0.480	1	100.00	-30.00
BATT-011-03	Load	0.690	0.480	1	100.00	-30.00
BATT-011-02	Load	0.690	0.480	1	100.00	-30.00
BATT-012-01	Load	0.690	0.480	1	100.00	-30.00
BATT-012-02	Load	0.690	0.480	1	100.00	-30.00
BATT-012-03	Load	0.690	0.480	1	100.00	-30.00
BATT-012-02	Load	0.690	0.480	1	100.00	-30.00
BUS6-103-01-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-103-02-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-103-01-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-103-02-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-103-01-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-103-02-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-104-01-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-104-02-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-105-01-DB1	Load	0.690	0.480	1	100.00	-30.00
BUS6-105-02-DB1	Load	0.690	0.480	1	100.00	-30.00

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BE08-106-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-106-02HH	Load	0.600	0.600	1	97.00	-24.00
BE55-201-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-201-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-202-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-202-02HH	Load	0.600	0.600	1	100.00	-24.00
BE55-203-01HH	Load	0.600	0.600	1	100.00	-24.00
BE08-203-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-204-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-204-02HH	Load	0.600	0.600	1	100.00	-24.00
BE55-205-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-205-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-206-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-206-02HH	Load	0.600	0.600	1	100.00	-24.00
BE55-301-01HH	Load	0.600	0.600	1	100.00	-24.00
BE08-301-02HH	Load	0.600	0.600	1	100.00	-30.00
BE56-302-01HH	Load	0.600	0.600	1	97.00	-24.00
BE55-303-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-303-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-303-02HH	Load	0.600	0.600	1	100.00	-30.00
BE56-304-01HH	Load	0.600	0.600	1	100.00	-24.00
BE55-304-02HH	Load	0.600	0.600	1	100.00	-24.00
BE08-305-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-305-02HH	Load	0.600	0.600	1	100.00	-30.00
BE56-306-01HH	Load	0.600	0.600	1	97.00	-24.00
BE55-306-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-401-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-401-02HH	Load	0.600	0.600	1	100.00	-30.00
BE56-402-01HH	Load	0.600	0.600	1	100.00	-24.00
BE55-402-02HH	Load	0.600	0.600	1	100.00	-24.00
BE08-403-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-403-02HH	Load	0.600	0.600	1	97.00	-24.00
BE55-404-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-404-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-405-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-405-02HH	Load	0.600	0.600	1	100.00	-24.00
BE55-406-01HH	Load	0.600	0.600	1	100.00	-24.00
BE08-406-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-501-01HH	Load	0.600	0.600	1	100.00	-30.00
BE56-501-02HH	Load	0.600	0.600	1	97.00	-24.00
BE55-502-01HH	Load	0.600	0.600	1	100.00	-30.00
BE08-502-02HH	Load	0.600	0.600	1	100.00	-30.00
BE08-503-01HH	Load	0.600	0.600	1	100.00	-30.00

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
BUS6-BUS4-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS4-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS4-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS5-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS5-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS6-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS6-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS7-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS7-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS8-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS8-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS9-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS9-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS10-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS10-02-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS11-01-MH	Load	0.600	0.600	1	100.00	-28.89
BUS6-BUS11-02-MH	Load	0.600	0.600	1	100.00	-28.89
MVSC-01	Load	34.500	34.500	1	103.24	-4.69
MVSC-02	Load	34.500	34.500	1	103.24	-4.69
MVSC-03	Load	34.500	34.500	1	103.24	-4.69
MVSC-04	Load	34.500	34.500	1	103.24	-4.69
MVSC-05	Load	34.500	34.500	1	103.24	-4.69
MVSC-06	Load	34.500	34.500	1	103.24	-4.69
MVSC-07	Load	34.500	34.500	1	103.24	-4.69
MVSC-08	Load	34.500	34.500	1	103.24	-4.69
MVSC-09	Load	34.500	34.500	1	103.24	-4.69
MVSC-10	Load	34.500	34.500	1	103.24	-4.69
POS	MVMD	34.500	34.500	1	100.00	0.00
SWBD-11	Load	34.500	34.500	1	100.00	0.00
SWBD-12	Load	34.500	34.500	1	100.00	0.00
SWBD-13	Load	34.500	34.500	1	100.00	0.00
SWBD-21	Load	34.500	34.500	1	100.00	0.00
SWBD-22	Load	34.500	34.500	1	100.00	0.00
SWBD-23	Load	34.500	34.500	1	100.00	0.00
XFMR-01-HV	Load	34.500	34.500	1	103.24	-4.69
XFMR-01-LV	Load	0.645	0.645	1	100.00	-28.89
XFMR-02-HV	Load	34.500	34.500	1	103.24	-4.69
XFMR-02-LV	Load	0.645	0.645	1	100.00	-28.89
XFMR-03-HV	Load	34.500	34.500	1	103.24	-4.69
XFMR-03-LV	Load	0.645	0.645	1	100.00	-28.89
XFMR-04-HV	Load	34.500	34.500	1	103.24	-4.69
XFMR-04-LV	Load	0.645	0.645	1	100.00	-28.89
XFMR-05-HV	Load	34.500	34.500	1	103.24	-4.69
XFMR-05-LV	Load	0.645	0.645	1	100.00	-28.89

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-T04-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T04-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T07-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T07-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T01-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T01-LV	Load	0.645	0.645	1	100.00	-24.68
XFMR-T03-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T03-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T05-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T05-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T04-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T04-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T09-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T09-LV	Load	0.645	0.645	1	100.00	-24.68
XFMR-T06-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T06-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T07-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T07-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T11-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T11-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T13-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T13-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T14-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T14-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T15-HV	Load	34.500	34.500	1	100.24	-4.69
XFMR-T15-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T16-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T16-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T17-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T17-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T18-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T18-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T19-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T19-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T20-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T20-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T21-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T21-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T22-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T22-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T23-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T23-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T24-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T24-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T25-HV	Load	34.500	34.500	1	100.24	-4.64
XFMR-T25-LV	Load	0.645	0.645	1	100.00	-24.69
XFMR-T26-HV	Load	34.500	34.500	1	100.24	-4.64

		Bus			Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-004-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4615-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4615-LV	Load	0.645	0.645	1	100.06	-29.99
XFMR-4616-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4616-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4617-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4617-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4618-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4618-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4619-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4619-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4620-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4620-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4621-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4621-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4622-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4622-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4623-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4623-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4624-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4624-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4625-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4625-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4626-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4626-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4627-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4627-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4628-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4628-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4629-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4629-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4630-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4630-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4631-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4631-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4632-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4632-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4633-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4633-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4634-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4634-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4635-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4635-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4636-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4636-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4637-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4637-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4638-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4638-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4639-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4639-LV	Load	0.645	0.645	1	100.00	-29.99
XFMR-4640-HV	Load	34.500	34.500	1	100.24	-0.64
XFMR-4640-LV	Load	0.645	0.645	1	100.00	-29.99

	Bus				Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
XFMR-0033-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0033-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0034-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0034-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0035-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0035-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0036-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0036-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0037-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0037-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0038-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0038-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0039-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0039-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0040-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0040-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0041-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0041-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0042-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0042-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0043-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0043-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0044-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0044-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0045-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0045-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0046-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0046-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0047-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0047-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0048-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0048-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0049-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0049-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0050-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0050-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0051-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0051-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0052-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0052-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0053-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0053-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0054-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0054-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0055-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0055-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0056-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0056-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0057-HV	Load	34.500	34.500	1	100.24	-9.65
XFMR-0057-LV	Load	0.690	0.690	1	100.00	-24.05
XFMR-0058-HV	Load	34.500	34.500	1	100.24	-9.69
XFMR-0058-LV	Load	0.690	0.690	1	100.00	-38.09
XFMR-0059-HV	Load	34.500	34.500	1	100.24	-9.65

Project:	Chemir	**ETAP**		Page:	11
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rial Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Bus

Initial Voltage

ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	Load	[illegible]	[illegible]	1	[illegible]	[illegible]

[illegible] Buses total

[illegible] voltages reported by ETAP are in % of bus [illegible] kV.
Bus kV values of buses are calculated and used internally by [illegible]

Project:	Chrome	ETAP		Page:	11
Location:	Brown and Mills County, TX	20.0.0C		Date:	08/04/2023
Contract:	03-49-1201			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	ehp14_Chrome			Config.:	Normal

Line/Cable/Busway Input Data

Line/Cable/Busway			Length									
ID	Library	Size	Adjusted (ft)	Actual (ft)	#/Phase	T (°C)	R1	X1	Z1	R0	X0	Z0
LVF-B1[illegible]	1000 CU	750	20.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B1[illegible]	1000 CU	500	45.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	20.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	60.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	45.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	20.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	20.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	500	55.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	15.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LVF-B[illegible]	1000 CU	750	30.0	0.0	1	75	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chrome	ETAP		Page:	12
Location:	Bowie and Mills County, TX	20.0.0C		Date:	08/04/2023
Contract:	15-49-1281			SN:	59185-ROG02
Engineer:	Pure Power Engineering	Study Case: SC-Loop 59		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Line/Cable/Busway

ID	Type	Size	Length (ft)	Ins. Type	# of Runs	T (°C)	r (Ω/...)	x (Ω/...)	Y (...)	Z (Ω/...)	R (%)	X (%)
LVC-8446-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8447-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8448-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8449-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8450-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8451-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8452-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8453-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8454-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8455-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8456-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8457-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8458-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8459-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8460-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8461-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8462-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8463-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8464-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8465-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8466-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8467-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8468-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8469-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8470-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8471-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8472-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8473-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8474-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8475-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8476-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8477-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8478-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8479-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8480-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8481-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8482-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8483-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8484-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8485-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8486-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8487-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8488-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8489-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8490-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8491-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8492-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8493-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8494-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8495-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8496-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8497-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8498-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8499-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8500-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8501-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8502-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8503-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8504-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8505-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8506-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8507-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8508-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8509-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8510-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8511-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8512-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8513-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8514-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8515-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8516-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8517-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8518-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8519-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8520-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8521-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8522-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8523-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8524-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8525-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8526-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8527-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8528-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8529-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8530-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8531-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8532-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8533-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8534-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8535-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8536-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8537-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8538-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8539-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8540-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8541-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8542-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8543-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8544-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8545-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8546-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8547-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8548-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8549-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8550-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8551-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8552-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8553-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8554-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8555-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8556-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8557-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8558-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8559-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8560-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8561-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8562-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8563-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8564-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8565-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8566-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8567-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8568-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8569-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8570-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8571-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8572-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8573-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8574-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8575-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8576-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8577-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8578-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8579-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8580-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8581-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8582-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8583-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8584-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8585-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8586-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8587-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8588-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8589-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8590-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8591-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8592-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8593-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8594-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8595-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8596-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8597-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8598-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8599-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8600-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8601-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8602-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8603-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8604-D	1/0 AWG CU	750	49.2	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8605-D	1/0 AWG CU	750	65.6	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
LVC-8606-D	1/0 AWG CU	750	98.4	600 V	3	75	0.000334	0.000123	0.000357	0.000356	93.6000	34.4000
MCC-8606-P1	350 kcmil CU	1,200	164.0	600 V	1	90	0.000028	0.000026	0.000038	0.000038	73.6842	68.4211
MCC-8607-P1	350 kcmil CU	1,200	49.2	600 V	1	90	0.000028	0.000026	0.000038	0.000038	73.6842	68.4211
MCC-8608-P1	350 kcmil CU	1,200	82.0	600 V	1	90	0.000028	0.000026	0.000038	0.000038	73.6842	68.4211

Project:	Chrome	SCADA		Page:	13
Location:	Brown and Mills County, TX	Drawn:		Date:	04/04/2013
Contract:	13-456-1281			Job:	09-585-04-00602
Engineer:	Pure Power Engineering	Scale Base:	50 Cents PP	Revision:	Base
Filename:	chp14_Chrome			Drawing:	Normal

Line Cable/Raceway

ID	Number	Size	Length	Percent	Voltage	Type	Color	Color	Color	Color	Color	Color
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chrome	ETAP		Page:	1
Location:	Brown and Mills Canyon, TX	Dynamic		Date:	04/04/2023
Contract:	15-49-1281			SN:	19102-RAD602
Engineer:	Pure Power Engineering	Study Case: SC Cases PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

Line/Cable/Busway

ID	Type	Size	Length (ft)	Adj. (ft)	# Runs	T (°C)	r (Ω/mi)	x (Ω/mi)	Y (µS/mi)	Ampacity (A)	Temp (°C)	% Vd
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chemie	**EVAP**		Page:	11
Location:	Bureau and Mills Concrete, TN	[illegible]		Date:	[illegible]
Contract:	CS-476-2781			Job:	[illegible]
Engineer:	Rod Power Engineering	Mode Case: 02 Loop: 04		Revision:	Base
Filename:	vtp14_2.3mem			Config:	Normal

[illegible] w/ [illegible] per [illegible] in Condenser (Cooling) or per Phase (Low/Reverse)

[illegible] Low/Cooling/Reverse			Length									
[illegible]	[illegible]	[illegible]	Full 1/8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

2-Winding Transformer Input Data

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	%Z	X/R	+ Tol	- Tol	%Tol	Prim	Sec	%Z	Type	Angle
BSTM0-01	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-02	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-03	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-04	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-05	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-06	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-07	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-08	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-09	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-10	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-11	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-12	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-13	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-14	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-15	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-16	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-17	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-18	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-19	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-20	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-21	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-22	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-23	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-24	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-25	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-26	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-27	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-28	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-29	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-30	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-31	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-32	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-33	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-34	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-35	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-36	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-37	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-38	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-39	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00
BSTM0-40	3.140	34.500	0.648	8.00	20.00	0	0	0.0	0	0	8.00	Dy	30.00

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ %	- %	% R/X	Prim.	Sec.	% Z	Type	Angle
BUSMB-001	5.140	34.500	0.600	8.83	30.00	0	0	-3.0	0	0	8.83	Dy	30.00
XFMR-T10	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T07	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T08	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T04	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T05	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T06	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T01	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T02	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T03	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T09	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T11	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T12	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T13	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T14	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T15	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T16	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T17	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T18	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T19	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T20	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T21	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T22	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T23	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T24	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T25	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T26	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T27	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T28	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T29	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T30	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T31	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T32	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T33	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T34	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T35	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T36	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T37	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00
XFMR-T38	4.800	34.500	0.600	8.00	8.83	0	0	-7.5	0	0	7.96	Dy	30.00

Transformer	Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol	Prim	Sec	% Z	Type	Angle
XFMR-501	4.167	34.500	0.645	8.00	8.00	5	5	0.0	0	0	7.96	Dy	30.00
XFMR-502	4.167	34.500	0.645	8.00	8.00	5	5	0.0	0	0	7.96	Dy	30.00
XFMR-503	4.167	34.500	0.645	8.00	8.00	5	5	0.0	0	0	7.96	Dy	30.00
XFMR-504	4.167	34.500	0.645	8.00	8.00	5	5	0.0	0	0	7.96	Dy	30.00

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Conn	kV	Amp	Ohm	Type	kV	Amp	Ohm
BSTMR-501	5.167	34.500	0.480	DY					Open			
BSTMR-502	5.167	34.500	0.480	DY					Open			
BSTMR-503	5.167	34.500	0.480	DY					Open			
BSTMR-504	5.167	34.500	0.480	DY					Open			
BSTMR-505	5.167	34.500	0.480	DY					Open			
BSTMR-506	5.167	34.500	0.480	DY					Open			
BSTMR-507	5.167	34.500	0.480	DY					Open			
BSTMR-508	5.167	34.500	0.480	DY					Open			
BSTMR-509	5.167	34.500	0.480	DY					Open			
BSTMR-510	5.167	34.500	0.480	DY					Open			
BSTMR-511	5.167	34.500	0.480	DY					Open			
BSTMR-512	5.167	34.500	0.480	DY					Open			
BSTMR-513	5.167	34.500	0.480	DY					Open			
BSTMR-514	5.167	34.500	0.480	DY					Open			
BSTMR-515	5.167	34.500	0.480	DY					Open			
BSTMR-516	5.167	34.500	0.480	DY					Open			
BSTMR-517	5.167	34.500	0.480	DY					Open			
BSTMR-518	5.167	34.500	0.480	DY					Open			
BSTMR-519	5.167	34.500	0.480	DY					Open			
BSTMR-520	5.167	34.500	0.480	DY					Open			
BSTMR-521	5.167	34.500	0.480	DY					Open			
BSTMR-522	5.167	34.500	0.480	DY					Open			
BSTMR-523	5.167	34.500	0.480	DY					Open			
BSTMR-524	5.167	34.500	0.480	DY					Open			
BSTMR-525	5.167	34.500	0.480	DY					Open			
BSTMR-526	5.167	34.500	0.480	DY					Open			

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	ohm	Type	kV	Amp	ohm
BSTMR-502	3.146	34.500	0.690	D/Y					Open			
BSTMR-503	3.146	34.500	0.690	D/Y					Open			
BSTMR-504	3.146	34.500	0.690	D/Y					Open			
BSTMR-505	3.146	34.500	0.690	D/Y					Open			
BSTMR-506	3.146	34.500	0.690	D/Y					Open			
BSTMR-601	3.146	34.500	0.690	D/Y					Open			
BSTMR-602	3.146	34.500	0.690	D/Y					Open			
BSTMR-603	3.146	34.500	0.690	D/Y					Open			
BSTMR-604	3.146	34.500	0.690	D/Y					Open			
BSTMR-605	3.146	34.500	0.690	D/Y					Open			
STMR-101	4.400	34.500	0.565	D/Y					Open			
STMR-102	4.400	34.500	0.565	D/Y					Open			
STMR-103	4.400	34.500	0.565	D/Y					Open			
STMR-104	4.400	34.500	0.565	D/Y					Open			
STMR-105	4.400	34.500	0.565	D/Y					Open			
STMR-106	4.400	34.500	0.565	D/Y					Open			
STMR-107	4.400	34.500	0.565	D/Y					Open			
STMR-201	4.400	34.500	0.565	D/Y					Open			
STMR-202	4.400	34.500	0.565	D/Y					Open			
STMR-203	4.400	34.500	0.565	D/Y					Open			
STMR-204	4.400	34.500	0.565	D/Y					Open			
STMR-205	4.400	34.500	0.565	D/Y					Open			
STMR-206	4.400	34.500	0.565	D/Y					Open			
STMR-207	4.400	34.500	0.565	D/Y					Open			
STMR-301	4.400	34.500	0.565	D/Y					Open			
STMR-302	4.400	34.500	0.565	D/Y					Open			
STMR-303	4.400	34.500	0.565	D/Y					Open			
STMR-304	4.400	34.500	0.565	D/Y					Open			
STMR-305	4.400	34.500	0.565	D/Y					Open			
STMR-306	4.400	34.500	0.565	D/Y					Open			
STMR-307	4.400	34.500	0.565	D/Y					Open			
STMR-401	4.400	34.500	0.565	D/Y					Open			

2-Winding Transformer Grounding Input Data

Transformer	Rating			Conn.	Grounding							
					Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
XFMR-402	4.400	34.500	0.345	D/Y					Open			
XFMR-403	4.400	34.500	0.345	D/Y					Open			
XFMR-404	4.400	34.500	0.345	D/Y					Open			
XFMR-405	4.400	34.500	0.345	D/Y					Open			
XFMR-406	4.400	34.500	0.345	D/Y					Open			
XFMR-407	4.400	34.500	0.345	D/Y					Open			
XFMR-501	4.400	34.500	0.345	D/Y					Open			
XFMR-502	4.400	34.500	0.345	D/Y					Open			
XFMR-503	4.400	34.500	0.345	D/Y					Open			
XFMR-504	4.400	34.500	0.345	D/Y					Open			
XFMR-505	4.400	34.500	0.345	D/Y					Open			
XFMR-506	4.400	34.500	0.345	D/Y					Open			
XFMR-601	4.400	34.500	0.345	D/Y					Open			
XFMR-602	4.400	34.500	0.345	D/Y					Open			
XFMR-603	4.400	34.500	0.345	D/Y					Open			
XFMR-604	4.400	34.500	0.345	D/Y					Open			
XFMR-605	4.400	34.500	0.345	D/Y					Open			
XFMR-606	4.400	34.500	0.345	D/Y					Open			

3-Winding Transformer Input Data

Transformer	Rating			Tap	Impedance				Z Variation		Phase Shift	
ID	Rating	MVA	kV	%	% Z	X/R	MVA	% Tol	+5%	-5%	Type	Angle
T1	Primary	120.000	345.000	0	Zps =	8.45	48.58	120.000	0	0	0	
	Secondary	120.000	34.500	0	Zpt =	15.26	65.54	120.000	0		Std Pos. Seq.	0.0
	Tertiary	90.000	13.800	0	Zst =	4.85	16.78	120.000	0		Std Pos. Seq.	-30.0
T2	Primary	120.000	345.000	0	Zps =	8.45	48.58	120.000	0	0	0	
	Secondary	120.000	34.500	0	Zpt =	15.26	65.54	120.000	0		Std Pos. Seq.	0.0
	Tertiary	90.000	13.800	0	Zst =	4.85	16.78	120.000	0		Std Pos. Seq.	-30.0

Project:	Chemie	ETAP		Page:	11
Location:	Bureau and Mills Courses, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

2-Winding Transformers Exceeding Input Limits

Transformer	Rating			Class		Percent Slip		
ID	Rating	MVA	kV	Type	Type	kV	Base	Min
T1	Primary	[illegible]	[illegible]	Bus	Solid			
	Secondary	[illegible]	[illegible]	Bus	Bolted		34.871.2	3.4444
	Tertiary	[illegible]	[illegible]	Bus				
T2	Primary	[illegible]	[illegible]	Bus	Solid			
	Secondary	[illegible]	[illegible]	Bus	Bolted		34.871.2	3.4444
	Tertiary	[illegible]	[illegible]	Bus				

Project:	Chisos	ETAP		Page:	22
Location:	Brown and Mills County, TX	Dr.A.C.		Date:	08/04/2015
Contract:	EX-09-1701			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp74_Chisos			Config.:	Normal

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., [illegible] MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	2W XFMR	[illegible]	[illegible]	1.163	116.35	116.37

Project:	Chisos	ETAP		Page:	15
Location:	Brown and Mills County, TX	Dr.K.M.		Date:	09/04/2015
Contract:	TX-09-1701			SN:	P1305-ROA002
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisos			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
0/MR-311	2W XFMR	0/MR-H 4.8kV	0/MR-311 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-314	2W XFMR	0/MR-314 4.8kV	0/MR-314 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-315	2W XFMR	0/MR-315 4.8kV	0/MR-315 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-316	2W XFMR	0/MR-316 4.8kV	0/MR-316 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-317	2W XFMR	0/MR-317 4.8kV	0/MR-317 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-321	2W XFMR	0/MR-321 4.8kV	0/MR-321 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-322	2W XFMR	0/MR-322 4.8kV	0/MR-322 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-323	2W XFMR	0/MR-323 4.8kV	0/MR-323 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-324	2W XFMR	0/MR-324 4.8kV	0/MR-324 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-331	2W XFMR	0/MR-331 4.8kV	0/MR-331 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-339	2W XFMR	0/MR-339 4.8kV	0/MR-339 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-351	2W XFMR	0/MR-351 4.8kV	0/MR-351 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-411	2W XFMR	0/MR-H 4.8kV	0/MR-411 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-412	2W XFMR	0/MR-412 4.8kV	0/MR-412 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-413	2W XFMR	0/MR-413 4.8kV	0/MR-413 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-414	2W XFMR	0/MR-414 4.8kV	0/MR-414 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-415	2W XFMR	0/MR-415 4.8kV	0/MR-415 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-416	2W XFMR	0/MR-416 4.8kV	0/MR-416 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-417	2W XFMR	0/MR-417 4.8kV	0/MR-417 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-511	2W XFMR	0/MR-511 4.8kV	0/MR-511 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-512	2W XFMR	0/MR-512 4.8kV	0/MR-512 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-513	2W XFMR	0/MR-513 4.8kV	0/MR-513 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-514	2W XFMR	0/MR-514 4.8kV	0/MR-514 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-517	2W XFMR	0/MR-517 4.8kV	0/MR-517 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-521	2W XFMR	0/MR-521 4.8kV	0/MR-521 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-522	2W XFMR	0/MR-522 4.8kV	0/MR-522 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-523	2W XFMR	0/MR-523 4.8kV	0/MR-523 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-524	2W XFMR	0/MR-524 4.8kV	0/MR-524 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-527	2W XFMR	0/MR-527 4.8kV	0/MR-527 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-531	2W XFMR	0/MR-531 4.8kV	0/MR-531 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-532	2W XFMR	0/MR-532 4.8kV	0/MR-532 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-533	2W XFMR	0/MR-533 4.8kV	0/MR-533 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-534	2W XFMR	0/MR-534 4.8kV	0/MR-534 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-537	2W XFMR	0/MR-537 4.8kV	0/MR-537 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-541	2W XFMR	0/MR-541 4.8kV	0/MR-541 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-542	2W XFMR	0/MR-542 4.8kV	0/MR-542 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-543	2W XFMR	0/MR-543 4.8kV	0/MR-543 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-544	2W XFMR	0/MR-544 4.8kV	0/MR-544 LV	1.0 (1)	6.7 (1)	6.8 (1)	
0/MR-547	2W XFMR	0/MR-547 4.8kV	0/MR-547 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-611	2W XFMR	1/MR-H 4.8kV	1/MR-611 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-612	2W XFMR	1/MR-612 4.8kV	1/MR-612 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-613	2W XFMR	1/MR-613 4.8kV	1/MR-613 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-614	2W XFMR	1/MR-614 4.8kV	1/MR-614 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-615	2W XFMR	1/MR-615 4.8kV	1/MR-615 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-616	2W XFMR	1/MR-616 4.8kV	1/MR-616 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-617	2W XFMR	1/MR-617 4.8kV	1/MR-617 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-621	2W XFMR	1/MR-621 4.8kV	1/MR-621 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-622	2W XFMR	1/MR-622 4.8kV	1/MR-622 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-623	2W XFMR	1/MR-623 4.8kV	1/MR-623 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-624	2W XFMR	1/MR-624 4.8kV	1/MR-624 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-625	2W XFMR	1/MR-625 4.8kV	1/MR-625 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-626	2W XFMR	1/MR-626 4.8kV	1/MR-626 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-627	2W XFMR	1/MR-627 4.8kV	1/MR-627 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-631	2W XFMR	1/MR-631 4.8kV	1/MR-631 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-632	2W XFMR	1/MR-632 4.8kV	1/MR-632 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-633	2W XFMR	1/MR-633 4.8kV	1/MR-633 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-634	2W XFMR	1/MR-634 4.8kV	1/MR-634 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-635	2W XFMR	1/MR-635 4.8kV	1/MR-635 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-636	2W XFMR	1/MR-636 4.8kV	1/MR-636 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-637	2W XFMR	1/MR-637 4.8kV	1/MR-637 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-641	2W XFMR	1/MR-641 4.8kV	1/MR-641 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-642	2W XFMR	1/MR-642 4.8kV	1/MR-642 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-643	2W XFMR	1/MR-643 4.8kV	1/MR-643 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-644	2W XFMR	1/MR-644 4.8kV	1/MR-644 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-645	2W XFMR	1/MR-645 4.8kV	1/MR-645 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-646	2W XFMR	1/MR-646 4.8kV	1/MR-646 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-647	2W XFMR	1/MR-647 4.8kV	1/MR-647 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-651	2W XFMR	1/MR-651 4.8kV	1/MR-651 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-652	2W XFMR	1/MR-652 4.8kV	1/MR-652 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-653	2W XFMR	1/MR-653 4.8kV	1/MR-653 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-654	2W XFMR	1/MR-654 4.8kV	1/MR-654 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-655	2W XFMR	1/MR-655 4.8kV	1/MR-655 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-656	2W XFMR	1/MR-656 4.8kV	1/MR-656 LV	1.0 (1)	6.7 (1)	6.8 (1)	
1/MR-657	2W XFMR	1/MR-657 4.8kV	1/MR-657 LV	1.0 (1)	6.7 (1)	6.8 (1)	
T1	3W XFMR	115/13.8kV	0/MR-H 4.8kV 1/MR-H 4.8kV	0.0	9.62	9.62	

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Location:	Brown and Mills County, TX	Date:	08/04/2023		
Contract:	TX-99-1701	SN:	PORT-POWER		
Engineer:	Port Power Engineering	Study Case: SC-Unity PF	Revision:	Base	
Filename:	etp74_Chisos		Config.:	Normal	

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
	600 V Bus	[illegible]	T1-1	4.46	44.47	44.71	
	PV Site	[illegible]	T1-2	8.26	3.87	3.88	
T1	PV Site	[illegible]	[illegible]	3.85	3.62	3.68	
	600 V Bus	[illegible]	T1-1	4.46	44.47	44.71	
	PV Site	[illegible]	T1-3	8.26	3.87	3.88	
CBL-B018-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B018-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A182-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B182-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B183-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-A183-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B184-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B184-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A185-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B185-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B186-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-A186-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B029-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B029-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A030-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B030-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B031-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-A031-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B032-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B032-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A033-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B033-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B034-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B034-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A035-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B035-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B036-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-A036-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B008-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B008-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A002-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B002-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A003-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B003-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-B004-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000000
CBL-B004-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137
CBL-A005-01	Cable	[illegible]	[illegible]	1.35	2.95	3.25	0.0000061
CBL-B005-02	Cable	[illegible]	[illegible]	3.65	8.37	9.02	0.0000137

Project:	Chisos	ETAP		Page:	25
Location:	Brown and Mills County, TX	Dickie		Date:	09/04/2015
Contract:	TX-09-1701			SN:	PORT-PC04922
Engineer:	Port Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisos			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVAb			
ID	Type	From Bus	To Bus	R	X	Z	Y
CBL-0106-01	Cable	69-MV-0106-LV	BAT-106-01	1.31	3.47	12.1	0.0826451
CBL-0107-02	Cable	69-MV-0107-LV	BAT-107-02	3.93	8.17	8.91	0.0961417
CBL-0108-01	Cable	69-MV-0108-HV	BAT-108-01	1.31	2.99	12.1	0.0826446
CBL-0109-02	Cable	69-MV-0109-LV	BAT-109-02	4.65	8.17	9.93	0.0806317
CBL-0110-01	Cable	69-MV-0110-LV	BAT-110-01	1.35	7.87	3.23	0.0909091
CBL-0111-02	Cable	69-MV-0111-LV	BAT-111-02	3.93	8.17	8.91	0.0961417
CBL-0112-01	Cable	69-MV-0112-LV	BAT-112-01	1.31	3.47	12.1	0.0826446
CBL-0113-02	Cable	69-MV-0113-LV	BAT-113-02	3.93	8.17	8.91	0.0961417
CBL-0114-01	Cable	69-MV-0114-HV	BAT-114-01	1.31	2.99	12.1	0.0826446
CBL-0115-02	Cable	69-MV-0115-LV	BAT-115-02	4.65	8.17	9.93	0.0806317
CBL-0116-01	Cable	69-MV-0116-LV	BAT-116-01	1.35	7.87	3.23	0.0909091
CBL-0117-02	Cable	69-MV-0117-LV	BAT-117-02	3.93	8.17	8.91	0.0961417
CBL-0118-01	Cable	69-MV-0118-LV	BAT-118-01	1.31	3.47	12.1	0.0826446
CBL-0119-02	Cable	69-MV-0119-LV	BAT-119-02	3.93	8.17	8.91	0.0961417
CBL-0120-01	Cable	69-MV-0120-HV	BAT-120-01	1.31	2.99	12.1	0.0826446
CBL-0121-02	Cable	69-MV-0121-LV	BAT-121-02	4.65	8.17	9.93	0.0806317
CBL-0122-01	Cable	69-MV-0122-LV	BAT-122-01	1.35	7.87	3.23	0.0909091
CBL-0123-02	Cable	69-MV-0123-LV	BAT-123-02	3.93	8.17	8.91	0.0961417
CBL-0124-01	Cable	69-MV-0124-LV	BAT-124-01	1.31	3.47	12.1	0.0826446
CBL-0125-02	Cable	69-MV-0125-LV	BAT-125-02	3.93	8.17	8.91	0.0961417
CBL-0126-01	Cable	69-MV-0126-HV	BAT-126-01	1.31	2.99	12.1	0.0826446
CBL-0127-02	Cable	69-MV-0127-LV	BAT-127-02	4.65	8.17	9.93	0.0806317
CBL-0128-01	Cable	69-MV-0128-LV	BAT-128-01	1.35	7.87	3.23	0.0909091
CBL-0129-02	Cable	69-MV-0129-LV	BAT-129-02	3.93	8.17	8.91	0.0961417
CBL-0130-01	Cable	69-MV-0130-LV	BAT-130-01	1.31	3.47	12.1	0.0826446
CBL-0131-02	Cable	69-MV-0131-LV	BAT-131-02	3.93	8.17	8.91	0.0961417
CBL-0132-01	Cable	69-MV-0132-HV	BAT-132-01	1.31	2.99	12.1	0.0826446
CBL-0133-02	Cable	69-MV-0133-LV	BAT-133-02	4.65	8.17	9.93	0.0806317
CBL-0134-01	Cable	69-MV-0134-LV	BAT-134-01	1.35	7.87	3.23	0.0909091
CBL-0135-02	Cable	69-MV-0135-LV	BAT-135-02	3.93	8.17	8.91	0.0961417
CBL-0136-01	Cable	69-MV-0136-LV	BAT-136-01	1.31	3.47	12.1	0.0826446
CBL-0137-02	Cable	69-MV-0137-LV	BAT-137-02	3.93	8.17	8.91	0.0961417
CBL-0138-01	Cable	69-MV-0138-HV	BAT-138-01	1.31	2.99	12.1	0.0826446
CBL-0139-02	Cable	69-MV-0139-LV	BAT-139-02	4.65	8.17	9.93	0.0806317
CBL-0140-01	Cable	69-MV-0140-LV	BAT-140-01	1.35	7.87	3.23	0.0909091
CBL-0141-02	Cable	69-MV-0141-LV	BAT-141-02	3.93	8.17	8.91	0.0961417
CBL-0142-01	Cable	69-MV-0142-LV	BAT-142-01	1.31	3.47	12.1	0.0826446
CBL-0143-02	Cable	69-MV-0143-LV	BAT-143-02	3.93	8.17	8.91	0.0961417
CBL-0144-01	Cable	69-MV-0144-HV	BAT-144-01	1.31	2.99	12.1	0.0826446
CBL-0145-02	Cable	69-MV-0145-LV	BAT-145-02	4.65	8.17	9.93	0.0806317
CBL-0146-01	Cable	69-MV-0146-LV	BAT-146-01	1.35	7.87	3.23	0.0909091
CBL-0147-02	Cable	69-MV-0147-LV	BAT-147-02	3.93	8.17	8.91	0.0961417
CBL-0148-01	Cable	69-MV-0148-LV	BAT-148-01	1.31	3.47	12.1	0.0826446
CBL-0149-02	Cable	69-MV-0149-LV	BAT-149-02	3.93	8.17	8.91	0.0961417
CBL-0150-01	Cable	69-MV-0150-HV	BAT-150-01	1.31	2.99	12.1	0.0826446
CBL-0151-02	Cable	69-MV-0151-LV	BAT-151-02	4.65	8.17	9.93	0.0806317
CBL-0152-01	Cable	69-MV-0152-LV	BAT-152-01	1.35	7.87	3.23	0.0909091
CBL-0153-02	Cable	69-MV-0153-LV	BAT-153-02	3.93	8.17	8.91	0.0961417
CBL-0154-01	Cable	69-MV-0154-LV	BAT-154-01	1.31	3.47	12.1	0.0826446
CBL-0155-02	Cable	69-MV-0155-LV	BAT-155-02	3.93	8.17	8.91	0.0961417
CBL-0156-01	Cable	69-MV-0156-HV	BAT-156-01	1.31	2.99	12.1	0.0826446
CBL-0157-02	Cable	69-MV-0157-LV	BAT-157-02	4.65	8.17	9.93	0.0806317
CBL-0158-01	Cable	69-MV-0158-LV	BAT-158-01	1.35	7.87	3.23	0.0909091
CBL-0159-02	Cable	69-MV-0159-LV	BAT-159-02	3.93	8.17	8.91	0.0961417
CBL-0160-01	Cable	69-MV-0160-LV	BAT-160-01	1.31	3.47	12.1	0.0826446
CBL-0161-02	Cable	69-MV-0161-LV	BAT-161-02	3.93	8.17	8.91	0.0961417
CBL-0162-01	Cable	69-MV-0162-HV	BAT-162-01	1.31	2.99	12.1	0.0826446
CBL-0163-02	Cable	69-MV-0163-LV	BAT-163-02	4.65	8.17	9.93	0.0806317
CBL-0164-01	Cable	69-MV-0164-LV	BAT-164-01	1.35	7.87	3.23	0.0909091
CBL-0165-02	Cable	69-MV-0165-LV	BAT-165-02	3.93	8.17	8.91	0.0961417
CBL-0166-01	Cable	69-MV-0166-HV	BAT-166-01	1.31	2.99	12.1	0.0826446
CBL-0167-02	Cable	69-MV-0167-LV	BAT-167-02	4.65	8.17	9.93	0.0806317
CBL-0168-01	Cable	69-MV-0168-LV	BAT-168-01	1.35	7.87	3.23	0.0909091
CBL-0169-02	Cable	69-MV-0169-LV	BAT-169-02	3.93	8.17	8.91	0.0961417
CBL-0170-01	Cable	69-MV-0170-HV	BAT-170-01	1.31	2.99	12.1	0.0826446
CBL-0171-02	Cable	69-MV-0171-LV	BAT-171-02	4.65	8.17	9.93	0.0806317
CBL-0172-01	Cable	69-MV-0172-LV	BAT-172-01	1.35	7.87	3.23	0.0909091
CBL-0173-02	Cable	69-MV-0173-LV	BAT-173-02	3.93	8.17	8.91	0.0961417
CBL-0174-01	Cable	69-MV-0174-HV	BAT-174-01	1.31	2.99	12.1	0.0826446
CBL-0175-02	Cable	69-MV-0175-LV	BAT-175-02	4.65	8.17	9.93	0.0806317
CBL-0176-01	Cable	69-MV-0176-LV	BAT-176-01	1.35	7.87	3.23	0.0909091
CBL-0177-02	Cable	69-MV-0177-LV	BAT-177-02	3.93	8.17	8.91	0.0961417
CBL-0178-01	Cable	69-MV-0178-HV	BAT-178-01	1.31	2.99	12.1	0.0826446
CBL-0179-02	Cable	69-MV-0179-LV	BAT-179-02	4.65	8.17	9.93	0.0806317
CBL-0180-01	Cable	69-MV-0180-LV	BAT-180-01	1.35	7.87	3.23	0.0909091
CBL-0181-02	Cable	69-MV-0181-LV	BAT-181-02	3.93	8.17	8.91	0.0961417
CBL-0182-01	Cable	69-MV-0182-HV	BAT-182-01	1.31	2.99	12.1	0.0826446
CBL-0183-02	Cable	69-MV-0183-LV	BAT-183-02	4.65	8.17	9.93	0.0806317
CBL-0184-01	Cable	69-MV-0184-LV	BAT-184-01	1.35	7.87	3.23	0.0909091
CBL-0185-02	Cable	69-MV-0185-LV	BAT-185-02	3.93	8.17	8.91	0.0961417
CBL-0186-01	Cable	69-MV-0186-HV	BAT-186-01	1.31	2.99	12.1	0.0826446
CBL-0187-02	Cable	69-MV-0187-LV	BAT-187-02	4.65	8.17	9.93	0.0806317
CBL-0188-01	Cable	69-MV-0188-LV	BAT-188-01	1.35	7.87	3.23	0.0909091
CBL-0189-02	Cable	69-MV-0189-LV	BAT-189-02	3.93	8.17	8.91	0.0961417
CBL-0190-01	Cable	69-MV-0190-HV	BAT-190-01	1.31	2.99	12.1	0.0826446
CBL-0191-02	Cable	69-MV-0191-LV	BAT-191-02	4.65	8.17	9.93	0.0806317
CBL-0192-01	Cable	69-MV-0192-LV	BAT-192-01	1.35	7.87	3.23	0.0909091
CBL-0193-02	Cable	69-MV-0193-LV	BAT-193-02	3.93	8.17	8.91	0.0961417
CBL-0194-01	Cable	69-MV-0194-HV	BAT-194-01	1.31	2.99	12.1	0.0826446
CBL-0195-02	Cable	69-MV-0195-LV	BAT-195-02	4.65	8.17	9.93	0.0806317
CBL-0196-01	Cable	69-MV-0196-LV	BAT-196-01	1.35	7.87	3.23	0.0909091
CBL-0197-02	Cable	69-MV-0197-LV	BAT-197-02	3.93	8.17	8.91	0.0961417
CBL-0198-01	Cable	69-MV-0198-HV	BAT-198-01	1.31	2.99	12.1	0.0826446
CBL-0199-02	Cable	69-MV-0199-LV	BAT-199-02	4.65	8.17	9.93	0.0806317
CBL-0200-01	Cable	69-MV-0200-LV	BAT-200-01	1.35	7.87	3.23	0.0909091
CBL-0201-02	Cable	69-MV-0201-LV	BAT-201-02	3.93	8.17	8.91	0.0961417
CBL-0202-01	Cable	69-MV-0202-HV	BAT-202-01	1.31	2.99	12.1	0.0826446
CBL-0203-02	Cable	69-MV-0203-LV	BAT-203-02	4.65	8.17	9.93	0.0806317
CBL-0204-01	Cable	69-MV-0204-LV	BAT-204-01	1.35	7.87	3.23	0.0909091
CBL-0205-02	Cable	69-MV-0205-LV	BAT-205-02	3.93	8.17	8.91	0.0961417
CBL-0206-01	Cable	69-MV-0206-HV	BAT-206-01	1.31	2.99	12.1	0.0826446
CBL-0207-02	Cable	69-MV-0207-LV	BAT-207-02	4.65	8.17	9.93	0.0806317
CBL-0208-01	Cable	69-MV-0208-LV	BAT-208-01	1.35	7.87	3.23	0.0909091
CBL-0209-02	Cable	69-MV-0209-LV	BAT-209-02	3.93	8.17	8.91	0.0961417
CBL-0210-01	Cable	69-MV-0210-HV	BAT-210-01	1.31	2.99	12.1	0.0826446
CBL-0211-02	Cable	69-MV-0211-LV	BAT-211-02	4.65	8.17	9.93	0.0806317
CBL-0212-01	Cable	69-MV-0212-LV	BAT-212-01	1.35	7.87	3.23	0.0909091
CBL-0213-02	Cable	69-MV-0213-LV	BAT-213-02	3.93	8.17	8.91	0.0961417
CBL-0214-01	Cable	69-MV-0214-HV	BAT-214-01	1.31	2.99	12.1	0.0826446
CBL-0215-02	Cable	69-MV-0215-LV	BAT-215-02	4.65	8.17	9.93	0.0806317
CBL-0216-01	Cable	69-MV-0216-LV	BAT-216-01	1.35	7.87	3.23	0.0909091
CBL-0217-02	Cable	69-MV-0217-LV	BAT-217-02	3.93	8.17	8.91	0.0961417
CBL-0218-01	Cable	69-MV-0218-HV	BAT-218-01	1.31	2.99	12.1	0.0826446
CBL-0219-02	Cable	69-MV-0219-LV	BAT-219-02	4.65	8.17	9.93	0.0806317
CBL-0220-01	Cable	69-MV-0220-LV	BAT-220-01	1.35	7.87	3.23	0.0909091
CBL-0221-02	Cable	69-MV-0221-LV	BAT-221-02	3.93	8.17	8.91	0.0961417
CBL-0222-01	Cable	69-MV-0222-HV	BAT-222-01	1.31	2.99	12.1	0.0826446
CBL-0223-02	Cable	69-MV-0223-LV	BAT-223-02	4.65	8.17	9.93	0.0806317
CBL-0224-01	Cable	69-MV-0224-LV	BAT-224-01	1.35	7.87	3.23	0.0909091
CBL-0225-02	Cable	69-MV-0225-LV	BAT-225-02	3.93	8.17	8.91	0.0961417
CBL-0226-01	Cable	69-MV-0226-HV	BAT-226-01	1.31	2.99	12.1	0.0826446
CBL-0227-02	Cable	69-MV-0227-LV	BAT-227-02	4.65	8.17	9.93	0.0806317
CBL-0228-01	Cable	69-MV-0228-LV	BAT-228-01	1.35	7.87	3.23	0.0909091
CBL-0229-02	Cable	69-MV-0229-LV	BAT-229-02	3.93	8.17	8.91	0.0961417
CBL-0230-01	Cable	69-MV-0230-HV	BAT-230-01	1.31	2.99	12.1	0.0826446
CBL-0231-02	Cable	69-MV-0231-LV	BAT-231-02	4.65	8.17	9.93	0.0806317
CBL-0232-01	Cable	69-MV-0232-LV	BAT-232-01	1.35	7.87	3.23	0.0909091
CBL-0233-02	Cable	69-MV-0233-LV	BAT-233-02	3.93	8.17	8.91	0.0961417
CBL-0234-01	Cable	69-MV-0234-HV	BAT-234-01	1.31	2.99	12.1	0.0826446
CBL-0235-02	Cable	69-MV-0235-LV	BAT-235-02	4.65	8.17	9.93	0.0806317
CBL-0236-01	Cable	69-MV-0236-LV	BAT-236-01	1.35	7.87	3.23	0.0909091
CBL-0237-02	Cable	69-MV-0237-LV	BAT-237-02	3.93	8.17	8.91	0.0961417
CBL-0238-01	Cable	69-MV-0238-HV	BAT-238-01	1.31	2.99	12.1	0.0826446
CBL-0239-02	Cable	69-MV-0239-LV	BAT-239-02	4.65	8.17	9.93	0.0806317
CBL-0240-01	Cable	69-MV-0240-LV	BAT-240-01	1.35	7.87	3.23	0.0909091
CBL-0241-02	Cable	69-MV-0241-LV	BAT-241-02	3.93	8.17	8.91	0.0961417
CBL-0242-01	Cable	69-MV-0242-HV	BAT-242-01	1.31	2.99	12.1	0.0826446
CBL-0243-02	Cable	69-MV-0243-LV	BAT-243-02	4.65	8.17	9.93	0.0806317
CBL-0244-01	Cable	69-MV-0244-LV	BAT-244-01	1.35	7.87	3.23	0.0909091
CBL-0245-02	Cable	69-MV-0245-LV	BAT-245-02	3.93	8.17	8.91	0.0961417
CBL-0246-01	Cable	69-MV-0246-HV	BAT-246-01	1.31	2.99	12.1	0.0826446
CBL-0247-02	Cable	69-MV-0247-LV	BAT-247-02	4.65	8.17	9.93	0.0806317
CBL-0248-01	Cable	69-MV-0248-LV	BAT-248-01	1.35	7.87	3.23	0.0909091
CBL-0249-02	Cable	69-MV-0249-LV	BAT-249-02	3.93	8.17	8.91	0.0961417
CBL-0250-01	Cable	69-MV-0250-HV	BAT-250-01	1.31	2.99	12.1	0.0826446
CBL-0251-02	Cable	69-MV-0251-LV	BAT-251-02	4.65	8.17	9.93	0.0806317
CBL-0252-01	Cable	69-MV-0252-LV	BAT-252-01	1.35	7.87	3.23	0.0909091
CBL-0253-02	Cable	69-MV-0253-LV	BAT-253-02	3.93	8.17	8.91	0.0961417
CBL-0254-01	Cable	69-MV-0254-HV	BAT-254-01	1.31	2.99	12.1	0.0826446
CBL-0255-02	Cable	69-MV-0255-LV	BAT-255-02	4.65	8.17	9.93	0.0806317
CBL-0256-01	Cable	69-MV-0256-LV	BAT-256-01	1.35	7.87	3.23	0.0909091
CBL-0257-02	Cable	69-MV-0257-LV	BAT-257-02	3.93	8.17	8.91	0.0961417
CBL-0258-01	Cable	69-MV-0258-HV	BAT-258-01	1.31	2.99	12.1	0.0826446
CBL-0259-02	Cable	69-MV-0259-LV	BAT-259-02	4.65	8.17	9.93	0.0806317
CBL-0260-01	Cable	69-MV-0260-LV	BAT-260-01	1.35	7.87	3.23	0.0909091
CBL-0261-02	Cable	69-MV-0261-LV	BAT-261-02	3.93	8.17	8.91	0.0961417
CBL-0262-01	Cable	69-MV-0262-HV	BAT-262-01	1.31	2.99	12.1	0.0826446
CBL-0263-02	Cable	69-MV-0263-LV	BAT-263-02	4.65	8.17	9.93	0.0806317
CBL-0264-01	Cable	69-MV-0264-LV	BAT-264-01	1.35	7.87	3.23	0.0909091
CBL-0265-02	Cable	69-MV-0265-LV	BAT-265-02	3.93	8.17	8.91	0.0961417
CBL-0266-01	Cable	69-MV-0266-HV	BAT-266-01	1.31	2.99	12.1	0.0826446
CBL-0267-02	Cable	69-MV-0267-LV	BAT-267-02	4.65	8.17	9.93	0.0806317
CBL-0268-01	Cable	69-MV-0268-LV	BAT-268-01	1.35	7.87	3.23	0.0909091
CBL-0269-02	Cable	69-MV-0269-LV	BAT-269-02	3.93	8.17	8.91	0.0961417
CBL-0270-01	Cable	69-MV-0270-HV	BAT-270-01	1.31	2.99	12.1	0.0826446
CBL-0271-02	Cable	69-MV-0271-LV	BAT-271-02	4.65	8.17	9.93	0.0806317
CBL-0272-01	Cable	69-MV-0272-LV	BAT-272-01	1.35	7.87	3.23	0.0909091
CBL-0273-02	Cable	69-MV-0273-LV	BAT-273-02	3.93	8.17	8.91	0.0961417
CBL-0274-01	Cable	69-MV-0274-HV	BAT-274-01	1.31	2.99	12.1	0.0826446
CBL-0275-02	Cable	69-MV-0275-LV	BAT-275-02	4.65	8.17	9.93	0.0806317
CBL-0276-01	Cable	69-MV-0276-LV	BAT-276-01	1.35	7.87	3.23	0.0909091
CBL-0277-02	Cable	69-MV-0277-LV	BAT-277-02	3.93	8.17	8.91	0.0961417
CBL-0278-01	Cable	69-MV-0278-HV	BAT-278-01	1.31	2.99	12.1	0.0826446
CBL-0279-02	Cable	69-MV-0279-LV	BAT-279-02	4.65	8.17	9.93	0.0806317
CBL-0280-01	Cable	69-MV-0280-LV	BAT-280-01	1.35	7.87	3.23	0.0909091
CBL-0281-02	Cable	69-MV-0281-LV	BAT-281-02	3.93	8.17	8.91	0.0961417
CBL-0282-01	Cable	69-MV-0282-HV	BAT-282-01	1.31	2.99	12.1	0.0826446
CBL-0283-02	Cable	69-MV-0283-LV	BAT-283-02	4.65	8.17	9.93	0.0806317
CBL-0284-01	Cable	69-MV-0284-LV	BAT-284-01	1.35	7.87	3.23	0.0909091
CBL-0285-02	Cable	69-MV-0285-LV	BAT-285-02	3.93	8.17	8.91	0.0961417
CBL-0286-01	Cable	69-MV-0286-HV	BAT-286-01	1.31	2.99	12.1	0.0826446
CBL-0287-02	Cable	69-MV-0287-LV	BAT-287-02	4.65	8.17	9.93	0.0806317
CBL-0288-01	Cable	69-MV-0288-LV	BAT-288-01	1.35	7.87	3.23	0.0909091
CBL-0289-02	Cable	69-MV-0289-LV	BAT-289-02	3.93	8.17	8.91	0.0961417
CBL-0290-01	Cable	69-MV-0290-HV	BAT-290-01	1.31	2.99	12.1	0.0826446
CBL-0291-02	Cable	69-MV-0291-LV	BAT-291-02	4.65	8.17	9.93	0.0806317
CBL-0292-01	Cable	69-MV-0292-LV	BAT-292-01	1.35	7.87	3.23	0.0909091
CBL-0293-02	Cable	69-MV-0293-LV	BAT-293-02	3.93	8.17	8.91	0.0961417
CBL-0294-01	Cable	69-MV-0294-HV	BAT-294-01	1.31	2.99	12.1	0.0826446
CBL-0295-02	Cable	69-MV-0295-LV	BAT-295-02	4.65	8.17	9.93	0.0806317
CBL-0296-01	Cable	69-MV-0296-LV	BAT-296-01	1.35	7.87	3.23	0.0909091
CBL-0297-02	Cable	69-MV-0297-LV	BAT-297-02	3.93	8.17	8.91	0.0961417
CBL-0298-01	Cable	69-MV-0298-HV	BAT-298-01	1.31	2.99	12.1	0.0826446
CBL-0299-02	Cable	69-MV-0299-LV	BAT-299-02	4.65	8.17	9.93	0.0806317
CBL-0300-01	Cable	69-MV-0300-LV	BAT-300-01	1.35	7.87	3.23	0.0909091
CBL-0301-02	Cable	69-MV-0301-LV	BAT-301-02	3.93	8.17	8.91	0.0961417
CBL-0302-01	Cable	69-MV-0302-HV	BAT-302-01	1.31	2.99	12.1	0.0826446
CBL-0303-02	Cable	69-MV-0303-LV	BAT-303-02	4.65	8.17	9.93	0.0806317
CBL-0304-01	Cable	69-MV-0304-LV	BAT-304-01	1.35	7.87	3.23	0.0909091
CBL-0305-02	Cable	69-MV-0305-LV	BAT-305-02	3.93	8.17	8.91	0.0961417
CBL-0306-01	Cable	69-MV-0306-HV	BAT-306-01	1.31	2.99	12.1	0.0826446
CBL-0307-02	Cable	69-MV-0307-LV	BAT-307-02	4.65	8.17	9.93	0.0806317
CBL-0308-01	Cable	69-MV-0308-LV	BAT-308-01	1.35	7.87	3.23	0.0909091
CBL-0309-02	Cable	69-MV-0309-LV	BAT-309-02	3.93	8.17	8.91	0.0961417
CBL-0310-01	Cable	69-MV-0310-HV	BAT-310-01	1.31	2.99	12.1	0.0826446
CBL-0311-02	Cable	69-MV-0311-LV	BAT-311-02	4.65	8.17	9.93	0.0806317
CBL-0312-01	Cable	69-MV-0312-LV	BAT-312-01	1.35	7.87	3.23	0.0909091
CBL-0313-02	Cable	69-MV-0313-LV	BAT-313-02	3.93	8.17	8.91	0.0961417
CBL-0314-01	Cable	69-MV-0314-HV	BAT-314-01	1.31	2.99	12.1	0.0826446
CBL-0315-02	Cable	69-MV-0315-LV	BAT-315-02	4.65	8.17	9.93	0.0806317
CBL-0316-01	Cable	69-MV-0316-LV	BAT-316-01	1.35	7.87	3.23	0.0909091
CBL-0317-02	Cable	69-MV-0317-LV	BAT-317-02	3.93	8.17	8.91	0.0961417
CBL-0318-01	Cable	69-MV-0318-HV	BAT-318-01	1.31	2.99	12.1	0.0826446
CBL-0319-02	Cable	69-MV-0319-LV	BAT-319-02	4.65	8.17	9.93	0.0806317
CBL-0320-01	Cable	69-MV-0320-LV	BAT-320-01	1.35	7.87	3.23	0.0909091
CBL-0321-02	Cable	69-MV-0321-LV	BAT-321-02	3.93	8.17	8.91	0.0961417
CBL-0322-01	Cable	69-MV-0322-HV	BAT-322-01	1.31	2.99	12.1	0.0826446
CBL-0323-02	Cable	69-MV-0323-LV	BAT-323-02	4.65	8.17	9.93	0.0806317
CBL-0324-01	Cable	69-MV-0324-LV	BAT-324-01	1.35	7.87	3.23	0.0909091
CBL-0325-02	Cable	69-MV-0325-LV	BAT-325-02	3.93	8.17	8.91	0.0961417
CBL-0326-01	Cable	69-MV-0326-HV	BAT-326-01	1.31	2.99	12.1	0.0826446
CBL-0327-02	Cable	69-MV-0327-LV	BAT-327-02	4.65	8.17	9.93	0.0806317
CBL-0328-01	Cable	69-MV-0328-LV	BAT-328-01	1.35	7.87	3.23	0.0909091
CBL-0329-02	Cable	69-MV-0329-LV	BAT-329-02	3.93	8.17	8.91	0.0961417
CBL-0330-01	Cable	69-MV-0330-HV	BAT-330-01	1.31	2.99	12.1	0.0826446
CBL-0331-02	Cable	69-MV-0331-LV	BAT-331-02	4.65	8.17	9.93	0.0806317
CBL-0332-01	Cable	69-MV-0332-LV	BAT-332-01	1.35	7.87	3.23	0.0909091
CBL-0333-02	Cable	69-MV-0333-LV	BAT-333-02	3.93	8.17	8.91	0.0961417
CBL-0334-01	Cable	69-MV-0334-HV	BAT-334-01	1.31	2.99	12.1	0.0826446
CBL-0335-02	Cable	69-MV-0335-LV	BAT-335-02	4.65	8.17	9.93	0.0806317
CBL-0336-01	Cable	69-MV-0336-LV	BAT-336-01	1.35	7.87	3.23	0.0909091
CBL-0337-02	Cable	69-MV-0337-LV	BAT-337-02	3.93	8.17	8.91	0.0961417
CBL-0338-01	Cable	69-MV-0338-HV	BAT-338-01	1.31	2.99	12.1	0.0826446
CBL-0339-02	Cable	69-MV-0339-LV	BAT-339-02	4.65	8.17	9.93	0.0806317
CBL-0340-01	Cable	69-MV-0340-LV	BAT-340-01	1.35	7.87	3.23	0.0909091
CBL-0341-02	Cable	69-MV-0341-LV	BAT-341-02	3.93	8.17	8.91	0.0961417
CBL-0342-01	Cable	69-MV-0342-HV	BAT-342-01	1.31	2.99	12.1	0.0826446
CBL-0343-02	Cable	69-MV-0343-LV	BAT-343-02	4.65	8.17	9.93	0.0806317
CBL-0344-01	Cable	69-MV-0344-LV	BAT-344-01	1.35	7.87	3.23	0.0909091
CBL-0345-02	Cable	69-MV-0345-LV	BAT-345-02	3.93	8.17	8.91	0.0961417
CBL-0346-01	Cable	69-MV-0346-HV	BAT-346-01	1.31	2.99	12.1	0.0826446
CBL-0347-02	Cable	69-MV-0347-LV	BAT-347-02	4.65	8.17	9.93	0.0806317
CBL-0348-01	Cable	69-MV-0348-LV	BAT-348-01	1.35	7.87	3.23	0.0909091
CBL-0349-02	Cable	69-MV-0349-LV	BAT-349-02	3.93	8.17	8.91	0.0961417
CBL-0350-01	Cable	69-MV-0350-HV	BAT-350-01	1.31	2.99	12.1	0.0826446
CBL-0351-02	Cable	69-MV-0351-LV	BAT-351-02	4.65	8.17	9.93	0.0806317
CBL-0352-01	Cable	69-MV-0352-LV	BAT-352-01	1.35	7.87	3.23	0.0909091
CBL-0353-02	Cable	69-MV-0353-LV	BAT-353-02	3.93	8.17	8.91	0.0961417
CBL-0354-01	Cable	69-MV-0354-HV	BAT-354-01	1.31	2.99	12.1	0.0826446
CBL-0355-02	Cable	69-MV-0355-LV

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Location:	Brown and Mills County, TX	24.0.0C		Date:	09/04/2015
Contract:	TX-09-1701			SN:	PORT-ROMEO
Engineer:	Port Power Engineering	Study Case:	SC-Unity PF	Revision:	Base
Filename:	chp24_Chisos			Config.:	Normal

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
MVT-BUS6-104	Cable	BUS6021-001	BUS6021-002	0.03	0.03	0.04	0.0623184
MVT-BUS6-105	Cable	BUS6021-001	BUS6021-003	0.03	0.03	0.03	0.0623184
UNT-BUS6-106	Cable	BUS6021-001	BUS6021-004	0.07	0.07	0.09	0.1402164
MVT-BUS6-108	Cable	BUS6021-001	BUS6021-005	0.05	0.06	0.08	0.1246368
MVT-BUS6-202	Cable	BUS6021-001	BUS6021-006	0.02	0.02	0.03	0.0311592
UNT-BUS6-203	Cable	BUS6021-001	BUS6021-007	0.07	0.07	0.09	0.1402164
MVT-BUS6-204	Cable	BUS6021-001	BUS6021-008	0.03	0.03	0.04	0.0623184
MVT-BUS6-205	Cable	BUS6021-001	BUS6021-009	0.03	0.03	0.03	0.0623184
UNT-BUS6-206	Cable	BUS6021-001	BUS6021-010	0.07	0.07	0.09	0.1402164
MVT-BUS6-302	Cable	BUS6021-001	BUS6021-011	0.02	0.02	0.03	0.0311592
UNT-BUS6-303	Cable	BUS6021-001	BUS6021-012	0.07	0.07	0.09	0.1402164
MVT-BUS6-304	Cable	BUS6021-001	BUS6021-013	0.03	0.03	0.04	0.0623184
MVT-BUS6-305	Cable	BUS6021-001	BUS6021-014	0.03	0.03	0.03	0.0623184
UNT-BUS6-306	Cable	BUS6021-001	BUS6021-015	0.07	0.07	0.09	0.1402164
MVT-BUS6-402	Cable	BUS6021-001	BUS6021-016	0.02	0.02	0.03	0.0311592
UNT-BUS6-403	Cable	BUS6021-001	BUS6021-017	0.07	0.07	0.09	0.1402164
MVT-BUS6-404	Cable	BUS6021-001	BUS6021-018	0.03	0.03	0.04	0.0623184
MVT-BUS6-405	Cable	BUS6021-001	BUS6021-019	0.03	0.03	0.03	0.0623184
UNT-BUS6-406	Cable	BUS6021-001	BUS6021-020	0.07	0.07	0.09	0.1402164
MVT-BUS6-502	Cable	BUS6021-001	BUS6021-021	0.02	0.02	0.03	0.0311592
UNT-BUS6-503	Cable	BUS6021-001	BUS6021-022	0.07	0.07	0.09	0.1402164
MVT-BUS6-504	Cable	BUS6021-001	BUS6021-023	0.03	0.03	0.04	0.0623184
MVT-BUS6-505	Cable	BUS6021-001	BUS6021-024	0.03	0.03	0.03	0.0623184
UNT-BUS6-506	Cable	BUS6021-001	BUS6021-025	0.07	0.07	0.09	0.1402164
MVT-BUS6-602	Cable	BUS6021-001	BUS6021-026	0.02	0.02	0.03	0.0311592
UNT-BUS6-603	Cable	BUS6021-001	BUS6021-027	0.07	0.07	0.09	0.1402164
MVT-BUS6-604	Cable	BUS6021-001	BUS6021-028	0.03	0.03	0.04	0.0623184
MVT-BUS6-605	Cable	BUS6021-001	BUS6021-029	0.03	0.03	0.03	0.0623184
UNT-BUS6-606	Cable	BUS6021-001	BUS6021-030	0.07	0.07	0.09	0.1402164
MVT-MVSC-101	Cable	MVSC-001	SS-BUS7-001	0.01	0.01	0.01	0.0155792
MVT-MVSC-102	Cable	MVSC-002	MVSC-001	0.00	0.00	0.00	0.0000000
MVT-MVSC-201	Cable	MVSC-001	SS-BUS7-002	0.01	0.01	0.01	0.0155792
UNT-MVSC-202	Cable	MVSC-002	SS-BUS7-003	0.02	0.02	0.02	0.0311592
MVT-MVSC-301	Cable	MVSC-001	MVSC-002	0.00	0.00	0.00	0.0000000
UNT-MVSC-302	Cable	MVSC-002	MVSC-003	0.00	0.00	0.00	0.0000000
MVT-MVSC-401	Cable	MVSC-001	SS-BUS7-004	0.01	0.01	0.01	0.0155792
UNT-MVSC-402	Cable	MVSC-002	MVSC-004	0.00	0.00	0.00	0.0000000
MVT-MVSC-403	Cable	MVSC-003	MVSC-004	0.00	0.00	0.00	0.0000000

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
MVT-MVSC-001	Cable	MVSC-001	Section 11	0.66	0.82	1.12	0.111186
MVT-MVSC-002	Cable	MVSC-002	MVSC-001	0.58	0.95	1.11	0.106091
UNT-PCS-021	Cable	500MW-0.8 kV	MVSC-002	0.85	0.75	1.26	0.134691
MVT-PCS-022	Cable	500MW-0.8 kV	XFMR-SEC#4	0.43	0.43	0.62	0.196162
MVT-PCS-023	Cable	MVSC-001	XFMR-SEC#3	0.59	0.83	0.89	0.187364
UNT-PCS-024	Cable	500MW-0.8 kV	XFMR-SEC#3	0.48	0.55	0.88	0.200900
MVT-PCS-025	Cable	500MW-0.8 kV	MVSC-001	0.54	0.44	0.67	0.111121
MVT-PCS-026	Cable	500MW-0.8 kV	XFMR-SEC#2	0.5	0.43	0.68	0.117760
UNT-PCS-027	Cable	500MW-0.8 kV	XFMR-SEC#1	0.48	0.45	0.67	0.208946
MVT-PCS-028	Cable	500MW-0.8 kV	MVSC-001	0.58	0.68	0.92	0.166862
MVT-PCS-029	Cable	500MW-0.8 kV	XFMR-SEC#1	0.62	0.55	0.83	0.167726
UNT-PCS-030	Cable	500MW-0.8 kV	XFMR-SEC#1	0.49	0.85	1.01	0.254161
MVT-PCS-031	Cable	500MW-0.8 kV	XFMR-SEC#4	0.52	0.55	0.71	0.151267
MVT-PCS-032	Cable	500MW-0.8 kV	MVSC-001	0.54	0.27	0.61	0.078457
UNT-PCS-033	Cable	500MW-0.8 kV	XFMR-SEC#4	0.55	0.86	1.03	0.203651
MVT-PCS-034	Cable	500MW-0.8 kV	XFMR-SEC#3	0.49	0.55	0.73	0.154121
UNT-PCS-035	Cable	500MW-0.8 kV	SS-BAY-1	0.52	0.38	0.64	0.077443
MVT-PCS-036	Cable	500MW-0.8 kV	XFMR-SEC#2	0.48	0.41	0.63	0.089944
MVT-PCS-037	Cable	500MW-0.8 kV	XFMR-SEC#3	0.46	0.46	0.66	0.140122
MVT-PCS-038	Cable	500MW-0.8 kV	XFMR-SEC#4	0.49	0.56	0.72	0.166452
UNT-PCS-039	Cable	500MW-0.8 kV	XFMR-SEC#1	0.45	0.86	1.46	0.252277
MVT-PCS-040	Cable	500MW-0.8 kV	XFMR-SEC#4	0.53	0.58	0.44	0.124365
MVT-PCS-041	Cable	500MW-0.8 kV	XFMR-SEC#3	0.44	0.82	1.07	0.161686
UNT-PCS-042	Cable	500MW-0.8 kV	MVSC-002	0.59	0.82	0.78	0.241114
MVT-PCS-043	Cable	500MW-0.8 kV	XFMR-SEC#2	0.46	0.55	0.71	0.156562
MVT-PCS-044	Cable	500MW-0.8 kV	XFMR-SEC#1	0.59	0.86	0.77	0.169167
UNT-PCS-045	Cable	500MW-0.8 kV	XFMR-SEC#4	0.57	0.24	0.42	0.111527
MVT-PCS-046	Cable	500MW-0.8 kV	MVSC-002	0.57	0.33	0.66	0.127005
MVT-PCS-047	Cable	500MW-0.8 kV	XFMR-SEC#3	0.55	0.33	0.66	0.079995
UNT-PCS-048	Cable	500MW-0.8 kV	XFMR-SEC#2	0.57	0.57	0.81	0.226254
MVT-PCS-049	Cable	500MW-0.8 kV	MVSC-002	0.66	0.44	0.8	0.134000
MVT-PCS-050	Cable	500MW-0.8 kV	XFMR-SEC#1	0.56	0.27	0.53	0.021992
UNT-PCS-051	Cable	500MW-0.8 kV	XFMR-SEC#4	0.47	0.42	0.63	0.195857
MVT-PCS-052	Cable	500MW-0.8 kV	XFMR-SEC#3	0.52	0.58	0.78	0.171026
MVT-PCS-053	Cable	500MW-0.8 kV	XFMR-SEC#2	0.53	0.63	0.82	0.178734
UNT-PCS-054	Cable	500MW-0.8 kV	XFMR-SEC#1	0.47	0.25	0.49	0.215462
MVT-PCS-055	Cable	500MW-0.8 kV	MVSC-002	0.53	0.38	0.66	0.146163
MVT-PCS-056	Cable	500MW-0.8 kV	XFMR-SEC#4	0.56	0.54	0.82	0.165724
UNT-PCS-057	Cable	500MW-0.8 kV	XFMR-SEC#3	0.55	0.29	0.44	0.204894

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Cable	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Cable	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Cable	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Transformer	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Tie Breaker	[illegible]	[illegible]				
[illegible]	Transformer

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA b			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Ty [illegible]	[illegible]	[illegible]				
[illegible]	Tra [illegible]	[illegible]	[illegible]			

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

CKT Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
[illegible]	Synchgen	[illegible]	[illegible]				
[illegible]	Synchgen	[illegible]	[illegible]				
[illegible]	Synchgen	[illegible]	[illegible]				

Power Grid Input Data

Power Grid	Connected Bus	Rating		% Positive Seq. Impedance (100 MVA Base)			Grounding	% Zero Seq. Impedance (100 MVA Base)		
ID	ID	[illegible]	kV	R	R	X	Type	R	R	X
[illegible]	Bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

SHORT-CIRCUIT REPORT

Fault at bus: **34.5 kV BUS - BUS6**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - BUS6	Total	0.00	24.102	0.00	116.14	115.17	36.455	36.455	2.368+000	9.179E+000	1.780+001	1.50E+001
#1 34.5 kV BUS	34.5 kV BUS - BUS6	86.14	25.691	90.44	99.96	99.57	15.243	0.084	4.98E+000	6.52E+000	1.71E+002	4.00E+001
#1 T1	34.5 kV BUS - BUS6	13.77	4.171	63.16	64.87	160.99	6.949	65.512 *	6.99E+000	3.08E+001	2.13E+001	2.99E+001
XFMR-BUS1-HV	SS4BAY-23	0.02	1.802	0.06	116.18	115.22	0.548	0.000	1.35E+002	6.98E+001		
XFMR-BUS1-HV	SS4BAY-23	0.07	0.938	0.04	116.16	115.20	0.490	0.000	1.62E+002	8.37E+001		
XFMR-BUS1-HV	SS4BAY-22	0.11	1.802	0.06	116.17	115.22	0.588	0.000	1.35E+002	6.98E+001		
XFMR-BUS1-HV	SS4BAY-22	0.07	1.802	0.04	116.16	115.20	0.588	0.000	1.35E+002	6.97E+001		
XFMR-BUS1-HV	SS4BAY-21	0.10	1.802	0.05	116.17	115.22	0.588	0.000	1.35E+002	6.98E+001		
XFMR-BUS1-HV	SS4BAY-21	0.02	1.802	0.06	116.18	115.22	0.548	0.000	1.35E+002	6.98E+001		

\# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of bus kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - SOLAR	Total	0.00	24.867	0.00	116.36	115.09	36.867	36.867	2.38E+000	8.27E+000	1.76E+001	1.93E+001
0.345 kV BUS	34.5 kV Bus - SOLAR-1	86.33	25.004	90.44	99.69	99.56	0.202	0.096	3.91E+000	6.52E+000	1.73E+002	4.06E+001
T1-1-	34.5 kV Bus - SOLAR-1	14.76	3.171	82.53	64.79	100.51	0.945	36.372 *	5.13E+000	2.16E+001	4.73E+001	2.56E+001
M1NC-501	504BAY-13	0.55	0.875	0.33	116.57	115.67	0.497	0.000	1.65E+002	9.63E+001		
M1ND-601	506BAY-13	0.59	0.876	0.33	116.57	115.68	0.498	0.000	1.65E+002	9.63E+001		
M1NC-601	506BAY-15	0.63	1.024	0.36	116.57	115.68	0.582	0.000	1.41E+002	8.23E+001		
SEMB-501-01	504BAY-12	0.39	1.027	0.22	116.49	115.53	0.583	0.000	1.41E+002	8.19E+001		
M1NC-101	504BAY-9	0.33	1.030	0.18	116.48	115.49	0.584	0.000	1.41E+002	8.18E+001		
M1NC-201	504BAY-11	0.24	1.030	0.13	116.46	115.58	0.584	0.000	1.41E+002	8.18E+001		

\# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **34.5 kV BUS - SOLAR-1**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
34.5 kV BUS - SOLAR-1	Total	0.00	24.167	0.00	166.36	115.09	36.467	36.467	2.38E+000	8.27E+000	1.76E+001	1.93E+001
4 345 kV BUS	34.5 kV Bus - SOLAR-1	86.33	25.004	90.44	99.69	99.56	0.202	0.096	5.91E+000	6.52E+000	1.73E+002	4.06E+004
571-1-	34.5 kV Bus - SOLAR-1	14.76	3.171	82.53	64.79	100.51	0.545	36.372 *	5.13E+000	2.38E+001	4.73E+001	2.36E+004
M 9NC-501	504BAY-13	0.35	0.875	0.33	166.57	115.67	0.497	0.000	1.65E+002	5.63E+001		
M 9NC-601	504BAY-13	0.39	0.976	0.33	166.57	115.68	0.498	0.000	1.65E+002	5.63E+001		
M 9NC-001	504BAY-13	0.63	1.624	0.56	166.57	115.68	0.502	0.000	1.68E+002	6.23E+001		
SD9B-501-01	504BAY-12	0.39	1.027	0.22	166.49	115.53	0.503	0.000	1.94E+002	9.98E+001		
M 9NC-101	504BAY-9	0.10	1.030	0.08	166.41	115.49	0.504	0.000	1.95E+002	8.28E+001		
M 9NC-201	504BAY-9	0.24	1.030	0.15	166.44	115.50	0.504	0.000	1.95E+002	8.28E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	[illegible]		Date:	04/26/2019
Contract:	CB-09c2781			SN:	WARD-WAWEE
Engineer:	Watt Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	wpj14_2.lfmdw			Config:	Normal

Fault at bus: **340 kV BUS**

Prefault voltage = 340.000 kV = 100.00 % of nominal bus kV (340.000 kV)
= 100.00 % of Base kV (340.000 kV)

									Positive & Zero Sequence Impedances Looking into "From Bus"			
		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	kA Symmetrical	kA Peak	% Voltage at From Bus			kA Symmetrical		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	26
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [0141]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	17
Location:	Borger and Mid-Cowtie, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100.00 kV)
= [illegible] % of Base kV (100.00 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	16
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84TT4024I**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I*2 Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A	3I0 Symm. mag. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B427 [402 kV]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms,	I/c Symm. rms	% Voltage at From Bus			I/c Symm. rms		R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84ST 69.0 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
84ST 69.0 kV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7788+j0.000	1.7788+j0.000		
84ST 69.0 kV	84ST 69.0 kV	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7788+j0.000	1.7788+j0.000		
84ST 69.0 kV	84ST 69.0 kV	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 (40 H)**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
B427 (40 H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I": Subtransient fault current contribution in Amps. Three-cycling short-circuit current.
*: Indicates a bus with negative fault current contribution (3I0) from a grounded-Wye-Y transformer.

Project:	Chemo	**ETAP**		Page:	42
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfrevew			Config:	Normal

Fault at bus: **B427 [0643]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B427 [0.48 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm. amp	% Voltage at From Bus			I-G Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	3I0	R1	X1	R0	X0
B427 [0.48 kV]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B427 [0.48 kV]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I" - Indicates fault current contribution in kA rms. Symmetrical value.

* - Indicates a value exceeding fault current interrupting rating (100) for a protective device. % Contribution

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: R4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B423-10P.91**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-109-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Peak Amp	Ia	Ib	Ic	3I0 Symm. Amp	3I0 Angle	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421 (0604)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	47
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 (Mill)**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	B421 (Mill)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution [illegible] from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rob Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B421 [0.0 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus 421 (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	ip Peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Rms A	3I0 Symm. Rms B	% Impedance on 100 MVA base R1	X1	R0	X0
B421 [0.0 kV]	Total	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B1008 [0.0 kV]	B421 [0.0 kV]	0.00	0.00	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	1.000+j0.000		
B1009 [0.0 kV]	B421 [0.0 kV]	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	44
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **B427 [84 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	B	C	3I0 From Bus A	B	R1	X1	R0	X0
B427 [84 kV]	Total	0.000	12.577	0.00	111.32	111.32	0.000	0.000	1.906+j0.000	1.758+j0.000		
B1008 [69 kV]	B427 [84 kV]	7.21	10.941	0.00	111.32	111.32	0.000	0.000	1.906+j0.000	1.758+j0.000		
B999 [69 kV]	Machine(s) on B1008	0.00	1.636	0.00	111.32	111.32	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	16.0.0C		Date:	04-26-2019
Contract:	CB-PS-2701			SN:	PCAD-PLPOJC
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj14_2.lmsax			Config:	Normal

Fault at bus: **B-GT1 (B2 H)**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	3I0	Va	Vb	Ia	Ib	R1	X1	R0	X0
B-GT1 (B2 H)	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.7780+j0.000	1.7780+j0.000		
B-GT2 (B2 L)	B-GT1 (B2 H)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000+j0.000	0.0000+j0.000		
B-GT2 (B2 L)	Bus Source 46kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	08/26/2019
Contract:	CB-09c2781			SN:	WORKSHOP02
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxm			Config:	Normal

Fault at bus: **B4T1302 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

									Positive & Zero Sequence Impedances Looking into "From Bus"			
		3-Phase Fault		Line-to-Ground Fault								
CKT/Branch ID	To Bus ID	I"k Symm. Amp	ip Asymm. peak	Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
B4T1302 #2	Total	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B4T08 #2 CKT 1	B4T1302 #2	7.211	18.368	0.000	120.00	120.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B4T08 #2 CKT 1	B4T08 #2 CKT 1	0.000	0.000	0.000	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	08/26/2019
Contract:	CB-09c2781			SN:	WGBS-WWW2
Engineer:	Watt Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	wgb14_2.lfmdw			Config:	Normal

Fault at bus: **B421 [0.48 kV]**

Prefault voltage = 0.480 kV = 100.00 % of nominal bus kV (0.480 kV)
= 100.00 % of Base kV (0.480 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm kA	3I0 Angle deg	R1	X1	R0	X0
B421 [0.48 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7280+j0.0000	1.7280+j0.0000		
B1008 [0.48 kV]	B421 [0.48 kV]	2.500	2.500	0.00	120.00	120.00	2.500	0.000	0.1382+j0.0000	0.1382+j0.0000		
B1009 [0.48 kV]	B1008 [0.48 kV]	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

I" = Maximum fault current contribution of all sources, shown in rms symmetrical amperes.
* = Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer.

Project:	Chemie	**ETAP**		Page:	33
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfanalysis			Config:	Normal

Fault at bus: **B421 [0.48 kV]**

Prefault voltage = 0.480 kV = 100.00 % of nominal bus kV (0.480 kV)
= 100.00 % of Base kV (0.480 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
B421 [0.48 kV]	Total	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B1000 [0.48 kV]	B421 [0.48 kV]	7.211	48.000	0.000	120.00	120.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B1000 [0.48 kV]	Machine(Gen) B1000	0.000	0.000	0.000	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC	Loop: R4	Revision:	Base
Filename:	rpe2.2.1.lfxmx			Config:	Normal

Fault at bus: **B421 [0441**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
B421 [0441	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B3508 [B3511 1	B421 [0441	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemic	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX			Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PLPSTC
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxm			Config:	Normal

Fault at bus: **B427 [04 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm kA	3I0 Angle deg	% Impedance on 100 MVA base R1	X1	R0	X0
B427 [04 kV]	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1008 [0.5 kV]	B427 [04 kV]	7.21	10.972	0.00	0.00	0.00	0.000	0.000	5.648+j0.000	0.000+j0.000		
B1009 [04 kV]	B427 [04 kV]	0.00	0.000	0.00	0.00	0.00	0.000	0.000				

- Indicates fault current contribution is from three winding transformers
* - Indicates a value exceeding fault current rating (100 times a generator's rating, 1 transformer

Project:	Chemo	**ETAP**		Page:	16
Location:	Borden and Mills County, TX			Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PCAD-PC-PC02
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	cgi2.4.2.lterm			Config:	Normal

Fault at bus: **B427-Def-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault Current	ip Asymm. Peak Current	% Voltage at From Bus 3a	3b	3c	3I0 Symm. Fault Current 3a	3b	R1	X1	R0	X0
B427-Def-01	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B7008-B7010-1	B427-Def-01	2.140	6.083	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B7010-Def-01	Medium-Voltage Bus	0.00	0.000	0.00	0.00	0.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	17
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B417-Def-01**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Base	Ik Symm. rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. rms Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemtr	**ETAP**		Page:	26
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [B6-0]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	24
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe24_2.lfmxm			Config:	Normal

Fault at bus: **B427 [Bus 6]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus 6 V (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427 [Bus 6]	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1008 [Bus 6.6 kV]	B427 [Bus 6]	7.211	10.000	0.000	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1009 [Bus 6.6 kV]	B427 [Bus 6]	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a value exceeding fault current interrupting rating (100.0 kA) for a protective device in the system

Project:	Chemic	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg2-4_2.lresw			Config:	Normal

Fault at bus: **B421 [B14]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
B421 [B14]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.788+j0.000	1.788+j0.000		
B1006 [B1006]	B421 [B14]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1006 [B1006]	B1006 [B1006]	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfanalysis			Config:	Normal

Fault at bus: **B427 [0.0 kV]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of bus kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I_0 Symm. Amp A	I_0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
B427 [0.0 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B1000 [0.0 kV]	B427 [0.0 kV]	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B1001 [0.0 kV]	B1000 [0.0 kV]	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

I" = Maximum fault current contribution of three-phase symmetrical current.
* = Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer.

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	16.0.0C		Date:	08-08-2019
Contract:	CB-09x270			SN:	09-001-09-0032
Engineer:	Real Power Engineering	Study Case: SC Comp 3ph		Revision:	Base
Filename:	cpg2-6-2.lfmxm			Config:	Normal

Fault at bus: **B-GT1-0824-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ik" kA	3I0 kA	Ik" kA	R1	X1	R1	X1	R0	X0
B-GT1-0824-01	Total	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000+j0.0000	0.0000+j0.0000		
B-T1-0824-01	B-GT1-0824-01	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000+j0.0000	0.0000+j0.0000		
B-T1-0824-01	B-0824-34.5kV-01	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000				

* - Indicates fault current contribution is from three-winding transformers
# - Indicates a zero sequence fault current contribution from a grounded Wye-Wye transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	08/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpe2.4.2.lfanalyz			Config:	Normal

Fault at bus: **B4T1302 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"									
Contributions		3-Phase Fault		Line-to-Ground Fault									
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus			X/R Symm. ratio		R1	X1	R0	X0	
				3Ø	LA	LB	3Ø	1Ø					
B4T1 [illegible]	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.000000	0.000000			
[illegible]	[illegible]	0.00	0.000	0.00	0.00	0.00	0.000	0.000	0.000000	0.000000			
[illegible]	[illegible]	0.00	0.000	0.00	0.00	0.00	0.000	0.000					

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemk	**ETAP**		Page:	4.0
Location:	Bowie and Mills County, TX	16.0.0C		Date:	04/26/2019
Contract:	CB-09x270			SN:	WORD-W-WIN2
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rep2-4-2.Chemm			Config:	Normal

Fault at bus: **B421303-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				3a	3b	3c	3I0	3I0	R1	X1	R0	X0
B421303-01	Total	0.000	00.111	0.00	111.11	111.11	0.000	0.000	1.7E+000	1.7E+002		
B7008 B421303-0	B421303-01	0.00	01.000	0.00	111.11	111.11	0.000	0.000	1.1E+000	1.1E+002		
B8000 B421303-0	B8000 B421303-01	0.00	0.000	0.00	111.11	111.11	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [illegible] 4E**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CurrentBasics		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	3I0 [illegible]	Va [illegible]	Vb [illegible]	Vc [illegible]	Ia [illegible]	Ib [illegible]	R1	X1	R0	X0
B421 [illegible] 4E	Bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borden and Mills County, TX	[illegible]		Date:	04/26/2019
Contract:	CR-09c-270			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	cgi2.4.2.lterm			Config:	Normal

Fault at bus: **B427 38441**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427 38441	Total	0.00	0.000	0.00	0.00	0.00	0.000	0.00	0.000+j0.000	0.000+j0.000		
B7008 B26111 1	B427 38441	2.00	0.000	0.00	0.00	0.00	0.000	0.00	0.000+j0.000	0.000+j0.000		
B8000 B26140	B8000 B26140 GR	0.00	0.000	0.00	0.00	0.00	0.000	0.00				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	47
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427 [illegible] 0**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value weighted by fault current contribution (IEC) from a generator (Unbal. Y transformer)

Project:	Chemie	**ETAP**		Page:	66
Location:	Borger and Mills County, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfanse			Config:	Normal

Fault at bus: **B421-HV41**

Prefault voltage = [illegible] = [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/X Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I" A Symm Amp	I" B Symm Amp	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	10
Location:	Bowie and Mills County, TX	16.0.0C		Date:	04-26-2019
Contract:	CB-09x270			SN:	89-001-89-0032
Engineer:	Real Power Engineering	Study Case: SC Comp 3ph		Revision:	Base
Filename:	rpp14_2.lfmxm			Config:	Normal

Fault at bus: **B423-169-85**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B423-169-85	Total	0.000	0.000	0.00	100.00	100.00	0.000	0.000	1.978+j0.000	2.708+j0.000		
B7008-B423-169-X	B423-169-85	7.211	7.211	0.00	100.00	100.00	0.000	0.000	1.978+j0.000	2.708+j0.000		
B8000-B423-169	B423-169-85	0.000	0.000	0.00	100.00	100.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a generator (Unbal. Y transformer)

Project:	Chemk	**ETAP**		Page:	10
Location:	Borger and Mills County, TX			Date:	08/26/2019
Contract:	CB-09c270			SN:	WORKSHOP02
Engineer:	Real Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	ogi24_2.lfmxm			Config:	Normal

Fault at bus: **B421 [0604]**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus 3I0	V1	V2	3I0 kA Symm. rms	ip	R1	X1	R0	X0
B421 [0604]	Total	0.000	0.000	0.00	100.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1008 [B1008]	B421 [0604]	0.000	0.000	0.00	100.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B1009 [B1009]	B1008 [B1008]	0.000	0.000	0.00	100.00	0.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	04/26/2019
Contract:	CB-09c2781			SN:	WORKSHOP02
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **B427 (46.0)**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

				Contributions					Positive & Zero Sequence Impedances Looking into "From Bus"			
		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	I"k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	A	B	R1	X1	R0	X0
B427 (46.0)	Total	0.000	32.000	0.00	120.00	120.00	0.000	0.000	1.978+j0.000	17.782+j0.000		
B7008 (46.0) kV	B427 (46.0)	7.111	40.000	0.00	120.00	120.00	0.000	0.000	1.978+j0.000	17.782+j0.000		
B8000 (46.0) kV	B8000 (46.0) kV	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **R427-4614-01**

Prefault voltage = 0.000 kV = [illegible] % of nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Asymm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
R427-4614-01	Total	0.000	0.000	0.000	120.000	120.000	0.000	0.000	1.000+j0.000	1.000+j0.000		
[illegible]	[illegible]	0.000	0.000	0.000	120.000	120.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
[illegible]	[illegible]	0.000	0.000	0.000	120.000	120.000	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	33
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfanalysis			Config:	Normal

Fault at bus: **B427-4614 02**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

									Positive & Zero Sequence Impedances Looking into "From Bus"			
Contributions		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
B427-4614 02	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B3508-Bus1 1 1	B427-Bus1 02	1.324	40.967	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B3508-Bus1 1 2	B4508-Bus1 02	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	36
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	08/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-6_2.lfmxm			Config:	Normal

Fault at bus: **84271-402 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
84271-402 kV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.00	1.7000+j0.000	1.7000+j0.000		
87008-Bus1 [1.2.3	84271-402 kV	0.000	0.000	0.00	120.00	120.00	0.000	0.00	0.0000+j0.000	0.0000+j0.000		
88999-402 kV	88999-Bus1 kV	0.000	0.000	0.00	120.00	120.00	0.000	0.00				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	11
Location:	Borger and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **B427-402 #2**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus 0.5 ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. amp	% Voltage at From Bus			3I0 Symm. amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Y transformer

Project:	Chemo	**ETAP**		Page:	36
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfrmdb			Config:	Normal

Fault at bus: **B421-4KV-01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (0.000 kV)
= [illegible] % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	77
Location:	Borger and Mills County, TX			Date:	04/26/2019
Contract:	CB-PN-2781			SN:	PGIBG-PC-PGTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lamsw			Config:	Normal

Fault at bus: **B427-4KB-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
B427-4KB-01	Total	0.000	32.979	0.00	120.00	120.00	0.000	0.000	1.4000+j0.0	2.1000+j0.0		
B427-4KB-01	B427-4KC-01	1.732	49.469	0.00	120.00	120.00	0.000	0.000	1.4000+j0.0	2.1000+j0.0		
B427-4KC-01	B427-4KB-01	0.000	32.979	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Wye-Y transformer

Project:	Chemir	**ETAP**		Page:	78
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rad Power Engineering	Study Case: SC (Comp: [illegible])		Revision:	Base
Filename:	rpj[illegible]			Config:	Normal

Fault at bus: **BAT1-46441**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus A	B	C	3I0 Symm. rms A	B	R1	X1	R0	X0
BAT1-46441	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	BAT1-46441	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	70
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **B421-004 #2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	40
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421-405 01**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Negative seq. kA	3I0 Zero seq. kA	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	08/26/2019
Contract:	CB-09c2781			SN:	WORD-WIN32
Engineer:	Real Power Engineering	Study Case: SC Comp 3ph		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B421-405-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm kA	Ik Symm kA	% Voltage at From Bus A	B	C	3I0 Symm. mag A	B	R1	X1	R0	X0
B421-404-01	Total	0.000	0.000	0.000	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B421B-B421-01-X	B421-401-01	7.211	6.843	0.000	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
B421-B421-01	B421B-B421-01-X	0.000	0.000	0.000	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three winding transformers
* - Indicates a value exceeding fault current interrupting rating (100) from a generator (Unbal. Y transformer)

Project:	Chemin	**ETAP**		Page:	42
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-4kV-01**

Prefault voltage = 4.160 kV = 100.00 % of nominal bus kV (4.160 kV)
= 100.00 % of Base kV (4.160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427-4kV-01	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.00	1.7000+j0.0000	1.7000+j0.0000		
B427-4kV-01	B427-Bus14	2.144	2.144	0.00	0.00	0.00	0.000	0.00	3.1000+j0.0000	3.1000+j0.0000		
B427-4kV-01	B427-Bus14-T2	0.000	0.000	0.00	0.00	0.00	0.000	0.00				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemin	**ETAP**		Page:	10
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	08/26/2019
Contract:	CR-09x-270			SN:	[illegible]
Engineer:	Rural Power Engineering	Study Case: SC-Comp-B4		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B-GT1-4kv-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
B-GT1-4kv-01	Total	0.000	0.000	0.00	100.00	100.00	0.000	0.000	1.978+j0.000	1.758+j0.000		
B-T1-4kv-01	B-GT1-4kv-01	7.211	18.373	0.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
B-T1-4kv-01	B-GT1-4kv-01 AB	0.000	0.000	0.00	0.00	0.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye, Y transformer

Project:	Chemie	**ETAP**		Page:	49
Location:	Borger and Wells Counties, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **B421-PH-01**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 Symm Amp A	I2 Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

I" = Subtransient fault current contribution in Amps. Shown on leading source buses.
* = Indicates a current magnitude fault current contribution (1%) from a generator/motor. Power transformer

Project:	Chemie	**ETAP**		Page:	44
Location:	Borger and Mills County, TX			Date:	04/26/2019
Contract:	CB-09c2781			SN:	WORKSTATION02
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421-PH-HI**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

				Contributions					Positive & Zero Sequence Impedances Looking into "From Bus"			
		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia	Ib	Ic	3I0 kA	3I0 Angle	R1	X1	R0	X0
B421-PH-HI	Total	0.000	62.000	0.000	100.00	100.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B421-PH-HI	B421-PH-HI	0.000	62.000	0.000	100.00	100.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B421-PH-HI	B421-PH-HI-GEN	0.000	0.000	0.000	0.00	0.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current interrupting rating (100) from a generator (Unbal. 3-Cycle/Momentary)

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-PRI-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
B427-PRI-01	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7500+j0.000	1.7500+j0.000		
B7008-B427-[illegible]	B427-PRI-01	0.000	0.000	0.00	120.00	120.00	0.000	0.000	0.0000+j0.000	0.0000+j0.000		
B8000-B427-01	B8000-B427-01-BUS	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	17
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfmxm			Config:	Normal

Fault at bus: **B427-PRI-02**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	66
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B427A0141**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Fault Current	ip Peak Fault Current	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Fault Current Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	40
Location:	Borger and Mills County, TX			Date:	04/26/2017
Contract:	CB-09c2781			SN:	WORKSTATION02
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B427 [0.48 kV]**

Prefault voltage = 0.480 kV = 100.00 % of nominal bus kV (0.480 kV)
= 100.00 % of Base kV (0.480 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B427 [0.48 kV]	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.00	1.000+j0.000	0.000+j0.000		
B7006 [0.48 kV]	B427 [0.48 kV]	7.21	7.21	0.00	120.00	120.00	0.000	0.00	1.000+j0.000	0.000+j0.000		
B6999 [0.48 kV]	B6998 [0.48 kV]	0.00	0.000	0.00	120.00	120.00	0.000	0.00				

- Indicates fault current contribution is from three winding transformers
* - Indicates a value exceeds fault current contribution (100) from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **84211 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfxmx			Config:	Normal

Fault at bus: **8421 [94 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. amp	% Voltage at From Bus A	B	C	3I_0 Symm. amp A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	42
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe2.4.2.lfxmx			Config:	Normal

Fault at bus: **B421 (Pdf 6)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	10
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeds fault current contribution [illegible] from a generator, Power Grid, or Synchronous

Project:	Chemie	**ETAP**		Page:	16
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B421 [illegible]**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	310	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemir	**ETAP**		Page:	46
Location:	Bowie and Mills County, TX			Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGIBG-PAPRE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxm			Config:	Normal

Fault at bus: **B427 6461-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
B427 6461-01	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.7000+000	1.7000+000		
B7008 6461-01	B427 6461-01	0.000	0.000	0.00	120.00	120.00	0.000	0.000	0.000+000	0.000+000		
B8000 6461-01	Mediumvoltage	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills Corners, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B42T440 #2**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompBusNum		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	Va	Vb	Vc	Ia	R1	X1	R0	X0
B42T440 #2	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution [illegible] from a grounded Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	98
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **R417-69241**

Prefault voltage = [illegible]

= [illegible] % of nominal bus 69 ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I sc Nom. kA	% Voltage at From Bus			X/R Ratio		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers

* - Indicates a value exceeds fault current contribution (IEC) from a grounded Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	69
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 69		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **B4T1-69 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
B4T1-69 kV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000000	0.000000		
B1T2-69 kV	B1T2-69 kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000000	0.000000		
B4T1-69 kV	B4T1-69 kV Bus	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	198
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **84271-69141**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	3I0	3I0	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	10
Location:	Borger and Mills County, TX	16.0.0C		Date:	08/26/2019
Contract:	CB-09c2781			SN:	WORD-W-WIN2
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **B-GT1-69.0 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus			3I0 Fault kA	Ia kA	R1	X1	R0	X0
B-GT1-69.0 kV	Total	0.000	0.000	0.00	0.00	0.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B-T2-69.0 kV	B-GT1-69.0 kV	0.00	0.000	0.00	0.00	0.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B-T2-69.0 kV	Bus Section 69.0kV	0.00	0.000	0.00	0.00	0.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **B423-00441**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus 3a	3b	3c	Ik Ang -deg 3a	3b	R1	X1	R0	X0
B423-00441	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.7788+j0.000	1.7788+j0.000		
B3508-00411 1	B423-00441	2.000	0.000	0.000	0.000	0.000	0.000	0.000	3.1181+j0.000	3.1181+j0.000		
B3509-00411 1	B423-00441	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	1/1
Location:	Bureau and Mills Concrete, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **B423-004 #2**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. kA	I/c Symm. rms	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
B423-004 #2	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B1000-B423-001 A	B423-004 #2	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	0.000+j0.000		
B1000-B423-001	B423-004 #2 Bus	0.00	0.000	0.00	120.00	120.00	0.000	0.000				

I" = Maximum fault current contribution of one, three-winding transformer
* = Indicates a value exceeding fault current contribution (100) from a generator, Static, or Motor

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	08/26/2019
Contract:	CR-09c-270			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **B427-600 kV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
B427-600 kV	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
B7508-600 kV	B427-600 kV	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000		
B8000-600 kV	Multiple Contributions	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a value exceeding fault current contribution (100) from a grounded Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	101
Location:	Borger and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfmxm			Config:	Normal

Fault at bus: **84T4-69-01**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	3I0	Va	Vb	Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

- Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	3/6
Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	CB-09x-2781			Old:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: SC Comp: Pf		Revision:	Base
Filename:	cgi2-4_2.lfmxml			Config:	Normal

Fault at bus: **MPAK-161**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (= 24.000 kV)
= 100.00 % of Base kV (= 24.000 kV)

		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Bus	Ik Symm. Amp	% Voltage at From Bus			Ik Symm. Amp		R1	X1	R0	X0
				Va	Vb	Vc	Ia	Ib				
MPAK-161	Bus	0.00	0.000	0.00	0.000	0.000	0.000	0.000	0.000+j0.000	0.000+j0.000	0.000+j0.000	0.000+j0.000
69-BUS 1	MPAK-161	2.96	71.066	7.4	92.76	104.37	0 Base	0.000	1.468+j0.000	7.120+j0.000	2.751+j0.000	7.151+j0.000
MPAK-161	MPAK-161	0.27	6.480	0.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
MPAK-161	MPAK-161	0.00	0.000	0.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

Bus current multiplied by contribution factor to obtain fault current contribution
* Indicates a zero or negative fault current contribution (100 Zone Load Current) Phase 1 Unbalanced

Project:	Chemin	**ETAP**		Page:	107
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGIBUILDER02
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2k12.lfmdb			Config:	Normal

Fault at bus: **WPAK 480**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (24.000 kV)
= 100.00 % of Base kV (24.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. kA	3I0 Angle	% Impedance on 100 MVA base R1	X1	R0	X0
WPAK 480	Total	0.00	0.00	0.00	120.00	120.00	0.00	0.00	0.00+j0.00	0.00+j0.00	0.00+j0.00	0.00+j0.00
WPAK 480	WPAK 480	0.00	0.00	0.00	120.00	120.00	0.00	0.00	0.00+j0.00	0.00+j0.00	0.00+j0.00	0.00+j0.00
WPAK 480	WPAK 480	0.00	0.00	0.00	120.00	120.00	0.00	0.00	0.00+j0.00	0.00+j0.00		
WPAK 480	WPAK 480	0.00	0.00	0.00	120.00	120.00	0.00	0.00	0.00+j0.00	0.00+j0.00		

Bus contributes both zero and positive sequence to fault. Bus is missing transformer.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	4.0
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4A		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: WWAC-2H1

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			I/c Symm. Amp		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
WWAC-2H1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	WWAC-2H1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	WWAC-2H1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (three-phase or line-to-ground).
* Indicates a zero sequence, fault current contribution. (3I0) from a grounded (Delta or Y) transformer.

Project:	Chemir	**ETAP**		Page:	3/8
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Φ		Revision:	Base
Filename:	rpe2.4.2.lemmr			Config:	Normal

Fault at bus: **MVAC-481**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV (.34.500 kV)
= [illegible] % of Base kV (.34.500 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
MVAC-481	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	111
Location:	Borger and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp24_2.lfanalyz			Config:	Normal

Fault at bus: MVAC-481

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

									Positive & Zero Sequence Impedances Looking into "From Bus"			
Contributions		3-Phase Fault		Line-to-Ground Fault								
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus			3I0 Symm. kA		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
MVAC-482	Bus	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	11
Location:	Bureau and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **MV4C-3N1**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV (.[illegible] kV)
= [illegible] % of Base kV (.[illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. amp Ia	Ib	R1	X1	R0	X0
MV4C-3N1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	111
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			Std:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ngl14_2.lfmxm			Config:	Normal

Fault at bus: **MV4C-PK1**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase fault	3I0	Va	Vb	Ia	Ib	R1	X1	R0	X0
MV4C-PK1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* [illegible]
** [illegible]

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **WWMC-001**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	I/c Symm. Amp A	B	R1	X1	R0	X0
WWMC-001	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Fault at bus: WWMC-MS1

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (= [illegible] kV)
= [illegible] % of Base kV (= [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
WWMC-MS1	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms	Ik Symm. rms	% Voltage at From Bus			3I0 Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chisme	ETAP		Page:	116
Location:	Brown and Mills County, TX	24.0.3C		Date:	09/04/2015
Contract:	TX-99-1701			SN:	IWHD-PC04002
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chisme			Config.:	Normal

Fault at bus: **SS-BAY-11**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BAY-11	Total	0.00	24.867	0.00	166.36	113.59	36.867	36.867	2.30E+000	8.27E+000	1.76E-001	1.93E+001
MSNC-151	SS-BAY-11	0.13	1.030	0.08	166.41	113.67	0.584	0.000	1.45E+002	8.13E+001		
MSNC-201	SS-BAY-11	0.24	1.008	0.15	166.49	113.69	0.584	0.000	1.81E+002	8.24E+001		
T-345 kV BUS	M-1 kV BUS - SOLAR-1	86.13	20.464	90.44	99.09	99.88	10.203	0.096	3.81E+000	6.42E+000	1.71E-002	3.00E+001
T-13-1	M-1 kV BUS - SOLAR-1	13.76	0.171	63.33	64.79	100.31	0.942	36.372 *	6.13E+000	7.38E+001	4.21E-001	2.19E+001
MSNC-301	SS-BAY-13	0.39	0.873	0.33	166.57	113.67	0.497	0.000	1.66E+002	9.69E+001		
MSNC-601	SS-BAY-13	0.39	0.870	0.33	166.57	113.68	0.498	0.000	1.65E+002	9.63E+001		
MSNC-901	SS-BAY-12	0.63	1.024	0.36	166.55	113.68	0.583	0.000	1.81E+002	8.28E+001		
XFMR_SOLAR	SS-BAY-12	0.35	1.027	0.22	166.49	113.57	0.583	0.000	1.81E+002	8.38E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chrome	ETAP		Page:	113
Location:	Brown and Mills County, TX	24.0.3C		Date:	09/04/2015
Contract:	EX-99-1701			SN:	IWHP-POWER
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp24_Chrome			Config.:	Normal

Fault at bus: **SS-BAY-12**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BAY-12	Total	0.00	24.867	0.00	166.36	115.09	36.867	36.867	2.30E+000	8.27E+000	1.76E-001	1.93E+001
MISC-001	SS-BAY-12	0.82	1.024	0.36	166.57	115.58	0.502	0.000	1.61E+002	8.23E+001		
XFMR-001HV	SS-BAY-12	0.99	1.027	0.22	166.69	115.57	0.503	0.000	1.61E+002	8.18E+001		
F-345 kV BUS	M-1 kV BUS - SOLAR-1	86.03	20.464	90.44	99.09	99.88	10.201	0.096	3.81E+000	6.42E+000	1.74E-002	3.00E+001
F-13.8	M-1 kV BUS - SOLAR-1	10.76	0.171	63.11	64.79	100.51	0.944	86.372 *	6.63E+000	5.08E+001	4.23E-001	2.19E+001
MISC-101	SS-BAY-12	0.99	0.851	0.33	166.57	115.67	0.497	0.000	1.66E+002	9.69E+001		
MISC-601	SS-BAY-12	0.99	0.976	0.33	166.57	115.68	0.498	0.000	1.65E+002	9.63E+001		
MISC-101	SS-BAY-12	0.99	1.000	0.08	166.48	115.69	0.504	0.000	1.61E+002	8.28E+001		
MISC-201	SS-BAY-12	0.24	1.030	0.13	166.46	115.58	0.504	0.000	1.61E+002	8.16E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BAY-13**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Va	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BAY-13	Total	0.00	24.867	0.00	116.36	113.09	36.867	36.867	2.30E+000	8.27E+000	1.76E-001	1.93E+001
MISC-301	SS-BAY-13	0.35	0.875	0.35	116.37	113.67	0.897	0.000	1.85E+002	9.67E+001		
MISC-601	SS-BAY-13	0.39	0.976	0.35	116.37	113.68	0.998	0.000	1.65E+002	9.63E+001		
F-345 kV BUS	M-1 kV BUS - SS-LAB-1	86.03	21.404	90.44	99.09	99.08	10.201	0.096	3.36E+000	6.42E+000	1.74E-002	3.00E+001
T-13-1	M-1 kV BUS - SS-LAB-1	13.76	3.171	63.11	64.79	100.31	0.944	36.772 *	6.63E+000	7.08E+001	4.21E-001	2.19E+001
MISC-101	SS-BAY-12	0.03	1.024	0.36	116.37	113.68	0.082	0.000	1.61E+002	8.29E+001		
XFMR-301-01	SS-BAY-12	0.39	1.027	0.22	116.48	113.53	0.583	0.000	1.41E+002	9.19E+001		
MISC-101	SS-BAY-9	0.03	1.030	0.08	116.48	113.69	0.584	0.000	1.41E+002	8.28E+001		
MISC-201	SS-BAY-9	0.24	1.030	0.23	116.46	113.58	0.584	0.000	1.41E+002	8.34E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-21**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BUS-21	Total	0.00	24.845	0.00	116.16	115.17	36.453	36.453	2.88E+00	8.67E+00	1.76E-01	1.93E+00
XFMR-B101-HV	SS-BAY-21	0.09	1.862	9.05	116.17	115.22	0.588	0.000	1.35E+02	6.98E+01		
XFMR-B201-HV	SS-BAY-21	0.02	1.862	9.06	116.18	115.22	0.588	0.000	1.35E+02	6.98E+01		
# 345 kV BUS	34.5 kV BUS - BR01	86.34	20.607	90.44	99.06	99.57	10.241	6.084	3.99E+00	6.42E+00	1.74E-02	3.06E+00
# T2-3	34.5 kV BUS - BR01	16.77	5.171	61.35	64.67	110.19	0.949	31.352 *	6.94E+00	3.98E+01	4.51E-01	2.39E+00
XFMR-B301-HV	SS-BAY-23	0.02	1.862	9.06	116.18	115.22	0.588	0.000	1.35E+02	6.98E+01		
XFMR-B601-HV	SS-BAY-23	0.07	0.938	9.08	116.19	115.29	0.490	0.000	1.62E+02	8.37E+01		
XFMR-B301-HV	SS-BAY-22	0.11	1.862	9.06	116.17	115.22	0.588	0.000	1.35E+02	6.98E+01		
XFMR-B601-HV	SS-BAY-22	0.07	1.862	9.04	116.16	115.29	0.588	0.000	1.35E+02	6.97E+01		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-22**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Ia	Vb	Vc	Ia	3I0	R1	X1	R0	X0
SS-BUS-22	Total	0.00	24.845	0.00	116.16	115.17	36.453	36.453	2.38E+00	8.27E+00	1.76E+01	1.93E+01
XFMR-BUS14-HV	SS-BAY-22	0.11	1.162	0.06	116.17	115.22	0.588	0.000	1.35E+02	6.98E+01		
XFMR-BUS1-HV	SS-BAY-22	0.07	1.162	0.04	116.16	115.20	0.588	0.000	1.35E+02	6.97E+01		
# 345 kV BUS	34.5 kV BUS - BUS1	86.14	20.407	90.44	99.06	99.57	10.241	6.084	3.99E+00	6.42E+00	1.71E+02	3.06E+02
# T2-3	34.5 kV BUS - BUS3	16.77	5.171	61.35	64.67	150.19	0.949	81.312 *	6.94E+00	3.98E+01	4.51E+01	2.39E+02
XFMR-BUS3-HV	SS-BAY-23	0.12	1.162	0.06	116.18	115.22	0.588	0.000	1.35E+02	6.98E+01		
XFMR-BUS4-HV	SS-BAY-23	0.07	0.930	0.04	116.16	115.20	0.470	0.000	1.62E+02	8.37E+01		
XFMR-BUS14-HV	SS-BAY-21	0.10	1.162	0.06	116.17	115.22	0.588	0.000	1.35E+02	6.98E+01		
XFMR-BUS1-HV	SS-BAY-21	0.12	1.162	0.06	116.18	115.22	0.588	0.000	1.35E+02	6.98E+01		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Fault at bus: **SS-BUS-13**

PreFault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of base kV (34.500 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus Ia	Vb	Vc	kA Symm. rms Ia	3I0	% Impedance on 100 MVA base R1	X1	R0	X0
SS-BUS-13	Total	0.00	24.342	0.00	116.16	115.17	36.453	36.453	2.308+008	8.078+009	1.760+001	1.938+004
XFMR-BX014-HV	SS4BAY-23	4.42	1.162	0.00	116.16	115.22	0.588	0.000	1.35E+002	6.98E+001		
XFMR-BX03-HV	SS4BAY-23	5.07	0.918	0.04	116.16	115.20	0.490	0.000	1.62E+002	8.37E+001		
# 345 kV BUS	34.5 kV BUS - BB06	86.34	20.607	90.44	99.06	99.57	10.243	6.084	2.98E+006	6.42E+009	1.74E+001	1.94E+004
# T2-3	34.5 kV BUS - BB06	16.77	5.171	61.35	64.67	160.19	6.949	61.352 *	6.94E+008	3.08E+001	4.51E+001	2.30E+004
XFMR-BX014-HV	SS4BAY-22	5.11	1.162	0.00	116.17	115.22	0.588	0.000	1.35E+002	6.98E+001		
XFMR-BX014-HV	SS4BAY-22	4.87	1.162	0.04	116.16	115.20	0.588	0.000	1.35E+002	6.97E+001		
XFMR-BX014-HV	SS4BAY-21	5.10	1.162	0.00	116.17	115.22	0.588	0.000	1.35E+002	6.98E+001		
XFMR-BX03-HV	SS4BAY-21	5.12	1.162	0.00	116.18	115.22	0.588	0.000	1.35E+002	6.98E+001		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	12
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-4M-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus			I/c Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
XFMR-4-HV4M	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being studied.
* Indicates a zero impedance fault current contribution. (Per ANSI Std. 3-phase, 1-line-to-ground, 3-phase-to-ground)

Project:	Chemo	**ETAP**		Page:	12
Location:	Bowie and Mills County, TX			Date:	04/26/2017
Contract:	CB-09x278			SN:	WGBS-WWW2
Engineer:	Watt Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	wgb14_2.lfmdw			Config:	Normal

Fault at bus: **EP908 (69.0 kV)**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
EP908 (69.0 kV)	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	2208.000	2184.000		
EP908 (69.0 kV)	EP908-EP908 (69.0 kV)	0.000	0.000	100.00	100.00	100.00	0.000	0.000	2208.000	2184.000		
EP908 (69.0 kV)	EP908-EP908 (69.0 kV)	0.000	0.000	0.00	120.00	120.00	0.000	0.000				

Bus EP908 (69.0 kV) fed by Line EP908-EP908 (69.0 kV) from bus EP908 (69.0 kV)
Bus EP908 (69.0 kV) fed by Line EP908-EP908 (69.0 kV) from bus EP908 (69.0 kV) to bus EP908 (69.0 kV)

Project:	Chemin	**ETAP**		Page:	123
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CB-PS-2781			SN:	PGBS-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxm			Config:	Normal

Fault at bus: **XF908-HV-III**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	B	C	3I0 From Bus A	B	R1	X1	R0	X0
XF908-HV-III	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-LV-1-III	XF908-LV-1-III*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-LV-2-III	XF908-LV-2-III*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the bus in the same sequence.
* Indicates a current contribution (fault current contribution (CB) from a generator/Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	12
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **XF908-HV-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF908-HV-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-HV-LV	XF908-HV-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 Total	XF908-HV-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemie	**ETAP**		Page:	10
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-HV-BUS**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 Symm. Amp A	I2 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes more than one percent to fault, fed by multiple transformers
* Bus has a generator, motor, or other source and contributes 100% or more of its nominal bus kV rating

Project:	Chemin	**ETAP**		Page:	127
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **EP908 [0.0 kV]**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Rms.	Ik Symm. rms.	% Voltage at From Bus			kA Symm. rms.		R1	X1	R0	X0
				Va	Vb	Vc	Ia	Ib				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Fault at bus: **XF908-004-HV**

Prefault voltage = [illegible] kV = [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA From Bus A	kA From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908-004-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-LV-1111	XF908-004-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-004-HV	XF908-LV-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the fault via Zero sequence transformer
Bus contributes current to the fault via Zero sequence transformer (YG) from a grounded-Delta-Y transformer

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Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908 004 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA From bus A	kA From bus B	R1	X1	R0	X0
XF908 004 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 004 LV	XF908 004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 004 LV	XF908 004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

* [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
** [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Project:	Chemin	**ETAP**		Page:	139
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908 (69 kV)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (= [illegible] kV)
= [illegible] % of Base kV (= [illegible] kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 (69 kV)	Total	0.00	22.203	0.00	111.97	112.11	0.000	0.000	0.00+j0.00	0.000+j0.000	0.000+j0.000	0.00+j0.00
[illegible]	[illegible]	0.00	22.203	0.00	111.97	112.11	0.000	0.000	[illegible]	7.34+j0.00	3.67+j0.00	1.83+j0.00
XF908 (69 kV)	[illegible]	0.00	0.000	0.00	111.97	112.11	0.000	0.000	0.00+j0.00	0.000+j0.000		
XF908 (69 kV)	[illegible]	22.20	0.000	0.00	111.97	112.11	0.000	0.000	0.00+j0.00	0.00+j0.00		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	13
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PLPOT2
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxml			Config:	Normal

Fault at bus: **XF900-HS13**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
XF900-HS13	Total	0.961	2.446	0.00	111.32	111.32	0.000	0.000	1.888+j0.000	1.384+j0.000		
XF900-HS13	XF900-HS13	0.961	2.446	0.00	111.32	111.32	0.000	0.000	1.888+j0.000	1.384+j0.000		
XF900	XF900	0.961	2.446	0.00	111.32	111.32	0.000	0.000				

Bus contributes fault current to the fault in From Bus - starting bus/branch
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y impedance

Project:	Chemie	**ETAP**		Page:	111
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XFMR-06 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms 3I0	Ia	R1	X1	R0	X0
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	111
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-10kV-T**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	B	C	3I0 Symm. comp. A	B	R1	X1	R0	X0
XF908-10kV-T	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-10kV-T1	XF908-10kV-T	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-10kV	XF908-10kV-T	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers

Indicates current contribution from unknown sources (120% Rule) or positive sequence

Project:	Chemie	**ETAP**		Page:	134
Location:	Bureau and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpe[illegible]			Config:	Normal

Fault at bus: **XFMR-HV-01**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
XFMR-HV-01	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV-01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF900-107-LV**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF900-107-LV	Total	0.000	10.775	0.000	111.32	111.32	0.000	0.000	2.288+j0.000	1.778+j0.000		
XF900-107-LV	XF900-107-LV	10.775	10.775	100.00	100.00	100.00	0.000	0.000	2.278+j0.000	1.768+j0.000		
XF900-107	XF900-107-LV	0.000	0.000	0.000	111.32	111.32	0.000	0.000				

Bus contributes fault current to fault at From Bus, but no remaining branch contributions

* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y-impedance

Project:	Chemie	**ETAP**		Page:	139
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR_HV-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from Relay-monitored branch
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	123
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-FN-2701			SN:	[illegible]
Engineer:	Rural Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF900 Bus 13**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 (13.8 kV)	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.906+j0.000	7.906+j0.000		
XF900 (0.1 kV)	XF900 (13.8 kV)	10.727	27.330	100.00	0.00	0.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF900 (0.1 kV)	XF900 (0.1 kV)	0.000	0.000	0.00	0.00	0.00	0.000	0.000				

# Indicates fault current contribution is from three-winding transformers

Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta or Y-grounded-Delta transformer

Project:	Chemie	**ETAP**		Page:	178
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF900_B2 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompliBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/I	% Voltage at From Bus			I/I Symm. rms					
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution from bus. Bus is initially unfaulted.
* - Indicates a zero sequence fault current contribution. (3I0) from a grounded (Delta, Y) transformer

Project:	Chemin	**ETAP**		Page:	139
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900 J02 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 To From Amp A	I2 To From Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 J02 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 J02 LV	XF900 J[illegible] LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 J[illegible] LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
[illegible]
[illegible]
[illegible]
[

Project:	Chemin	**ETAP**		Page:	141
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR_HV_HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp A	B	R1	X1	R0	X0
XFMR_HV_HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_HV_LV	XFMR_HV_LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_HV_LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR_HV_LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a Indicates that current flows from the bus being analyzed to the faulted bus.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemie	**ETAP**		Page:	141
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfrpow			Config:	Normal

Fault at bus: **XF900_H4 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm. amp	Ia	Ib	Ic	3I0 Symm. amp	3I0	R1	X1	R0	X0
XF900_H4 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900_H2 LV1	XF900_H2 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900_H4 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

Bus contributes fault current to bus in From Bus - to bus - ordering identification

* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y impedance

Project:	Chemis	**ETAP**		Page:	102
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	04/18/2017
Contract:	CR-PN-2701			SN:	PGBG-PLWQ2
Engineer:	Rust Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg2-4_2.lfanew			Config:	Normal

Fault at bus: **XFMR_BM-HV**

Prefault voltage = [illegible] kV = [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-ph Symm Rms	I" 3-ph Symm Ang	Va	Vb	Vc	Ia	Ib	R1	X1	R0	X0
XFMR_BM-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_BM-HV	XFMR_BM-HV	7.21	-64.83	1.11	121.34	-117.91	11.811	11.811	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_BM-HV	XFMR_BM-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

* Indicates fault current contribution is from three-winding transformers
# Indicates current contribution from unknown sources (100% from synchronous machines, 0% from induction motors)

Project:	Chemin	**ETAP**		Page:	151
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGIBUILDER02
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF900 J04 LV**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 DC kA	R1	X1	R0	X0
XF900 J04 LV	Total	0.000	0.000	0.000	111.32	111.32	0.000	0.000	2.178+j0.000	1.778+j0.000		
XF900 J04 LV	XF900 J04 LV	10.126	10.126	100.000	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF900 J04 LV	XF900 J04 LV	0.000	0.000	0.000	111.32	111.32	0.000	0.000				

Bus contributes short-circuit current to its own fault.
* Indicates a current contribution from a power source (SC) or motor (MOTOR).

Fault at bus: **XFMR 230 HV**

Prefault voltage = 241.000 kV = 100.00 % of nominal bus kV (241.000 kV)
= 100.00 % of Base kV (241.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	ip Symm kA	% Voltage at From Bus A	B	C	3I0 Symm. mag. A	B	R1	X1	R0	X0
XFMR 230 HV	Total	0.000	0.000	0.00	111.96	132.44	0.000	0.000	7.1284+j0.0000	87.7981+j0.0000	2.6861+j0.0000	4.3661+j0.0000
69 kV Bus	XFMR 230 HV	3.46	8.79	7.83	111.96	117.37	0.000	0.000	7.1284+j0.0000	87.7981+j0.0000	2.6861+j0.0000	4.3661+j0.0000
XFMR 230 HV	69 kV Bus	0.00	0.000	0.00	111.96	132.44	0.000	0.000	7.1284+j0.0000	87.7981+j0.0000		
XFMR 230 HV	Total	3.46	8.79	7.83	111.96	132.44	0.000	0.000	7.1284+j0.0000	87.7981+j0.0000		

A - Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	191
Location:	Bureau and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe14_2.lfmxml			Config:	Normal

Fault at bus: **EP908 [69.0]**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	B	C	3I0 kA	Ang	R1	X1	R0	X0
EP908 [69.0 kV]	Total	0.961	2.447	0.00	111.32	119.23	0.000	0.000	1.978+j0.000	1.984+j0.000		
EP908 [69.0 kV]	EP908 [69.0 kV]	10.127	25.812	86.000	100.00	100.00	0.000	0.000	1.978+j0.000	1.984+j0.000		
EP908 [69.0 kV]	EP908 [69.0 kV]	0.961	2.447	0.00	111.32	119.23	0.000	0.000				

Bus contributes fault current to the fault at this bus (including contribution from the bus itself).
* Indicates a current contribution (fault current contribution (100) from a generator/motor, X" impedance)

Fault at bus: **XF900 J04 01**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Flowing	% Voltage at From Bus			kA Flowing		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF900 Bkr13**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A	3I0 Symm. mag. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 Bkr13	Total	0.961	10.870	0.00	111.32	111.32	0.000	0.000	0.2250+j0.0000	1.1250+j0.0000		
XF900 Bkr13	XF900 Bkr13	10.127	10.870	66.667	100.00	100.00	0.000	0.000	0.2250+j0.0000	1.1250+j0.0000		
XF900 Bus	XF900 Bkr13	0.961	0.000	0.00	111.32	111.32	0.000	0.000				

Bus bracing load exceeds bus momentary duty rating
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	146
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfanalysis			Config:	Normal

Fault at bus: **XFMR_HV-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes [illegible] symmetrical rms fault current to From Bus for a three-phase fault.
Bus contributes a zero sequence fault current contribution ([illegible]) from a grounded-Delta-Y transformer.

Project:	Chemo	**ETAP**		Page:	199
Location:	Bowen and Mills Corner, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **EP908 J07-13**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	I sc Nom unit	% Voltage at From Bus			I sc Nom unit		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
EP908 J07-13	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP908 J07-13	EP908 J07-13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP908 J07-13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	191
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **EP908_BS-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
EP908-HV-###1	Infinite	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from Motor, Motor Operated Valve or Generator

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF900_Bus13**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
XF900-Bus13	Total	0.961	10.000	0.00	111.11	111.11	0.000	0.000	1.956+j0.000	1.956+j0.000		
XF900-Bus1111	XF900_Bus1112	10.171	10.673	66.666	333.33	333.33	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF900-Bus	XF900_Bus1111	0.961	10.000	0.00	111.11	111.11	0.000	0.000				

Bus contributes fault current to the fault via a three winding transformer.
* Indicates a current contribution from a motor or generator. (IEC) Some or all current contributions from asynchronous

Project:	Chemic	**ETAP**		Page:	132
Location:	Ramos and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **XF908_B2 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRadius		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	B	C	3I0 Symm. comp. A	B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from faulted bus. Sum of faulted bus contributions.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	111
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF908_BG LV**

Prefault voltage = 0.941 kV = 108.00 % of nominal bus kV (0.941 kV)
= 108.00 % of Base kV (0.871 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908-BG LV	Total	0.000	0.000	0.00	111.32	111.32	0.000	0.000	1.888+j0.000	7.554+j0.000		
XF908-BG LV	XF908_BG LV	0.000	0.000	100.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		
XF908-BG	XF908_BG LV	0.000	0.000	0.00	11.32	11.32	0.000	0.000				

Bus contributes fault current to the fault, but no existing branches
* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y- transformer

Fault at bus: **XF908_3kV 4H**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp 3I0	Ia	R1	X1	R0	X0
XF908-4H-HV4	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-4H-LV1	XF908_3.3-4.16*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-4H-LV2	XF908_3.3-4.16*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-4H-LV3	XF908_3.3-4.16*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus connected to source through a Delta-Wye transformer

* Indicates a unit transformer [illegible] [illegible] [illegible] [illegible]

Project:	Chemin	**ETAP**		Page:	151
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPSE
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900_Bus3 Cy**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia kA	Ib kA	Ic kA	3I0 kA	3I0 kA	R1	X1	R0	X0
XF900-Bus3 Y	Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.2208+j0.000	1.1758+j0.000		
XF900_Bus3 Cy	XF900_Bus3 Cy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.2208+j0.000	1.1758+j0.000		
XF900-Bus3 Cy	XF900_Bus3 Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

Bus contribution current is less than specified Cutoff Value of 1 Amps or 1 %.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta or Y-grounded transformer

Project:	Chemo	**ETAP**		Page:	19
Location:	Borden and Milk Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			Rev:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxml			Config:	Normal

Fault at bus: **XF908_B64-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symmetrical	kA Peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symmetrical - Imag. A	kA Symmetrical - Imag. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

A - Indicates that current contribution is from faulted bus
* - Indicates a zero impedance fault current contribution (100 Zone Impedance/Zero Impedance)

Project:	Chemin	**ETAP**		Page:	13
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF908_B4-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF908-HV4-S	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908_B4-LV	XFMR_B4-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XFMR_B4-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

# Indicates fault current contribution is from three-winding transformers
Indicates current contribution from unknown rotating machine(s) (individual machine contributions may be greater than 1%)

Project:	Chemie	**ETAP**		Page:	178
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR_800 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I_2 Symm Amp A	I_2 Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR_800 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_800 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR_800 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR_800 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	139
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmdw			Config:	Normal

Fault at bus: **XFMR_BUS1**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible]% of Base kV (Base kV = [illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase [illegible]	ip 3-phase [illegible]	3I0	Ia	Ib	Ia	Ib	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	191
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			Rev:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **XFMR_BUS1**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Peak Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemtr	**ETAP**		Page:	101
Location:	Bowers and Mills Corners, TX	16.0.1C		Date:	04/26/2019
Contract:	CB-PS-2701			SN:	PGBELPOWER
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg2-4_2.lfmxm			Config:	Normal

Fault at bus: **XF900_Bus13**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	Ik 3-phase peak	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900-Bus13	Total	0.961	42.977	0.00	111.32	111.32	0.000	0.000	2.2496+j0.0	17.3861+j0.0		
XF900-Bus1111	XF900_Bus1111	0.106	42.111	66.000	100.00	100.00	0.000	0.000	9.4281+j0.0	17.7281+j0.0		
XF01-Bus	XF900-Bus13	0.961	42.977	0.00	111.32	111.32	0.000	0.000				

Bus13 fault current contribution to From Bus 'existing' transformers

* Indicates a current contribution from a motor or generator (120% from generator/25% for motor)

Project:	Chemin	**ETAP**		Page:	112
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ngd14_2.lfmdw			Config:	Normal

Fault at bus: **XF900_B(7.2)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompRelease		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA 3-Phase	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus [illegible] fault current contribution is from Bus [illegible] existing transformers.
Bus [illegible] current contribution [illegible] from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmdw			Config:	Normal

Fault at bus: **EP908_B07_LV**

Prefault voltage = 0.941 kV = 100.00 % of nominal bus kV (0.941 kV)
= 100.00 % of Base kV (0.941 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
EP908-0412-T	Total	0.000	10.337	0.000	111.32	111.32	0.000	0.000	2.2280+j0.0000	2.1882+j0.0000		
EP908_B07_LV	EP908_B07_LV	10.337	10.337	100.00	100.00	100.00	0.000	0.000	2.2280+j0.0000	2.1882+j0.0000		
Bus EP	EP908_B07_LV	0.000	0.000	0.00	111.32	111.32	0.000	0.000				

Bus EP908_B07_LV is a Bus, Base, existing, Grid/Network
Subsystem: Load connected to Bus, Base, existing, Grid/Network (100) From Load Flow, P, Unbalanced

Project:	Chemie	**ETAP**		Page:	3#4
Location:	Borden and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Mode: Case: SC Comp: #4		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **LF900-480-III**

Prefault voltage = [illegible] V

= [illegible] % of Nominal bus kV (34.500 kV)
= [illegible] % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3 Phase Fault	ip 3 Phase Fault	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Bus is initially unfaulted.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	101
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	04/26/2017
Contract:	CB-09c-2701			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **EP908-40kV-1**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	Ik" 3-phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A kA	3I0 Symm. comp. B kA	R1	X1	R0	X0
EP908-40kV-1	Total	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		
EP908-40kV-1 T1	EP908-40kV-1 T1	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		
EP908-40kV-1	EP908-40kV-1 T1	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000				

Bus contribution current is from load flow calculation
* Indicates a current contribution from a motor or generator (CPS Source or generator/Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	100
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-402 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XF900-402 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900-402 HV	XF900-402 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900-402 HV	XF900-402 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-402 HV	XF900-402 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes more than one percent to fault current
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	101
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF900-402 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm. ang	% Voltage at From Bus			3I0 Symm. mag	3I0 Symm. ang	% Impedance on 100 MVA base			
				A	B	C	A	A	R1	X1	R0	X0
XF900-402 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-402 LV	XF900-402 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
From Bus	XF900-402 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

Bus contributes [illegible] current to fault at From Bus, during unbalanced conditions

Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y-impedance

Fault at bus: **XF900-402 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm Amp	% Voltage at From Bus Va	Vb	Vc	Ia Symm Amp Ia	Ib	R1	X1	R0	X0
XF900-402 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900-402 HV	XF900-402 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF900-402 HV	XF900-402 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-402 HV	XF900-402 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	105
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF900-4KV-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm mult	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 To From mult A	I2 To From mult B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900-4KV-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-4KV-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemin	**ETAP**		Page:	179
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF908-4H4-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm rms	% Voltage at From Bus A	B	C	3I0 Symm rms A	B	R1	X1	R0	X0
XF908-4H4-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-4H1-HV	XF908-4H4-HV	4.32	[illegible]	3.82	111.96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-4H4-P	XF908-4H4-HV	[illegible]	[illegible]	98.91	99.96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the fault in a From - Bus - to - Infinity branch direction

Bus contributes current to the fault (non-zero contribution) from a grounded-Delta-Y transformer

Project:	Chemin	**ETAP**		Page:	17
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGIBUILDING02
Engineer:	Real Power Engineering	Study Case: SC Comp 4pf		Revision:	Base
Filename:	rpg2.4.2.lfmxm			Config:	Normal

Fault at bus: **XF900-4044-T**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF900-4044-T	Total	0.000	0.000	0.000	117.32	117.32	0.000	0.000	2.238+j0.000	17.886+j0.000		
XF900-4044-T	XF900-4044-T	10.134	10.134	100.000	100.00	100.00	0.000	0.000	2.238+j0.000	17.886+j0.000		
Bus 4044	XF900-4044-T	0.000	0.000	0.000	117.32	117.32	0.000	0.000				

Bus contributes fault current to fault in From Bus - Looking into Branch

^ Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y impedance

Project:	Chemie	**ETAP**		Page:	172
Location:	Bureau and Mills Concrete, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-400 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	B	C	I/c A Symm. Amp	I/c B	R1	X1	R0	X0
XFMR-HV-[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus. Bus is missing impedance data.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	171
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPRE
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2.4.2.lfmxm			Config:	Normal

Fault at bus: **EP908-405 LV**

Prefault voltage = 0.941 kV = 108.00 % of nominal bus kV (0.941 kV)
= 108.00 % of Base kV (0.871 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	B	C	3I0 Symm. kA	3I0	R1	X1	R0	X0
EP908-405 LV	Total	0.000	0.000	0.000	111.00	111.00	0.000	0.000	2.2200+j0.0000	1.1750+j0.0000		
EP908-405 LV1	EP908-405 LV	10.100	10.100	100.000	100.00	100.00	0.000	0.000	4.4400+j0.0000	2.3500+j0.0000		
Bus Total	EP908-405 LV	0.000	0.000	0.000	111.00	111.00	0.000	0.000				

Bus contribution is less than 1% of total fault current
* Indicates a zero sequence, line-to-ground or line-to-line (120°) fault, a positive sequence, or a user-specified current source

Project:	Chemo	**ETAP**		Page:	179
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	04/26/2019
Contract:	CB-09x2781			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **LF908-406 (0)**

Prefault voltage = 24.000 kV = 100.00 % of nominal bus kV (= 24.000 kV)
= 100.00 % of Base kV (= 24.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
LF908-406 (0)	Total	0.00	28.456	0.00	111.79	110.00	31.276	111.79	1.888+j0.000	1.888+j0.000	2.130+j0.000	2.279+j0.000
LF908-406 (0)	SF908-406 (0)	0.00	28.456	0.00	111.79	110.00	31.276	111.79	1.888+j0.000	1.888+j0.000	2.130+j0.000	2.279+j0.000
LF908-406 (0)	SF908-406 (0)	0.00	0.000	0.00	111.79	110.00	0.000	111.79	1.888+j0.000	1.888+j0.000		
LF908-406 (0)	SF908-406 (0)	100.00	0.000	79.00	100.00	100.00	0.000	0.000	0.000+j0.000	0.000+j0.000		

A - Indicates fault current contribution from Motor, Static Starting, Capacitor Bank

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye X-Y transformer

Project:	Chemin	**ETAP**		Page:	171
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	cpj[illegible]			Config:	Normal

Fault at bus: **XF908-4Kv LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	Ik 3-phase kA	% Voltage at From Bus A	B	C	3I0 A	3I0 B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemin	**ETAP**		Page:	179
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmdw			Config:	Normal

Fault at bus: **XF900-407-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus			I" k Symm Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemin	**ETAP**		Page:	177
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-407-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm Amp A	3I0 Symm Amp B	R1	X1	R0	X0
XFMR-407-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-407-HV	XFMR-407-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
Bus407	XFMR-407-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

Bus407 fault current contribution is from Bus407 existing transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Fault at bus: **XFMR 4W-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I"k Symm. comp. kA A	I"k Symm. comp. kA B	R1	X1	R0	X0
XFMR-HV-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus [illegible] fault current contribution from [illegible] branches
* Indicates a zero sequence fault current contribution (XFR Conn = [illegible] Delta, Y Solidly Grounded)

Project:	Chemin	**ETAP**		Page:	179
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **EP908 Bus13**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	191
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.4.2.lfmmv			Config:	Normal

Fault at bus: **XFMR 69.0 (H)**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV (= [illegible] kV)
= [illegible] % of Base kV (= [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I" k Symm Amp A	I" k Symm Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	19
Location:	Bowie and Mills County, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: R4	Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XFMR 0612-LV**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I"0 Symm. comp. A	3I"0 Symm. comp. B	R1	X1	R0	X0
XFMR 0612-LV	Total	0.000	0.000	0.000	120.00	120.00	0.000	0.000	2.314+j0.000	17.886+j0.000		
XFMR 0612-LV	XFMR 0612-HV	0.247	0.352	100.00	100.00	100.00	0.000	0.000	2.314+j0.000	17.886+j0.000		
XFMR 0612-HV	XFMR 0612-LV	0.247	0.352	0.00	0.00	0.00	0.000	0.000				

Bus is connected to Bus1 via Bus2 having a transformer.

Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta or Y-grounded-Delta transformer

Project:	Chemo	**ETAP**		Page:	192
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR 004 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus Va	Vb	Vc	I/c Symm Amp Ia	Ib	R1	X1	R0	X0
XFMR 004 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 004 HV	XFMR 004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR 004 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR 004 HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF908 0kV CP**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
XF908 0kV CP	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 345kV	XF908_T1 1 CP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908_T2 1 CP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	101
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908 004 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus A	B	C	3I0 Symm Amp A	B	R1	X1	R0	X0
XF908 004 HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe2.2.1.lmdb			Config:	Normal

Fault at bus: **XF900 004 LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (1.040 kV)
= [illegible]% of Base kV (4.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	Ik Symm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle	R1	X1	R0	X0
XF900 004 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 004 LV	XF900_004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900_004 LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

* Indicates fault current contribution is from three winding transformers
** Indicates current contribution from unknown contributor (100) from a grounded-Delta-Y transformer

Fault at bus: **XF008 000 111**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/I	% Voltage at From Bus			I/I Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being initially investigated.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	10
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPER
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4-2.lfmdw			Config:	Normal

Fault at bus: **EP909 069.1V**

Prefault voltage = 0.841 kV = 100.00 % of nominal bus EP_1 (0.841 kV)
= 100.00 % of Base kV (0.841 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	B	C	3I0 Symm. comp. A	B	R1	X1	R0	X0
EP909 069.1V	Total	0.00	0.000	0.00	111.32	111.32	0.000	0.000	2.288+j0.000	1.798+j0.000		
EP909 069.1V	EP909_T1 1.1V	10.16	25.871	100.00	100.00	100.00	0.000	0.000	0.000+j0.000	1.798+j0.000		
EP909 069.1V	EP909_T1 69.1V	0.00	0.000	0.00	111.32	111.32	0.000	0.000				

Bus contribution exceeds 0.1 kA for 3-Phase fault
^ Subtransient current contribution (100) from synchronous machine

Fault at bus: **XF008 004 (0)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	kA (from bus)	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF008 004 (0)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF008 003 (0)	XF008_T003 (0)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF008 004 (0)	XF008_T004 (0)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes fault current to the fault via a Power, Series, or Mutual impedance.
* Indicates a current contribution (fault current contribution (100) from a generator/Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	199
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Kuhl Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi[illegible]			Config:	Normal

Fault at bus: **XF908 Bkr LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF908 Bkr LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908 Bkr LV	XF908 Bkr LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908	XF908 Bkr LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Fault at bus: **XFMR-480-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

				Positive & Zero Sequence Impedances Looking into "From Bus"									
		3-Phase Fault		Line-to-Ground Fault									
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm Amp	% Voltage at From Bus			I/c Symm Amp		R1	X1	R0	X0	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

# Indicates fault current contribution from faulted bus
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemtr	**ETAP**		Page:	10
Location:	Borger and Wells Counties, TX			Date:	08/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PLPOT2
Engineer:	Real Power Engineering	Study Case: SC Comp 3Ø		Revision:	Base
Filename:	rpg2-6_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-480-13**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	R1	X1	R0	X0
XFMR-480-13	Total	0.000	0.000	0.00	111.32	111.32	0.000	0.000	2.000+j0.000	0.000+j0.000		
XFMR-480-LV1	XFMR-480-LV1	0.000	0.000	0.00	111.32	111.32	0.000	0.000	0.000+j0.000	0.000+j0.000		
XFMR-480	XFMR-480-LV1	0.000	0.000	0.00	111.32	111.32	0.000	0.000				

Bus contributes fault current to the fault. Bus is missing from the one-line diagram.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta, Y transformer

Project:	Chemo	**ETAP**		Page:	192
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-HV3 (H)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase Symm. [illegible]	ip 3-Phase Symm. peak	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
XFMR-HV3 (H)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV3 (H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV3 (H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-HV3 (H)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (XFR from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-4602-LV**

Prefault voltage = 0.943 kV = 100.00 % of nominal bus kV (0.943 kV)
= 100.00 % of Base kV (0.943 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	Ik 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	Ik Symm. kA A	Ik Symm. kA B	R1	X1	R0	X0
XF908-4602-LV	Total	0.000	0.000	0.000	117.32	117.32	0.000	0.000	2.2496 mOhm	17.986 mOhm		
XF908-4602-LV	XF908-4602-LV	27.42	26.355	100.00	100.00	100.00	0.000	0.000	2.2496 mOhm	17.986 mOhm		
XF908-4602	XF908-4602-LV	0.000	0.000	0.000	117.32	117.32	0.000	0.000				

Bus contributes short-circuit current to its own fault.

* Indicates a current contribution from a motor or generator. (IEC) Some or all current fed from X (supplemental) bus.

Project:	Chemo	**ETAP**		Page:	199
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ep[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Peak kA	% Voltage at From Bus 3c	3b	3a	Ik Symm. kA	Ik" kA	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution ([illegible] from a grounded [illegible] transformer

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-663 LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
XF908-663 LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-663 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Fault at bus: **XFMR-HV1 (1)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-HV1 (1)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV1 (1)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV1 (1)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-HV1 (1)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-[illegible] transformer.

Project:	Chemin	**ETAP**		Page:	191
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC	Loop: B4	Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-604-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)

= [illegible] % of Base kV (Base kV = [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedance Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c X/R	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	R1	X1	R0	X0
XF908-604-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-604-LV	XF908-604-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908-604-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

Bus contribution exceeds [illegible] % of total fault current.

* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemo	**ETAP**		Page:	118
Location:	Borden and Milk Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-400 HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (= [illegible] kV)
= [illegible] % of Base kV (= [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k From Bus	Ik From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedances on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer

Project:	Chemtr	**ETAP**		Page:	199
Location:	Bowers and Mills Corners, TX			Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rod Power Engineering	Study Case: SC	Comp: 84	Revision:	Base
Filename:	[illegible]			Config:	Normal

Fault at bus: **XFMR-465.13**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-465.13	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-541.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]
* [illegible]

Project:	Chemis	**ETAP**		Page:	298
Location:	Bowen and Mills Counties, TX			Date:	04/26/2019
Contract:	CR-PN-2781			SN:	PGBG-PLPSTZ
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg2-4_2.lfmxml			Config:	Normal

Fault at bus: **XFMR-4H4-HV**

Prefault voltage = 34.500 kV = 100.00 % of nominal bus kV (34.500 kV)
= 100.00 % of Base kV (34.500 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-4H4-HV	Total	0.000	0.000	0.00	111.54	111.54	0.000	0.000	1.0000+j0.0000	1.0000+j0.0000	2.2500+j0.0000	2.2500+j0.0000
XFMR-4H4-HV	BUS4H4-HV	7.977	20.000	0.00	111.54	111.54	0.000	0.000	1.0000+j0.0000	0.0000+j0.0000	2.2500+j0.0000	2.2500+j0.0000
XFMR-4H4-HV	BUS4H4-HV	0.000	0.000	100.00	111.54	111.54	0.000	0.000	0.0000+j0.0000	0.0000+j0.0000		

Bus contributes fault current to the fault in From Bus, Bus is missing from the system
Indicates a zero sequence fault current contribution (3I0) from a grounded Delta, Y-ungrounded

Project:	Chemin	**ETAP**		Page:	291
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-4kV LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (nominal bus kV = [illegible] kV)
= [illegible] % of Base kV (Base kV = [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus			3I0 Symm. Amp		R1	X1	R0	X0
				A	B	C	A	B				
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

[illegible]

[illegible]

Project:	Chemie	**ETAP**		Page:	333
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC [illegible]		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Real	Ik Symm rms	% Voltage at From Bus A	B	C	Ia Symm rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus [illegible] is connected to a three-winding transformer.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-[illegible] transformer)

Project:	Chemo	**ETAP**		Page:	333
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **EP909-B401-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (EP909-LV)
= [illegible]% of Base kV (EP909-LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/X k Symm ratio	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
EP909-B401-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909-B401-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909-B401-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP909-B401-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution exceeds limit of [illegible] kA.
* Bus has a generator. Fault current contribution [illegible] from a generator(s) [illegible] subtransient

Fault at bus: **XFMR-BUS2-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-BUS1-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BUS1-LV	XFMR-BUS1-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BUS1-LV	XFMR-BUS1-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-BUS2-LV	XFMR-BUS2-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied three-phase bus
* Indicates a zero sequence fault current contribution. (XFR Conn: [illegible])

Project:	Chemo	**ETAP**		Page:	200
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF909-B402-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm Amp	Ia	Ib	Ic	3I0 Symm Amp	3I0 Angle	R1	X1	R0	X0
XF909-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF909-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF909-B402-LV	M-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0 from a grounded Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	298
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-4160-HV**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. Amp	ip Peak Amp	% Voltage at From Bus A	B	C	3I0 Symm. Amp A	B	R1	X1	R0	X0
XFMR-4160-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4160-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4160-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-4160-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus. Bus is initially unfaulted.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemie	**ETAP**		Page:	207
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **XF900-B600 LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Mutually Coupled Branches
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Delta transformer

Project:	Chemo	**ETAP**		Page:	2.0
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfimm			Config:	Normal

Fault at bus: **XFMR-BH4-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A	3I0 Symm. mag. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **EP909-B104-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus EP_1 (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA	3I0 Angle deg	% Impedance on 100 MVA base R1	X1	R0	X0
EP909-B104-LV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	1.648+j0.000		
B117-104-LV	EP909-B104-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.879+j0.000	1.879+j0.000		
B117-104-LV	EP909-B104-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.879+j0.000	1.879+j0.000		
EP909-B104-LV	EP909-B104-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	1.648+j0.000		

Bus contributes more than one fault current to the fault.
* Indicates a zero or negative fault current contribution. (IEC Zero sequence/Delta Y transformer)

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	33
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpg14_2.lfmdw			Config:	Normal

Fault at bus: **XF900-B400-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (400-LV)
= [illegible] % of Base kV (400-LV)

CompRemote		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. Amp A	3I0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900-B4CP1-3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B4CP1-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B4CP2-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B4CP3-3	XF900-B4CP3-3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus voltage drops below 80% during motor starting transients.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	212
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I_k Symm. rms	% Voltage at From Bus Va	Vb	Vc	3I_0 Symm. rms Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	11
Location:	Borden and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF909-B106-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	ip Symm kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. kA A	3I0 Symm. kA B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0 from a grounded-Wye-Y transformer)

Fault at bus: **XFMR-RDS-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteBus		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus is both source and load. Bus is in the faulted substation.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemie	**ETAP**		Page:	11
Location:	Borger and Mills County, TX			Date:	08/26/2019
Contract:	CB-09c2781			SN:	WORKSTATION
Engineer:	Real Power Engineering	Study Case: SC Comp 09		Revision:	Base
Filename:	rpp14_2.lfmdw			Config:	Normal

Fault at bus: **XF900 (Elbo LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. kA	3I0 Angle	R1	X1	R0	X0
XF900 (Elbo LV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.000+j0.000	1.000+j0.000		
BUS1 (LV)	XF900 (Elbo LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.522+j0.000		
BUS2 (LV)	XF900 (Elbo LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.548+j0.000		
XF900 (Elbo LV)	XF900 (Elbo LV	60.25	85.000	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	1.000+j0.000		

# Indicates fault current contribution from study transformer
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **XF908 4160.415**

Prefault voltage = 24 [illegible] kV = [illegible] % of nominal bus kV (24 [illegible] kV)
= [illegible] % of Base kV (24 [illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms 3I0	Ia	R1	X1	R0	X0
XF908 4160.415	Total	[illegible]	22.858	[illegible]	113.99	117.51	22.999	119.99	[illegible]	[illegible]	[illegible]	[illegible]
XF908 4160.415	XF908-4160.000	0.00	22.858	0.00	113.99	117.51	22.999	119.99	[illegible]	[illegible]	[illegible]	[illegible]
XF908 4160.000	XF908-4160.000	[illegible]	0.000	0.00	113.99	117.51	0.000	0.00	[illegible]	[illegible]		
XF908 4160.000	XF908-4160.000	[illegible]	0.000	0.00	113.99	117.51	0.000	0.00	[illegible]	[illegible]		

Bus voltage is less than specified minimum bus voltage (85.0% from system setting) for this bus.
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Delta-Y transformer.

Fault at bus: **XF900 4160.4 kV**

Prefault voltage = 4160.00 V = 100.00 % of nominal bus kV (4160 kV)
= 100.00 % of Base kV (4160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia Symm. kA	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. kA	3I0 Angle deg	R1	X1	R0	X0
XF900 4160.4 kV	Total	0.000	0.000	0.000	100.00	100.00	0.000	0.000		1.000+j0.000	1.000+j0.000		
BUS1 4160 kV	XF900 4160.4 kV	0.000	0.000	0.000	100.00	100.00	0.000	0.000		1.479+j0.000	6.422+j0.000		
BUS2 4160 kV	XF900 4160.4 kV	0.000	0.000	0.000	100.00	100.00	0.000	0.000		1.479+j0.000	6.422+j0.000		
XF900 4160.4 kV	XF900 4160.4 kV	0.000	0.000	0.000	100.00	100.00	0.000	0.000		1.479+j0.000	1.000+j0.000		

Bus contributes more than one-half of total fault current for faults on this bus
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **XFMR-HIGH-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms 3I0	Ia	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-[illegible] transformer

Fault at bus: **XF900 (0.69 kV**

Prefault voltage = 0.690 kV = 100.00 % of nominal bus kV (0.690 kV)
= 100.00 % of Base kV (0.690 kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	Ia	Ib	Ic	3I0 Real	3I0 Imag.	R1	X1	R0	X0
XF900 (0.69 kV)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1 (0.69 kV)	XF900 (0.69 kV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2 (0.69 kV)	XF900 (0.69 kV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 (0.69 kV)	to XF900 (0.69 kV)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus is limit violation of bus voltage or branch current rating in the faulted network.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chevron	**ETAP**		Page:	220
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 3ph		Revision:	Base
Filename:	rpe[illegible]			Config:	Normal

Fault at bus: **XFMR-RDM-01Y**

Prefault voltage = [illegible] kV = [illegible]% of nominal bus kV (34.500 kV)
= [illegible]% of Base kV (34.500 kV)

Contribution	3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp	3I0	R1	X1	R0	X0
XFMR-RDM-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-RDM-01Y	XFMR-RDM-01Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-RDM-01Y	XFMR-RDM-01Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-RDM-01Y	XFMR-RDM-01Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus. Bus splitting is applied.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	111
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp14_2.lfmxml			Config:	Normal

Fault at bus: **XF908 [illegible] LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms Ia	kA Symm. rms 3I0	% Impedance on 100 MVA base R1	X1	R0	X0
XF908 [illegible] LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution is from three-winding transformers
* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	[illegible]
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 04		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-B200-01V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/Ir Symm Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I_0 Symm. Amp A	I_0 Symm. Amp B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-B200-01V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B200-01V	XFMR-B200-02V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B200-01V	XFMR-B200-03V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B200-01V	XFMR-B200-04V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (From Bus).

* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Fault at bus: **EP908 (8269.4) V**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus kV (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ik" kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. kA	R1	X1	R0	X0
EP908 (8269.4) V	Total	0.000	0.000	0.000	100.00	100.00	0.000	0.000	1.4486+j0.000	12.8[illegible]+j0.000		
[illegible]	[illegible]	0.00	0.00	0.000	100.00	100.00	0.000	0.000	1.479+j0.000	6.123+j0.000		
[illegible]	[illegible]	0.00	0.000	0.000	100.00	100.00	0.000	0.000	1.479+j0.000	6.148+j0.000		
[illegible]	[illegible]	0.00	0.000	0.000	100.00	100.00	0.000	0.000	1.948+j0.000	12.848+j0.000		

[illegible]
* [illegible]

Project:	Chemie	**ETAP**		Page:	324
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-HDW-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XFMR-[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-[illegible]	XFMR-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	222
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900 (Elbw-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (Elbw-LV)
= [illegible] % of Base kV (Elbw-LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. amp	% Voltage at From Bus A	B	C	3I0 Symm. amp A	B	R1	X1	R0	X0
XF900 (Elbw-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS7 (Elbw-LV	XF900 (Elbw-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS7 (Elbw-LV	XF900 (Elbw-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 (Elbw-LV	XF900 (Elbw-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution from bus being analyzed.
* - Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta T transformer)

Project:	Chemie	**ETAP**		Page:	126
Location:	Borneo and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **UP908 (LBN-41)**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
UP908 (LBN-41)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UP908 (LBN-41)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
UP908 (LBN-41)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution current is from Ramp underlying impedances
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	227
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900 (Z00-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (XF900 LV)
= [illegible] % of Base kV (XF900 LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ia	Ib	Ic	3I0 Real	3I0 Imag.	R1	X1	R0	X0
XF900 BUS 1 V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1 0.6 kV	XF900 BUS 1 V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2 0.6 kV	XF900 BUS 1 V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900 BUS 1 HV	XF900 BUS 1 V	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence to the fault current.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded Delta-Y transformer)

Project:	Chemic	**ETAP**		Page:	228
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi[illegible]			Config:	Normal

Fault at bus: **XFMR-BUS1H**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Phase kA	I/c Symm. rms	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. rms Ia	Ib	R1	X1	R0	X0
XFMR-BUS1H	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BUS1H	XFMR-BUS1H	5.61	12.54	[illegible]	111.32	114.74	11.841	6.121	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BUS1H	XFMR-BUS1H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-BUS1H	XFMR-BUS1H	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus is faulted, but not contributing to fault.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Delta-Y transformer)

Fault at bus: **XF900 (kV) 4.1V**

Prefault voltage = 4.000 kV = [illegible]% of nominal bus kV (4.000 kV)
= [illegible]% of Base kV (4.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 (kV) 4.1V	Total	4.000	10.400	0.000	173.205	173.205	0.000	0.000	1.000+j0.000	1.000+j0.000		
BUS1 (kV) 4.1	XF900 (kV) 4.1V	4.000	10.400	0.000	173.205	173.205	0.000	0.000	1.000+j0.000	1.000+j0.000		
BUS2 (kV) 4.1	XF900 (kV) 4.1V	4.000	10.400	0.000	173.205	173.205	0.000	0.000	1.000+j0.000	1.000+j0.000		
XF900 (kV) 4.1V	Infinite Source	12.000	31.200	300.000	346.410	346.410	0.000	0.000	1.000+j0.000	1.000+j0.000		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemie	**ETAP**		Page:	2.0
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-BUS1-HV**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Ph Symm Rms	I/c Symm. Angle	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. mag. 3I0	3I0 Symm. Angle	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus fault).
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	231
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyzer			Config:	Normal

Fault at bus: **XF900-BS01-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

CompleteNetwork		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase kA	ip 3-phase kA	Ik" kA	3I0 kA	Ia kA	R1 ohms	X1 ohms	R1	X1	R0	X0
XF900-BS01-LV	Utility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-BS01-LV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS2-BS01-LV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-BS01-MV	XF900-BS01-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus is limit violation of bus voltage
* Indicates a zero or negative fault current contribution (Type 5 generator/Delta-Y transformer)

Project:	Chemie	**ETAP**		Page:	222
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyzer			Config:	Normal

Fault at bus: **XFMR-BRKER**

Prefault voltage = [illegible] V

= [illegible] % of Nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	I in From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I in From Bus A	I in From Bus B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-BRKER	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BRKER	XFMR-BRKER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-BRKER	XFMR-BRKER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-BRKER	XFMR-BRKER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF900 (kV)**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (kV)
= [illegible] % of Base kV (kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V (from bus)	I (from unit)	% Voltage at From Bus			I (from unit)					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
[illegible]

Project:	Chevron	**ETAP**		Page:	234
Location:	Ransom and Wells Corporate, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR-RMP-41V**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from bus being analyzed (bus-to-bus).
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer.

Project:	Chemo	**ETAP**		Page:	233
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-HAM-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (XF900-LV)
= [illegible]% of Base kV (XF900-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	3-Ph Fault Current	LG Fault Current	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	LG Fault Current Ia	LG Fault Current 3I0	% Impedance on 100 MVA base R1	X1	R0	X0
XF900-HAM-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution is less than 1% of total fault current.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta-Y transformer)

Project:	Chemin	**ETAP**		Page:	236
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2701			SN:	PGBG-PAPRJC
Engineer:	Real Power Engineering	Study Case: SC-Comp-BP		Revision:	Base
Filename:	rpgCA_Chemin			Config:	Normal

Fault at bus: **XFMR-HV-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	Ik Symm cmp	% Voltage at From Bus Va	Vb	Vc	Ia Symm cmp	Ib	R1	X1	R0	X0
XFMR-HV-HV (1)	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV-HV (1)	XFMR-HV-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-HV-HV (2)	XFMR-HV-HV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Symmetrical fault current is from "Bus" before closing transformer.
* Indicates a current contribution from a motor or generator. (SC) Source (Swing) Contribution. M Asymmetrical

Project:	Chemo	**ETAP**		Page:	227
Location:	Bowen and Mills Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpp14_2.lfmxm			Config:	Normal

Fault at bus: **UP908 (Elbo-LV**

Prefault voltage = [illegible]

= [illegible] % of Nominal bus kV (UP908 LV)
= [illegible] % of Base kV (UP908 LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Nom Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms A	kA Symm. rms B	R1	X1	R0	X0
UP908 (Elbo-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BLUE (Mid-LV	UP908 (Elbo-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BLUE (Mid-LV	UP908 (Elbo-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
UP908 (Elbo-LV	UP908 (Elbo-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	236
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 Symm Amp A	I2 Symm Amp B	% Impedance on [illegible] MVA base R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-[illegible] transformer.

Project:	Chemo	**ETAP**		Page:	139
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe2.4.2.lterm			Config:	Normal

Fault at bus: **LP900-B400-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (LP900-LV)
= [illegible] % of Base kV (LP900-LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I2 X Symm. Amp A	I2 X Symm. Amp B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a. Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	246
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF908-B402-01Y**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Nom. Bus	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF908-B402-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B402-01Y	XF908-B402-02Y	5.42	21.53	0 %	112.56	118.13	16.217	16.217	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B402-02Y	XF908-B402-04Y	0.00	0.000	0.00	111.47	116.69	0.000	0.000	[illegible]	[illegible]		
XF908-B402-03Y	XF908-B402-04Y	71.89	0.000	67.36	0.00	0.00	0.000	0.000	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus, Bus coupling or mutual impedance.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	20
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XF900-B402-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (1.000 kV)
= [illegible]% of Base kV (1.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900-B402-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B402-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B402-LV	M-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Indicates a zero sequence fault current contribution. (XFMR from a grounded-Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	242
Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpp[illegible]			Config:	Normal

Fault at bus: **XFMR-B460-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV (= [illegible] kV)
= [illegible] % of Base kV (= [illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I_k Symm. Amp	% Voltage at From Bus A	B	C	3I_0 Symm. Amp A	B	R1	X1	R0	X0
XFMR-B460-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B460-LV1	SF5kV-B461-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-B460-LV2	SF5kV-B462-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-B460-LV3	SF5kV-B463-SW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied three-winding transformer
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	291
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900-B460-LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	Ip Symm. amp	Ia	Ib	Ic	3I0 Symm. amp	3I0	R1	X1	R0	X0
XF900-B460-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B460-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
B-[illegible]	XF900-B460-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF900-B460-LV	XF900-B460-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Fault at bus: **XFMR-4kV-01Y**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/In Symm Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm Amp Ia	Ib	R1	X1	R0	X0
XFMR-4kV-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4kV-01Y	XFMR-4kV-02Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4kV-01Y	XFMR-4kV-03Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-4kV-01Y	XFMR-4kV-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent Bus (mutual coupling not included).
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemo	**ETAP**		Page:	2#1
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp #4		Revision:	Base
Filename:	rpe2.4.2.lemew			Config:	Normal

Fault at bus: **XFMR-B4414-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus kV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XFMR-B4414-LV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		
B-117-4.4-LV	XFMR-B4414-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.122+j0.000		
B-117-480-LV	XFMR-B4414-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.248+j0.000		
XFMR-B4414-HV	XFMR-B4414-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		

* Indicates fault current contribution is from three-winding transformers
# Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	246
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-460P-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms 3I0	Ia	R1	X1	R0	X0
XFMR-460P-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-460P-HV	XFMR-460P-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-460P-MV	XFMR-460P-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-460P-HV	XFMR-460P-MV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	297
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxml			Config:	Normal

Fault at bus: **XF908-B409-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (100% kV)
= [illegible]% of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Nom Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF908-B409-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908-B409-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908-B409-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF908-B409-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemin	**ETAP**		Page:	246
Location:	Bowers and Mills Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	ogi[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/I" k Symm rmsg	% Voltage at From Bus A	B	C	3I0 Symm rmsg A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]
[illegible]
[illegible]
[

Fault at bus: **LF909-B46-LV**

Prefault voltage = 0.000 kV = 100.00 % of nominal bus LV (0.000 kV)
= 100.00 % of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. mag. A	3I0 Symm. mag. B	% Impedance on 100 MVA base R1	X1	R0	X0
LF909-B46-LV-1	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	1.648+j0.000		
B-LV1-B46-LV	LF909-B46-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	1.479+j0.000		
B-LV2-B46-LV	LF909-B46-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	1.479+j0.000		
LF909-B46-LV-2	LF909-B46-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	1.648+j0.000		

A - Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemtr	**ETAP**		Page:	270
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XFMR-4H-HV**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Module Ang.	ip Module Ang.	% Voltage at From Bus A	B	C	3I0 Module Ang.	3I0	R1	X1	R0	X0
XFMR-4H-HV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XFMR-4H-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XFMR-4H-LV-A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (XFMR from a grounded-[illegible] transformer

Project:	Chemo	**ETAP**		Page:	271
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900-4000-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (3.000 kV)
= [illegible]% of Base kV (3.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900-4000-LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes more than one percent to fault, fed by a leading source branch.
* Bus has a grounded-Wye transformer with neutral grounding resistor (XFMR Data: [illegible])

Project:	Chemin	**ETAP**		Page:	222
Location:	Ranson and Mills Counties, TX	[illegible]		Date:	04/26/2019
Contract:	CR-PN-2781			SN:	[illegible]
Engineer:	Rust Power Engineering	Mode: Case: SC Comp: 84		Revision:	Base
Filename:	rpe2-4_2.lfanalyze			Config:	Normal

Fault at bus: **XF908-BUS2.115**

Prefault voltage = [illegible] kV = [illegible]% of nominal bus kV ([illegible] kV)
= [illegible]% of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms 3I0	Ia	R1	X1	R0	X0
XF908-BUS2.115	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Fault at bus: **XF900-B502.4.V**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (3.000 kV)
= [illegible]% of Base kV (3.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				A	B	C	A	B	R1	X1	R0	X0
XF900-B502.4.V	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemie	**ETAP**		Page:	234
Location:	Ransom and Wells Corners, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 84		Revision:	Base
Filename:	rpe14_2.lfmdw			Config:	Normal

Fault at bus: **EP908-BUS-01V**

Prefault voltage = [illegible] V

= [illegible] % of nominal bus kV ([illegible] kV)

= [illegible] % of Base kV ([illegible] kV)

CapriBuses		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-phase fault	ip 3-phase peak	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 fault mag. A	3I0 fault mag. B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]

[illegible]

Project:	Chemo	**ETAP**		Page:	231
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **LP909 4160.0 kV**

Prefault voltage = 4160.0 kV = 100.00 % of nominal bus kV (4160 kV)
= 100.00 % of Base kV (4160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k Symm. kA	ip Asymm. kA	Ia Symm. kA	Ia Angle	3I0 Symm. kA	R1 Ohm	X1 Ohm	R1	X1	R0	X0
LP909 4160.0 kV	Total	0.961	1.638	0.831	111.31	0.831	0.000	0.000	1.438+j0.000	12.951+j0.000		
BUS1 0.6 kV	XFMR1-BUS1 kV	0.26	0.441	0.225	111.31	0.225	0.000	0.000	1.479+j0.000	6.122+j0.000		
BUS2 480 kV	XFMR2-BUS2 kV	0.29	0.490	0.250	111.31	0.250	0.000	0.000	1.479+j0.000	6.108+j0.000		
XFMR-BUS3 kV	XFMR3-BUS3 kV	0.437	0.737	0.376	111.31	0.376	0.000	0.000	1.438+j0.000	12.951+j0.000		

Bus contributes more than 1% to total fault. Bus is being included.
* Indicates a zero sequence fault current contribution. (XFMR Zero sequence/Delay Y Substation)

Project:	Chemo	**ETAP**		Page:	256
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfmxml			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				3a	3b	3c	3a	3b	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution is from three-winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemin	**ETAP**		Page:	225
Location:	Ramon and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyz			Config:	Normal

Fault at bus: **LF909-BN44-LV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV (LF909-LV)
= [illegible] % of Base kV (LF909-LV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" Symm. Rms	I/c Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	I/c Symm. rms A	I/c Symm. rms B	% Impedance on 100 MVA base R1	X1	R0	X0
[illegible]	Utility	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

a - Indicates fault current contribution from Bus Tie or Bus Sectionalizing Transformer
* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta-Y transformer

Project:	Chemie	**ETAP**		Page:	278
Location:	Bowen and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfanalyzer			Config:	Normal

Fault at bus: **LF909-4160-415**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV (4.160 kV)
= [illegible] % of Base kV (4.160 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer.

Fault at bus: **EP909-4850-LV**

Prefault voltage = 0.000 kV = [illegible]% of nominal bus EP_1 (0.000 kV)
= [illegible]% of Base kV (0.000 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedances on 100 MVA base R1	X1	R0	X0
EP909-4850-LV	Total	0.000	0.000	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		
BUS1-0.6 kV	EP909-4850-LV	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.122+j0.000		
BUS2-0.6 kV	EP909-4850-LV	0.00	0.000	0.00	120.00	120.00	0.000	0.000	1.479+j0.000	6.248+j0.000		
EP909-4850-LV	Infinite Bus	0.00	0.00	0.00	120.00	120.00	0.000	0.000	1.648+j0.000	12.500+j0.000		

A - Indicates fault current contribution is from three winding transformers

* - Indicates a zero sequence fault current contribution (3I0) from a grounded Delta or Y transformer

Project:	Chemin	**ETAP**		Page:	290
Location:	Bowie and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Rms	I/In	% Voltage at From Bus			I/I Symm. rms		% Impedance on 100 MVA base			
				A	B	C	3I0	3I2	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	20
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpe2.4.2.lfmxm			Config:	Normal

Fault at bus: **LF909-B9kA-LV**

Prefault voltage = [illegible]

= [illegible]% of nominal bus kV (LF909-LV)
= [illegible]% of Base kV (LF909-LV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA From Bus	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA From bus A	kA From bus B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes more than one percent to fault, fed by a leading impedance branch.

* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemie	**ETAP**		Page:	242
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	ogi14_2.lfanalyz			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" 3-Phase Symm. [illegible]	I/I 3-Phase Symm. [illegible]	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. comp. Ia	Ib	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	291
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF900 4kV LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (4.000 kV)
= [illegible] % of Base kV (4.000 kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	kA Symm. rms	kA Symm. rms	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	kA Symm. rms Ia	kA Symm. rms 3I0	% Impedance on 100 MVA base R1	X1	R0	X0
XF900 4kV LV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
* [illegible]

Project:	Chemo	**ETAP**		Page:	294
Location:	Ransom and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **XF908-B602.415**

Prefault voltage = [illegible] V = [illegible] % of nominal bus 415. ([illegible] V)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip kA	% Voltage at From Bus A	% Voltage at From Bus B	% Voltage at From Bus C	3I0 Symm. comp. A	3I0 Symm. comp. B	% Impedance on 100 MVA base R1	X1	R0	X0
XF908-B602.415	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B602.415	XF908-B602.308	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
XF908-B602.415	XF908-B602.309	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
XF908-B602.415	XF908-B602.309	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contribution current is from Ignore existing transformers

* Indicates a zero sequence fault current contribution. (3I0 from a grounded Delta-Y transformer)

Project:	Chemo	**ETAP**		Page:	201
Location:	Ramos and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxml			Config:	Normal

Fault at bus: **EP900 [illegible] kV**

Prefault voltage = [illegible] = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ik" kA	% Voltage at From Bus				R1	X1	R0	X0
					A	B	C					
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]
* [illegible]

Project:	Chemie	**ETAP**		Page:	256
Location:	Borger and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg14_2.lfanalyz			Config:	Normal

Fault at bus: **XFMR 4kV3 4H**

Prefault voltage = [illegible] V = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from adjacent bus. Bus is being faulted.
* Indicates a zero sequence fault current contribution. (3I0) from a grounded-Wye-Y transformer.

Project:	Chemo	**ETAP**		Page:	247
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg14_2.lfmxm			Config:	Normal

Fault at bus: **XF900 4600.0 kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (4600 kV)
= [illegible] % of Base kV (4600 kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
XF900 4600.0 kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 4600.0 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 4600.0 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	XF900 4600.0 kV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution is from three-winding transformers
* Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Fault at bus: **EP008-B6044-01Y**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contribution		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	% Voltage at From Bus A	B	C	3I0 Symm. comp. A	B	R1	X1	R0	X0
EP008-B6044-01Y	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP008-B6044-01Y	EP008-B6044-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EP008-B6044-04Y	EP008-B6044-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
EP008-B6044-01Y	EP008-B6044-04Y	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

* Indicates fault current contribution is from three-winding transformers
# Indicates a zero sequence fault current contribution (3I0) from a grounded-Wye-Y transformer

Project:	Chemo	**ETAP**		Page:	208
Location:	Bonnie and Milo Corner, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpe14_2.lfmxm			Config:	Normal

Fault at bus: **XF908 [illegible] kV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I" k Symm Amp	I/c Symm. Amp	% Voltage at From Bus Va	Vb	Vc	3I0 Symm. Amp Ia	Ib	R1	X1	R0	X0
XF908 [illegible] kV	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible] kV Bus [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible] kV Bus [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible] kV Bus [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

# Indicates fault current contribution from studied bus. Bus is initially impedance.
* Indicates a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chemin	**ETAP**		Page:	276
Location:	Ransom and Wells Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Rust Power Engineering	Study Case: SC Comp 4H		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **[illegible]**

Prefault voltage = [illegible] kV = [illegible] % of nominal bus kV ([illegible] kV)
= [illegible] % of Base kV ([illegible] kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V Prefault	kA Symm. rms	% Voltage at From Bus A	B	C	kA Symm. rms A	B	R1	X1	R0	X0
[illegible]	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

[illegible]
[illegible]

Project:	Chemo	**ETAP**		Page:	271
Location:	Borger and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Real Power Engineering	Study Case: SC Comp 4M		Revision:	Base
Filename:	rpg[illegible]			Config:	Normal

Fault at bus: **EP900 (bus9) LV**

Prefault voltage = [illegible]

= [illegible] % of nominal bus kV (100% kV)
= [illegible] % of Base kV (100% kV)

Contributions		3-Phase Fault		Line-to-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	I"k 3-Phase kA	ip 3-Phase kA	Ik" Real	Ik" Imag	Ik"	3I0 Real	3I0 Imag	R1	X1	R0	X0
EP900-BUS1-3	Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-[illegible]	EP900-Bus9-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
BUS1-[illegible]	EP900-Bus9-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	EP900-Bus9-LV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

Bus contributes both zero and positive sequence fault current.
* Bus has a zero sequence fault current contribution. (3I0 from a grounded-Wye-Y transformer)

Project:	Chrome	ETAP		Page:	272
Location:	Brown and Mills County, TX	20.0.0C		Date:	09/04/2023
Contract:	TX-99-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Long IP		Revision:	Base
Filename:	ehp14_Chrome			Config.:	Normal

Short-Circuit Summary Report

3-Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Nominal Bus kV

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chrome	ETAP		Page:	273
Location:	Brown and Mills County, TX	Dr.A.M.		Date:	09/04/2015
Contract:	15-49-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	chp14_Chrome			Config.:	Normal

LF Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisos	ETAP		Page:	224
Location:	Brown and Mills County, TX	20.0.0C		Date:	09/04/2023
Contract:	ES-MS-1201			SN:	59385-RMS02
Engineer:	Pure Power Engineering	Study Case: SC Cases PF		Revision:	Base
Filename:	chp14_Chisos			Config.:	Normal

3-Cycle - 3-Phase LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Brown and Mills County, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: [illegible]		Revision:	Base
Filename:	[illegible]			Config.:	Normal

[illegible]

[illegible]

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss	Ikss
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	229
Location:	Brown and Mills County, TX	Dr.A.M.		Date:	09/04/2015
Contract:	15-456-1281			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Loop PF		Revision:	Base
Filename:	ehp14_Chrome			Config.:	Normal

LF Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Bowie and Mills County, TX	Dr.A.C.		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	[illegible]			Config.:	Normal

[illegible]

[illegible]

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ikssg	Ikssg	Ikssl	Ikssg	Ikssg	Ikssl	Ikssg	Ikssg	Ikssl	Ikssg	Ikssg
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Brown and Mills County, TX	Dr.A.C.		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Comp PF		Revision:	Base
Filename:	[illegible]			Config.:	Normal

[illegible]

[illegible]

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Ikss	Ikssg	Ikssg	Ikss1	Ikssg	Ikssg	Ikss2	Ikssg	Ikssg	Ikss0	Ikssg	Ikssg
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

IEC 61363 - 3 Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100.0 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[1] Fault currents are symmetrical (1/2 cycle currents, adjusted as required).
* I.E.C. fault currents in the begin of the first Medium Size Generator.

Project:	Chisos	ETAP		Page:	249
Location:	Brown and Mills County, TX	20.0.0C		Date:	08/04/2023
Contract:	TX-99-1701			SN:	[illegible]
Engineer:	Pure Power Engineering	Study Case: SC-Unity PF		Revision:	Base
Filename:	etp14_Chisos			Config.:	Normal

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohms)			Negative Seq. Imp. (ohms)			Zero Seq. Imp. (ohms)			Fault Z (ohms)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Project:	Chisms	ETAP		Page:	24
Location:	Brown and Mills County, TX	Dr.A.M.		Date:	04/24/2023
Contract:	ES-49-1281			SN:	59182-RA9602
Engineer:	Pure Power Engineering	Study Case: SC Cases PF		Revision:	Base
Filename:	etp14_Chisms			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault Z1 (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]

Project:	[illegible]	ETAP		Page:	[illegible]
Location:	Bowie and Mills Counties, TX	[illegible]		Date:	[illegible]
Contract:	[illegible]			SN:	[illegible]
Engineer:	Red Raven Engineering	Study Case: SC Cases.IP		Revision:	Base
Filename:	[illegible]			Config.:	Normal

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Grid XF (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
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APPENDIX D – MV CABLE WITHSTAND CALCULATION

PRELIMINARY

APPENDIX E – UTILITY CONTRIBUTION

PRELIMINARY

** -- Application Rating is available for each circuit breaker depending on the number and timing of automatic reclosures, X/R ratio, CB rating structure (symmetrical or asymmetrical), CB rated interrupting time, and contact parting time; all of which are included in the ASPEN Circuit Breaker Rating Module used for this study.

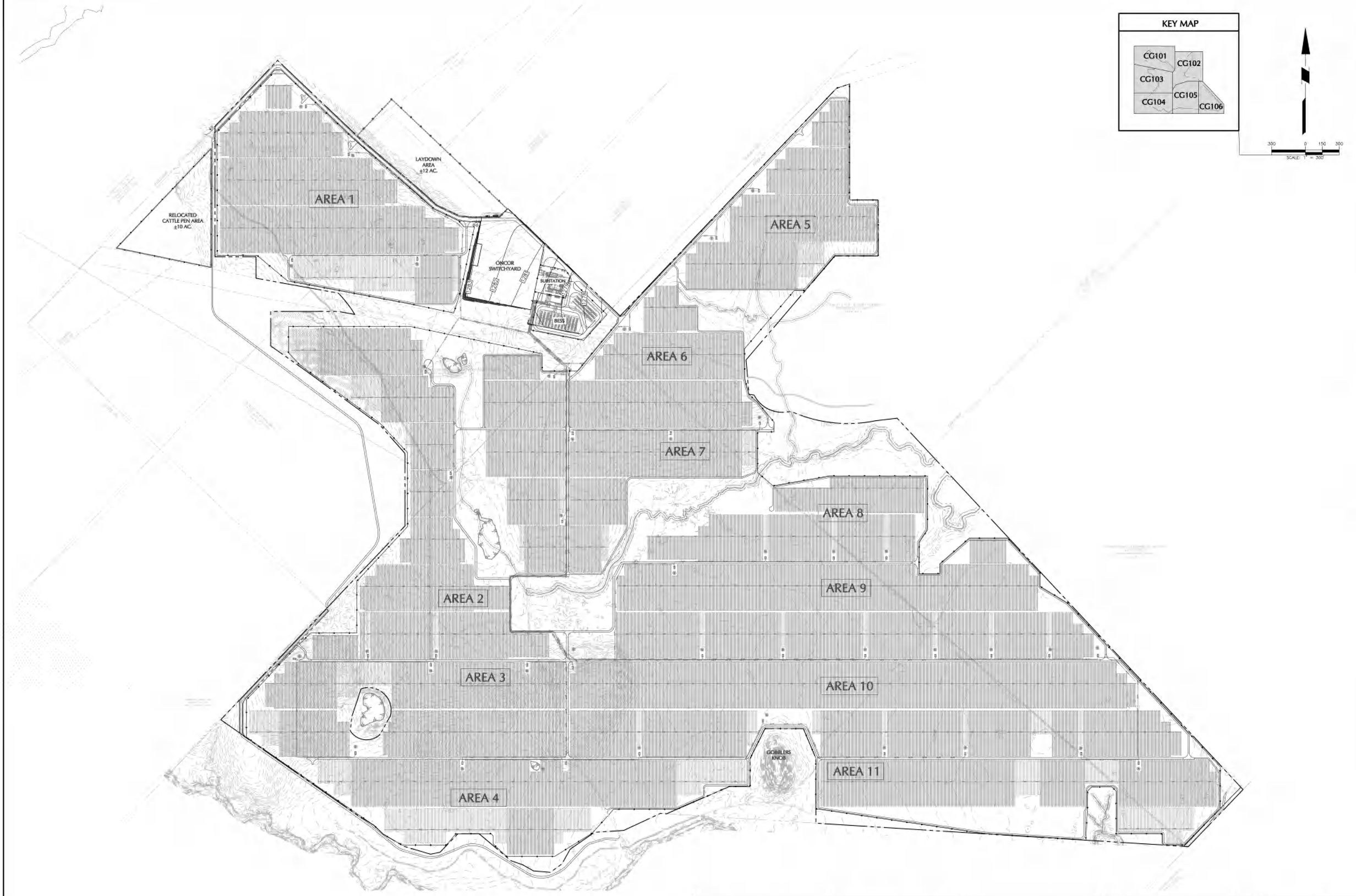
Short Circuit Data

The following table lists estimated short circuit currents and system equivalent impedances:

Quantity		Fault Location and System Configuration		
		Fault at 345kV Oncor Station with [Blue Heron Solar, LLC- Online]	Fault at 345kV Oncor Station with [Blue Heron Solar, LLC- Offline]	Fault at 345kV Oncor Station with [Blue Heron Solar, LLC- Offline and the 345kV Line to Brown Switch out of service]
Three Phase	Fault Current (A)	13,772.9	12,795.1	8,650.3
	ANSI X/R	19.2372	18.9011	19.7844
Single Phase	Fault Current (A)	11,316.8	9,191.7	5,345.4
	ANSI X/R	20.3731	7.93675	12.3667
Equivalent Impedance (Ohms)	Positive Sequence	0.7598+j13.5449	0.41994+j15.4817	3.13388+j55.1189
	Zero Sequence	3.52635+j23.2861	7.04954+j33.2611	30.7764+j70.2416

Conclusion

Based on this study, there are no Oncor Electric Delivery circuit breakers that will be over-duty as a result of Generation Interconnection Request 24INR0333 & 24INR0331.



04/11/2025	30% DD SET	1
Date	Description	No.
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date: 7/16/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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TBPE FIRM REG. #F-13709

Project
CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title
GRADING PLAN

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VMSD

Drawing No.
CG100

LANGAN
Project No. 520102301
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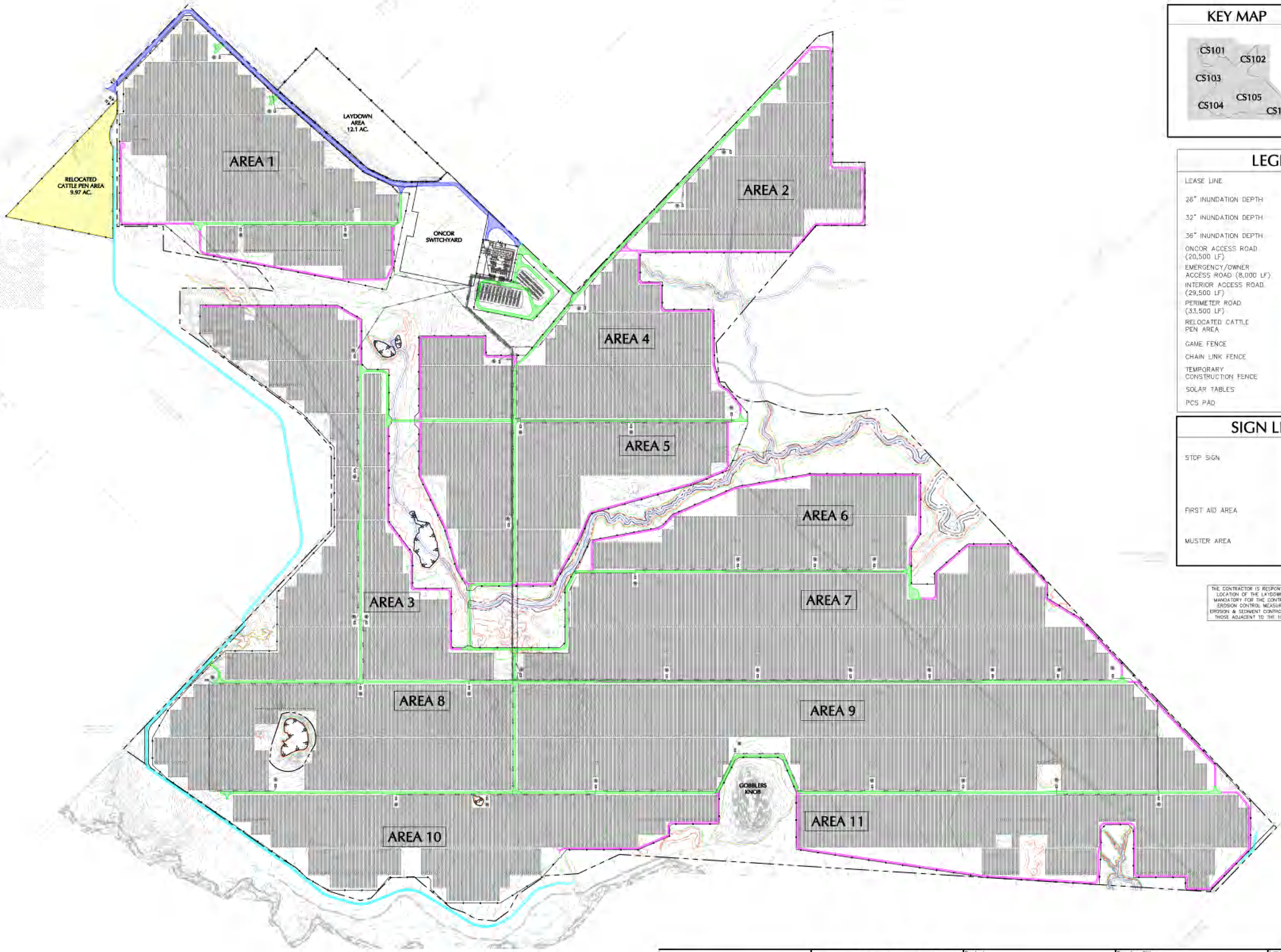
Date: 7/15/2025 Time: 11:48 User: rsims Style Table: Langan.stb Layout: CG100 Document Code: 520102301-SS01-CG101-0101



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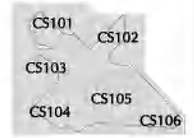

300 0 150 300
SCALE: 1" = 300'

LEGEND

- LEASE LINE
- 28" INUNDATION DEPTH
- 32" INUNDATION DEPTH
- 36" INUNDATION DEPTH
- ONCOR ACCESS ROAD (20,500 LF)
- EMERGENCY/OWNER ACCESS ROAD (8,000 LF)
- INTERIOR ACCESS ROAD (29,500 LF)
- PERIMETER ROAD (33,500 LF)
- RELOCATED CATTLE PEN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

STOP SIGN	STOP R1-1 30" X 30" (1)
FIRST AID AREA	(2)
MUSTER AREA	(3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY FOR THE CONTRACTOR TO IMPLEMENT ALL EROSION CONTROL MEASURES SHOWN ON THE "SOIL EROSION & SEDIMENT CONTROL" PLAN SHEET, ESPECIALLY THOSE ADJACENT TO THE 100-YR INUNDATION AREAS.

Date	Description	No.
Revisions		

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.: 142436
Date: 6/25/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.: F-13709

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Project: CHISME SOLAR AND STORAGE
8987 CR. 268
BROWN & MILLS COUNTY TEXAS

Drawing Title: OVERALL SITE PLAN

Langan Project No.: 520102301
PRCE Project No.: TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date: 04/11/2025
Drawn By: RMS
Checked By: VP

Drawing No.: CS100

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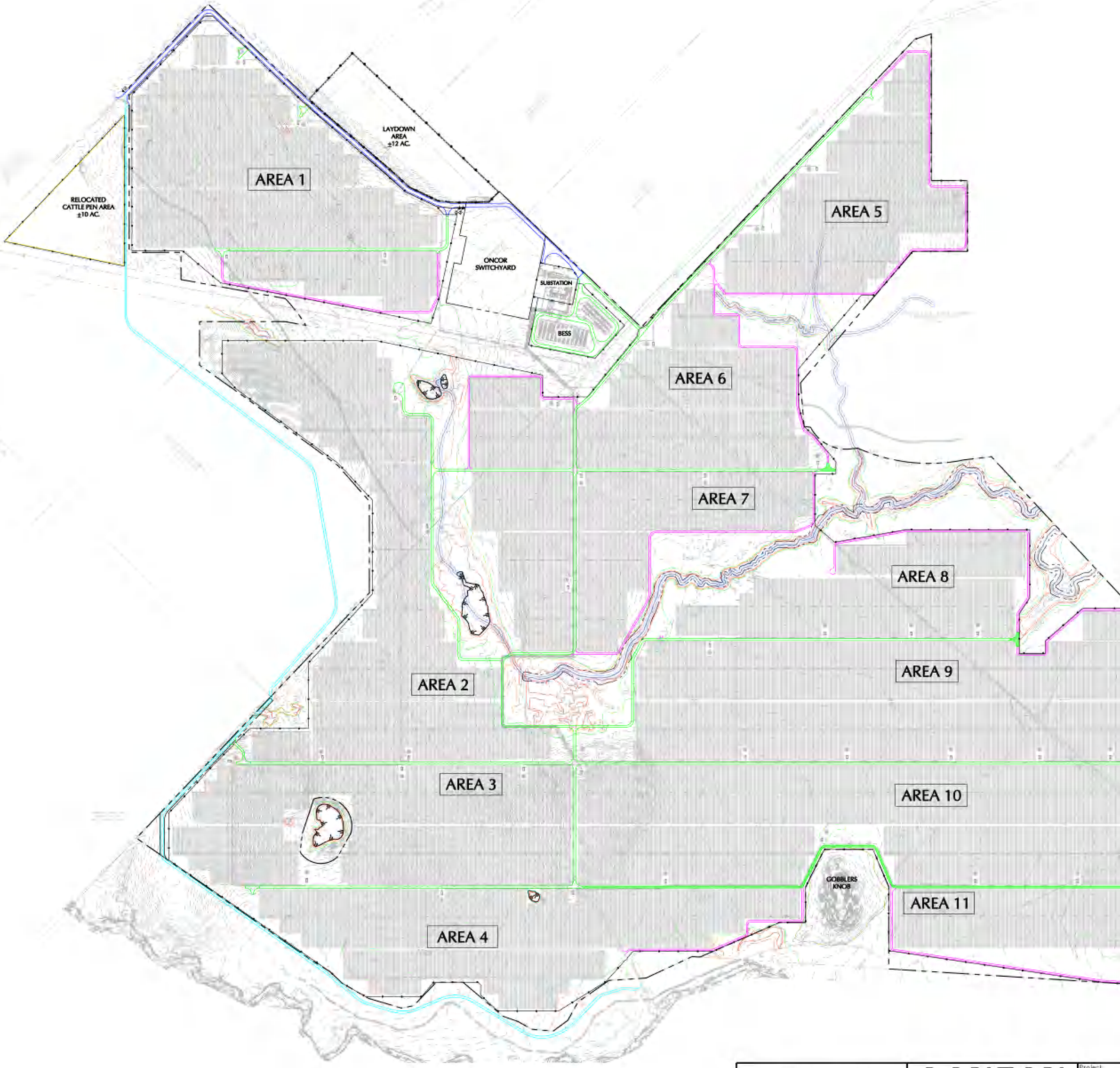
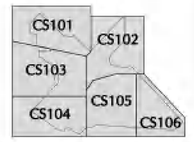
Project No. 520102301

LANGAN

Date: 6/25/2025 Time: 16:31 User name: Style Table: Langan.stb Layout: CS100 Document Date: 520102501-S001-CS101-S101



KEY MAP



300 0 150 300
SCALE: 1" = 300'

LEGEND

- LEASE LINE
- 28" INUNDATION DEPTH
- 32" INUNDATION DEPTH
- 36" INUNDATION DEPTH
- ONCOR ACCESS ROAD (20,500 LF)
- EMERGENCY/OWNER ACCESS ROAD (8,000 LF)
- INTERIOR ACCESS ROAD (29,500 LF)
- PERIMETER ROAD (33,500 LF)
- RELOCATED CATTLE PEN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

- STOP SIGN — STOP, R1-1, 30" X 30", (1)
- FIRST AID AREA — (2)
- MUSTER AREA — (3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY FOR THE CONTRACTOR TO IMPLEMENT ALL EROSION CONTROL MEASURES SHOWN ON THE "SOIL EROSION & SEDIMENT CONTROL" PLAN SHEET, ESPECIALLY THOSE ADJACENT TO THE 100-YR INUNDATION AREAS.

No.	Description	Date
1	30% DD SET	04/11/2025

Revisions

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL. NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date: 7/16/2025
Langan Engineering and Environmental Services, LLC
TBPE Firm Registration No.: F-13709

LANGAN
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TBPE FIRM REG. #F-13709

Project: CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title: OVERALL SITE PLAN

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VYSD

Drawing No.: CS100

Project No. 520102301

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Date: 7/16/2025 Time: 11:10 User name: Style Table: Langan.stb Layout: CS100 Document Date: 520102301-SS01-CS101-0101

SUBSTATION GROUNDING GRID EVALUATION REPORT

ISSUED FOR REVIEW

1.0 Design Background

This report documents the data used, the assumptions made, and the calculations made toward the grounding grid evaluation for the proposed electrical substation located at Red River Clean Energy (RRCE)'s Chisme Substation in Mails County, Texas. The scope of this study is limited to the grounding grid associated with the 345 kV substation. The grounding of the adjacent BESS was not taken into consideration in this design.

The design equations contained herein are made using IEEE 80-2013, the IEEE Guide for Safety in AC Substation Grounding. Version 19.0.19425 of the CDEGS program developed by Safe Engineering Services and Technologies Ltd. were used to develop the design and to check conformance to the allowable step and touch potentials. The modules within CDEGS that were used include RESAP, SoilModelManager and MALZ.

2.0 Soil Resistivity

Soil Resistivity measurements were obtained as part of the Geotechnical Report prepared by Langan Engineering. Results of these measurements can be seen below in Table 1 as well as in Attachment A. For the Substation, FRT-11 was used in the analysis. The results of the worst case RESAP soil model is shown in Table 1 below (Layer Number 1 is air).

Table 1
RESAP Soil Model

Layer Number	Conductivity	
	Resistivity (Ohm)	Thickness (feet)
1	Infinite	Infinite
2	38.98	2.20
3	34.44	4.22
4	32.52	Infinite

3.0 Fault Current and Current Division

Fault data for the 345 kV system was provided by ONCOR[3] short circuit report and is presented in Attachment B. The maximum available Single-Line-to-Ground (SLG) fault current is 11,206.8 Amps with an X/R ratio of 20.4. A 10% growth factor was used in the study to account for future growth of the system. The backup clearing time is assumed to be 0.90 seconds (38 cycles). **Note if the clearing time is greater than assumed, contact the engineer that performed this study for re-validation.**

A "mesh factor" is often used in the design to account for overhead shield wires or neutral conductors that are connected to the substation grounding grid. These wires divert a portion of the ground current away from the substation by providing an alternate return path to the source, thereby lowering the ground potential within the substation grounding grid. The split factor is addressed in IEEE 80-2013 Annex C. Chosen conductor is one (1) transmission line or wall to twelve (12) collector circuits. The split factor is realized as 1.0 to 12 Feeders using Figure C.1 from IEEE 80-2013. Using MALZ the grid resistance is found to be 0.106 Ω. **A split factor was not used in this study.**

4.0 Grid Design

A minimum #4 AWG stranded copper (7 strands) cable may be used for given clearing time and projected fault current according to calculation. 4/0 AWG cable is used in the design study and is recommended for use due to its mechanical strength and better grid performance.

The substation grid pattern consists of 4/0 AWG copper conductors with parallel conductors in a checkerboard pattern "X" diameter by 10'-0" copper-clad rods are positioned at various perimeter and interior conductor intersections. The grid and the top of each rod are located 18 inches below subgrade. See drawing E-501 for the exact layout of the designed grid.

Yard equipment grounding is redundant where allowed by manufacturer design. Ground taps to structures and equipment are the same size as the main grid conductor. Low voltage AC panels and other equipment located within the control building should be tied directly to the grounding grid.

A 4" thick layer of crushed stone surfacing with an average 5,000 ohm-meter resistivity shall be placed on the substation surface.

5.0 Grid Worst Case Condition

Table 2 below presents the summary of tolerable and calculated design values for the soil model which are applicable only for the grid design made herein. The substation system design values are considered adequate since calculated step and touch potentials are within IEEE tolerable limits. 2-D Spot plots are included in Attachment H for reference. Equipment and structures must be securely bonded to ground cables.

Table 2
Design Values

Design Factor	Tolerable	Calculated
Step Potential (Rock)	≤ [illegible] V	[illegible] V
Touch Potential (Rock)	[illegible] V	[illegible] V
Grid Resistance to Remote Earth		[illegible] Ohms
Grid Potential Rise		[illegible] V

Calculated step and touch potentials at the substation are below the tolerable limits as observed on the 2-D spot plots. On the plots shaded with the tolerable voltage set as the threshold, areas within tolerable limits are denoted by the absence of color. Telephone and other communication circuits must be equipped with telephone protectors rated for the grid potential rise (GPR) that is presented.

The grid resistance to remote earth shall be tested in accordance with the fall-of-potential method as described in IEEE Standard 81. If this resistance is found to be greater than the value presented, then contact the Engineer for resolution, which might include installing additional ground rods or ground conductor to lower the grid resistance value.

6.0 Revision Control

Rev. No.	Date	By	Purpose	Description
A	07/25/25	BK	Issued for Review	Original Issue

Attachment	Description	Page No.
A	Ground Resistivity Measurements	6
B	Fault Current Data	13
C	Ampacity Function Report	15
D	Grid Model and Current Injection Point	19
E	MALZ Input File	22
F	Safety Calculations Table	28
G	MALZ Output File	30
H	Voltage Plots, consisting of:	32

a. Touch Voltage Magnitudes across Yard, with tolerable level set as threshold (Summer)
b. Step Voltage Magnitudes across Yard, with tolerable level set as threshold (Summer)
c. Grid Potential Rise across Yard (Summer)

Attachment A

Ground Resistivity Measurements

ADDITIONAL PARCEL #1

ADDITIONAL PARCEL #2

ADDITIONAL PARCEL #3

BORROW PIT #1

BORROW PIT #2

BORROW PIT #3

BORROW PIT #4

N

W

E

S

Legend

- Site Boundary
- Initial Lease Boundary
- Onsite Substation Footprint
- Proposed Substation and BESS Footprint
- Wetland Boundary
- ERT Line
- Boring Location - 25'
- Boring Location - 50'
- Pole Load Test
- Test Pit

Notes

1. Aerial imagery provided by Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. All features shown are approximate.

1,000 0 1,000

SCALE IN FEET

LANGAN

Langan Engineering and Environmental Services, LLC

Project

CHISME SOLAR STORAGE

BROWN & MILLS COUNTY TEXAS

Figure Title

SUBSURFACE INVESTIGATION PLAN

Project No.	520102301
Date	7/2/2025
Scale	1"=1,000'
Drawn By	GS
Figure	3A

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

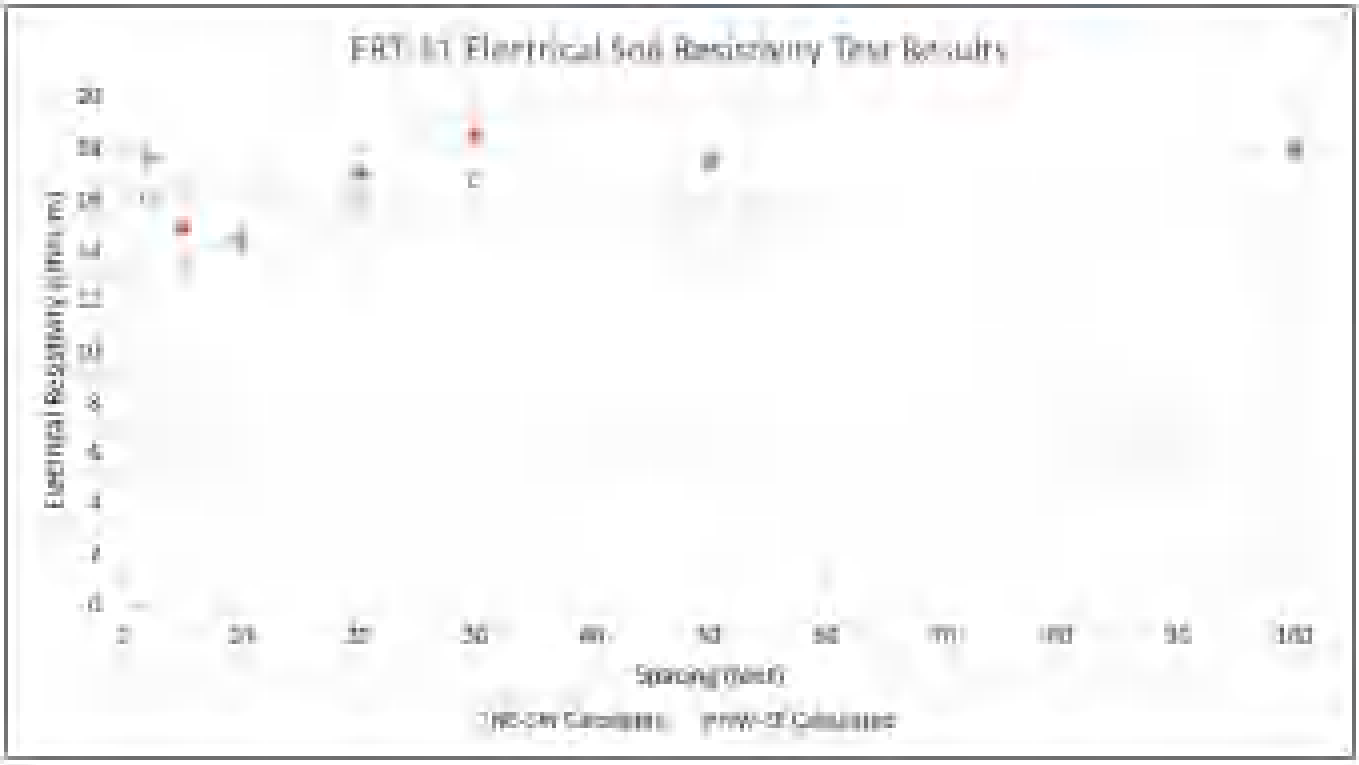
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520702201	**INSPECTOR:**	Shamn Wallace
DATE:	5/7/2025	**TIME:**	1:30 PM
TEST LOCATION:	DIR-T1	**TEMP:**	Clear sties, 90s F

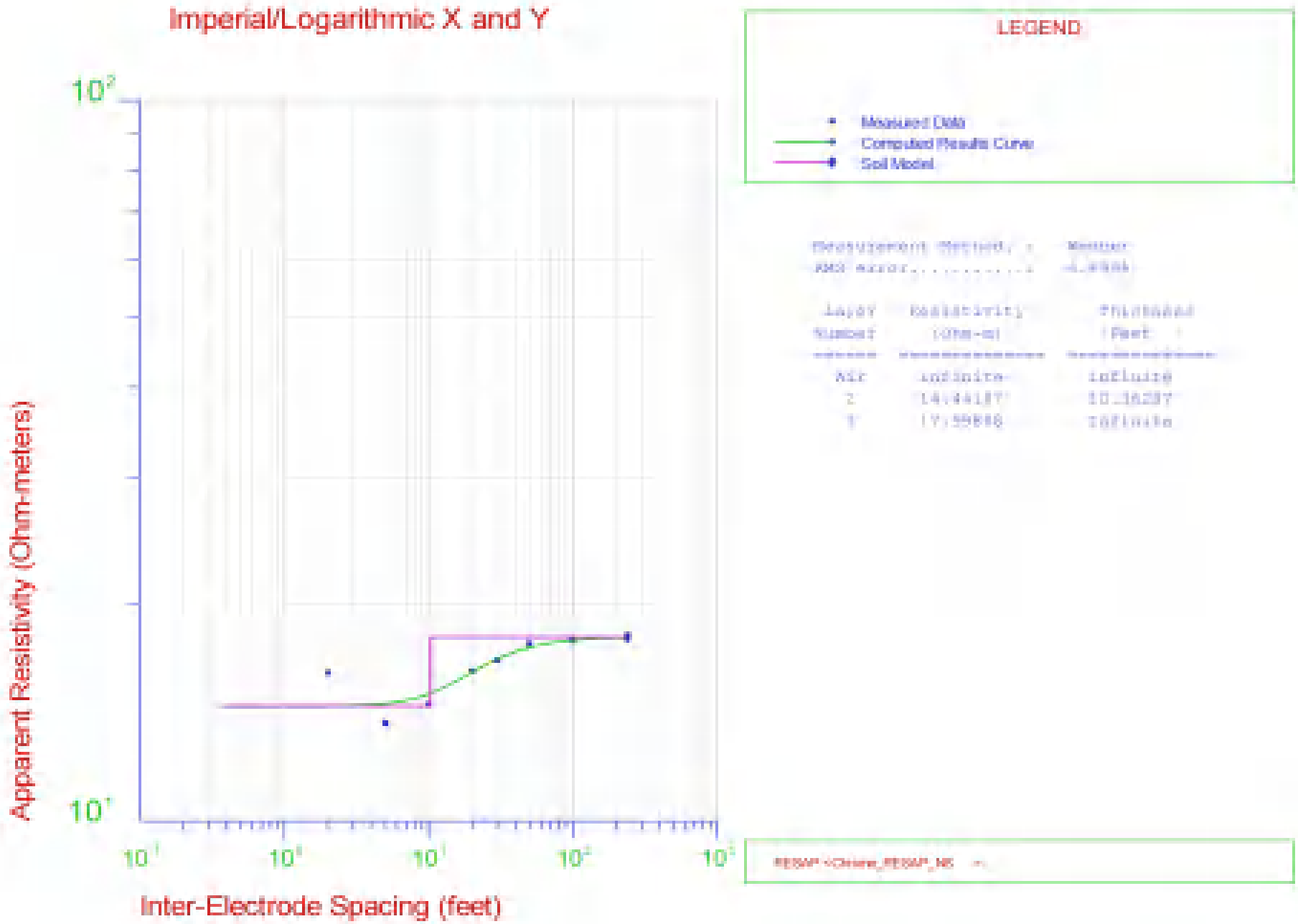
DIRECTION 1: NE-SW

ELECTRODE SPACING "a"		MAX PENETRATION (5% a)	ACTUAL PENETRATION		RESISTANCE	RESISTIVITY (CALC.)
(ft)	(m)	(m)	(in)	(m)	(ohm)	(ohm-m)
2	0.61	1.2	2	0.0508	4.185	16.07
5	1.52	3	3	0.0762	1.422	13.68
10	3.05	6	4	0.1016	0.757	14.53
20	6.10	12	6	0.1524	0.421	16.14
30	9.14	18	6	0.1524	0.291	16.73
50	15.24	30	6	0.1524	0.184	17.62
100	30.48	60	6	0.1524	0.092	17.61

DIRECTION 2: NW-SE

ELECTRODE SPACING "a"		MAX PENETRATION (5% a)	ACTUAL PENETRATION		RESISTANCE	RESISTIVITY (CALC.)
(ft)	(m)	(m)	(in)	(m)	(ohm)	(ohm-m)
2	0.61	1.2	2	0.0508	4.543	17.61
5	1.52	3	3	0.0762	1.544	14.85
10	3.05	6	4	0.1016	0.747	14.33
20	6.10	12	6	0.1524	0.444	17.02
30	9.14	18	6	0.1524	0.321	18.46
50	15.24	30	6	0.1524	0.182	17.43
100	30.48	60	6	0.1524	0.094	18.00




Imperial/Logarithmic X and Y
LEGEND
Measured Data
Computed Results Curve
Soil Model
Apparent Resistivity (Ohm-meters)
Inter-Electrode Spacing (feet)

Report #1

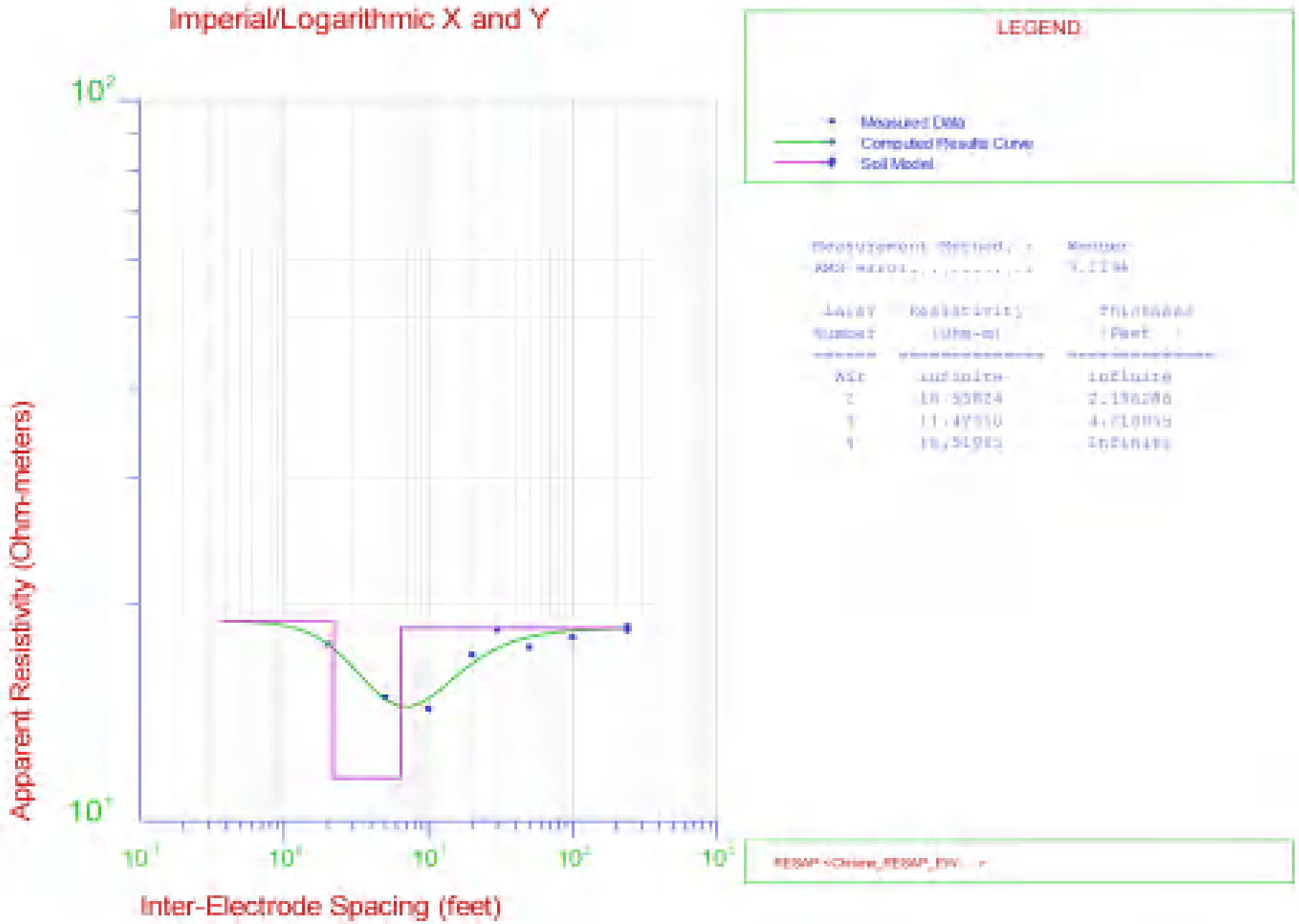
========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >==========

Run ID:.....: Chisms_RESAP_NS
System of Units .....: British
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated....: 4.69926 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

Layer Number	<--- LAYER CHARACTERISTICS ---> Resistivity (ohm-m)	Thickness (Feet)	Reflection Coefficient (p.u.)	Resistivity Contrast Ratio
1	Infinite	Infinite	0.0	1.0
2	14.44187	10.36297	-1.0000	0.14442E-1E
3	27.99888	Infinite	0.19365	1.2463

WARNING MORE THAN ONE SOIL MODEL CAN PRODUCE SIMILAR APPARENT RESISTIVITY MEASUREMENT CURVES. IF YOU USE THE DEFAULT STEEPEST-DESCENT METHOD, THEN YOU WILL MOST OFTEN OBTAIN DECENT AGREEMENT BETWEEN MEASURED VALUES AND THE COMPUTED CURVE, WITH A REALISTIC SOIL MODEL; HOWEVER, THE FIT MAY OCCASIONALLY BE SUB-OPTIMAL. IN SUCH CASES, THE MARQUARDT METHOD WILL USUALLY YIELD AN EXCELLENT FIT, BUT MAY SOMETIMES SUGGEST EXTREME RESISTIVITY VALUES. NOTE THAT DIFFERENT SOIL MODELS WILL USUALLY YIELD SIMILAR RESULTS FOR YOUR GROUNDING SYSTEM MODELS (I.E., GPR, TOUCH & STEP VOLTAGES), PROVIDED THAT THE GROUNDING SYSTEM IS LOCATED CLOSE TO THE EARTH SURFACE. IF IN DOUBT, CHECK YOUR RESULTS WITH BOTH SOIL MODELS.

End of Report #1


Imperial/Logarithmic X and Y
LEGEND
Measured Data
Computed Results Curve
Soil Model
Apparent Resistivity (Ohm-meters)
Inter-Electrode Spacing (feet)

Report #1

========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >==========

Run ID:.....: Chisago_RESAP_SW
System of Units .....: British
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated....: 3.11925 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

Layer Number	<--- LAYER CHARACTERISTICS ---> Resistivity (ohm-m)	Thickness (Feet)	Reflection Coefficient (p.u.)	Resistivity Contrast Ratio
1	Infinite	Infinite	0.0	1.0
2	28.93824	2.196288	-1.0000	0.1893E-1E
3	21.47310	4.218059	-0.24547	0.60382
4	28.31905	Infinite	0.13493	1.0141

WARNING MORE THAN ONE SOIL MODEL CAN PRODUCE SIMILAR APPARENT RESISTIVITY MEASUREMENT CURVES. IF YOU USE THE DEFAULT STEEPEST-DESCENT METHOD, THEN YOU WILL MOST OFTEN OBTAIN DECENT AGREEMENT BETWEEN MEASURED VALUES AND THE COMPUTED CURVE, WITH A REALISTIC SOIL MODEL; HOWEVER, THE FIT MAY OCCASIONALLY BE SUB-OPTIMAL. IN SUCH CASES, THE MARQUARDT METHOD WILL USUALLY YIELD AN EXCELLENT FIT, BUT MAY SOMETIMES SUGGEST EXTREME RESISTIVITY VALUES. NOTE THAT DIFFERENT SOIL MODELS WILL USUALLY YIELD SIMILAR RESULTS FOR YOUR GROUNDING SYSTEM MODELS (I.E., GPR, TOUCH & STEP VOLTAGES), PROVIDED THAT THE GROUNDING SYSTEM IS LOCATED CLOSE TO THE EARTH SURFACE. IF IN DOUBT, CHECK YOUR RESULTS WITH BOTH SOIL MODELS.

End of Report #1

Attachment B

Fault Current Data

** – Application Rating is a variable for each circuit breaker depending on the number and timing of automatic reclosures, X/R ratio, CB rating structure (asymmetrical or symmetrical), CB rated interrupting time, and contact parting time; all of which are included in the ASPEN Circuit Breaker Rating Module used for this study.

Short Circuit Data

The following table lists estimated short circuit currents and system equivalent impedances:

Quantity		Fault Location and System Configuration		
		Fault at 345kV Onion Station with (Blue Heron Solar, LLC- Online)	Fault at 345kV Onion Station with (Blue Heron Solar, LLC- Offline)	Fault at 115kV Onion Station with (Blue Heron Solar, LLC- Offline and the 345kV Line to Brown Switch out of service)
Three Phase	Fault Current (A)	13,772.9	12,795.1	3,650.3
	ANSI X/R	19.2372	18.9011	19.7844
Single Phase	Fault Current (A)	11,316.8	9,191.7	3,343.4
	ANSI X/R	20.3731	7.93675	12.3667
Equivalent Impedance (Ohms)	Positive Sequence	0.7598+j13.3449	0.91994+j15.94817	3.13388+j55.1189
	Zero Sequence	3.52635+j23.2861	7.09954+j33.2611	30.7764+j70.2416

Conclusion

Based on this study, there are no Onion Electric Delivery circuit breakers that will be over-duty as a result of Generation Interconnect Request# 24INR0333 & 24INR0331.

Attachment C

Ampacity Function Report

Ampacity Function Report

CDEGS Conductor Ampacity Calculation (per IEEE Standard 80)

Date:	7/11/2025
Time:	8:59:13 AM
Analysis Filename:	2025-07-11T085827
File Path:	C:\Users\Public\Documents\SES Software\My Projects
System of Units:	Metric
Temperature Units:	Celsius
Conductor Size Units:	AWG

Input Data:

Ambient Temperature:	25.00 °C
Maximum Allowable Temperature:	1083 °C
Conductor Type:	Copper annealed soft drawn (100% conductivity)
Frequency:	60.00 Hz

Fault Data:

Stage	Symmetrical RMS Current (kA)	Clearing Time (s)	X/R Ratio
1	12.4383	0.5	20.0

Material Constants of Conductor:

Conductor Type:	Copper annealed soft drawn (100% conductivity)
Reference Temperature for Material Constants:	20 °C
Thermal Coefficient of Resistivity at Reference Temperature:	0.0039 1/°C
Resistivity of Conductor at Reference Temperature:	1.720 μΩ-cm
Fusing Temperature of Conductor:	1083 °C
Thermal Capacity per Unit Volume:	3.4 J/(cm³·°C)

Computation Results:

Overall Asymmetrical RMS Current:	13.089 kA
[illegible]	83.907 AWG
	32.374 mm²
	0.0502 in²
	6.42 mm (Diameter - Solid Conductor)
	0.253 in (Diameter - Solid Conductor)

A #4 AWG, bare, stranded conductor has a diameter of approx. 0.232 inches.
A #3 AWG, bare, stranded conductor has a diameter of approx. 0.260 inches.

Stranded Bare Copper

CONSTRUCTION AT A GLANCE

CONDUCTOR TYPE 1
COPPER

APPLICATIONS

- Suitable for use in substations as uninsulated hook ups, jumpers, and grounds

CONSTRUCTION DETAILS

- Bare copper conductor
- Available in soft-drawn (annealed), medium-hard-drawn, or hard-drawn tempers
- Concentric-lay or combination unilay stranded, depending on stranding and temper

SPECIFICATIONS

Southwire's Bare Copper Conductor meets or exceeds applicable ASTM specifications:

- **B 1:** Hard-Drawn Copper Wire
- **B 2:** Medium-Hard-Drawn Copper Wire
- **B 3:** Soft or Annealed Copper Wire
- **B 8:** Concentric-Lay-Stranded Copper Conductor, Hard, Medium-Hard or Soft
- **B 787:** 19 Wire Combination Unilay-Stranded Copper Conductor

OPTIONS

- Solid (1 strand)
- Stranded (7, 19, 37, 61 strands)

0.253" conductor is between #4 and #3.

Size (AWG or kcmil)	Strand-ing	Strand-ing Class	Weight (lbs / 1000 ft)	Diameter (inches)		Hard Drawn		Medium-Hard Drawn		Soft Drawn (Annealed)		Allowable Ampacity*
				Individual	Complete Cable	Rated Strength (lbs)	R_{dc} @ 20°C (Ω / 1000 ft)	Rated Strength (lbs)	R_{dc} @ 20°C (Ω / 1000 ft)	Rated Strength (lbs)	R_{dc} @ 20°C (Ω / 1000 ft)	
8	7	B	51	0.040"	0.126"	777	0.6563	690	0.6629	495	0.6408	75
6	7	B	81	0.051"	0.184"	1236	0.4125	1098	0.4158	794	0.4020	100
4	7	A, B	129	0.097"	0.202"	1970	0.2600	1749	0.2622	1265	0.2534	135
3	7	A, B	164	0.087"	0.260"	2538	0.2060	2255	0.2079	1630	0.2010	155
2	7	A, B	205	0.040"	0.292"	3091	0.1660	2744	0.1640	2110	0.1578	180
1	7	A	259	0.139"	0.328"	3831	0.1316	3403	0.1329	2622	0.1253	205
1/0	7	A, AA	326	0.125"	0.368"	4752	0.1042	4220	0.1037	3221	0.1020	310
1/0	19	B	326	0.075"	0.373"	4752	0.1042	4220	0.1037	3221	0.1020	310
2/0	7	A, AA	411	0.139"	0.414"	5926	0.08327	4640	0.08352	4052	0.08156	355
2/0	19	B	411	0.084"	0.418"	6000	0.08327	4780	0.08352	4104	0.08216	355
3/0	7	A, AA	518	0.156"	0.464"	7366	0.06606	5862	0.06662	5103	0.06431	410
4/0	7	A, AA	653	0.174"	0.522"	9154	0.05239	7278	0.05317	6459	0.05089	480
4/0	19	B	653	0.106"	0.529"	9412	0.05330	7479	0.05317	6458	0.05089	480
250	19	A	772	0.115"	0.574"	11060	0.04440	8835	0.04438	7627	0.04275	530
250	37	B	772	0.080"	0.575"	11400	0.04401	8952	0.04439	7940	0.04403	530
300	19	A	926	0.126"	0.628"	13510	0.03697	10600	0.03698	9152	0.03563	590
350	19	A	1080	0.136"	0.679"	15760	0.03014	12400	0.03169	10680	0.03053	655
400	37	A, B	1544	0.116"	0.696"	17900	0.02310	14150	0.02318	12200	0.02225	810
450	37	A, AA	1736	0.123"	0.737"	20520	0.02053	16065	0.02063	13820	0.01978	915
500	37	A, B	1929	0.111"	0.778"	22800	0.01847	17850	0.01848	15340	0.01781	1040
1000	61	A, B	3856	0.126"	1.102"	44800	0.00970	35100	0.01109	30200	0.01068	1540

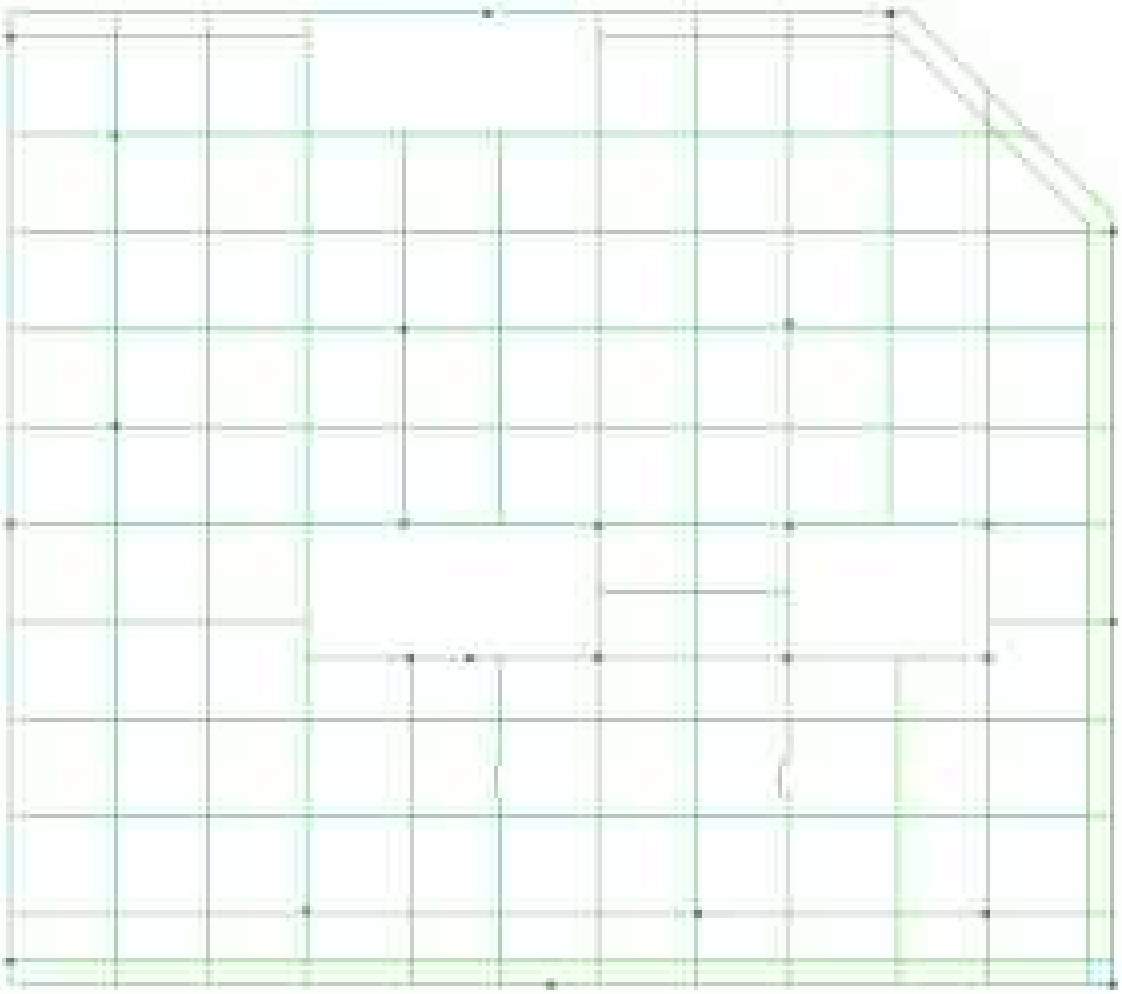
* Ampacities based on 30 °C conductor temperature, 40 °C ambient temperature, 24" clear, zone A wind.

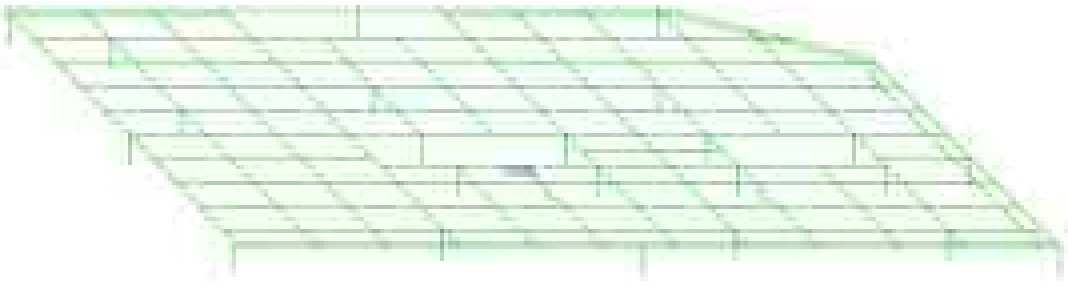
** Conductor stranding shown may not be available in every size. Consult your Southwire representative for availability and recommendations.

Dimensions and weights are nominal values and may vary slightly due to manufacturing tolerances.

Attachment D

Grid Model and Current Injection Point





Attachment E

MALZ Input File

Issued 08 March 2017 (v. 2.1 / March). 2 / Legal Count

Effective 01 April 2017 (v. 2.1 / 2.2).

Cost: Small — Time: 1 day
Risk: Low / Rev.: 2 / Used

Notice Publication Particulars
Book
Permanent Summary Register of Completed Transactions
Weight: Single-Entry Ledger Volume
Physical Dimensions: Height 11.7 Inches (3 Centimeters) by Width 8.3 Inches
Material Specs: 100 lb. Ivory Matte Text Paper
Composition Note: Typeset in Adobe Caslon Pro and Gill Sans

Community Forum Issue ——— Comments ——— Comments ——— Comments ——— Comments ——— Comments Event Code

Cost: $Bid — Used: 0
Item: Drivers_Small

Check Item Identification — Drivers_Small

Circles in Circle / 2 Settings (Timers)

Area Transaction Ledger — 30
Full Signature Ledger Volume — 2.1.00

1. Information and Ethics Coordinator or Executive Implementation Officer — Employee

Component Control

- Ethics Committee of Implementers
- Agile Delivery Plan to Eliminate

Coordinate Scope Item Issue Impact Determine Service Impact Team — Service 1 — Criteria

Information Team from Lawful Interest Interpretation — Employee

Assign Responsible Person Consistency — 30

Investigation Plan Into Impression Cost — Employee

Cost: $Bid — Used: 0
Item: Drivers_Small

Implementing Amendments and Interpretations

Information Management Procedures

1. Committee on Guidance

Committee Assignment

- Project Principles
- Amendment Principles
- Change Implementation Recommendations

2. Implementing Principles

Implementing Amendments

- Information on Guidance Recommendations — 0.0000000
- Development Costs to Current Implementation Issues — 0.0000000
- Guidance Comments Relevant Service Use — 0.0000

Service Improve Until, Implementation Team Execute Comments

Regular Comment Cost: 30

1. Committee, Principles

Committee Assignment

- Statement of Service Implication — 0.0000000
- Recommend Costs to Current Implementation Issues — 0.0000000
- Guidance Comments Relevant Service Use — 0.0000

Agenda: Comment Service Recommendation for Your Assignment Request and Notification

Implement Work Services Implementation & Assessment — 0.0000000 — Response — 0.0000000 — Comments — 0.0000000

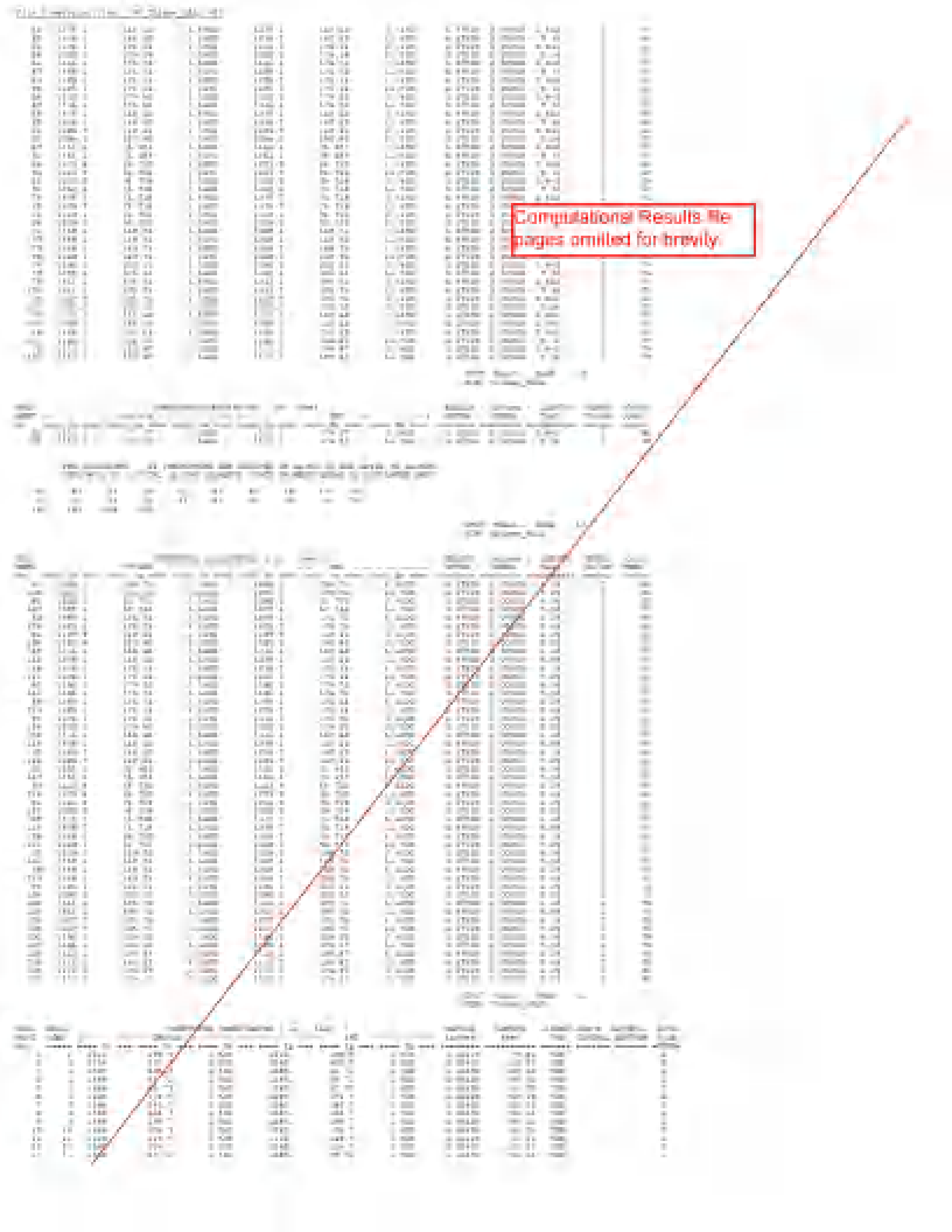
Cost: $Bid — Used: 0
Item: Drivers_Small

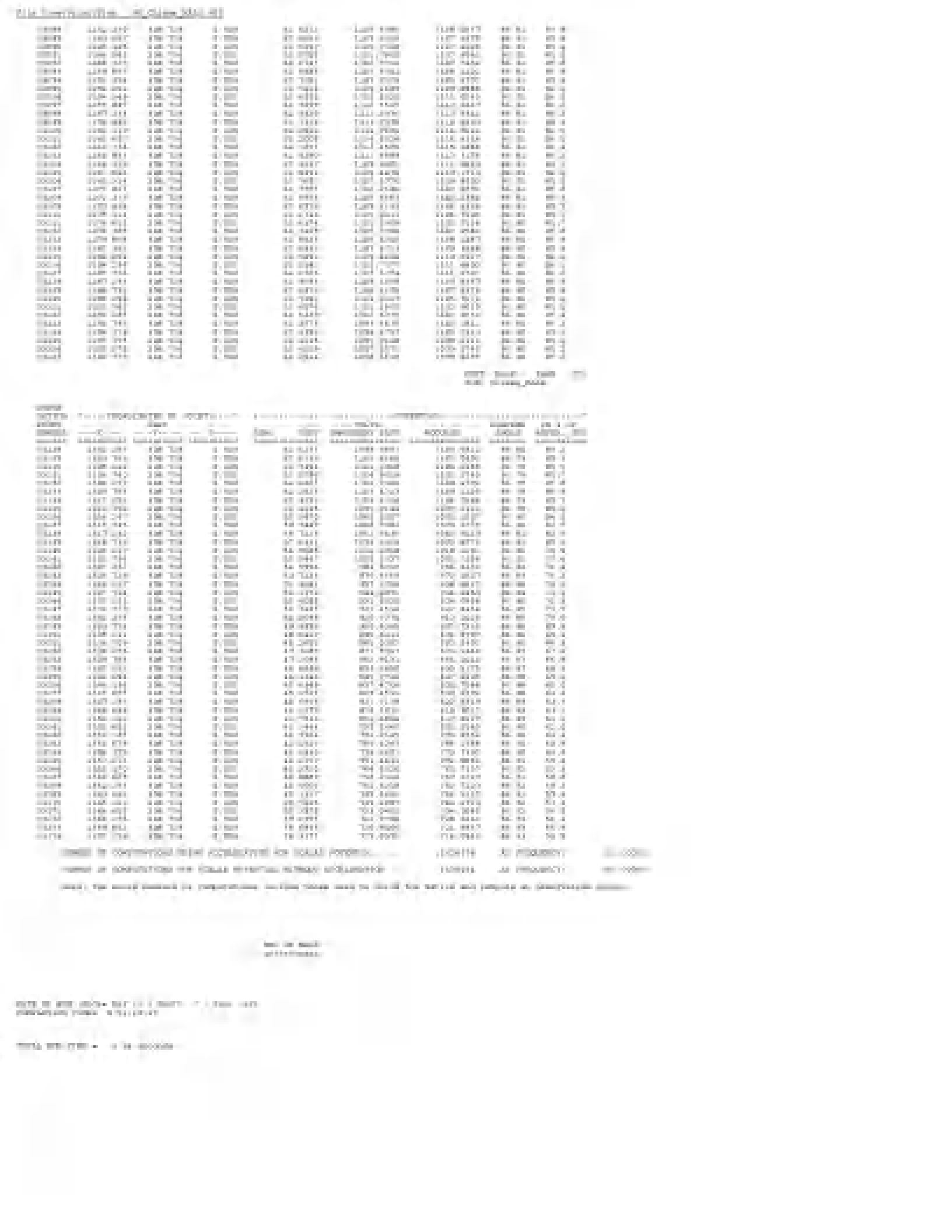
Implementation of Impact Interpretation Guidance

Issue Committee Notice Lawful Impact Interpretation

Issue — Implementation — Impact — Interpretation — Assessment
Implementation — Team — Recommendation Impact Implementation

Computational Results file pages omitted for brevity.


Computational Results file
pages omitted for brevity



Attachment F

Safety Calculations Table

Report #1

Safety Report

Date Of Run: [illegible] / Month: 3 / Year: 2026
Starting Time: 8:51:38.16

Touch Voltage Thresholds not Zone "Default"

Computed Touch Voltage.....| V |: 694.84

Main Computation Standard.....: IEEE 80(2)

Network Specifications

System Frequency	(Hertz)	60.0
Shock Duration	(Seconds)	0.50000
X/R Ratio		20.000
Computed Decrement Factor		1.0507

Site Data

Surface Layer Thickness	m	4.0000
Surface Layer Resistivity	(Ohm-m)	4000.0
Sub-Surface Layer Resistivity	(Ohm-m)	10.000
Foot Resistance Calculation Method		IEEE Std.80-2013
Computed Foot Resistance	Ohm per Foot	6456.7
User Defined Footwear Resistance	Ohm per Foot	0.0000
User Defined Glove Resistance	Ohm per Hand	0.0000

Human Data

Fibrillation Current Calculation		IEEE Std.80-2013 (70kg)
Fibrillation Current Value	A	0.1048
Body Resistance Calculation Method		IEEE Std.80-2013
Body Resistance Value	Ohm	1000.0

Step Voltage Threshold not Zone "Default Step"

Computed Step Voltage.....| V |: 2166.2

Main Computation Standard.....: IEEE Std.80

Network Specifications

System Frequency	(Hertz)	60.000
Shock Duration	(Seconds)	0.5000
X/R Ratio		20.000
Computed Decrement Factor		1.0507

Site Data

Surface Layer Thickness	m	4.0000
Surface Layer Resistivity	(Ohm-m)	4000.0
Sub-Surface Layer Resistivity	(Ohm-m)	10.000
Foot Resistance Calculation Method		IEEE Std.80-2013
Computed Foot Resistance	Ohm per Foot	6456.7
User Defined Footwear Resistance	Ohm per Foot	0.0000
User Defined Glove Resistance	Ohm per Hand	0.0000

HUMAN DATA

Fibrillation Current Calculation		IEEE Std.80-2013 (70kg)
Fibrillation Current Value	A	0.1048
Body Resistance Calculation Method		IEEE Std.80-2013
Body Resistance Value	Ohm	1000.0

End of Report #1

Attachment G

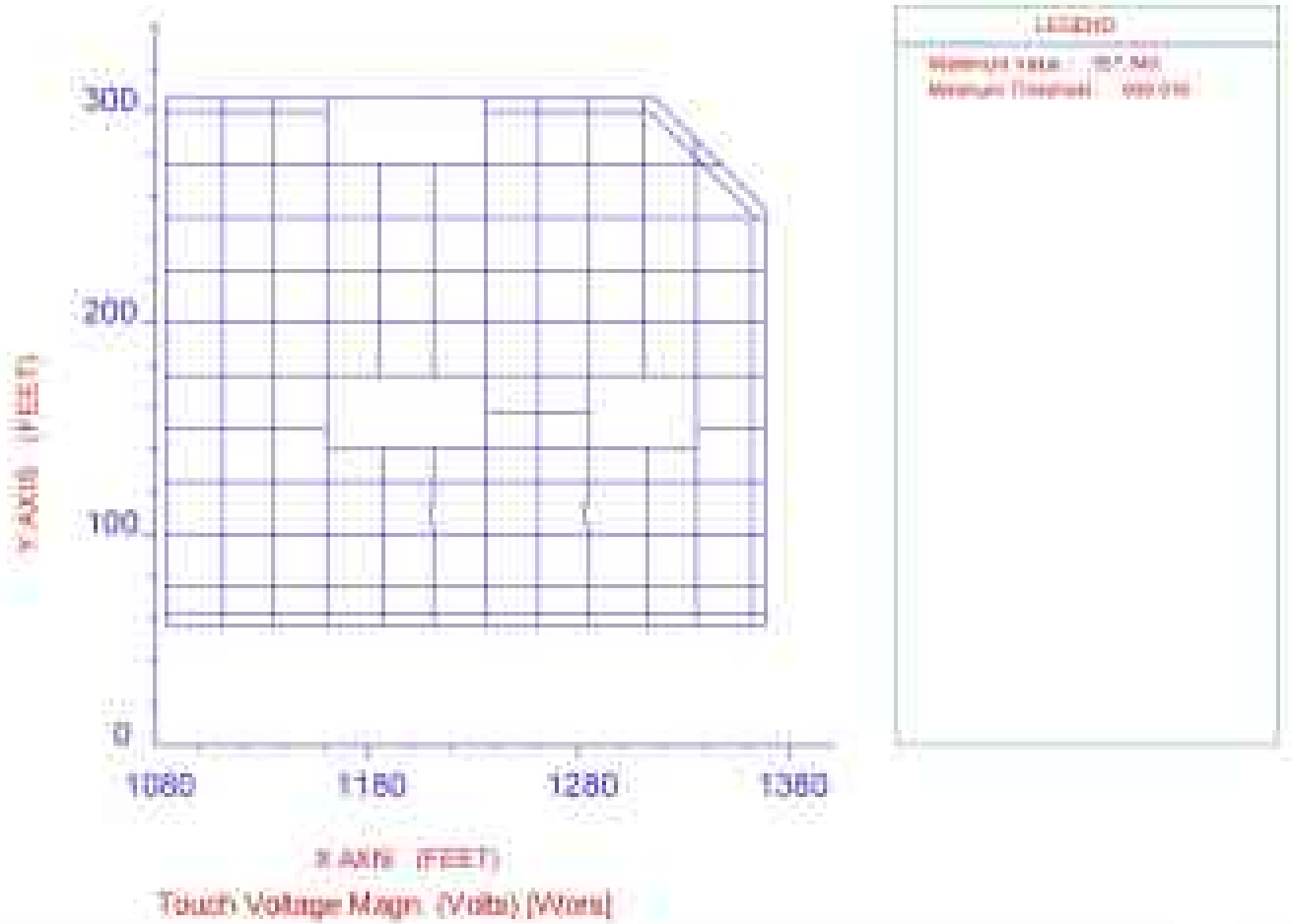
MALZ Output File

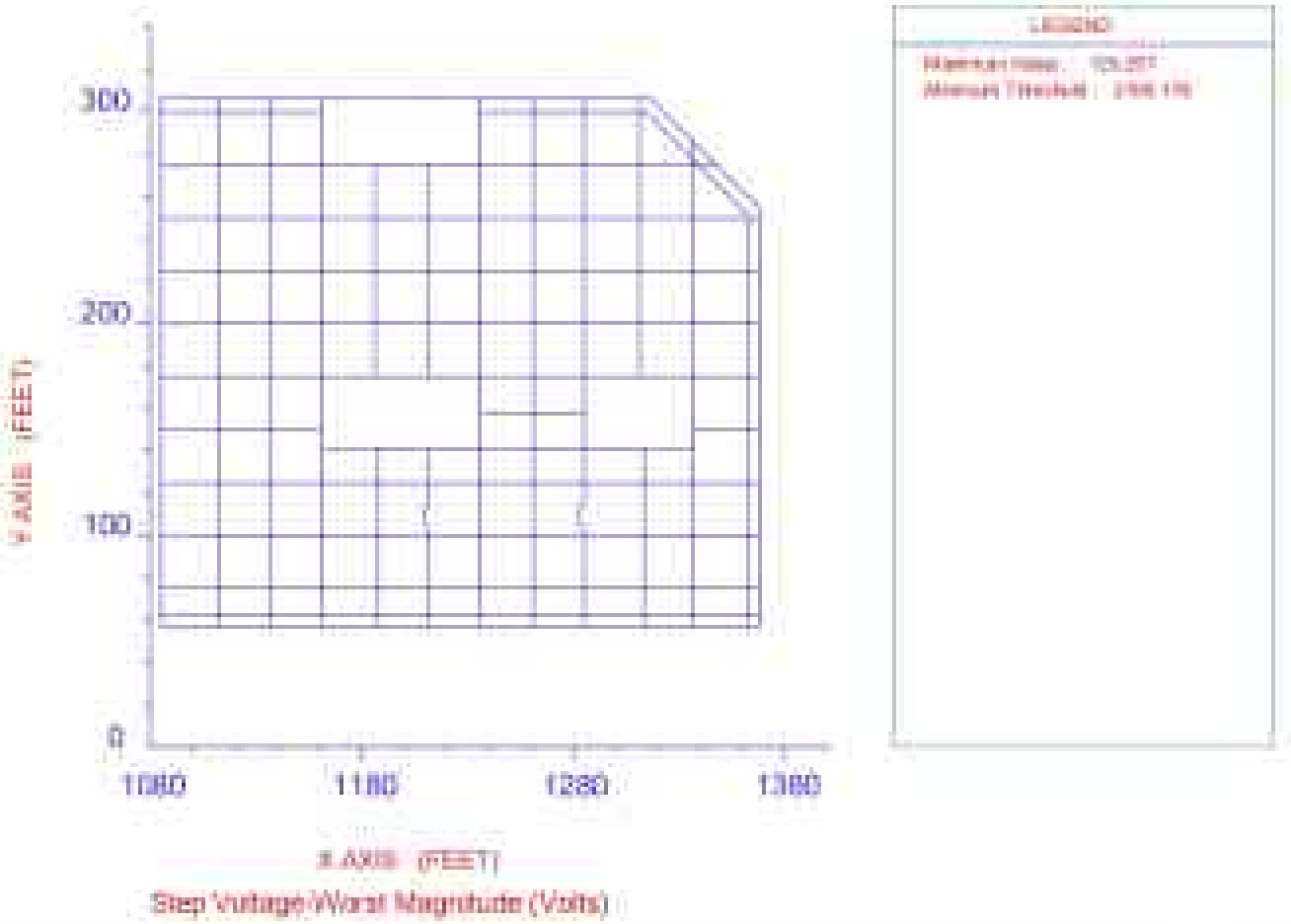
```
DATE OF RUN (Start)= DAY 11 / Month  7 / Year 2025
STARTING TIME=  0:51:51:09


==========< M A L Z        | SYSTEM INFORMATION SUMMARY | >==========

Run ID.....................................: Chisma_MALZ
System of Units ...........................: English
Earth Potential/Magnetic Field Calculations : Potentials
Number of Energization Source Busses .....:     1
 Current Injected in Reference Source Bus....: 510.276 + j12430.5 Amps
Energization Scaling Factor (SPLITS/VOCING/specified)..:   1.0000
Number of Original Conductors .............:     80
Number of Frequency Values to be Analyzed...:     1
Power Source Frequency.....................:   60.000     Hertz
Impedance Values are Based On..............:   60.000     Hertz
Total Length of Conductor Network..........:   4961.3     Feet
1

CHARACTERISTICS OF MEDIA SURROUNDING NETWORK
--------------------------------------------

AIR LAYER :  Resistivity.............:  0.100000E+13 ohm-meters
             Relative Permittivity..:   1.00300
             Relative Permeability..:   1.00300

>>> SOIL TYPE : Multi-Layer Horizontal

LAYER RESISTIVITY  |------- RELATIVE --------|   THICKNESS
 No.  (Ohm-meter) Permittivity Permeability     (Feet)
----- ------------ ------------ ------------ ------------
    1   38.9400       1.00000       1.00000       2.20000
    2   34.4400       1.00000       1.00000       4.22000
    3   28.5200       1.00000       1.00000      Infinite
1

Case Number................................:     1
Frequency for This Case....................:   60.000     Hertz
GPR at Reference Source Bus (E  1)...Magn..:   1191.298     Volts
                                    Angle..:    -89.84029     degrees

Impedance of Grounding System.........Magn..:   0.1037315     Ohms
                                    Angle..:    2.650291     degrees
```

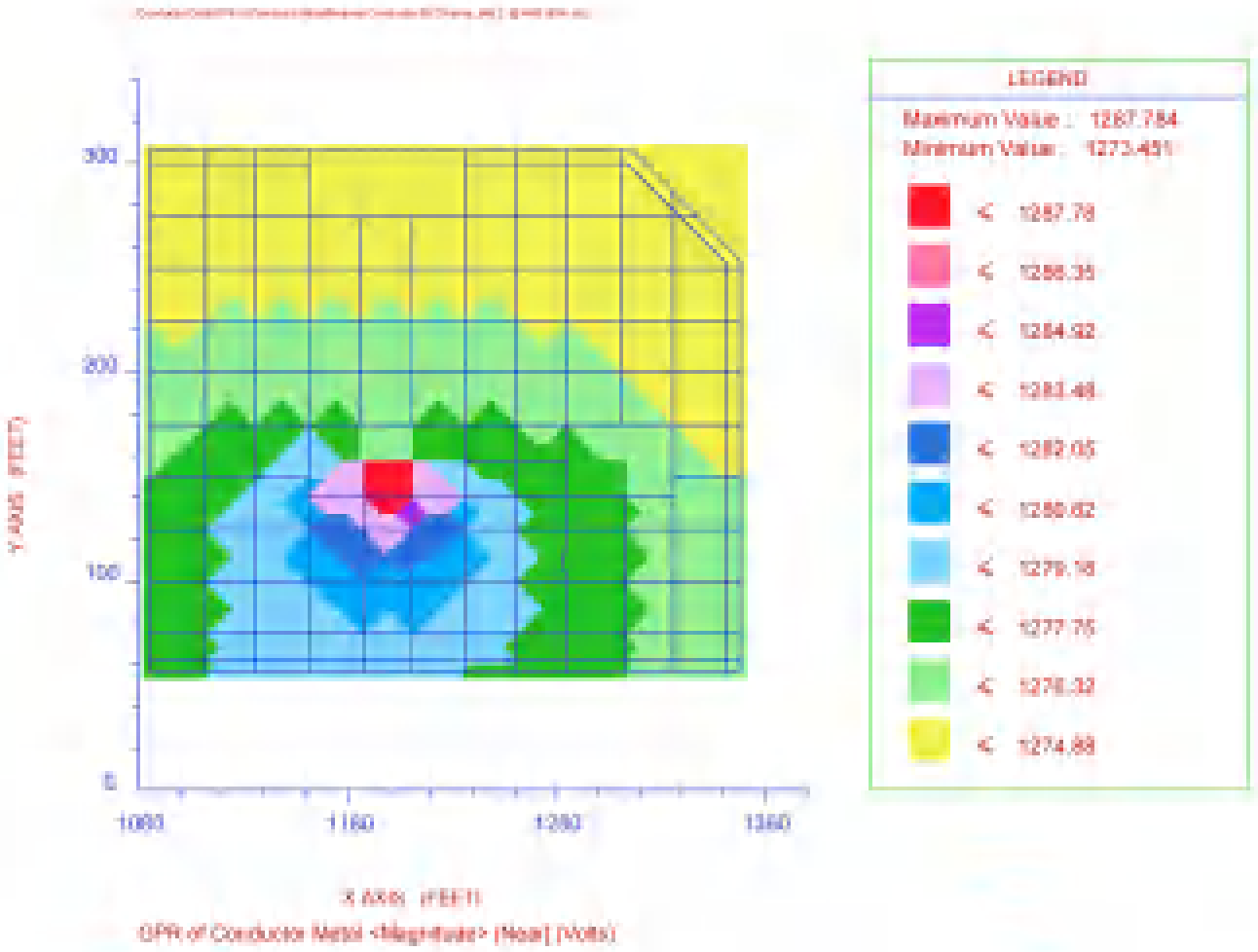
Attachment H

Voltage Plots, consisting of:

a. Touch Voltage Magnitudes across Yard, with tolerable level set as threshold (Summer)
b. Step Voltage Magnitudes across Yard, with tolerable level set as threshold (Summer)
c. Grid Potential Rise across Yard (Summer)


LEGEND
300
200
100
0
1080
1180
1280
1380
Y AXIS (FEET)
X AXIS (FEET)
Touch Voltage Magn. (Volts) [Worst]


LEGEND
300
200
100
0
1080
1180
1280
1380
Y AXIS (FEET)
X AXIS (FEET)
Step Voltage/Worst Magnitude (Volts)


LEGEND
Maximum Value : 1287.784
Minimum Value : 1273.451
< 1287.78
< 1286.35
< 1284.92
< 1283.48
< 1282.05
< 1280.62
< 1279.19
< 1277.75
< 1276.32
< 1274.89
300
200
100
0
1080
1180
1280
1380
Y AXIS (FEET)
X AXIS (FEET)
GPR of Conductor Metal <Magnitude> [Real] (Volts)

EQUIPMENT AND DEVICE LEGEND

27	UNDERVOLTAGE AC RELAY
50	PHASE INSTANTANEOUS OVERCURRENT RELAY
51	PHASE TIME OVERCURRENT RELAY
50G	GROUND INSTANTANEOUS OVERCURRENT RELAY
51G	GROUND TIME OVERCURRENT RELAY
52	CIRCUIT BREAKER
59	OVERVOLTAGE AC RELAY
63	TRANSFORMER SUDDEN PRESSURE RELAY
81	FREQUENCY RELAY
86	LOCKOUT RELAY
87	DIFFERENTIAL RELAY
89	DISCONNECT SWITCH

POWER BUS
AC SENSING
DC TRIP
COMMUNICATIONS

PHASE SEQUENCE A-B-C CCW
(TBC)

NOTES:

1. DESIGN BASED ON THE FOLLOWING INCOMING LINE PARAMETERS:
   A. A-B-C PHASING WITH TERMINATION TO MATCH TRANSFORMER H1-H2-H3 BUSHINGS. UTILITY INCOMING PHASING IS A-B-C OCW (ASSUMED) (TBC).
   B. TO MATCH INCOMING PHASING, PHASE ROTATION IN THE RELAYS WILL BE SET ABC.
2. THE MAXIMUM AVAILABLE FAULT CURRENTS FOR THE 345KV SYSTEM ARE 13,773A (THREE PHASE) AND 11,317A (SINGLE PHASE LINE TO GROUND).
3. SYSTEM OPERATING VOLTAGE IS NOMINALLY 345KV IN A NORMAL RANGE OF 0.95-1.05 p.u. (TBC)
4. DESIGN IS BASED ON TRANSFORMER FULL LOAD RATING OF 200MVA AT 65 DEGREE C.
5. WSL METER, CT'S AND PT'S TO BE PROVIDED BY ONCOR (TBC).

TO POI 345KV TAP @ ONCOR GOBBERS KNOB SWITCH

89L1 345KV, 2000A GOAB

52L1 345KV, 2000A, 40KAI

220KV MCOV

89T1 345KV, 2000A GOAB

52T1 345KV, 2000A, 40KAI

220KV MCOV

T1 345-34.5-13.8KV 120/160/200 MVA ONAN/ONAF1/ONAF2 8.5% IMPEDANCE (H-X) OLTC: ±16 STEPS @ 0.625% EA

NEUTRAL GROUNDING REACTOR 0.5 Ω, 600A 25KAI, 10 SEC (TBC)

29KV MCOV

PT-1 20,125/34,500GY-115/67.08V 175/300:1:1, 0.3 WXY

SST-1 75KVA, 19,920-240/120V, 1Φ, 3W

DISC-1A 400A MAX. W/400A FUSE (AT SST-1)

FU-2 (3) SMD-20 (1A)

FU-1 (1) SMD-20 (5E)

CONTROL BUILDING

DISC-1B 400A MAX. W/400A FUSE

ATS 400A 240V

DISC-1C 400A MAX. W/400A FUSE

TO BACKUP POWER SOURCE, 120/240V

TO 120/240VAC AC PANEL-ACP1

TO 120/240VAC AC PANEL-ACP2

89T1B 34.5KV, 4000A GOAB

89T1C 34.5KV, 4000A GOAB, NORMALLY OPEN

WSL METERING ENCLOSURE

SEE NOTE 5

89F11 34.5KV, 1200A HOOKSTICK — 52F11 38KV, 1200A, 40KAI (TBD)

89F12 34.5KV, 1200A HOOKSTICK — 52F12 38KV, 1200A, 40KAI (TBD)

89F13 34.5KV, 1200A HOOKSTICK — 52F13 38KV, 1200A, 40KAI (TBD)

89F11A1 / 89F11A2 34.5KV, 1200A HOOKSTICK

89F12A1 / 89F12A2 34.5KV, 1200A HOOKSTICK

89F13A1 / 89F13A2 34.5KV, 1200A HOOKSTICK

FEEDER F11A1 SOLAR FEEDER

FEEDER F11A2 SOLAR FEEDER

FEEDER F12A1 SOLAR FEEDER

FEEDER F12A2 SOLAR FEEDER

FEEDER F13A1 SOLAR FEEDER

FEEDER F13A2 SOLAR FEEDER

CVT1 (3) 207,000-115/69V 1800/3000:1:1 0.15 WXMYZ, 1000VA

89T2 345KV, 2000A GOAB

52T2 345KV, 2000A, 40KAI

220KV MCOV

T2 345-34.5-13.8KV 120/160/200 MVA ONAN/ONAF1/ONAF2 8.5% IMPEDANCE (H-X) OLTC: ±16 STEPS @ 0.625% EA

NEUTRAL GROUNDING REACTOR 0.5 Ω, 600A 25KAI, 10 SEC (TBC)

29KV MCOV

PT-2 20,125/34,500GY-115/67.08V 175/300:1:1, 0.3 WXY

FU-3 (3) SMD-20 (1A)

89T2B 34.5KV, 4000A GOAB

89F21 34.5KV, 1200A HOOKSTICK — 52F21 38KV, 1200A, 40KAI (TBD)

89F22 34.5KV, 1200A HOOKSTICK — 52F22 38KV, 1200A, 40KAI (TBD)

89F23 34.5KV, 1200A HOOKSTICK — 52F23 38KV, 1200A, 40KAI (TBD)

89F21A1 / 89F21A2 34.5KV, 1200A HOOKSTICK

89F22A1 / 89F22A2 34.5KV, 1200A HOOKSTICK

89F23A1 / 89F23A2 34.5KV, 1200A HOOKSTICK

FEEDER F21A1 BESS FEEDER

FEEDER F21A2 BESS FEEDER

FEEDER F22A1 BESS FEEDER

FEEDER F22A2 BESS FEEDER

FEEDER F23A1 BESS FEEDER

FEEDER F23A2 BESS FEEDER

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	07/21/25	60% DESIGN REVIEW	KWN	MG	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	12/11/24
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701 345/34.5kV SUBSTATION

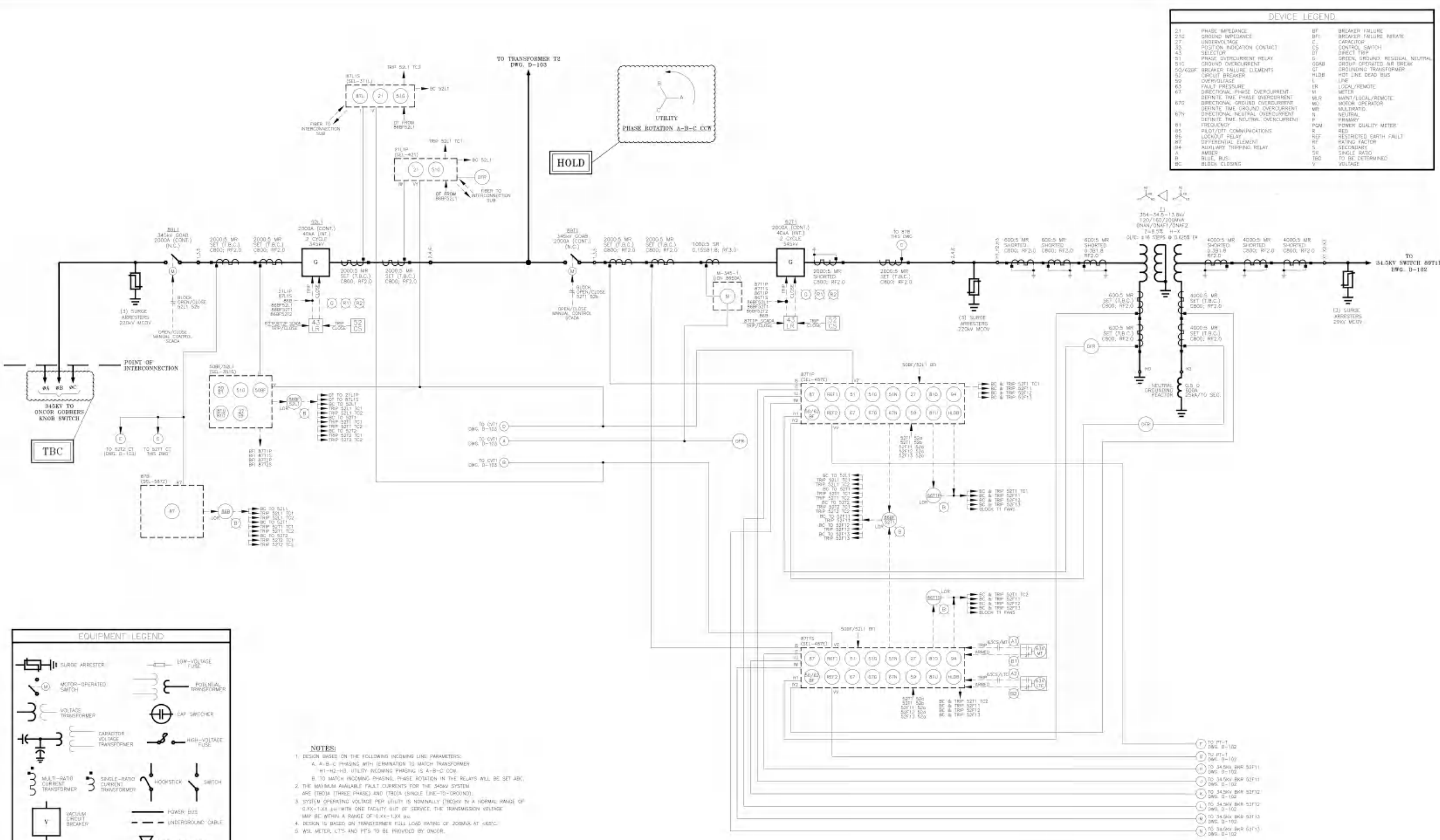
TITLE: POWER ONE LINE - SWITCHING DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-100

JOB NUMBER: 24144-01

DRAWING NUMBER: 100



NOTES:

1. DESIGN BASED ON THE FOLLOWING INCOMING LINE PARAMETERS:
   A. A-B-C PHASING WITH TERMINATION TO MATCH TRANSFORMER H1-H2-H3. UTILITY INCOMING PHASING IS A-B-C CCW.
   B. TO MATCH INCOMING PHASING, PHASE ROTATION IN THE RELAYS WILL BE SET ABC.
2. THE MAXIMUM AVAILABLE FAULT CURRENTS FOR THE 345kV SYSTEM ARE (TBD)A (THREE-PHASE) AND (TBD)A (SINGLE LINE-TO-GROUND).
3. SYSTEM OPERATING VOLTAGE PER UTILITY IS NOMINALLY (TBD)kV IN A NORMAL RANGE OF 0.XX–1.XX p.u. WITH ONE FACILITY OUT OF SERVICE, THE TRANSMISSION VOLTAGE MAY BE WITHIN A RANGE OF 0.XX–1.XX p.u.
4. DESIGN IS BASED ON TRANSFORMER FULL LOAD RATING OF 200MVA AT <65°C.
5. WSL METER, CT'S AND PT'S TO BE PROVIDED BY ONCOR.

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

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RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

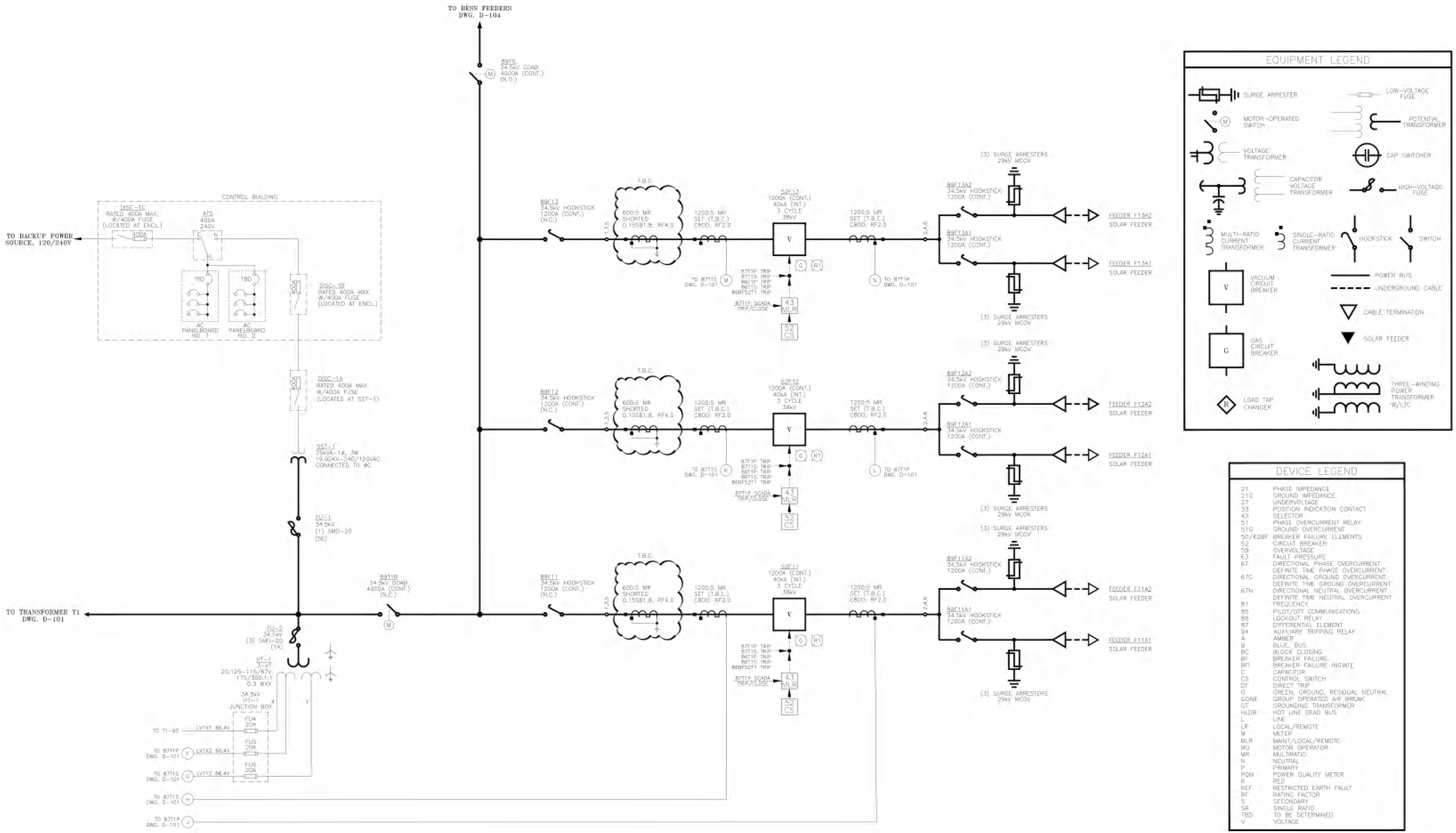
TITLE: SUBSTATION SINGLE LINE DIAGRAM

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-101

JOB NUMBER: 24144-01

DRAWING NUMBER: 101



DEVICE LEGEND

21	PHASE IMPEDANCE
21G	GROUND IMPEDANCE
27	UNDERVOLTAGE
33	POSITION INDICATION CONTACT
43	SELECTOR
51	PHASE OVERCURRENT RELAY
51G	GROUND OVERCURRENT
50/62BF	BREAKER FAILURE ELEMENTS
52	CIRCUIT BREAKER
59	OVERVOLTAGE
63	FAULT PRESSURE
67	DIRECTIONAL PHASE OVERCURRENT
	DEFINITE TIME PHASE OVERCURRENT
67G	DIRECTIONAL GROUND OVERCURRENT
	DEFINITE TIME GROUND OVERCURRENT
67N	DIRECTIONAL NEUTRAL OVERCURRENT
	DEFINITE TIME NEUTRAL OVERCURRENT
81	FREQUENCY
85	PILOT/DTT COMMUNICATIONS
86	LOCKOUT RELAY
87	DIFFERENTIAL ELEMENT
94	AUXILIARY TRIPPING RELAY
A	AMBER
B	BLUE, BUS
BC	BLOCK CLOSING
BF	BREAKER FAILURE
BFI	BREAKER FAILURE INITIATE
C	CAPACITOR
CS	CONTROL SWITCH
DT	DIRECT TRIP
G	GREEN, GROUND, RESIDUAL NEUTRAL
GDAB	GROUP OPERATED AIR BREAK
GT	GROUNDING TRANSFORMER
HLDB	HOT LINE DEAD BUS
L	LINE
LR	LOCAL/REMOTE
M	METER
MLR	MAINT/LOCAL/REMOTE
MO	MOTOR OPERATOR
MR	MULTIRATIO
N	NEUTRAL
P	PRIMARY
POM	POWER QUALITY METER
R	RED
REF	RESTRICTED EARTH FAULT
RF	RATING FACTOR
S	SECONDARY
SR	SINGLE RATIO
TBD	TO BE DETERMINED
V	VOLTAGE

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	GDK	GDK	SRH

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION SINGLE LINE DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-102
JOB NUMBER	24144-01
DRAWING NUMBER	102

DEVICE LEGEND

21	PHASE IMPEDANCE	BF	BREAKER FAILURE
21G	GROUND IMPEDANCE	BFI	BREAKER FAILURE INITIATE
27	UNDERVOLTAGE	C	CAPACITOR
33	POSITION INDICATION CONTACT	CS	CONTROL SWITCH
43	SELECTOR	DT	DIRECT TRIP
51	PHASE OVERCURRENT RELAY	G	GREEN, GROUND, RESIDUAL NEUTRAL
51G	GROUND OVERCURRENT	GOAB	GROUP OPERATED AIR BREAK
50/62BF	BREAKER FAILURE ELEMENTS	GT	GROUNDING TRANSFORMER
52	CIRCUIT BREAKER	HLDB	HOT LINE DEAD BUS
59	OVERVOLTAGE	L	LINE
63	FAULT PRESSURE	LR	LOCAL/REMOTE
67	DIRECTIONAL PHASE OVERCURRENT	M	METER
	DEFINITE TIME PHASE OVERCURRENT	MLR	MAINT/LOCAL/REMOTE
67G	DIRECTIONAL GROUND OVERCURRENT	MO	MOTOR OPERATOR
	DEFINITE TIME GROUND OVERCURRENT	MR	MULTIRATIO
67N	DIRECTIONAL NEUTRAL OVERCURRENT	N	NEUTRAL
	DEFINITE TIME NEUTRAL OVERCURRENT	P	PRIMARY
81	FREQUENCY	PQM	POWER QUALITY METER
85	PILOT/DTT COMMUNICATIONS	R	RED
86	LOCKOUT RELAY	REF	RESTRICTED EARTH FAULT
87	DIFFERENTIAL ELEMENT	RF	RATING FACTOR
94	AUXILIARY TRIPPING RELAY	S	SECONDARY
A	AMBER	SR	SINGLE RATIO
B	BLUE, BUS	TBD	TO BE DETERMINED
BC	BLOCK CLOSING	V	VOLTAGE

EQUIPMENT LEGEND

- SURGE ARRESTER
- LOW-VOLTAGE FUSE
- MOTOR-OPERATED SWITCH
- POTENTIAL TRANSFORMER
- VOLTAGE TRANSFORMER
- CAP SWITCHER
- CAPACITOR VOLTAGE TRANSFORMER
- HIGH-VOLTAGE FUSE
- MULTI-RATIO CURRENT TRANSFORMER
- SINGLE-RATIO CURRENT TRANSFORMER
- HOOKSTICK SWITCH
- V — VACUUM CIRCUIT BREAKER
- POWER BUS
- UNDERGROUND CABLE
- CABLE TERMINATION
- SOLAR FEEDER
- G — GAS CIRCUIT BREAKER
- R — LOAD TAP CHANGER
- THREE-WINDING POWER TRANSFORMER W/LTC

EXT1 3-CVT 207,000-115/66Vac 1800/3000:1:1 X&Y; 0.15MWXYZ, 1000VA

89T2 345kV GOAB 2000A (CONT.) (N.C.)

BLOCK OPEN/CLOSE 52T2 52b

OPEN/CLOSE MANUAL CONTROL SCADA

2000:5 MR SET (T.B.C.) C800; RF2.0

2000:5 MR SET (T.B.C.) C800; RF2.0

1000:5 SR 0.15SB1.8; RF3.0

M-345-2 (ION 8650A)

52T2 2000A (CONT.) 40kA (INT.) 2 CYCLE 345kV

87T2P 87T2S 86T2P 86T2S 86BF52L1 86BF52T2 86B

87T2P SCADA TRIP/CLOSE

TRIP CLOSE

43 LR

TRIP CLOSE 52 CS

2000:5 MR SHORTED C800; RF2.0

TO B7R DWG. D-101

2000:5 MR SET (T.B.C.) C800; RF2.0

(3) SURGE ARRESTERS 220kV MCOV

600:5 MR SHORTED C800; RF2.0

600:5 MR SHORTED C800; RF2.0

600:5 MR SHORTED C800; RF2.0

T2 354-34.5-13.8kV 120/160/200MVA ONAN/ONAF1/ONAF2 Z=8.5% H-X OLTC:±16 STEPS @ 0.625% EA

4000:5 MR SHORTED C800; RF2.0

4000:5 MR SHORTED C800; RF2.0

4000:5 MR SHORTED C800; RF2.0

(3) SURGE ARRESTERS 29kV MCOV

TO 34.5kV SWITCH 89T2B DWG. D-104

600:5 MR SET (T.B.C.) C800; RF2.0

600:5 MR SET (T.B.C.) C800; RF2.0

4000:5 MR SET (T.B.C.) C800; RF2.0

4000:5 MR SET (T.B.C.) C800; RF2.0

DFR

DFR

NEUTRAL GROUNDING REACTOR

0.5 Ω 600A 25kA/10 SEC.

345kV CVT1 JUNCTION BOX

FU1 20A HV1X2 67.05V

FU2 20A HV1Y1 115V

FU3 20A HV1Y2 67.05V

TO 87T1S, B7L13 DWG. D-101

TO DFR, M-345-1 DWG. D-101

TO 87T1P, 21L1P, 50BF/52L1 DWG. D-101

87T2P (SEL-487E) 87 REF1 51 51G 51N 27 81O 94 50/62 BF REF2 67 67G 67N 59 81U HLDB

50BF/52L1 BFI

BC & TRIP 52T2 TC1 BC & TRIP 52F21 BC & TRIP 52F22 BC & TRIP 52F23

52T2 52a 52T2 52b 52F21 52a 52F22 52a 52F23 52a

BC TO 52L1 TRIP 52L1 TC1 TRIP 52L1 TC2 BC TO 52F1 TRIP 52F1 TC1 TRIP 52F1 TC2 BC TO 52T2 TRIP 52T2 TC1 TRIP 52T2 TC2 BC TO 52F21 TRIP 52F21 BC TO 52F22 TRIP 52F22 BC TO 52F23 TRIP 52F23

86BF 52T2

86T2P LOR B

BC & TRIP 52T2 TC1 BC & TRIP 52F21 BC & TRIP 52F22 BC & TRIP 52F23 BLOCK T2 FANS

86T2S LOR B

BC & TRIP 52T2 TC2 BC & TRIP 52F21 BC & TRIP 52F22 BC & TRIP 52F23 BLOCK T2 FANS

87T2S (SEL-487E) 87 REF1 51 51G 51N 27 81O 94 50/62 BF REF2 67 67G 67N 59 81U HLDB

50BF/52L1 BFI

TRIP 63QS/MT ARMED 63X MT

TRIP 63QS/LTC ARMED 63X LTC

A1 B1 A2 B2

52T2 52a 52T2 52b 52F21 52a 52F22 52a 52F23 52a

BC & TRIP 52T2 TC2 BC & TRIP 52F21 BC & TRIP 52F22 BC & TRIP 52F23

S TO PT-2 DWG. D-104

T TO PT-2 DWG. D-104

W TO 34.5kV BKR 52F21 DWG. D-104

X TO 34.5kV BKR 52F21 DWG. D-104

Y TO 34.5kV BKR 52F22 DWG. D-104

Z TO 34.5kV BKR 52F22 DWG. D-104

AA TO 34.5kV BKR 52F23 DWG. D-104

BB TO 34.5kV BKR 52F23 DWG. D-104

TO 345kV MAIN BUS DWG. D-101

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

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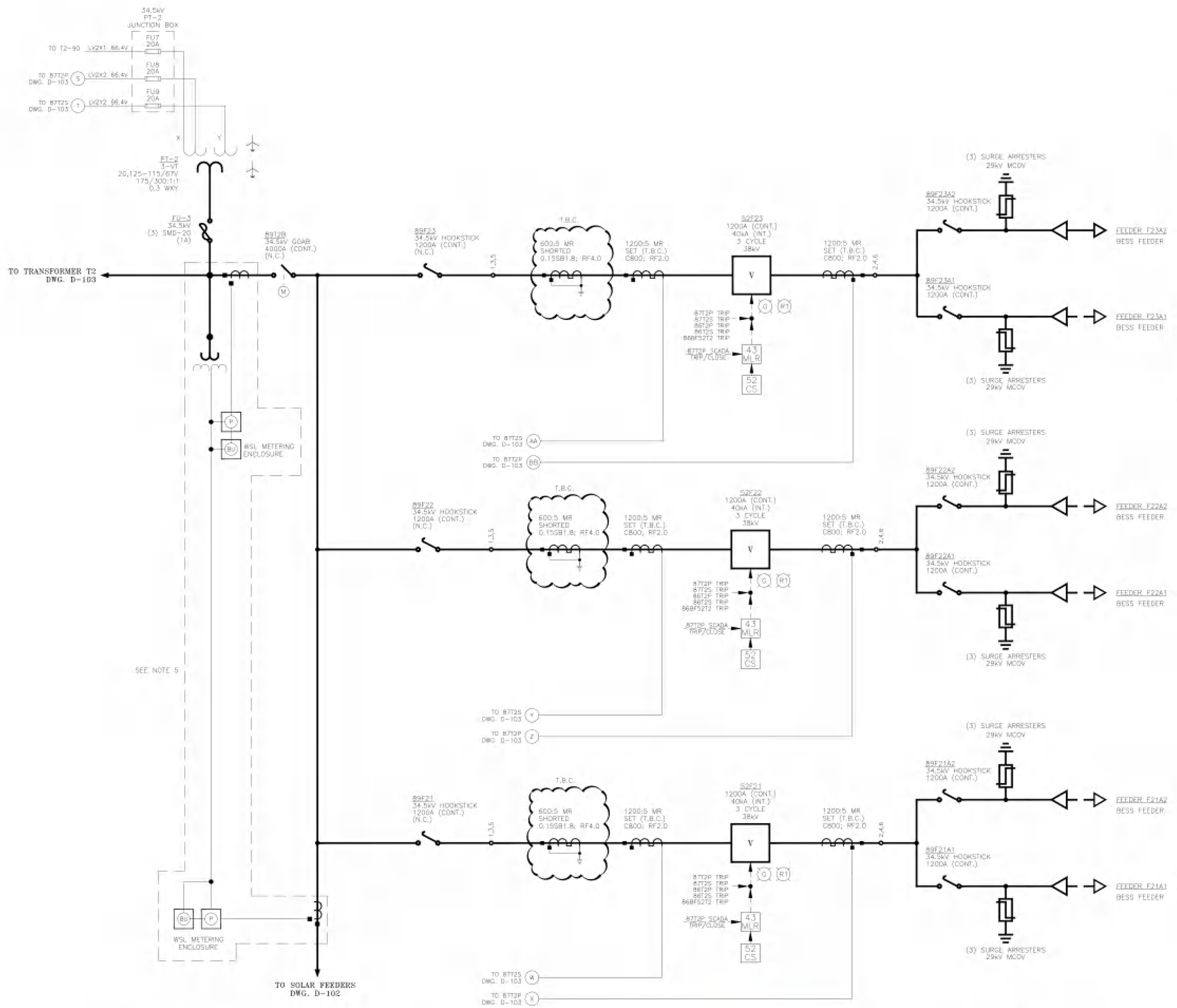
SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: SUBSTATION SINGLE LINE DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-103
JOB NUMBER	24144-01
DRAWING NUMBER	103



EQUIPMENT LEGEND

- SURGE ARRESTER
- LOW-VOLTAGE FUSE
- MOTOR-OPERATED SWITCH
- POTENTIAL TRANSFORMER
- VOLTAGE TRANSFORMER
- CAP SWITCHER
- CAPACITOR VOLTAGE TRANSFORMER
- HIGH-VOLTAGE FUSE
- MULTI-RATIO CURRENT TRANSFORMER
- SINGLE-RATIO CURRENT TRANSFORMER
- HOOKSTICK
- SWITCH
- VACUUM CIRCUIT BREAKER
- POWER BUS
- UNDERGROUND CABLE
- GAS CIRCUIT BREAKER
- CABLE TERMINATION
- SOLAR FEEDER
- LOAD TAP CHANGER
- THREE-WINDING POWER TRANSFORMER W/LTC

DEVICE LEGEND

21	PHASE IMPEDANCE
21G	GROUND IMPEDANCE
27	UNDERVOLTAGE
33	POSITION INDICATION CONTACT
43	SELECTOR
51	PHASE OVERCURRENT RELAY
51G	GROUND OVERCURRENT
50/62BF	BREAKER FAILURE ELEMENTS
52	CIRCUIT BREAKER
59	OVERVOLTAGE
63	FAULT PRESSURE
67	DIRECTIONAL PHASE OVERCURRENT DEFINITE TIME PHASE OVERCURRENT
67G	DIRECTIONAL GROUND OVERCURRENT DEFINITE TIME GROUND OVERCURRENT
67N	DIRECTIONAL NEUTRAL OVERCURRENT DEFINITE TIME NEUTRAL OVERCURRENT
81	FREQUENCY
85	PILOT/DTT COMMUNICATIONS
86	LOCKOUT RELAY
87	DIFFERENTIAL ELEMENT
94	AUXILIARY TRIPPING RELAY
A	AMBER
B	BLUE, BUS
BC	BLOCK CLOSING
BF	BREAKER FAILURE
BFI	BREAKER FAILURE INITIATE
C	CAPACITOR
CS	CONTROL SWITCH
DT	DIRECT TRIP
G	GREEN, GROUND, RESIDUAL NEUTRAL
GOAB	GROUP OPERATED AIR BREAK
GT	GROUNDING TRANSFORMER
HLDB	HOT LINE DEAD BUS
L	LINE
LR	LOCAL/REMOTE
M	METER
MLR	MAINT/LOCAL/REMOTE
MO	MOTOR OPERATOR
MR	MULTIRATIO
N	NEUTRAL
P	PRIMARY
PQM	POWER QUALITY METER
R	RED
REF	RESTRICTED EARTH FAULT
RF	RATING FACTOR
S	SECONDARY
SR	SINGLE RATIO
TBD	TO BE DETERMINED
V	VOLTAGE

REV	DATE	DESCRIPTION	DRN	CK'D	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	GDK	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701 345/34.5kV SUBSTATION

TITLE: SUBSTATION SINGLE LINE DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-104

JOB NUMBER: 24144-01

DRAWING NUMBER: 104

TO 345kV 52T1 & 52T2 CIRCUIT BREAKERS DWG. D-111

345kV CVT1 JUNCTION BOX

CVT1 3-CVT 207,000-115/69V 1800/3000:1:1 X&Y: 0.15MWXY2, 1000VA

2000:5 MR SET (T.B.C) C800; RF2.0

345kV CIRCUIT BREAKER 52L1 2000A (CONT.) 40kA (INT.) 2 CYCLE

2000:5 MR SET (T.B.C) C800; RF2.0

2000:5 MR SET (T.B.C) C800; RF2.0

2000:5 MR SET (T.B.C) C800; RF2.0

89L1 345kV GOAB 2000A (CONT.) (N.C.)

(3) SURGE ARRESTERS 220kV MCOV

ØA ØB ØC

345kV TO ONCOR GOBBERS KNOB SWITCH

TBC

TO M-345-1 (ION 8650A) DWG. D-111

TO M-345-2 (ION 8650A) DWG. D-111

TO 50BF/52L1 (SEL-351S) THIS DWG.

TO 87T1P (SEL-487E) DWG. D-112

TO 21L1P (SEL-421) THIS DWG.

TO 87T2P (SEL-487E) DWG. D-114

TO 87T1S (SEL-487E) DWG. D-112

TO 87L1S (SEL-311L) THIS DWG.

TO 87T2S (SEL-487E) DWG. D-114

TO 87B (SEL-5872) DWG. D-111

TO 345kV CVT1 THIS DWG.

TO 345kV CVT1 (THIS DWG.)

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHRORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701 345/34.5kV SUBSTATION

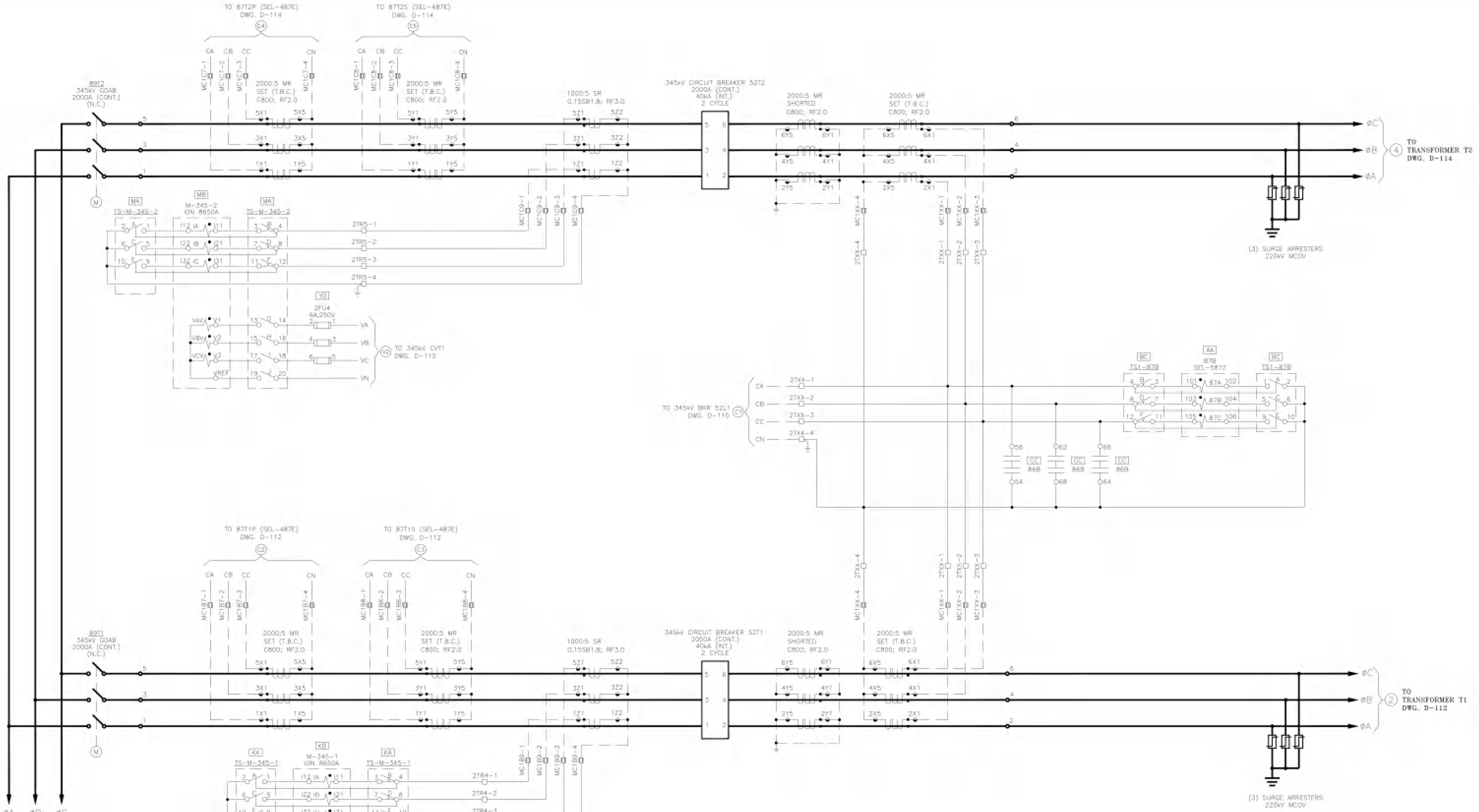
TITLE: SUBSTATION THREE LINE DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-110

JOB NUMBER: 24144-01

DRAWING NUMBER: 110



TAP	2000:5A	
	TURNS	RATIO
X3-X4	60	300:5
X1-X2	80	400:5
X4-X5	100	500:5
X2-X3	160	800:5
X3-X5	160	800:5
X2-X4	220	1100:5
X1-X3	240	1200:5
X1-X4	300	1500:5
X2-X5	320	1600:5
X1-X5	400	2000:5

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	ETS	GDK	SRH

STAMP

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SCALE: NTS
DATE: 03/12/25
DRAWN: KWN
CHECKED: MC
APPROVED: SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701 345/34.5kV SUBSTATION

TITLE: SUBSTATION THREE LINE DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-111
JOB NUMBER: 24144-01
DRAWING NUMBER: 111

TO 345kV BREAKER 52T1 DWG. D-111

TO 345kV SWITCH 89T1B DWG. D-113

T1
345-34.5-13.8kV
120/160/200MVA
FNAN/ONAF1/ONAF2 @65°C
Z=8.5% H-X
@LTC ±16 STEPS @ 0.625% EA

NEUTRAL GROUNDING REACTOR
0.5 Ω
600A
25kA/10 SEC.

(A) SURGE ARRESTERS
25kV MCOV

TAP	600:5A	
	TURNS	RATIO
X2-X3	10	50:5
X1-X2	20	100:5
X1-X3	30	150:5
X4-X5	40	200:5
X3-X4	50	250:5
X2-X4	60	300:5
X1-X3	80	400:5
X3-X5	90	450:5
X2-X5	100	500:5
X1-X5	120	600:5

TAP	2000:5A	
	TURNS	RATIO
X3-X4	60	300:5
X1-X2	80	400:5
X4-X5	100	500:5
X2-X3	160	800:5
X2-X4	220	1100:5
X1-X3	240	1200:5
X1-X4	300	1500:5
X2-X5	320	1600:5
X1-X5	400	2000:5

TAP	4000:5A	
	TURNS	RATIO
X1-X2	100	500:5
X3-X4	200	1000:5
X2-X3	300	1500:5
X1-X3	400	2000:5
X2-X4	500	2500:5
X1-X4	600	3000:5
X2-X5	700	3500:5
X1-X5	800	4000:5

[XX] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
●	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
⊓	MARSHALLING CABINET

REV.	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION THREE LINE DIAGRAM

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-112

JOB NUMBER: 24144-01

DRAWING NUMBER: 112

TAP	600:5A	
	TURNS	RATIO
X2–X3	10	50:5
X1–X2	20	100:5
X1–X3	30	150:5
X4–X5	40	200:5
X3–X4	50	250:5
X2–X4	60	300:5
X1–X4	80	400:5
X3–X5	90	450:5
X2–X5	100	500:5
X1–X5	120	600:5

TAP	2000:5A	
	TURNS	RATIO
X3–X4	60	300:5
X1–X2	80	400:5
X4–X5	100	500:5
X2–X3	160	800:5
X2–X4	220	1100:5
X1–X3	240	1200:5
X1–X4	300	1500:5
X2–X5	320	1600:5
X1–X5	400	2000:5

TO BESS FEEDERS DWG. D-115

6

ØC ØB ØA

89TIE 345kV GDAB 4000A (CONT.) (N.C.)

M

89F13 34.5kV HOOKSTICK 1200A (CONT.) (N.C.)

T.B.C.

600:5 MR SHORTED 0.15SB1.8; RF4.0

1200:5 MR SET (T.B.C.) C800; RF2.0

38kV CIRCUIT BREAKER 52F13 1200A (CONT.) 40kA (INT.) 3 CYCLE

1200:5 MR SET (T.B.C.) C800; RF2.0

89F13A2 34.5kV HOOKSTICK 1200A (CONT.)

89F13A1 34.5kV HOOKSTICK 1200A (CONT.)

(3) SURGE ARRESTERS 29kV MCOV

MC1D13-1 MC1D13-2 MC1D13-3 MC1D13-4 CA CB CC CN

C12

TO 87T1S DWG. D-112

MC1D12-1 MC1D12-2 MC1D12-3 MC1D12-4 CA CB CC CN

C8

TO 87T1P DWG. D-112

ØC ØB ØA

TO SOLAR FEEDER F13A2

TO SOLAR FEEDER F13A1

89F12 34.5kV HOOKSTICK 1200A (CONT.) (N.C.)

T.B.C.

600:5 MR SHORTED 0.15SB1.8; RF4.0

1200:5 MR SET (T.B.C.) C800; RF2.0

38kV CIRCUIT BREAKER 52F12 1200A (CONT.) 40kA (INT.) 3 CYCLE

1200:5 MR SET (T.B.C.) C800; RF2.0

89F12A2 34.5kV HOOKSTICK 1200A (CONT.)

89F12A1 34.5kV HOOKSTICK 1200A (CONT.)

(4) SURGE ARRESTERS 29kV MCOV

MC1B13-1 MC1B13-2 MC1B13-3 MC1B13-4 CA CB CC CN

C11

TO 87T1S DWG. D-112

MC1B12-1 MC1B12-2 MC1B12-3 MC1B12-4 CA CB CC CN

C7

TO 87T1P DWG. D-112

ØC ØB ØA

TO SOLAR FEEDER F12A2

TO SOLAR FEEDER F12A1

89T1B 345kV GDAB 4000A (CONT.) (N.C.)

89F11 34.5kV HOOKSTICK 1200A (CONT.) (N.C.)

T.B.C.

600:5 MR SHORTED 0.15SB1.8; RF4.0

1200:5 MR SET (T.B.C.) C800; RF2.0

38kV CIRCUIT BREAKER 52F11 1200A (CONT.) 40kA (INT.) 3 CYCLE

1200:5 MR SET (T.B.C.) C800; RF2.0

89F11A2 34.5kV HOOKSTICK 1200A (CONT.)

89F11A1 34.5kV HOOKSTICK 1200A (CONT.)

(3) SURGE ARRESTERS 29kV MCOV

MC1D11-1 MC1D11-2 MC1D11-3 MC1D11-4 CA CB CC CN

C10

TO 87T1S DWG. D-112

MC1D10-1 MC1D10-2 MC1D10-3 MC1D10-4 CA CB CC CN

C6

TO 87T1P DWG. D-112

ØC ØB ØA

TO SOLAR FEEDER F11A2

TO SOLAR FEEDER F11A1

TO XFMR T1 DWG. D-112 (3)

ØC ØB ØA

SST-1 75kVA 19.92kV-240/120V 1Ø-3W

DISC-1A RATED 400A MAX WITH 400A FUSES (2P) LOCATED AT SST-1

DISC-1B RATED 400A MAX WITH 400A FUSES (2P) LOCATED AT END

H1 H0 X1 X2 X3 H1 N H2

TO 400A, 240V AUTOMATIC TRANSFER SWITCH (FOR INTERCONNECTION SEE DWG. D-1500)

FU-1 34.5kV (1) SMD-20 (3E)

FU-2 34.5kV (3) SMD-20 (1A)

PT-1 3-VT 20,125-115/67V 175/300:1 0.3 WYE

34.5kV PT-1 JUNCTION BOX

TB1 TB2 TB3

FU4 20A,250V FU5 20A,250V FU6 20A,250V

VA VB VC VN

MC1F8-1 MC1F8-2 MC1E8-1 N1 MC1F8-3 MC1F8-4 MC1E8-2 N2

TO TRANSF. T1 OLTC CONTROLLER DWG. D-1522

MC1F9-1 3TR15-1 MC1F9-2 3TR15-2 MC1F9-3 3TR15-3 MC1F9-4 3TR15-4

M10 TO 87T1P DWG. D-112

MC1F10-1 4TR15-5 MC1F10-2 4TR15-6 MC1F10-3 4TR15-7 MC1F10-4 4TR15-8

M11 TO 87T1S DWG. D-112

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHIPPING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	ETS	GDK	SRH

STAMP

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: SUBSTATION THREE LINE DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-113
JOB NUMBER	24144-01
DRAWING NUMBER	113

TO 345kV BREAKER 52T2 DWG. D-111

TO 34.5KV SWITCH 89T2B DWG. D-115

(4) SURGE ARRESTERS 29kV MCOV

345-34.5-13.8KV 120/160/200 MVA ONAN/ONAF1/ONAF2, 65°C Z=8.5% H-X OLTC: ±16 STEPS @ 0.625% EA

600:5 MR SHORTED C800; RF2.0

600:5 MR SHORTED C800; RF2.0

600:5 MR SHORTED 0.3B18; RF2.0

4000:5 MR SHORTED C800; RF2.0

4000:5 MR SHORTED C800; RF2.0

4000:5 MR SHORTED C800; RF2.0

HSCT1-TO ECLIPSE

HSCT2-TO ECLIPSE

CT1-TO ECLIPSE

LOCATED IN TRASNF. CONTROL CABINET

600:5 MR SET (1,B,C) C800; RF2.0

4000:5 MR SET (1,B,C) C800; RF2.0

600:5 MR SET (1,B,C) C800; RF2.0

4000:5 MR SET (1,B,C) C800; RF2.0

NEUTRAL GROUNDING REACTOR 0.5 Ω 600A 25kA/10 SEC.

TO BKR 52T2 CT DWG. D-111

TO BKR 52F21 CT DWG. D-115

TO BKR 52F22 CT DWG. D-115

TO BKR 52F23 CT DWG. D-115

TO 345kV CVT1 DWG. D-110

TO 34.5kV PT-2 DWG. D-115

CONTINUED ON THIS DWG.

CONTINUED ON THIS DWG.

CONTINUED ON THIS DWG.

CONTINUED ON THIS DWG.

TAP	600:5A	
	TURNS	RATIO
X2-X3	10	50:5
X1-X2	20	100:5
X1-X3	30	150:5
X4-X5	40	200:5
X3-X4	50	250:5
X2-X4	60	300:5
X1-X4	80	400:5
X3-X5	90	450:5
X2-X5	100	500:5
X1-X5	120	600:5

TAP	4000:5A	
	TURNS	RATIO
X1-X2	100	500:5
X3-X4	200	1000:5
X2-X3	300	1500:5
X1-X3	400	2000:5
X2-X4	500	2500:5
X1-X4	600	3000:5
X2-X5	700	3500:5
X1-X5	800	4000:5

[XX] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHRORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

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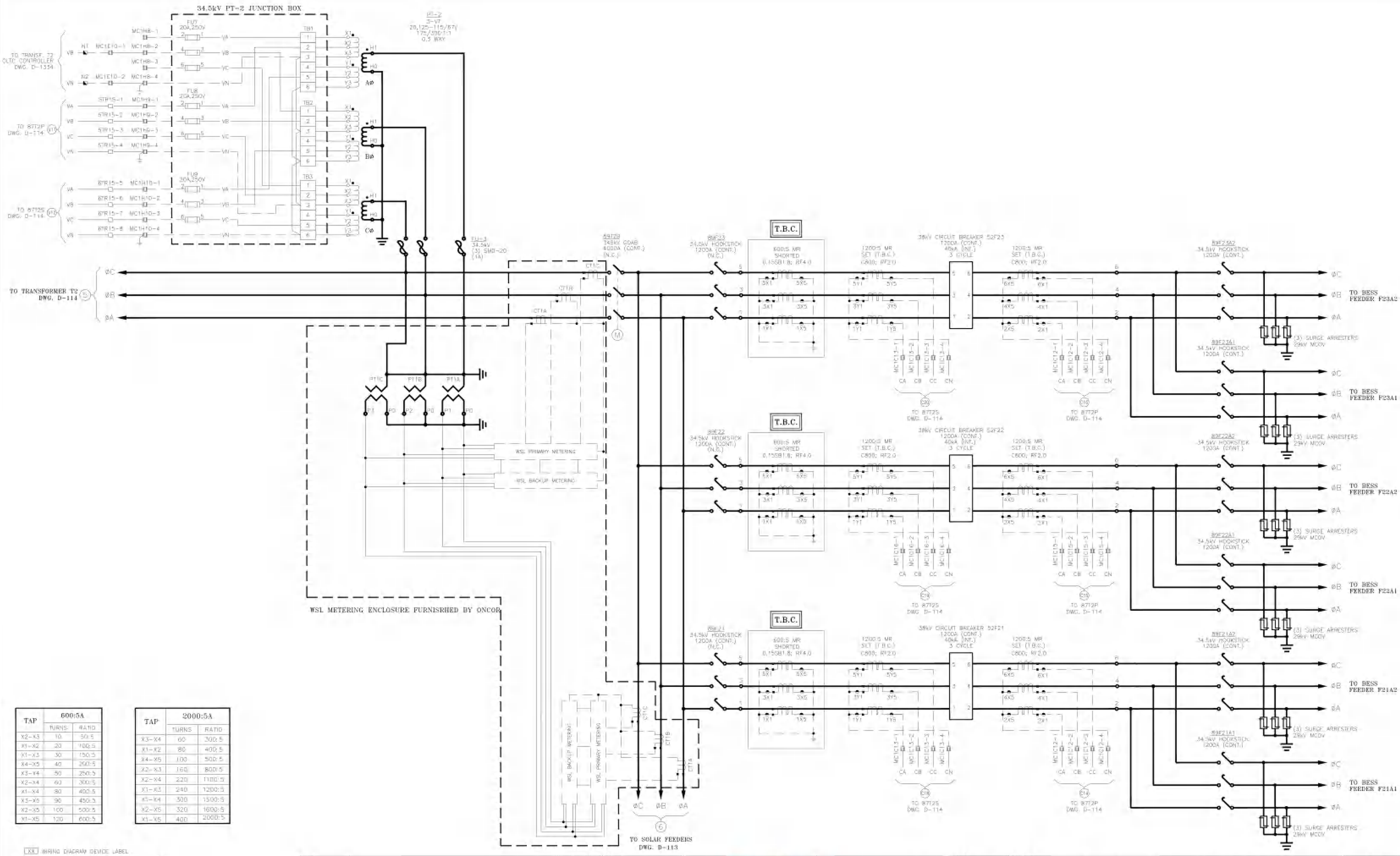
SCALE: NTS
DATE: 03/12/25
DRAWN: KWN
CHECKED: MC
APPROVED: SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: SUBSTATION THREE LINE DIAGRAM

LOCATION: 8957 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-114
JOB NUMBER: 24144-01
DRAWING NUMBER: 114



TAP	600:5A	
	TURNS	RATIO
X2-X3	10	50:5
X1-X2	20	100:5
X1-X3	30	150:5
X4-X5	40	200:5
X3-X4	50	250:5
X2-X4	60	300:5
X1-X4	80	400:5
X3-X5	90	450:5
X2-X5	100	500:5
X1-X5	120	600:5

TAP	2000:5A	
	TURNS	RATIO
X3-X4	60	300:5
X1-X2	80	400:5
X4-X5	100	500:5
X2-X3	160	800:5
X2-X4	220	1100:5
X1-X3	240	1200:5
X1-X4	300	1500:5
X2-X5	320	1600:5
X1-X5	400	2000:5

[XX] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
▬	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▥	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

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SCALE	NTS
DATE	03/12/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION THREE LINE DIAGRAM

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-115
JOB NUMBER	24144-01
DRAWING NUMBER	115

24114-01 Chisme Solar, 345 - 34.5kV
Brown County, TX

Date: 07/09/25
Revision: B
Project #24114-01

ITEM NO.	QTY	UNIT	ITEM DESCRIPTION	SPEC # / DWG	MANUFACTURER/VENDOR	CATALOG/MODEL#
MAJOR EQUIPMENT						
M1	2	EA	POWER TRANSFORMER, 345-34.5-13.8kV, 120/160/200 MVA, 65 DEG C RISE/55 DEG C RISE, H-X: 8.5% Z, WITH HV OLTC +16 STEPS @ 0.625%		CHINT	
M2	1	EA	SF6 CIRCUIT BREAKER, 345kV, 2000 A, 40 KA FURNISHED WITH BCTS PER SPEC		TBD	TBD
M3	6	EA	VACUUM CIRCUIT BREAKER, 38 kV, 1200 A, 40KA FURNISHED WITH BCTS PER SPEC		TBD	TBD
M4	3	EA	VERTICAL BREAK 69kV SWITCH, 3 POLE, 345KV, 2000 A, 1300 KV BIL, ALUMINUM LIVE PARTS, FURNISHED WITH STATION POST INSULATORS, MOTOR OPERATED		TBD	TBD
M5	3	EA	VERTICAL BREAK 69kV SWITCH, 1 POLE, 34.5 KV, 4000 A, 200 KV BIL, ALUMINUM LIVE PARTS, FURNISHED WITH STATION POST INSULATORS, 125VDC MOTOR OPERATOR AND 120VAC SPACE HEATER AND RECEPT.		TBD	TBD
M7	54	EA	HOOKSTICK SWITCH, 38 kV, 1200 A, 200 KV BIL, COPPER FURNISHED WITH STATION POST INSULATORS		TBD	TBD
M8	6	EA	PT, 20125/34500GY-115/67, 175/200:1:1 RATIO, 0.6WXY, WITH TWO SECONDARY WINDINGS		RITZ	VET35-101
M9	3	EA	CVT, 20 X/300-115/67V, 1800/5000:1:1 RATIO, 0.15WXYZ, 1600VA, WITH TWO SECONDARY WINDINGS		TBD	TBD
M10	72 (TBD)	EA	STATION POST INSULATOR, 1300 KV BIL, TR 326, STANDARD STRENGTH, 5" BOLT CIRCLE, GRAY PORCELAIN, 306" HEIGHT (QTY. INCLUDES ONE SPARE)		LAPP	315324-70
M11	63 (TBD)	EA	STATION POST INSULATOR, 200 KV BIL, TR 210, STANDARD STRENGTH, 3" BOLT CIRCLE, GRAY PORCELAIN, 186" HEIGHT (QTY. INCLUDES ONE SPARE)		LAPP	315210-70
M12	1	EA	STATION SERVICE TRANSFORMER, POLE MOUNT, OIL FILLED CPT RATED, 75 KVA, 19,920-240/120V, 1PH/3W		TBD	TBD
M13	3	EA	SURGE ARRESTER, 276kV RATED, 220kV MCOV, POLYMER, STATION CLASS, USED FOR DEAD END		GE	CAT # 9L11HNM2765
M14	36	EA	SURGE ARRESTER, 36 KV RATED, 29kV MCOV, POLYMER, STATION CLASS, WITH NEMA 6 HOLE PAD, USED FOR FEEDER/COLLECTOR FEEDER CIRCUITS		GE	CAT: 9L11J8P40865
M15	6	EA	CT, 34.5kV DRY TYPE, 200kV BIL, 3000:5A, 0.15HT, 8, 1 PHASE, FURNISHED BY ONCOR.		TBD	BY ONCOR
M16	3	EA	POWER FUSE, 1 POLE, 34.5 KV, 200 KV BIL, STATION RIGHT ANGLE, EPOXY, WITH NEMA 2 HOLE PADS		S&C	TYPE SMD-2D, P/N 192284R3-E-S
M17	2	EA	FUSE UNIT FOR SS1, 3 POLE, 34.5 KV, 10E, STANDARD SPEED (QTY. INCLUDES ONE SPARE)		S&C	TYPE SMU-20, P/N 614010
M18	2	EA	FUSE UNIT FOR PT, 35 KV, 3A, STANDARD SPEED (QTY. INCLUDES ONE SPARE)		S&C	TYPE SMU-20, P/N 704003
M19	440	FT	TUBING, AL., 2" IPS, SCHEDULE 40, 6063-T6, (~1312 A) PROVIDE 22 PCS @ 20'		TBD	
M20	720	FT	TUBING, AL., 3" IPS, SCHEDULE 40, 6063-T6, (~2436 A) PROVIDE 36 PCS @ 20'		TBD	
M21	440	FT	TUBING, AL., 4" IPS, SCHEDULE 40, 6063-T6, (~3719 A) PROVIDE 23 PCS @ 20'		TBD	
M22	2000	FT	CABLE, 1590MCM, AAC, 37 STRAND, "CORE@PSS", USED FOR HV & LV CONDUCTOR		SOUTHWIRE	
M23	540	FT	CABLE, 636MCM, AAC, 37 STRAND "ORCHID", USED FOR DAMPENING CABLE		SOUTHWIRE	
M24	100	FT	CABLE, #2 AWG, SOLID CU. CABLE, USED FOR PT AND STATION SERVICE CPT		SOUTHWIRE	
STRUCTURES						
S1	7	EA	BUS SUPPORT STAND, LOW			
S2	11	EA	BUS SUPPORT STAND, HIGH			
S3	3	EA	SURGE ARRESTER STAND, 25'-6" HEIGHT			
S4	3	EA	SWITCH STAND, 345kV, 3 PHASE			
S5	1	EA	STATION SERVICE TRANSFORMER/PT/BUS SUPPORT STAND			
S6	1	EA	CT/PT SUPPORT STAND, 18'-10" HEIGHT			
S7	1	EA	TIE BUS STRUCTURE			
S8	1	EA	TIE BUS STRUCTURE			
S9	6	EA	FEEDER STAND			
S10	2	EA	STATIC MAST, 80'-0" OVERALL HEIGHT, LIGHTING PROVISIONS AT 55'-0", STATIC WIRE PLA@ OFF AT 75'-0"			
S11	3	EA	CVT STAND, 22'-6" HEIGHT			
S12	24	EA	GRD LINDING MAT, GALVANIZED, BAR GRATING, 4'-0" X 8'-0", WITH NEMA 2-HOLE PATTERN ON OPPOSITE CORNERS			

			YARD LIGHTING			
L1	5	EA	OUTDOOR FLOODLIGHT, LED, MULTI-VOLT (120-TH RU 277V) 55K LUMENS, NEMA 6X5 BEAM SPREAD, WITH VERTICAL TENON TYPE MOUNTING, AND SHORTING CAP.		HOLDRITE	CAT: RMGLED-PS-40K-MVOLT-FT-LT-VTORSED-SH
			FITTINGS			
F1	39	EA	TERMINAL, ALUMINUM, HV, 4" 6-HOLE PAD, BOLTED, FOR (1) 1590 MCM AAC, "COREOPSIS", STRAIGHT		SEPCOR	AFHDHV-61-48-HS
F3	6	EA	TERMINAL, ALUMINUM, HV, 4" 6-HOLE PAD, WELDED, FOR 4" SPS SCH. 40 TUBE, EXPANSION		SEPCOR	WFHDHV-61-48
F4A	6	EA	TERMINAL, ALUMINUM, 4" 6-HOLE PAD, BOLTED, FOR (3) 1590MCM AAC, "COREOPSIS", 90 DEGREE		SEPCOR	AFHDS-90-63-48
F4B	6	EA	TERMINAL, ALUMINUM, 6" 6-HOLE PAD, BOLTED, FOR (3) 1590MCM AAC, "COREOPSIS", 90 DEGREE		SEPCOR	AFHDS-90-63-68
F5	78	EA	TERMINAL, ALUMINUM, 4" 4-HOLE PAD, BOLTED, FOR (1) 1590 MCM AAC, "COREOPSIS", STRAIGHT		SEPCOR	AFHC-63-48
F6	150	EA	TERMINAL, ALUMINUM, 3" 4-HOLE PAD, BOLTED, FOR (1) 1590MCM AAC, "COREOPSIS", STRAIGHT		SEPCOR	AFHC-63-4A
F7	1	EA	TERMINAL, ALUMINUM, HV, 4" 6-HOLE PAD, BOLTED, FOR (1) 1590 MCM AAC, "COREOPSIS", 90 DEGREE, USED AT CVTs		SEPCOR	AFHDHV-90-63-48
F8	42	EA	TERMINAL, ALUMINUM, 4" 6-HOLE PAD, BOLTED, FOR (3) 1590 MCM AAC, "COREOPSIS", STRAIGHT		SEPCOR	AFHDS-63-48
F9	86	EA	TERMINAL, ALUMINUM, 4" 6-HOLE PAD, BOLTED, FOR (3) 1590 MCM AAC, "COREOPSIS", 45 DEGREE		SEPCOR	AFHC-45-63-48
F10	6	EA	TERMINAL, ALUMINUM, 6" 6-HOLE PAD, BOLTED, FOR 6" SPS SCH. 40 TUBE, 90 DEGREE		SEPCOR	AFHTSD-09-68
F11	6	EA	TERMINAL, ALUMINUM, 6" 6-HOLE PAD, BOLTED, FOR 6" SPS SCH. 40 TUBE, STRAIGHT		SEPCOR	AFHTC-63-68
F12	12	EA	TERMINAL, ALUMINUM, 4" 4-HOLE PAD, BOLTED, FOR 4" SPS SCH. 40 TUBE, STRAIGHT		SEPCOR	AFHC-HV-49-48
F13	12	EA	TERMINAL, ALUMINUM, 6" 6-HOLE PAD, BOLTED, FOR (3) 1590 MCM AAC, "COREOPSIS", STRAIGHT		EEFCOR	AFHCS-63-68
F14	20	EA	TERMINAL, BRONZE, FOR #2 SOLID COPPER WIRE, BOLTED, 1.63" WIDE, 2-HOLE NEMA PAD, STRAIGHT		HUBBELL	GT4541AH
F15	24	EA	TEE, ALUMINUM, BOLTED, FOR 6" SPS SCH. 40 TUBE, 4" 4-HOLE PAD		SEPCOR	ATF-69-48
F16	54	EA	TEE, ALUMINUM, BOLTED, FOR 2" SPS SCH. 40 TUBE, 4" 4-HOLE PAD		SEPCOR	ATFHX58-48
F17	6	EA	TEE, ALUMINUM, BOLTED, FOR (1) 1590 MCM AAC, "COREOPSIS", 4" 4-HOLE PAD		SEPCOR	ATF-63-48
F18	6	EA	TEE, ALUMINUM, BOLTED, FOR (3) 1590 MCM AAC, "COREOPSIS", 4" 4-HOLE PAD		SEPCOR	ASPC-41-48B
F19	6	EA	TEE, ALUMINUM, BOLTED, FOR 6" SPS SCH. 40 TUBE TO 6" SPS SCH. 40 TUBE		SEPCOR	ATTT-6969
F20	6	EA	TEE, ALUMINUM, WELDED, FOR 4" SPS SCH. 40 TO 4" SPS SCH. 40, USED AT TOP OF A-FRAME		SEPCOR	WFVT15-6464
F21	24	EA	TEE, ALUMINUM, WELDED, FOR 4" SPS SCH. 40 TO 4" SPS SCH. 40, USED AT BOTTOM AND MIDDLE OF A-FRAME		SEPCOR	WFFT15-6464
F22	30	EA	STRAIN, ALUMINUM, BOLTED, FOR (1) 1590MCM AAC, USED AT PT CONNECTIONS		SEPCOR	ANLSC-45
F26	18	EA	BUS SUPPORT CLAMP, ALUMINUM, BOLTED, FOR (1) 1590MCM AAC, "COREOPSIS", 3" BOLT CIRCLE		SEPCOR	AVCA-43-1
F27	1	EA	BUS SUPPORT CLAMP, ALUMINUM, BOLTED, FOR 4" SPS, SCHEDULE 40, 5" BOLT CIRCLE, EXPANSION		SEPCOR	WVECTD-64-5
F28	19	EA	BUS SUPPORT CLAMP, ALUMINUM, HOOK TYPE, FOR 4" SPS, SCHEDULE 40, 5" BOLT CIRCLE		SEPCOR	ASWH-64-5
F29	24	EA	BUS SUPPORT CLAMP, ALUMINUM, HOOK TYPE, FOR 6" SPS, SCHEDULE 40, 6" BOLT CIRCLE		SEPCOR	ASWH-69-6-SE
F30	18	EA	BUS SUPPORT CLAMP, ALUMINUM, HOOK TYPE, FOR 2" SPS, SCHEDULE 40, 3" BOLT CIRCLE		SEPCOR	ASWH-58-3-SE
F31	18	EA	BUS SUPPORT CLAMP, ALUMINUM, BOLTED, VERTICAL, FOR 2" SPS, SCHEDULE 40, 3" BOLT CIRCLE		SEPCOR	AVTI-58-3
F35	28	EA	COUPLER, ALUMINUM, BOLTED, HV, 4" SPS SCH 40 TUBE TO 4" SPS SCH 40 TUBE, STRAIGHT		SEPCOR	ASCTHV-6464
F36	18	EA	COUPLER, ALUMINUM, BOLTED, HV, 6" SPS SCH 40 TUBE TO 6" SPS SCH 40 TUBE, STRAIGHT		SEPCOR	ASCT-6969
F37	6	EA	COUPLER, ALUMINUM, BOLTED, HV, 6" SPS SCH 40 TUBE TO 6" SPS SCH 40 TUBE, 90 DEGREE		TRAMS	18-462-96
F38	12	EA	COUPLER, ALUMINUM, WELDED, SPHERE		SEPCOR	WUBUM-8
F40	6	EA	SPACER, ALUMINUM, BOLTED, FOR (3) 1590 MCM "COREOPSIS", 2" SPACING		SEPCOR	ASPC3-63-2
F45	6	EA	CAP, ALUMINUM, WELDED, BALL TYPE, FOR 4" SPS, SCHEDULE 40		SEPCOR	WBPC-64-B
F46	6	EA	CAP, ALUMINUM, DRIVE-ON, FOR 6" SPS, SCHEDULE 40		SEPCOR	DPS-69-AL
F47	12	EA	CAP, ALUMINUM, DRIVE-ON, FOR 4" SPS, SCHEDULE 40		SEPCOR	DPS-64-AL
F48	18	EA	CAP, ALUMINUM, DRIVE-ON, FOR 2" SPS, SCHEDULE 40		SEPCOR	DPS-58-AL
F50	20	EA	HARDWARE SHIELD, 4"X4", 4-HOLE NEMA PATTERN		SEPCOR	64-2084
F51	9	EA	CLAMP, HOT LINE, ALUMINUM, TIN PLATED, FOR PT CONNECTIONS		HUBBELL	5153DWGP

			GROUNDING MATERIAL			
G1	8100	FT	4/0 AWG BARE COPPER CABLE, SOFT DRAWN, 19-STRAND (CLASS B). QUANTITY DOES NOT INCLUDE ABOVE GROUND PIGTAILS			
G2	200	FT	#2 AWG, SOLID, TINNED, BARE COPPER WIRE			
G3	6	EA	GROUND STRAP, 24" FLEXIBLE BRAID		SEPCOR	XBG76-D-24
G4	75	EA	GROUND ROD, COPPER-BONDED, 5/8" DIA. X 10'-0", POINTED		ERICO	613400
G5	10	EA	DRIVE SLEEVE FOR 5/8" DIA. GROUND ROD, POINTED		ERICO	613733
G6	14	EA	WELD METAL, TYPE XB, CROSS, #4/0 AWG TO #4/0 AWG, PACKAGED IN BOXES OF 10, 127 REQUIRED		ERICO	250
G7	1	EA	MOLD FOR ITEM G6, PROVIDE WITH WEAR PLATES		ERICO	XBM-2020
G8	19	EA	WELD METAL, TYPE TA, TEE, #4/0 AWG TO #4/0 AWG, PACKAGED IN BOXES OF 10, 172 REQUIRED		ERICO	150
G9	1	EA	MOLD FOR ITEM G8, PROVIDE WITH WEAR PLATES		ERICO	TAC-2020
G10	4	EA	WELD METAL, TYPE GTE, ROD, #4/0 AWG TO 3/4" DIA. ROD, PACKAGED IN BOXES OF 10, 35 REQUIRED		ERICO	115
G11	2	EA	MOLD FOR ITEM G10, ROD, PROVIDE WITH WEAR PLATES		ERICO	GTC-182G
G12	310	EA	DISKS FOR #150 TO #600 WELD (3 1/2" DIA.)		ERICO	61170
G13	40	EA	TERMINAL, COMPRESSION TYPE, FOR #4/0 AWG CU TO FLAT (NEMA 2-HOLE)		BURNDY	YGA26-2N
G14	36	EA	SINGLE GROOVE GROUND CLAMP, FOR #4/0 AWG CU CABLE TO FLAT SURFACE, 1/2" STUD		SEPCOR	GTC-14B
G15	25	EA	DOUBLE GROOVE GROUND CLAMP, FOR (2) #4/0 AWG CU CABLES TO FLAT SURFACE, 1/2" STUD		SEPCOR	GTC2-14B
G16	10	EA	SPLIT BOLT CONNECTOR, FOR #4 AWG SOLID CU (#10-#2 RANGE) FOR CABINET GROUND		BURNDY	KB2C3B1
G17	115	EA	SPLIT BOLT CONNECTOR, FOR #2 SOLID CU TO BARBED WIRE		BURNDY	SBS10
G18	85	EA	GROUND CLAMP, 1 1/4" S.P.S., TOP RAIL TO #4 AWG CU (#4-#2/0 AWG RANGE)		SEPCOR	GU1-4929
G19	4	EA	GROUND CLAMP, 2" S.P.S., DRIVE GATE FRAME TO #4 AWG CU (#4-#2/0 AWG RANGE)		SEPCOR	GU1-5869
G20	2	EA	GROUND CLAMP, 1 1/2" S.P.S., MAN GATE FRAME TO #2 AWG CU (#4-#2/0 AWG RANGE)		SEPCOR	GU1-5429
G21	20	EA	GROUND CLAMP, 1 1/2" S.P.S., LINE POST TO #4/0 AWG CU (#2 AWG-250 MCM RANGE)		SEPCOR	GU1-5412
G22	10	EA	GROUND CLAMP, 2 1/2" S.P.S., CORNER POST TO #4/0 AWG CU (#2 AWG-250 MCM RANGE)		SEPCOR	GU1-6012
G23	6	EA	GROUND CLAMP, 3 1/2" S.P.S., GATE POST TO #4/0 AWG CU (#4 AWG-250 MCM RANGE)		SEPCOR	GU1-6312
G24	2	EA	CABLE CLEANING BRUSH		ERICO	TB14
G25	2	EA	CABLE CLAMP ASSEMBLY		ERICO	8265
G26	5	EA	FLINT IGNITOR		ERICO	TA20
G27	2	EA	MOLD CLEANING BRUSH		ERICO	TB94
G28	2	EA	SLAG REMOVAL SPADES FOR WELD METAL 90 AND ABOVE		ERICO	BE36R
G29	2	EA	TORCH HEAD		ERICO	TA11
G37	1	EA	CLAMP, GROUND ROD, U-BOLT TO 3/4" ROD, FOR (3) 4/0 AWG BARE COPPER CABLE		ERICO	GC065TH
G38	1	EA	GROUND ACCESS WELL, 15" DIA. 12" LONG		ERICO	PB36R
STATIC LINE MATERIAL						
T1	111	EA	ANCHOR SHACKLE, RATED 35 KIPS, LONG SHANK		HUBBELL	4675L
T2	4	EA	COMPRESSION STATIC DEADEND, 7/16" EHS, WITH HORIZONTAL EYE AND ARMA 2 HOLE PAD.		HUBBELL	861630SH
T3	4	EA	CONNECTOR, EYE BOLT GROUND, (2) STUD, FOR 4/0 AWG 19 STRAND, TIN PLATED		SEPCOR	LWA-4539T-SND
T4	475	FT	CABLE, 7/16" EHS SHIELD WIRE			

NO.	DATE	DESCRIPTION	DRN	CHK	APP
C	07/11/25	60% DESIGN SUBMITTAL	REB	GLB	SRH
B	04/11/25	30% DESIGN SUBMITTAL	REB	GLB	SRH
A	02/28/25	ISSUED FOR REVIEW	REB	GLB	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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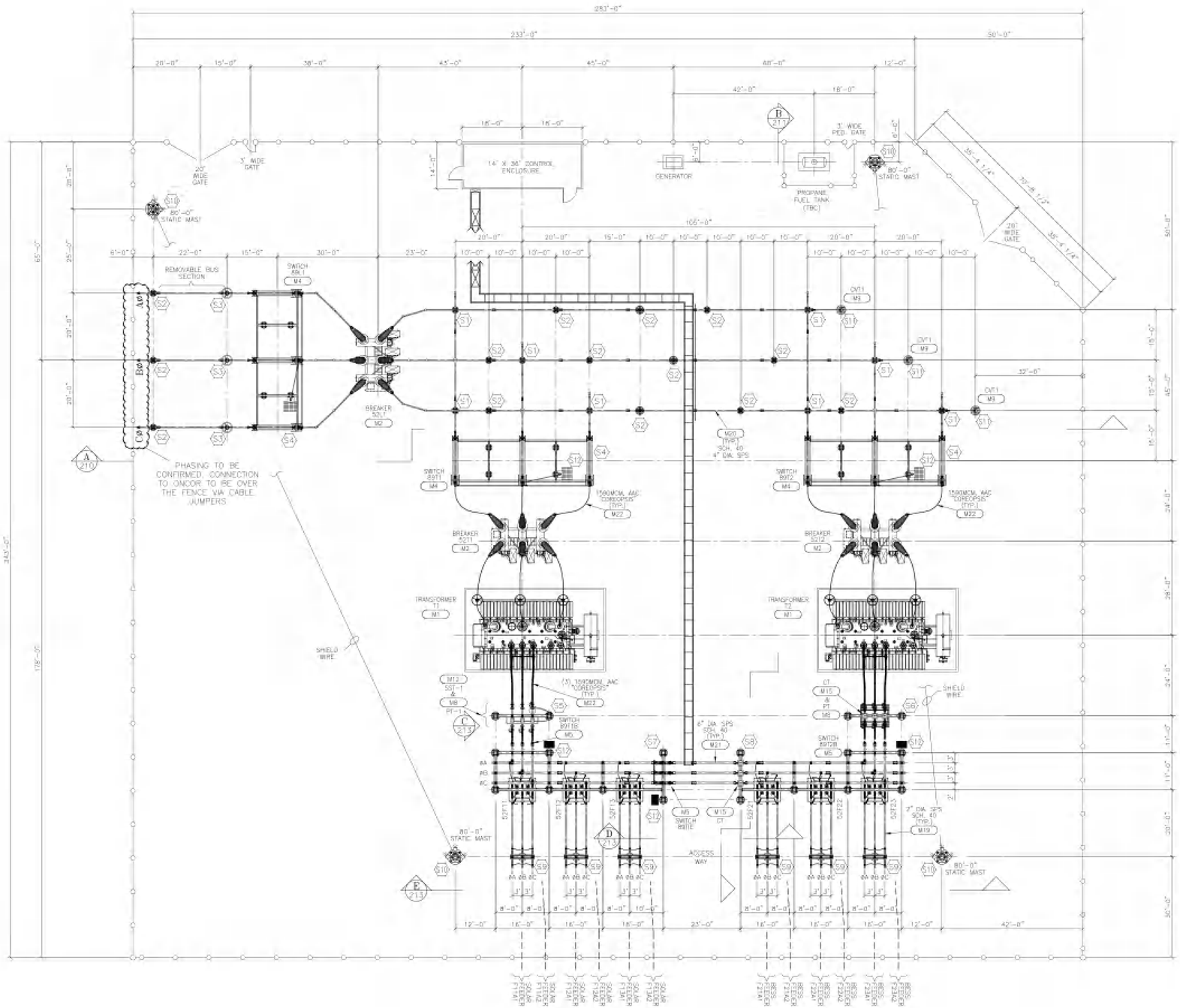
DSN	KLS
DATE	12/11/24
DRAWN	REB
CHECKED	GLB
APPROVED	SRH

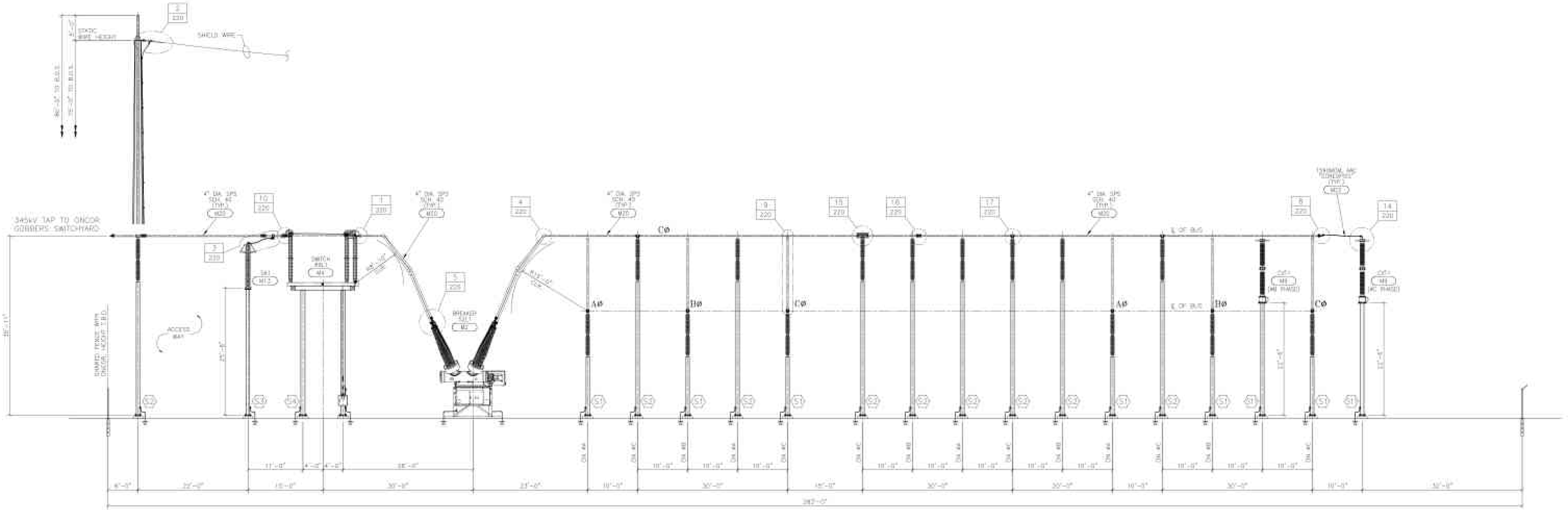
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: SUBSTATION BILL OF MATERIAL

LOCATION: 6987 CR 268, 6981 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24114-01-180
JOB NUMBER	24114-01
DRAWING NUMBER	180


283'-0"
233'-0"
50'-0"
105'-0"
14' X 36' CONTROL ENCLOSURE
GENERATOR
PROPANE FUEL TANK (TBC)
3' WIDE PED. GATE
20' WIDE GATE
80'-0" STATIC MAST
REMOVABLE BUS SECTION
SWITCH 8811
BREAKER 5011
PHASING TO BE CONFIRMED. CONNECTION TO ONCOR TO BE OVER THE FENCE VIA CABLE JUMPERS
1590MCM, AAC "CORE OPSS" (TYP.)
SWITCH 8911
SWITCH 8912
BREAKER 5211
BREAKER 5212
TRANSFORMER T1
TRANSFORMER T2
SHIELD WIRE
SWITCH 8911B
SWITCH 8912B
ACCESS WAY
4" DIA. SCH. 40 SPS
7" DIA. SCH. 40 (TYP.)
345kV BUS
34.5kV BUS
345kV DEAD-END STRUCTURE
345kV TAP TO EXISTING 345kV LINE
345kV TAP TO EXISTING 345kV LINE
345kV DEAD-END STRUCTURE
34.5kV DEAD-END STRUCTURE
34.5kV DEAD-END STRUCTURE
34.5



SECTION

LEGEND AND NOTES:

1. ABBREVIATIONS:
   T.O.S.=TOP OF STEEL
   B.O.S.=BOTTOM OF STEEL
   T.O.C.=TOP OF CONCRETE
   N.T.S.=NOT TO SCALE
2. STRUCTURE IDENTIFICATION
3. BILL OF MATERIAL ITEM NUMBER (B.O.M. LATER)

SCALE BAR
INCREMENTS IN FEET & INCHES

REV	DATE	DESCRIPTION	DRN	CKD	APP
C	07/11/25	60% DESIGN SUBMITTAL	RDB	GDK	SRH
B	04/11/25	30% DESIGN SUBMITTAL	RDB	GDK	SRH
A	01/21/25	ISSUED FOR REVIEW	RDB	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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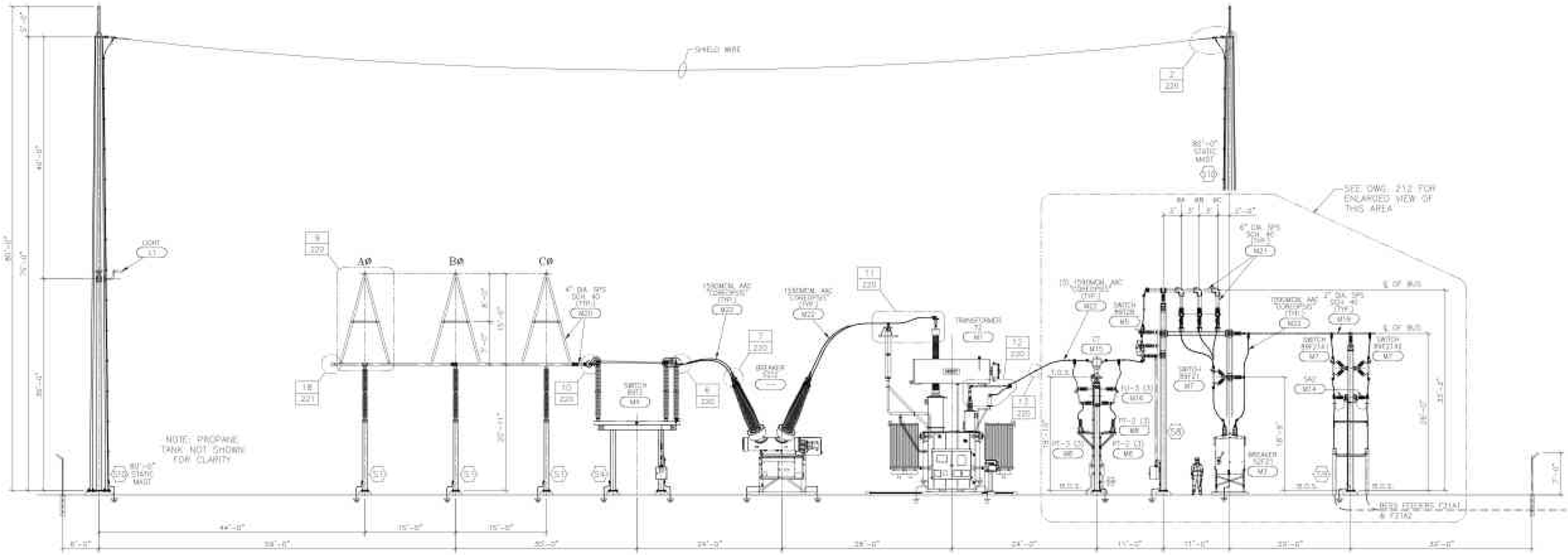
SCALE	1"=10'-0"
DATE	01/21/25
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION ELEVATIONS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-210
JOB NUMBER	24144-01
DRAWING NUMBER	210



B SECTION

LEGEND AND NOTES:

1. ABBREVIATIONS:
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2. STRUCTURE IDENTIFICATION
3. BILL OF MATERIAL ITEM NUMBER (B.O.M. LATER)

SCALE BAR
INCREMENTS IN FEET & INCHES

REV	DATE	DESCRIPTION	DRN	CKD	APP
C	07/11/25	60% DESIGN SUBMITTAL	RDB	GDK	SRH
B	04/11/25	30% DESIGN SUBMITTAL	RDB	GDK	SRH
A	01/21/25	ISSUED FOR REVIEW	RDB	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

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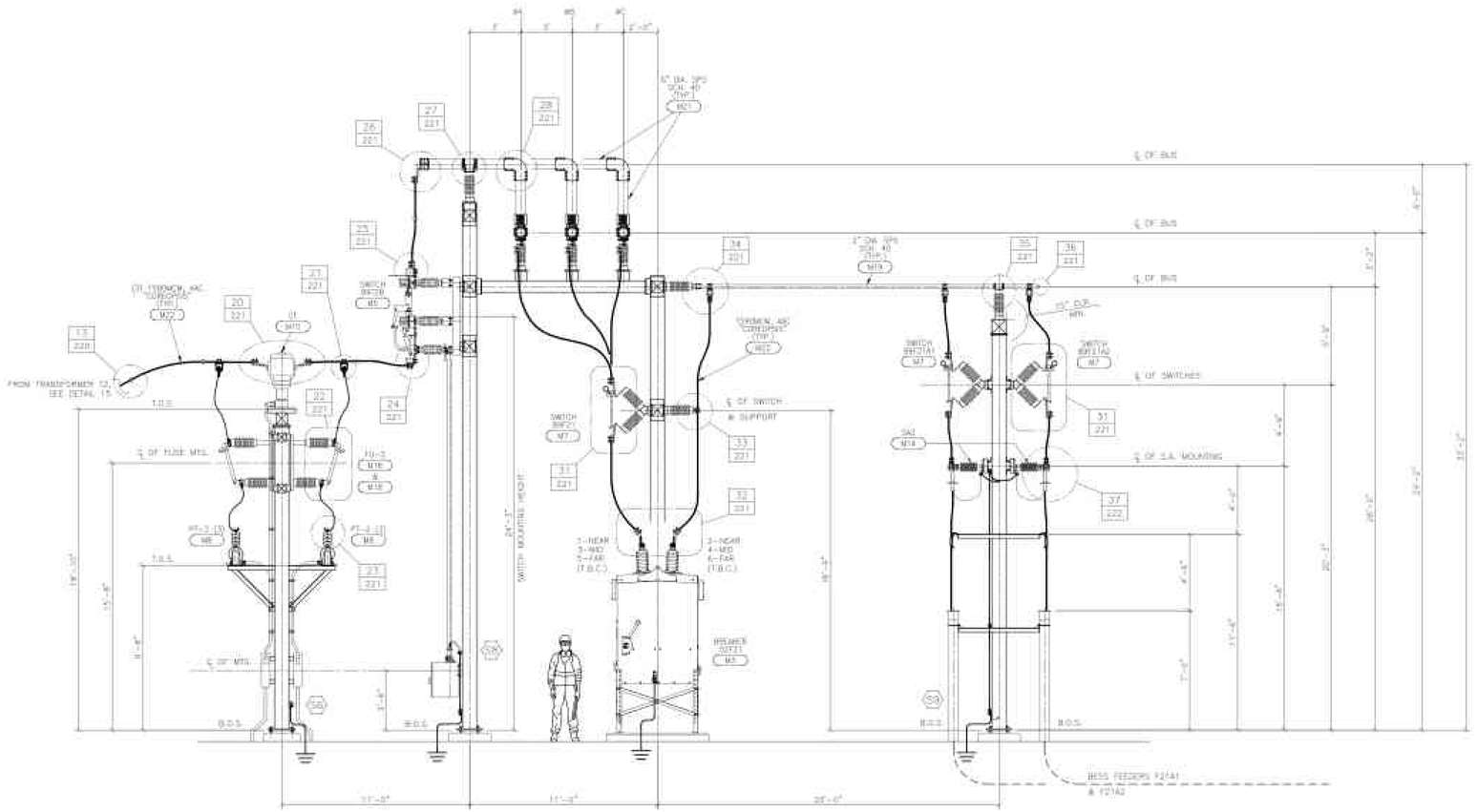
SCALE	1"=10'-0"
DATE	01/21/25
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION ELEVATIONS

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-211
JOB NUMBER: 24144-01
DRAWING NUMBER: 211



REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/11/25	60% DESIGN SUBMITTAL	RDB	CDK	SRH

STAMP

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QUALUS

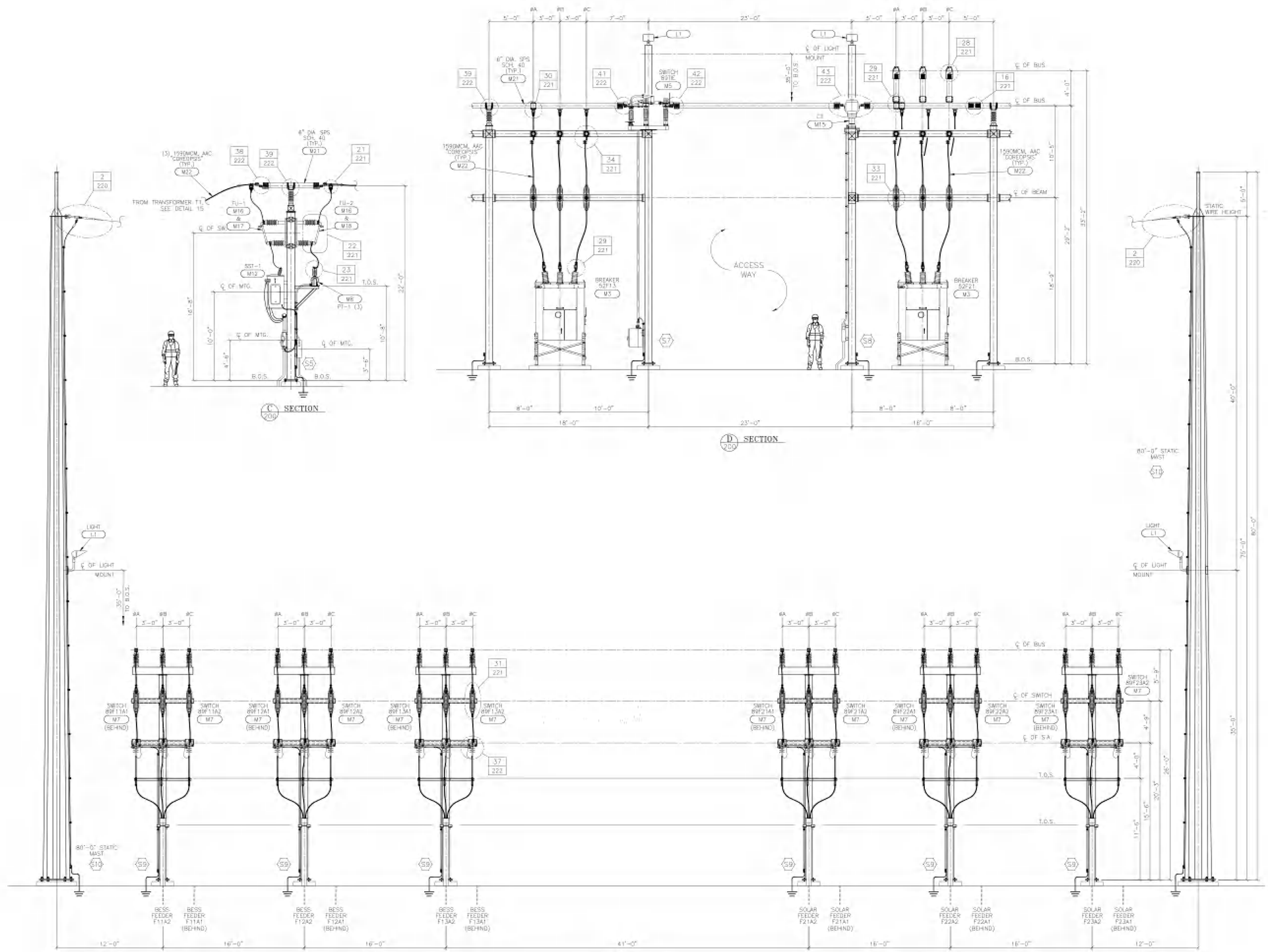
SCALE	1/4"=1'-0"
DATE	07/08/25
DRAWN	RDB
CHECKED	CDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION ELEVATIONS

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-212
JOB NUMBER	24144-01
DRAWING NUMBER	212



E 200 SECTION

C 200 SECTION

D 200 SECTION

LEGEND AND NOTES:

1. ABBREVIATIONS:
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   B.O.S.=BOTTOM OF STEEL
   T.O.C.=TOP OF CONCRETE
   N.T.S.=NOT TO SCALE
2. ⬡ STRUCTURE IDENTIFICATION
3. ⬭ BILL OF MATERIAL ITEM NUMBER (B.O.M. LATER)

0" 5'-0" 10'-0" 15'-0" 20'-0" 25'-0"

SCALE BAR
INCREMENTS IN FEET & INCHES

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/11/25	60% DESIGN SUBMITTAL	RDB	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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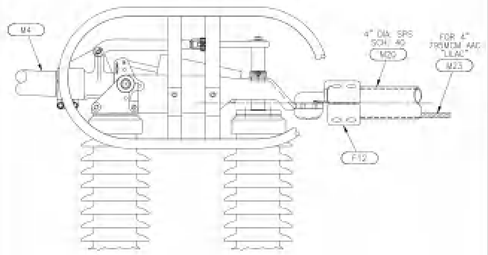
SCALE	3/16"=1'-0"
DATE	07/08/25
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

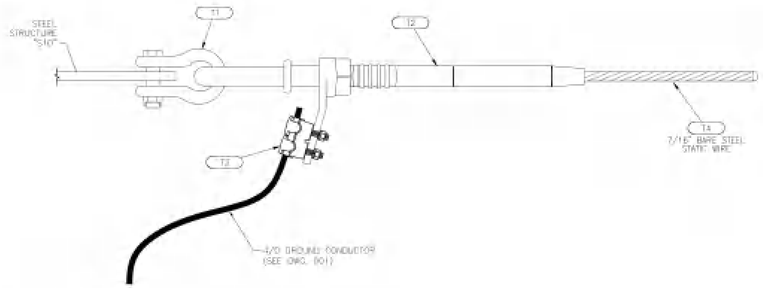
TITLE: SUBSTATION ELEVATIONS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

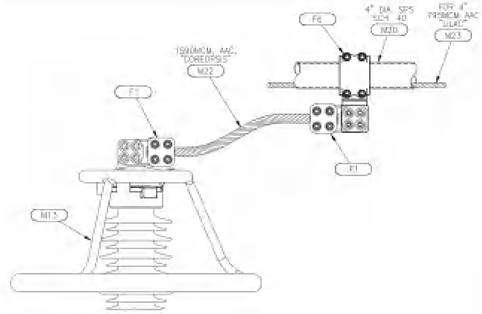
FILE NAME	24144-01-213
JOB NUMBER	24144-01
DRAWING NUMBER	213



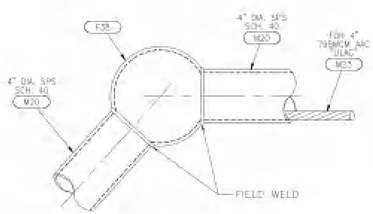
1 / 210 DISCONNECT SWITCH CONNECTION DETAIL (HINGE END)
(3) REQ'D



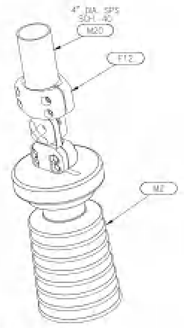
2 / 210 STATIC LINE CONNECTION DETAIL
(6) REQ'D



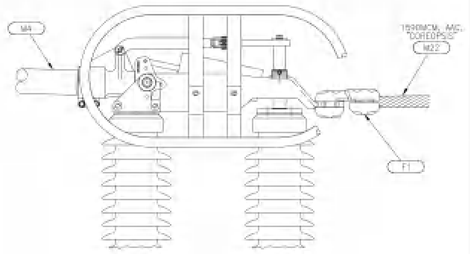
3 / 210 SURGE ARRESTER CONNECTION DETAIL
(3) REQ'D



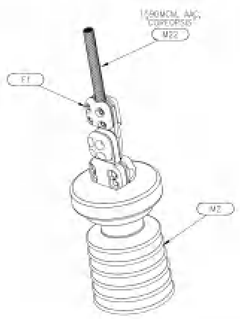
4 / 210 SPHERICAL WELDED COUPLER DETAIL
(12) REQ'D



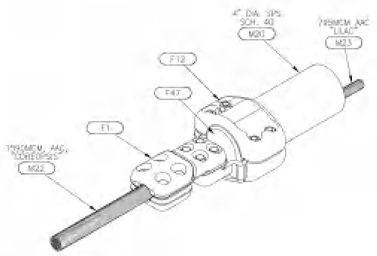
5 / 210 BREAKER CONNECTION DETAIL
(6) REQ'D



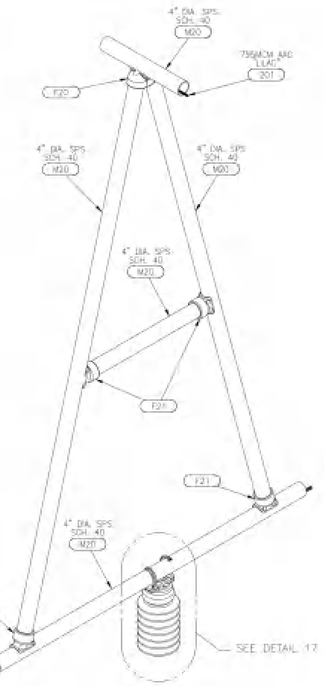
6 / 210 DISCONNECT SWITCH CONNECTION DETAIL (HINGE END)
(6) REQ'D



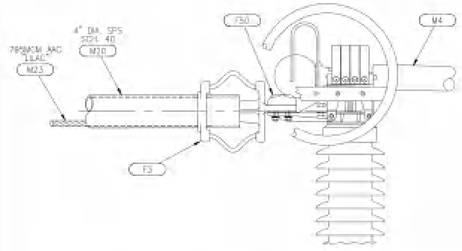
7 / 210 BREAKER CONNECTION DETAIL
(12) REQ'D



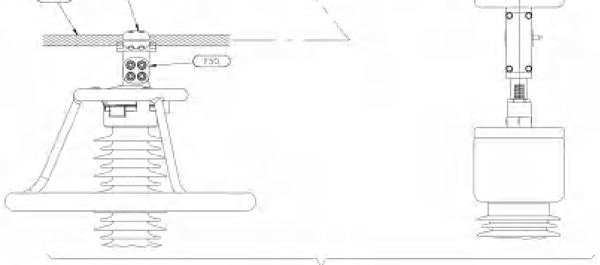
8 / 210 CABLE TO 4" BUS CONNECTION DETAIL
(3) REQ'D



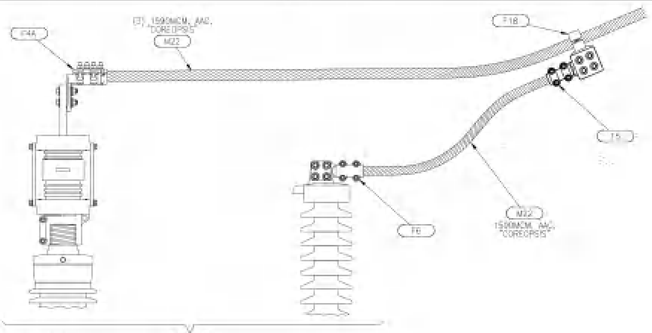
9 / 210 4" DIA. BUS A-FRAME DETAIL
(6) REQ'D



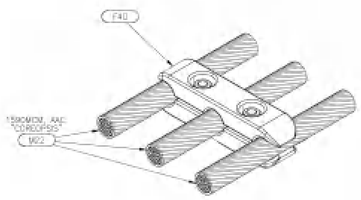
10 / 210D DISCONNECT SWITCH CONNECTION DETAIL (CONTACT END – EXPANSION)
(9) REQ'D



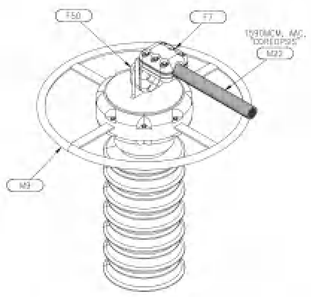
11 / 211 TRANSFORMER HIGH SIDE CONNECTION DETAIL
(6) REQ'D



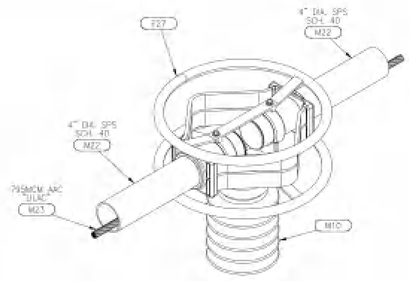
12 / 211 TRANSFORMER LOW SIDE CONNECTION DETAIL
(6) REQ'D



13 / 211 CABLE SPACER DETAIL
(12) REQ'D



14 / 210 CCVT CONNECTION DETAIL
(3) REQ'D



15 / 210 BUS SUPPORT DETAIL (EXPANSION)
(3) REQ'D

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/11/25	60% DESIGN REVIEW	RDB	GDK	SRH

STAMP:

RED RIVER CLEAN ENERGY

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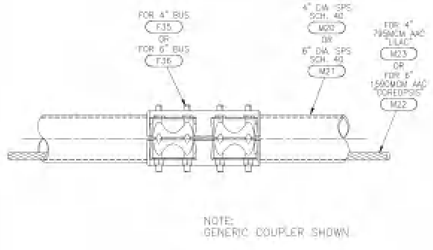
SCALE	NTS
DATE	12/11/24
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

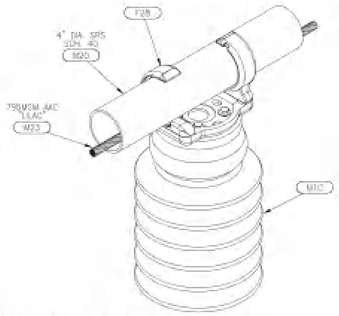
TITLE: CONNECTION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

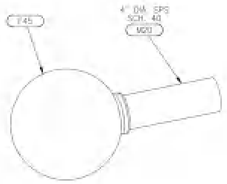
FILE NAME	24144-01-220
JOB NUMBER	24144-01
DRAWING NUMBER	220



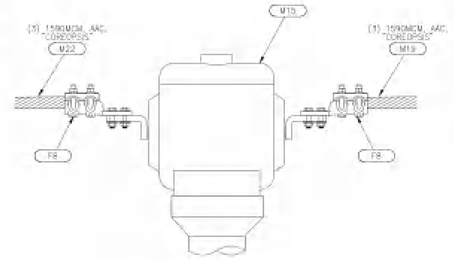
16 / 210 BUS COUPLER DETAIL (4" OR 6" BUS)
(20) 4" REQ'D, (18) 6" REQ'D



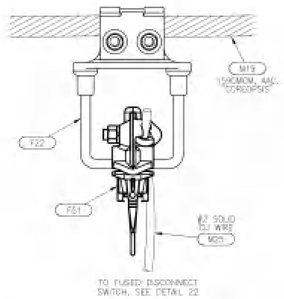
17 / 210 4" BUS SUPPORT DETAIL
(17) REQ'D



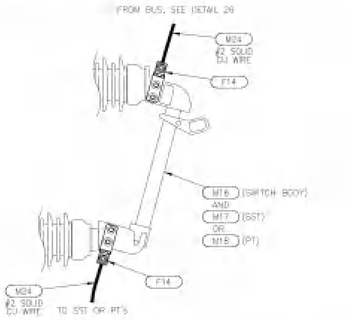
18 / 211 END CAP - BALL TYPE
(6) REQ'D



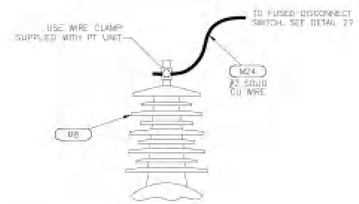
20 / 212 CURRENT TRANSFORMER CONNECTION DETAIL
(3) REQ'D



21 / 211 FUSED DISCONNECT SWITCH BUS CONNECTION DETAIL
(10) REQ'D



22 / 212 FUSED DISCONNECT SWITCH CONNECTION DETAIL
(10) REQ'D - (9) FOR PT'S & (1) FOR SST



23 / 212 PT CONNECTION DETAIL
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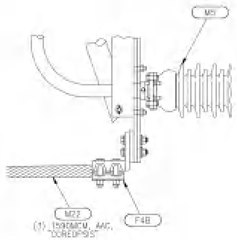

24 / 212 DISCONNECT SWITCH CONNECTION DETAIL (HINGE END)
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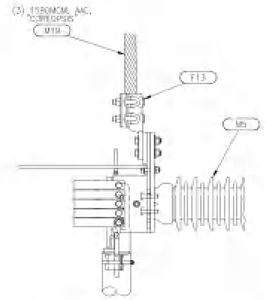
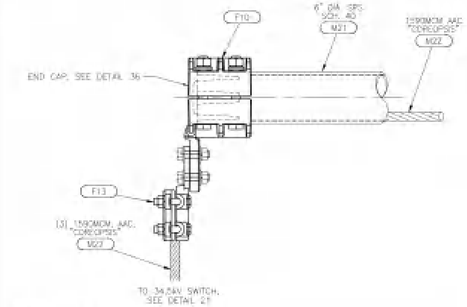
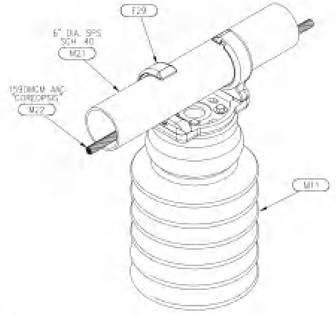


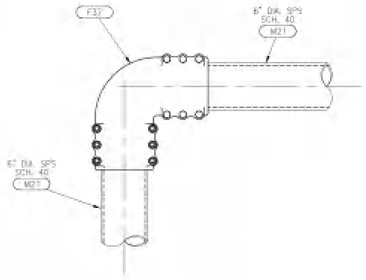
25 / 212 DISCONNECT SWITCH CONNECTION DETAIL (CONTACT END)
(6) REQ'D



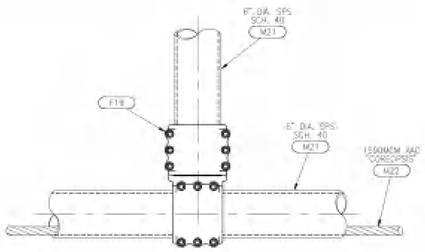
26 / 211 CABLE TO BUS CONNECTION DETAIL
(6) REQ'D



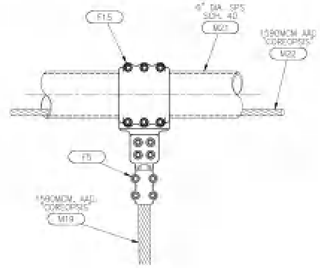
27 / 211 6" BUS SUPPORT DETAIL
(30) REQ'D



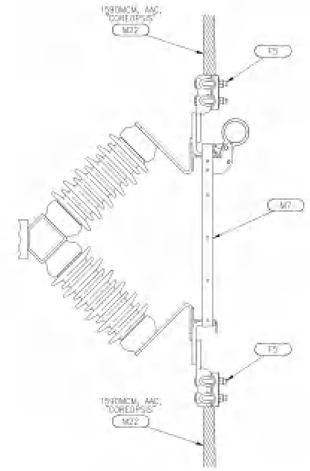
28 / 211 6" BUS 90 DEG. COUPLER DETAIL
(6) REQ'D



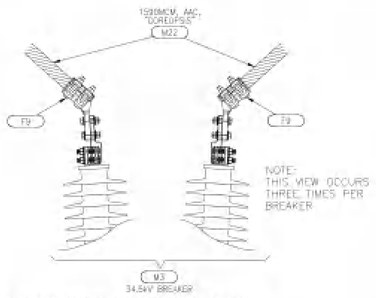
29 / 211 6" BUS TEE DETAIL
(6) REQ'D



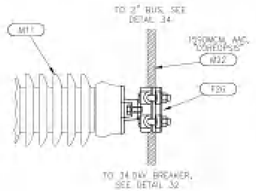
30 / 212 CABLE TO BUS TAP DETAIL
(18) REQ'D



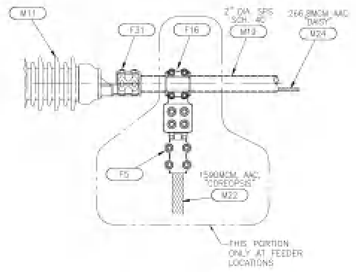
31 / 212 VEE TYPE HOOKSTICK DISCONNECT SWITCH CONNECTION DETAIL
(54) REQ'D



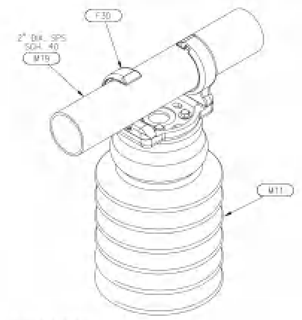
32 / 211 MEDIUM VOLTAGE BREAKER TERMINAL CONNECTION DETAIL
(18) REQ'D



33 / 211 CABLE SUPPORT
(18) REQ'D



34 / 212 2" BUS SUPPORT/CABLE TAP
(18) REQ'D



35 / 212 2" BUS SUPPORT DETAIL
(18) REQ'D

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/11/25	60% DESIGN REVIEW	RDB	CDK	SRH

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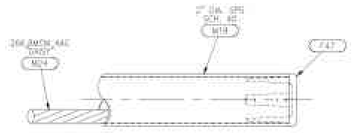
SCALE	NTS
DATE	12/11/24
DRAWN	RDB
CHECKED	CDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

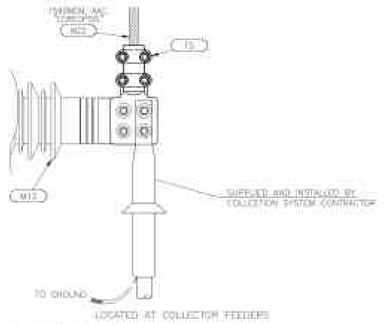
TITLE: CONNECTION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

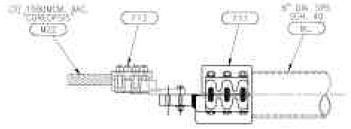
FILE NAME	24144-01-221
JOB NUMBER	24144-01
DRAWING NUMBER	221



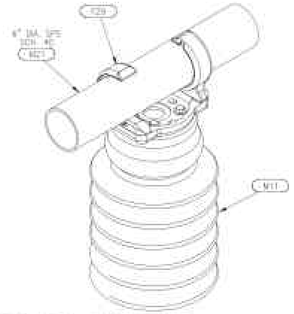
36 / 212 2" BUS END CAP DETAIL
(24) REQ'D



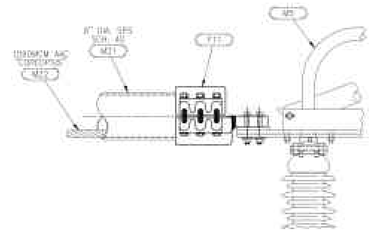
37 / 211 FEEDER TERMINATION DETAIL
(36) REQ'D



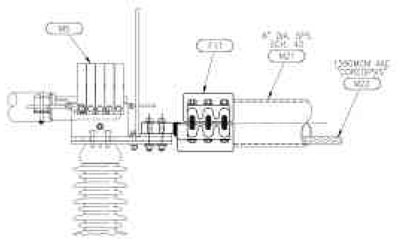
38 / 213 CABLE TO BUS CONNECTION DETAIL
(8) REQ'D



39 / 211 6" BUS SUPPORT DETAIL (TR210 INSULATOR)
(3) REQ'D



41 / 212 DISCONNECT SWITCH CONNECTION DETAIL (HINGE END)
(3) REQ'D



42 / 211 DISCONNECT SWITCH CONNECTION DETAIL (CONTACT END)
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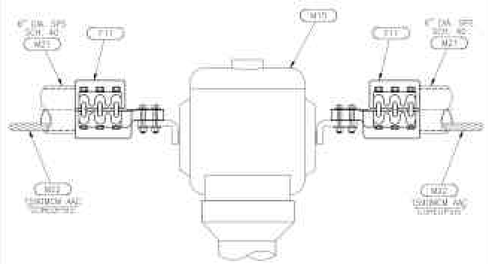
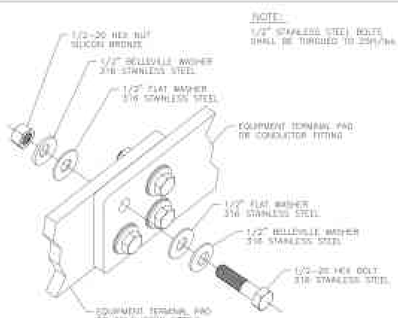


43 / 212 CURRENT TRANSFORMER CONNECTION DETAIL
(3) REQ'D



TYPICAL TERMINAL CONNECTION DETAIL

REV	DATE	DESCRIPTION	RDB	GDK	SRH
A	07/11/25	60% DESIGN REVIEW	RDB	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

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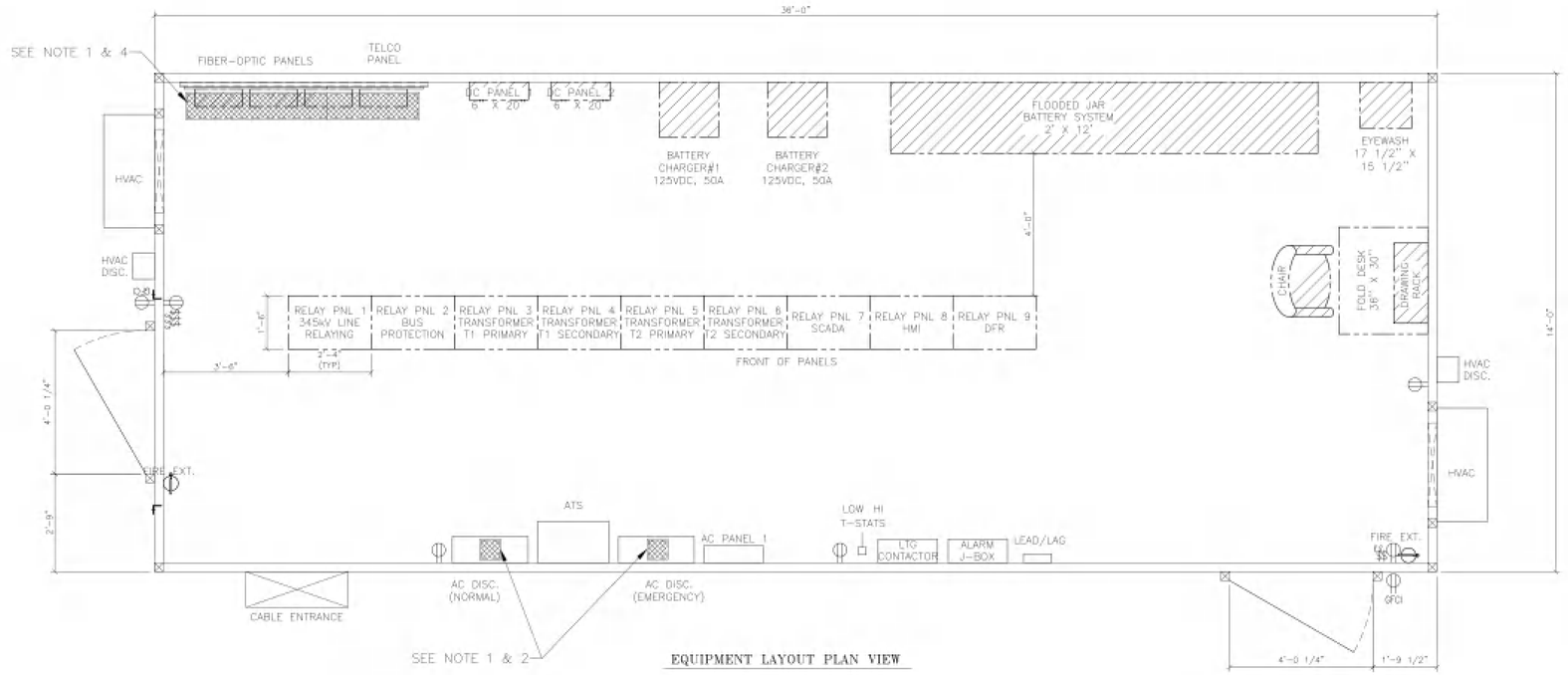
SCALE	NTS
DATE	12/11/24
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

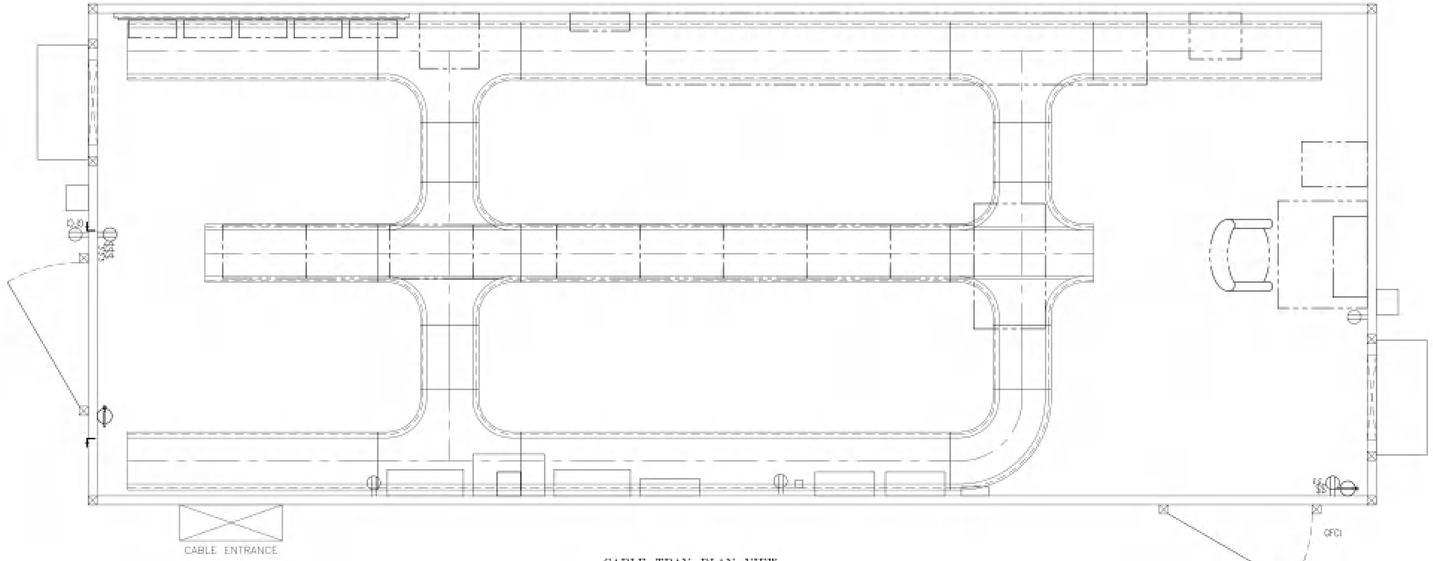
TITLE: CONNECTION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-222
JOB NUMBER	24144-01
DRAWING NUMBER	222



EQUIPMENT LAYOUT PLAN VIEW



CABLE TRAY PLAN VIEW

NOTES:

1. ALL FLOOR CUTOUTS TO BE LOCATED SO THEY DO NOT OVERLAP WITH PIER LOCATIONS.
2. OPENING TO BE 6.00x6.00 INCH WITH A FLUSRH 7.00x7.00 INCH COVER PLATE WITH 0.50 INCH OVERLAP ON ALL SIDES, CENTERED UNDERNEATH DISCONNECT.
3. OPENING TO BE 66.50x18.125 INCH WITH A FLUSRH 67.50x19.125 INCH COVER PLATE WITH 0.50 INCH OVERLAP ON ALL SIDES.
4. OPENING TO BE 95.00x8.00 INCH WITH (2) FLUSRH 48.00x9.00 INCH COVER PLATE WITH 0.50 INCH OVERLAP ON OUTSIDE EDGES, CENTERED UNDERNEATH BOARDS.
5. QUANTITY OF PANELS SRHOWN IS MAXIMUM NUMBER. ACTUAL NUMBER TO VARY PER REQUIREMENTS.

LEGEND:

EQUIPMENT INSTALLED BY TBD

FLOOR CUTOUT BY VENDOR

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	07/23/25	60% DESIGN SUBMITTAL	RDB	GDK	SRH
A	04/11/25	30% DESIGN SUBMITTAL	GDK	GDK	SRH

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RED RIVER CLEAN ENERGY

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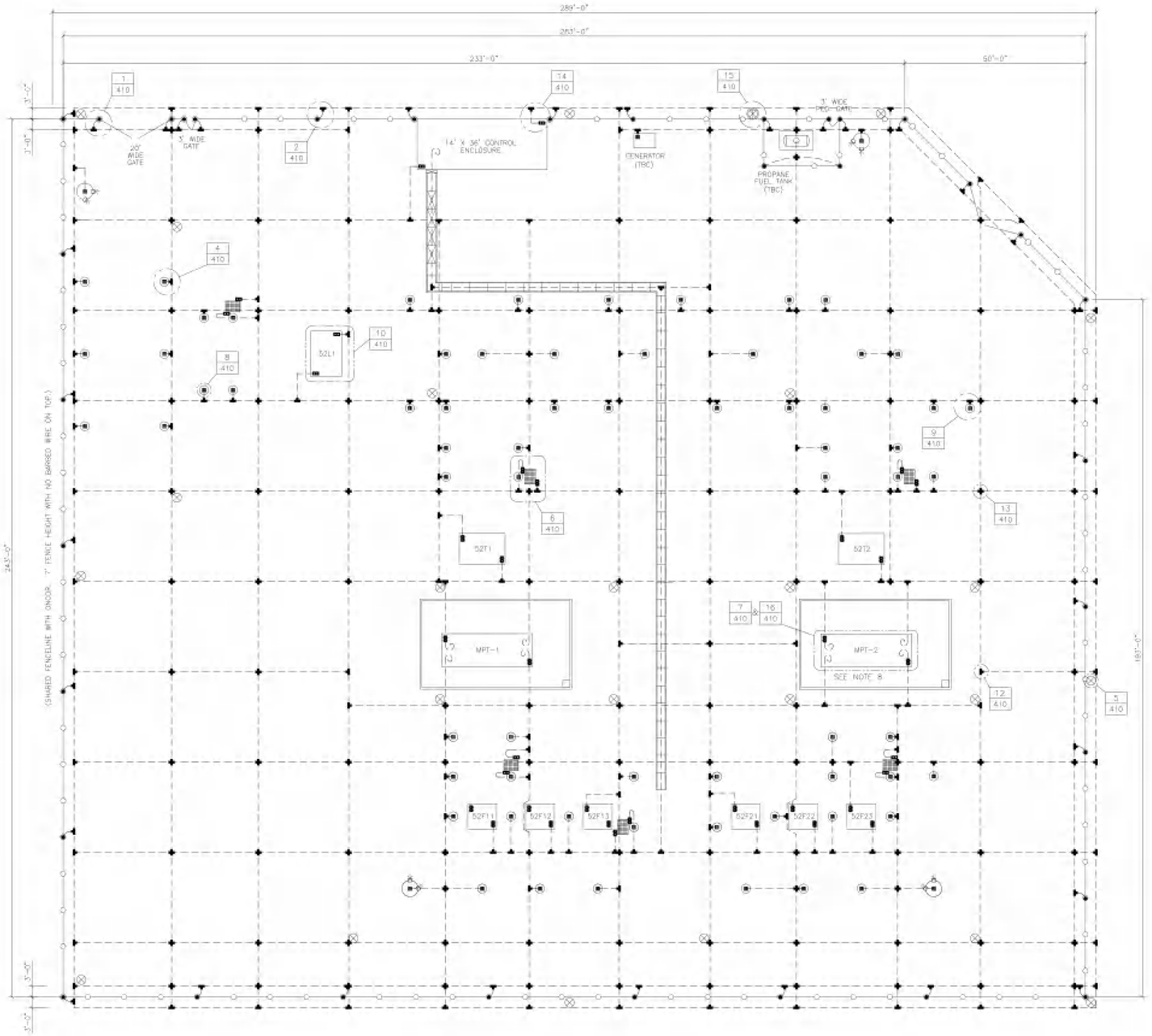
SCALE	NTS
DATE	04/07/25
DRAWN	GDK
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION CONTROL ENCLOSURE LAYOUT

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-300
JOB NUMBER	24144-01
DRAWING NUMBER	300



GROUNDING PLAN VIEW

DESIGN NOTES

1. REFERENCE DOCUMENT 24144-01 CHISME GROUND GRID ANALYSIS.
2. STATION GROUNDING IS BASED ON THE FOLLOWING DESIGN CRITERIA.
   - A. UTILITY GRID DESIGN EARTH CURRENT ——— 11,316 AMPS
     ADDITIONAL FUTURE CONTRIBUTION ——— 2,263 AMPS
   - B. FAULT CLEARING TIME ——— 0.50 SECONDS (TBC)
   - C. SPLIT FACTOR ——— NOT USED
   - D. GRID BURIAL DEPTH (BELOW SUBGRADE) ——— 18 IN. MINIMUM
   - E. SELECTED SOIL MODEL FOR GROUND RESISTIVITY:

LAYER NUMBER	RESISTIVITY (OHM-M)	THICKNESS (FEET)
1	INFINITE	INFINITE
2	18.94	2.20
3	14.44	4.22
4	18.52	INFINITE

3. DESIGN RESULTS

DESIGN FACTOR	TOLERABLE	CALCULATED
STEP POTENTIAL	2,168 V	1.50 V
TOUCH POTENTIAL	658 V	< 558 V
GRID RESISTANCE		0.104 OHMS
GRID POTENTIAL RISE		1,288 V

GENERAL NOTES

1. THIS DESIGN IS DEPENDANT UPON PLACEMENT OF A MINIMUM OF (4) INCHES OF CRUSHED LIMESTONE ROCK WITH A NOMINAL RESISTIVITY OF (3000) OHM-METERS. ROCK SURFACING SHALL EXTEND OUTSIDE THE SUBSTATION FENCE A MINIMUM OF THREE FEET.
2. THE TESTING SUBCONTRACTOR SHALL TEST THE GROUND GRID PRIOR TO CONNECTING ANY EXTERNAL GROUND/SHIELD WIRES TO CONFIRM THAT THE RESISTANCE TO THE REMOTE EARTH IS EQUAL TO OR LOWER THAN THE DESIGN VALUE.
3. GROUNDING FOR ALL JUNCTION BOXES TO BE PROVIDED BY THE CONTRACTOR.
4. STATION PERIMETER FENCE SHALL BE GROUNDED IN ACCORDANCE WITH LOCAL PRACTICES AND THESE DRAWINGS. ALL FENCE GROUNDING SHALL BE INSTALLED ON THE INSIDE OF THE FENCE.
5. GROUND RODS SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THIS DRAWING.
6. THE CONTRACTOR SHALL PROVIDE SUFFICIENT SLACK FOR EQUIPMENT AND STRUCTURE GROUND LEADS TO REACH GROUNDING PADS.
7. THE CONTRACTOR SHALL CONNECT (1) 4/0 AWG COPPER CABLE FROM THE GROUND GRID THRU THE CABLE TRENCH AS SHOWN, SECURING IT WITH GROUND CLIPS TO THE TRENCH SIDEWALL. THE CABLE TRENCH GROUND SHALL CONNECT TO THE MAIN GROUND GRID IN (3) LOCATIONS AS SHOWN. THE 4/0 AWG COPPER CABLE SHALL BE RUN CONTINUOUSLY FROM THE CABLE TRENCH THROUGHOUT THE BUILDING CABLE TRAY AND BONDED EVERY 10' MINIMUM.
8. TRANSFORMER GROUND PIGTAILS SHALL BE INSTALLED IN 1" PVC CONDUIT EMBEDDED IN FOUNDATION. SEE CONDUIT PLAN DRAWING 450.

LEGEND

- —DETAIL NUMBER
  —DRAWING NO.
- ±8500 FT 4/0 AWG 19 STRAND (CLASS B) CU., MEDIUM HARD DRAWN, BELOW GRADE CABLE SHALL BE INSTALLED A MINIMUM OF 18" BELOW SUBGRADE (SOIL).
- (28) 3/4" x 10'-0" LONG COPPERWELD GROUND RODS
- ±(127) EXOTHERMIC CONNECTION (CROSS) LOCATIONS
- ±(177) EXOTHERMIC CONNECTION (TEE) LOCATIONS
- ±(36) TWO HOLE BRONZE BOLTED TERMINALS
- ±(49) SINGLE GROOVE BRONZE CONNECTORS
- ±(22) DOUBLE GROOVE BRONZE CONNECTORS
- ±(35) FENCE GROUNDING LOCATIONS
- GALVANIZED CHAIN LINK FENCE
- (6) 3' X 4' GROUND MAT
- (ONE) TEST WELL
- 10' PIGTAIL

REFERENCE DRAWINGS:

SUBSTATION PLAN VIEW	24144-01-0-200
SUBSTATION GROUNDING DETAILS	24144-01-0-410
SUBSTATION CONDUIT PLAN	24144-01-0-450
SUBSTATION FOUNDATION PLAN	24144-01-0-501

0' 20'-0" 40'-0" 60'-0" 80'-0" 100'-0"

SCALE BAR
INCREMENTS IN FEET & INCHES

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/11/25	80% DESIGN SUBMITTAL	RDB	GDK	SRH

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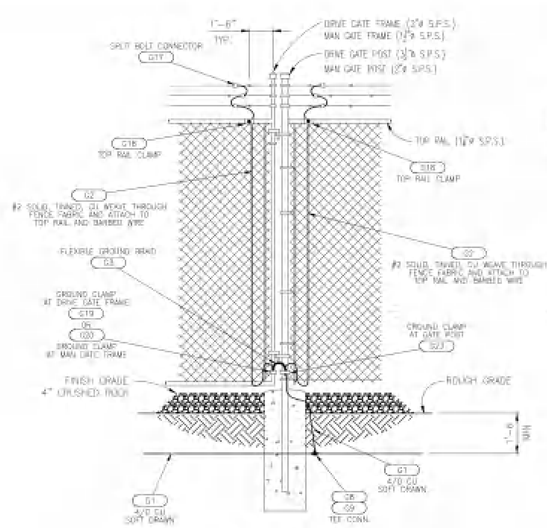
SCALE	1/16"=1'-0"
DATE	07/21/25
DRAWN	RDB
CHECKED	GDK
APPROVED	SRH

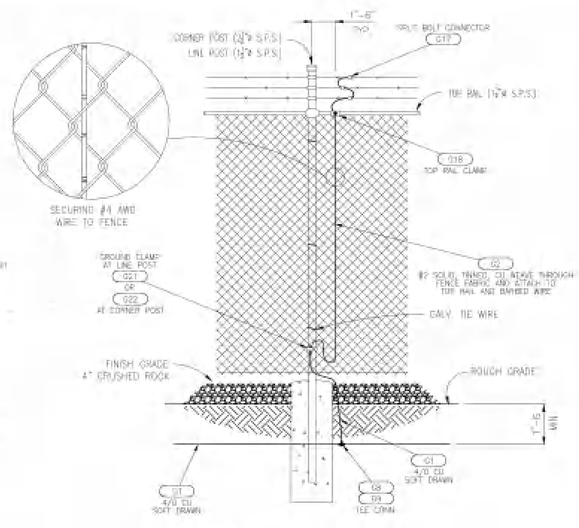
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

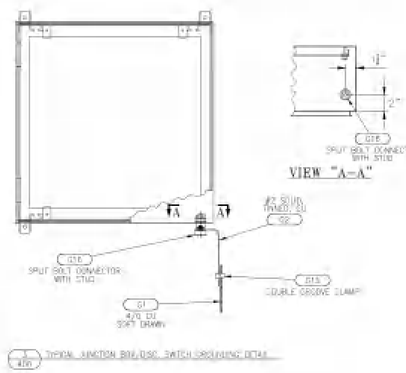
TITLE: SUBSTATION
GENERAL ARRANGEMENT PLAN

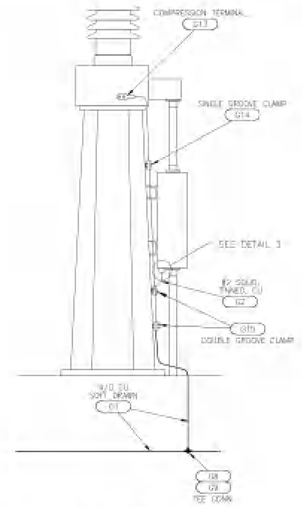
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

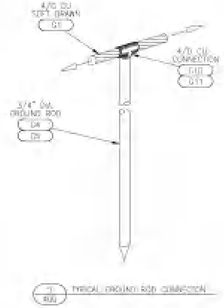
FILE NAME	24144-01-400
JOB NUMBER	24144-01
DRAWING NUMBER	400

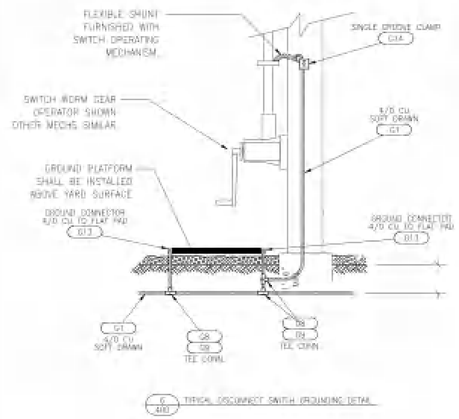


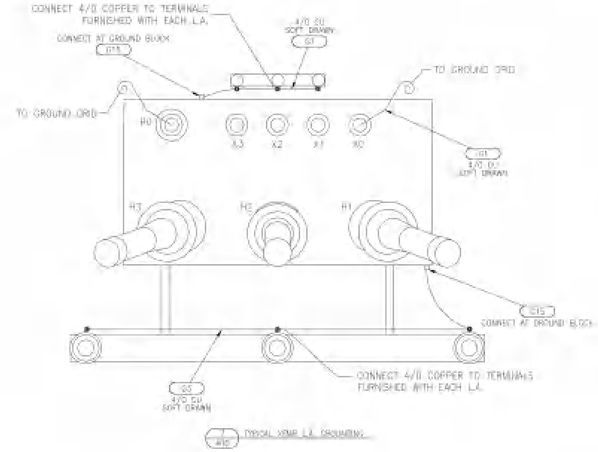


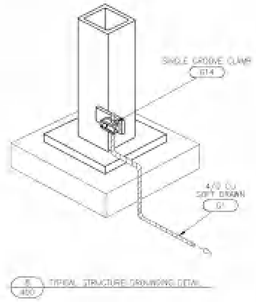


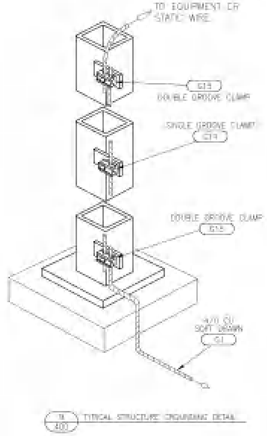


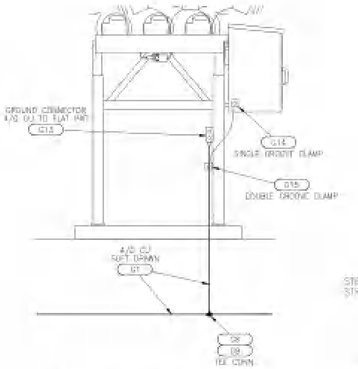


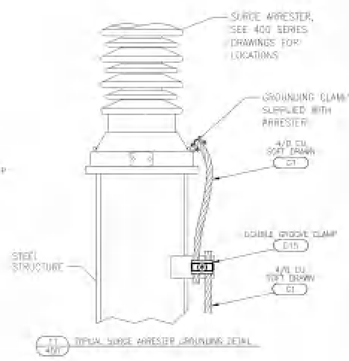


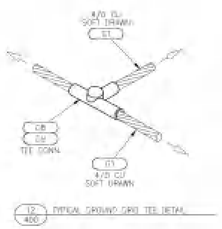


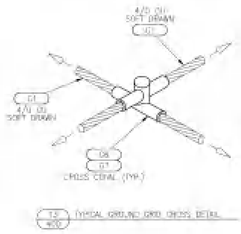


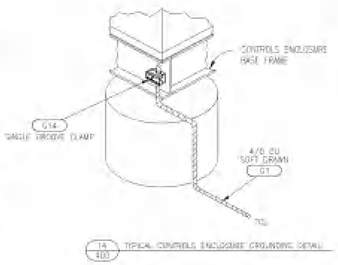


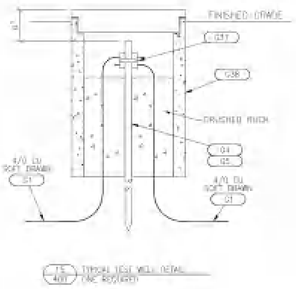


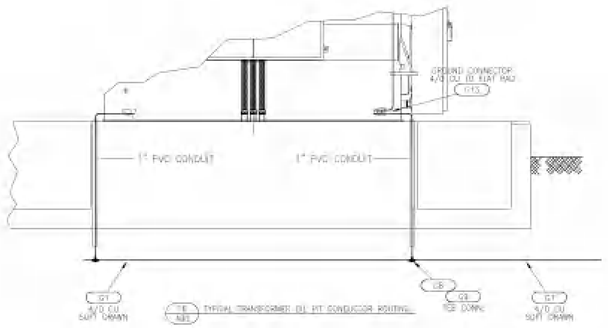












REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/21/25	60% DESIGN SUBMITTAL	GDK	GDK	SRH

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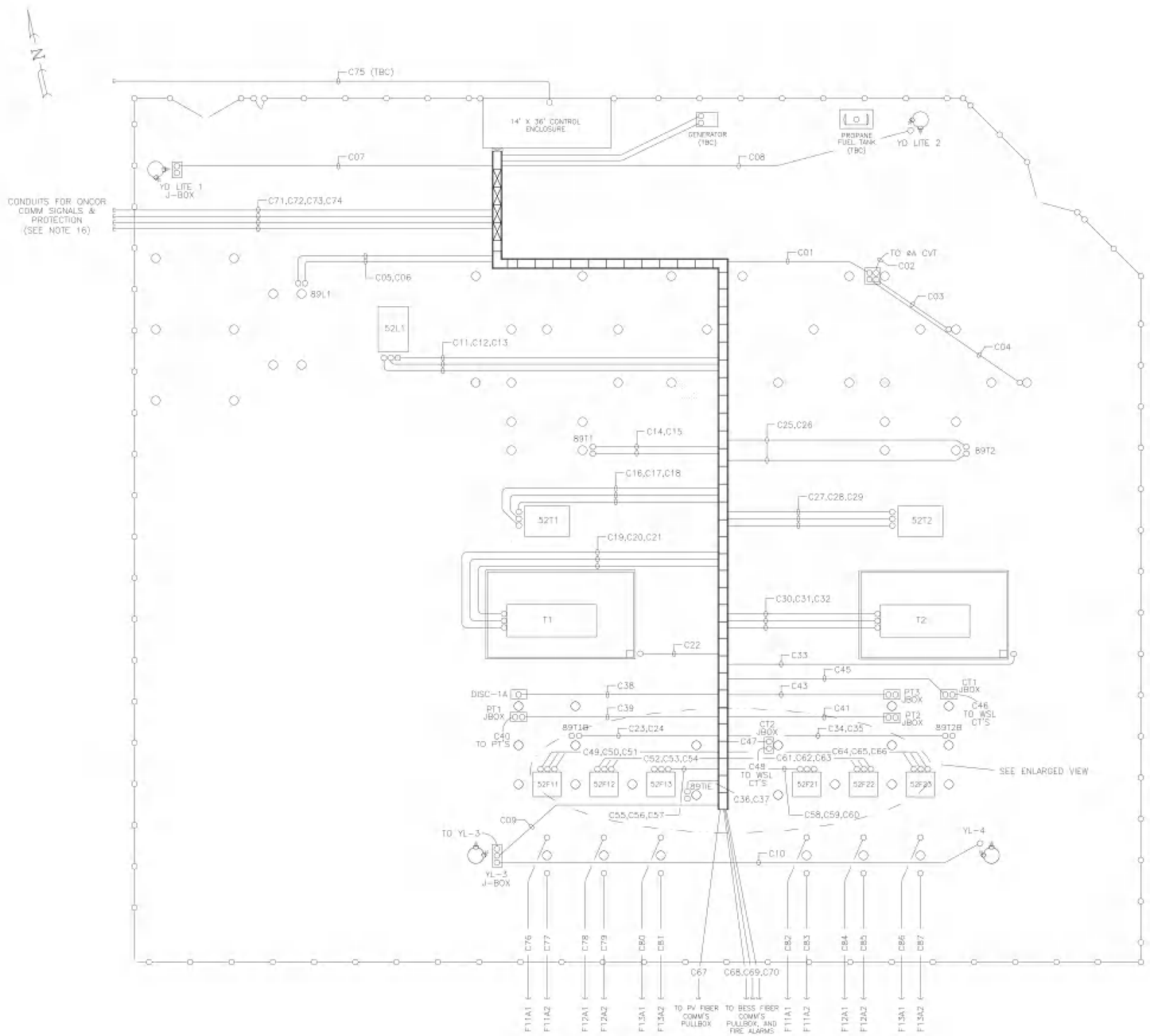
SCALE	1/16"=1'-0"
DATE	07/21/25
DRAWN	GDK
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

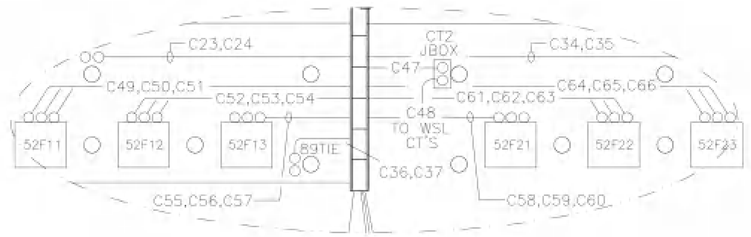
TITLE: SUBSTATION GROUNDING DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-410
JOB NUMBER	24144-01
DRAWING NUMBER	410



CONDUIT & CABLE TRENCH PLAN VIEW



ENLARGED VIEW

CONDUIT NOTES:

1. ALL CONDUIT INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE 2020 NATIONAL ELECTRIC CODE, NESC, AND OTHER APPLICABLE STANDARDS.
2. THE CONDUIT LAYOUT SHOWN IN THESE PLANS IS CONCEPTUAL ONLY. THE CONTRACTOR SHALL ROUTE AND LOCATE THE CONDUITS TO SUIT SITE CONDITIONS. CONTRACTOR SHALL COORDINATE ALL CHANGES IN WIRING AND CONDUIT WITH THE ENGINEER.
3. WHEN FIELD CUTTING IS REQUIRED, THE CONDUIT SHALL BE CUT SQUARE AND DEBURRED.
4. ALL CONDUITS SHALL BE FREE OF ANY OBSTRUCTIONS AND PROPERLY SECURED BEFORE THE CABLE IS PULLED. CONTRACTOR SHALL APPLY CABLE PULLING LUBRICANT BEFORE PULLING CABLE.
5. ALL BELOW GRADE CONDUIT, INCLUDING BENDS, SHALL BE PVC SCHEDULE 40 WITHOUT CONCRETE ENCASEMENT, UNLESS NOTED OTHERWISE. ALL ABOVE GRADE CONDUIT SHALL BE GALVANIZED RIGGID STEEL (GRS). ALL TURN-UP ELBOWS SHALL BE PVC COATED GRS EXTENDING TO A MINIMUM HEIGHT OF 6" ABOVE FINISHED GRADE.
6. THE TOP OF CONDUIT SHALL BE INSTALLED A MINIMUM OF 30" BELOW FINISHED GRADE (TOP OF GRAVEL), UNLESS SHOWN OR NOTED OTHERWISE.
7. THERE SHALL BE NO MORE THAN FOUR 90 DEGREE BENDS BETWEEN PULL LOCATIONS SUCH AS CONDUIT BODIES AND PULL BOXES.
8. PRIOR TO CABLE PULLING, A MANDREL NO LESS THAN 1/4" SMALLER IN DIAMETER THAN THE CONDUITS NOMINAL INSIDE DIAMETER, SHALL BE PULLED THROUGH ALL COMPLETED CONDUITS.
9. ALL SPARE CONDUITS TERMINATING AT EQUIPMENT SHALL HAVE A PULL ROPE INSTALLED AND LEFT IN ALL CONDUITS.
10. ALL CONDUIT FITTINGS ARE TO BE SUPPORTED WITHIN A MAXIMUM OF 3'-0" OF EACH HUB.
11. ALL PVC CONDUITS TERMINATING INTO PULL BOXES AND VAULTS SHALL BE PROVIDED WITH END BELL FITTINGS. PVC CONDUITS SHALL ENTER BOTTOM OF CABLE TRENCH AND USE 45 DEGREE FITTINGS WITH END BELLS.
12. CONTRACTOR SHALL CONFIRM STUB-UP LOCATIONS WITH THE EQUIPMENT DRAWINGS.
13. PVC CONDUIT AND FITTINGS SHALL BE JOINED TOGETHER AND MADE LEAK PROOF USING THE PVC CLEANER AND FAST DRYING SOLVENT CEMENT.
14. CABLE TRENCH SHALL BE INSTALLED PER MANUFACTURE RECOMMENDATIONS. A #4/0 AWG BARE COPPER GROUND CABLE SHALL BE INSTALLED INSIDE TRENCH AND BONDED TO THE GROUND GRID IN AT LEAST (3) PLACES. SEE GROUNDING PLAN DRAWING 400.
15. SEE DRAWING 451 FOR CONDUIT SCHEDULE. SEE DRAWING 452 FOR CONDUIT DETAILS.
16. CONDUITS C71-C74 SHALL BE EXTENDED 5' BEYOND FENCELINE AND CAPPED OFF FOR ONCOR USE. EXACT LOCATION TO BE DETERMINED (LATER).

REFERENCE DRAWINGS:

PLAN VIEW	24144-01-200
GROUNDING PLAN	24144-01-400
CONDUIT SCHEDULE	24144-01-451
CONDUIT DETAILS	24144-01-452
FOUNDATION PLAN	24144-01-501

0' 20'-0" 40'-0" 60'-0" 80'-0" 100'-0"

SCALE BAR
INCREMENTS IN FEET & INCHES

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/21/25	80% DESIGN SUBMITTAL	GDK	GDK	SRH

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SCALE	1/16"=1'-0"
DATE	07/21/25
DRAWN	GDK
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION
CONDUIT AND CABLE TRENCH PLAN VIEW

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-450
JOB NUMBER	24144-01
DRAWING NUMBER	450

CHISME SUBSTATION CONDUIT SCHEDULE

CONDUIT NO.	SIZE	FROM	TO	REMARKS
C01	2"	CVT1 J-BOX 1	CABLE TRENCH	PT SIGNALS
C02	2"	CVT1 J-BOX 1	CVT1 A PHASE	PT SIGNAL, A PHASE
C03	2"	CVT1 J-BOX 1	CVT1 B PHASE	PT SIGNAL, B PHASE
C04	2"	CVT1 J-BOX 1	CVT1 C PHASE	PT SIGNAL, C PHASE
C05	3"	HV DISC. SW-89L1	CABLE TRENCH	STATUS, CONTROLS
C06	3"	HV DISC. SW-89L1	CABLE TRENCH	CONTROL POWER
C07	2"	YL-1 J-BOX	CABLE TRENCH	YARD LIGHTS
C08	2"	YL-2	CABLE TRENCH	YARD LIGHTS
C09	2"	YL-3 J-BOX	CABLE TRENCH	YARD LIGHTS
C10	2"	YL-3 J-BOX	YL-4	YARD LIGHTS
C11	3"	HV BREAKER 52-L1	CABLE TRENCH	CT SIGNALS
C12	3"	HV BREAKER 52-L1	CABLE TRENCH	CONTROL POWER
C13	3"	HV BREAKER 52-L1	CABLE TRENCH	CONTROLS & ALARMS
C14	3"	HV DISC. SW-89T1	CABLE TRENCH	STATUS, CONTROLS
C15	3"	HV DISC. SW-89T1	CABLE TRENCH	CONTROL POWER
C16	3"	HV BREAKER 52-T1	CABLE TRENCH	CT SIGNALS
C17	3"	HV BREAKER 52-T1	CABLE TRENCH	CONTROL POWER
C18	3"	HV BREAKER 52-T1	CABLE TRENCH	CONTROLS & ALARMS
C19	3"	TRANSFORMER T1	CABLE TRENCH	CT SIGNALS
C20	3"	TRANSFORMER T1	CABLE TRENCH	ALARMS
C21	3"	TRANSFORMER T1	CABLE TRENCH	CONTROL POWER
C22	2"	OIL MINDER PUMP #1	CABLE TRENCH	CONTROL POWER & ALARMS
C23	2"	34.5KV DISC. SW-89T1B	CABLE TRENCH	STATUS, CONTROLS
C24	2"	34.5KV DISC. SW-89T1B	CABLE TRENCH	CONTROL POWER
C25	3"	HV DISC. SW-89T2	CABLE TRENCH	STATUS, CONTROLS
C26	3"	HV DISC. SW-89T2	CABLE TRENCH	CONTROL POWER
C27	3"	HV BREAKER 52-T2	CABLE TRENCH	CT SIGNALS
C28	3"	HV BREAKER 52-T2	CABLE TRENCH	CONTROL POWER
C29	3"	HV BREAKER 52-T2	CABLE TRENCH	CONTROLS & ALARMS
C30	3"	TRANSFORMER T2	CABLE TRENCH	CT SIGNALS
C31	3"	TRANSFORMER T2	CABLE TRENCH	ALARMS
C32	3"	TRANSFORMER T2	CABLE TRENCH	CONTROL POWER
C33	2"	OIL MINDER PUMP #2	CABLE TRENCH	CONTROL POWER & ALARMS
C34	2"	34.5KV DISC. SW-89T2B	CABLE TRENCH	STATUS, CONTROLS
C35	2"	34.5KV DISC. SW-89T2B	CABLE TRENCH	CONTROL POWER
C36	2"	34.5KV DISC. SW-89TIE	CABLE TRENCH	STATUS, CONTROLS
C37	2"	34.5KV DISC. SW-89TIE	CABLE TRENCH	CONTROL POWER
C38	4"	SST1 DISC SW-1A	CABLE TRENCH	NORMAL STATION SERVICE
C39	2"	PT1 JUNCTION BOX	CABLE TRENCH	PT SIGNALS
C40	2"	PT1 JUNCTION BOX	PT1 POTENTIAL TRANS.	PT SIGNALS
C41	2"	PT2 JUNCTION BOX	CABLE TRENCH	PT SIGNALS
C42	2"	PT2 JUNCTION BOX	PT2 POTENTIAL TRANS.	PT SIGNALS
C43	2"	PT3 JUNCTION BOX	CABLE TRENCH	WSL PT SIGNALS
C44	2"	PT3 JUNCTION BOX	PT3 POTENTIAL TRANS.	WSL PT SIGNALS
C45	2"	CT1 JUNCTION BOX	CABLE TRENCH	WSL T2 CT SIGNALS
C46	2"	CT1 JUNCTION BOX	CT1 WSL CT'S	WSL T2 CT SIGNALS
C47	2"	CT2 JUNCTION BOX	CABLE TRENCH	WSL BUS CT SIGNALS
C48	2"	CT2 JUNCTION BOX	CT2 WSL CT'S	WSL BUS CT SIGNALS
C49	2"	34.5KV BREAKER 52-F11	CABLE TRENCH	CONTROLS & ALARMS
C50	2"	34.5KV BREAKER 52-F11	CABLE TRENCH	CT SIGNALS
C51	2"	34.5KV BREAKER 52-F11	CABLE TRENCH	CONTROL POWER
C52	2"	34.5KV BREAKER 52-F12	CABLE TRENCH	CONTROLS & ALARMS
C53	2"	34.5KV BREAKER 52-F12	CABLE TRENCH	CT SIGNALS
C54	2"	34.5KV BREAKER 52-F12	CABLE TRENCH	CONTROL POWER
C55	2"	34.5KV BREAKER 52-F13	CABLE TRENCH	CONTROLS & ALARMS
C56	2"	34.5KV BREAKER 52-F13	CABLE TRENCH	CT SIGNALS
C57	2"	34.5KV BREAKER 52-F13	CABLE TRENCH	CONTROL POWER
C58	2"	34.5KV BREAKER 52-F21	CABLE TRENCH	CONTROLS & ALARMS
C59	2"	34.5KV BREAKER 52-F21	CABLE TRENCH	CT SIGNALS
C60	2"	34.5KV BREAKER 52-F21	CABLE TRENCH	CONTROL POWER
C61	2"	34.5KV BREAKER 52-F22	CABLE TRENCH	CONTROLS & ALARMS
C62	2"	34.5KV BREAKER 52-F22	CABLE TRENCH	CT SIGNALS
C63	2"	34.5KV BREAKER 52-F22	CABLE TRENCH	CONTROL POWER
C64	2"	34.5KV BREAKER 52-F23	CABLE TRENCH	CONTROLS & ALARMS
C65	2"	34.5KV BREAKER 52-F23	CABLE TRENCH	CT SIGNALS
C66	2"	34.5KV BREAKER 52-F23	CABLE TRENCH	CONTROL POWER
C67	3"	PV FIBER COMM'S	CABLE TRENCH	PV FIBER COMM SIGNALS
C68	3"	BESS FIBER COMM'S	CABLE TRENCH	BESS FIBER COMM SIGNALS
C69	2"	BESS FIRE ALARM LOOP	CABLE TRENCH	BESS FIRE ALARM SIGNALS
C70	2"	BESS FIRE ALARM LOOP	CABLE TRENCH	BESS FIRE ALARM SIGNALS
C71	3"	ONCOR FIBER COMM'S	CABLE TRENCH	ONCOR FIBER COMM
C72	3"	ONCOR CONTROL/PROTECTION	CABLE TRENCH	ONCOR SIGNALS
C73	3"	ONCOR CONTROL/PROTECTION	CABLE TRENCH	ONCOR SIGNALS
C74	3"	ONCOR CONTROL/PROTECTION	CABLE TRENCH	ONCOR SIGNALS
C75	4"	BACK UP STATION SUPPLY (TBD)	CABLE TRENCH	BACKUP STATION SERVICE
C76	6"	PV COLLECTOR CIRCUIT F11A1	PV COLLECTOR CIRCUIT	34.5KV FEEDER F11A1
C77	6"	PV COLLECTOR CIRCUIT F11A2	PV COLLECTOR CIRCUIT	34.5KV FEEDER F11A2
C78	6"	PV COLLECTOR CIRCUIT F12A1	PV COLLECTOR CIRCUIT	34.5KV FEEDER F12A1
C79	6"	PV COLLECTOR CIRCUIT F12A2	PV COLLECTOR CIRCUIT	34.5KV FEEDER F12A2
C80	6"	PV COLLECTOR CIRCUIT F13A1	PV COLLECTOR CIRCUIT	34.5KV FEEDER F13A1
C81	6"	PV COLLECTOR CIRCUIT F13A2	PV COLLECTOR CIRCUIT	34.5KV FEEDER F13A2
C82	6"	PV COLLECTOR CIRCUIT F21A1	PV COLLECTOR CIRCUIT	34.5KV FEEDER F21A1
C83	6"	PV COLLECTOR CIRCUIT F21A2	PV COLLECTOR CIRCUIT	34.5KV FEEDER F21A2
C84	6"	PV COLLECTOR CIRCUIT F22A1	PV COLLECTOR CIRCUIT	34.5KV FEEDER F22A1
C85	6"	PV COLLECTOR CIRCUIT F22A2	PV COLLECTOR CIRCUIT	34.5KV FEEDER F22A2
C86	6"	PV COLLECTOR CIRCUIT F23A1	PV COLLECTOR CIRCUIT	34.5KV FEEDER F23A1
C87	6"	PV COLLECTOR CIRCUIT F23A2	PV COLLECTOR CIRCUIT	34.5KV FEEDER F23A2

REFERENCE DRAWINGS:

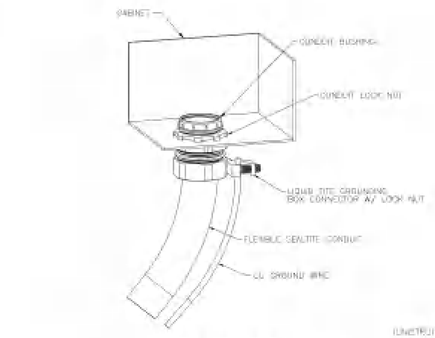
RED RIVER CLEAN ENERGY

QUALUS

CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

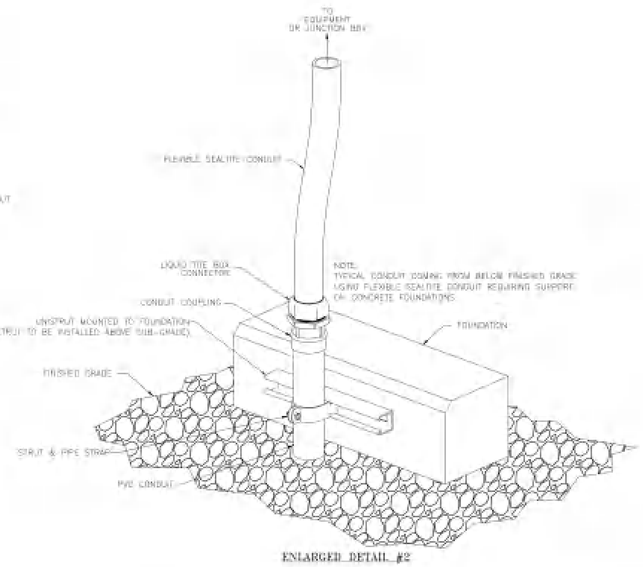
SUBSTATION
CONDUIT SCHEDULE

451



ENLARGED DETAIL #1

NOTE:
TYPICAL FOR ALL CONTROL CABINETS, AUXILIARY SWITCH BOXES, ETC.



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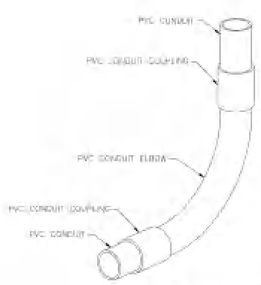

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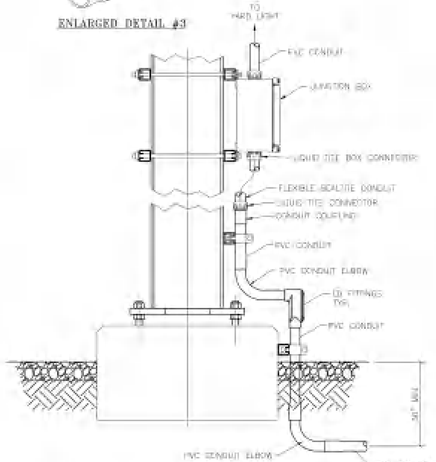
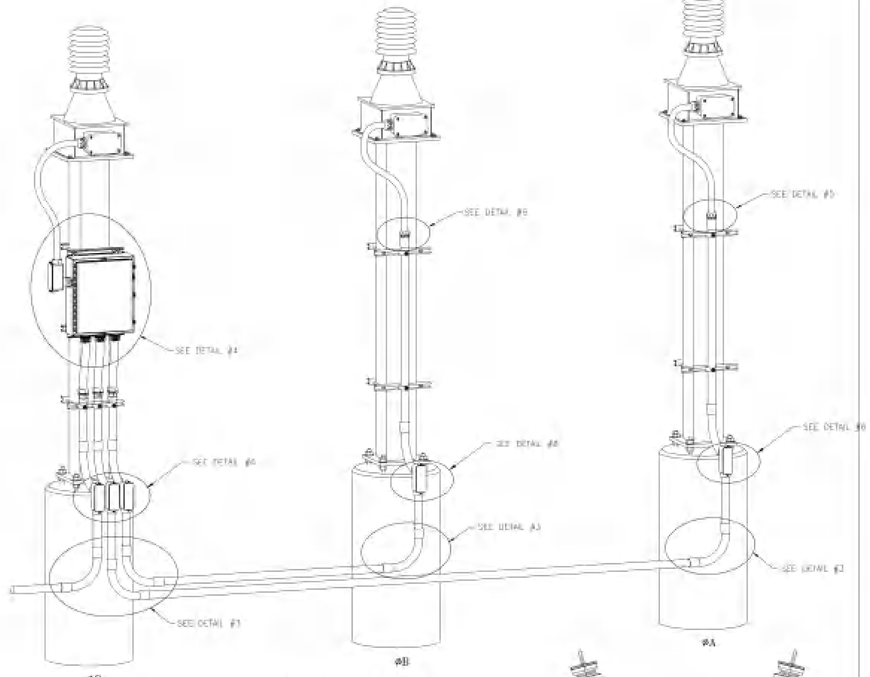
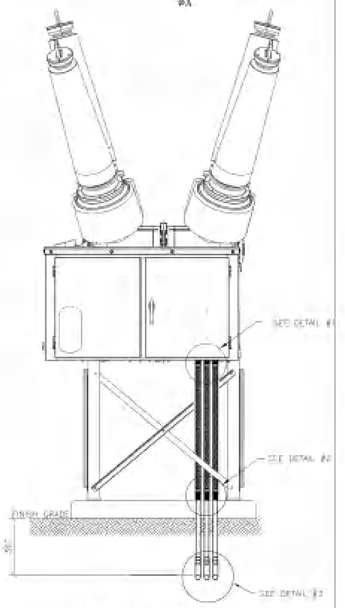


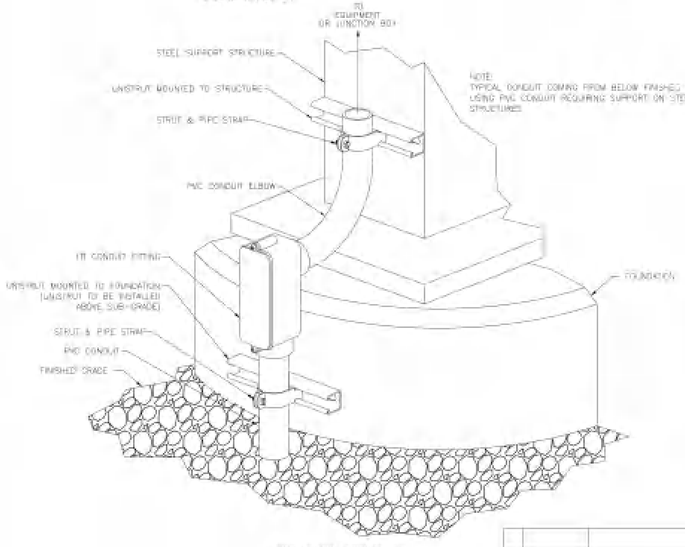
FEEDER STRUCTURE LIGHTING CONDUIT



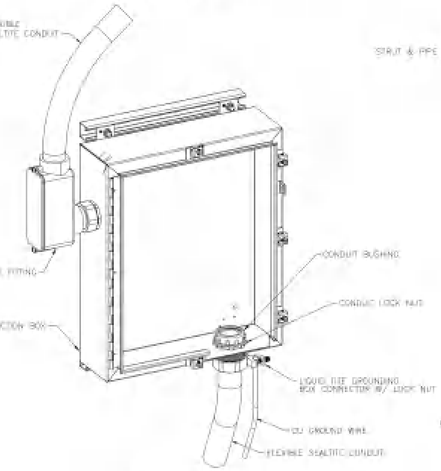
345KV CVT CONDUIT DETAIL
DETAIL ASSUMES A STRUCTURE HEIGHT OF 11'-0"
SEE DWG. E-450 FOR CONDUIT DEPTH BELOW GRADE
SEE DWG. E-400 & 410 FOR GROUNDING



TYPICAL BREAKER CONDUIT DETAIL

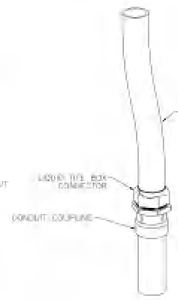


ENLARGED DETAIL #8

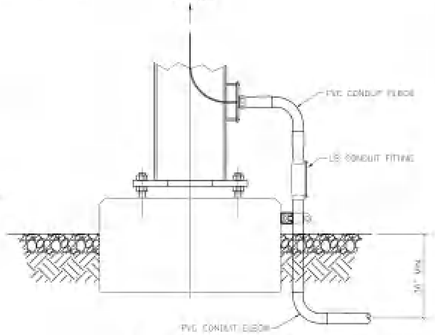


ENLARGED DETAIL #4

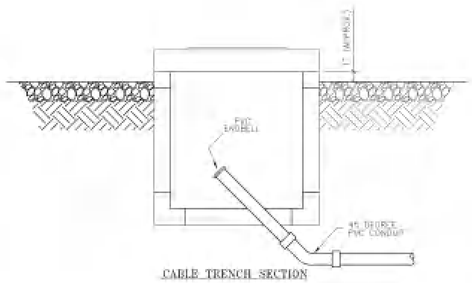
NOTE:
TYPICAL FOR ALL JUNCTION BOXES. JUNCTION BOXES WITH TOP CONDUITS SHALL USE THE SAME TYPE ITEMS EXCLUDING THE GROUND CONNECTION



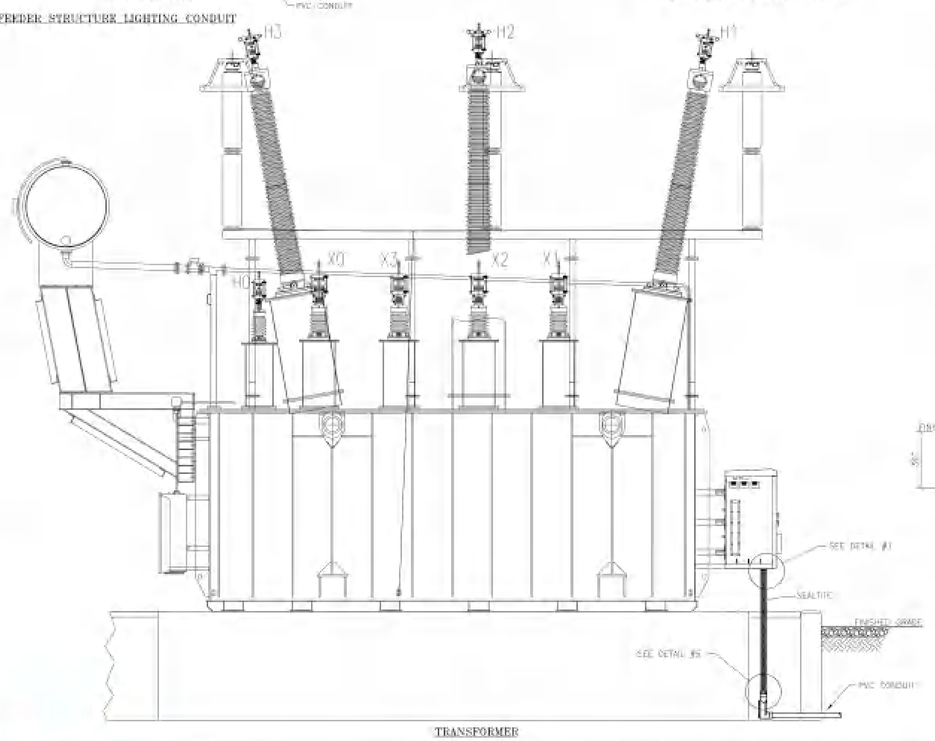
ENLARGED DETAIL #5



DEADEND LIGHTING CONDUIT



CABLE TRENCH SECTION



TRANSFORMER

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/21/25	60% DESIGN SUBMITTAL	GDK	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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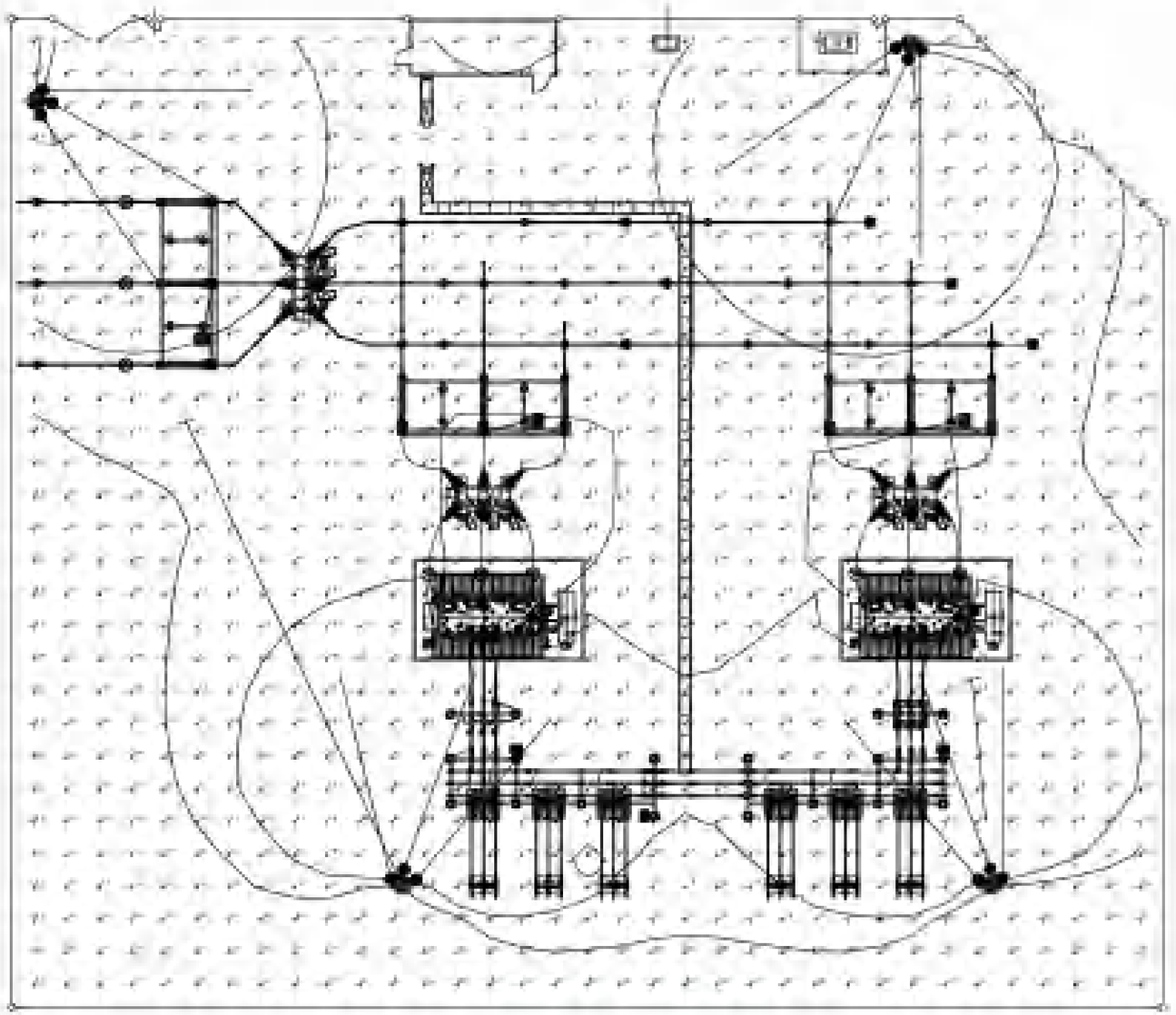
SCALE	1/16"=1'-0"
DATE	07/21/25
DRAWN	GDK
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION CONDUIT DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-452
JOB NUMBER	24144-01
DRAWING NUMBER	452



0	7/22/25	ISSUED FOR REVIEW	CTM	CTM	CTM
REV	DATE	DESCRIPTION	DRN	CHK	APP

RED RIVER
TEXAS DIVISION

QUALUS

DATE	07/22/25
DRN	CTM
CHK	CTM
APP	CTM

CHISHOM SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

SUBSTATION
LIGHTING PLAN

LOCATION: NEAR: Cty Line, BROWN COUNTY, TEXAS

TITLE NUMBER	24144-111-475
JOB NUMBER	24144-01
DRAWING NUMBER	475

QUALUS

TECHNICAL REPORT

PROJECT: Red River Clean Energy – Chisme

JOB NUMBER: 24144-01

SUBJECT:	Site Lighting Study			**CALC NO.:**	24144
				SHEET NO.:	1 OF 6
BY:	Qualus	**DATE:**	07/23/25	**REV:**	A

SITE
LIGHTING STUDY

(Issued For Review)

TABLE OF CONTENTS

1.0 Purpose and Scope 3
2.0 Design Requirements 3
3.0 Design Methodology 3
4.0 Design Results 4
5.0 References 5
6.0 Revision Control 5

TECHNICAL REPORT

PROJECT: Red River Clean Energy – Owens
JOB NUMBER: 29184.01

SUBJECT:	Site Lighting Study	**CALC NO:**	29184
		SHEET NO:	1 OF 5
BY:	Qualus	**DATE:**	09/26/25
		REV:	0

1.0 Purpose and Scope

The Purpose of this Site Lighting Study is to determine the lighting levels within the Red River Clean Energy 345/34.5 kV Substation, which is in Brown County, Texas.

The Scope of this Study includes determining **general lighting levels**, fixtures, lamps, etc. for the areas directly associated with the substation yard which includes the control building's exterior lights, as detailed on the design drawings. The study does not account for light from existing sources.

2.0 Design Requirements

Lighting levels are established in general accordance with the NESC/IEEE standards and with good engineering practice. NESC Foot-candle Recommendations are presented in Attachment C "Table 111-1 – Illumination levels". Lighting levels range from 0.2 foot-candles (fc) for general orientation in remote areas, to 2 fc for general exterior.

For the ranges of foot-candle values presented, the lower end value manipulates the Light Loss Factor (LLF) as described in Section 3.3 below and represents the minimum target maintained level. Values are horizontal values measured at the walking surface.

3.0 Design Methodology

3.1 Computer Software

Lighting calculations are determined using Visual 2020 (Version 2.1.0394) computer software by Acuity Brands Lighting, Inc. This software allows the user to import a CAD file of the facility, locate lighting fixtures in plan, assign fixture/lamp properties, and set the mounting height and orientation (direction and tilt angle) of the fixtures. The software also allows the user to assign a Light Loss Factor (LLF), which is described further in this section.

3.2 Fixtures and Mounting

Two different types of fixtures are used throughout the facility: AEC® Field Adjustable Area Lights. Lighting fixture information in the form of catalog cut sheets is included in Attachment A.

3.0 Light Loss Factor

A Light Loss Factor (LLF) is used to compensate for the physical conditions of the design. A LLF value of 1.00 indicates that there are no "real world" losses or gains compared to the design. Values less than or greater than 1.00 indicate "real world" losses or gains compared to the design. The LLF is the product of several loss factors, including the following:

- Lamp Lumen Depreciation (LLD), which accounts for the diminished light output (lumens) as the lamp ages. This value is largely dependent on the lamp type (mercury vapor, metal halide, etc.).
- Luminaire Dirt Depreciation (LDD), which accounts for dirt accumulation on lamps and fixtures. A LDD factor of 0.80 is used for outdoor, which reflects cleaning every two years in a "Dirty" environment.
- Voltage Effects (VE), which accounts for the variation of light output (lumens) due to the variation in supply voltage. A VE factor of 0.95 is used for outdoor lighting.

The resulting LLF = LLD * LDD * VE is calculated to be 0.861 for LED fixtures.

3.4 Design Conditions

The following design assumptions and limitations are noted:

1. Outdoor lighting designs consider direct lighting only and do not consider reflectance.
2. The mounting angle of the lights are at a fixed angle of 0°.
3. RAB Field-Adjustable lights are at a height of 37'.

4.0 Design Results

Design Results are presented in Attachment B in the form of a plan view, which shows spot lighting levels (and in some cases combined lighting levels) plotted at the walking surface. A summary of the results with design recommendations follows.

4.1 General Yard Lighting

Results of the lighting study are shown on the overall plan view in Attachment B, with combined lighting levels shown at 0.1, 0.2 and 2 fc. The minimum target lighting level of 0.2 fc for remote areas is well maintained. While the lighting level for working areas is around 2 fc, it is assumed that the transformers and breakers have internal lights for work.

4.2 Other Considerations

1. LED lamps are rated for many thousands of hours and should not need to be replaced for several years. The lead time for lamps is expected to be relatively short, perhaps stock to two weeks. It is recommended that new lamps be ordered at the time of the first failure, and that all lamps be replaced at one time for preventive maintenance. Stocking of spare lamps is at the Customer's discretion.
2. It is recommended that fixtures be cleaned as part of a regularly scheduled maintenance plan.

5.0 References

5.1 *National Electric Safety Code, 2023 Edition.*

5.2 *Visual 2020 (version 2.11.0994)*

6.0 Revision Control

Rev. No.	By	Date	Purpose	Description
A	TJK	07/23/25	Issued For Review	Original Issue

Attachment	Description	Page No.
A	Lighting Fixture Information	7
B	Design Results	17
C	Selected Project Data	19

Attachment A

Lighting Fixture Information

FXLEDMSF

RAB

Project:

Type:

Prepared By:

Date:

Color: Bronze

Weight: 21 lbs

Driver Info

Type	Constant Current
120V	2.54A
208V	1.47A
240V	1.28A
277V	1.15A
Input Watts	309/344/370

LED Info

Watts	280W
Color Temp	5000K/5700K
Color Accuracy	70 CRI
L70 Lifespan	100,000 hrs
Lumens	37,000-40,000 lm
Efficacy	120 lm/W

Technical Specifications

Field Adjustability

Field Adjustable:

Field Adjustable Light Output:
140W/210W (Factory default: 180W)
Color temperature selectable by 4000K and 5000K

Compliance

UL Listed:

Suitable for wet locations. Suitable for mounting within 0 ft (0 m) of the ground.

IP Rating

Ingress protection rating of dust, debris and water

IESNA LM-79 & LM-80 Testing

RAB's LED luminaires and LED components have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80.

Trade Agreements Act Compliant

This product is a product of a designated country ("designated country" means any of the following: a World Trade Organization Government Procurement Agreement country, or a United States free trade agreement country, or a least developed country) that complies with the Trade Agreements Act.

DLC Listed

This product is listed by Design Lights Consortium® (DLC) as an energy efficient premium product that qualifies for the highest tier of rebates from DLC Member Utilities. Designed to meet DLC 5.1 requirements.

DLC Product Code: 5-C-202956

LED Characteristics

LEDs:

Long life, high-efficacy, phosphor, surface mount LEDs

Color Consistency:

7-step MacAdam Ellipse binning to achieve consistent color quality

Color Stability:

LED color temperature is consistent and not affected by dimming. Color temperature remains constant throughout the lifetime of the luminaire.

Color Uniformity:

Within a single luminaire, color temperature does not vary more than the qualification of the American National Standard for Solid-State Lighting (ANSI/NEMA/ASSIST 2017).

Electrical

Driver:

120V: Constant Current, Class 2, 120-277V, 50/60 Hz, 1.03A, 124W, 1.68A, 202W, 1.28A, 154W, 1.15A, 277V, 0.77A

208V: Constant Current, Class 2, 120-277V, 50/60 Hz, 1.03A, 214W, 1.67A, 347W, 1.28A, 266W, 1.15A, 239W, 0.77A

Dimming Driver:

Driver includes dimming control wiring for 0-10V dimming systems. Requires separate 0-10V DC dimming control. Dims down to 10%.

THD:

<10% at 120V, 5.7% at 277V

Power Factor:

>97% at 120V, 90.2% at 277V

Surge Protection:

4kV

Performance

Lifespan:

100,000 hours. LED lumen maintenance data calculated per IESNA TM-21 calculations.

Wattage Equivalency:

Comparable to 1000W Metal Halide

Optical

NEMA Type:

NEMA Distribution: Horizontal

Construction

Cold Weather Starting:

The minimum starting temperature is -40°C (-40°F).

Ambient Temperature:

Non-Power Twist Rated: 40°C (104°F)
Low Power Twist Rated: 45°C (113°F)

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Technical Specifications (continued)

Housing:

Tilt Increment:

Lens:

Reflector:

Vibration Rating:

Effective Projected Area:

Gaskets:

Finish:

Green Technology:

Installation

Mounting:

Other

10-Year, No-Compromise Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of ten (10) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish. RAB's warranty is subject to all terms and conditions found at

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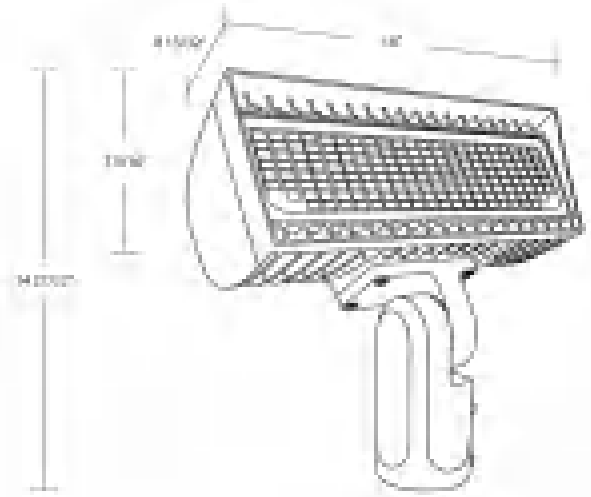
FXLEDMSF

RAB

Dimensions



Features

- 100,000 hour life based on LM-80 results and TM-21 calculations
- DLC Premium Listed
- IP66 Rating protects against dust & water ingress
- 10 Year, No Compromise Warranty

Ordering Matrix

Family	Housing Size	Color Temp	NEMA Type	Mounting	Finish	Driver	Options
FXLED	M			SF			
	XS = Field Adjustable 80/68/48W S = Field Adjustable 168/133/97/69W M = Field Adjustable 346/213W L = Field Adjustable 534/445W	**Blank** = 4000/5000K CCT Adjustable	**Blank** = 6ft x 6V (DS6S) or 7ft x 6V (N6L) **R59** = 1H x 3V [1] **R55** = 1H x 5V [1]	**SF** = SlipFitter **T** = Trunnion	**Blank** = Bronze **W** = White	**Blank** = 120-277v, 0-10V Dimming **480** = 480v, 0-10v Dimming	**Blank** = No Options **7PR** = 7-Pin receptacle

[1] *Available on small/core (S6) and large (L) sizes only*

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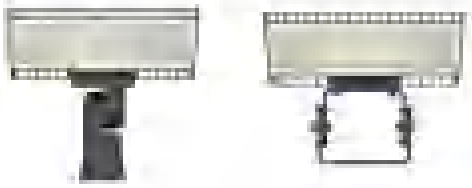
FXLED Field-Adjustable Floodlights

RAB

FXLED6S / FXLED6



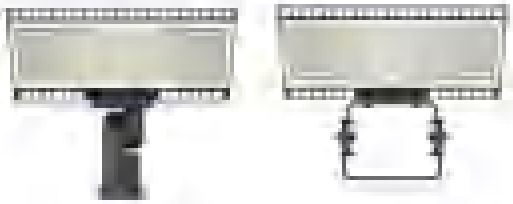
PROJECT

DATE

TYPE

PRODUCT #

FXLED8W



FXLED8

Field Adjustable CCT and Wattage

KEY FEATURES

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PERFORMANCE

FXLED6S (40W)	4000K	5000K	4000K	5000K	4000K	5000K
PA Wattage	40W	40W	40W	40W	40W	40W
Input Watts	40.7W	40W	40.9W	40.8W	40.4W	39.9W
Lumens	5,643	5,668	5,807	5,802	5,970	5,797
Lm/W	138.7	139.9	141.9	142.3	147.8	146.0
CRI	82	85	82	85	83	85
Voltage Ratings			120-277V			

FXLED6S (60W)	4000K	5000K	4000K	5000K	4000K	5000K
PA Wattage	60W	60W	60W	60W	40W	40W
Input Watts	60W	59.8W	59.5W	59.2W	40.2W	39.4W
Lumens	11,455	11,601	8,544	8,866	5,805	5,624
Lm/W	138.4	139.9	142.4	142.5	144.4	142.7
CRI	82	85	82	85	83	85
Voltage Ratings			120-277V			

FXLED Field-Adjustable Floodlights

RAB

PERFORMANCE (CONTINUED)

FXLED (with P)	40LED	60LED	80LED	100LED	40LED	60LED	80LED	100LED
FA Wattage	39W	59W	78W	98W	39W	59W	78W	98W
Input Watts	40.3W	60.3W	79.3W	99W	40.6W	60.6W	80.3W	100.4W
Lumens	5,000	7,500	9,900	12,400	5,000	7,500	9,900	12,400
Lm/W	131.5	131.8	128.4	128.8	126.3	126.9	131.2	134.1
CRI	80	81	81	81	70	80	81	81
Voltage Ratings	120-277V							

FXLED (with P)	40LED	60LED	80LED	100LED	40LED	60LED	80LED	100LED
FA Wattage	39W	59W	78W	98W	39W	59W	78W	98W
Input Watts	40.3W	60.3W	79.3W	99.1W	40.8W	61.2W	82.8W	102.4W
Lumens	5,000	7,500	9,900	12,400	5,000	7,500	9,900	12,400
Lm/W	124.1	124.4	124.8	125.1	122.5	122.5	119.6	121.1
CRI	81	81	81	81	81	81	81	81
Voltage Ratings	347V							

FXLED (with P)	40LED	60LED	80LED	100LED	40LED	60LED	80LED	100LED
FA Wattage	39W	59W	78W	98W	39W	59W	78W	98W
Input Watts	40.3W	60.3W	79.3W	99.1W	40.8W	61.2W	82.8W	102.4W
Lumens	5,000	7,500	9,900	12,400	5,000	7,500	9,900	12,400
Lm/W	124.1	124.4	124.8	125.1	122.5	122.5	119.6	121.1
CRI	81	81	81	81	81	81	81	81
Voltage Ratings	120-277V				480V			

FXLED (with P)	40LED	60LED	80LED	100LED	40LED	60LED	80LED	100LED
FA Wattage	39W	59W	78W	98W	39W	59W	78W	98W
Input Watts	40.3W	60.3W	79.3W	99.1W	40.8W	61.2W	82.8W	102.4W
Lumens	5,000	7,500	9,900	12,400	5,000	7,500	9,900	12,400
Lm/W	124.1	124.4	124.8	125.1	122.5	122.5	119.6	121.1
CRI	81	81	81	81	81	81	81	81
Voltage Ratings	120-277V				480V			

FXLED (with P)	40LED	60LED	80LED	100LED	40LED	60LED	80LED	100LED
FA Wattage	39W	59W	78W	98W	39W	59W	78W	98W
Input Watts	40.3W	60.3W	79.3W	99.1W	40.8W	61.2W	82.8W	102.4W
Lumens	5,000	7,500	9,900	12,400	5,000	7,500	9,900	12,400
Lm/W	124.1	124.4	124.8	125.1	122.5	122.5	119.6	121.1
CRI	81	81	81	81	81	81	81	81
Voltage Ratings	120-277V				480V			

FXLED Field-Adjustable Floodlights

RAB

PERFORMANCE (CONTINUED)

FXLED (120V)	4000K	3000K	4000K	3000K	4000K	3000K	4000K	3000K
FA Wattage	53W	53W	44W	44W	53W	53W	44W	44W
Input Watts	56.3W	56.9W	47.0W	47.5W	56.7W	56.2W	47.1W	47.4W
Lumens	7,403	7,367	6,087	6,130	7,388	7,360	6,159	6,133
Lm/W	131.5	129.6	129.5	129.1	130.3	129.6	131	129.5
CRI	80	80	80	80	80	80	80	80
Voltage Ratings	120-277V				347V			

FXLED (208V)	4000K	3000K	4000K	3000K	4000K	3000K	4000K	3000K
FA Wattage	53W	53W	44W	44W	53W	53W	44W	44W
Input Watts	55.3W	54.8W	45.5W	45.2W	55.1W	54.8W	45.6W	45.3W
Lumens	7,403	7,367	6,087	6,130	7,388	7,360	6,159	6,133
Lm/W	133.8	134.4	133.8	135.6	134.1	134.3	135.1	135.4
CRI	80	80	80	80	80	80	80	80
Voltage Ratings	120-277V				480Y			

FXLED (240V)	4000K	3000K	4000K	3000K	4000K	3000K	4000K	3000K
FA Wattage	53W	53W	44W	44W	53W	53W	44W	44W
Input Watts	55.6W	55.3W	46.4W	46.0W	55.5W	55.1W	46.0W	45.5W
Lumens	7,403	7,367	6,087	6,130	7,388	7,360	6,159	6,133
Lm/W	133.2	133.1	131.1	133.2	133.1	133.5	133.8	134.8
CRI	80	80	80	80	80	80	80	80
Voltage Ratings	120-277V				480Y			

TECHNICAL SPECIFICATIONS

CONSTRUCTION

Cold Weather Starting

Maximum Ambient Temperature

Housing

Mounting

Optical Assembly

Lens

Gasketing

Hardware

CONSTRUCTION

Finish

Electrical

IP Rating

Warranty Terms

Green Technology

Paint

TECHNICAL SPECIFICATIONS (CONTINUED)

COMPLIANCE

cULus Listed
Suitable for wet locations. Suitable for mounting within 4 feet of the ground.

DLC Listed
This product is listed by Design Lights Consortium® (DLC®) as an ultra-efficient premium product. Visit qualified for the highest tier of Efficiency (Tier 1). Meets or Exceeds Designed to meet DLC 5.1 requirements.

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

LIGHT CHARACTERISTICS

CCTs
[illegible]

Color consistency
[illegible]

Color Rendering
[illegible]

Color Shifting
[illegible]

ELECTRICAL

Drivers
[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

ELECTRICAL (CONTINUED)

Drivers
[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	
[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]

[illegible]

FXLED Field-Adjustable Floodlights

TECHNICAL SPECIFICATIONS (CONTINUED)

OPTICAL

NEMA Type
NEMA System Optics™
Shr XXX available for XS & S
2H x 3W available for M & L
3W3T available for M & L
5H5W available for M & L

OTHER

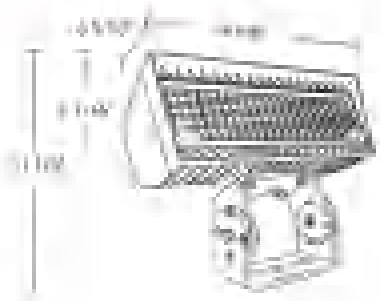
Warranty
RAB backlight, total cut-off products will be free from defects in materials and workmanship for a period of ten (10) years from the date of delivery to the first user, including coverage of light output, color stability, driver performance and fixture finish. RAB's warranty is subject to all terms and conditions found at rablight.com/warranty.
To be made RAB compliant.

Lifespan
60,000 hour LED lifespan based on IES LM-80 results & L-70 calculations

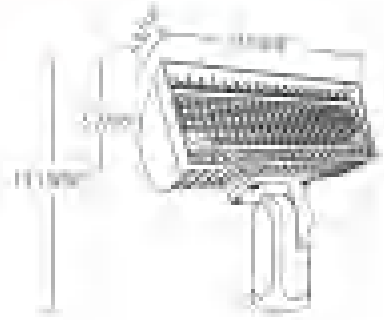
DIMENSIONS

FXLEDXST - 4W/6W/8W/10W

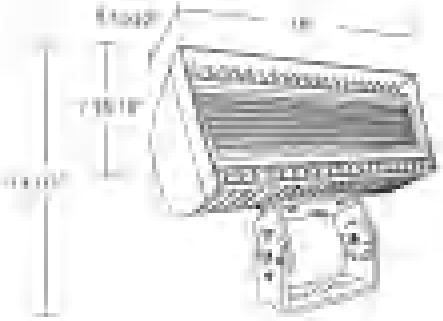
FXLEDXST - 16W/21W/27W/32W



FXLEDMST - 16W/21W/27W/32W



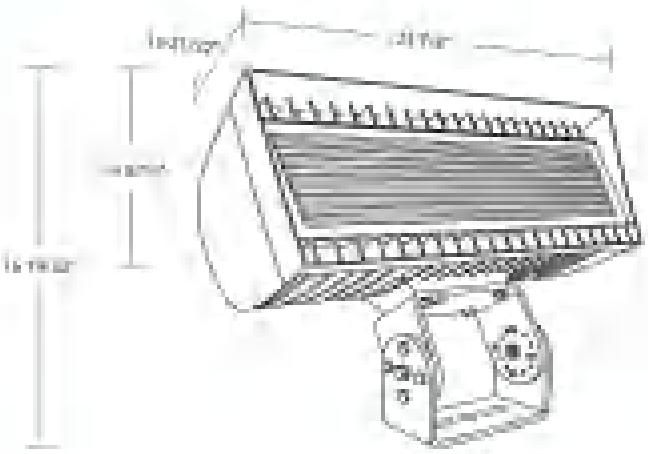
FXLEDMT - 14GW/21W



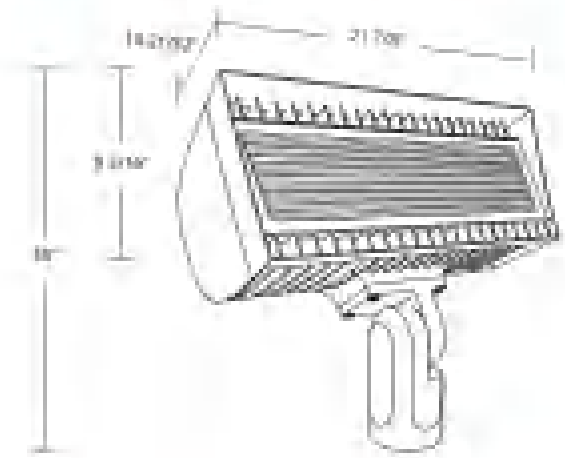
FXLEDMSF - 14GW/21W

DIMENSIONS (CONTINUED)

FXLED1LT - 53.4W/44.5W



FXLED1SF - 53.4W/44.5W



ORDERING MATRIX

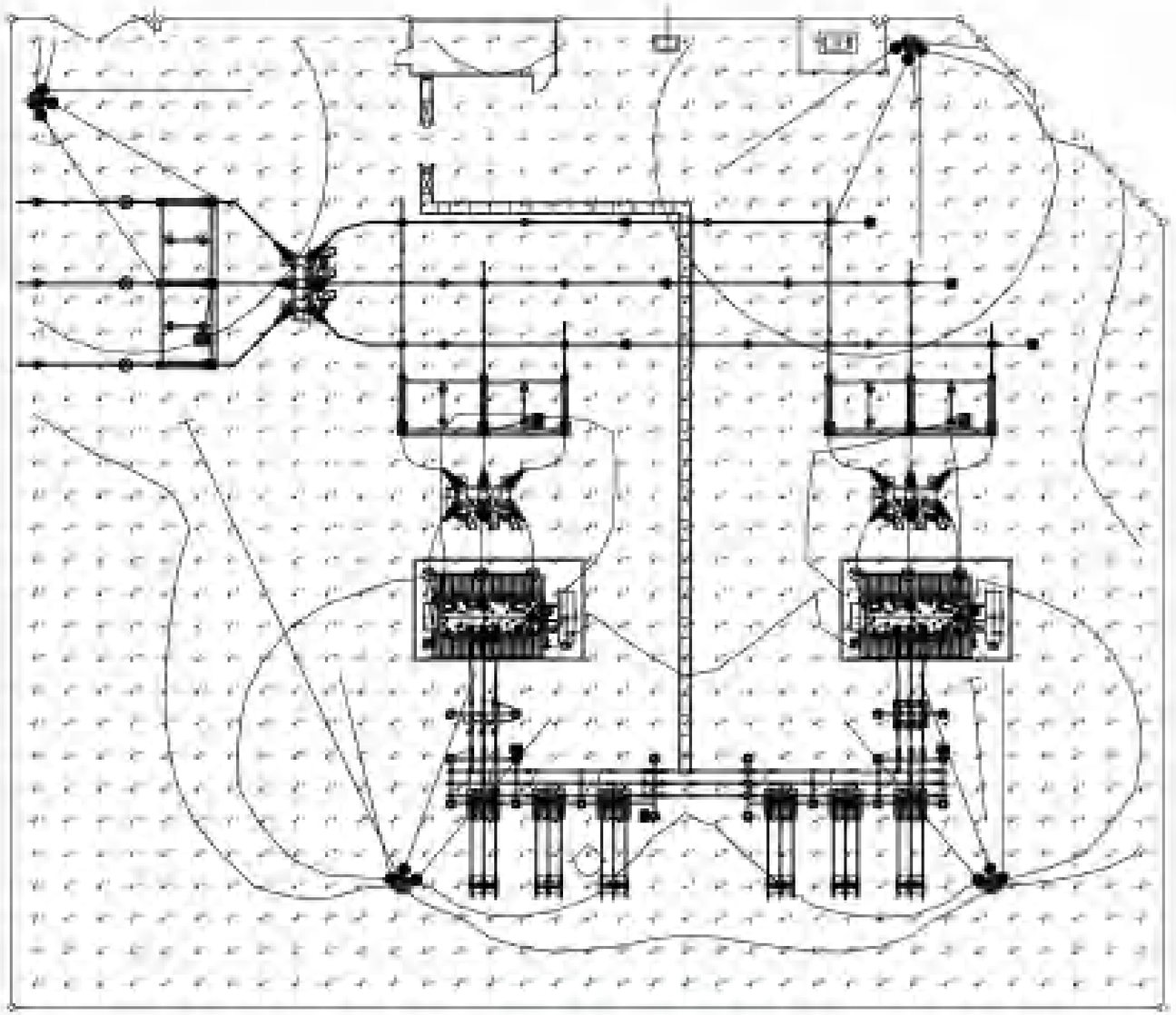
FXLED

Example:	FXLED													
	XS		BLANK		BLANK		D		BLANK		BLANK		BLANK	
	S						T						/TPR	
	M				2CT						HBG			
	L				3CT									

* Only available on 4d x 1 models

Attachment B

Design Results



0	7/22/25	ISSUED FOR REVIEW	CTM	CTM	CTM
REV	DATE	DESCRIPTION	DRN	CHK	APP

RED RIVER
TEXAS DIVISION

QUALUS

DATE	07/22/25
DRN	CTM
CHK	CTM
APP	CTM

CHISHOM SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

SUBSTATION
LIGHTING PLAN

LOCATION: NEAR: Cty Line, BROWN COUNTY, TEXAS

TITLE NUMBER	24144-111-475
JOB NUMBER	24144-01
DRAWING NUMBER	475

Attachment C

Selected Project Documentation

g. Receptacles in damp or wet locations

All 120 V ac permanent receptacles shall be provided with one or more of the following:

1. Ground-fault circuit interrupter (GFCI) protection.
2. Be on a grounded circuit that is tested at such intervals as experience has shown to be necessary.
3. Be applied in conjunction with a GFCI device between the receptacle and the load.

Table 111-1—Illumination levels

Location	footcandles	lux
Generating station (interior)		
Highly critical areas occupied most of the time [1]	25	270
Areas occupied most of the time [2]	15	160
Critical areas occupied infrequently [3]	10	110
Areas occupied infrequently [4]	5	55

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Table 111-1—Illumination levels (continued)

Location	footcandles	lux
Generating station (exterior)		
Building pedestrian main entrance	10	110
Critical areas[5]	5	55
Areas occupied occasionally by pedestrians[6]	2	22
Areas occupied occasionally by vehicles[7]	1	11
Areas occupied infrequently[8]	0.5	5.5
Remote areas[9]	0.2	2.2
Substation		
Control building interior	5	55
General exterior horizontal and equipment vertical	2	22
Remote areas[10]	0.2	2.2

[1] Such as: Chemical laboratory, large centralized control room (6 ft (1.68 m) above floor, portion of duplex, facing away from operator, bench boards (horizontal level), dispatch boards—horizontal plane (desk level), dispatch boards—vertical face of board (48 in (1.22 m) above floor, facing operator)—system load dispatch room.

[2] Such as: Ordinary control room (6 ft (1.68 m) above floor, secondary dispatch room, turbine room.

[3] Such as: Switchyards, battery room, boiler feed pumps, tanks, compressors, gage area, burner platforms, hydrogen and carbon dioxide manifold area, screen house, power switchgear, communication equipment room, turbine bay, sub-basement, turbine gallery, water treating area.

[4] Such as: Air-conditioning equipment, air precleaner and fan floor, ash sluicing, boiler platforms, cable room, conveyor, fly ash pump bay, coal conveyor, crusher, feeder, tunnel area, pulverizer, flue area, transfer tower, condensers, de-aerator floor, evaporator floor, heater floors, open trestle floors, switchboards, rear of all switchboard panels (vertical), precipitators, scrubber plenum, slag blower platform, steam headers and throttles, piping tunnels or galleries.

[5] Such as: Coal unloading dock (loading or unloading zones), coal unloading car dumper, gate house conveyor entrance, fuel-oil delivery headers, platforms—boiler turbine deck.

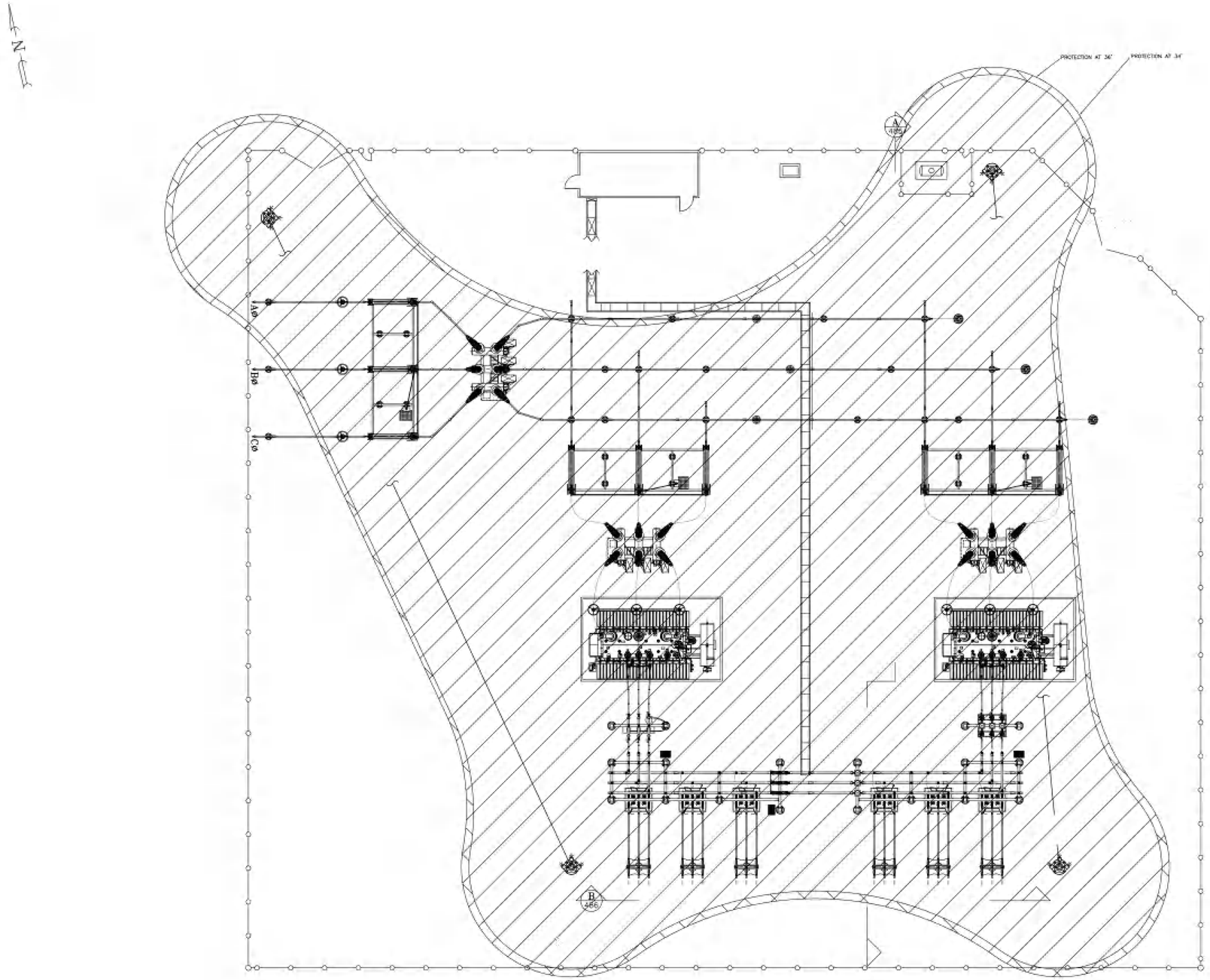
[6] Such as: Catwalks, coal unloading trestle, conveyors, secondary building entrances.

[7] Such as: Off storage tanks, roadways between or along buildings.

[8] Such as: Coal unloading large storage areas, roadways not bordered by buildings.

[9] Such as: Cinder dumps, fenced, open yard.

[10] Such as: Fence, open yard.



REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/23/25	60% DESIGN REVIEW	CTW	JAM	ADJ

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	01/21/25
DRAWN	RDB
CHECKED	CDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION
LIGHTNING PROTECTION PLAN

LOCATION: 8987 CR 268, 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-480
JOB NUMBER	24144-01
DRAWING NUMBER	480

SITE
LIGHTNING STUDY

(Issued For Review)

TABLE OF CONTENTS

1.0 Purpose and Scope 3
2.0 Design Methodology 3
3.0 Design Results 5
4.0 References 6
5.0 Revision Control 6

1.0 Purpose and Scope

Qualus has conducted a comprehensive Lightning Protection Study for Red River Clean Energy's 345/34.5 kV Chisme Substation, which is in Brown County, Texas. This study focuses on ensuring the reliability and resilience of the substation infrastructure against direct lightning strikes, which are a critical consideration for facilities operating in open and exposed environments. The goal of the study is to determine the substation's shielding requirements and calculate its lightning protection design in compliance with IEEE Std. 998-2012, (IEEE Guide for Direct Lightning Stroke Shielding of Substations).

2.0 Design Methodology

2.1 Rolling Sphere

The lightning protection design utilizes the rolling sphere method prescribed by IEEE Std. 998-2012, a widely recognized standard for determining zones of protection in substations. This method evaluates the ability of static wires and masts to provide comprehensive shielding against lightning strikes. The calculations verify that the proposed design meets the protection requirements. Detailed calculations are provided in Attachment A.

The Rolling Sphere Method models the interaction of a lightning stroke with substation equipment and structures. The approach calculates a specific striking distance, determined by the energy and voltage of the lightning, which is visualized as the radius of an imaginary sphere. The sphere is then "rolled" over and around substation components to identify areas vulnerable to direct lightning strikes.

Equipment or structures that remain below the curved surface of the sphere are considered protected, as they fall within the shielded zone created by shielding electrodes (e.g., lightning masts, shield wires). Conversely, equipment that comes into contact with or penetrates the sphere is deemed unprotected.

One of the rolling sphere method involves rolling an imaginary sphere of radius r over the surface of a substation. The sphere rolls up and over (and is supported by) lightning masts, shield wires, substation fences, and other grounded metallic objects that can provide lightning shielding. A piece of equipment is said to be protected from a direct stroke if a sphere of radius r cannot touch the exposed surface of the sphere by virtue of the sphere being supported by shield wires or other devices. Equipment that touches the sphere or protrudes its surface is not protected. The basic concept is illustrated in Figure 24.

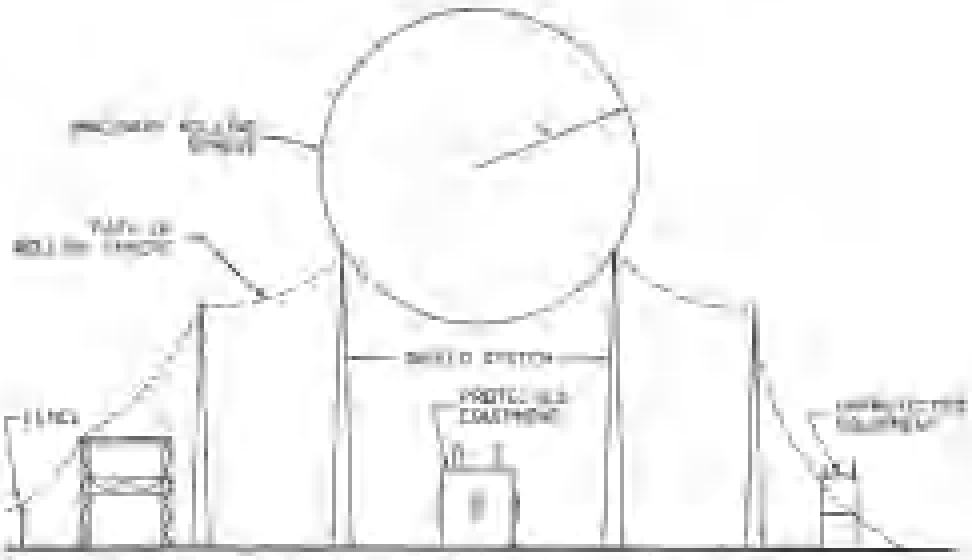
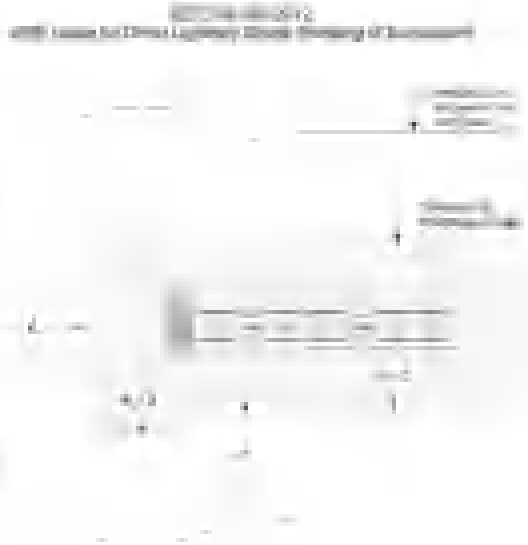


Figure 24—Principle of rolling sphere with multiple shielding electrodes

Illustrations from IEEE Std 998-2012

1. **Elevation View (Figure 24)**
   - **Description**: This view illustrates the principle of the Rolling Sphere Method with an elevation perspective.
   - **Key Features**:
     - The imaginary rolling sphere of radius is shown interacting with shielding systems and substation equipment.
     - The shield system, which consists of lightning masts, wires, and grounded metallic objects, prevents the sphere from touching the protected equipment.
     - Unprotected equipment is clearly identified as being exposed to potential lightning strikes.



2. **Plan View**

   - **Description**: This illustration provides a horizontal, plan-level perspective of the Rolling Sphere Method.
   - **Key Features**:
     - The protected zone at both ground level and equipment height is demonstrated.
     - The configuration ensures that shielding components are adequately spaced to provide comprehensive protection across the substation.

3.0 Design Results

Detailed calculations are presented in Attachment A, and design results are presented in Attachment B in the form of a plan view and elevation drawings. A brief table showing the calculation results are below.

Table 1 – Rolling Sphere Radius

Voltage – Bus Height	BIL	Sphere Radius
345 kV – 36 ft	1300 kV	152.74 ft
34.5 kV – 34 ft	200 kV	140.71 ft

4.0 References

4.1 *IEEE Std. 998-2012 (IEEE Guide for Direct Lightning Stroke Shielding of Substation)*

5.0 Revision Control

Rev. No.	By	Date	Purpose	Description
A	CTW	07/23/25	60% Design Review	Original Issue

Attachment	Description	Page No.
A	Calculations	8
B	Design Results	12

Attachment A

Calculations

Symbology

$\mathcal{L}$	Broken-stick-over-box classifier (BS)
$\mathcal{M}$	Polygon-window-quantile (PWQ)
$\mathcal{N}$	Cyclic-Poisson (CP_λ) mixture (all λ_k fixed at 1); $\mathrm{CP}_\lambda(\mathbf{x}) = \sum_{k=0}^{\infty} \pi_k \, \mathrm{Poisson}(k; \lambda)$
$\mathcal{O}(\cdot)$	Asset-clearing clearance source (CC)
$\mathcal{J}$	Sample-dependent prior-mismatch
$\mathcal{D}$	Margin-of-error-constraint
$\mathcal{R}_0$	Extreme-outlier
$\mathcal{C}$	Estimate-variance-of-confidence
$\mathcal{Q}$	Allowable-variance-voltage-$(\mathcal{C}_\mathcal{Q} \in \mathbb{R}^{+}_{>0})$ for-case-monitoring
$\mathcal{V}_{\mathcal{C}}$	$\mathcal{L}^2(\mathcal{P}(\mathcal{B}_\mathcal{C}, \mathcal{C}))$-Wiener-space-on-$\mathcal{L}^2(\mathcal{B}, \mathcal{C})$-over-$\mathcal{P}(\mathcal{B}, \mathcal{C})$
$\mathcal{V}_\mathcal{C}$	$\mathcal{B}$-Borel-σ-algebra-on-$\mathcal{P}(\mathcal{B}, \mathcal{C})$

Instrumentation

$\mathcal{C} \in$ [above-rate-$\mathcal{M}$-plate]
$\mathcal{B} \in$ [collection-$\mathcal{M}$, $\mathcal{M}$-mixture]
$\mathcal{C}_\mathcal{C} \in$ [$\mathcal{M}$-Wiener-rate]

Operations Power-curve-$\mathcal{M}$-rate-data-$\mathcal{M}$(x)

$\mathcal{M}_\mathcal{M}(\mathcal{C}, \mathcal{C})$ $\quad \mathcal{C}_\mathcal{C} \cap \mathcal{M}_\mathcal{C}(\mathcal{B}_\mathcal{C}) \cdot \mathcal{C}_\mathcal{C}(\mathcal{B}, \mathcal{C}) \cdot \mathcal{C}_\mathcal{C}(\mathcal{B}, \mathcal{C})$

$\mathcal{M}_\mathcal{M}(\mathcal{C}, \mathcal{C})$ $\quad \mathcal{C}_\mathcal{C} \cdot \mathcal{M}(\mathcal{C}^{-1}\text{-harmonic-}(\mathcal{B}^{\mathcal{C}}(\mathcal{B}_\mathcal{C})^{-1}\text{-like-}\mathcal{C}^{\mathcal{C}}\text{-over-}\mathcal{C}))$

$\mathcal{M}_\mathcal{M}(\mathcal{C}, \mathcal{C})$ $\quad \mathcal{C} \cdot \mathcal{C}(\mathcal{C}^{\mathcal{C}}(\mathcal{B}_\mathcal{C}))$

$\mathcal{M}_\mathcal{M}(\mathcal{C}, \mathcal{C})$ $\quad \mathcal{C} \cdot \mathcal{C}(\mathcal{C}, \mathcal{C}) \cdot \mathcal{C}^{\mathcal{C}}$

Results

$\mathcal{C}_\mathcal{C}$	1.23	Bo-curve
$\mathcal{B}_\mathcal{C}$	1.23	Bo-curve
$\mathcal{M}_\mathcal{C}(\mathcal{B}, \mathcal{C})$	(20.57 kn)	
$\mathcal{C}(\mathcal{C}, \mathcal{C})$	(100.00 kn)	
$\mathcal{C}_\mathcal{C}$	75.00 ft	Height-of-Tablet-Entry
$\mathcal{C}_\mathcal{C}$	45.00 ft	Height-of-Section-1
$\mathcal{C}_\mathcal{C}$	30.00 ft	Height-of-Section-2
$\mathcal{C}_\mathcal{C}$	5.00 ft	ft-to-$\mathcal{C}$
$\mathcal{C}_\mathcal{C}$	0.63 ft	ft-per-$\mathcal{C}$
$\mathcal{C}_\mathcal{C}$	10.00 ft	Above-Area
$\mathcal{C}_\mathcal{C}$	(300.00 kn)	
$\mathcal{C}_\mathcal{C}$	(100.00 kn)	
$\mathcal{C}_\mathcal{C}$	10.21 (0.10 ft)	

Tablet-Wind (Wind, Engine-and-$\mathcal{C}$, mm)

$\mathcal{C}$ (ft)	$\mathcal{C}$	$\mathcal{B}$ (kn)	$\mathcal{C}$ (%)	$\mathcal{C}$ (cm)	$\mathcal{C}_\mathcal{C}$ ($\mathcal{B}$ (ft))	$\mathcal{B}_\mathcal{C}$ (%)	$\mathcal{C}_\mathcal{C}$	$\mathcal{C}$ (cm)	$\mathcal{C}$ (ft)	$\mathcal{C}$ (%)
10 (ft)	1.00	100 (kn)	0 (%)	0.00 (cm)	10 ft	0 (%)	0.00 (cm)	0 (ft)	0.0 (-)	10 (ft)

Section 1-1 (Wind, $\mathcal{C}$ = 100, 100)

$\mathcal{C}$ (ft)	$\mathcal{C}$	$\mathcal{B}$ (kn)	$\mathcal{C}$ (%)	$\mathcal{C}$ (cm)	$\mathcal{C}_\mathcal{C}$ ($\mathcal{B}$ (ft))	$\mathcal{B}_\mathcal{C}$ (%)	$\mathcal{C}_\mathcal{C}$	$\mathcal{C}$ (cm)	$\mathcal{C}$ (ft)	$\mathcal{C}$ (%)
10 (ft)	1.00	100 (kn)	0 (%)	0.00 (cm)	10 ft	0 (%)	0.00 (cm)	0 (ft)	0.0 (-)	10 (ft)

Section 2 (-1.7 kn, 17 kn, 1.0 ft)

$\mathcal{C}$ (ft)	$\mathcal{C}$	$\mathcal{B}$ (kn)	$\mathcal{C}$ (%)	$\mathcal{C}$ (cm)	$\mathcal{C}_\mathcal{C}$ ($\mathcal{B}$ (ft))	$\mathcal{B}_\mathcal{C}$ (%)	$\mathcal{C}_\mathcal{C}$	$\mathcal{C}$ (cm)	$\mathcal{C}$ (ft)	$\mathcal{C}$ (%)
10 (ft)	1.00	100 (kn)	0 (%)	0.00 (cm)	10 ft	0 (%)	0.00 (cm)	0 (ft)	0.0 (-)	10 (ft)

Note: $\mathcal{C}$-$\mathcal{M}$ = Use-of-$\mathcal{C}$-Service-Model-$\mathcal{C}$-$\mathcal{B}$-for-$\mathcal{C}$-crossed-with-$\mathcal{C}$-and-$\mathcal{C}$-$\mathcal{B}$-$\mathcal{C}$-$\mathcal{C}$-$\mathcal{C

Calculations for Aluminium Wire

Eq: (C-1) $R_t = \ln(2*h/R_c) - K_s/\mu_r + 0$

Calculated Rt Value $R_t =$ [illegible] h

Eq: (C-3) $Z_s = 60 * \sqrt{\ln(2*h/R_c)^2 + \ln(2*h/r)^2}$

Bus surge impedance: $Z_s =$ [illegible]

Eq: (5-16) $I_s = (2.2*BIL) / Z_s$

Allowable Stroke Current: $I_s =$ [illegible] kA

[Minimum Stroke Current allowed is 5kA] "If I_s less than 5kA, use 5kA at minimum" Probability of stroke greater than Is (Figure 4 in IEEE 998)

Engineer judgement deems below value as acceptable

Eq: (5-18) $h = 26.26 * s * I_s^{0.65}$ $I_s =$ [illegible] kA [illegible]%

Sphere radius: $h =$ [illegible] ft

$S_r = h * .8$

$S_r =$ [illegible] ft

Calculations for Switch 2:

Eq: (C-1) $R_t = \ln(2*h/R_c) - K_s/\mu_r + 0$

Calculated Rt Value: $R_t =$ [illegible] ft

Eq: (C-3) $Z_s = 60 * \sqrt{\ln(2*h/R_c)^2 + \ln(2*h/r)^2}$

Bus surge impedance: $Z_s =$ [illegible] Ω

Eq: (5-16) $I_s = (2.2*BIL) / Z_s$

Allowable Stroke Current: $I_s =$ [illegible] kA

[Minimum Stroke Current allowed is 5kA] "If I_s less than 5kA, use 5kA at minimum" Probability of stroke greater than Is (Figure 4 in IEEE 998)

Engineer judgement deems below value as acceptable

Eq: (5-18) $h = 26.26 * s * I_s^{0.65}$ $I_s =$ [illegible] kA [illegible]%

Sphere radius: $h =$ [illegible] ft

$S_r = h * .8$

S_c = 1.35 kV/ft

Calculation for Section 2:

Eq (C.1) $R_c = \rho_1 (2^*h)/(R_c) \cdot K_s K_t \rho_2 = R$

Calculated Rc Value: R_c = 0.08 Ω

Eq (C.3) $A_g = \pi R^2 + \pi\rho(1/\pi) (2^*h)/(R_c)) + 1/\pi (2^*h)/(r))$

Rod-to-ogd Impedance: Z_c = 180 Ω

Eq (5-2M) $I_f = (3.2^*S_f)/Z_c$

Allowable Strobe Current: I_f = 1.13 kA

(Minimum Strobe Current allowed is .5kA)

"If I_f less than 3kA, use 3kA as minimum". **Probability of strobe greater than is (figure 8 in IEEE 2001**
Engineer judgement deems below value as acceptable

I_f = 10 kA 95%

Eq (5-1B) $S = 20.25 * t * I_f^{-1.47}$

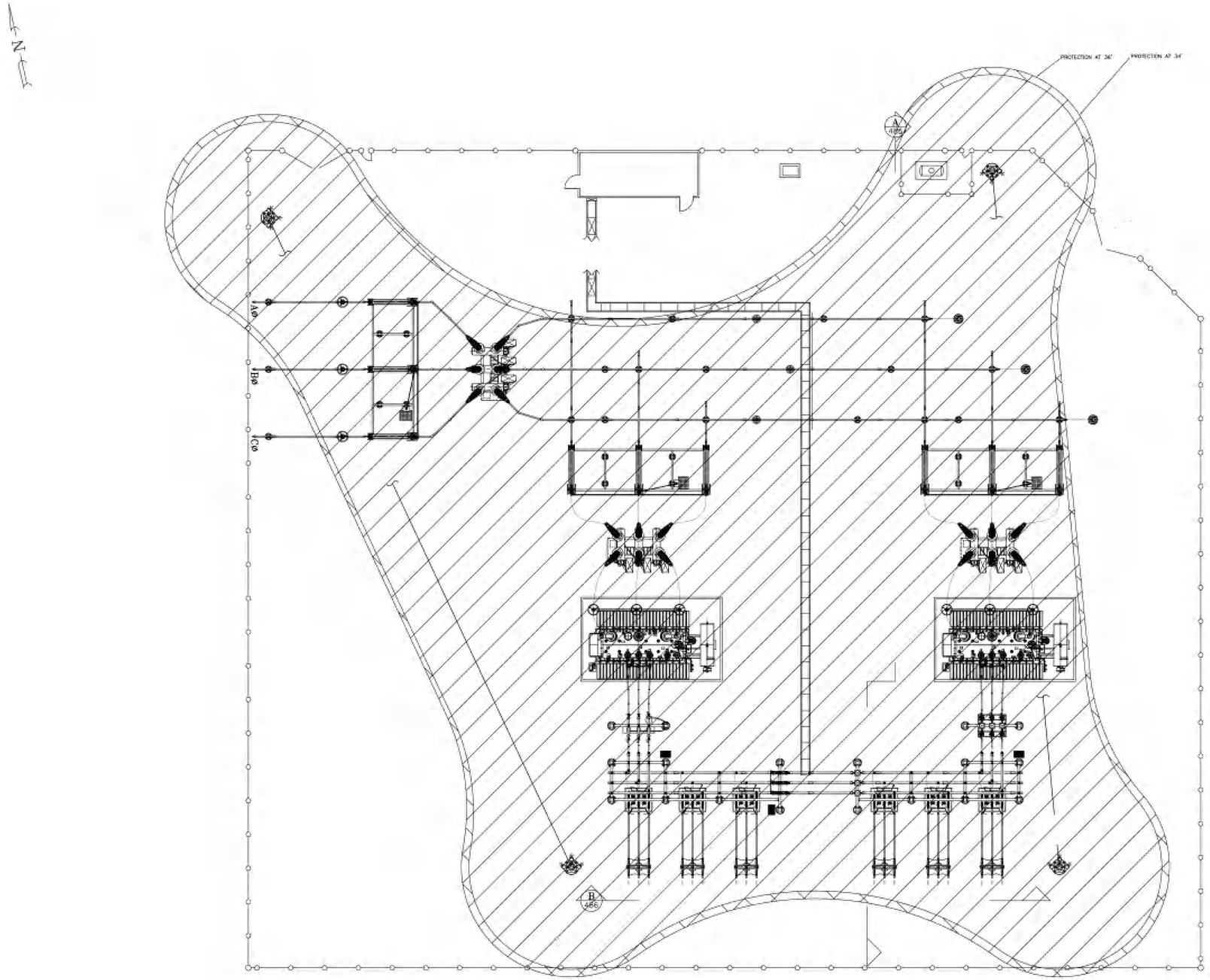
Turbine Inertia: S = 140.71 A

$S_m = S * R$

S_m = 126.63 R

Attachment B

Design Results



REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/23/25	60% DESIGN REVIEW	CTW	JAM	ADJ

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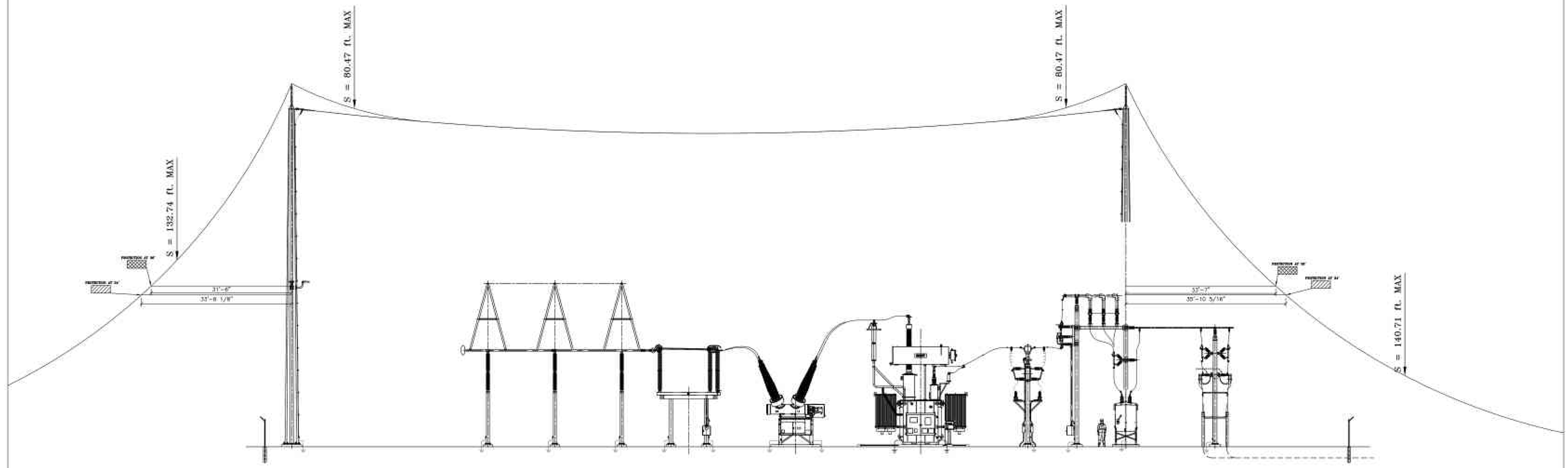
SCALE	NTS
DATE	01/21/25
DRAWN	RDB
CHECKED	CDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION
LIGHTNING PROTECTION PLAN

LOCATION: 8987 CR 268, 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-480
JOB NUMBER	24144-01
DRAWING NUMBER	480



A 490 SECTION

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DATE	01/21/25
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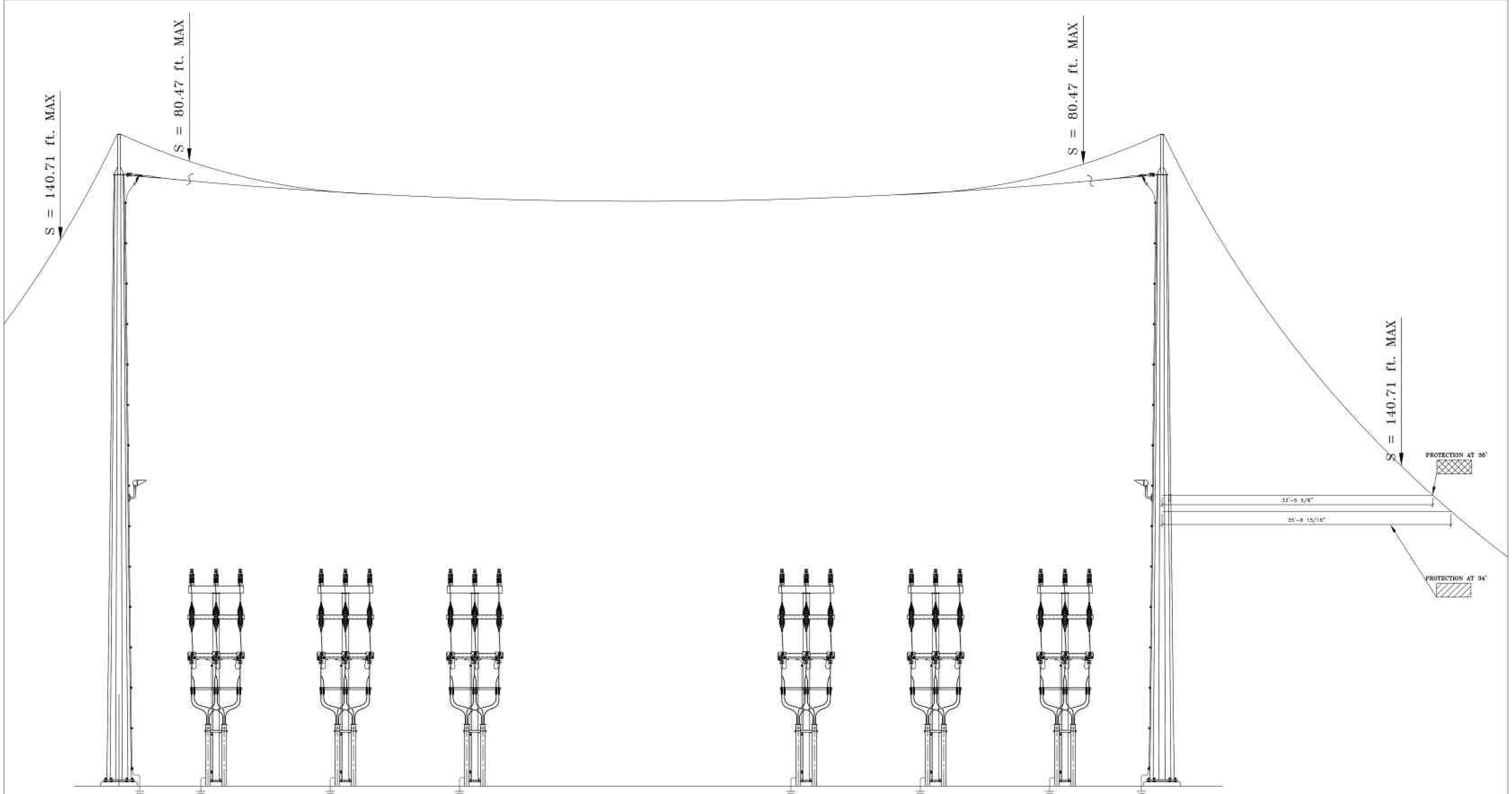
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: LIGHTNING PROTECTION SECTION VIEW A

LOCATION: 8987 CR 268, 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-210
JOB NUMBER	24144-01
DRAWING NUMBER	485



B SECTION
486

REV	DATE	DESCRIPTION	DRN	CKD	APP
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DATE	07/08/25
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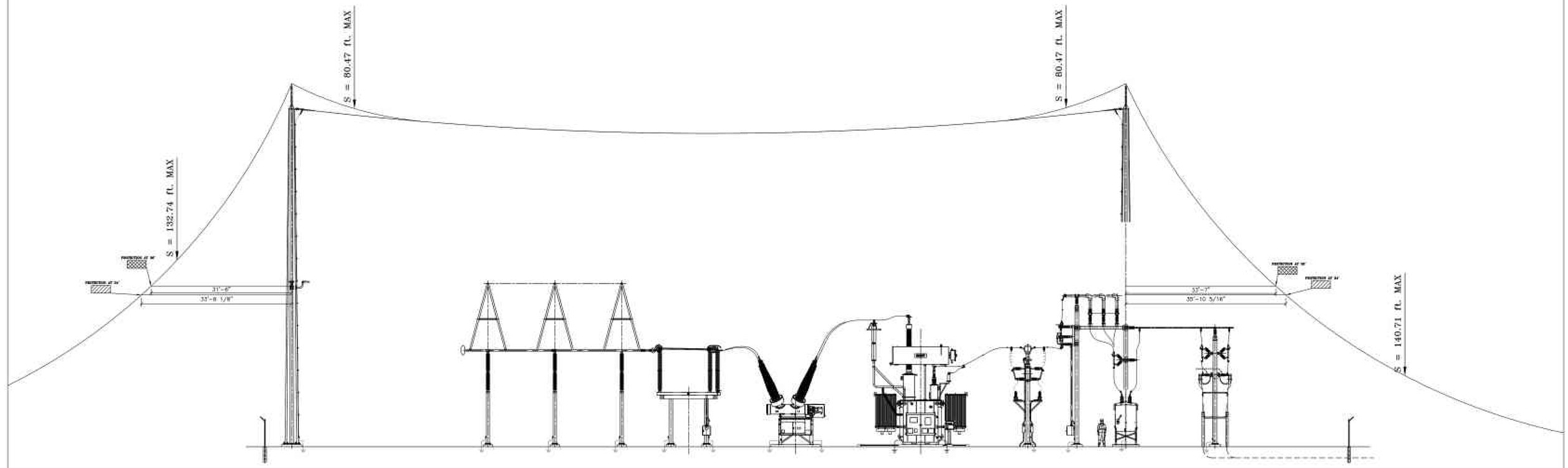
CHECKED	GDK
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: LIGHTNING PROTECTION SECTION VIEW B

LOCATION: 8987 CR 268, 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-210
JOB NUMBER	24144-01
DRAWING NUMBER	486



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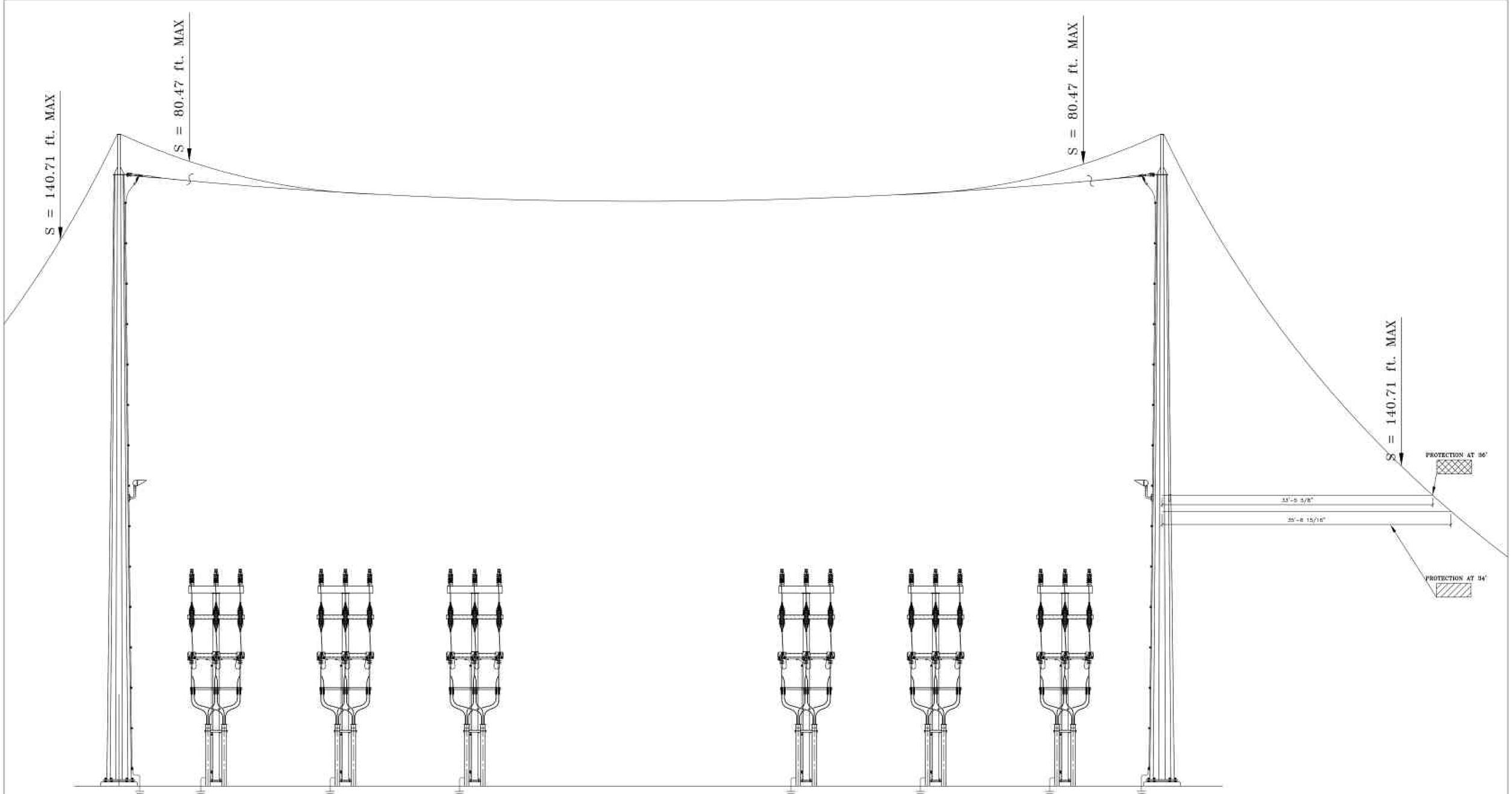

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PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: LIGHTNING PROTECTION SECTION VIEW B

LOCATION: 8987 CR 268, 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-210
JOB NUMBER	24144-01
DRAWING NUMBER	486

GENERAL NOTES:

1. FOUNDATION DESIGN BASED ON GEOTECHNICAL ENGINEERING REPORT FOR CHISME SOLAR AND STORAGE (LANGAN PROJECT No. 820102301) DATED: JULY 03, 2025
2. THE CONTRACTOR SHALL CORRELATE ALL DIMENSIONS BETWEEN THE ELECTRICAL, CIVIL, STRUCTURAL, AND FOUNDATION PLANS BEFORE CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR INCONSISTENCIES BEFORE PROCEEDING WITH THE WORK.
3. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL STANDARDS. THE CONTRACTOR SHALL ALSO COMPLY WITH ALL OWNER SAFETY STANDARDS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ADJACENT STRUCTURES, UTILITY LINES, FIXTURES, EQUIPMENT, PROCESSES, STREETS, AND SIDEWALKS DURING EXCAVATION AND CONSTRUCTION.
5. CONTACT 811 NO LESS THAN 2 FULL BUSINESS DAYS PRIOR TO EXCAVATION OR DEMOLITION TO HAVE UNDERGROUND FACILITIES MARKED.
6. IF GROUNDWATER IS ENCOUNTERED, IT SHALL BE CONTROLLED USING STANDARD DRAINAGE TECHNIQUES, SUCH AS DIVERSION, DITCHES, PUMPING, OR BY INSTALLING SUBSURFACE DRAINS.
7. FOUNDATION EXCAVATIONS SHALL NOT REMAIN OPEN OVERNIGHT UNLESS SPECIAL PROVISIONS ARE APPROVED BY THE ENGINEER.
8. DEBRIS IN THE BOTTOM OF THE EXCAVATION SHALL BE REMOVED PRIOR TO STEEL PLACEMENT. WATER SHALL NOT BE ALLOWED TO INFILTRATE THE FOUNDATION EXCAVATIONS.
9. TO REDUCE THE POTENTIAL FOR GROUNDWATER SEEPAGE INTO THE EXCAVATION AND TO MINIMIZE DISTURBANCES TO THE BEARING AREA, STEEL AND CONCRETE SHALL BE PLACED AS SOON AS POSSIBLE AFTER THE EXCAVATION IS COMPLETED AND PROPERLY CLEANED.
10. ALL EXCAVATIONS SHALL BE SLOPED OR SHORED IN COMPLIANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS INCLUDING CURRENT OSHA EXCAVATION AND TRENCH SAFETY STANDARDS.

DESIGN CRITERIA

1. CODES:
   2021 INTERNATIONAL BUILDING CODE

   ASCE 7-16 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

   AISC 14th EDITION STEEL CONSTRUCTION MANUAL

   ACI 318-19 - BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE & COMMENTARY
2. LOADS:
   WIND SPEED: 113 MPH, EXPOSE CATEGORY C, RISK CATEGORY II

   SOIL PARAMETERS:
   BEARING CAPACITY: 2500 PSF (NET)
   COEFFICIENT OF FRICTION: 0.36
   WATER TABLE ELEVATION: NOT ENCOUNTERED

   SEISMIC PARAMETERS:
   SITE CLASS: C
   RISK CATEGORY: II
   PGAm: 0.074g
   SDC: A
   Ss: 0.056g
   S1: 0.035g

CONCRETE NOTES:

1. ALL CONCRETE MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF ACI 318 AND ACI 301.
2. CONCRETE TESTING FOR QUALITY CONTROL IS THE RESPONSIBILITY OF THE CONTRACTOR AND THE FREQUENCY AND TYPES OF TESTING SHALL BE DETERMINED BY THE OWNER.
3. ALL CONCRETE SHALL BE:

   A. 4,000 PSI MIN. COMPRESSIVE STRENGTH @ 28 DAYS
   B. MAXIMUM SIZE AGGREGATE 3/4" UNLESS OTHERWISE NOTED
   C. CEMENT SHALL BE ASTM C150, TYPE II UNLESS OTHERWISE NOTED.
   D. ACI APPROVED ADMIXTURES MAY BE USED FOR CONCRETE CURING.
   E. DO NOT USE ADMIXTURES WITH CHLORINE SALTS IN THE CONCRETE.
   F. SLUMP SHALL BE A MINIMUM OF 5".
4. ALL CONCRETE SHALL BE 4% MAX AIR ENTRAINMENT AND HAVE A WATER-CEMENT RATION OF 0.45.
5. PROVIDE 3/4" CHAMFER ON ALL EXPOSED EDGES.
6. ALL REINFORCING SHALL BE:
   GRADE 60 DEFORMED BARS CONFORMING TO ASTM SPECIFICATION A615.
7. ALL CONCRETE REINFORCEMENT SHALL BE DETAILED, FABRICATED, LABELED, SUPPORTED AND SPACED IN FORMS AND SECURED IN PLACE IN ACCORDANCE WITH THE PROCEDURES AND REQUIREMENTS OUTLINED IN THE LATEST EDITION OF THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" ACI 318 AND THE "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315. SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION.
8. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT:

   A. CONCRETE CAST AND PERMANENTLY EXPOSED TO EARTH 3"
   B. CONCRETE EXPOSED TO EARTH AND WEATHER 2"
9. HOOKS NOT DIMENSIONED SHALL BE STANDARD ACI HOOKS.
10. SPREAD REINFORCEMENT AS REQUIRED TO CLEAR EMBEDDED PARTS AND ANCHOR BOLTS.
11. ALL CONCRETE POURS MADE WHEN TEMPERATURES RANGE BETWEEN 50 AND 80F, CAN BE MADE WITHOUT ANY SPECIAL PROVISIONS.
12. DURING COLD WEATHER (TEMPERATURES BELOW 50F), CONCRETE MIXING, PLACING, AND CURING OPERATIONS SHALL BE IN ACCORDANCE WITH ACI 306R, "COLD WEATHER CONCRETING".
13. DURING HOT WEATHER (TEMPERATURES ABOVE 90F), CONCRETE MIXING, PLACING, AND CURING OPERATIONS SHALL BE IN ACCORDANCE WITH ACI 305R, "HOT WEATHER CONCRETING".
14. CONCRETE SHALL NOT BE PLACE DURING RAIN, SLEET OR SNOW. RAIN WATER SHOULD NOT BE ALLOWED TO INCREASE MIXING WATER NOR TO DAMAGE SURFACE FINISH.
15. ALL EXTERIOR OR EXPOSED CONCRETE SHALL BE CONSOLIDATED BY INTERNAL VIBRATION IN ACCORDANCE WITH ACI 309, "RECOMMENDED PRACTICE FOR CONSOLIDATION OF CONCRETE".
16. LAP REINFORCING BARS IN ACCORDANCE WITH CLASS B SPLICE PER ACI 318 FOR ALL SPLICES SHALL HAVE MATCHING CORNER BARS AT ALL CORNERS OF CONCRETE WALLS.
17. HONEYCOMBED, SPALLED, OR OTHERWISE DAMAGED CONCRETE SHALL BE REPAIRED AND PATCHED; NOTIFY STRUCTURAL ENGINEER OF DEFECTS AND SUBMIT REMEDIAL PROCEDURES IN WRITING FOR REVIEW PRIOR TO BEGINNING WORK.
18. ALL DETAILING, FABRICATION, PLACING AND SUPPORTING OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH ACI 318 AND CRSI (CURRENT EDITION).
19. ALL REINFORCING ANCHOR RODS SHALL BE RIGIDLY SECURED IN POSITION PRIOR TO THE PLACING OF CONCRETE.
20. ALL REINFORCEMENT AND WELDED WIRE FABRIC SHALL BE FREE OF RUST, DIRT, OIL, AND MILL SCALE PRIOR TO PLACING OF CONCRETE.
21. ALL ANCHOR RODS SHALL BE SET WITH THE AID OF AN ANCHOR ROD SETTING TEMPLATE. ALL ANCHOR ROD SETTING TEMPLATES SHALL BE ASTM A-36 AND SHALL BE LEFT UNFINISHED (BLACK).

INTERNATIONAL BUILDING CODE, 2021 (IBC 2021) – TABLE 1705.3 REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD
1. INSPECT REINFORCEMENT, INCLUDING PRESTRESSING TENDONS AND VERIFY PLACEMENT.	–	X	ACI 318: CH. 20, 25.2, 25.3, 26.6.1 – 26.6.3
2. REINFORCING BAR WELDING:			
A. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706;	–	X	AWS D1.4
B. INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16"; AND	–	X	ACI 318: 26.6.4
C. INSPECT ALL OTHER WELDS	X	–	
3. INSPECT ANCHORS CAST IN CONCRETE.	–	X	ACI 318: 17.8.2
4. INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS:			
A. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS	X	–	ACI 318: 17.6.2.4
B. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4.A.	–	X	ACI 318: 17.8.2
5. VERIFY USE OF REQUIRED DESIGN MIX.	–	X	ACI 318: CH. 19, 26.4.3, 26.4.4
6. PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGHT TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X	–	ASTM C 172, ASTM C 31; ACI 318: 26.5, 26.12
7. INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X	–	ACI 318: 26.5
8. VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	–	X	ACI 318: 26.5.3 – 26.5.5
9. INSPECT PRESTRESSED CONCRETE FOR:			
A. APPLICATION OF PRESTRESSING FORCES; AND	X	–	ACI 318: 26.10
B. GROUTING OF BONDED PRESTRESSING TENDONS.	X	–	
10. INSPECT ERECTION OF PRECAST CONCRETE MEMBERS.	–	X	ACI 318: 26.9
11. VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.	–	X	ACI 318: 26.11.2
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED, SHORING AND RESHORING.	–	X	ACI 318: 26.11.2(b)

REBAR DEVELOPMENT LENGTH SCHEDULE (f'c=4,000 psi)

BAR SIZE	MIN. BAR SPACING	SPLICE LENGTH (LS)		DEVELOPMENT LENGTH (LD)		HOOKED BAR DEVELOPMENT (LDH)	
		TOP BARS	OTHER	TOP BARS	OTHER	TOP BARS	OTHER
#3	1.375	25	19	19	15	–	8
#4	1.500	33	25	25	19	–	10
#5	1.625	41	31	31	24	–	12
#6	1.750	49	37	37	29	–	15
#7	1.875	71	54	54	42	–	17
#8	2.000	81	62	62	48	–	19
#9	2.375	91	70	70	54	–	22

NOTES:
1. TOP BARS INDICATE HORIZONTAL BARS WITH MORE THAN 12" OF CONCRETE CAST BENEATH.
2. "CLEAR COVER" - PROVIDE PER DETAILS OR AS PER NOTE 21 (THIS SHEET).
3. WHERE BARS OF DIFFERENT SIZES ARE SPLICED IN TENSION THE LAP STRENGTH SHALL BE THE LAP SPLICE STRENGTH OF THE SMALLER BAR.
4. WHERE ACTUAL CONDITIONS DIFFER FROM THE PROVIDED SCHEDULE AND OR NOTES, LENGTHS SHALL BE ADJUSTED ONLY WITH THE APPROVAL OF THE STRUCTURAL ENGINEER.
5. DEVELOPMENT VALUES ASSUME NON-COATED BARS.
6. NORMAL WEIGHT CONCRETE fy=60 KSI

SPECIAL INSPECTION AGENCIES	FIRM	ADDRESS, TELEPHONE, EMAIL
1. SPECIAL INSPECTION COORDINATOR		
2. INSPECTOR		
3. INSPECTOR		
4. TESTING AGENCY		
5. TESTING AGENCY		
6. OTHER		

INTERNATIONAL BUILDING CODE, 2021 (IBC 2021) – TABLE 1705.6 REQUIRED SPECIAL INSPECTION AND TESTS OF SOILS

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC
1. VERIFY MATERIAL BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.		X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.		X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.		X
4. VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	X	
5. PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUB GRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.		X

SCHEDULE OF SPECIAL INSPECTIONS

PROJECT: CHISME SOLAR & STORAGE — OWNER:
LOCATION: BROWN COUNTY, TEXAS
DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: SEAN R. HARBIN, PE

THIS STATEMENT OF SPECIAL INSPECTIONS IS SUBMITTED AS A CONDITION FOR PERMIT ISSUANCE IN ACCORDANCE WITH THE SPECIAL INSPECTION AND TESTING REQUIREMENTS SECTION OF THE ADOPTED INTERNATIONAL BUILDING CODE. THIS PROJECT SHALL COMPLY WITH THE SPECIAL INSPECTION AND TESTING REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE AS THE OWNER OR THE OWNER'S REPRESENTATIVE DEEMS APPROPRIATE. IT INCLUDES A SCHEDULE OF SPECIAL INSPECTION SERVICES APPLICABLE TO THIS PROJECT AS WELL AS THE NAME OF THE SPECIAL INSPECTION COORDINATOR AND THE IDENTITY OF OTHER APPROVED AGENCIES TO BE RETAINED FOR CONDUCTING THESE INSPECTIONS AND TESTS. THIS STATEMENT OF SPECIAL INSPECTIONS ENCOMPASS THE FOLLOWING DISCIPLINES:

☐ STRUCTURAL ☐ ELECTRICAL
☐ OTHER: _____

THE SPECIAL INSPECTION COORDINATOR SHALL KEEP RECORDS OF ALL INSPECTIONS AND SHALL FURNISH INSPECTION REPORTS TO THE OWNER OR THE OWNER'S REPRESENTATIVE AND THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE IF REQUESTED. DISCOVERED DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF SUCH DISCREPANCIES ARE NOT CORRECTED, THE DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. THE SPECIAL INSPECTION PROGRAM DOES NOT RELIEVE THE CONTRACTOR OF HIS OR HER RESPONSIBILITIES.

INTERIM REPORTS SHALL BE SUBMITTED TO THE OWNER OR THE OWNER'S REPRESENTATIVE AND THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE WHEN REQUESTED.

A FINAL REPORT OF SPECIAL INSPECTIONS DOCUMENTING COMPLETION OF ALL REQUIRED SPECIAL INSPECTIONS, TESTING AND CORRECTION OF ANY DISCREPANCIES NOTED IN THE INSPECTIONS SHALL BE SUBMITTED AT THE COMPLETION OF THE PROJECT.

JOB SITE SAFETY AND MEANS AND METHODS OF CONSTRUCTION ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.

SCHEDULE OF INSPECTION AND TESTING AGENCIES

THIS STATEMENT OF SPECIAL INSPECTIONS / QUALITY ASSURANCE PLAN INCLUDES THE FOLLOWING BUILDING SYSTEMS:

☒ SOILS AND FOUNDATIONS
☒ CAST-IN-PLACE CONCRETE
☐ PRECAST CONCRETE
☐ MASONRY
☐ STRUCTURAL STEEL
☐ COLD-FORMED STEEL FRAMING
☐ SPRAY FIRE RESISTANT MATERIAL
☐ WOOD CONSTRUCTION
☐ EXTERIOR INSULATION AND FINISH SYSTEM
☐ MECHANICAL & ELECTRICAL SYSTEMS
☐ ARCHITECTURAL SYSTEMS
☐ SPECIAL CASES

QUALIFICATION AND CERTIFICATIONS

QUALIFICATIONS OF ALL PERSONNEL PERFORMING SPECIAL INSPECTION AND TESTING ACTIVITIES ARE SUBJECT TO THE APPROVAL OF THE OWNER OR THE OWNER'S REPRESENTATIVE. THE CREDENTIALS OF ALL INSPECTORS AND TESTING TECHNICIANS SHALL BE PROVIDED IF REQUESTED.

KEY FOR MINIMUM QUALIFICATIONS OF INSPECTION AGENTS:

WHEN THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE DEEMS IT APPROPRIATE THAT THE INDIVIDUAL PERFORMING THE STIPULATED TEST OR INSPECTION HAVE A SPECIFIC CERTIFICATION OR LICENSE AS INDICATED BELOW, SUCH DESIGNATION SHALL APPEAR BELOW THE AGENCY NUMBER ON THE SCHEDULE.

PE — PROFESSIONAL ENGINEER – A LICENSED PE SPECIALIZING IN THE DESIGN OF BUILDING STRUCTURES
PE/GE — GEOTECHNICAL ENGINEER – A LICENSED PE SPECIALIZING IN SOIL MECHANICS AND FOUNDATIONS

AMERICAN CONCRETE INSTITUTE (ACI) CERTIFICATION
- ACI-CFTT — CONCRETE FIELD TESTING TECHNICIAN – GRADE 1
- ACI-CCI — CONCRETE CONSTRUCTION INSPECTOR
- ACI-LTT — LABORATORY TESTING TECHNICIAN – GRADE 1 & 2
- ACI-STT — STRENGTH TESTING TECHNICIAN

AMERICAN SOCIETY OF NON-DESTRUCTIVE TESTING (ASNT) CERTIFICATION
- ASNT — NON-DESTRUCTIVE TESTING TECHNICIAN – LEVEL II OR III.

AMERICAN WELDING SOCIETY (AWS) CERTIFICATION
- AWS-CWI — CERTIFIED WELDING INSPECTOR
- AWS-ASC-SSI — CERTIFIED STRUCTURAL STEEL INSPECTOR

INTERNATIONAL CODE COUNCIL (ICC) CERTIFICATION
- ICC-SMS — STRUCTURAL MASONRY SPECIAL INSPECTOR
- ICC-SWS — STRUCTURAL STEEL AND WELDING SPECIAL INSPECTOR
- ICC-SFSI — SPRAY-APPLIED FIREPROOFING SPECIAL INSPECTOR
- ICC-PCSI — PRESTRESSED CONCRETE SPECIAL INSPECTOR
- ICC-RSCI — REINFORCED CONCRETE SPECIAL INSPECTOR

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)
- NICET-CT — CONCRETE TECHNICIAN – LEVELS I, II, III, & IV
- NICET-ST — SOILS TECHNICIAN – LEVELS I, II, III, & IV
- NICET-GET — GEOTECHNICAL ENGINEERING TECHNICIAN – LEVELS I, II, III, & IV

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/07/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

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SCALE: NTS
DATE: 07/07/25
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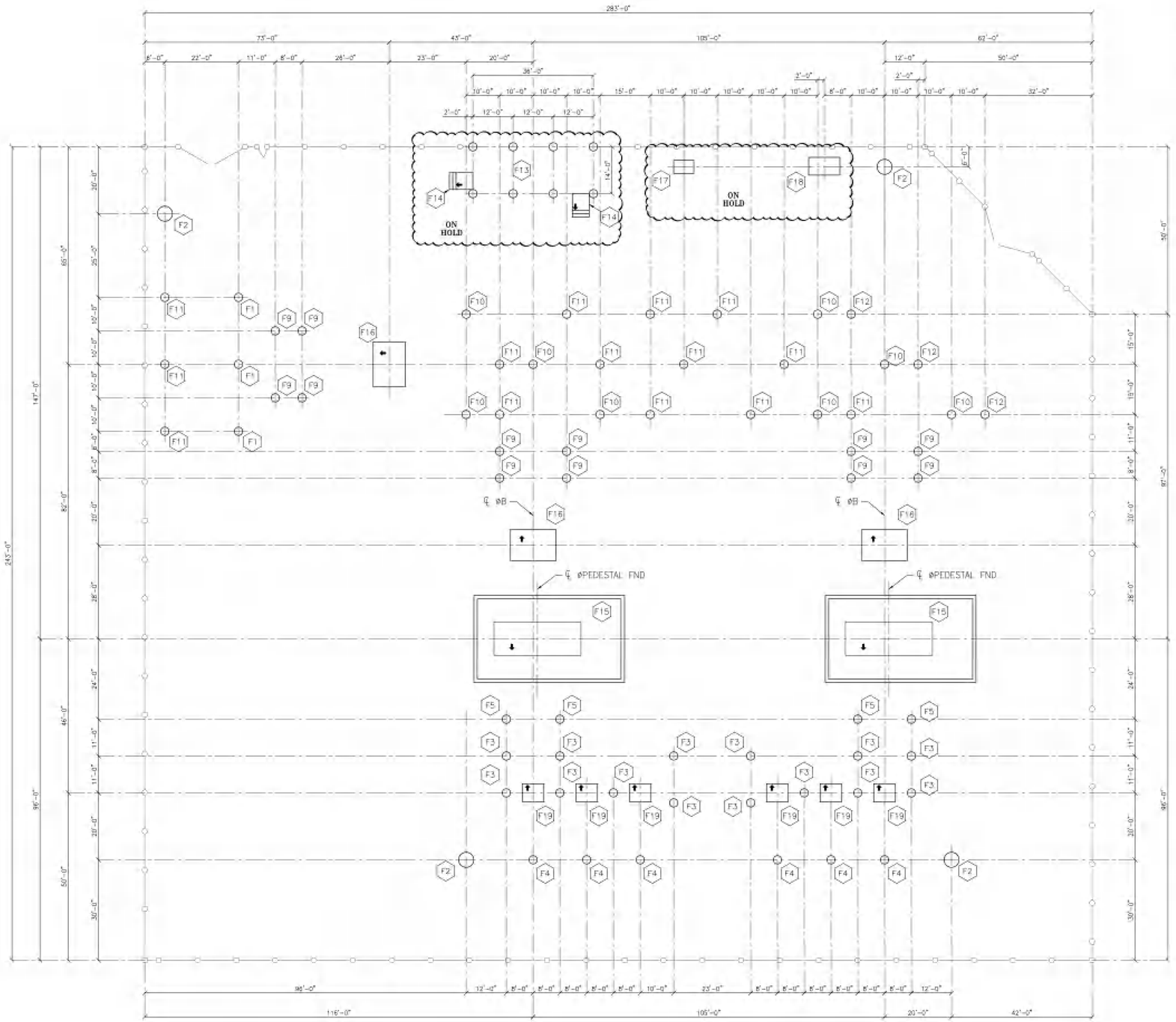
APPROVED: SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION FOUNDATION NOTES

LOCATION: 8953 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-500
JOB NUMBER: 24144-01
DRAWING NUMBER: 500



SUBSTATION PLAN VIEW

FOUNDATION DETAIL KEY

KEY	DESCRIPTION	FOUNDATION DWG. NO.	QTY	CU. YARDS PER FDN.	TOTAL CU. YARDS	ANCHOR TYPE	QTY / FDN	TOTAL ANCHOR QTY	TEMPLATE TYPE	TOTAL TEMPLATE QTY
F1	SURGE ARRESTOR SUPPORT STAND	24144-01-510	3	2.36	7.08		4	12		
F2	80' STATIC MAST (S10) FOUNDATION	24144-01-510	4	9.42	37.68		8	32		
F3	34.5kV COLLECTOR BAY STRUCTURE (S7 & S8) FDN	24144-01-510	14	2.88	40.32		4	56		
F4	34.5kV BUS SUPPORT / FEEDER RISER (S9) FDN	24144-01-510	6	2.36	14.16		4	24		
F5	34.5kV CT/PT & SST/PT STRUCTURE (S5 & S6) FDN	24144-01-510	4	2.36	9.44		4	16		
F9	345kV 3ø SWITCH STAND (S4) FOUNDATION	24144-01-510	12	2.36	28.32		4	48		
F10	345kV 1ø LOW BUS STRUCTURE (S1) FDN	24144-01-510	8	2.36	18.88		4	32		
F11	345kV 1ø HIGH BUS STRUCTURE (S2) FDN	24144-01-510	14	2.36	33.04		4	56		
F12	345kV 1ø CVT STRUCTURE (S11) FOUNDATION	24144-01-510	3	2.36	7.08		4	12		
F13	CONTROL ENCLOSE FOUNDATION	24144-01-511	8	2.0	16.00			##		
F14	CONTROL ENCLOSURE STOOP FOUNDATION	24144-01-512	2	3.06	6.12			##		
F15	345/34.5kV-(120/160/200 MVA) XFMR FDN	24144-01-515	2	113.08	226.16			##		
F16	345kV CIRCUIT BREAKER FOUNDATION	24144-01-512	3	13.06	39.18			##		
F17	GENERATOR	LATER	1	TBD	####			##		
F18	FUEL TANK FOUNDATION	LATER	1	TBD	####			##		
F19	34.5kV CIRCUIT BREAKER FOUNDATION	24144-01-512	6	3.06	18.36			##		

LEGEND & NOTES:

1. (F-) FOUNDATION IDENTIFICATION
2. ↑ ORIENTATION MARK
3. ABBREVIATIONS:
   - T.O.S. = TOP OF STEEL
   - B.O.S. = BOTTOM OF STEEL
   - T.O.C. = TOP OF CONCRETE
   - FDN = FOUNDATION
   - NS = NEAR SIDE
   - FS = FAR SIDE
   - N.T.S. = NOT TO SCALE
4. SEE DRAWING 24144-01-500 FOR FOUNDATION AND CONSTRUCTION NOTES
5. ANCHORS AND ANCHORING CLIPS PROVIDED BY BUILDING MANUFACTURER

0' 20'-0" 40'-0" 60'-0" 80'-0" 100'-0"

SCALE BAR
INCREMENTS IN FEET & INCHES

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	07/07/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

STAMP

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SCALE	1/16"=1'-0"
DATE	07/07/25
DRAWN	CTS
CHECKED	SRH
APPROVED	SRH
PROJECT	CHISME SOLAR AND STORAGE - TX-PS-2701 345/34.5kV SUBSTATION
TITLE	SUBSTATION FOUNDATION PLAN
LOCATION	8987 CR 268, BROWN COUNTY, TEXAS
FILE NAME	24144-01-501
JOB NUMBER	24144-01
DRAWING NUMBER	501

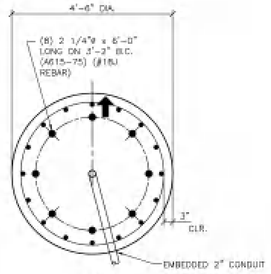
REFERENCE DRAWINGS:

CONDUIT PLAN	24144-01-450
FOUNDATION AND CONSTRUCTION NOTES	24144-01-500
FOUNDATION PLAN	24144-01-501
ANCHOR BOLT & TEMPLATE SCHEDULE	24144-01-525

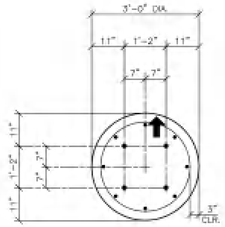
LEGEND & NOTES:

1. (F-) FOUNDATION IDENTIFICATION
2. ABBREVIATIONS:
   - T.O.S. = TOP OF STEEL
   - B.O.S. = BOTTOM OF STEEL
   - T.O.C. = TOP OF CONCRETE
   - NS = NEAR SIDE
   - FS = FAR SIDE
   - N.T.S. = NOT TO SCALE
3. SEE DRAWING 24144-01-500 FOR FOUNDATION AND CONSTRUCTION NOTES

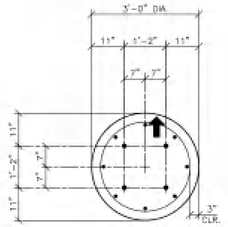
NOTE: REMOVE TOP ANCHOR TEMPLATES WHEN STRUCTURE IS INSTALLED



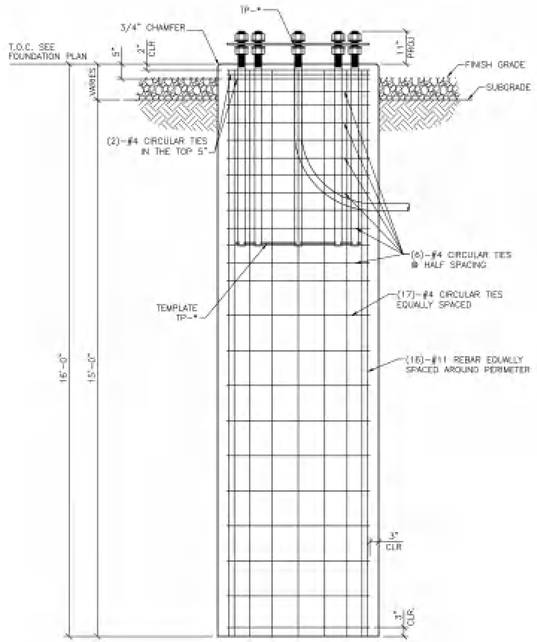
PLAN



PLAN

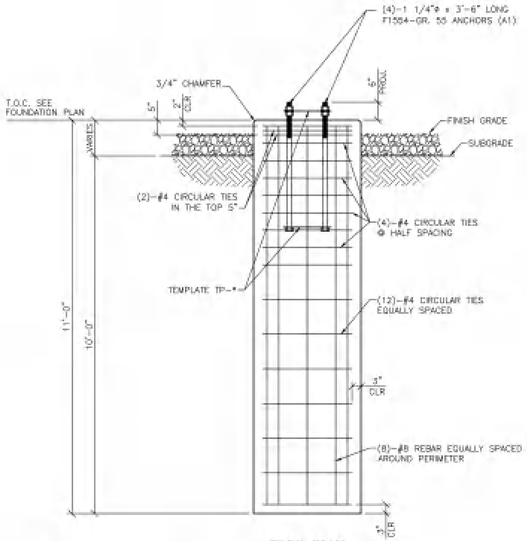


PLAN



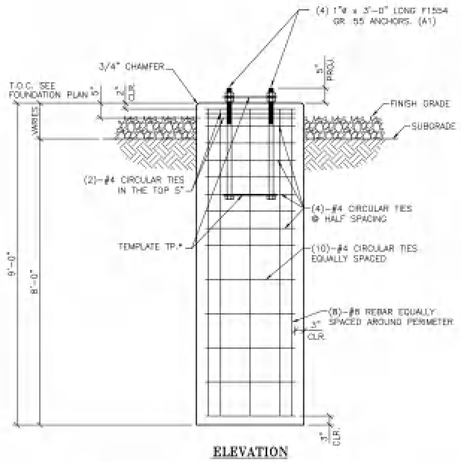
ELEVATION

F2 **STATIC MAST (S10) FOUNDATION**
QUANTITY REQUIRED: (4)
VOLUME OF CONCRETE = 9.42 CY EACH



ELEVATION

F3 **34.5kV COLLECTOR BAY STRUCTURE (S7 & S8) FDN**
QUANTITY REQUIRED: (14)
VOLUME OF CONCRETE = 2.88 CY EACH



ELEVATION

F1 **SURGE ARRESTOR SUPPORT STAND (S3)**
QUANTITY REQUIRED: (3)
VOLUME OF CONCRETE = 2.36 CY EACH

F4 **34.5kV BUS SUPPORT / FEEDER RISER (S9) FOUNDATION**
QUANTITY REQUIRED: (6)
VOLUME OF CONCRETE = 2.36 CY EACH

F5 **34.5kV CT/PT STRUCTURE (S5 & S6) FOUNDATION**
QUANTITY REQUIRED: (4)
VOLUME OF CONCRETE = 2.36 CY EACH

F9 **345kV 3ø SWITCH STAND (S4) FOUNDATION**
QUANTITY REQUIRED: (12)
VOLUME OF CONCRETE = 2.36 CY EACH

F10 **345kV LOW BUS STRUCTURE (S1) FOUNDATION**
QUANTITY REQUIRED: (8)
VOLUME OF CONCRETE = 2.36 CY EACH

F11 **345kV HIGH BUS STRUCTURE (S2) FOUNDATION**
QUANTITY REQUIRED: (14)
VOLUME OF CONCRETE = =2.36 CY EACH

F12 **345kV 1ø CVT STRUCTURE (S11) FOUNDATION**
QUANTITY REQUIRED: (3)
VOLUME OF CONCRETE = 2.36 CY EACH

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/18/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

STAMP

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SCALE	1/2"=1'-0"
DATE	07/07/25
DRAWN	CTS
CHECKED	SRH
APPROVED	SRH

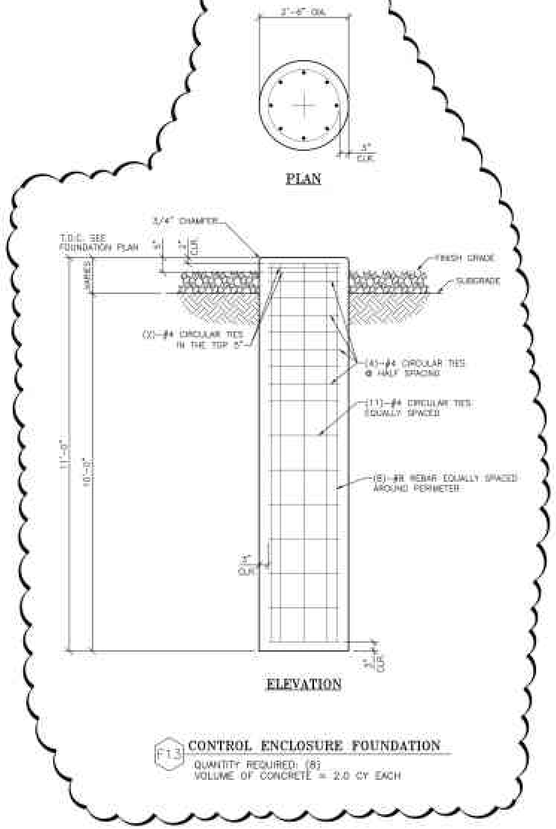
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION FOUNDATION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-510
JOB NUMBER	24144-01
DRAWING NUMBER	510

ON HOLD PENDING CONTROL ENCLOSURE DRAWINGS



F13 **CONTROL ENCLOSURE FOUNDATION**
QUANTITY REQUIRED: (8)
VOLUME OF CONCRETE = 2.0 CY EACH

LEGEND & NOTES:

1. F- FOUNDATION IDENTIFICATION
2. ABBREVIATIONS:
   - T.O.S. = TOP OF STEEL
   - B.O.S. = BOTTOM OF STEEL
   - T.O.C. = TOP OF CONCRETE
   - NS = NEAR SIDE
   - FS = FAR SIDE
   - N.T.S. = NOT TO SCALE
3. SEE DRAWING 24144-01-500 FOR FOUNDATION AND CONSTRUCTION NOTES

REFERENCE DRAWINGS:

CONDUIT PLAN	24144-01-450
FOUNDATION AND CONSTRUCTION NOTES	24144-01-500
FOUNDATION PLAN	24144-01-501
ANCHOR BOLT & TEMPLATE SCHEDULE	24144-01-525

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/18/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

STAMP

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SCALE	1/2"=1'-0"
DATE	07/07/25
DRAWN	CTS
CHECKED	SRH
APPROVED	SRH

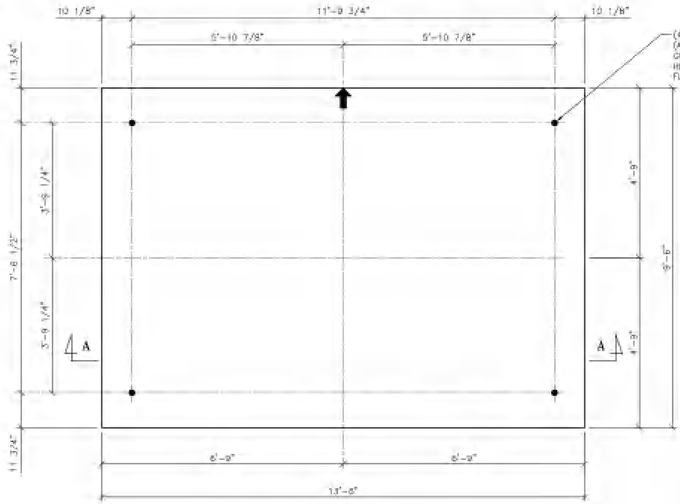
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION FOUNDATION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-511
JOB NUMBER	24144-01
DRAWING NUMBER	511

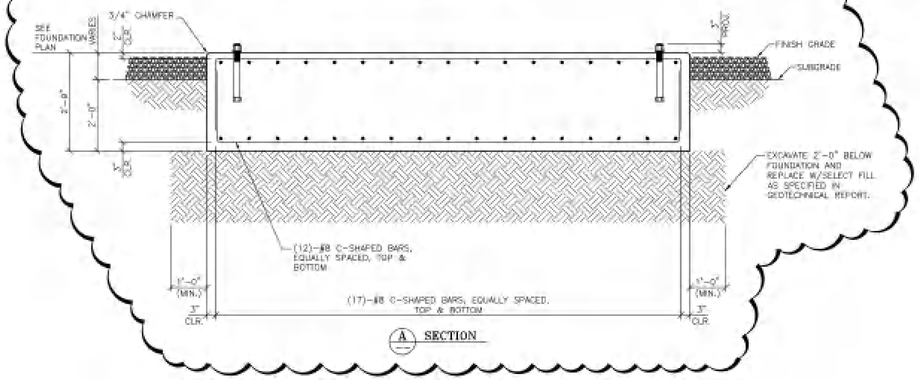
ON HOLD PENDING
BREAKER DRAWINGS



PLAN

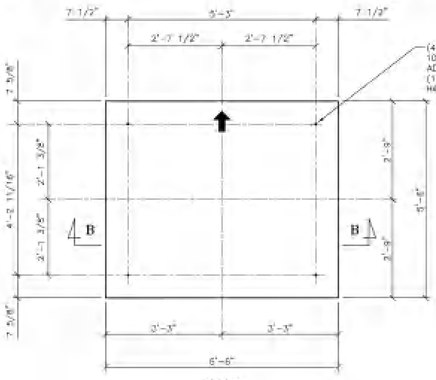
F16 **345kV BREAKER FOUNDATION**

QUANTITY REQUIRED: (3)
VOLUME OF CONCRETE = 13.06 CY EACH



A SECTION

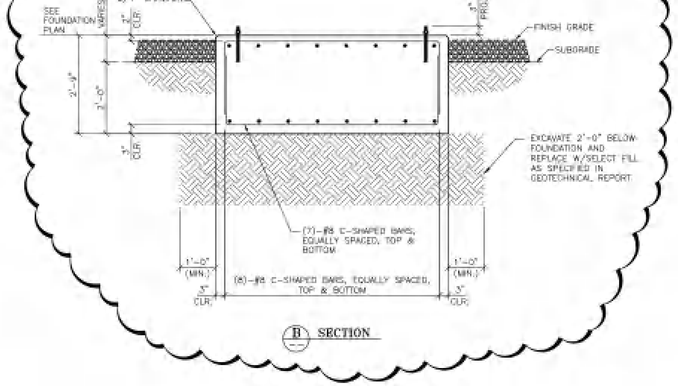
ON HOLD PENDING
BREAKER DRAWINGS



PLAN

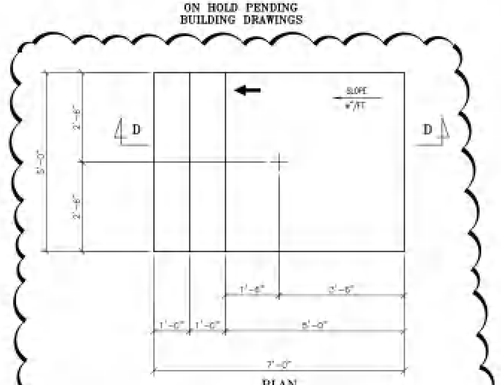
F18 **34.5kV BREAKER FOUNDATION**

QUANTITY REQUIRED: (6)
VOLUME OF CONCRETE = 3.64 CY EACH



B SECTION

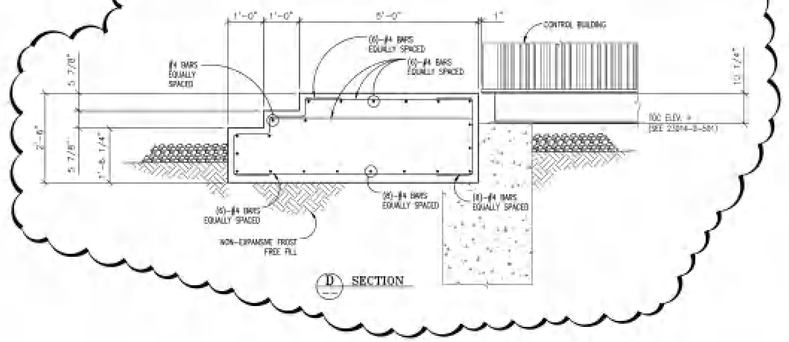
ON HOLD PENDING
BUILDING DRAWINGS



PLAN

F14 **CONTROL ENCLOSURE STOOP FOUNDATION**

QUANTITY REQUIRED: (2)
VOLUME OF CONCRETE = 3.06 CY EACH



D SECTION

LEGEND & NOTES:

1. F — FOUNDATION IDENTIFICATION
2. ORIENTATION MARK
3. ABBREVIATIONS:
   - T.O.S. = TOP OF STEEL
   - B.O.S. = BOTTOM OF STEEL
   - T.O.C. = TOP OF CONCRETE
   - NS = NEAR SIDE
   - FS = FAR SIDE
   - N.T.S. = NOT TO SCALE
4. SEE DRAWING 24144-01-500 FOR FOUNDATION AND CONSTRUCTION NOTES

REFERENCE DRAWINGS:

CONDUIT PLAN	24144-01-450
FOUNDATION AND CONSTRUCTION NOTES	24144-01-500
FOUNDATION PLAN	24144-01-501
ANCHOR BOLT & TEMPLATE SCHEDULE	24144-01-525

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/18/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

STAMP

RED RIVER CLEAN ENERGY

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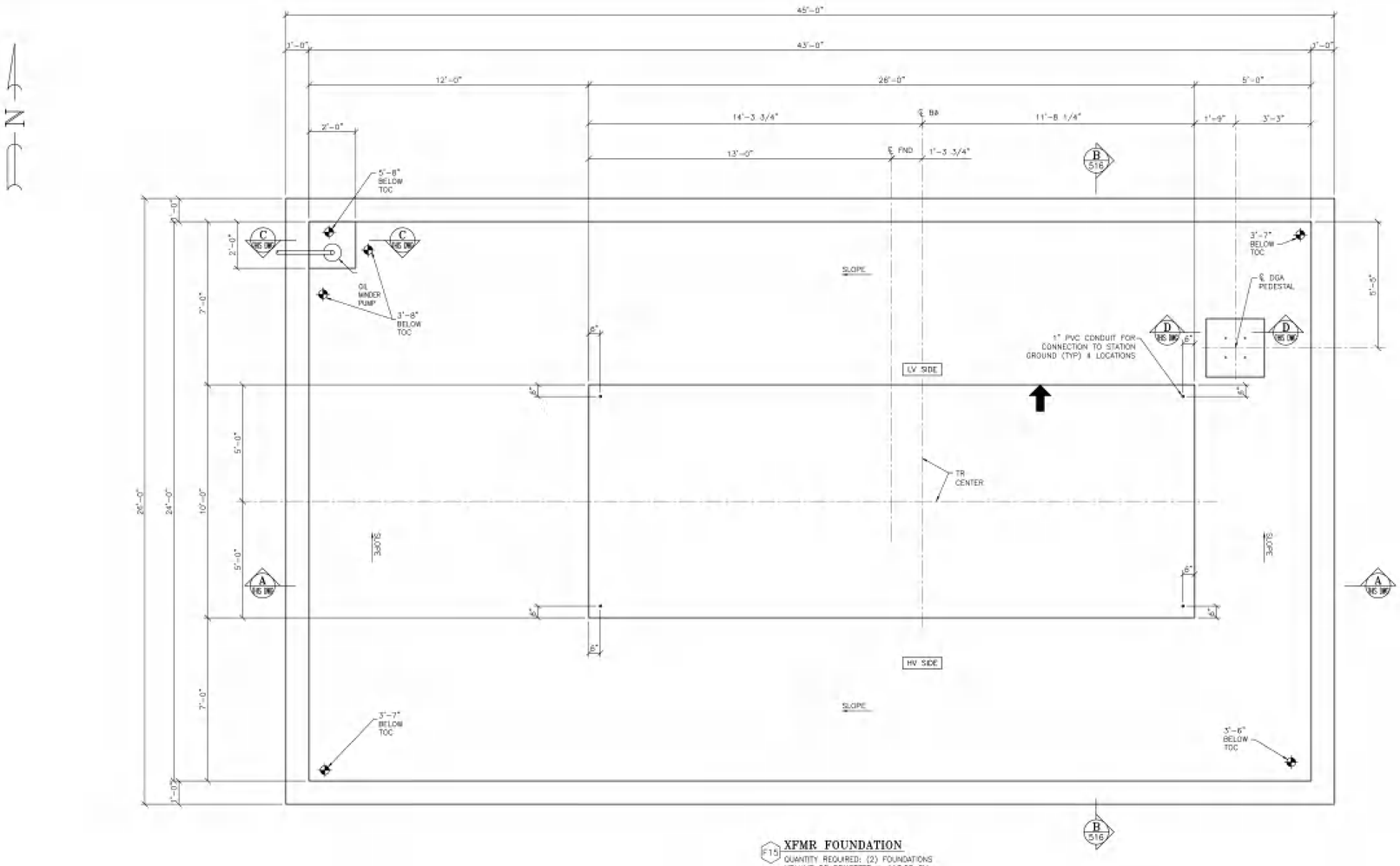
SCALE	1/2"=1'-0"
DATE	07/07/25
DRAWN	CTS
CHECKED	SRH
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION
FOUNDATION DETAILS

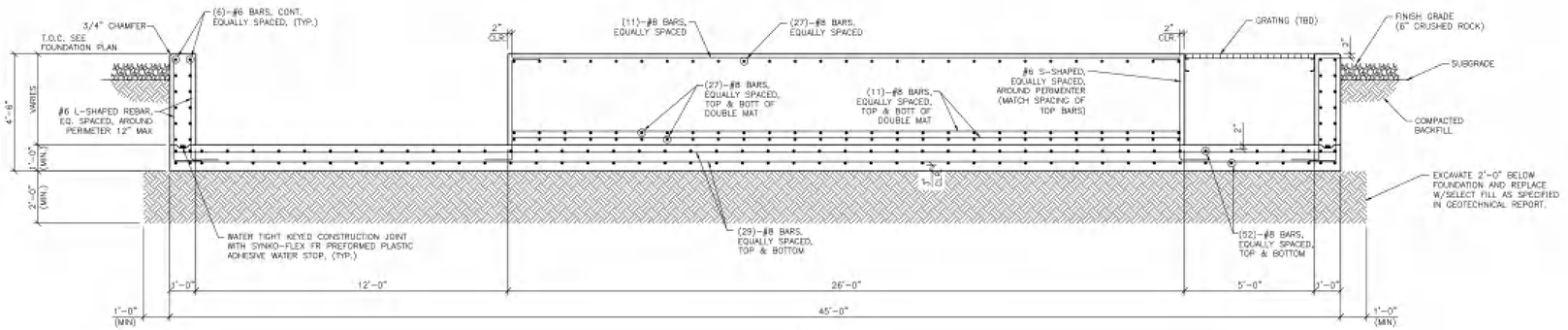
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-512
JOB NUMBER	24144-01
DRAWING NUMBER	512

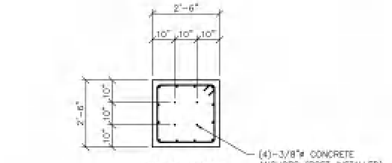


F15 **XFMR FOUNDATION**

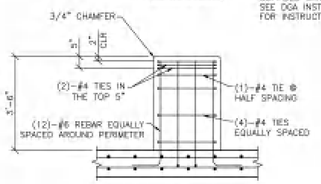
QUANTITY REQUIRED: (2) FOUNDATIONS
VOLUME OF CONCRETE = 113.08 CY
TRANSFORMER OIL: 11,783 GAL.
FREEBOARD: 8,429 GAL.
CONTAINMENT VOLUME: 20,212 GAL.



A **SECTION**
DGA PEDESTAL NOT SHOWN IN THIS VIEW FOR CLARITY



PLAN VIEW



D **SECTION**
DGA PEDESTAL

LEGEND & NOTES:

1. (F-) FOUNDATION IDENTIFICATION
2. ORIENTATION MARK
3. ABBREVIATIONS:
   - T.O.S. = TOP OF STEEL
   - B.O.S. = BOTTOM OF STEEL
   - T.O.C. = TOP OF CONCRETE
   - NS = NEAR SIDE
   - FS = FAR SIDE
   - N.T.S. = NOT TO SCALE
4. SEE DRAWING 24144-01-500 FOR FOUNDATION AND CONSTRUCTION NOTES
5. ADDITIONAL DETAILS ON DRAWING 24144-01-516

REFERENCE DRAWINGS:

CONDUIT PLAN	24144-01-450
FOUNDATION AND CONSTRUCTION NOTES	24144-01-500
FOUNDATION PLAN	24144-01-501
SUBSTATION POWER TRANSFORMER FOUNDATION DETAILS	24144-01-516
ANCHOR BOLT & TEMPLATE SCHEDULE	24144-01-525

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/18/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

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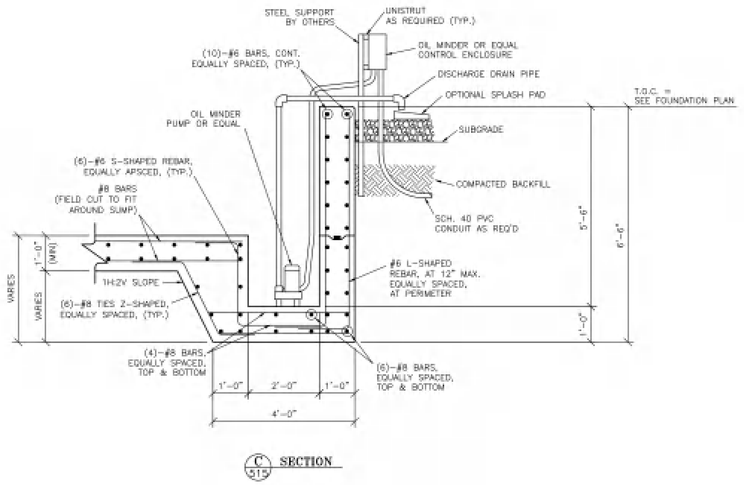
SCALE	3/8"=1'-0"
DATE	07/07/25
DRAWN	CTS
CHECKED	SRH
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

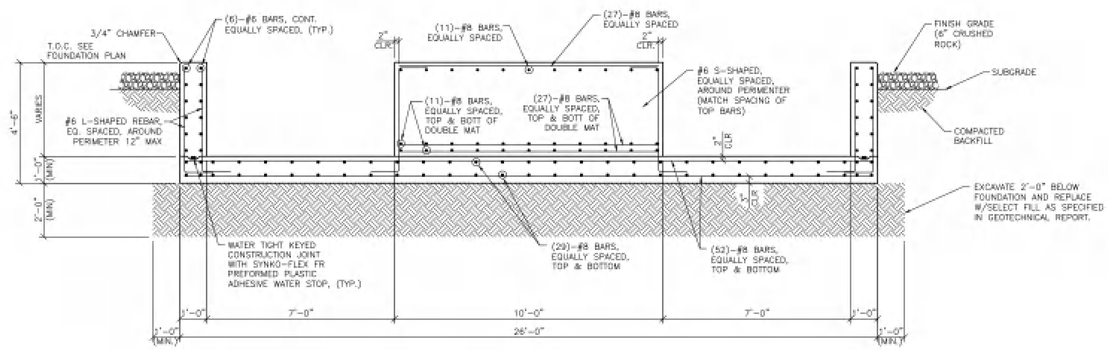
TITLE: SUBSTATION POWER TRANSFORMER FOUNDATION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-515
JOB NUMBER: 24144-01
DRAWING NUMBER: 515



C 515 SECTION



H 515 SECTION

LEGEND & NOTES:

1. (F-) FOUNDATION IDENTIFICATION
2. ORIENTATION MARK
3. ABBREVIATIONS:
   - T.O.S. = TOP OF STEEL
   - B.O.S. = BOTTOM OF STEEL
   - T.O.C. = TOP OF CONCRETE
   - NS = NEAR SIDE
   - FS = FAR SIDE
   - N.T.S. = NOT TO SCALE
4. SEE DRAWING 24144-01-500 FOR FOUNDATION AND CONSTRUCTION NOTES

REFERENCE DRAWINGS:

CONDUIT PLAN	24144-01-450
FOUNDATION AND CONSTRUCTION NOTES	24144-01-500
FOUNDATION PLAN	24144-01-501
SUBSTATION POWER TRANSFORMER FOUNDATION DETAILS	24144-01-515
ANCHOR BOLT & TEMPLATE SCHEDULE	24144-01-525

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/18/25	60% DESIGN SUBMITTAL	CTS	SRH	SRH

STAMP

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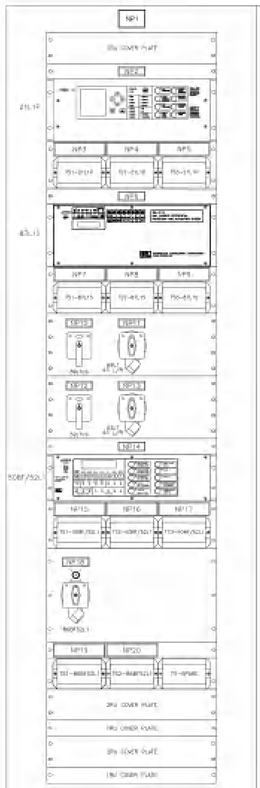
SCALE	1/2"=1'-0"
DATE	07/07/25
DRAWN	CTS
CHECKED	SRH
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

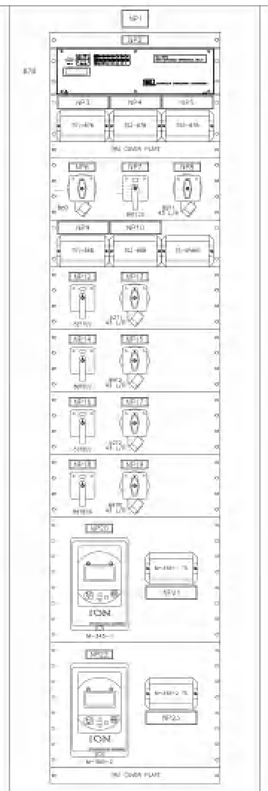
TITLE: SUBSTATION POWER TRANSFORMER FOUNDATION DETAILS

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

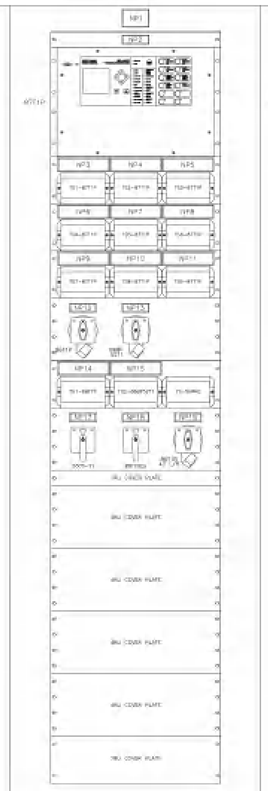
FILE NAME	24144-01-516
JOB NUMBER	24144-01
DRAWING NUMBER	516



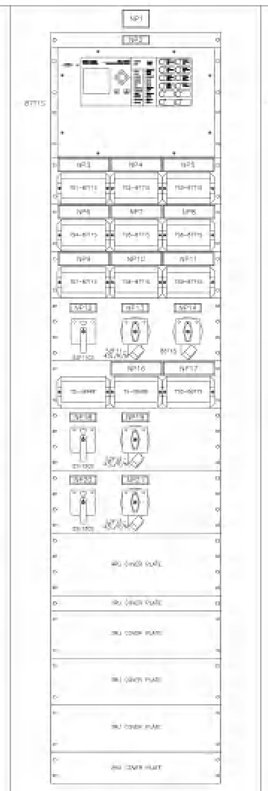
RELAY PANEL NO.1
VIEWED FROM FRONT



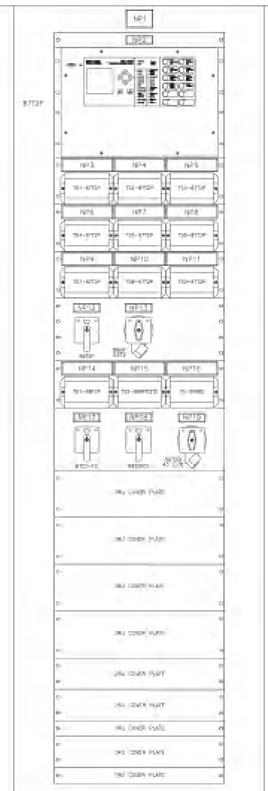
RELAY PANEL NO.2
VIEWED FROM FRONT



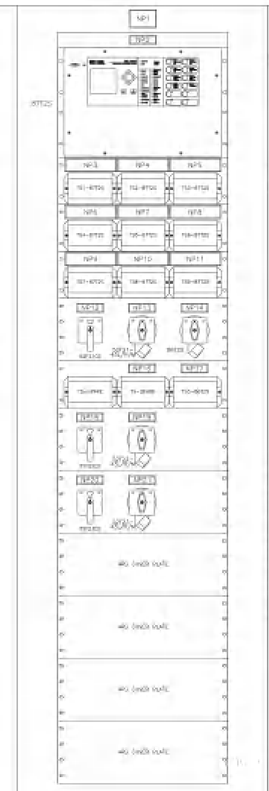
RELAY PANEL NO.3
VIEWED FROM FRONT



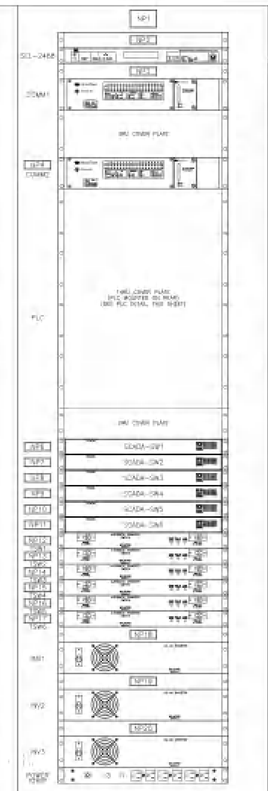
RELAY PANEL NO.4
VIEWED FROM FRONT



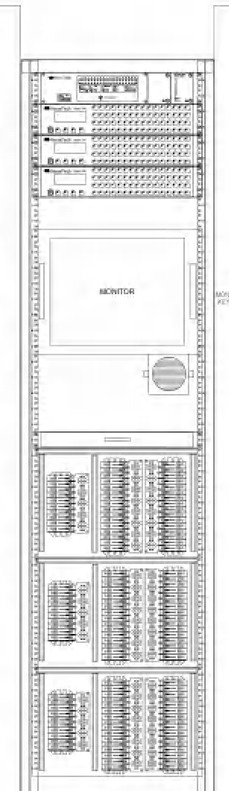
RELAY PANEL NO.5
VIEWED FROM FRONT



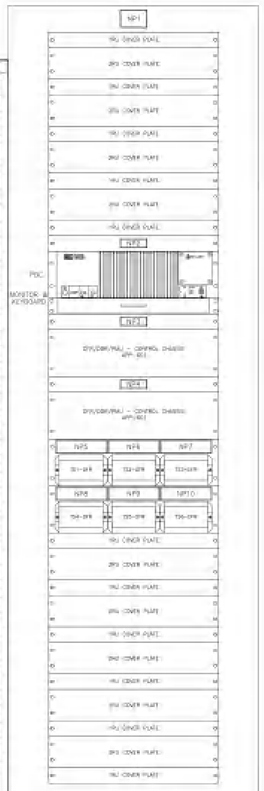
RELAY PANEL NO.6
VIEWED FROM FRONT



RELAY PANEL NO.7
VIEWED FROM FRONT



RELAY PANEL NO.8
VIEWED FROM FRONT



RELAY PANEL NO.9
VIEWED FROM FRONT

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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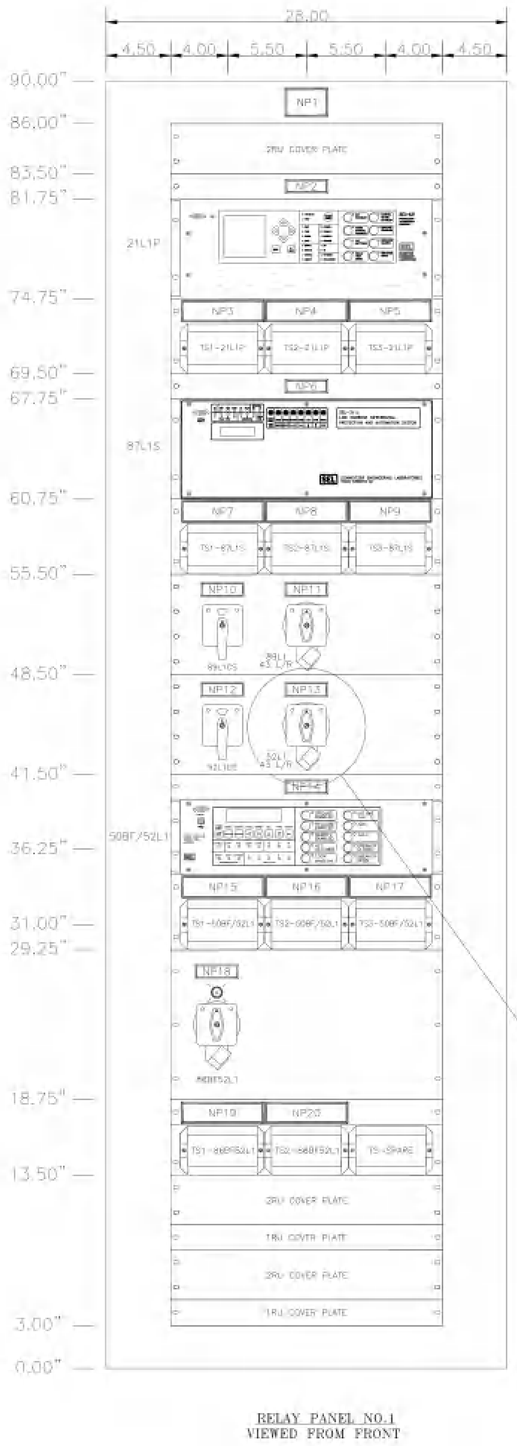
SCALE: NTS
DATE: 03/17/25
DRAWN: KWN
CHECKED: MC
APPROVED: SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL LAYOUT

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1100
JOB NUMBER: 24144-01
DRAWING NUMBER: 1100



RELAY PANEL NO.1
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

NP NO.	NP SIZE	QTY.	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 3)	2	PANEL 6	1/2"	TRANSFORMER T2	1/4"	PROTECTION	1/4"
NP2	3.5" X 0.75"	1	87T2S	5/32"	SECONDARY	5/32"	TRANSFORMER T2 RELAYING	5/32"
NP3	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP4	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP5	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP6	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP7	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP8	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP9	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP10	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP11	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP12	2.5" X 0.75"	1	52T2CS	5/32"	TRIP/CLOSE	5/32"		
NP13	2.5" X 0.75"	1	52T21-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		
NP14	2.5" X 0.75"	1	86T2S	5/32"	LOCK-OUT RELAY	5/32"		
NP15	NOT USED							
NP16	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP17	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP18	2.5" X 0.75"	1	52T2CS	5/32"	TRIP/CLOSE	5/32"		
NP19	2.5" X 0.75"	1	52T21-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		
NP20	2.5" X 0.75"	1	52T2CS	5/32"	TRIP/CLOSE	5/32"		
NP21	2.5" X 0.75"	1	52T21-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		

NP3
TS1-21L1P

A	B	C	D	E	F	G	H	I	J
89/1		89/2		52/1		43/1			
OUT	IN	OUT	IN	OUT	IN	43/1	43/2	43/3	43/4
C	C	C	C	C	C	P	P	P	P

NP4
TS2-21L1P

A	B	C	D	E	F	G	H	I	J
							RELAY INOPERATIVE TO SCADA		
C	C	C	C	C	C	T	T	T	T

NP5
TS3-21L1P

A	B	C	D	E	F	G	H	I	J
52/1 TC1						COMM OUTOUT	ALARM	PWR H	PWR L
T	T	T	T	T	T	T	T	T	T

NP7
TS1-87L1S

A	B	C	D	E	F	G	H	I	J
IA		IB		IC		43/1			
OUT	IN	OUT	IN	OUT	IN	VA	VB	VC	VN
C	C	C	C	C	C	P	P	P	P

NP8
TS2-87L1S

A	B	C	D	E	F	G	H	I	J
							RELAY INOPERATIVE TO SCADA		
C	C	C	C	C	C	T	T	T	T

NP9
TS3-87L1S

A	B	C	D	E	F	G	H	I	J
52/1 TC2						COMM OUTOUT	ALARM	PWR H	PWR L
T	T	T	T	T	T	T	T	T	T

NP15
TS1-50BF/52L1

A	B	C	D	E	F	G	H	I	J
IA		IB		IC		43/1			
OUT	IN	OUT	IN	OUT	IN	VA	VB	VC	VN
C	C	C	C	C	C	P	P	P	P

NP16
TS2-50BF/52L1

A	B	C	D	E	F	G	H	I	J
TRIP MONITOR		52/1 TC1	52/1 TC2		RELAY INOPERATIVE TO SCADA	ALARM		PWR H	PWR L
P	P	P	P	P	P	P	P	P	P

NP17
TS3-50BF/52L1

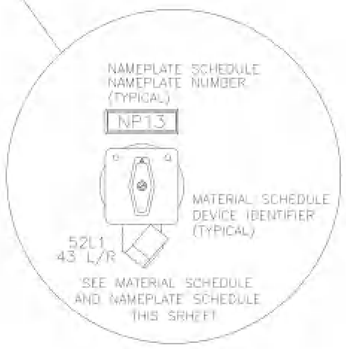
A	B	C	D	E	F	G	H	I	J
									52/1 SELF
P	P	P	P	P	P	P	P	P	P

NP19
TS1-86BF52L1

A	B	C	D	E	F	G	H	I	J
52/1 TC1	52/1 TC2	52/1 TC1	52/1 TC2	52/1 TC1	52/1 TC2	21L1 87T1	21L1 87T2	REMOTE LOCKOUT TO SCADA	REMOTE LOCKOUT TO SCADA
P	P	P	P	P	P	P	P	P	P

NP20
TS2-86BF52L1

A	B	C	D	E	F	G	H	I	J
REMOTE LOCKOUT TO SCADA	REMOTE LOCKOUT TO SCADA	REMOTE LOCKOUT TO SCADA							
P	P	P	P	P	P	P	P	P	P



MATERIAL SCHEDULE

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 28" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	N/A		1" X 1/4" X 22" COPPER BAR WITH 15/32 HOLES DRILLED AND TAPPED AT 2" CENTERS (10 HOLES MAX). WASHER HEAD SCREWS INCLUDED IN EACH HOLE
TB	LOT	GE	EB25N12	12 POINT TERMINAL BLOCK
TB	LOT	GE	EB27SMS	4 POINT SHORTING TERMINAL BLOCK
1FU3 1FU6 1FU7 1FU8	4	MERSEN FERRAZ SHAWMUT	USCC2	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE
1FU1 1FU2 1FU3 1FU4	4	MERSEN FERRAZ SHAWMUT	USCC3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 3 POLE
	12	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING
	8	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING
21L1P	1	SEL	0421461G0X0X4H2X00XXX	SEL-421-4, R327-V0
87L1S	1	SEL	0311L1L0B42542000X	SEL-311L, R502
ETHERNET/FIBER CONVERTER	2	SEL	SEL-2specialMMF	SINGLE MODE FIBEROPTIC TRANSCEIVER, EIA-232 MALE DB-9
ETHERNET TRANSCEIVER	2	SEL	SEL-2890	EIA-232 SERIAL TO ETHERNET FOR CONNECTING SEL-421 AND SEL-311L RELAYS TO NEER NETWORK.
TS1-21L1P TS2-21L1P TS3-21L1P TS1-87L1S TS2-87L1S TS3-87L1S	2	ABB	FRXH 171 183 036	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 6 CURRENTS, 4 POTENTIALS B: 6 CURRENTS, 4 TRIPS C: 10 TRIPS
52L1CS 89L1CS	2	ELECTROSWITCH	74PD202LT	CONTROL SWITCH (TRIP-CLOSE) WITH PISTOL GRIP, 2 DECKS, 1 GREEN AND 2 RED LEDS ENDR CODE: 1239-2823
52L1-43/LR 89L1-43/LR	2	ELECTROSWITCH	2420SR	CONTROL SWITCH (LOCAL-REMOTE) WITH OVAL HANDLE, 2 DECKS ENDR CODE: 1100-31246
50BF/52L1	1	SEL	2351S5XH0485431 KEY CODE: 3518#7265	PROTECTION SYSTEM FIRMWARE: STANDARD (INCLUDES MIRRORED BITS AND LOAD PROFILE) CHASSIS AND MOUNTING: 5U HORIZONTAL RACK MOUNT USER INTERFACE: STANDARD INTERFACE INCLUDING USB PLUS CONFIGURABLE LABELS POWER SUPPLY: 125/250 VDC OR 120/230 VAC COMMUNICATIONS INTERFACE: (2) 10/100BASE-T, EIA-485 SECONDARY INPUT CURRENT: 5 A PHASE, 5 A NEUTRAL CONTROL INPUT VOLTAGE: 125 VDC I/O BOARD: ADDITIONAL 12 STD OUTPUTS, 8 INPUTS COMMUNICATIONS PROTOCOLS: STANDARD PROTOCOLS
86BF52L1	1	ELECTROSWITCH	76BTD	MANUAL RESET LOCK-OUT RELAY (TRIP RESET) WITH OVAL HANDLE, 7 DECKS ENDR CODE: 1312-3122
TS1-50BF/52L1 TS2-50BF/52L1 TS3-50BF/52L1	1	ABB	FRXH 171 001 001	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 6 CURRENTS, 4 POTENTIALS B: 10 POTENTIALS C: 10 POTENTIALS
TS1-86BF52L1 TS2-86BF52L1 TS-SPARE	1	ABB	FRXH 011 001 000	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 10 POTENTIALS B: 10 POTENTIALS C: BLANK
	6	VENDOR	1 RU	1 RU PLATE
	3	VENDOR	2 RU	2 RU PLATE

NOTES:
1. REFER TO RELAY PANEL SPECIFICATION FOR INTERNAL AND EXTERNAL FINISH COLOR.
2. NAMEPLATES TO BE FURNISHED FOR EACH DEVICE INTERNAL TO THE PANEL.
3. TWO PANEL NAMEPLATES SHALL BE FURNISHED WITH EACH PANEL, ONE MOUNTED ON THE FRONT AND ONE MOUNTED ON THE BACK.
4. PANEL SUPPLIER SHALL VERIFY MANUFACTURER STYLE NUMBERS.
5. NAMEPLATES ARE TO BE BLACK WITH WHITE LETTERING AND ADHESIVE BACKING. TEXT SHALL BE CENTERED ON EACH LINE.
6. TEST SWITCH NAMEPLATES SHALL BE MOUNTED 1/4" FROM THE TOP OF THE TEST SWITCH ASSEMBLY.
7. TERMINAL & FUSE BLOCKS SHALL BE PROVIDED AS NECESSARY AND ACCESSIBLY MOUNTED.

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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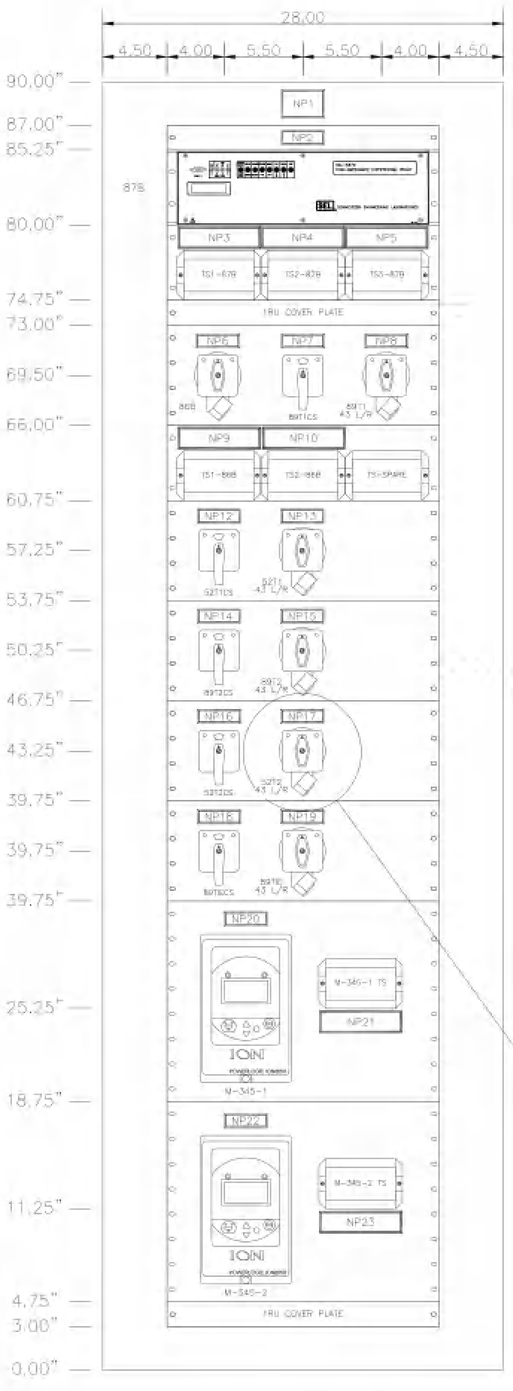
SCALE: NTS
DATE: 03/17/25
DRAWN: KWN
CHECKED: MC
APPROVED: SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.1 LAYOUT

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1101
JOB NUMBER: 24144-01
DRAWING NUMBER: 1101



RELAY PANEL NO.2
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

NP NO	NP SIZE	QTY	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 3)	2	PANEL 2	1/2"	BUS	1/4"	PROTECTION	1/4"
NP2	2.5" X 0.75"	1	87B	5/32"	BUS	5/32"	DIFFERENTIAL	5/32"
NP3	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP4	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP5	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP6	2.5" X 0.75"	1	86B	5/32"	LOCK-OUT RELAY	5/32"		
NP7	2.5" X 0.75"	1	89T1CS	5/32"	OPEN/CLOSE	5/32"		
NP8	2.5" X 0.75"	1	89T1-43L/R	5/32"	LOCAL/REMOTE	5/32"		
NP9	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP10	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP11	NOT USED							
NP12	6" X 1.25"	1	52T1CS	5/32"	TRIP/CLOSE	5/32"		
NP13	6" X 1.25"	1	52T1-43L/R	5/32"	LOCAL/REMOTE	5/32"		
NP14	6" X 1.25"	1	89T2CS	5/32"	OPEN/CLOSE	5/32"		
NP15	2.5" X 0.75"	1	89T2-43L/R	5/32"	LOCAL/REMOTE	5/32"		
NP16	6" X 1.25"	1	52T2CS	5/32"	TRIP/CLOSE	5/32"		
NP17	2.5" X 0.75"	1	52T2-43L/R	5/32"	LOCAL/REMOTE	5/32"		
NP18	6" X 1.25"	1	89T3CS	5/32"	OPEN/CLOSE	5/32"		
NP19	2.5" X 0.75"	1	89T3-43L/R	5/32"	LOCAL/REMOTE	5/32"		
NP20	2.5" X 0.75"	1	M-345-1	5/32"	REVENUE METER	5/32"		
NP21	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP22	2.5" X 0.75"	1	M-345-2	5/32"	REVENUE METER	5/32"		
NP23	6" X 1.25"	1	SEE TAG BELOW	1/8"				

NP3
TS1-87B
A B C D E F G H I J
C - C C - C C - C C - C C - C
P P P P P P P P P P

NP4
TS2-87B
A B C D E F G H I J
P P P P P P P P P P

NP5
TS3-87B
A B C D E F G H I J
P P P P P P P P P P

NP9
TS1-86B
A B C D E F G H I J
P P P P P P P P P P

NP10
TS2-86B
A B C D E F G H I J
P P P P P P P P P P

NP21
M-345-1
A B C D E F G H I J
C - C C - C C - C P P P P

NP23
M-345-2
A B C D E F G H I J
C - C C - C C - C P P P P

NAMEPLATE SCHEDULE
NAMEPLATE NUMBER
(TYPICAL)
NP17
MATERIAL SCHEDULE
DEVICE IDENTIFIER
(TYPICAL)
52T2
43 L/R
SEE MATERIAL SCHEDULE
AND NAMEPLATE SCHEDULE
THIS SRHEET

NOTES:
1. REFER TO RELAY PANEL SPECIFICATION FOR INTERNAL AND EXTERNAL FINISRH COLOR.
2. NAMEPLATES TO BE FURNISRHED FOR EACH DEVICE INTERNAL TO THE PANEL.
3. TWO PANEL NAMEPLATES SRHALL BE FURNISRHED WITH EACH PANEL, ONE MOUNTED ON THE FRONT AND ONE MOUNTED ON THE BACK.
4. PANEL SUPPLIER SRHALL VERIFY MANUFACTURER STYLE NUMBERS.
5. NAMEPLATES ARE TO BE BLACK WITH WHITE LETTERING AND ADHESIVE BACKING. TEXT SRHALL BE CENTERED ON EACH LINE.
6. TEST SWITCH NAMEPLATES SRHALL BE MOUNTED 1/4" FROM THE TOP OF THE TEST SWITCH ASSEMBLY.
7. TERMINAL & FUSE BLOCKS SRHALL BE PROVIDED AS NECESSARY AND ACCESSIBLY MOUNTED.

MATERIAL SCHEDULE

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 32" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	N/A		1" X 1/4" X 22" COPPER BAR WITH 18-32 HOLES DRILLED AND TAPPED AT 2" CENTERS (18 HOLES MAX). WASHER HEAD SCREWS INCLUDED IN EACH HOLE
TB	LOT	GE	EB25B12	12 POINT TERMINAL BLOCK
TB	LOT	GE	EB27B6NS	4 POINT SHORTING TERMINAL BLOCK
2FU5 2FU6	2	MERSEN FERRAZ SHAWMUT	USCC2	2P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE
2FU1 2FU2 2FU3 2FU4	4	MERSEN FERRAZ SHAWMUT	USCC3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 3 POLE
	12	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING.
	4	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING.
87B	1	SEL	587ZD0325H12XX KEY CODE: 5872B101	HIGH IMPEDANCE DIFFERENTIAL RELAY; STANDARD FIRMWARE;HORIZONTAL RACK MOUNT; 48/125 VDC/VAC POWER SUPPLY; 125VDC CONTROL INPUT VOLTAGE; 2 MOVS-5500 J; 5 AMP PHASE SECONDARY INPUT CURRENT; EIA-232 FRONT AND REAR PORTS; STANDARD COMMUNICATION PROTOCOLS
TS1-87B TS2-87B TS3-87B	1	ABB	FR0H 873 081 001	TEST SWITCH, FT1HR, 3RU, ANSI 70, CLEAR COVER A: 10 CURRENTS B: 10 POTENTIALS C: 10 POTENTIALS
86B	1	ELECTROSWITCH	76870	MANUAL RESET LOCK-OUT RELAY (TRIP RESET) WITH OVAL HANDLE, 7 DECKS ENGR CODE: 17C-2L22
TS1-86B TS2-86B TS-SPARE	1	ABB	FR0H 801 081 000	TEST SWITCH, FT1HR, 3RU, ANSI 70, CLEAR COVER A: 10 POTENTIALS B: 10 POTENTIALS C: BLANK
52T1CS 52T2CS 89T1CS 89T2CS 89T3CS	5	ELECTROSWITCH	T4P2282LT	CONTROL SWITCH (TRIP-CLOSE) WITH PISTOL GRIP, 2 DECKS, 1 GREEN AND 2 RED LEDS ENGR CODE: 1238-2823
52T1-43L/R 52T2-43L/R 89T1-43L/R 89T2-43L/R 89T3-43L/R	5	ELECTROSWITCH	242028	CONTROL SWITCH (LOCAL-REMOTE) WITH OVAL HANDLE, 2 DECKS ENGR CODE: 16D-2L24A
M-345-1 M-345-2	2	SCHNEIDER ELECTRIC	S8686A-4D3H07A0A-AW643	ION 8650A METER.
M-345-1 TS M-345-2 TS	2	ABB	C774B430020	METER TEST SWITCH, 6 CURRENTS, 4 POTENTIALS, CLEAR COVER
M-345-1 I/O M-345-2 I/O	2	SCHNEIDER ELECTRIC	P8S0E90	ION METER EXTENSION CARD
M-345-1 CABLE M-345-2 CABLE	2	SCHNEIDER ELECTRIC	CBL-8490-EOP-10ECX	METER EXTENSION CONNECTOR CABLE
	2	VENDOR	1 RU	1 RU PLATE
	1	VENDOR	2 RU	2 RU PLATE
	1	VENDOR	3 RU	3 RU PLATE

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	ETS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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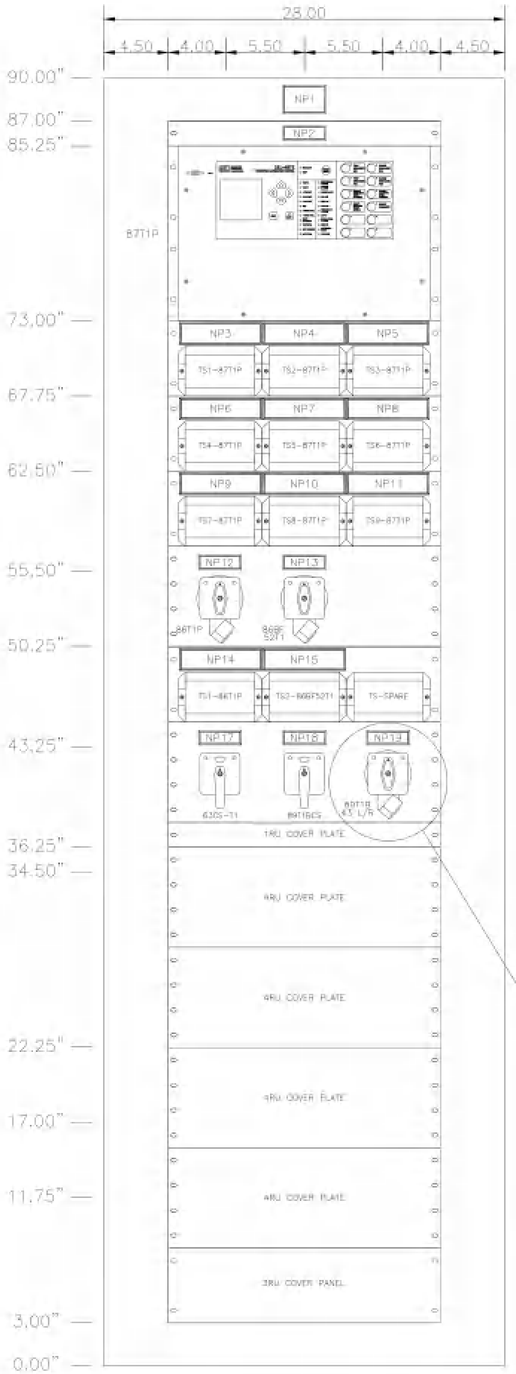
SCALE	NTS
DATE	03/17/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.2 LAYOUT

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1102
JOB NUMBER	24144-01
DRAWING NUMBER	1102



RELAY PANEL NO.3
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

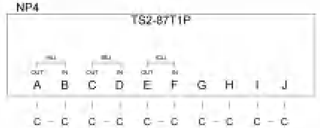
NP NO.	NP SIZE	QTY.	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 5)	2	PANEL 3	1/2"	TRANSFORMER T1	1/4"	PRIMARY PROTECTION	1/4"
NP2	2.5" X 0.75"	1	87T1P	5/32"	PRIMARY	5/32"	TRANSFORMER T1 RELAYING	5/32"
NP3	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP4	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP5	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP6	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP7	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP8	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP9	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP10	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP11	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP12	2.5" X 0.75"	1	86T1P	5/32"	LOCK-OUT RELAY	5/32"		
NP13	2.5" X 0.75"	1	86BF52T1	5/32"	LOCK-OUT RELAY	5/32"		
NP14	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP15	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP16	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP17	2.5" X 0.75"	1	63QS-T1	5/32"	FAULT PRESSURE RELAY	5/32"	CUTOFF SWITCH	5/32"
NP18	2.5" X 0.75"	1	89T1BCS	5/32"	OPEN/CLOSE	5/32"		
NP19	2.5" X 0.75"	1	89T1B-43L/R	5/32"	LOCAL/REMOTE	5/32"		

MATERIAL SCHEDULE

DEVICE(S)	QTY.	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	NA		90" X 32" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	NA		1" X 1/4" X 22" COPPER BAR WITH 10-32 HOLES DRILLED AND TAPPED AT 2" CENTERS (10 HOLES MIN), WASHER HEAD SCREWS INCLUDED IN EACH HOLE
TB	LOT	GE	EB25B12	12 POINT TERMINAL BLOCK
SH	LOT	GE	EB27SH3	4 POINT SHORTING TERMINAL BLOCK
3FU5	2	MERSEN FERRAZ SHAWMUT	USCC2	2P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP. FOR CLASS CC FUSES 2 POLE
3FU1 3FU2 3FU3 3FU4	4	MERSEN FERRAZ SHAWMUT	USCC3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP. FOR CLASS CC FUSES 3 POLE
	12	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING
	4	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING
87T1P	1	SEL	0451E2061130630X40H24H0	SEL-451E, TRANSFORMER PROTECTION RELAY. SEL-451E, TRANSFORMER PROTECTION RELAY, STANDARD FIRMWARE, SCREW TERMINAL BLOCK, 125/250VDC POWER SUPPLY, 5A PHASE AND 5A NEUTRAL CURRENT INPUTS, FTP, TELNET, DNP3 LAN/WAN, PRP, ETHERNET PROTOCOLS, TWO 10/100BASE-T ETHERNET PORTS, 125VDC MAIN BOARD INPUT VOLTAGE, 7 UNIT HORIZONTAL RACK MOUNT, I/O BOARD IN POSITION B WITH 8 125VDC INPUTS, 13 STANDARD FORM A OUTPUTS, 2 STANDARD FORM C OUTPUTS, I/O BOARD IN POSITION C WITH 24 125VDC INPUTS AND 8 FORM A OUTPUTS.
TS1-87T1P TS2-87T1P TS3-87T1P TS7-87T1P TS8-87T1P TS9-87T1P	2	ABB	FR64 673 673 673	TEST SWITCH, FT15R, 3RU, ANSI 70, CLEAR COVER A: 10 CURRENTS B: 10 CURRENTS C: 15 CURRENTS
TS4-87T1P TS5-87T1P TS6-87T1P	1	ABB	FR64 631 636 636	TEST SWITCH, FT15R, 3RU, ANSI 70, CLEAR COVER A: 10 POTENTIALS B: 10 TRIPS C: 15 TRIPS
86T1P	1	ELECTROSWITCH	T80SD	MANUAL RESET LOCK-OUT RELAY (TRIP-RESET) WITH OVAL HANDLE, 8 DECKS ENGR CODE: 17C-2L22
86BF52T1	1	ELECTROSWITCH	T80TD	MANUAL RESET LOCK-OUT RELAY (TRIP-RESET) WITH OVAL HANDLE, 7 DECKS ENGR CODE: 17C-2L22
TS1-86T1P TS2-86BF52T1 TS-SPARE	1	ABB	FR64 636 636 636	TEST SWITCH, FT15R, 3RU, ANSI 70, CLEAR COVER A: 10 TRIPS B: 10 TRIPS C: 15 TRIPS
63QS-T1	1	ELECTROSWITCH	24232ACZ	CONTROL SWITCH (MAINT-NORM) WITH PISTOL GRIP, 2 DECKS, 1 BLUE AND 1 AMBER LED ENGR CODE: 01SD-2K11JL
89T1BCS	1	ELECTROMATCH	74PB202MN	CONTROL SWITCH (OPEN-CLOSE), 2 DECKS, 1 GREEN AND 1 RED LED ENGR CODE: 123S-202MMR
89T1B-43L/R	1	ELECTROSWITCH	24232B	CONTROL SWITCH (LOCAL/REMOTE) 12 O'CLOCK "LOCAL" 5 O'CLOCK "LOCAL" ENGR CODE: 10D-2L34A
	2	VENDOR	1 RU	1 RU PLATE
	1	VENDOR	3 RU	3 RU PLATE
	4	VENDOR	4 RU	4 RU PLATE

NP3
TS1-87T1P

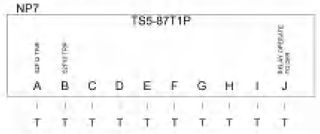
NP4
TS2-87T1P



NP5
TS3-87T1P

NP6
TS4-87T1P

NP7
TS5-87T1P



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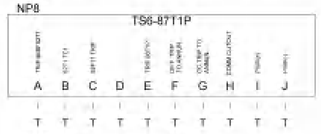
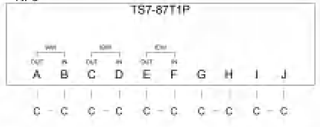
TS6-87T1P



NP9
TS7-87T1P



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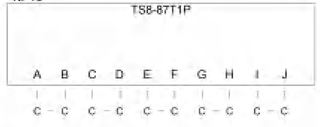
TS8-87T1P



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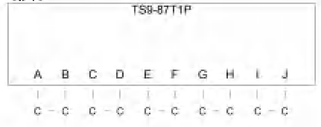
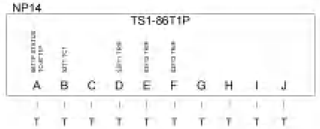
TS9-87T1P

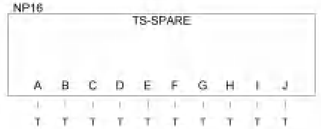


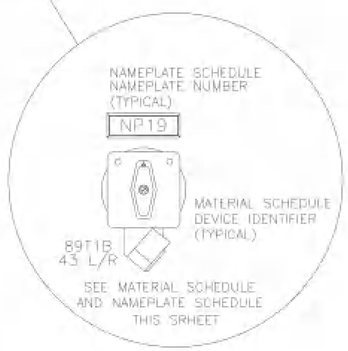
NP14
TS1-86T1P



NP15
TS2-86BF52T1

NP16
TS-SPARE





NOTES:

1. REFER TO RELAY PANEL SPECIFICATION FOR INTERNAL AND EXTERNAL FINISRH COLOR.
2. NAMEPLATES TO BE FURNISRHED FOR EACH DEVICE INTERNAL TO THE PANEL.
3. TWO PANEL NAMEPLATES SRHALL BE FURNISRHED WITH EACH PANEL, ONE MOUNTED ON THE FRONT AND ONE MOUNTED ON THE BACK.
4. PANEL SUPPLIER SRHALL VERIFY MANUFACTURER STYLE NUMBERS.
5. NAMEPLATES ARE TO BE BLACK WITH WHITE LETTERING AND ADHESIVE BACKING. TEXT SRHALL BE CENTERED ON EACH LINE.
6. TEST SWITCH NAMEPLATES SRHALL BE MOUNTED 1/4" FROM THE TOP OF THE TEST SWITCH ASSEMBLY.
7. TERMINAL & FUSE BLOCKS SRHALL BE PROVIDED AS NECESSARY AND ACCESSIBLY MOUNTED.

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	08/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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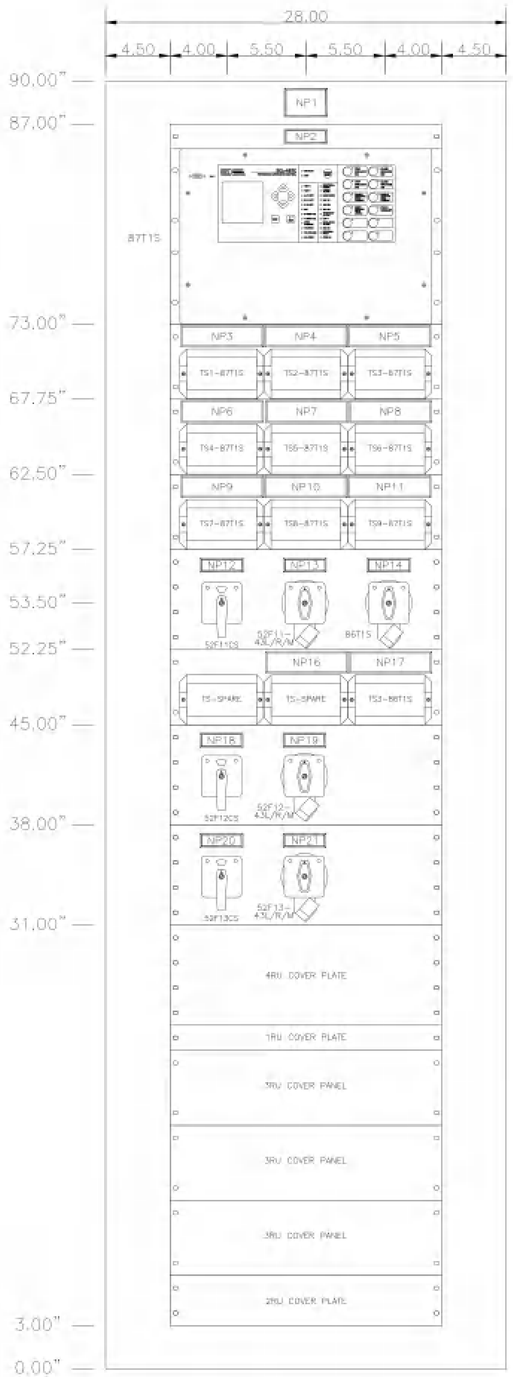
SCALE	NTS
DATE	03/17/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.3 LAYOUT

LOCATION: 8957 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1103
JOB NUMBER	24144-01
DRAWING NUMBER	1103



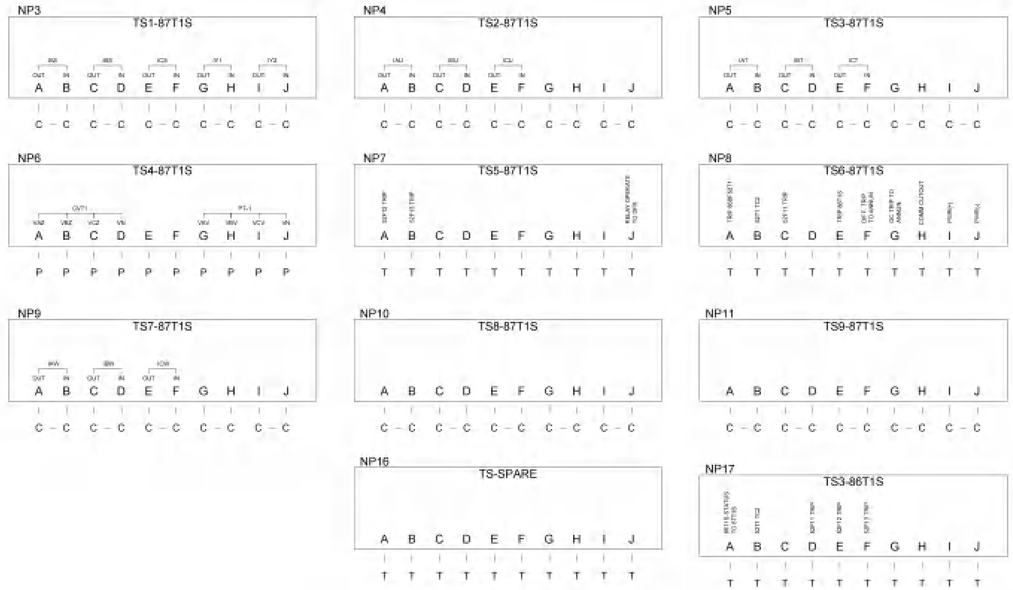
RELAY PANEL NO.4
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

NP NO.	NP SIZE	QTY.	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 3)	2	PANEL 4	1/2"	TRANSFORMER T1	1/4"	SECONDAY PROTECTION	1/4"
NP2	2.5" X 0.75"	1	87T1S	5/32"	SECONDARY	5/32"	TRANSFORMER T1 RELAYING	5/32"
NP3	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP4	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP5	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP6	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP7	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP8	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP10	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP11	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP12	2.5" X 0.75"	1	52F11CS	5/32"	TRIP/CLOSE	5/32"		
NP13	2.5" X 0.75"	1	52F11-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		
NP14	2.5" X 0.75"	1	86T1S	5/32"	LOCK-OUT RELAY	5/32"		
NP15	NOT USED							
NP16	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP17	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP18	2.5" X 0.75"	1	52F12CS	5/32"	TRIP/CLOSE	5/32"		
NP19	2.5" X 0.75"	1	52F12-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		
NP20	2.5" X 0.75"	1	52F13CS	5/32"	TRIP/CLOSE	5/32"		
NP21	2.5" X 0.75"	1	52F13-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		

MATERIAL SCHEDULE

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 32" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	N/A		1" X 1/4" X 22" COPPER BAR WITH 10-32 HOLES DRILLED AND TAPPED AT 2" CENTERS (10) HOLES MAG. WASHER HEAD SCREWS INCLUDED IN EACH HOLE.
TB	LOT	GE	EB25B12	12 POINT TERMINAL BLOCK.
TB	LOT	GE	EB27B0MS	4 POINT SHORTING TERMINAL BLOCK
4FU5 4FU6	2	MERSEN FERRAZ SHAWMUT	USCC2	2P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE.
4FU1 4FU2 4FU3 4FU4	4	MERSEN FERRAZ SHAWMUT	USCC3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 3 POLE.
	12	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING.
	4	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING.
87T1S	1	SEL	0487E3061120EBBB4B1F24444X	SEL-487E, TRANSFORMER PROTECTION RELAY. SEL-487E TRANSFORMER PROTECTION RELAY, STANDARD FIRMWARE, SCREW TERMINAL BLOCK, 125/250VDC POWER SUPPLY, 5A PHASE AND 5A NEUTRAL CURRENT INPUTS, FTP, TELNET, DNP3 LAN/WAN, PRP ETHERNET PROTOCOLS, TWO 10/100BASE-T ETHERNET PORTS, 125VDC MAIN BOARD INPUT VOLTAGE, 7 UNIT HORIZONTAL RACK MOUNT, I/O BOARD IN POSITION B WITH 8 125VDC INPUTS, 16 STANDARD FORM A OUTPUTS, 2 STANDARD FORM C OUTPUTS, I/O BOARD IN POSITION C WITH 24 125VDC INPUTS AND 8 FORM A OUTPUTS.
TS1-87T1S TS2-87T1S TS3-87T1S TS7-87T1S TS8-87T1S TS9-87T1S	2	ABB	FRXH 673 073 873	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 10 CURRENTS B: 10 CURRENTS C: 10 CURRENTS
TS4-87T1S TS5-87T1S TS6-87T1S	1	ABB	FRXH 601 036 836	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 10 POTENTIALS B: 10 TRIPS. C: 10 TRIPS.
86T1S	1	ELECTROSWITCH	7806D	MANUAL RESET LOCK-OUT RELAY (TRIP-RESET) WITH OVAL HANDLE, 5 DECKS ENGR CODE: 17C-2L22
TS-SPARE TS-SPARE TS3-86T1S	1	ABB	FRXH 600 036 836	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: BLANK B: 10 TRIPS. C: 10 TRIPS.
52F11CS 52F12CS 52F13CS	3	ELECTROSWITCH	74PB202NN	CONTROL SWITCH (OPEN-CLOSE), 2 DECKS, 1 GREEN AND 1 RED LED ENGR CODE: 12-99-202/AW
52F11-43L/R/M 52F12-43L/R/M 52F13-43L/R/M	3	ELECTROSWITCH	24204WAS	CONTROL SWITCH (MAINT/LOCAL/REMOTE) 11 O'CLOCK "MAINT" 12 O'CLOCK "LOCAL" 1 O'CLOCK "NORM"
	1	VENDOR	1 RU	1 RU PLATE
	2	VENDOR	2 RU	2 RU PLATE
	4	VENDOR	3 RU	3 RU PLATE



REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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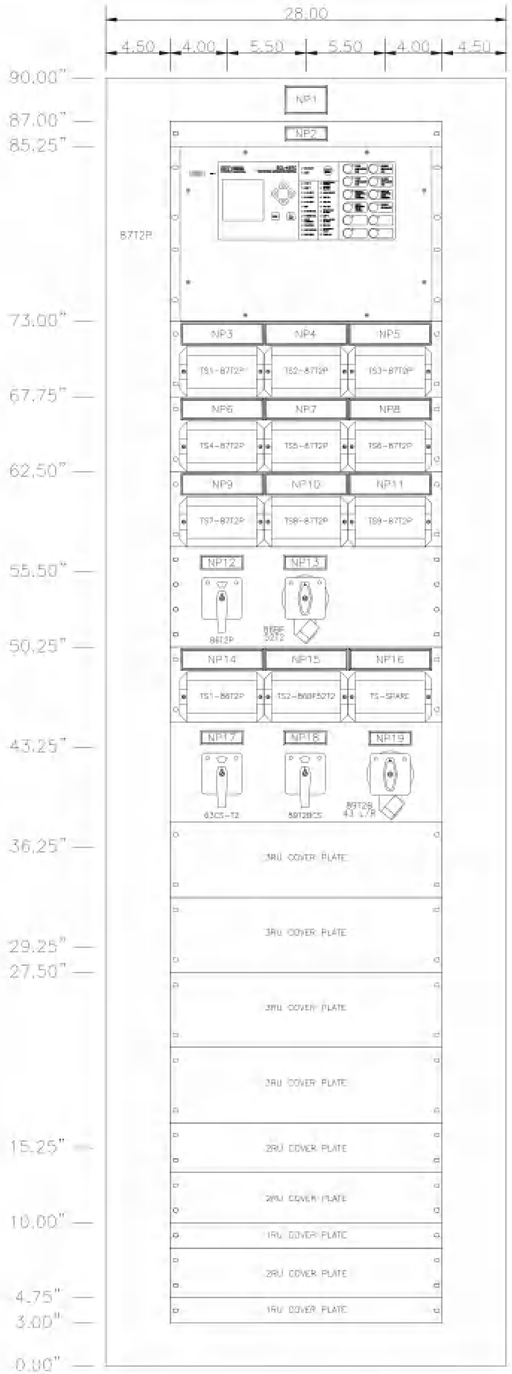
SCALE: NTS
DATE: 03/17/25
DRAWN: KWN
CHECKED: MC
APPROVED: SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.4 LAYOUT

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1104
JOB NUMBER: 24144-01
DRAWING NUMBER: 1104



RELAY PANEL NO.5
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

NP NO.	NP SIZE	QTY.	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 3)	2	PANEL 5	1/2"	TRANSFORMER T2	1/4"	PRIMARY PROTECTION TRANSFORMER T2 RELAYING	1/4"
NP2	2.5" X 0.75"	1	87T2P	5/32"	PRIMARY	5/32"		5/32"
NP3	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP4	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP5	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP6	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP7	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP8	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP9	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP10	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP11	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP12	2.5" X 0.75"	1	86T2P	5/32"	LOCK-OUT RELAY	5/32"		
NP13	2.5" X 0.75"	1	86BF52T2	5/32"	LOCK-OUT RELAY	5/32"		
NP14	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP15	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP16	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP17	2.5" X 0.75"	1	63C5-T2	5/32"	FAULT PRESSURE RELAY	5/32"	CUTOFF SWITCH	5/32"
NP18	2.5" X 0.75"	1	86T2BCS	5/32"	OPEN/CLOSE	5/32"		
NP19	2.5" X 0.75"	1	86T2B-43L/R	5/32"	LOCAL/REMOTE	5/32"		

MATERIAL SCHEDULE

DEVICE(S)	QTY.	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 32" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	N/A		1" X 1/4" X 22" COPPER BAR WITH 19-32 HOLES DRILLED AND TAPPED AT 2" CENTERS (10) HOLES MAY, WASHER HEAD SCREWS INCLUDED IN EACH HOLE
TB	LOT	GE	EB23B12	12 POINT TERMINAL BLOCK
TB	LOT	GE	EB2703045	4 POINT SHORTING TERMINAL BLOCK
SFU5 SFU6	2	MERSEN FERRAZ SHAWMUT	USOC2	2P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE.
SFU1 SFU2 SFU3 SFU4	4	MERSEN FERRAZ SHAWMUT	USOC3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 3 POLE.
	12	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING.
	4	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING.
87T2P	1	SEL	0487E2001130X0904H7044A0	SEL-487E, TRANSFORMER PROTECTION RELAY. SEL-487E TRANSFORMER PROTECTION RELAY, STANDARD FIRMWARE, SCREW TERMINAL BLOCK, 125/250VDC POWER SUPPLY, 5A PHASE AND 5A NEUTRAL CURRENT INPUTS, FTP, TELNET, DNP3 LAN/WAN, PRP ETHERNET PROTOCOLS, TWO 10/100BASE-T ETHERNET PORTS, 125VDC MAIN BOARD INPUT VOLTAGE, 7 UNIT HORIZONTAL RACK MOUNT, I/O BOARD IN POSITION B WITH 8 125VDC INPUTS, 13 STANDARD FORM A OUTPUTS, 2 STANDARD FORM C OUTPUTS, I/O BOARD IN POSITION C WITH 24 125VDC INPUTS AND 8 FORM A OUTPUTS.
TS1-87T2P TS2-87T2P TS3-87T2P TS7-87T2P TS8-87T2P TS9-87T2P	2	ABB	FR6H 073 073 073	TEST SWITCH, FT16R, 3RU, ANSI 70, CLEAR COVER A: 10 CURRENTS B: 10 CURRENTS C: 10 CURRENTS
TS4-87T2P TS5-87T2P TS6-87T2P	1	ABB	FR6H 061 036 036	TEST SWITCH, FT16R, 3RU, ANSI 70, CLEAR COVER A: 10 POTENTIALS B: 10 TRIPS C: 10 TRIPS
86T2P	2	ELECTROSWITCH	78D5D	MANUAL RESET LOCK-OUT RELAY (TRIP RESET) WITH OVAL HANDLE, 5 DECKS ENGR CODE: 17C-2L22
86BF52T2	1	ELECTROSWITCH	78DTD	MANUAL RESET LOCK-OUT RELAY (TRIP RESET) WITH OVAL HANDLE, 7 DECKS ENGR CODE: 17C-2L22
TS1-86T2P TS2-86BF52T2 TS-SPARE	1	ABB	FR6H 036 036 036	TEST SWITCH, FT16R, 3RU, ANSI 70, CLEAR COVER A: 10 TRIPS B: 10 TRIPS C: 10 TRIPS
63C5-T2	1	ELECTROSWITCH	24202ACZ	CONTROL SWITCH (MAINT-NORM) WITH PISTOL GRIP, 2 DECKS, 1 BLUE AND 1 AMBER LED ENGR CODE: 51GD-2W1-LL
86T2BCS	1	ELECTROSWITCH	74PB2S2NN	CONTROL SWITCH (OPEN-CLOSE), 2 DECKS, 1 GREEN AND 1 RED LED ENGR CODE: 123B-2G2SMW
86T2B-43L/R	1	ELECTROSWITCH	2422G5	CONTROL SWITCH (LOCAL/REMOTE) 12 O'CLOCK "LOCAL" 3 O'CLOCK "LOCAL" ENGR CODE: 13D-2L24A
	2	VENDOR	1 RU	1 RU PLATE
	3	VENDOR	2 RU	2 RU PLATE
	4	VENDOR	3 RU	3 RU PLATE

NP3 — TS1-87T2P

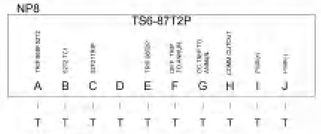
NP4 — TS2-87T2P

NP5 — TS3-87T2P

NP8 — TS4-87T2P

NP7 — TS5-87T2P

NP8 — TS6-87T2P



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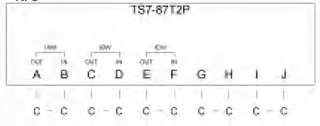

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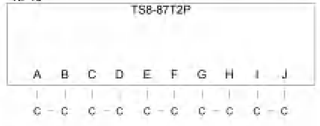
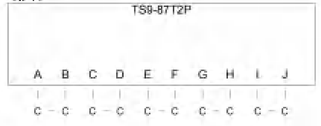
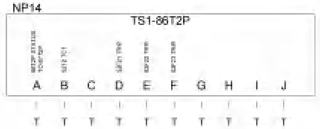


NP11 — TS9-87T2P

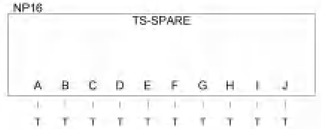


NP14 — TS1-86T2P



NP15 — TS2-86BF52T2

NP16 — TS-SPARE



NOTES:

1. REFER TO RELAY PANEL SPECIFICATION FOR INTERNAL AND EXTERNAL FINISRH COLOR.
2. NAMEPLATES TO BE FURNISRHED FOR EACH DEVICE INTERNAL TO THE PANEL.
3. TWO PANEL NAMEPLATES SRHALL BE FURNISRHED WITH EACH PANEL, ONE MOUNTED ON THE FRONT AND ONE MOUNTED ON THE BACK.
4. PANEL SUPPLIER SRHALL VERIFY MANUFACTURER STYLE NUMBERS.
5. NAMEPLATES ARE TO BE BLACK WITH WHITE LETTERING AND ADHESIVE BACKING. TEXT SRHALL BE CENTERED ON EACH LINE.
6. TEST SWITCH NAMEPLATES SRHALL BE MOUNTED 1/4" FROM THE TOP OF THE TEST SWITCH ASSEMBLY.
7. TERMINAL & FUSE BLOCKS SRHALL BE PROVIDED AS NECESSARY AND ACCESSIBLY MOUNTED.

REV.	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	ETS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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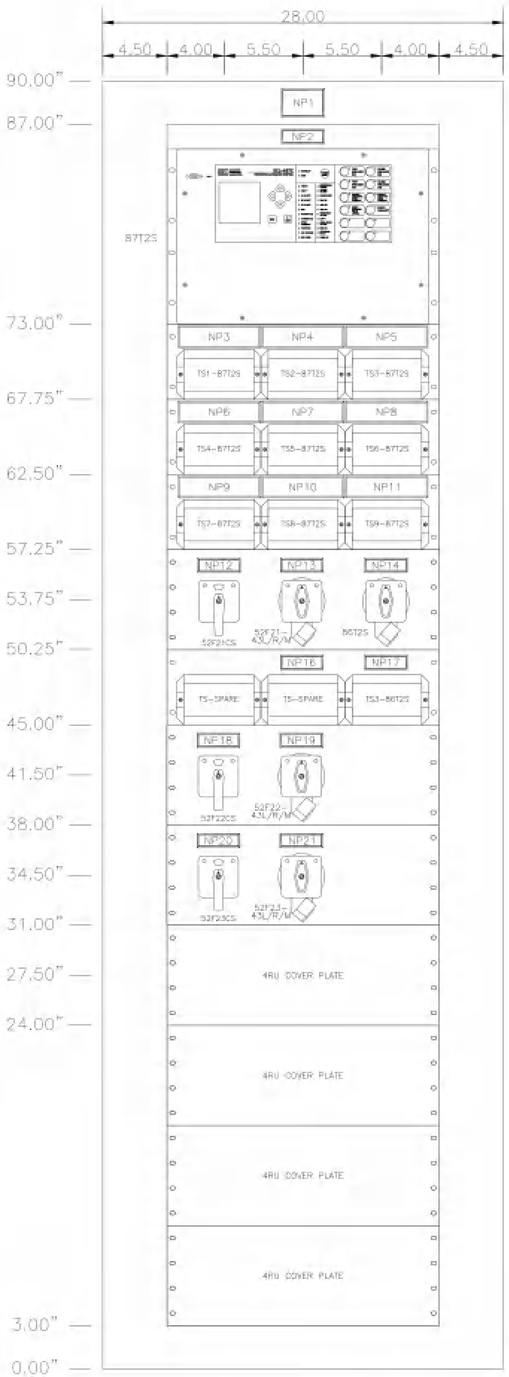
SCALE	NTS
DATE	03/17/25
DRAWN	KWN
CHECKED	MC
APPROVED	SHR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.5 LAYOUT

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1105
JOB NUMBER	24144-01
DRAWING NUMBER	1105



RELAY PANEL NO.6
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

NP NO	NP SIZE	QTY.	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 3)	2	PANEL 6	1/2"	TRANSFORMER T2	1/4"	PROTECTION	1/4"
NP2	2.5" X 0.75"	1	87T2S	5/32"	SECONDARY	5/32"	TRANSFORMER T2 RELAYING	5/32"
NP3	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP4	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP5	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP6	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP7	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP8	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP9	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP10	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP11	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP12	2.5" X 0.75"	1	52F21CS	5/32"	TRIP/CLOSE	5/32"		
NP13	2.5" X 0.75"	1	52F21-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		
NP14	2.5" X 0.75"	1	86T2S	5/32"	LOCK-OUT RELAY	5/32"		
NP15	NOT USED							
NP16	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP17	6" X 1.25"	1	SEE TAG BELOW	1/8"				
NP18	2.5" X 0.75"	1	52F22CS	5/32"	TRIP/CLOSE	5/32"		
NP19	2.5" X 0.75"	1	52F22-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		
NP20	2.5" X 0.75"	1	52F23CS	5/32"	TRIP/CLOSE	5/32"		
NP21	2.5" X 0.75"	1	52F23-43L/R/M	5/32"	LOCAL/REMOTE/MAINT	5/32"		

MATERIAL SCHEDULE

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 32" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	N/A		1" X 1/4" X 22" COPPER BAR WITH 10-32 HOLES DRILLED AND TAPPED AT 2" CENTERS 1/2 HOLES (MIN), WASHER HEAD SCREWS INCLUDED IN EACH HOLE
TB	LOT	GE	EB2SH12	12 POINT TERMINAL BLOCK
TB	LOT	GE	EB2TB4S	4 POINT SHORTING TERMINAL BLOCK
6FU5 6FU6	2	MERSEN FERRAZ SHAWMUT	USCC2	2P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE.
6FU1 6FU2 6FU3 6FU4	4	MERSEN FERRAZ SHAWMUT	USCC3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 3 POLE.
	12	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING.
	4	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING.
87T2S	1	SEL	0487E3X511X0X8X0H1724444	SEL-487E, TRANSFORMER PROTECTION RELAY. SEL-487E TRANSFORMER PROTECTION RELAY, STANDARD FIRMWARE, 5C/5I3V TERMINAL BLOCK, 125/250VDC POWER SUPPLY, 5A PHASE AND 5A NEUTRAL CURRENT INPUTS, FTP, TELNET, DNP3 LAN/WAN, PRP ETHERNET PROTOCOLS, TWO 10/100BASE-T ETHERNET PORTS, 125VDC MAIN BOARD INPUT VOLTAGE, 7 UNIT HORIZONTAL RACK MOUNT, I/O BOARD IN POSITION B WITH 8 125VDC INPUTS, 13 STANDARD FORM A OUTPUTS, 2 STANDARD FORM C OUTPUTS, I/O BOARD IN POSITION C WITH 24 125VDC INPUTS AND 8 FORM A OUTPUTS.
TS1-87T2S TS2-87T2S TS3-87T2S TS7-87T2S TS8-87T2S TS9-87T2S	2	ABB	FR6H 073 873 073	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 10 CURRENTS B: 10 CURRENTS C: 10 CURRENTS
TS4-87T2S TS5-87T2S TS6-87T2S	1	ABB	FR6H 001 835 036	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: 10 POTENTIALS B: 10 TRIPS C: 10 TRIPS
86T2S	1	ELECTROSWITCH	7685D	MANUAL RESET LOCK-OUT RELAY (TRIP-RESET) WITH OVAL HANDLE, 5 DECKS ENGR CODE: 12C-2L22
TS-SPARE TS-SPARE TS3-86T2S	1	ABB	FR6H 000 835 036	TEST SWITCH, FT19R, 3RU, ANSI 70, CLEAR COVER A: BLANK B: 10 TRIPS C: 10 TRIPS
52F21CS 52F22CS 52F23CS	3	ELECTROSWITCH	74PB202NN	CONTROL SWITCH (OPEN-CLOSE), 2 DECKS, 1 GREEN AND 1 RED LED ENGR CODE: 12SB-2D25MW
52F21-43L/R/M 52F22-43L/R/M 52F23-43L/R/M	3	ELECTROSWITCH	24D04AAS	CONTROL SWITCH (MAINT/LOCAL/REMOTE) 11 O'CLOCK "MAINT" 12 O'CLOCK "LOCAL" 1 O'CLOCK "NORM"
	4	VENDOR	4 RU	4 RU PLATE

NP3
TS1-87T2S

IA2	IB2	IC2	IV1	IV2
OUT IN	OUT IN	OUT IN	OUT IN	OUT IN
A B C D E F G H I J				
C – C C – C C – C C – C C – C				

NP4
TS2-87T2S

IAT	IBT	ICT
OUT IN	OUT IN	OUT IN
A B C D E F G H I J		
C – C C – C C – C C – C C – C		

NP5
TS3-87T2S

IAU	IBU	ICU
OUT IN	OUT IN	OUT IN
A B C D E F G H I J		
C – C C – C C – C C – C C – C		

NP6
TS4-87T2S

87V1						PT3				
VAZ	VBZ	VCZ	VN			VAV	VBV	VCV	VN	
A B C D E F G H I J										
P P P P P P P P P P										

NP7
TS5-87T2S

52F21 TRIP	52F23 TRIP								RELAY OPERATE TO SPR
A B C D E F G H I J									
T T T T T T T T T T									

NP8
TS6-87T2S

TRIP 86BF BKTZ	52F21 TCC	52F21 TRIP	TRIP MOTOR	DIFF. TRIP TO CHANNA	DC TRIP TO ANNUN	COMM CUTOUT	PSWR1	PSWR2
A B C D E F G H I J								
T T T T T T T T T T								

NP9
TS7-87T2S

IAV	IBV	ICV
OUT IN	OUT IN	OUT IN
A B C D E F G H I J		
C – C C – C C – C C – C C – C		

NP10
TS8-87T2S

A B C D E F G H I J
C – C C – C C – C C – C C – C

NP11
TS9-87T2S

A B C D E F G H I J
C – C C – C C – C C – C C – C

NP16
TS-SPARE

A B C D E F G H I J
T T T T T T T T T T

NP17
TS3-86T2S

86T2S STATUS TO 87T2S	52F21 TCC		52F21 TRIP	52F23 TRIP	52F23 TRIP
A B C D E F G H I J					
T T T T T T T T T T					

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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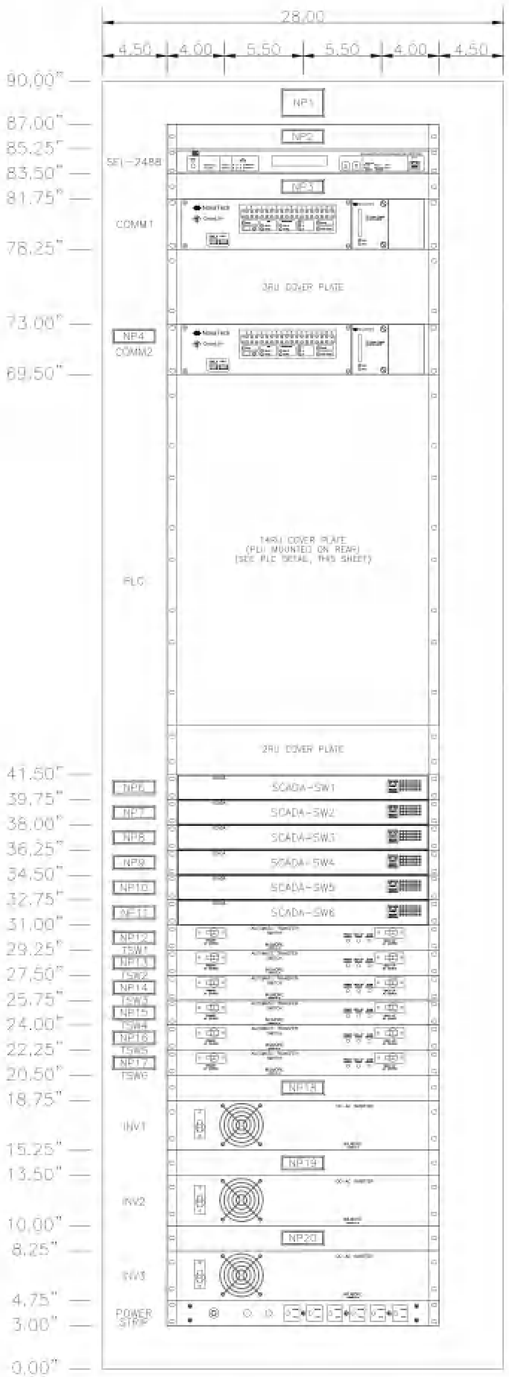
SCALE	NTS
DATE	03/17/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.6 LAYOUT

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

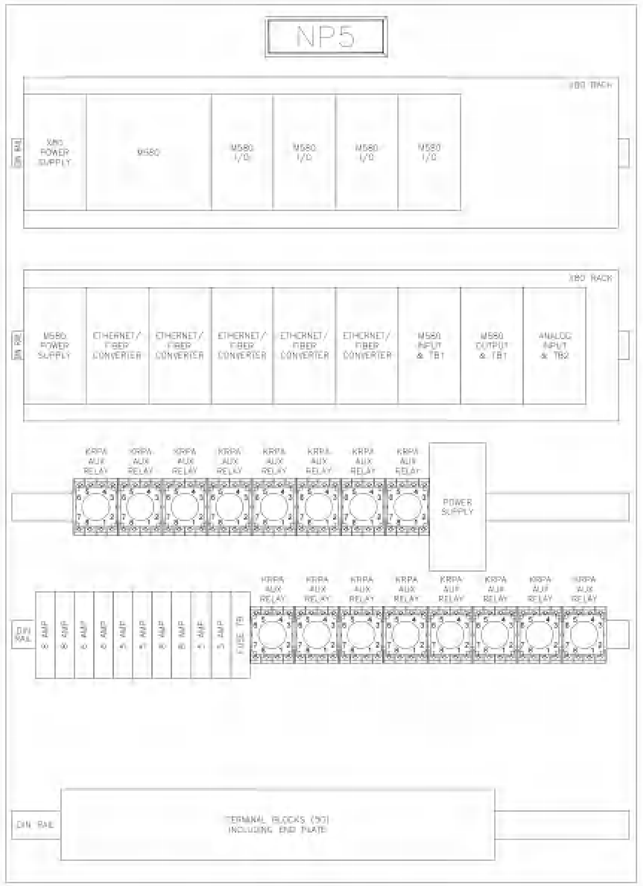
FILE NAME	24144-03-1106
JOB NUMBER	24144-01
DRAWING NUMBER	1106



RELAY PANEL NO.7
VIEWED FROM FRONT

NAMEPLATE SCHEDULE

NP NO	NP SIZE	QTY	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3"-0" x (NOTE 2)	2	PANEL 1	1.0"	CUBICLE PVC	1.0"		
NP2	2.5" x 8.75"	1	CLOCK	0.50"	GPS CLOCK	0.50"		
NP3	2.5" x 8.75"	1	COMM1	0.50"	ORION LX+	0.50"		
NP4	2.5" x 8.75"	1	COMM2	0.50"	ORION LX+	0.50"		
NP5	2.5" x 8.75"	1	PLC	0.50"		0.50"		
NP6	2.5" x 8.75"	1	SCADA-SW1	0.50"		0.50"		
NP7	2.5" x 8.75"	1	SCADA-SW2	0.50"		0.50"		
NP8	2.5" x 8.75"	1	SCADA-SW3	0.50"		0.50"		
NP9	2.5" x 8.75"	1	SCADA-SW4	0.50"		0.50"		
NP10	2.5" x 8.75"	1	SCADA-SW5	0.50"		0.50"		
NP11	2.5" x 8.75"	1	SCADA-SW6	0.50"		0.50"		
NP12	2.5" x 8.75"	1	TSW1	0.50"	AUTOMATIC TRANSFER	0.50"	SWITCH	0.50"
NP13	2.5" x 8.75"	1	TSW2	0.50"	AUTOMATIC TRANSFER	0.50"	SWITCH	0.50"
NP14	2.5" x 8.75"	1	TSW3	0.50"	AUTOMATIC TRANSFER	0.50"	SWITCH	0.50"
NP15	2.5" x 8.75"	1	TSW4	0.50"	AUTOMATIC TRANSFER	0.50"	SWITCH	0.50"
NP16	2.5" x 8.75"	1	TSW5	0.50"	AUTOMATIC TRANSFER	0.50"	SWITCH	0.50"
NP17	2.5" x 8.75"	1	TSW6	0.50"	AUTOMATIC TRANSFER	0.50"	SWITCH	0.50"
NP18	2.5" x 8.75"	1	INV1	0.50"	DC-AC INVERTER	0.50"		
NP19	2.5" x 8.75"	1	INV2	0.50"	DC-AC INVERTER	0.50"		
NP20	2.5" x 8.75"	1	INV3	0.50"	DC-AC INVERTER	0.50"		



PLC DETAIL
SEE LOAD CONTROL PANEL NOTES
(NOT TO SCALE)

MATERIAL SCHEDULE

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 28" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
	13	SEL	C273A	SEL COMMUNICATION CABLE - LENGTH AS REQUIRED
	13	BEL	C893	COAXIAL CABLE FOR RRG-8 - LENGTH AS REQUIRED (MALE TO MALE)
	10	SEL	C892	COAXIAL CABLE FOR RRG-58 - LENGTH AS REQUIRED (MALE TO FERRULE)
	8	BEL DEN	9182A	TWISTED PAIR SHIELD CABLE - LENGTH AS REQUIRED
	63	SEL	C627	ETHERNET CABLE - LENGTH AS REQUIRED
POWER STRIP	1	ANIXTER	3337/39	AC POWER STRIP, 120VAC, 15AMP
	9	MERSEN FERRAZ SHAWMUT	USCC2	2P FUSE BLOCK, UL/IEC 69AB MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE.
	4	MERSEN FERRAZ SHAWMUT	ATMR6	FUSE, CLASS CC, 6 AMP, FAST ACTING
	4	MERSEN FERRAZ SHAWMUT	ATMR30	FUSE, CLASS CC, 30 AMP, FAST ACTING
	6	MERSEN FERRAZ SHAWMUT	ATMR30	FUSE, CLASS CC, 30 AMP, FAST ACTING
TB	18	GENERAL ELECTRIC	EB-25	TERMINAL BLOCKS, TYPE EB-25, TWELVE POINT MODEL.
GROUND BAR	1	VENDOR	GROUND BAR	GROUND BAR, 1/4"X1" COPPER GROUND BAR, DRILLED AND TAPPED FOR 10-32, S.H.E. AT 1" MTG. CENTERS, MOUNTED ON REAR
	3	COMMSCOPE	CEMM63%	RECEPTACLE, 125VAC, 60HZ, 15/20A, TYPE 5-15R
COMM1 COMM2	2	NOVATECH	OrionLX+-A8-B2-D5-HVXX-04-S7-14-S7-47-49-51-53-84-97-99-S MEE39	ORION LX +
SEL-2488	1	SEL	2488RAK1181AX2SA	GPS CLOCK WITH COMPLETE ANTENNA INSTALLATION KIT - GPS/GLONASS ANTENNA (SEL-163482), 50FT LMR-400 CABLE (SEL-C287-50), GAS TUBE COAXIAL SURGE PROTECTOR, MOUNTING KIT (915801291), 25FT LMR 400 CABLE (SEL-C951-025), AND ANTENNA PIPE MOUNTING KIT (915802042)
SCADA-SW1 SCADA-SW2 SCADA-SW3 SCADA-SW4 SCADA-SW5 SCADA-SW6	6	HIRSCHMANN	GRS1 142-8T6ZSHH2Y9HHSDAB9XX.XXX	FD/ETHERNET SWITCH
	96	HIRSCHMANN	SFP FAST SM LC	SFP PORTS
	12	HIRSCHMANN	GRM0X.ZZZZZZZX.9HHS	8 SFP MODULE
	6	HIRSCHMANN	GPS1.X3Y9HH	DIN RAIL POWER SUPPLY UNIT
TSW1 TSW2 TSW3 TSW4 TSW5 TSW6 INV1 INV2 INV3	9	WILMORE	1741-ATS	AUTOMATIC TRANSFER SWITCH
	3	WILMORE	1747-130-115-60	DC-AC INVERTER
MM FIBER	10	FIBER	SELC9662000CSXE	2ST-SC 62.5/125um MULTIMODE DUPLEX ZIPCORD JUMPER CABLE, LENGTH AS REQUIRED. FOR CONNECTING FIELD EQUIPMENT TO ORION LX+ (COMM1)
	5	BEL	240-1400	BNC TEE, FEMALE, FEMALE, FEMALE
	13	BEL	240-1700	BNC TEE, FEMALE, MALE, FEMALE
	13	SEL	240-1600	BNC TERMINATOR, 50 OHM
SM FIBER	13	FIBER	SELC9897000CSXE	2ST-SC 9um SINGLE-MODE FIBER JUMPER CABLE, LENGTH AS REQUIRED
SM FIBER	19	FIBER	C9N2ZSCCJCXXHH	SC-LC 9um SINGLE-MODE FIBER JUMPER CABLE, LENGTH AS REQUIRED FOR CONNECTING SCADA SWITCHES TO ITEMs
	19	LEGRAND	VS 19M LC SC 09 DPX PVC	SC-LC FIBER JUMPER, 09 METERS
TRANCEIVER	2	SEL	SEL-2812MRX6	MULTIMODE FIBER/OPTIC TRANSCEIVER, EIA-232 MALE DB-9, RS-6 RECEIVER FOR S3-T1 AND S3-T2 SEL-2533 ANNUNCIATORS MOUNTED IN BREAKER CONTROL CABINETS
	13	VENDOR	1 RU	1 RU PLATE
	1	VENDOR	2 RU	2 RU PLATE
	1	VENDOR	3 RU	3 RU PLATE
	1	VENDOR	14 RU	14 RU PLATE

PLC MATERIAL

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
	4	SCHNEIDER ELECTRIC	BMX NRP 0201	ETHERNET/MODBUS COMMUNITION
	4	BUSSMANN	GMC-6	GLASS FUSES, 6 AMP
	2	BUSSMANN	GMC-8	GLASS FUSES, 8 AMP
	6	BUSSMANN	GMC-9	GLASS FUSES, 9 AMP
	1	MODICON	BMX CPS 3540	M580 POWER SUPPLY MODULE - 35W
	1	MODICON	BMX DDI 1602	M580 DISCRETE INPUT MODULE
	1	MODICON	BMX DDO 1602	M580 DISCRETE OUTPUT MODULE
	1	MODICON	BMX AMI 0800	ANALOG INPUT
	1	PHOENIX	2904572	POWER SUPPLY, 120/240 VAC INPUT, 24VDC OUTPUT
	1	MODICON	BMX XTB 2830	SCREW-TYPE TERMINAL BLOCKS (28 STD PO INTS)
	3	MODICON	BMX XTB 2810	REMOVEABLE TERMINAL BLOCK 20 STD POINTS
	1	MODICON	BME P58 4040	M580 ISAHT-CAPABLE PROCESSOR MODULE
	1	SCHNEIDER ELECTRIC	BMXRMS04020PF	M580 SC CARD 4GB (INSTALLED ON CPU CARD)
	2	MODICON	BMX XBP 0800	XBO RACK
	50	PHOENIX	3044071	TERMINAL BLOCKS INCLUDING END PLATE
	11	PHOENIX	3004130	FUSE 3B W/DISC LEVER
	16	POTTER & BRUMFIELD	KRPA-11D0-24	KRPA AUX RELAY
	16	POTTER & BRUMFIELD	27S881	SCREW TERMINAL SOCKET, 12BID WITH KRPA AUX RELAY
	LOT	VENDOR	DIN	DIN RAIL
	LOT	PANDUIT	TM15A-C	PANDUIT CABLE TIE MOUNT, SCREW/RIVET MOUNTED
	1	SCHNEIDER ELECTRIC	BMX CPS 4002	XBO AC REDUNDANT POWER SUPPLY MODULE, 45W
	4	SCHNEIDER ELECTRIC	BME NOC 0301	M580 IO SCANNER MODULE, ETHERNET/IP & MODBUS TCP, 3 PORTS
	1	SCHNEIDER ELECTRIC	BME CRA 31210	EIO DROP ADAPTER, MODICON X80, WITH ETHERNET BACKPLANE

LOAD CONTROL PANEL NOTES:

1. ALL WIRING SHALL BE HIGH STRAND TINNED CU NO. 18 AWG SIS INSULATED WIRE.
2. TERMINATE ALL WIRES USING APPROPRIATE THOMAS & BETTS FERRULES THOMAS & BETTER PART NO. FZ023 OR EQUIVALENT.
3. ALL SCREW OR STUD TERMINATIONS SHALL BE MADE USING THOMAS & BETTER RING LUG TERMINALS.
4. MAINTAIN 1" CLEAR VERTICAL AREA ALONG RIGHT AND LEFT EDGES.

NOTES:

1. REFER TO RELAY PANEL SPECIFICATION FOR INTERNAL AND EXTERNAL FINISRH COLOR.
2. NAMEPLATES TO BE FURNISRHED FOR EACH DEVICE INTERNAL TO THE PANEL.
3. TWO PANEL NAMEPLATES SRHALL BE FURNISRHED WITH EACH PANEL, ONE MOUNTED ON THE FRONT AND ONE MOUNTED ON THE BACK.
4. PANEL SUPPLIER SRHALL VERIFY MANUFACTURER STYLE NUMBERS.
5. NAMEPLATES ARE TO BE BLACK WITH WHITE LETTERING AND ADHESIVE BACKING. TEXT SRHALL BE CENTERED ON EACH LINE.
6. TEST SWITCH NAMEPLATES SRHALL BE MOUNTED 1/4" FROM THE TOP OF THE TEST SWITCH ASSEMBLY.
7. TERMINAL & FUSE BLOCKS SRHALL BE PROVIDED AS NECESSARY AND ACCESSIBLY MOUNTED.

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	ETS	GDK	SRH

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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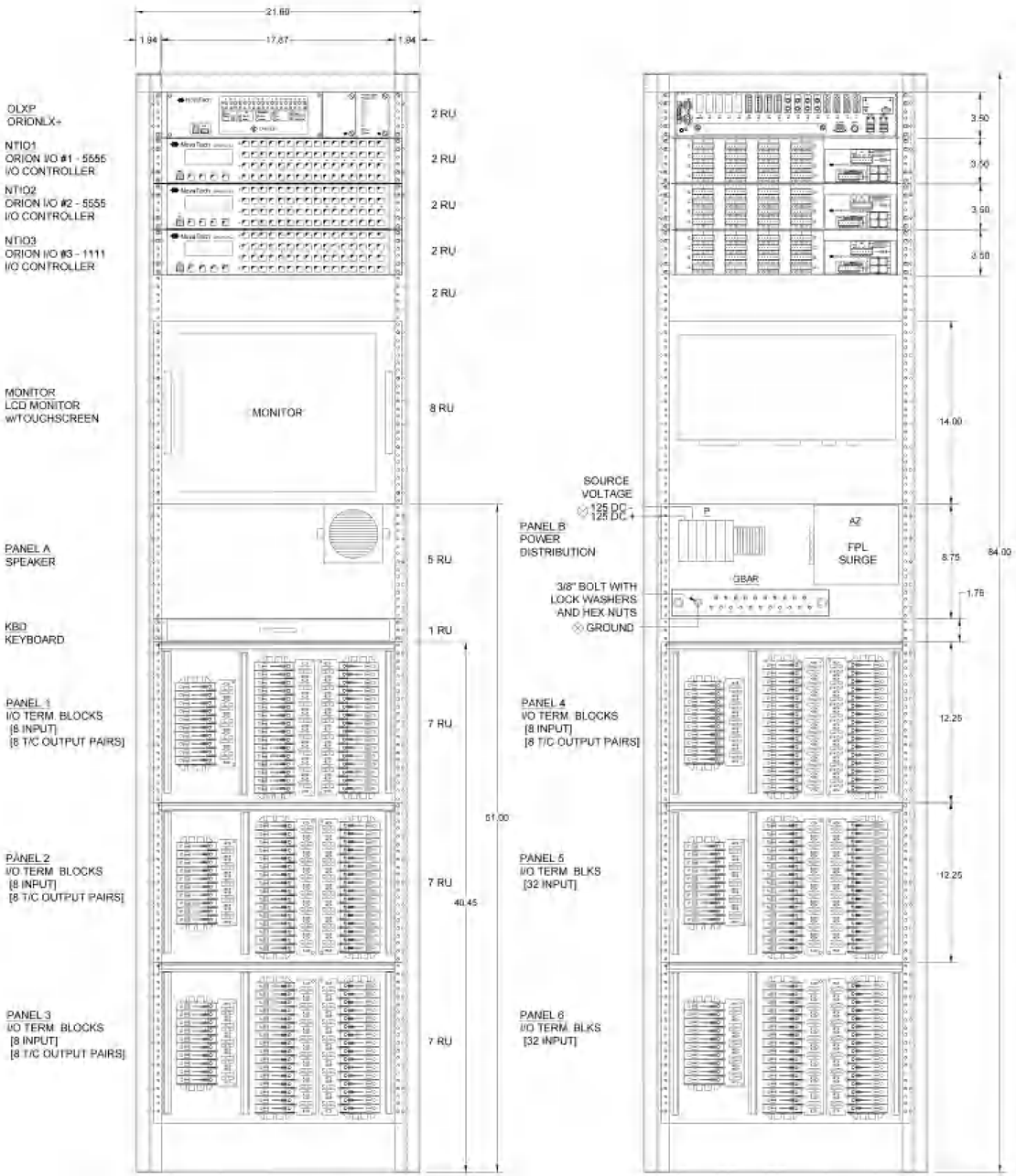
SCALE	NTS
DATE	03/17/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.7 LAYOUT

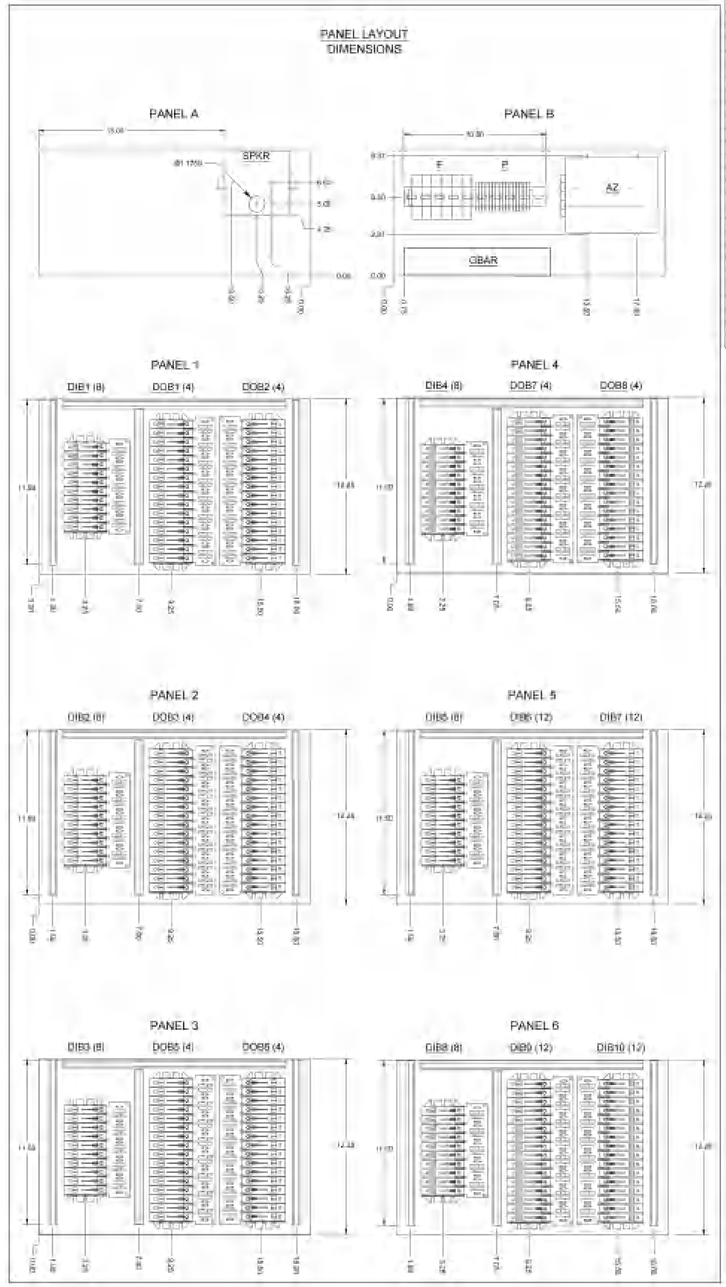
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-03-1107
JOB NUMBER	24144-01
DRAWING NUMBER	1107



RELAY PANEL NO.8
VIEWED FROM FRONT

RELAY PANEL NO.8
VIEWED FROM BACK



MATERIAL SCHEDULE

QTY	MFG.	CAT. NO.	DESCRIPTION
1	HOFFMAN		RACK, 45RU
1	SPECO TECHNOLOGIES	CBS240	CBS240 SPEAKER, 8OHMS, 10W
1	TRANSDUCTION	TR-LCD1000-RM-V2	MONITOR, TOUCHSCREEN, LCD
1	XYMPHONY	LCDK1000-mru	KEYBOARD
2	HOFFMAN	P15RP5UP	PANEL, 5RU
7	HOFFMAN	P15RP7UP	PANEL, 7RU
6	PHOENIX	3048306	FUSE BLOCK
2	BUSS	BAF-10	FUSE, FAST-ACTING, 10A
4	BUSS	BAF-5	FUSE, FAST-ACTING, 5A
14	PHOENIX	3044364	TERMINAL BLOCK, UT 4-TWIN
1	PHOENIX	3047141	END SECTION, D-URT 2,5/4-TWIN
3	PHOENIX	0800886	END STOP, E/NS 35 N
-	WEIDMULLER	0514570000	DIN RAIL, 35x8mm
8	ABBATRON	9393Q	STAND-OFF, 1"
-	WEIDMULLER	0117500000	MINI DIN RAIL, 15x5mm
1	NOVATECH	TYPE II	SURGE SUPPRESSOR
1	ELEC. PWR PROD	NOVAGB2	GROUND BAR
4	STATES	C3-210-A	TEST KNIFE SWITCH, 10-POLE, w/CLEAR COVER
8	STATES	C3-216-A	TEST KNIFE SWITCH, 16-POLE, w/CLEAR COVER
-	STATES	-	NUTS FOR TEST SWITCH
4	NOVATECH		SURGE SUPPRESSOR PCB, 10-POS
8	NOVATECH	-	SURGE SUPPRESSOR PCB, 16-POS
168	WAYTEK	31127	TERMINAL FORK, #10 BLUE
168	WAYTEK	30203	TERMINAL FORK, #10 UNINSULATED
1	NOVATECH	ORIONLX+	AUTOMATION PLATFORM
2	NOVATECH	ORION I/O - 5555	I/O CONTROLLER
1	NOVATECH	ORION I/O - 1111	I/O CONTROLLER
1	ACCURATE PRODUCTS	A12-17-400K	GROMMET, RUBBER, 3/4" INNER DIA, BLACK
1	PHOENIX	MSTB 2,5/6-ST-5,08	TERMINAL CONNECTOR, 6-POS
2	AMPHENOL	ELF50S210E	TERMINAL CONNECTOR, 8-POS
16	PANDUIT	PV18-P4T-CY	CRIMP TERMINAL, PIN, RED, 18-22GA.
4	MOUSER	FIT221J-3	HEATSHRINK TUBING, 3/8"DxI"L
1	BELDEN	9842	CABLE, #24, 2 TW-PR, SHIELDED

NOTES:
1. REFER TO RRA PANEL SPECIFICATION FOR INTERNAL (I/O) & EXTERNAL FINISH COLOR.
2. NAMEPLATES TO BE FURNISHED FOR EACH DEVICE INTERNAL TO THE PANEL.
3. TWO PANEL NAMEPLATES SHALL BE FURNISHED WITH EACH PANEL, ONE MOUNTED ON THE FRONT AND ONE MOUNTED ON THE BACK.
4. PANEL SUPPLIER SHALL VERIFY MANUFACTURER STYLE NUMBERS.
5. NAMEPLATES ARE TO BE BLACK WITH WHITE LETTERING AND ADHESIVE BACKING. TEXT SHALL BE CENTERED ON EACH LINE.
6. TEST SWITCH NAMEPLATES SHALL BE MOUNTED 1/8" FROM THE TOP OF THE TEST SWITCH ASSEMBLY.
7. TERMINAL & FUSE BLOCKS SHALL BE PROVIDED AS NECESSARY AND ACCESSIBLY MOUNTED.
8. CABLING BETWEEN PDU, I/O'S & TERMINAL BLOCKS, TO BE 12' IN LENGTH UNLESS OTHERWISE SPECIFIED.
9. ALL WIRING FROM GROUND AND I/O'S TO THE TERMINAL BLOCKS ARE ROUTED WITH WIRE TO/FROM THE BACK SIDE OF THE OPEN FRAME RACK.
10. ALL PANELS TO BE MOUNTED WITH STAINLESS STEEL INTERNAL-TOOTH LOCKWASHERS ON BOTH TOP SCREWS.

				STAMP
B	08/07/25	RRA DESIGN REVIEW	KWN	MC	GDK
A	03/17/25	90% DESIGN REVIEW	CTS	GDK	SRH
REV	DATE	DESCRIPTION	DRN	CKD	APP

RED RIVER CLEAN ENERGY

QUALUS

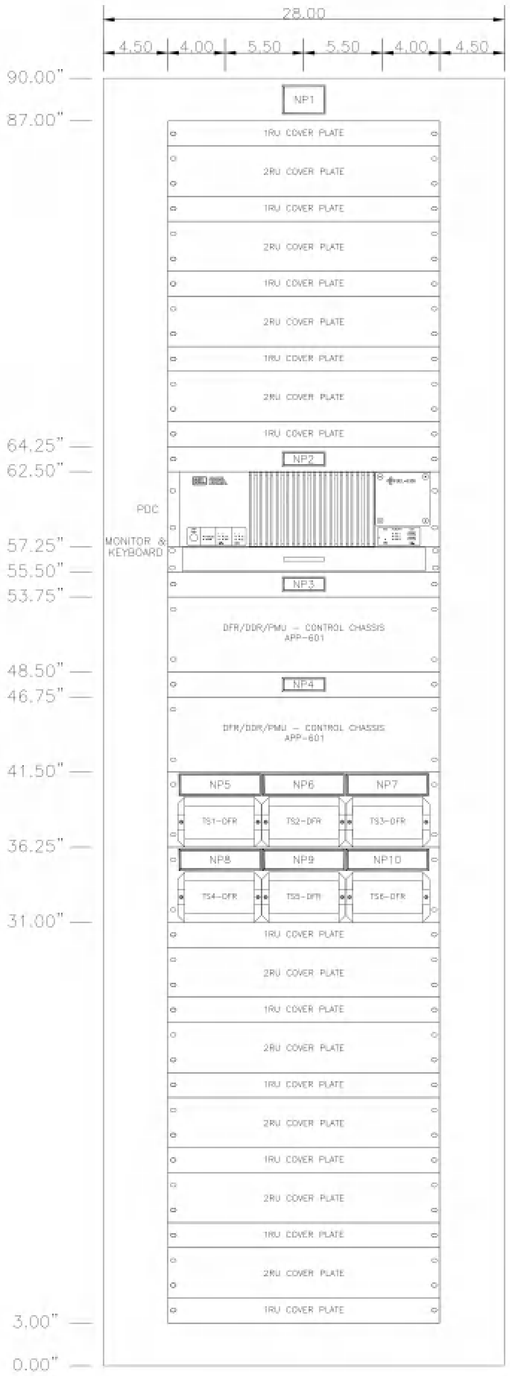
SCALE: NTS
DATE: 03/17/25
DRAWN: KWN
CHECKED: MC
APPROVED: SRH

DRAWING: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

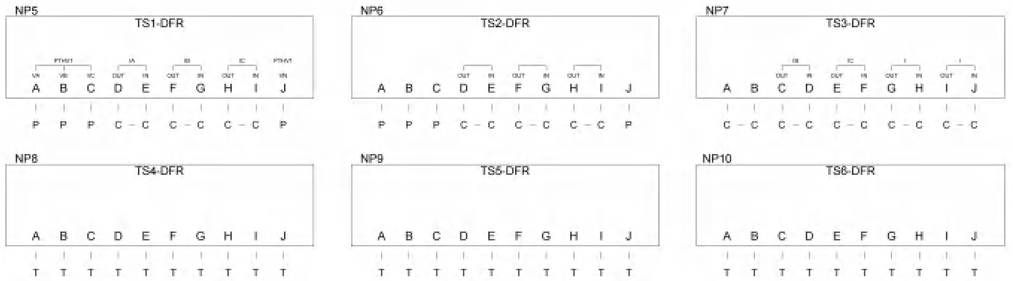
TITLE: RELAY PANEL NO.8 LAYOUT

LOCATION: 5857 CR 265, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1108
JOB NUMBER: 24144-01
DRAWING NUMBER: 1108



RELAY PANEL NO.9
VIEWED FROM FRONT



NAMEPLATE SCHEDULE

NP NO	NP SIZE	QTY.	FIRST LINE	TEXT HEIGHT	SECOND LINE	TEXT HEIGHT	THIRD LINE	TEXT HEIGHT
NP1	3" X 2" (NOTE 3)	2	PANEL 9	1/2"	DFR	1/4"		
NP2	2.5" X 0.75"	1	PDC	5/32"				
NP3	2.5" X 0.75"	1	DFR/DDR/PMU	5/32"	CONTROL CHASSIS	5/32"		
NP4	2.5" X 0.75"	1	DATA ACQUISITION	5/32"	CHASSIS	5/32"		
NP5	6" X 1.25"	1	TS1-DFR	5/8"				
NP6	6" X 1.25"	1	TS2-DFR	5/8"				
NP7	6" X 1.25"	1	TS3-DFR	5/8"				
NP8	6" X 1.25"	1	TS4-DFR	5/8"				
NP9	6" X 1.25"	1	TS5-DFR	5/8"				
NP10	6" X 1.25"	1	TS6-DFR	5/8"				

MATERIAL SCHEDULE

DEVICE(S)	QTY	MFG.	CAT. NO.	DESCRIPTION
PANEL	1	N/A		90" X 28" X 18" NEMA 1 PANEL PER RELAY PANEL SPECIFICATION
GROUND BUS	LOT	N/A		1" X 1/4" X 22" COPPER BAR WITH 10-32 HOLES DRILLED AND TAPPED AT 2" CENTERS (10 HOLES MAX). WASHER HEAD SCREWS INCLUDED IN EACH HOLE.
9FU2 9FU3 9FU4	3	MERSEN FERRAZ SHAWMUT	U60C2	2P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 2 POLE.
9FU1	1	MERSEN FERRAZ SHAWMUT	U60C3	3P FUSE BLOCK, ULTRA SAFE MODULAR FUSE HOLDER, 30 AMP, FOR CLASS CC FUSES 3 POLE.
	3	MERSEN FERRAZ SHAWMUT	ATMR5	FUSE, CLASS CC, 5 AMP, FAST ACTING.
	6	MERSEN FERRAZ SHAWMUT	ATMR20	FUSE, CLASS CC, 20 AMP, FAST ACTING.
PDC	1	SEL	3355RDWK3	SEL-3355 - 3RU HORIZONTAL RACK MOUNT, 125-250VDC or 120-240VAC EURO TERMINAL BLOCK (18DI/9), 3D TLC 480 GB INDUSTRIAL GRADE SSD WITH SEL-5073 SYNCHROWAVE PHASOR DATA CONCENTRATOR
MONITOR & KEYBOARD	1	APP	APP9084	APP-904 SLIDING MONITOR & KEYBOARD CONSOLE - 1 RU
DFR/DDR/PMU - CONTROL CHASIS	1	APP	APP601-C601-00A-08E-N	DIGITAL FAULT RECORDER CONTROL APP-601 COMPUTER CHASSIS WITH 3X SATA BAYS, ATOM E3845 QUAD PROCESSOR, 8GB DDR-3 RAM, 3X ETHERNET PORTS, 2X RS232, 1X VGA, 1X HDMI, 4X USB, RAID1 2X 1TB HDD's PLUS 1X 1TB HDD HOT SPARE DRIVE, Win10 OS, PROGRAMMING CABLE, 1 SUBCOPY OPERATING MANUAL - 3 RU
DATA ACQUISITION CHASSIS	1	APP	APP-601-D12A-32E-0	ACQUISITION CHASSIS WITH 12 ANALOG AND 32 EVENT CHANNELS (4 ANALOG CARDS AND 4 EVENT CARDS), WITH ALARM OUTPUT BOARD, APP00037 10AWG GROUND ASSEMBLY - 10' LENGTH
TS1-DFR TS2-DFR TS3-DFR	1	ABB	FR0H614873073	TEST SWITCH, FT1WR, 3RU, ANSI TD, CLEAR COVER A: P P P C-C-C C C P B: C-C C-C C C-C C-C C C: C-C C-C C-C C-C C-C
TS4-DFR TS5-DFR TS6-DFR	1	ABB	FR0H636836836	TEST SWITCH, FT1WR, 3RU, ANSI TD, CLEAR COVER A: 10 TRIPS B: 10 TRIPS C: 16 TRIPS
	14	VENDOR	1 RU	1 RU PLATE
	9	VENDOR	2 RU	2 RU PLATE

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN REVIEW	KWN	MC	GDK
A	04/11/25	30% DESIGN REVIEW	CTS	GDK	SRH

STAMP

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SCALE	NTS
DATE	03/17/25
DRAWN	KWN
CHECKED	MC
APPROVED	SRH

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RELAY PANEL NO.8 LAYOUT

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1109
JOB NUMBER	24144-01
DRAWING NUMBER	1109

(+)

(-)

TO 125VDC DIST. PANEL DCP1 (SHEET #2.4) DWG. D-1502

125VDC

CONTINUED BELOW

CONTINUED ABOVE

1TLB-1

1TLB-2

1FU5 250V,50A

1FU6 250V,20A

1TLA-9

2TLA-9

1TRS-8

MC1F4-6

TB1-1

MX2 52-3

MX3 52-3

MX4 52-3

MC1F4-7

1TRS-7

2TLA-10

1TLA-10

A2

52G1 TC1

86BF52L1

TB1

48

L3

52L1

TS1-86BF52L1

14

TRIP 52L1 TC1 DWG. D-1318

RELAY OPERATE TO DFR DWG. D-1366

DC TRIP TO ORION I/O #3 DWG. D-1361

RELAY ALARM TO ORION I/O #3 DWG. D-1361

Z29 GND STUD

Z30

FS (PWR SUPPLY)

Z25

VDC (MONITOR VDC 1)

Z26

A01 (+) OUT101 A02

A03 (+) OUT102 A04

A05 (+) OUT103 A06

A07 (+) OUT104 A08

A09 OUT105 A10

A11 A12 OUT106

A13 A14 OUT107 A15

A16 A17 OUT108 A18

A19 A20

IN 101 86BF52L1 DFT TR

A21

A22 IN 102

A23

A24 IN 103 52L1 STATUS

A25

A26 IN 104

A27

A28 IN 105

A29

A30 IN 106

A31

A32 IN 107

A33

IRIG-B

EIA-232

PORT 1

PORT 2

PORT 3

TO CONN1 DWG. D-1600

FIBER TO ONCOR GOBBER2 KNOB SWITCH SUBSTATION

ETHERNET TO OWNER NETWORK RACK SWITCH DWG. D-1600

AA 21L1P

(SEE L-421)

TB3-1

TB3-2

TB3-3

TB3-4

TB3-5

TB3-6

TB3-7

TB3-8

TB3-9

TB3-10

TB3-11

TB3-12

TB3-13

TB3-14

TB3-15

TB3-16

TB3-17

TB3-18

TB3-19

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TB3-39

TB3-40

TB3-41

TB3-42

TB3-43

TB3-44

TB3-45

TB3-46

TB3-47

TB3-48

A01 OUT201 A02

A03 OUT202 A04

A05 OUT203 A06

A07 OUT204 A08

A09 OUT205 A10

A11 OUT206 A12

A13 OUT207 A14

A15 OUT208 A16

A17 OUT209 A18

A19 OUT210 A20

A21 OUT211 A22

A23 OUT212 A24

A25 OUT213 A26

A27 A28 OUT214

A29 A31 OUT215

A33 IN 201

A35 IN 202

A37 IN 203

A39 IN 204

A41 IN 205

A43 IN 206

A45 IN 207

A47 IN 208

AA 21L1P

(SEE L-421)

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

	RELAY PANEL
	RELAY PANEL, SHORTING TYPE
	BREAKER, CIRCUIT SWITCHER, RECLOSER
	INSTRUMENT TRANSFORMER
	POWER TRANSFORMER
	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: 345kV LINE PRIMARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1300

JOB NUMBER: 24144-01

DRAWING NUMBER: 1300

(+)

(-)

TO 125VDC DIST. PANEL DCPS2 (SHT. #2.4) DWG. D-1503

125VDC

TTB-3

TTB-4

YT
JTUB
250V,20A

TO 50RF/521.1 & TO 86RF521.1
(DWG. D-1502) (DWG. D-1503)

TTB-11
STB-11

TTB-12
STB-12

TTB1-6
NC1TB-8
TB1

WA3
52-3

TB1
TBC1

TBC1
TBB1

TBB1
NC1TB-7
TTB1-5

TB1

TB1
TBC1

TBC1
TBB1

TBB1

44
RX
86RF521.1
46

15
H
TB1-86RF521.1
16

DA
TS3-87L1S

TRIP
52L1 TC2
DWG. D-1317

RELAY OPERATE
TO DFR
DWG. D-1366

DC TRIP
TO ORION I/O #3
DWG. D-1361

RELAY ALARM
TO ORION I/O #3
DWG. D-1361

STB-12
TTB-12

DA
87L1S

22S
22R
PS
DWR
(PWR SUPPLY)

A01 OUT101 A02
A03 OUT102 A04
A05 OUT103 A06
A07 OUT104 A08
A09 OUT105 A10
A11 OUT106 A12
A13 OUT107 A14
A15 ALARM A16

A17 IN 101 86RF521.1 DFT TX
A18 IN 102 A19
A21 IN 103 52L1 STATUS A22
A23 IN 104 A24
A25 IN 105 A26
A27 IN 106 A28

SERIAL PORT 1 RTC-IB
SERIAL PORT 2
SERIAL PORT 3

CHANNEL A
TX
RX
(SEL-311L)

TO COMM1
DWG. D-1600

ETHERNET TO OWNER NETWORK RACK SWITCH DWG. D-1600

FIBER TO ONCOR GOBBERS KNOB SWITCH SUBSTATION

CONTINUED BELOW

CONTINUED ABOVE

DA
87L1S

B01 OUT201 B02
B04 OUT202 B00
B07 OUT203 B08
B09 OUT204 B10
B12 OUT205 B13
B15 OUT206 B16
C01 OUT301 C02
C03 OUT302 C04
C05 OUT303 C06
C07 OUT304 C08
C09 OUT305 C10
C11 OUT306 C12
C13 OUT307 C14
C15 OUT308 C16
C17 OUT309 C18
C19 OUT310 C20
C21 OUT311 C22
C23 OUT312 C24

C25 IN 201 C26
C27 IN 202 C28
C29 IN 203 C30
C31 IN 204 C32
C33 IN 205 C34
C35 IN 206 C36
C37 IN 207 C38
C39 IN 208 C40

(SEL-311L)

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

	RELAY PANEL
	RELAY PANEL, SHORTING TYPE
	BREAKER, CIRCUIT SWITCHER, RECLOSER
	INSTRUMENT TRANSFORMER
	POWER TRANSFORMER
	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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SCALE	NTS
DATE	06/04/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

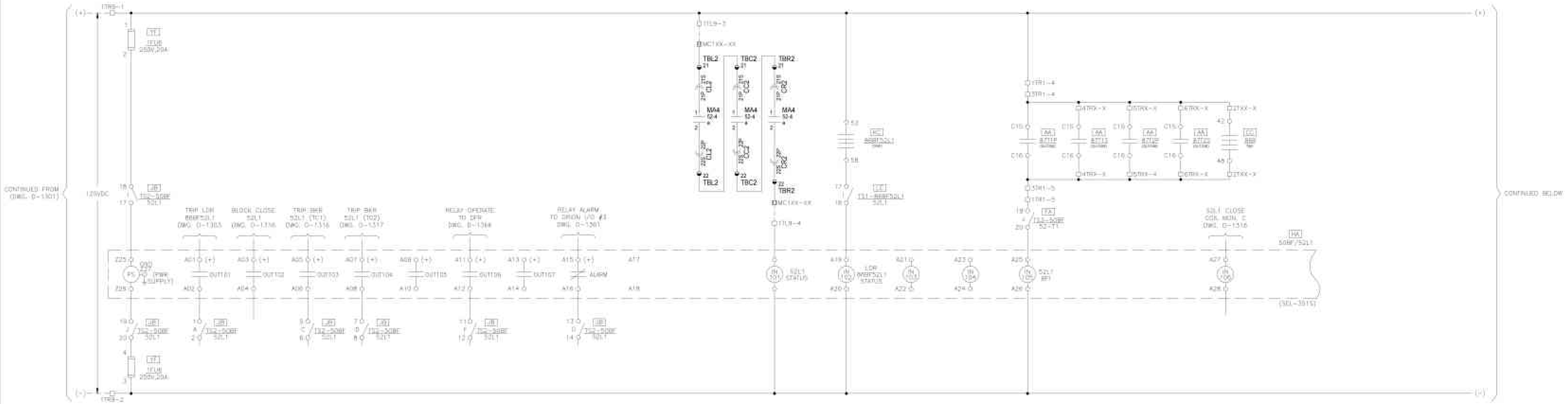
TITLE: 345kV LINE BACKUP RELAYING DC SCHEMATIC

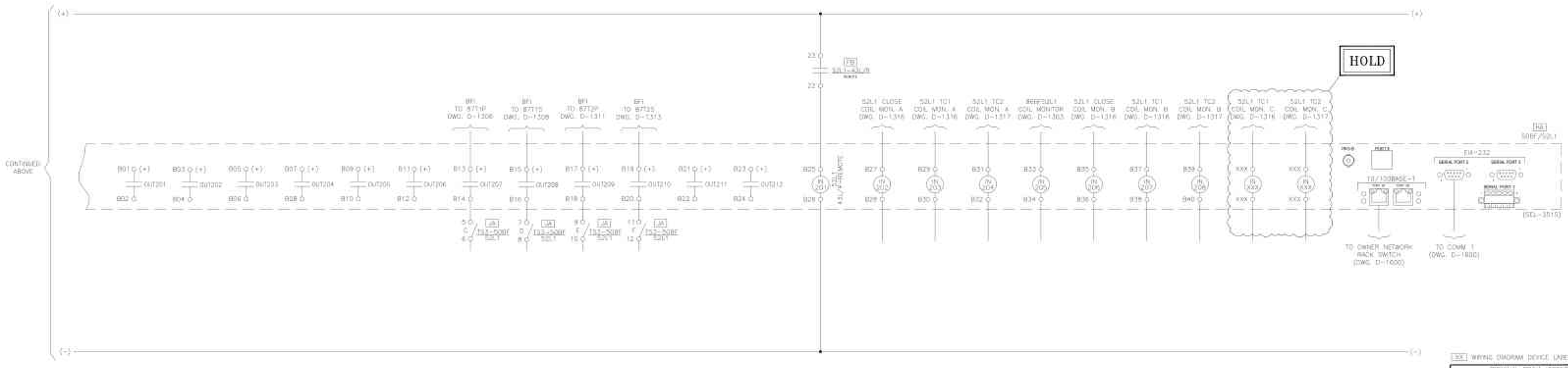
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1301

JOB NUMBER: 24144-01

DRAWING NUMBER: 1301





XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
▣	RELAY PANEL, SHORTING TYPE
●	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
⊟	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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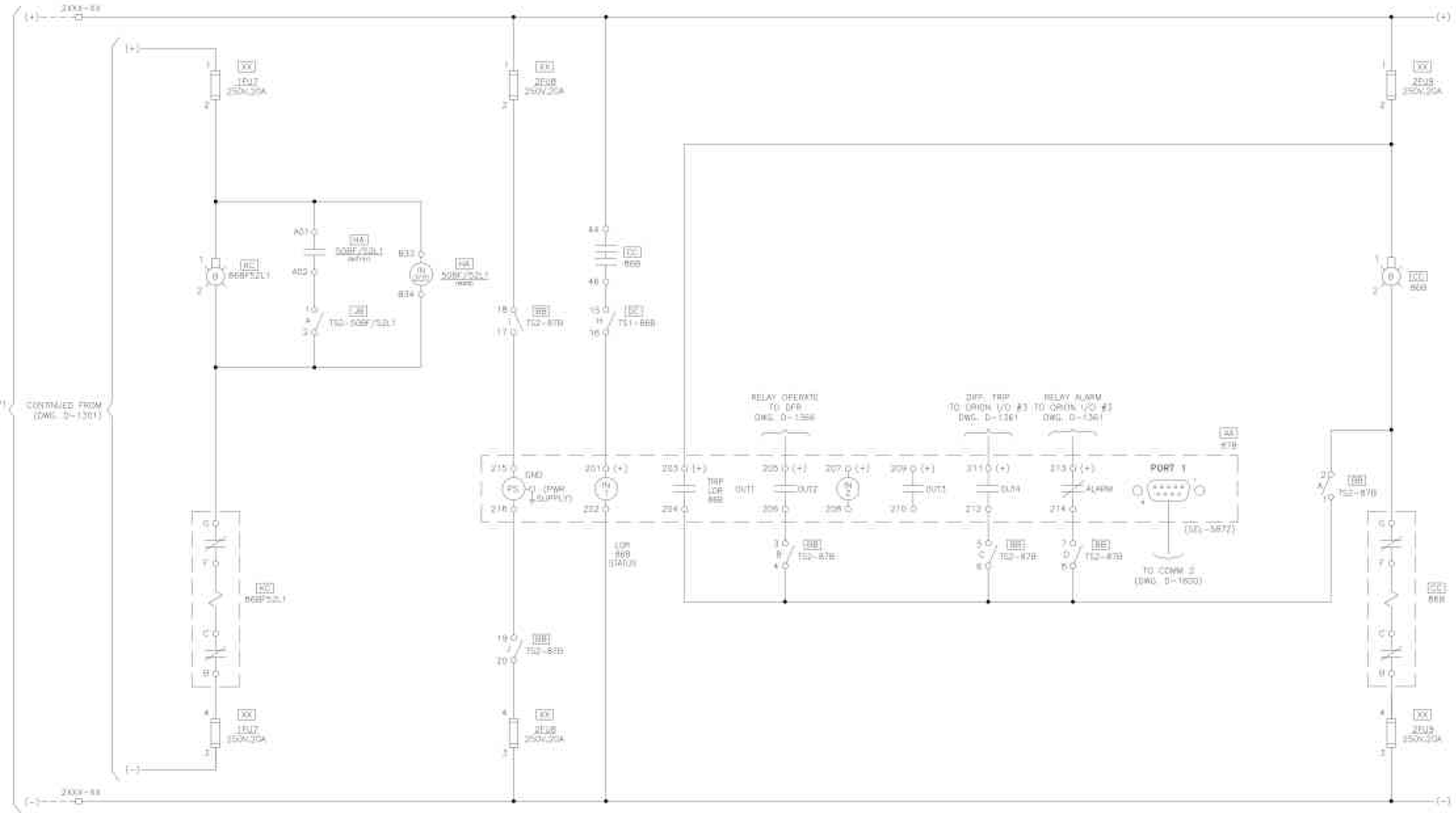
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDS

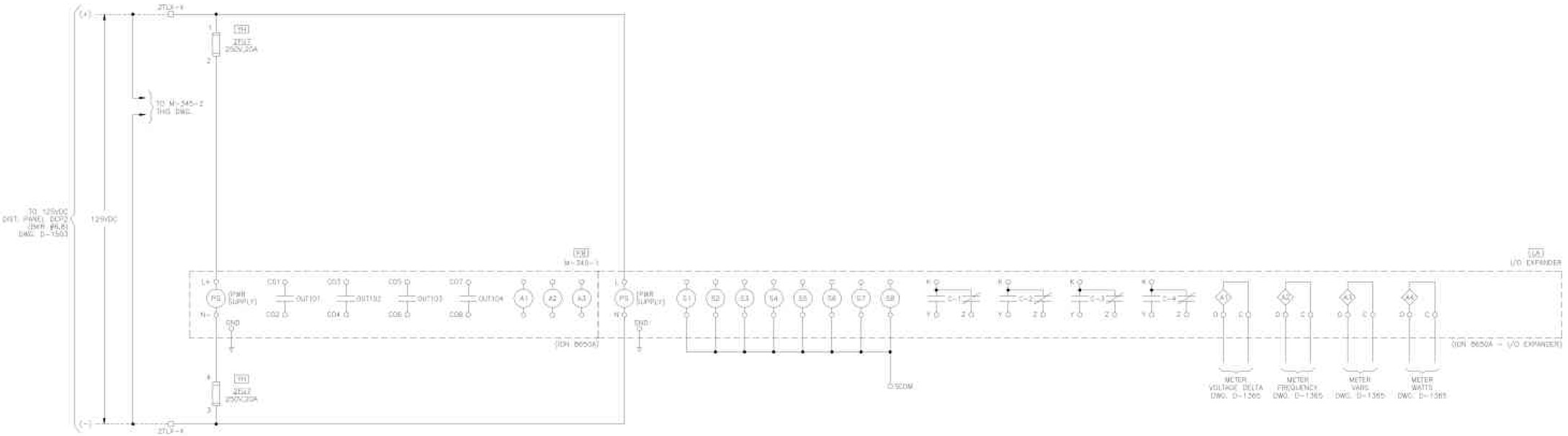
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: HV BREAKER 52L1 BF RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1302
JOB NUMBER	24144-01
DRAWING NUMBER	1302


2XXX-XX
(+)
(-)
XX
1EU7
250V,20A
2EU8
250V,20A
2EU9
250V,20A
1EU7
250V,20A
2EU8
250V,20A
2EU9
250V,20A
HA
52BF/52L1
(NEW)
HA
52BF/52L1
(NEW)
HC
86BF52L1
HB
TS2-87B
HB
TS2-87B
HB
TS2-87B
HB
TS2-87B
HB
TS2-87B
HC
86BF52L1
HC
86BF52L1
HD
TS2-52BF/52L1
HD
TS1-52BF/52L1
HE
TS2-87B
HE
TS2-87B
HE
TS2-87B



XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▯	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EGK

STAMP

RED RIVER CLEAN ENERGY

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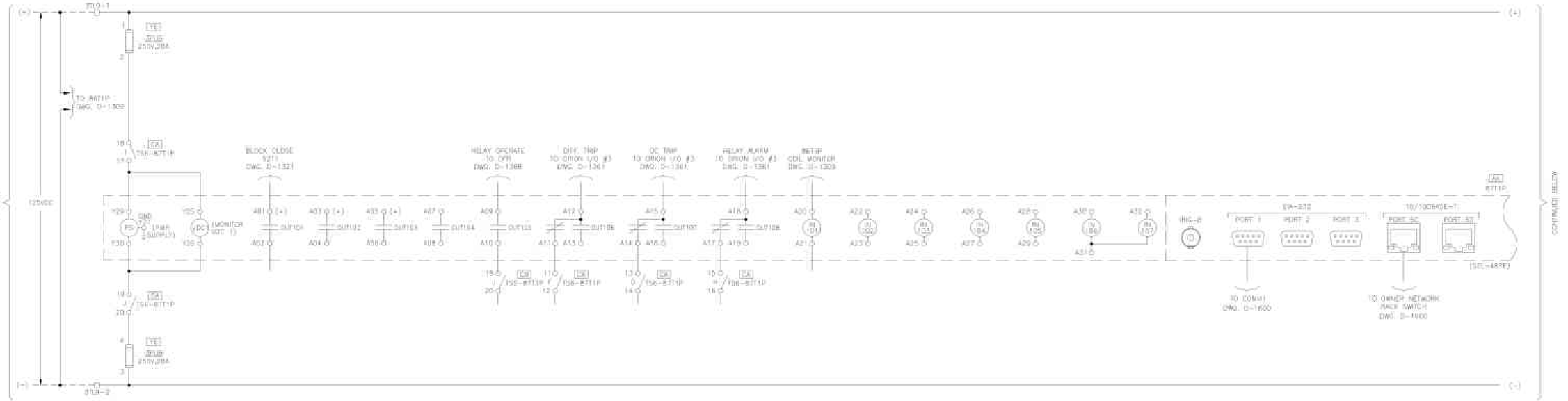
SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EGK

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: SUBSTATION METERS DC SCHEMATIC

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1304
JOB NUMBER	24144-01
DRAWING NUMBER	1304



[XX] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
PP	PILOT PANEL
RP	RELAY PANEL, SHORTING TYPE
⇌	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
⊞	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDS

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
PRIMARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1305
JOB NUMBER	24144-01
DRAWING NUMBER	1305

CONTINUED FROM DWG. D-1305

CONTINUED BELOW

CONTINUED ABOVE

(+)

(-)

TRIP LOR 86BF52T1 DWG. D-1309

TRIP 52T1 TC1 DWG. D-1321

TRIP 52F11 DWG. D-1331

TRIP 52F12 DWG. D-1332

TRIP 52F13 DWG. D-1333

TRIP LOR 86TTF DWG. D-1309

BKR 52T1 BFI TO 50BF/52L1 DWG. D-1302

52T1 TC2 COIL MON. C DWG. D-1322

52T1 43L/R-REMOTE

52F11 43L/R/M-REMOTE

52F11 43L/R/M-MAINT.

52F12 43L/R/M-REMOTE

52F12 43L/R/M-MAINT.

52F13 43L/R/M-REMOTE

52F13 43L/R/M-MAINT.

52T1 52a STATUS

52F11 52a STATUS

52F12 52a STATUS

52F13 52a STATUS

LOR 86TTF STATUS

LOR 86BF52T1 STATUS

LOR (SEL-487E) 86BF52L1 STATUS

BREAKER FAILURE INITIATE

(SEL-487E)

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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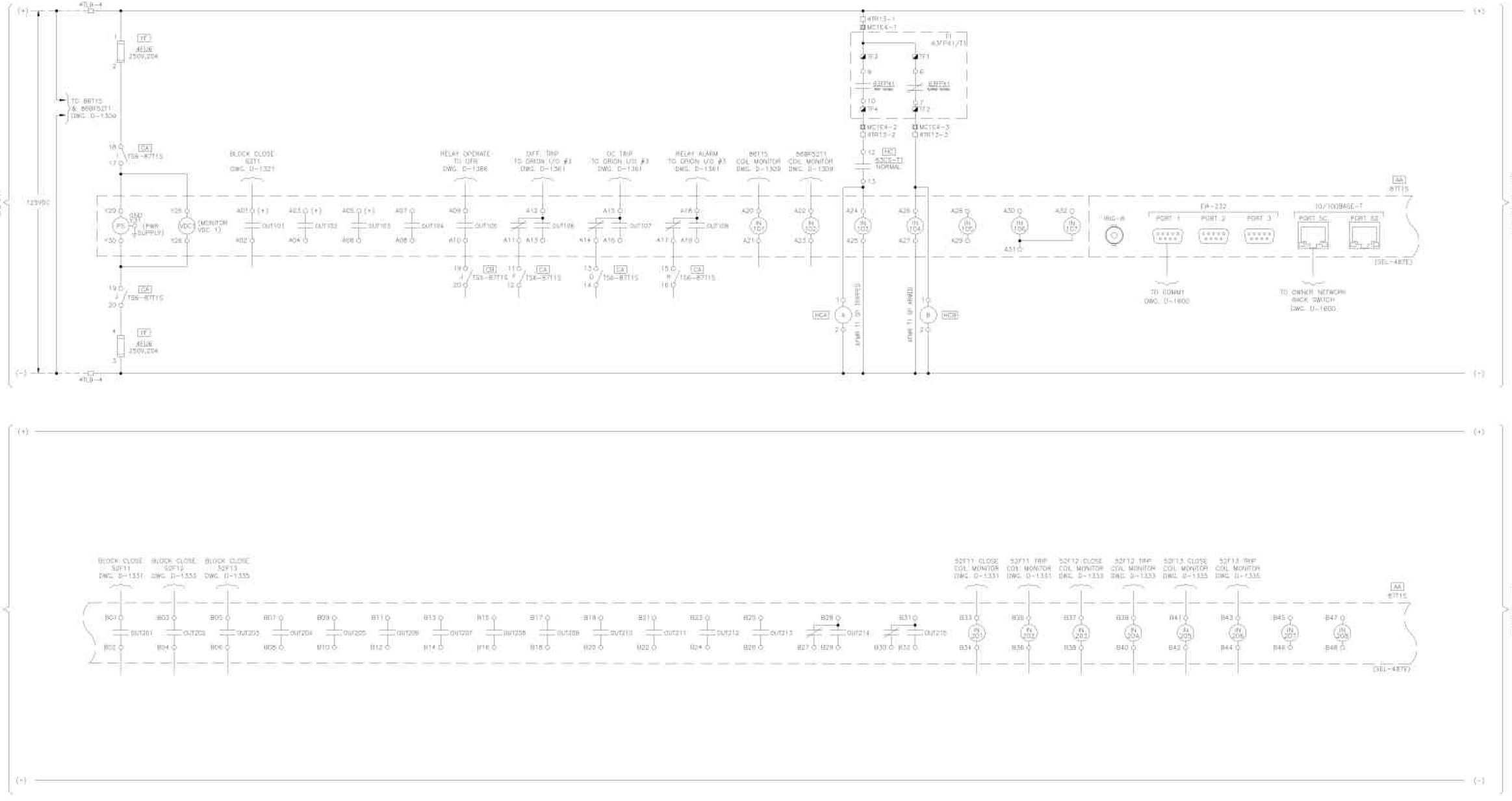
SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1 PRIMARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1306
JOB NUMBER	24144-01
DRAWING NUMBER	1306



63CS-T1
ELECTROSWITCH 2403ACZ
CONTACT DIAGRAM

DECK	CONTACTS	MAINT	NORM	DESCRIPTION	DWG.
1	12 ○—|—○ 13		X	ENABLE 63TS-T1	THIS DWG.
	16 ○—|—○ 17		X		
2	22 ○—|—○ 23		X		
	26 ○—|—○ 27		X		

XX1 WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
CP	PILOT PANEL
RP	RELAY PANEL, SHORTING TYPE
▬	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▥	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
SECONDARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1307
JOB NUMBER	24144-01
DRAWING NUMBER	1307

CONTINUED FROM DWG. D-1307

CONTINUED BELOW

CONTINUED ABOVE

BREAKER FAILURE INITIATE

(+)

(-)

A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK
REV.	DATE	DESCRIPTION	DRN	CKD	APP

STAMP

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EGR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
SECONDARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

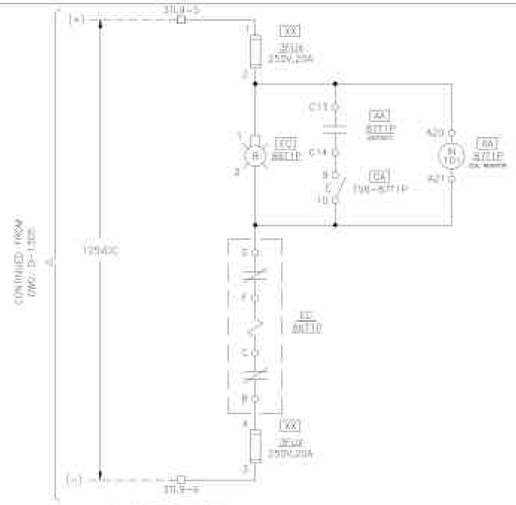
FILE NAME: 24144-01-1308

JOB NUMBER: 24144-01

DRAWING NUMBER: 1308

[##] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALING CABINET


CONTINUED FROM DWG. D-1307
(+)
(-)
125VDC
52F11
52F12
52F13
52F14
52F15
52F16
52F17
52F18
52F19
52F20
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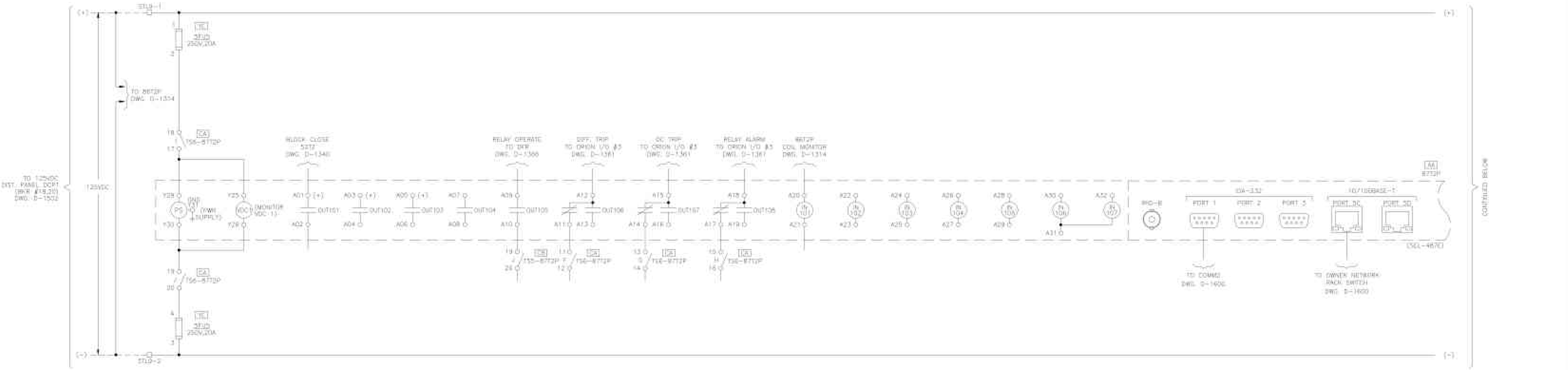
52F50



AA WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
PILOT PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

STAMP

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDK

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T2
PRIMARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1310
JOB NUMBER	24144-01
DRAWING NUMBER	1310

CONTINUED FROM DWG. D-1310

CONTINUED BELOW

CONTINUED ABOVE

(+)

(-)

TRIP LOR 86BF52T2 DWG. D-1314

TRIP 52T2_TC1 DWG. D-1340

TRIP 52F21 DWG. D-1350

TRIP 52F22 DWG. D-1353

TRIP 52F23 DWG. D-1304

TRIP LOR 86T2P DWG. D-1314

BRK 52T2_BF1 TO 86BF/52L1 DWG. D-1302

52T2_TC2 COIL MON. C DWG. D-1341

52T2_52a STATUS

52T2_52b STATUS

52F21_52a STATUS

52F22_52a STATUS

52F23_52a STATUS

LOR_86T2P STATUS

LOR_86BF52T2 STATUS

LOR 86BF52L1 STATUS

52F2_43L/R/M– REMOTE

52F21 43L/R/M– REMOTE

52F21 43L/R/M– MAINT.

52F22 43L/R/M– REMOTE

52F22 43L/R/M– MAINT.

52F23 43L/R/M– REMOTE

52F23 43L/R/M– MAINT.

BREAKER FAILURE INITIATE

(SEL-487E)

AA WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
▣	RELAY PANEL, SHORTING TYPE
●	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
⊟	SWITCHYARD CABINET

REV	DATE	DESCRIPTION	DRN	CKD	QDK
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

RED RIVER CLEAN ENERGY

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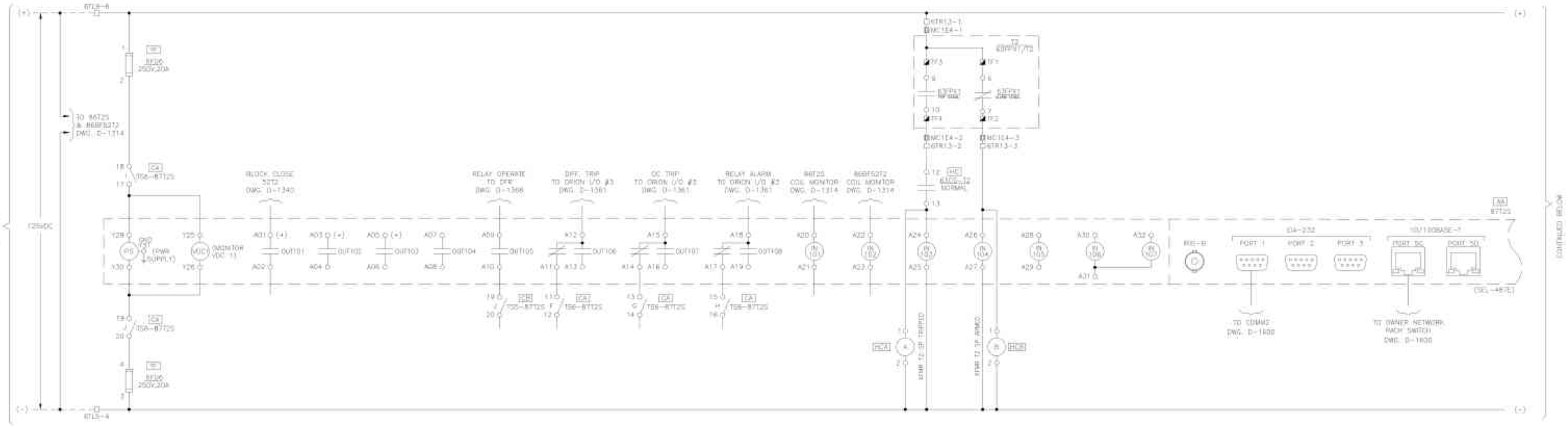
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T2
PRIMARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1311
JOB NUMBER	24144-01
DRAWING NUMBER	1311



63S5-T2
ELECTROSWITCH 24C2ACZ
CONTACT DIAGRAM

DECK	CONTACTS	MAINT	NORMAL	DESCRIPTION	DWG.
1	12O—II—O13		X	ENABLE 63TP(1)	THIS DWG.
	16O—II—O17		X		
3	22O—II—O23		X		
	26O—II—O27		X		

[XX] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
CP	RELAY PANEL
SS	RELAY PANEL, SHORTING TYPE
⬬	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
⊞	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EGS

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T2
SECONDARY RELAYING DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1312
JOB NUMBER	24144-01
DRAWING NUMBER	1312

CONTINUED FROM DWG. D-1312

CONTINUED BELOW

CONTINUED ABOVE

(+)

(-)

TRIP LOR 86BF5212 DWG. D-1314

TRIP 52T2 TC2 DWG. D-1341

TRIP 52F21 DWG. D-1350

TRIP 52F22 DWG. D-1352

TRIP 52F23 DWG. D-1354

TRIP LOR 86T2S DWG. D-1314

BKR 5272 BF TO 509F/52L1 DWG. D-1302

52T2 52a STATUS

52T2 52b STATUS

52F21 52a STATUS

52F22 52a STATUS

52F23 52a STATUS

LOR 86T2S STATUS

LOR 86BF52T2 STATUS

LOR 86BF52L1 STATUS

(SEL-487E)

52T2 43L/R-REMOTE

52F21 43L/R/M-MAINT.

52F22 43L/R/M-MAINT.

52F23 43L/R/M-MAINT.

BREAKER FAILURE INITIATE

[AA] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

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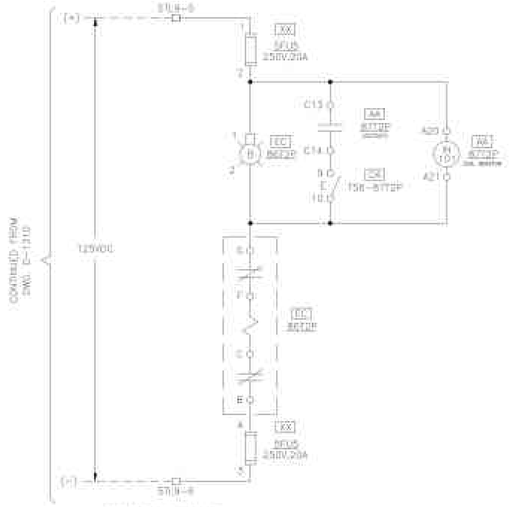
SCALE: NTS
DATE: 08/30/25
DRAWN: KWN
CHECKED: MC
APPROVED: EDK

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

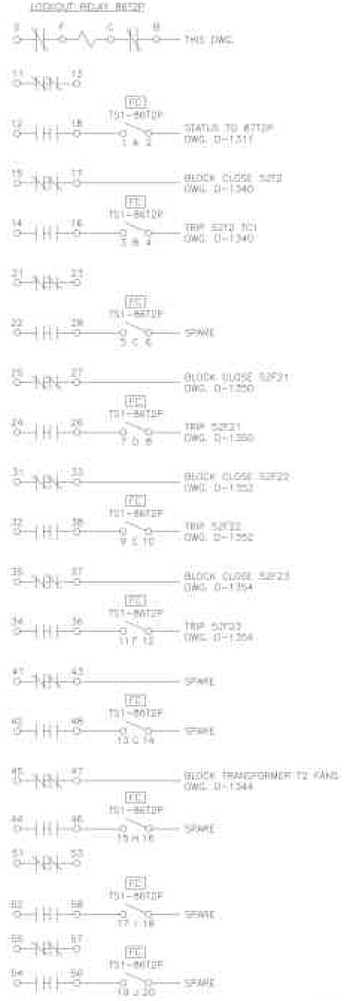
TITLE: TRANSFORMER T2
SECONDARY RELAYING DC SCHEMATIC

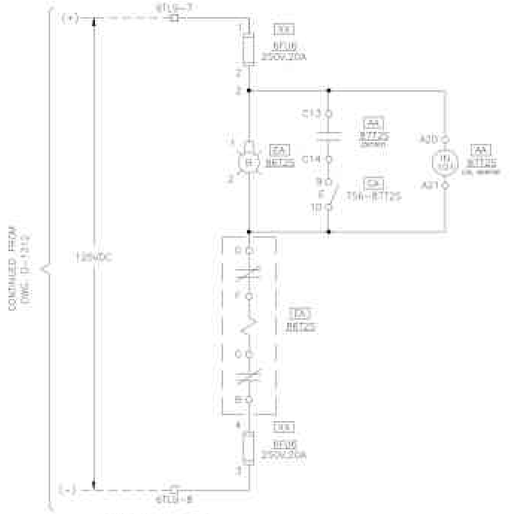
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1313
JOB NUMBER: 24144-01
DRAWING NUMBER: 1313

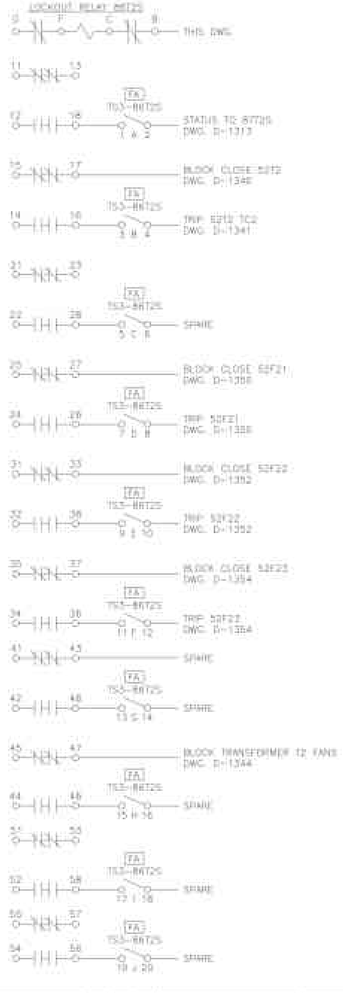


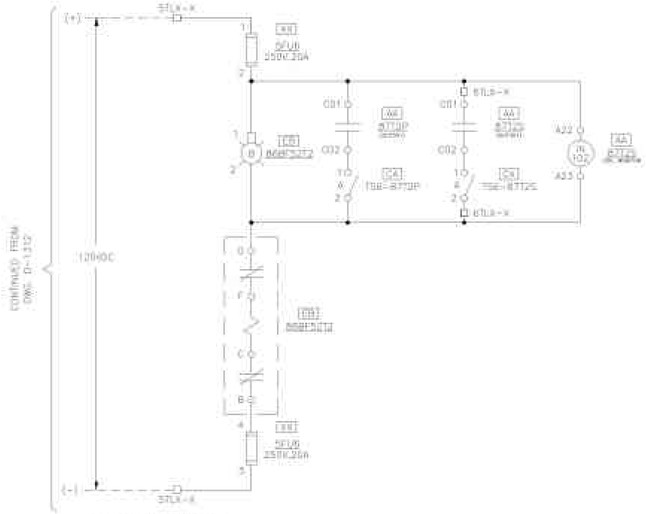
LOCKOUT RELAY 86T2P



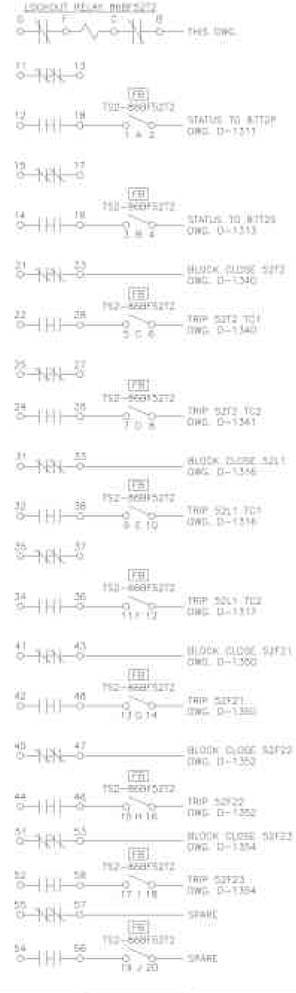


LOCKOUT RELAY 86T2S





LOCKOUT RELAY 86BFR52T2



XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
PC	RELAY PANEL SHORTING TYPE
●	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▥	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

STAMP

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDK

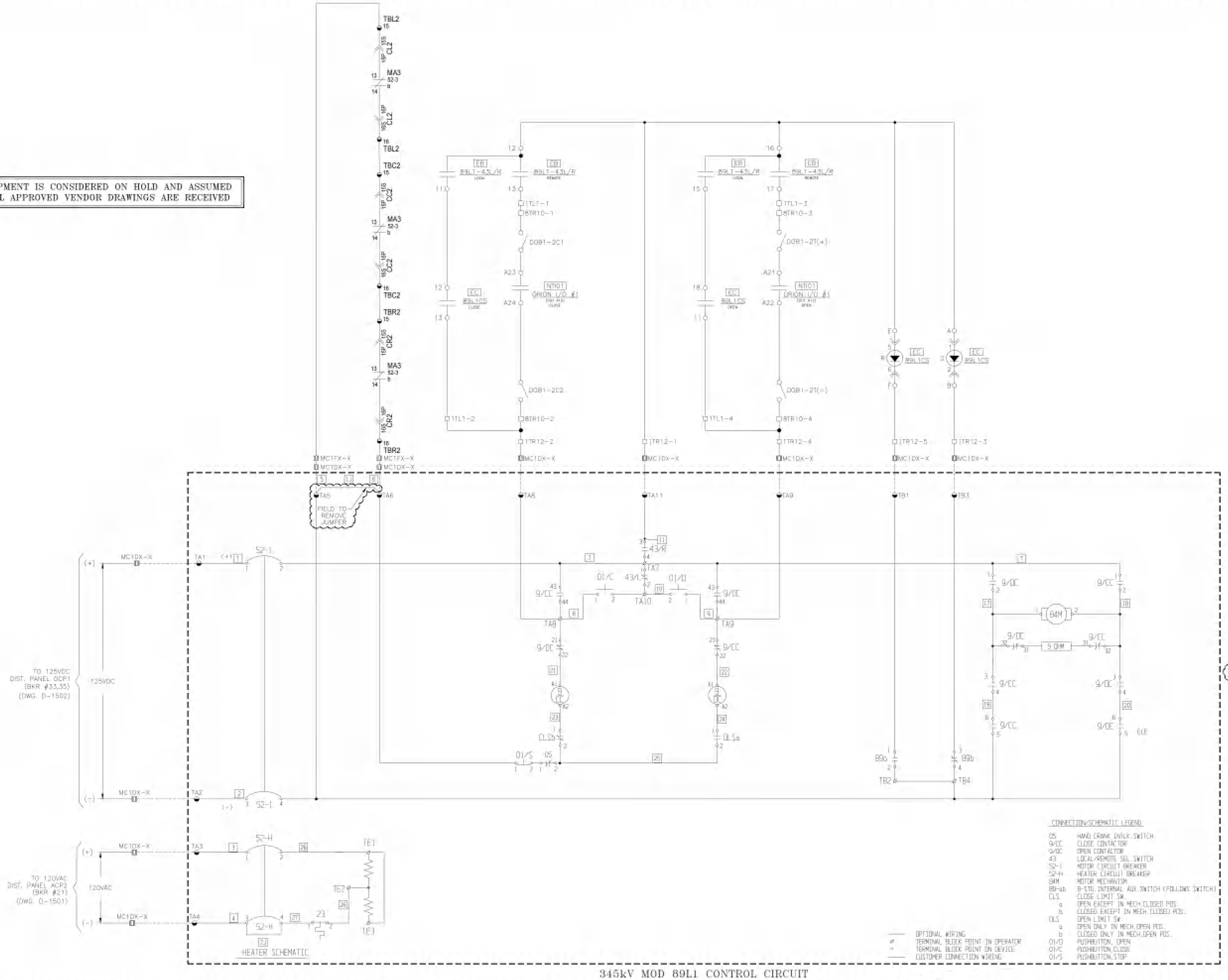
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: LOCKOUT RELAY
86T2P, 86T2S, 86BF52T2 DC SCHEMATIC

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1314
JOB NUMBER	24144-01
DRAWING NUMBER	1314

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED



345kV MOD 89L1 CONTROL CIRCUIT

89L1CS

DEVICE 89L1CS

DISCONNECT SWITCH

C R

OPEN CLOSE

ELECTROSWITCH SERIES 74PB202NN
ENGRAVING CODE 1238-2025MM

DECK	CONTACTS		TRIP	POSITION NORMAL	POSITION CLOSE	FUNCTION
1	15	11	X			OPEN
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

89L1-43L/R

DEVICE 89L1-43L/R

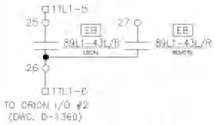
LOCAL REMOTE SW

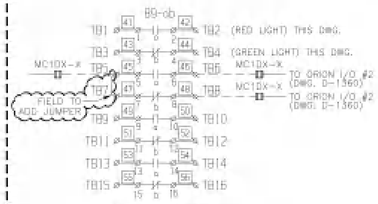
LOCAL

REMOTE

ELECTROSWITCH SERIES 242028
ENGRAVING CODE 10D-2L24A

DECK	CONTACTS		POS. LOCAL	POS. REMOTE	FUNCTION
1	12	11	X		LOCAL CLOSE
	12	13		X	REM. CLOSE
	16	15	X		LOCAL OPEN
	16	17		X	REM. OPEN
2	22	21	X		
	22	23		X	
	26	25	X		STATUS BELOW
		27		X	





AUXILIARY SWITCH
(FOLLOWS SWITCH POSITION)

CONNECTION/SCHEMATIC LEGEND

05	HAND CRANK (MAN.) SWITCH
9/CC	CLOSE CONTACTOR
9/OC	OPEN CONTACTOR
43	LOCAL/REMOTE SEL. SWITCH
52-1	MOTOR CIRCUIT BREAKER
52-H	HEATER (CIRCUIT) BREAKER
B4M	MOTOR MECHANISM
89-ab	B-STG. INTERNAL AUX. SWITCH (FOLLOWS SWITCH)
CLS	CLOSE LIMIT SW.
a	OPEN EXCEPT IN MECH. CLOSED POS.
b	CLOSED EXCEPT IN MECH. CLOSED POS.
OLS	OPEN LIMIT SW.
a	OPEN ONLY IN MECH. OPEN POS.
b	CLOSED ONLY IN MECH. OPEN POS.
01/O	PUSHBUTTON, OPEN
01/C	PUSHBUTTON, CLOSE
01/S	PUSHBUTTON, STOP

OPTIONAL WIRING
TERMINAL BLOCK POINT IN OPERATOR
TERMINAL BLOCK POINT ON DEVICE
CUSTOMER CONNECTION WIRING

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▯	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

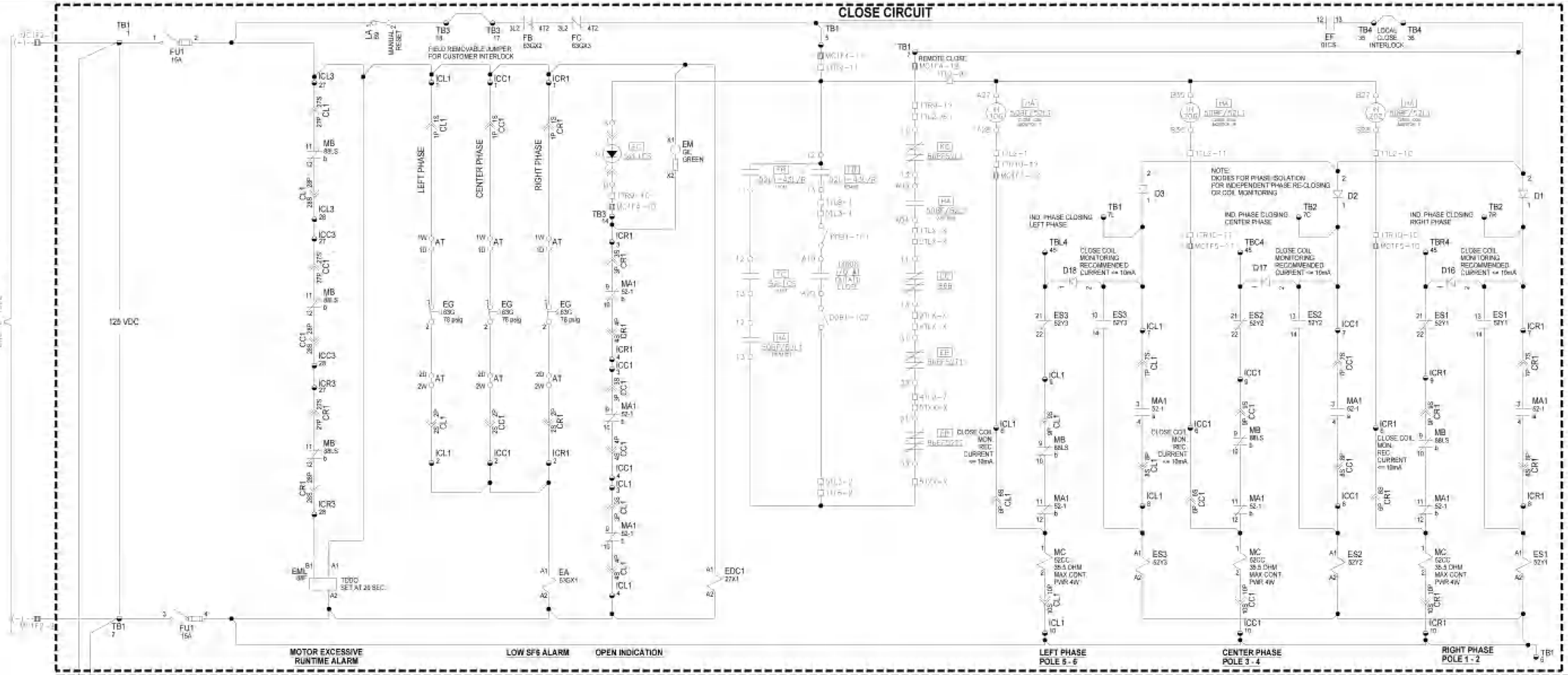
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV MOD SWITCH 89L1 DC SCHEMATIC

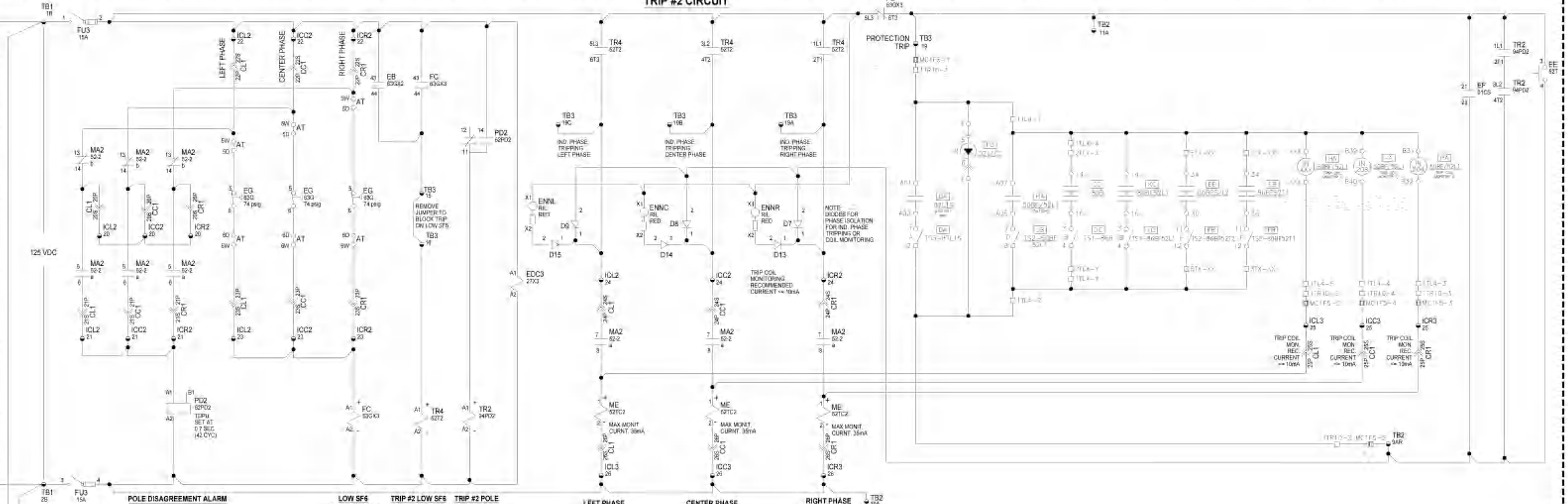
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1315
JOB NUMBER	24144-01
DRAWING NUMBER	1315

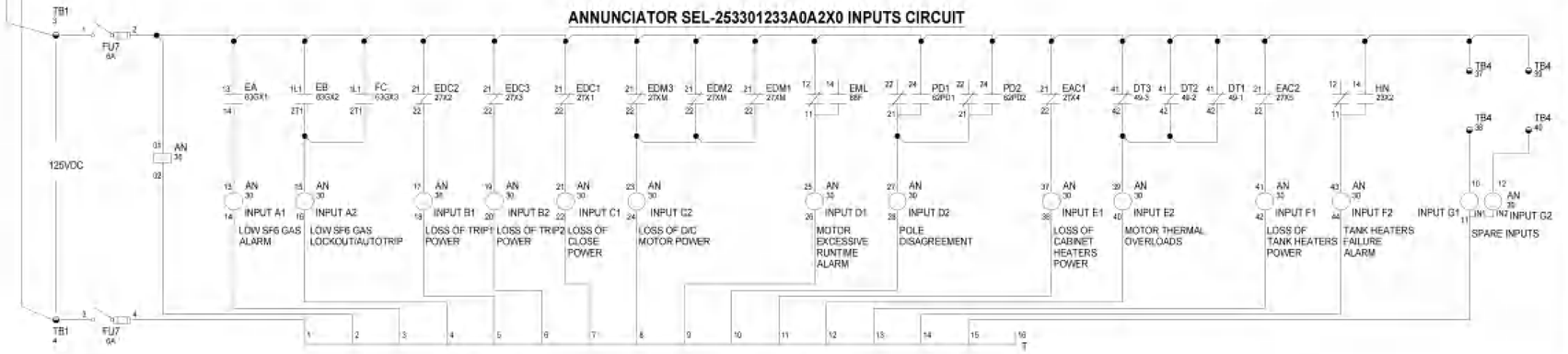
CLOSE CIRCUIT

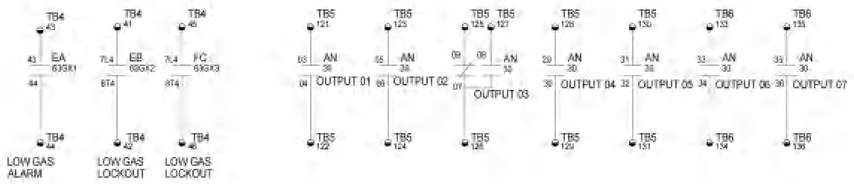


TRIP #2 CIRCUIT



ANNUNCIATOR SEL-253301233A0A2X0 INPUTS CIRCUIT





NOTES:
1. ALL DEVICES SHOWN IN DE-ENERGIZED POSITION.
2. BREAKER SHOWN IN OPEN POSITION.
3. SF6 SHOWN AT ZERO PRESSURE.
4. CHARGING SPRINGS SHOWN IN CHARGED POSITION.

XXO WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

	RELAY PANEL
	RELAY PANEL, SHORTING TYPE
	BREAKER, CIRCUIT SWITCHER, RECLOSER
	INSTRUMENT TRANSFORMER
	POWER TRANSFORMER
	MARSHALLING CABINET

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED.

	CIRCUIT BREAKER
	CABINET LIGHT
	COIL
	CONTACT, NORMALLY CLOSED
	CONTACT, NORMALLY OPEN
	CONNECTOR
	DENSITY MONITOR
	DOOR SWITCH
	FUSE BLOCK
SLUG	FUSE BLOCK, SLUGGED
	FUSED DISCONNECT
SLUG	FUSED DISCONNECT, SLUGGED
	FUSE PULLOUT
SLUG	FUSE PULLOUT, SLUGGED
	INTERNAL WIRING CONNECTION
	CUSTOMER CONNECTION

	INDICATOR LIGHT
	KNIFE SWITCH
	MOTOR
	PUSHBUTTON
	RESISTOR/ HEATER
	TERMINAL BLOCK
	TERMINAL BLOCK (AUXILIARY)
	THERMOSTAT
	TRIP COIL MONITOR
	TOGGLE SWITCH
	TRANSFORMER

STANDARD ANSI DESIGNATIONS

- 01CS BREAKER CONTROL SWITCH
- 23 THERMOSTAT
- 23X HEATER CONTACTOR
- 27X LOSS OF POWER RELAY
- 30 ANNUNCIATOR
- 37 UNDERCURRENT ALARM
- 49 MOTOR THERMAL OVERLOAD
- 52C CLOSE PUSHBUTTON
- 52CC BREAKER CLOSE COIL
- 52T TRIP PUSHBUTTON
- 52TC BREAKER TRIP COIL
- 52X CLOSING RELAY
- 52Y ANTIPUMP RELAY
- 52-MON BREAKER CONDITION MONITOR
- 63G SF6 PRESSURE / DENSITY GAUGE
- 63GX SF6 PRESSURE / DENSITY RELAY
- 69 PERMISSIVE CONTROL SWITCH
- 69-KI KEY INTERLOCK
- 74CC CLOSE COIL MONITOR
- 74TC TRIP COIL MONITOR
- 79X RECLOSE DELAY RELAY
- 83X MOTOR TRANSFER CONTACTOR
- 88 MOTOR
- 88F MOTOR FAILURE ALARM
- 88LS MOTOR LIMIT SWITCH
- AIL AMBER INDICATOR LIGHT
- GIL GREEN INDICATOR LIGHT
- HTR HEATER
- RIL RED INDICATOR LIGHT
- TCM TRIP COIL MONITOR
- 94D1(TR1) POLE DISAGREEMENT

REV	DATE	DESCRIPTION	DWN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EOR

STAMP

RED RIVER CLEAN ENERGY

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SCALE: NTS
DATE: 06/30/25
DRAWN: KWN
CHECKED: MC
APPROVED: EOR

PROJECT
CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE
345kV BREAKER 52L1
TRIP COIL 2 & ANNUNCIATOR

LOCATION 5857 CR 268, BROWN COUNTY, TEXAS

FILE NAME 24144-01-1317
JOB NUMBER 24144-01
DRAWING NUMBER 1317

TANK HEATERS

CONTROL CABINET HEATERS

MECHANISM CABINET HEATERS

MOTOR CIRCUIT

CABINET RECEPTACLE

CABINET LIGHTING

LEFT PHASE POLE 5 - 6

CENTER PHASE POLE 3 - 4

RIGHT PHASE POLE 1 - 2

NOTE: LOOP TEFZEL OR SIS WIRE THROUGH BP 3X

SET BP AT 45A

240VAC 60Hz

120VAC 60Hz

125VDC

TDPU SET AT 5 SEC

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

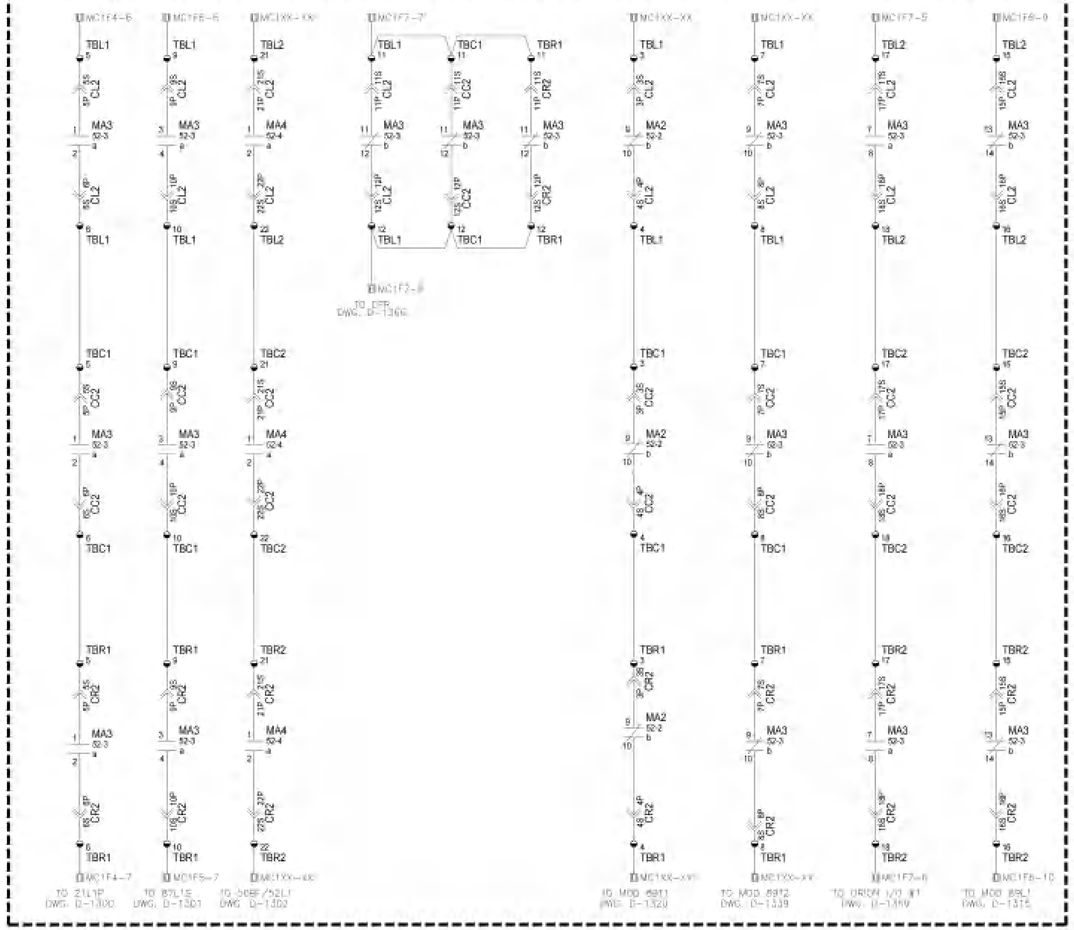
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52L1
AC SYSTEMS & MOTOR CIRCUIT

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1318
JOB NUMBER	24144-01
DRAWING NUMBER	1318

CONTACTS IN USE



TB5 132

TB6 137 TB6 138 TB6 139 TB6 140 TB5 141

TB6 142 TB6 143 TB6 144

TBL4 46 TBL4 47 TBL4 48

TBC4 46 TBC4 47 TBC4 48

TBR4 46 TBR4 47 TBR4 48

ICL1 5 ICL1 11 ICL1 12 ICL3 33 ICL3 34 ICL3 35 ICL3 36

ICL4 47 ICL4 48

ICC1 5 ICC1 11 ICC1 12 ICC3 33 ICC3 34 ICC3 35 ICC3 36

ICC4 47 ICC4 48

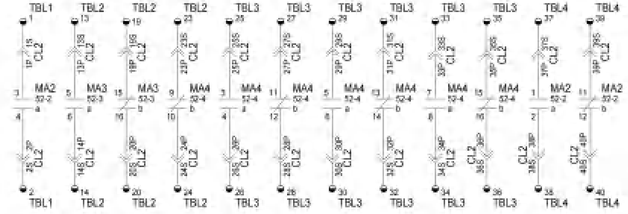
ICR1 5 ICR1 11 ICR1 12 ICR3 33 ICR3 34 ICR3 35 ICR3 36

ICR4 47 ICR4 48

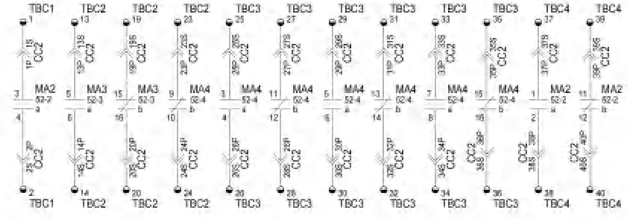
SPARE TERMINALS FOR CUSTOMER USE

SPARE CONTACTS

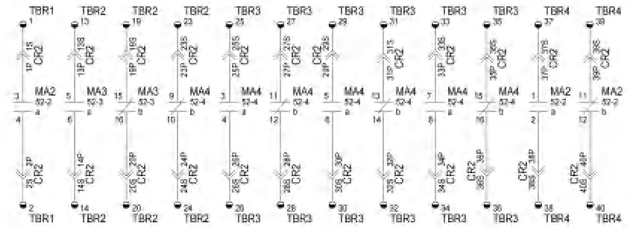
LEFT PHASE AUXILIARY SWITCHES



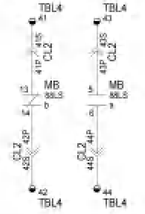
CENTER PHASE AUXILIARY SWITCHES



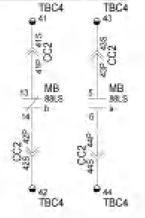
RIGHT PHASE AUXILIARY SWITCHES



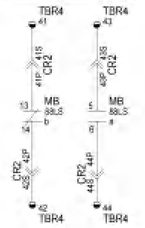
LEFT PHASE MOTOR LIMIT SWITCHES



CENTER PHASE MOTOR LIMIT SWITCHES



RIGHT PHASE MOTOR LIMIT SWITCHES



EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

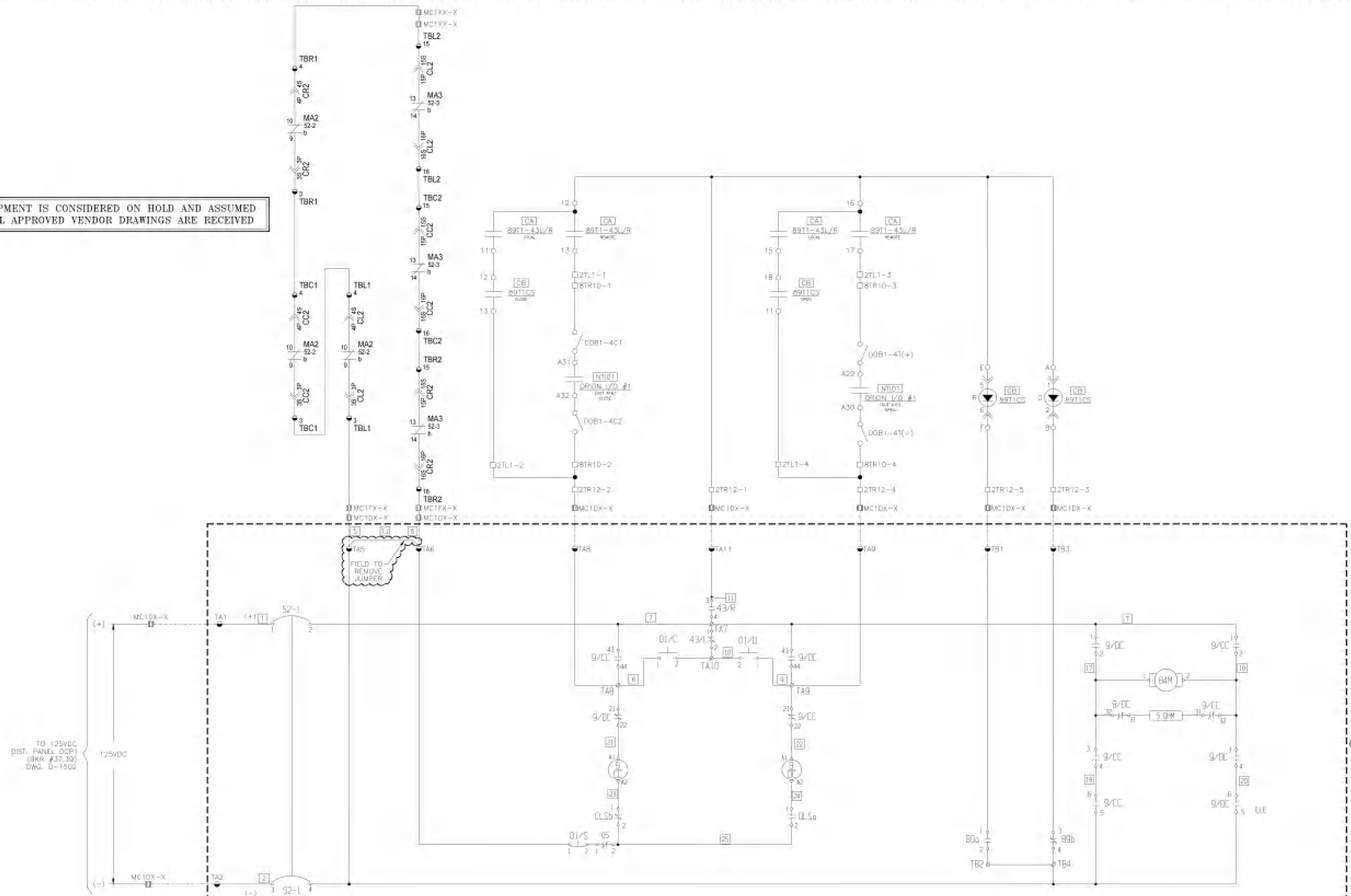
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52L1 AUXILIARY CONTACTS

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1319
JOB NUMBER	24144-01
DRAWING NUMBER	1319

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED


MC1FX-X
MC1DX-X
TBL2
TBR1
TBC2
TBR2
TBC1
TBL1
MA2 52-2
MA3 52-3
CR2
CL2
CC2
CA 89T1-43L/R LOCAL
CA 89T1-43L/R REMOTE
CB 89T1CS CLOSE
CB 89T1CS OPEN
2TL1-1
2TL1-2
2TL1-3
2TL1-4
8TR10-1
8TR10-2
8TR10-3
8TR10-4
DOB1-4C1
DOB1-4C2
DOB1-4T(+)
DOB1-4T(-)
NTI01 ORION I/O #1
NTI01 ORION I/O #1
2TR12-1
2TR12-2
2TR12-3
2TR12-4
2TR12-5
CR 89T1CS
CR 89T1CS
FIELD TO REMOVE JUMPER
TA5
TA6
TA11
TA9
TA10
TA7
TB1
TB3
43/R
01/C
01/O
43
89/CC
89/OC
89/DC
89/CC
89/CC
89/C

CLOSE CIRCUIT

125 VDC

MOTOR EXCESSIVE RUNTIME ALARM

LOW SF6 ALARM

OPEN INDICATION

LEFT PHASE POLE 5 - 6

CENTER PHASE POLE 3 - 4

RIGHT PHASE POLE 1 - 2

SWITCS

DEVICE SERIES

BREAKER CONTROL

ELECTROSWITCH SERIES 74PD2D2LT
ENGRAVING CODE 1236-2893

52T1-43L/R

DEVICE 52T1-43 /R

LOCAL REMOTE SW.

LOCAL

REMOTE

ELECTROSWITCH SERIES 09E09B
ENGRAVING CODE 100-2124A

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

NOTES:
1. ALL DEVICES SHOWN IN DE-ENERGIZED POSITION.
2. BREAKER SHOWN IN OPEN POSITION.
3. GAS SYSTEM AT ZERO PRESSURE.
4. CHARGING MOTOR SHOWN DISCHARGED POSITION.

WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

- RELAY PANEL
- RELAY PANEL, MOUNTING TYP.
- BREAKER CIRCUIT SWITCHGEAR RELEASE
- INSTRUMENT TRANSFORMER
- POWER TRANSFORMER
- MARSHALLING CABINET

TC1 TRIP CIRCUIT

POLE DISAGREEMENT ALARM

LOW SF6 GAS LOCKOUT

TRIP #1 LOW SF6 GAS LOCKOUT

TRIP #1 POLE DISAGREEMENT

LEFT PHASE POLE 5 - 6

CENTER PHASE POLE 3 - 4

RIGHT PHASE POLE 1 - 2

REV	DATE	DESCRIPTION	DWN	CKD	APP
A	06/30/25	90% DESIGN SUBMITTAL	KWN	MC	GDK

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

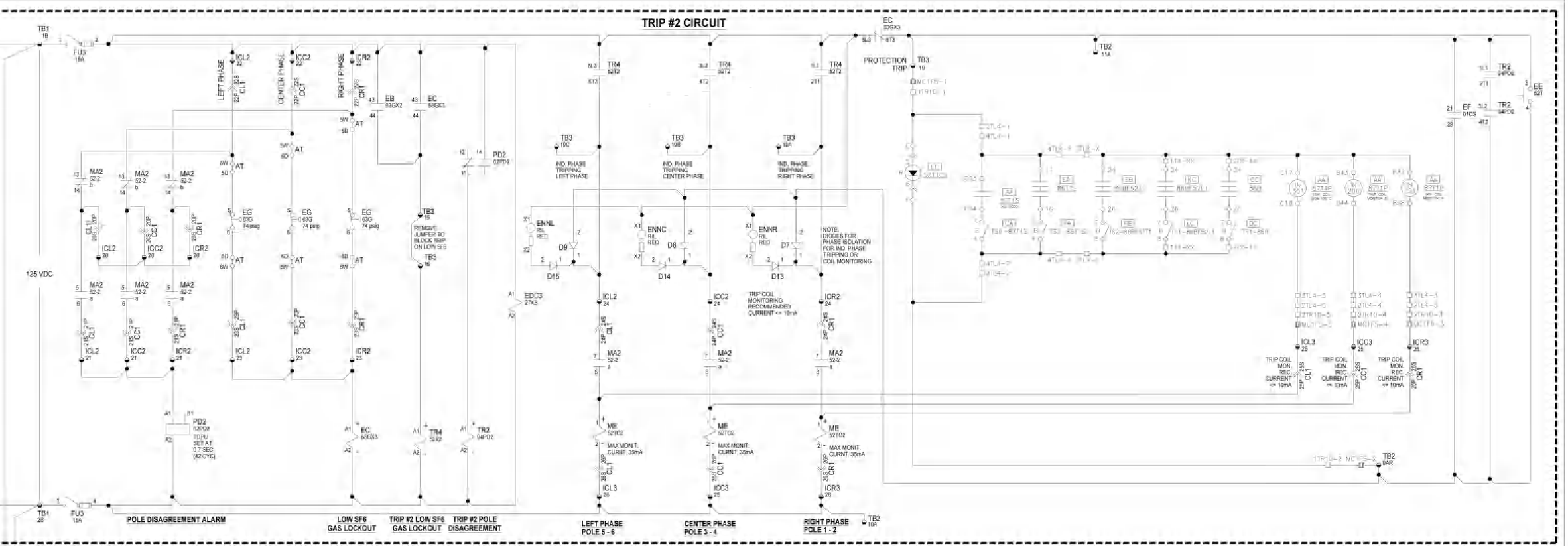
CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

345kV BREAKER 52T1
CLOSE & TRIP COIL 1

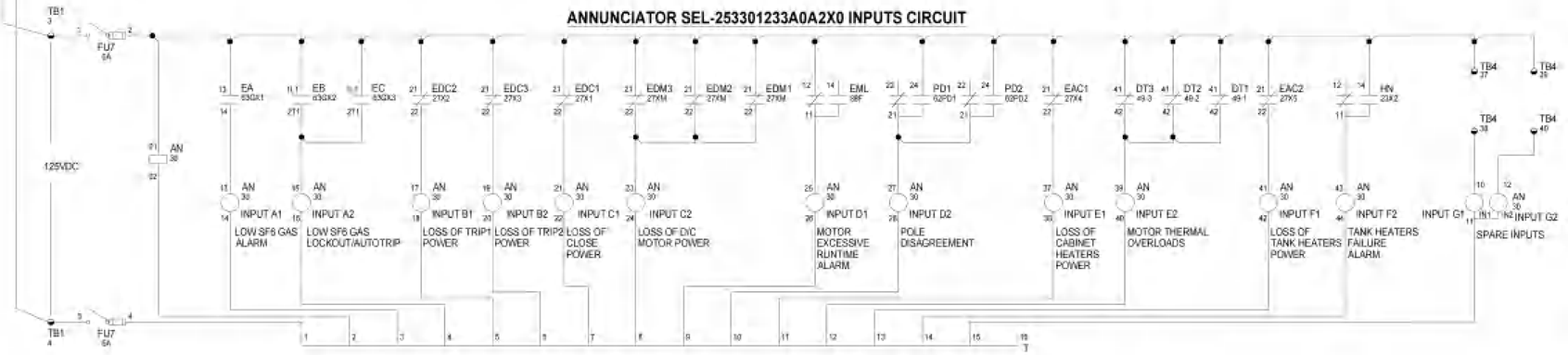
LOCATION: 5951 CR 268, BROWN COUNTY, TEXAS

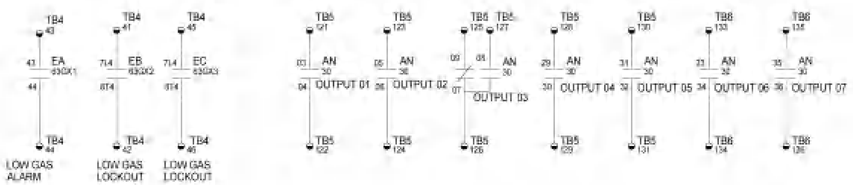
FILE NAME	24144-01-1321
JOB NUMBER	24144-01
DRAWING NUMBER	1321

TRIP #2 CIRCUIT



ANNUNCIATOR SEL-253301233A0A2X0 INPUTS CIRCUIT





NOTES:
1. ALL DEVICES SHOWN IN DE-ENERGIZED POSITION.
2. BREAKER SHOWN IN OPEN POSITION.
3. SF6 SHOWN AT ZERO PRESSURE.
4. CHARGING SPRING SHOWN IS CHARGED POSITION.

XXX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
	RELAY PANEL
	RELAY PANEL, SHORTING TYPE
	BREAKER, CIRCUIT SWITCHER, RECLOSER
	INSTRUMENT TRANSFORMER
	POWER TRANSFORMER
	MARSHALLING CABINET

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

CIRCUIT BREAKER	INDICATOR LIGHT
CABINET LIGHT	KNIFE SWITCH
COIL	MOTOR
CONTACT, NORMALLY CLOSED	PUSHBUTTON
CONTACT, NORMALLY OPEN	RESISTOR/ HEATER
CONNECTOR	TERMINAL BLOCK
DENSITY MONITOR	TERMINAL BLOCK (AUXILIARY)
DOOR SWITCH	THERMOSTAT
FUSE BLOCK	TRIP COIL MONITOR
FUSE BLOCK, SLUGGED	TOGGLE SWITCH
FUSED DISCONNECT	TRANSFORMER
FUSED DISCONNECT, SLUGGED	
FUSE PULLOUT	
FUSE PULLOUT, SLUGGED	
INTERNAL WIRING CONNECTION	
CUSTOMER CONNECTION	

STANDARD ANSI DESIGNATIONS

- 01CS BREAKER CONTROL SWITCH
- 23 THERMOSTAT
- 23X HEATER CONTACTOR
- 27X LOSS OF POWER RELAY
- 30 ANNUNCIATOR
- 37 UNDERCURRENT ALARM
- 49 MOTOR THERMAL OVERLOAD
- 52C CLOSE PUSHBUTTON
- 52CC BREAKER CLOSE COIL
- 52T TRIP PUSHBUTTON
- 52TC BREAKER TRIP COIL
- 52X CLOSING RELAY
- 52Y ANTIPUMP RELAY
- 52-MON BREAKER CONDITION MONITOR
- 63G SF6 PRESSURE / DENSITY GAUGE
- 63GX SF6 PRESSURE / DENSITY RELAY
- 69 PERMISSIVE CONTROL SWITCH
- 69-KI KEY INTERLOCK
- 74CC CLOSE COIL MONITOR
- 74TC TRIP COIL MONITOR
- 79X RECLOSE DELAY RELAY
- 83X MOTOR TRANSFER CONTACTOR
- 88 MOTOR
- 88F MOTOR FAILURE ALARM
- 88LS MOTOR LIMIT SWITCH
- AIL AMBER INDICATOR LIGHT
- GIL GREEN INDICATOR LIGHT
- HTR HEATER
- RIL RED INDICATOR LIGHT
- TCM TRIP COIL MONITOR
- 94D1(TR1) POLE DISAGREEMENT

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EOR

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

SUBJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52T1
TRIP COIL 2 & ANNUCIATOR

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-152
JOB NUMBER	24144-01
DRAWING NUMBER	1322

TO 240/120VAC DIST. PANEL ACP1 (BKR #5,7)
DWG. D-1901

TANK HEATERS

TBAT 1 — FU8 30A — TB10 4

MC1F1-1 (X)

240VAC 60Hz

NOTE: LOOP TEFZEL OR SIS WIRE THROUGH BP 3X
SET BP AT 45A

BP 37 (3P 3P 3P)

TB10 1 — TB10 2

TBAT 2 — FU8 30A

MC1F1-2 (Y)

EHR 23X1 (1L1 / 2T1)	EHR 23X1 (3L2 / 4T2)	EHR 23X1 (5L3 / 6T3)	EHR 23X1 (13NO / 14NO)
ICL4 39 / ICL4 40 — CL1 39P 39S 40S 40P	ICC4 39 / ICC4 40 — CC1 39P 39S 40S 40P	ICR4 39 / ICR4 40 — CR1 39P 39S 40S 40P	TH3 23 25C (-13F) NC1 C1
BPL 1W 1D / 3W 3D	BPC 1W 1D / 3W 3D	BPR 1W 1D / 3W 3D	NC NO BP 37 C
HL1 HTR-T3 750 W 76.8 OHMS 1 2	HC1 HTR-T2 750 W 76.8 OHMS 1 2	HR1 HTR-T1 750 W 76.8 OHMS 1 2	EHR 23X1 A1 A2
HL2 HTR-T3 750 W 76.8 OHMS 2 1	HC2 HTR-T2 750 W 76.8 OHMS 2 1	HR2 HTR-T1 750 W 76.8 OHMS 2 1	TDPU SET AT 5 SEC
BPL 2D 2W / 4D 4W	BPC 2D 2W / 4D 4W	BPR 2D 2W / 4D 4W	EAC2 27X5 A1 A2
CL1 41P 41S / 42S 42P	CC1 41P 41S / 42S 42P	CR1 41P 41S / 42S 42P	
ICL4 41 / ICL4 42	ICC4 41 / ICC4 42	ICR4 41 / ICR4 42	

LEFT PHASE POLE 5 - 6 — CENTER PHASE POLE 3 - 4 — RIGHT PHASE POLE 1 - 2

CONTROL CABINET HEATERS

TBAC 1 — FU5 20A

240VAC 60Hz

AT1 1W 1D — TH1 23 0C/ 32F 1 2 — TH 23 45-90 F (7-32 C) 1 2

HT 4W 4D / 6W 6D — H1 HTR 95 W 600 OHM 1 3 — HT 1W 1D / 3W 3D — H HTR 95 W 600 OHM 1 3

HT 6D 5W — HT 2D 2W

AT1 2D 2W

TBAC 2 — FU5 20A

MECHANISM CABINET HEATERS

LEFT PHASE POLE 5 - 6	CENTER PHASE POLE 3 - 4	RIGHT PHASE POLE 1 - 2
ICL4 37 — CL1 37P 37S	ICC4 37 — CC1 37P 37S	ICR4 37 — CR1 37P 37S
TH2 23 45-90 F (7-32 C) 1 2	TH2 23 45-90 F (7-32 C) 1 2	TH2 23 45-90 F (7-32 C) 1 2
HT2 1W 1D / 3W 3D	HT2 1W 1D / 3W 3D	HT2 1W 1D / 3W 3D
H2 HTR 95 W 600 OHM 1 3	H2 HTR 95 W 600 OHM 1 3	H2 HTR 95 W 600 OHM 1 3
H3 HTR 95 W 600 OHM 3 1	H3 HTR 95 W 600 OHM 3 1	H3 HTR 95 W 600 OHM 3 1
HT2 2D 2W / 4D 4W	HT2 2D 2W / 4D 4W	HT2 2D 2W / 4D 4W
CL1 39P 39S — ICL4 38	CC1 39P 39S — ICC4 38	CR1 39P 39S — ICR4 38

EAC1 27X4 A1 A2

CABINET RECEPTACLE

TBAC 3 — FU6 20A

120VAC 60Hz

PL1 120 VAC
20 A
1 - LINE
2 - NEUTRAL
3 - GND
4 - LOAD LINE
5 - LOAD NEUTRAL

MC1F1-3 (N)

TBAC 4

CABINET LIGHTING

DSW 1 2 — L1 L2 — GND L1 — GND L2

GND TH 23 — GND AN 30

GND1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

GND2	GND2	GND2
TH2 23	TH2 23	TH2 23
AT 7W 7D	AT 7W 7D	AT 7W 7D
EG 63G	EG 63G	EG 63G
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

MOTOR CIRCUIT

TBM 1M

TO TRIP COIL DWG. D-1321

FU4L 20A	FU4C 20A	FU4R 20A
DT3 49-3 16-20A — ICL3 29 / 30 — CL1 29S 30S	DT2 49-2 16-20A — ICC3 29 / 30 — CC1 29S 30S	DT1 49-1 16-20A — ICR3 29 / 30 — CR1 29S 30S
MB 88LS	MB 88LS	MB 88LS
M 88 125VDC 2100 W	M 88 125VDC 2100 W	M 88 125VDC 2100 W
MB 88LS	MB 88LS	MB 88LS
CL1 31P 31S / 32S 32P	CC1 31P 31S / 32S 32P	CR1 31P 31S / 32S 32P
ICL3 31 / ICL3 32	ICC3 31 / ICC3 32	ICR3 31 / ICR3 32
DT3 16-20A 49-3	DT2 16-20A 49-2	DT1 16-20A 49-1
125VDC	125VDC	125VDC
EDM3 27KM	EDM2 27KM	EDM1 27KM
LEFT PHASE	CENTER PHASE	RIGHT PHASE

TBM 2M

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

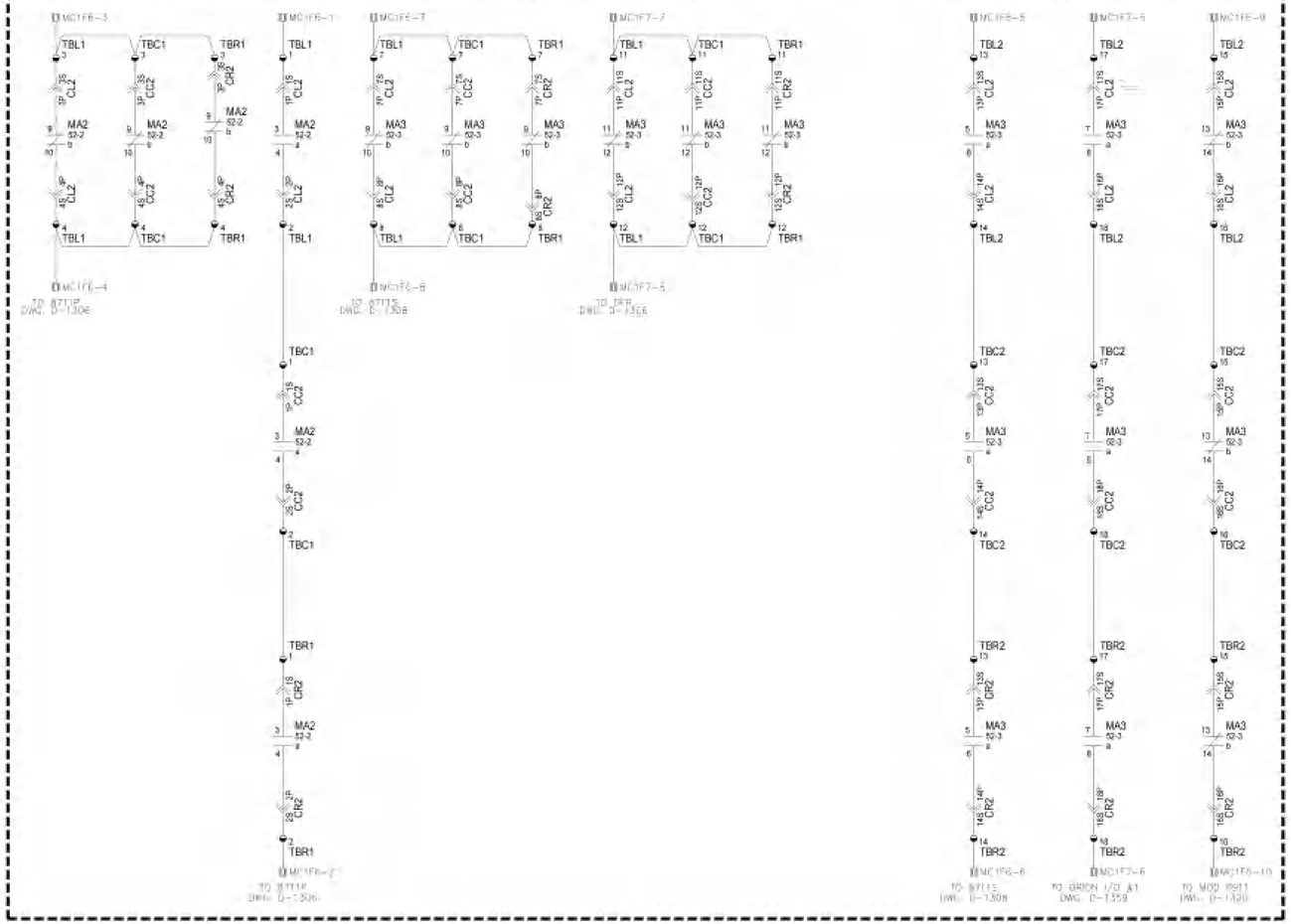
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52T1
AC SYSTEMS & MOTOR CIRCUIT

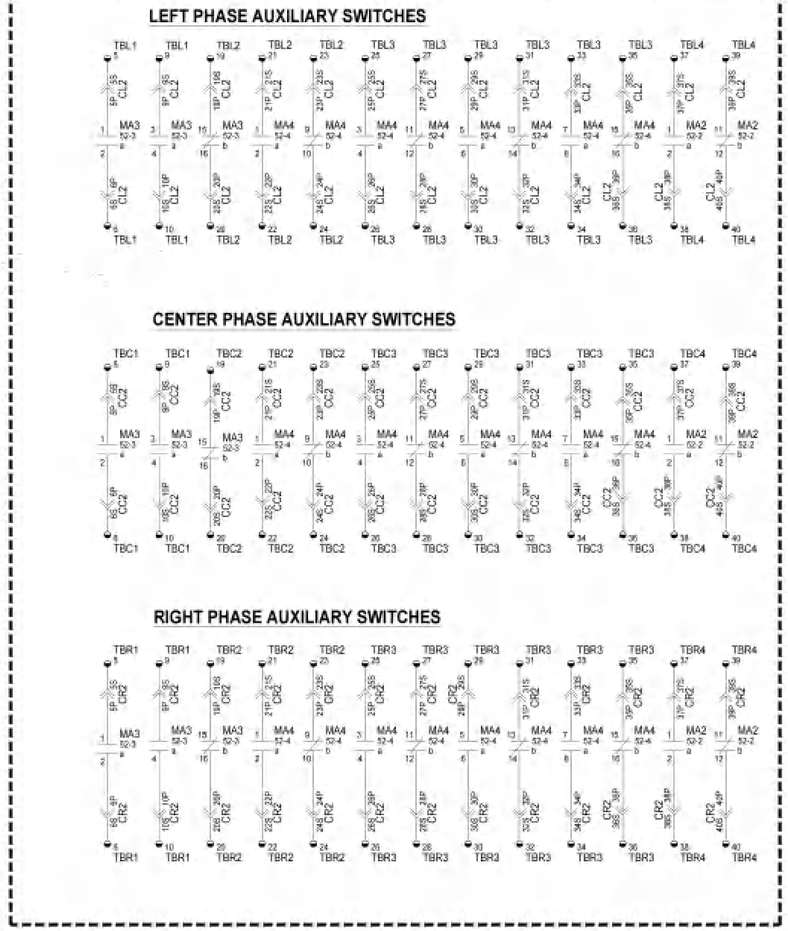
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1323
JOB NUMBER	24144-01
DRAWING NUMBER	1323

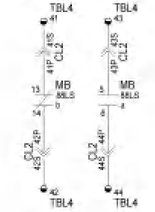
CONTACTS IN USE



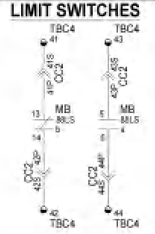
SPARE CONTACTS



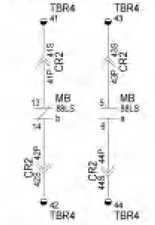
LEFT PHASE MOTOR LIMIT SWITCHES



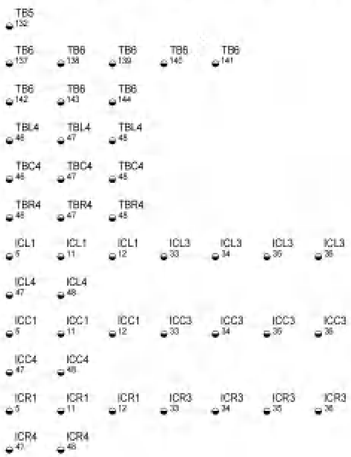
CENTER PHASE MOTOR LIMIT SWITCHES



RIGHT PHASE MOTOR LIMIT SWITCHES



SPARE TERMINALS FOR CUSTOMER USE



EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR
PROJECT	CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION
TITLE	345kV BREAKER 52T1 AUXILIARY CONTACTS
LOCATION	8897 CR 268, BROWN COUNTY, TEXAS
FILE NAME	24144-01-1324
JOB NUMBER	24144-01
DRAWING NUMBER	1324

MAIN POWER SUPPLY
1Φ 120/240V AC 60Hz
TO AC PANEL ACP1
(BKR#1,2)
(DWG. D-1581)

MC1E1-1 MC1E1-2 MC1E1-3

OLTC MAIN POWER
1Φ 120 AC 60Hz

TO TAP-CHANGER CONTROL
(DWG. D-1329)

B-AC3
S8025-C10
10AT

B-AC4
S8025-C10
10AT

B
S8025-D80
60AT

TO DGA
(DWG. D-1326)

3TRX-X
4TRX-X
4TRX-X
3TRX-X
4TRX-X

LTC
86T1P

EA
86T1S

MC1E4-4 JUMPER MC1E4-5
TQ 11 TQ 12

NOTE: FIELD TO REMOVE JUMPER

B-AC1
S8015-C20
20AT

CONTACTS LOCATED FROM TOP OIL THERMOMETER
26Q1/26Q2
FAN COOLING 55 °C

CONTACTS LOCATED FROM ETM(49TM)
ETM
FAN COOLING 65 °C

ETM
FAN COOLING 75 °C

CONTACTS LOCATED FROM TOP OIL THERMOMETER
26Q1/26Q2
FAN COOLING 65 °C

27X1
27X2

43-1 MAN AUTO
43-2 MAN AUTO
43SF

4-1
4-2

52-1
S8025-D32
32AT

52-2
S8025-D32
32AT

4-1
AF26300013

4-2
AF26300013

27x1 (CM-ESS.M AC240V)			
○	11	14	DWG. 1326
●	11	12	DWG. 1326
●	21	22	
○	21	24	

52F1~19 (MS116-16)			
○	13	14	
●	21	22	DWG. 1326

4-1 (AF26300013 AC240V)			
○	1	2	THS DWG.
○	3	4	
○	5	6	THS DWG.
○	13	14	DWG. 1326
●	21	22	

4-2 (AF26300013 AC240V)			
○	1	2	THS DWG.
○	3	4	
○	5	6	THD DWG.
○	13	14	DWG. 1326
●	21	22	

52F11 52F12 52F13 52F14 52F15 52F16 52F17 52F18 52F19 52F20

TA2 1 2 3 FAN MOTOR #11
TA2 4 5 6 FAN MOTOR #12
TA2 7 8 9 FAN MOTOR #13
TA2 10 11 12 FAN MOTOR #14
TA2 13 14 15 FAN MOTOR #15
TA2 16 17 18 FAN MOTOR #16
TA2 19 20 21 FAN MOTOR #17
TA2 22 23 24 FAN MOTOR #18
TA2 25 26 27 FAN MOTOR #19
TA2 28 29 30 FAN MOTOR #20

STAGE 2

52F1 52F2 52F3 52F4 52F5 52F6 52F7 52F8 52F9 52F10

TA1 1 2 3 FAN MOTOR #1
TA1 4 5 6 FAN MOTOR #2
TA1 7 8 9 FAN MOTOR #3
TA1 10 11 12 FAN MOTOR #4
TA1 13 14 15 FAN MOTOR #5
TA1 16 17 18 FAN MOTOR #6
TA1 19 20 21 FAN MOTOR #7
TA1 22 23 24 FAN MOTOR #8
TA1 25 26 27 FAN MOTOR #9
TA1 28 29 30 FAN MOTOR #10

STAGE 1

B-AC2
S8015-C20
20AT

SW1 S8015-C10 10AT
SW2 S8025-C10 10AT
SW3 S8015-C10 10AT
SW4 S8015-C10 10AT
SW5 S8015-C10 10AT
SW6 S8015-C10 10AT

23-1 23-2
DS1 DS2
SH1 AC 120V 100W
SH2 AC 120V 100W
SW2 S8025-C10 10AT
GFI AC 120V
FL1 AC 120V 9W
FL2 AC 120V 9W

TS 1 TS 2 74DB1
TU 1 TU 2 74DB2
TY 10 TY 11 49T1&49T2 A26Q

43-1~2
MAN OFF AUTO

43SF
A B

27X2 (CM-ESS.M AC120V)			
○	11	14	DWG. 1326
●	11	12	DWG. 1326
●	21	22	
○	21	24	

FAN MOTOR IS 1PHASE 60Hz 1/3HP 240V (FALL LOAD CURRENT: 1.8A)
⇒52F1~52F20 SETTING VALUE: 1.8A X 1.2=2.16A(SET : 2.2A)
■ : THE LOCATION ON THE TRANSFORMER BODY OR LTC

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▥	MARSHALLING CABINET

REF. CHINT EQUIPMENT DRAWING DOC.NO:1ZD8207200P-00365 SHT 3 & 4 REV 01

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

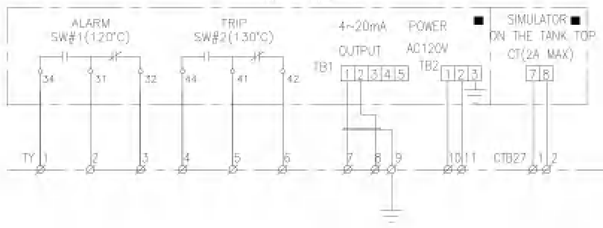
PROJECT
CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE
TRANSFORMER T1
AC SCHEMATIC

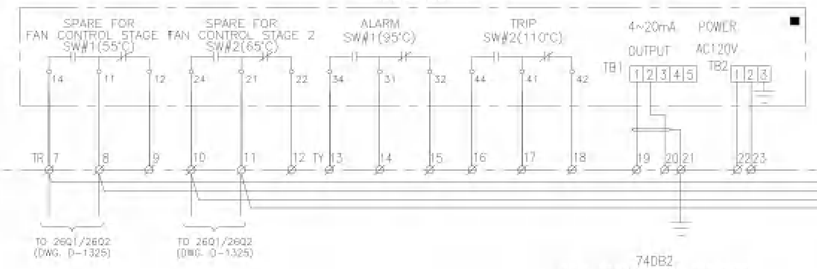
LOCATION
8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1325
JOB NUMBER	24144-01
DRAWING NUMBER	1325

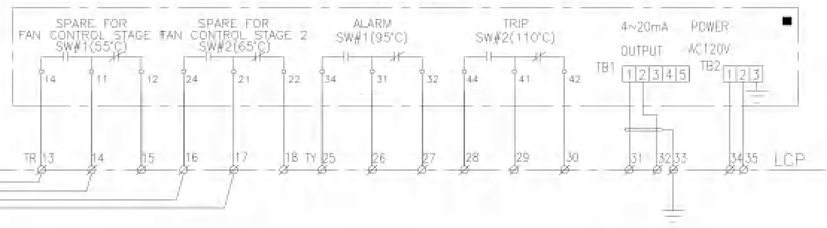
49T1
WINDING TEMPERATURE INDICATOR(LV)
QUALITROL



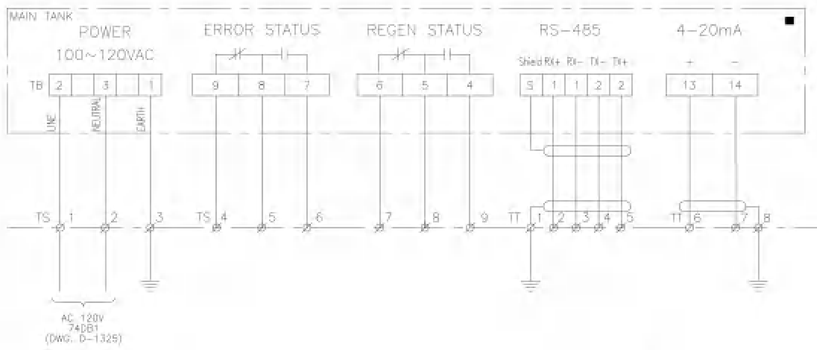
26Q1
TOP OIL TEMPERATURE THERMOMETER
QUALITROL



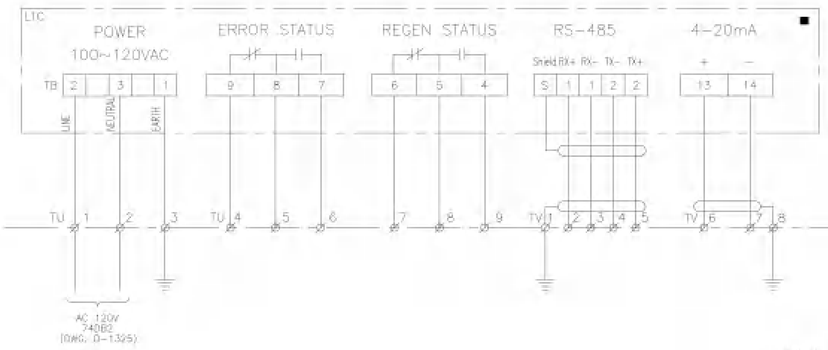
26Q2
TOP OIL TEMPERATURE THERMOMETER
QUALITROL



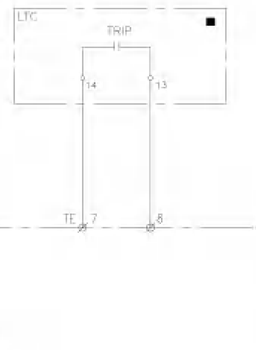
74DB1
SELF-REGENERATING BREATHER
MESSKO



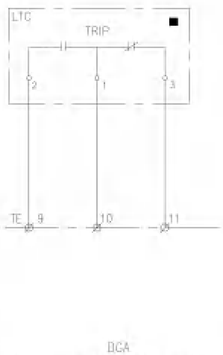
74DB2
SELF-REGENERATING BREATHER
MESSKO



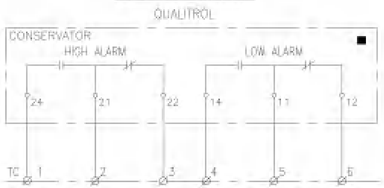
63PR3
PRESSURE RELIEF DEVICE
Messko from MR



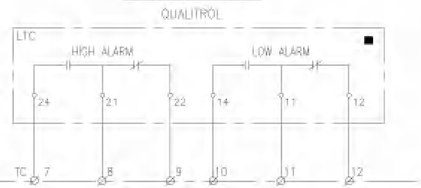
63G1
OIL FLOW RELAY
MR RS2001



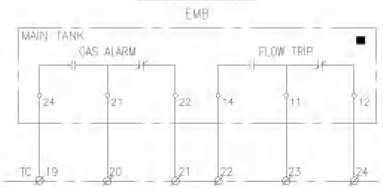
71Q1
OIL LEVEL INDICATOR
QUALITROL



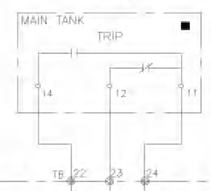
71Q2
OIL LEVEL INDICATOR
QUALITROL



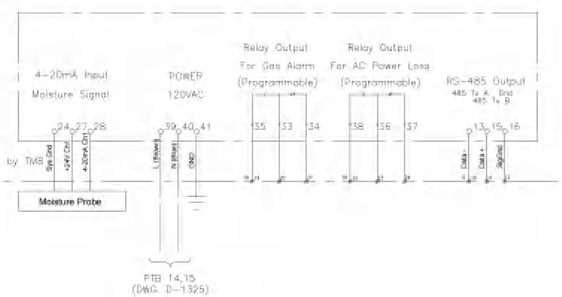
63B
BUCHHOLZ RELAY
EMB



63FP1
SUDDEN PRESSURE RELAY
QUALITROL

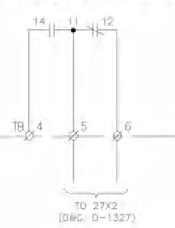


DGA
Dissolved Gas Analysis (DGA) Monitoring Device
Qualitrol TMB



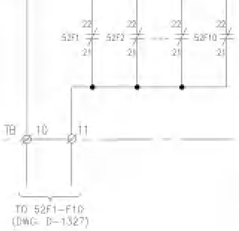
27X1
MAIN POWER LOSS ALARM

27X2
AC CONTROL POWER LOSS ALARM

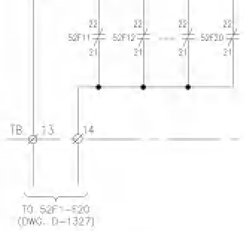


27D
DC CONTROL
POWER LOSS ALARM

STAGE 1
FAN FAILURE ALARM

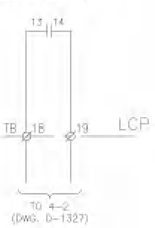


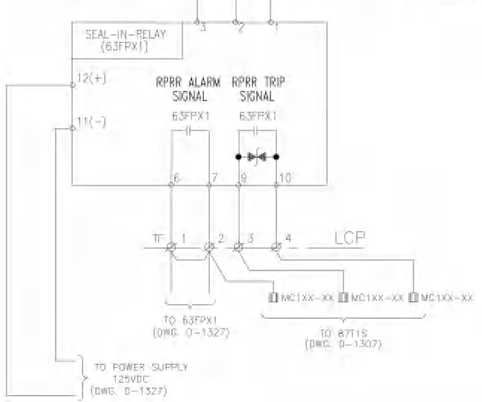
STAGE 2
FAN FAILURE ALARM



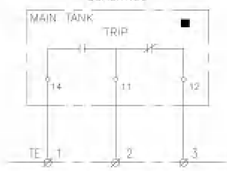
4-1
GROUP 1 RUNNING

4-2
GROUP 2 RUNNING

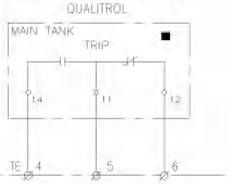




63PR1
PRESSURE RELIEF DEVICE 1#
QUALITROL



63PR2
PRESSURE RELIEF DEVICE 2#
QUALITROL



■ : THIS LOCATION ON THE TRANSFORMER BODY OR LTC

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▥	MARSHALLING CABINET

REF. CHINT EQUIPMENT DRAWING DOC.NO:12DB207280P-00365 SHT 5 REV 01

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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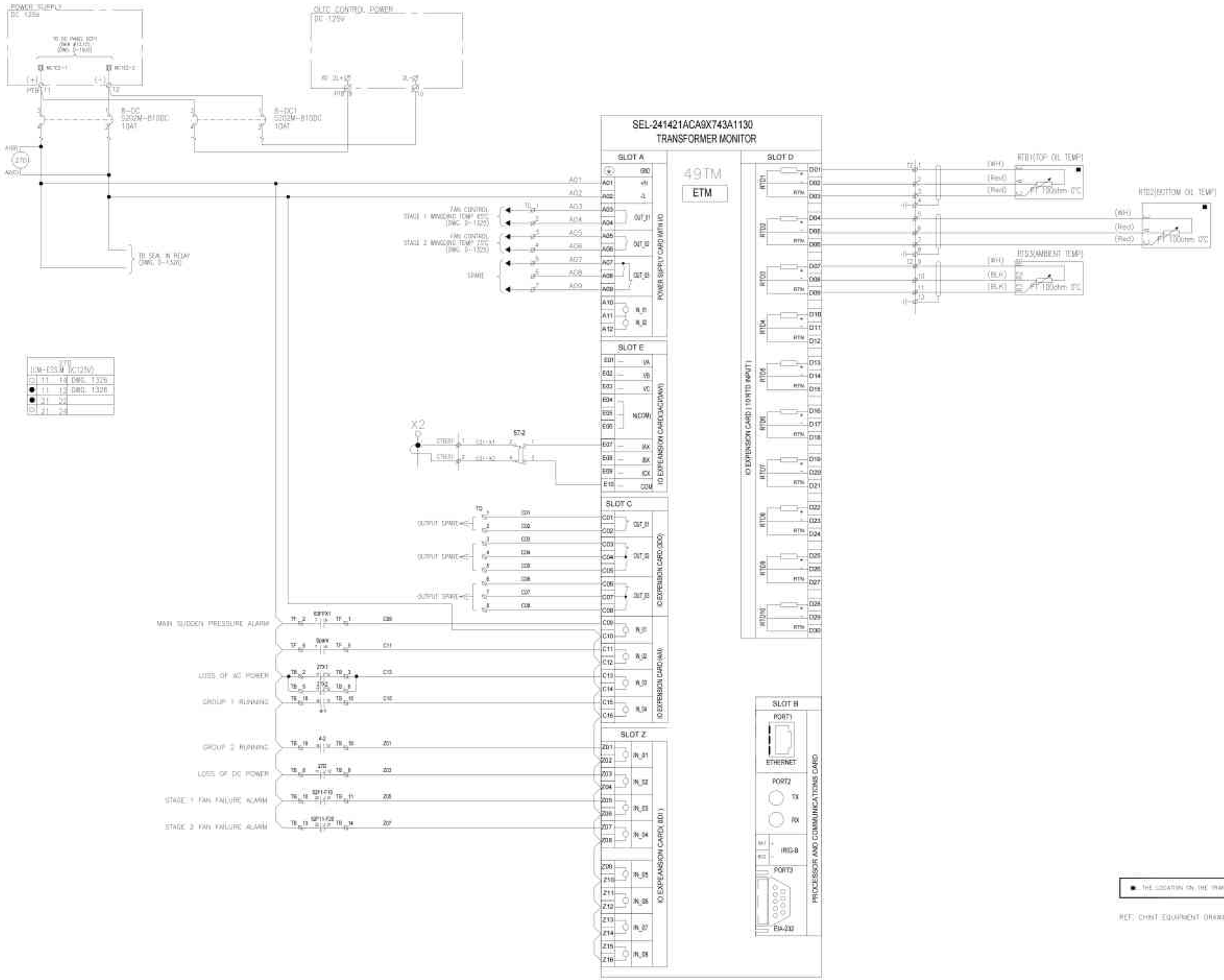
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
DC SCHEMATIC

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1326
JOB NUMBER: 24144-01
DRAWING NUMBER: 1326



● THE LOCATION ON THE TRANSFORMER BODY OR LTC

REF. CHINT EQUIPMENT DRAWING DOC:NO1Z030072000P-00368 SHT 6 REV 01

[XX] WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV.	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

STAMP

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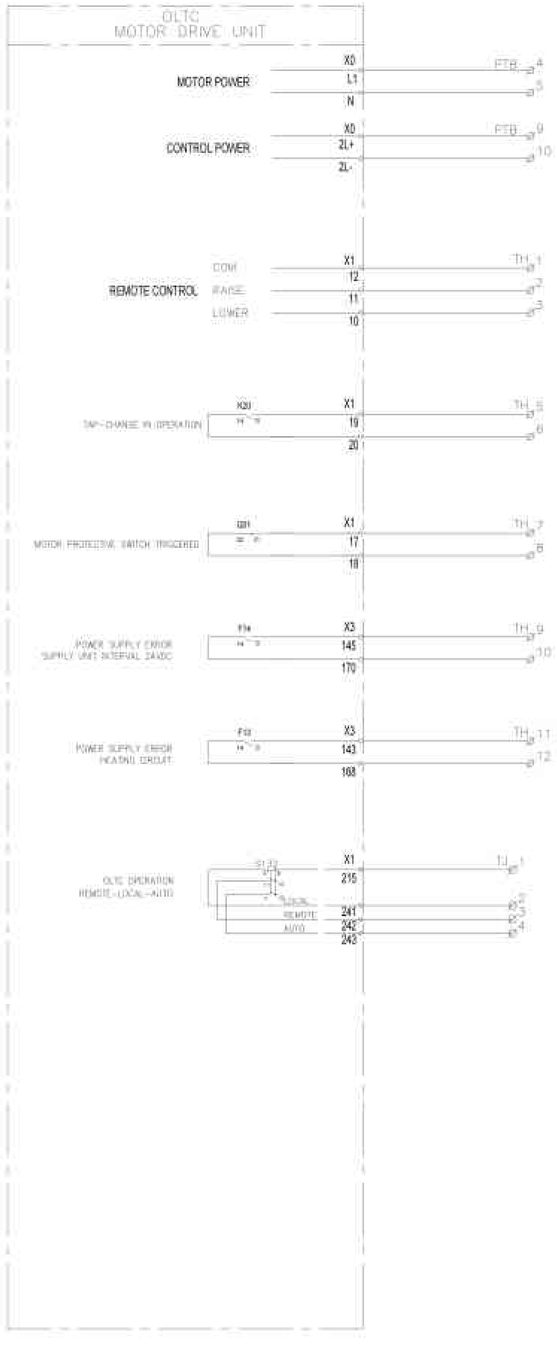
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDK

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
DC SCHEMATIC

LOCATION: 8087 CR 269, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1327
JOB NUMBER	24144-01
DRAWING NUMBER	1327



REF. JOINT EQUIPMENT DRAWING DOC.NO.1ZEB3372002F-00365 SHT 8 REV 01

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

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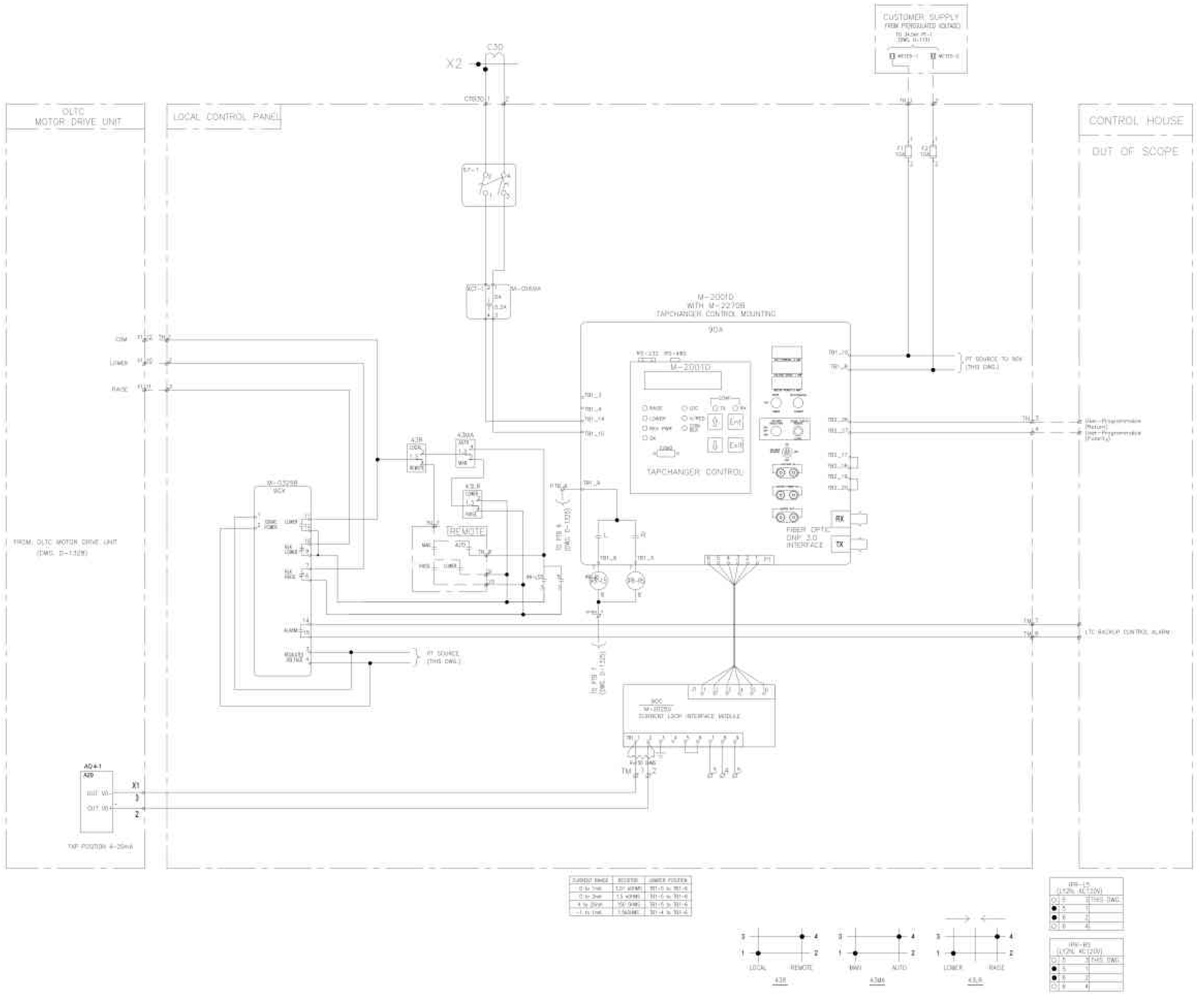
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1328
JOB NUMBER	24144-01
DRAWING NUMBER	1328



CURRENT RANGE	RESISTOR	LOWER POSITION
0 to 1mA	12K ohms	301-5 to 301-6
0 to 2mA	6K ohms	301-5 to 301-6
4 to 20mA	150 ohms	301-5 to 301-6
-1 to 1mA	1.5K ohms	301-4 to 301-6

REF. JOINT EQUIPMENT DRAWING DOC.NO.1Z8E0372GSP-00565 SHT # REV 01

REV	DATE	DESCRIPTION	DRN	CAD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDK

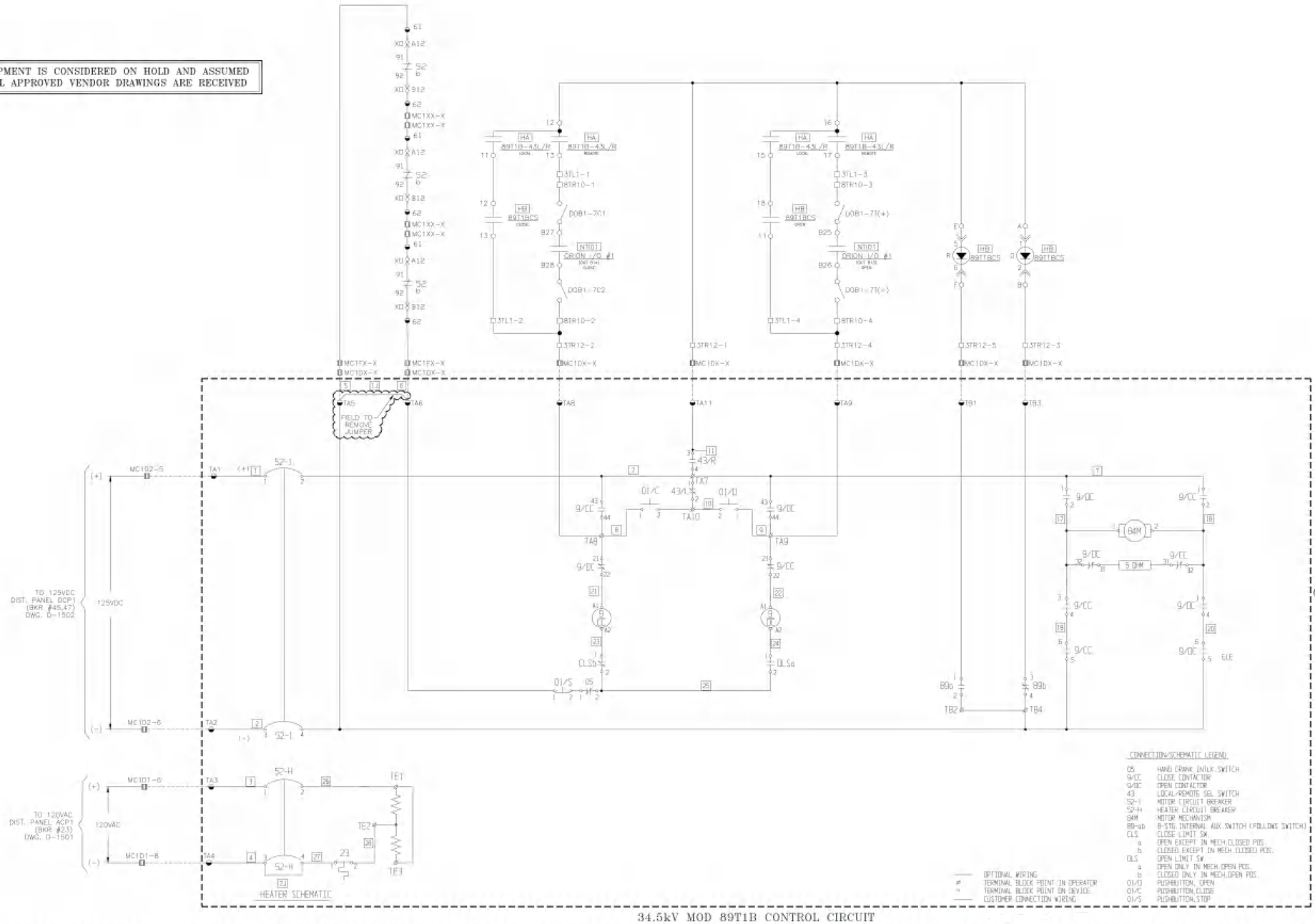
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T1
DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1329
JOB NUMBER	24144-01
DRAWING NUMBER	1329

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED



34.5kV MOD 89T1B CONTROL CIRCUIT

89T1BCS

DEVICE 89T1BCS

DISCONNECT SWITCH

C R

OPEN CLOSE

DECK	CONTACTS		TRIP	POSITION NORMAL	POSITION CLOSE	FUNCTION
1	10	11	X			OPEN
	12	13			X	CLOSE
	14	15	X			
	16	17		X		
2	20	21	X			
	22	23		X		
	24	25	X			
	26	27		X		

ELECTROSWITCH SERIES 74PB202NN
ENGRAVING CODE 1238-2025MM

89T1B-43L/R

DEVICE 89T1B-43L/R

LOCAL REMOTE SW

LOCAL

REMOTE

DECK	CONTACTS		POS. LOCAL	POS. REMOTE	FUNCTION
1	12	11	X		LOCAL CLOSE
		13		X	REM. CLOSE
	16	15	X		LOCAL OPEN
		17		X	REM. OPEN
2	22	21	X		
		23		X	
	26	25	X		STATUS BELOW
		27		X	

ELECTROSWITCH SERIES 242028
ENGRAVING CODE 10D-2L24A

CONNECTION/SCHEMATIC LEGEND

05	HAND CRANK SWITCH
9/CC	CLOSE CONTACTOR
9/OC	OPEN CONTACTOR
43	LOCAL/REMOTE SEL. SWITCH
52-1	MOTOR CIRCUIT BREAKER
52-H	HEATER CIRCUIT BREAKER
84M	MOTOR MECHANISM
89-ab	B-STG INTERNAL AUX. SWITCH (FOLLOWS SWITCH)
CLS	CLOSE LIMIT SW.
a	OPEN EXCEPT IN MECH.CLOSED POS.
b	CLOSED EXCEPT IN MECH.CLOSED POS.
OLS	OPEN LIMIT SW.
a	OPEN ONLY IN MECH.OPEN POS.
b	CLOSED ONLY IN MECH.OPEN POS.
01/O	PUSHBUTTON, OPEN
01/C	PUSHBUTTON, CLOSE
01/S	PUSHBUTTON, STOP

OPTIONAL WIRING
TERMINAL BLOCK POINT IN OPERATOR
TERMINAL BLOCK POINT ON DEVICE
CUSTOMER CONNECTION WIRING

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▯	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

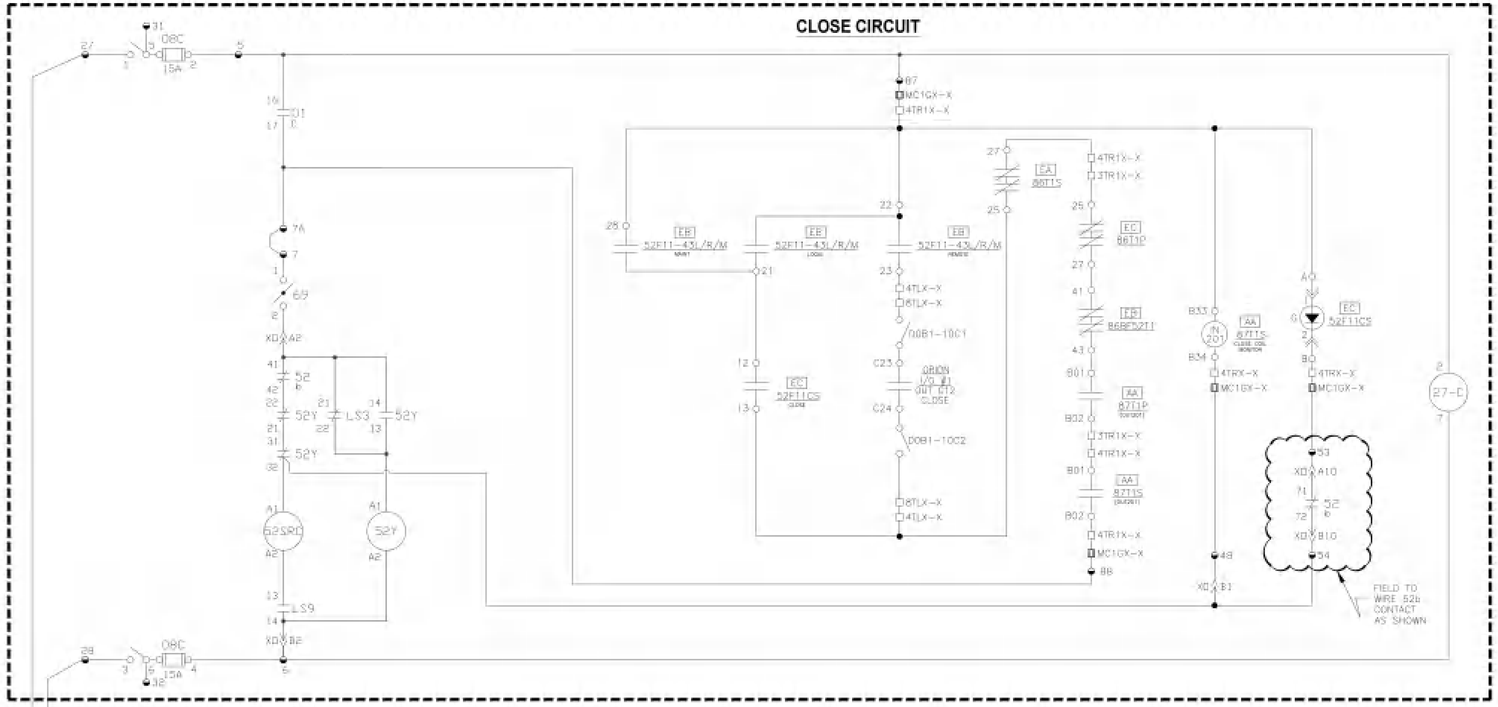
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV MOD SWITCH 89T1B DC SCHEMATIC

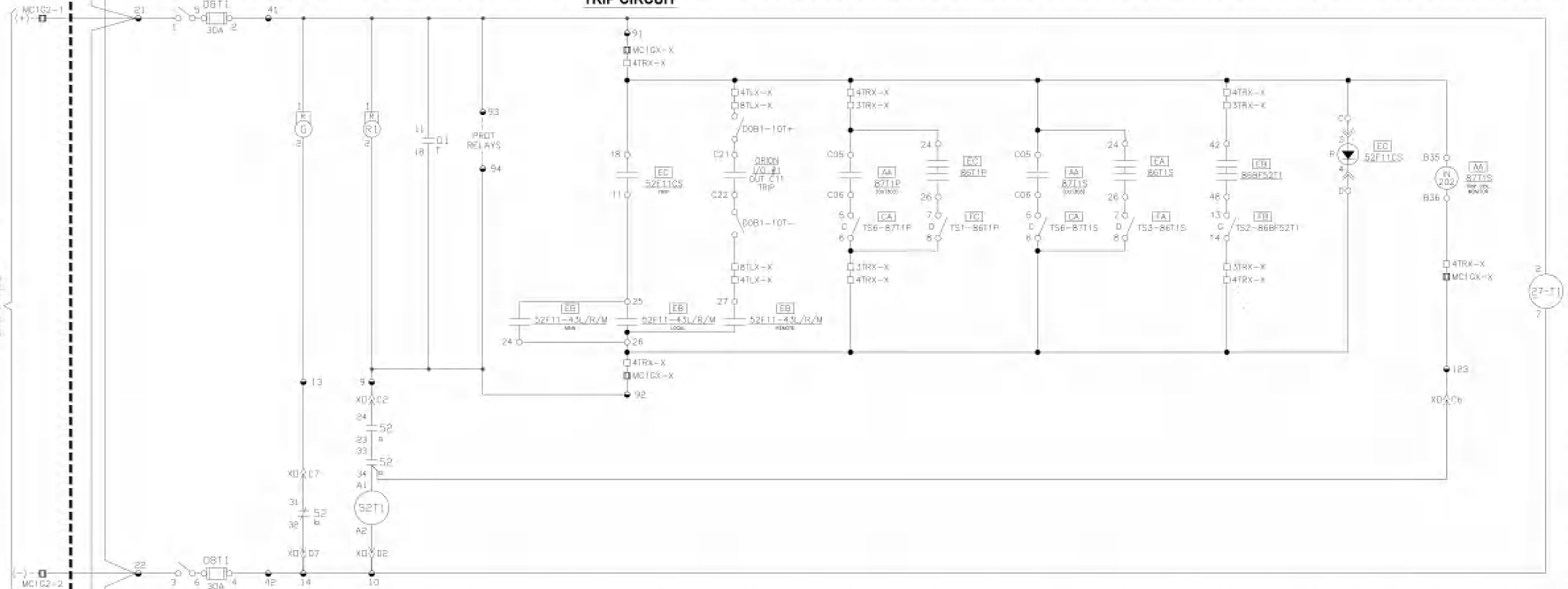
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1330
JOB NUMBER	24144-01
DRAWING NUMBER	1330

CLOSE CIRCUIT



TRIP CIRCUIT



DEVICE 52F11CS

BREAKER CONTROL

C R R

TRIP CLOSE

ELECTROSWITCH SERIES 74PD202LT
ENGRAVING CODE 123B-2B23

52F11CS

DECK	CONTACTS		POSITION TRIP	POSITION NORMAL	POSITION CLOSE	FUNCTION
1	18	11	X			TC1
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

DEVICE 52F11-43L/R/M

LOCAL REMOTE SW

LOCAL

REMOTE

ELECTROSWITCH SERIES 24204AMS
ENGRAVING CODE 100-2L24A

52F11-43L/R/M

DECK	CONTACTS		POSITION MAINT	POSITION LOCAL	POSITION REMOTE	DESCRIPTION
1	18	11	X			
	11	12	X			
	12	13			X	
	14	15	X			
	15	16		X		
	16	17			X	
2	28	21	X			MAINT. CLOSE
	21	22		X		LOCAL CLOSE
	22	23			X	REMOTE CLOSE
	24	25	X			MAINT. TRIP
	25	26		X		LOCAL TRIP
	26	27			X	REMOTE TRIP
3	38	31	X			
	31	32		X		
	32	33			X	STATUS (SEE BELOW)
	34	35	X			STATUS (SEE BELOW)
	35	36		X		
	36	37			X	
4	48	41	X			
	44	45	X			STATUS (SEE BELOW)

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▯	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

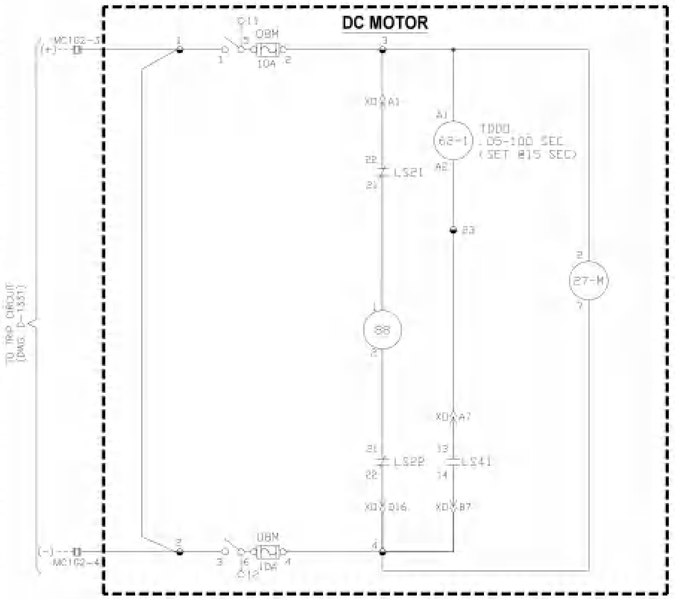
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F11 CLOSE & TRIP

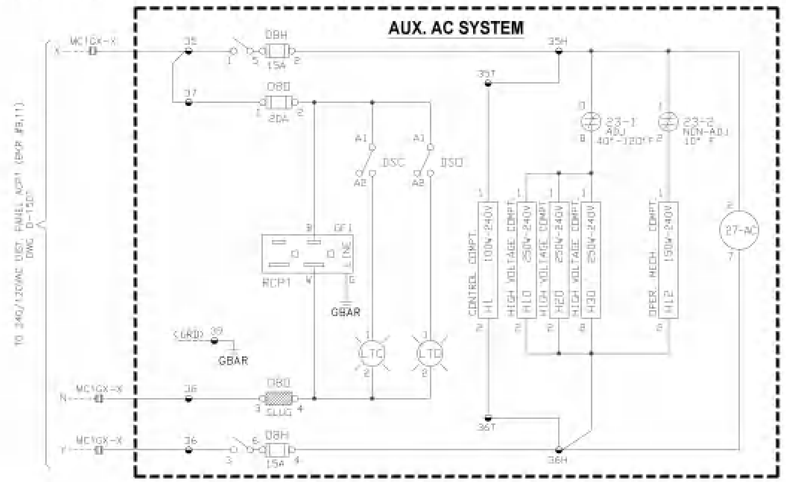
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1331
JOB NUMBER	24144-01
DRAWING NUMBER	1331

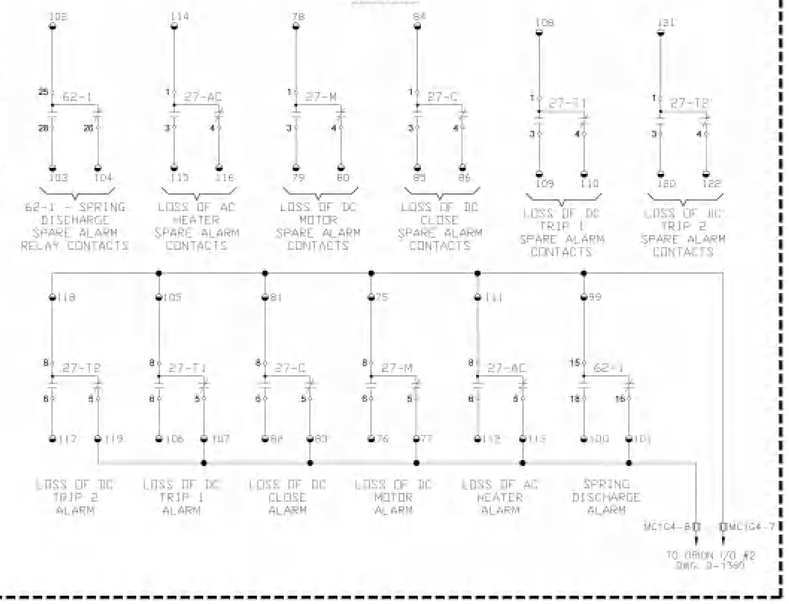
DC MOTOR



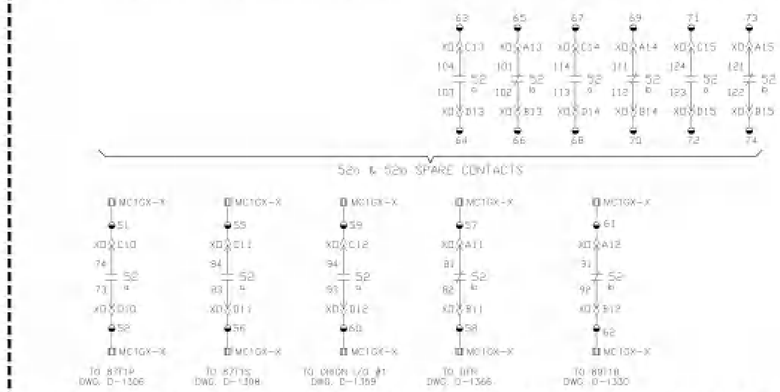
AUX. AC SYSTEM



ALARMS



52a & 52b SPARE CONTACTS



EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

LEGEND

☒01	CONTROL SWITCH	LS3	CLOSING SPRING POSITION SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
OBC	CLOSE POWER DISCONNECT	LS9	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
OBH	HEATER POWER DISCONNECT	LS21	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
OBM	MOTOR POWER DISCONNECT	LS22	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
OBD	LIGHT & RECEPTACLE POWER FUSE	LS41	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
OBT1	TRIP POWER DISCONNECT (PRIMARY)	DSC	DOOR ACTIVATED LIGHT SWITCH(CONTROL COMPT)
OBT2	TRIP POWER DISCONNECT (SECONDARY)	DSD	DOOR ACTIVATED LIGHT SWITCH(OPERATOR COMPT)
23-1	ADJUSTABLE THERMOSTAT	LTC	CONTROL COMPARTMENT LIGHT
23-2	NON-ADJUSTABLE THERMOSTAT	LTD	OPERATOR COMPARTMENT LIGHT
27-AC	LOSS OF AC VOLTAGE (HEATER CIRCUIT)	☒R1	RED INDICATING LIGHT (PRIMARY TRIP)
27-C	LOSS OF DC VOLTAGE (CLOSE CIRCUIT)	☒R2	RED INDICATING LIGHT (SECONDARY TRIP)
27-M	LOSS OF DC VOLTAGE (MOTOR CIRCUIT)	RECPT	DUPLEX RECEPTACLE (GFCI)
27-T1	LOSS OF DC VOLTAGE (TRIP 1 CIRCUIT)	XD	PLUG CONNECTOR (OPERATOR CONNECTIONS)
27-T2	LOSS OF DC VOLTAGE (TRIP 2 CIRCUIT)		
52a	AUX SWITCH, OPEN WHEN BKR OPEN		
52b	AUX SWITCH, CLOSED WHEN BKR OPEN		
52SRC	CLOSING, SPRING RELEASE COIL		
52T1	TRIP COIL (PRIMARY)		
52T2	TRIP COIL (SECONDARY)		
52Y	ANTI-PUMP RELAY		
62-1	SPRING DISCHARGE ALARM RELAY		
69	CLOSING CUTOUT SWITCH		
88	MOTOR		
☒G	GREEN INDICATING LIGHT		
H#	HEATER		

NOTES

1. ALL EQUIPMENT SHOWN WITH CIRCUIT BREAKER OPEN, TRIP LATCH NOT-RESET, RELAY DE-ENERGIZED AND SPRINGS DISCHARGED.
2. ☒ = DEVICE LOCATED ON SWITCH PANEL.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
☒	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◧	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

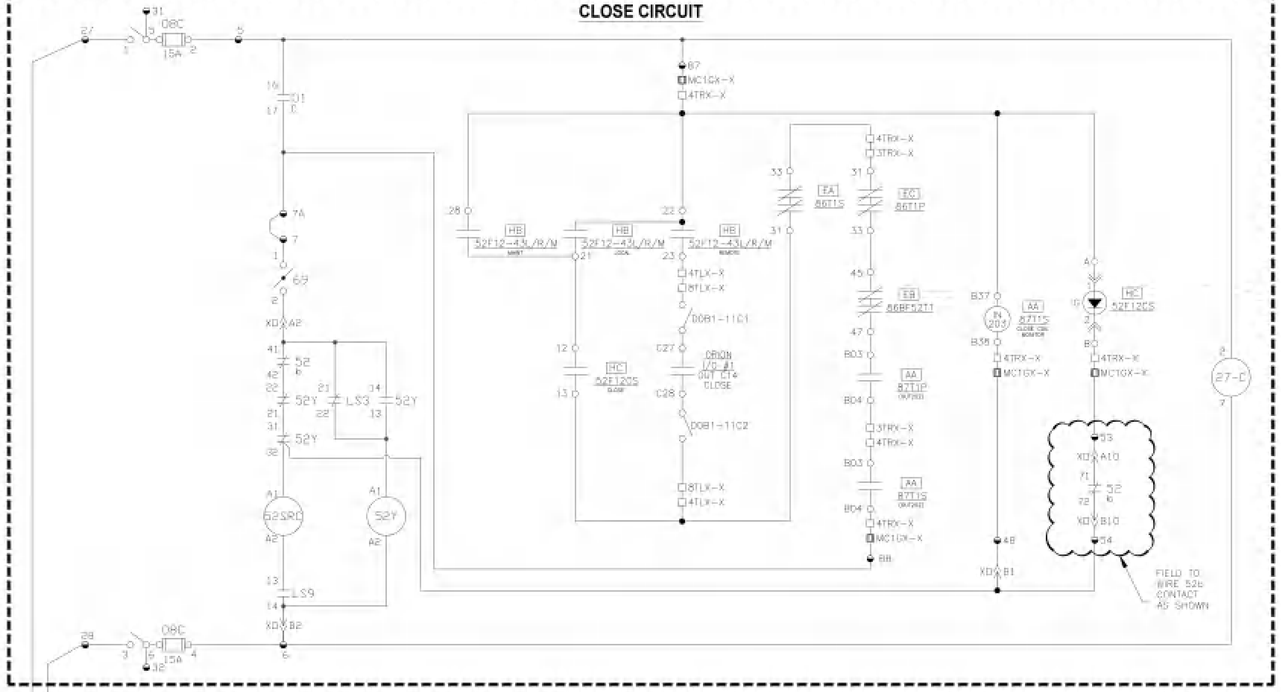
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F11
ALARMS & AC SYSTEM

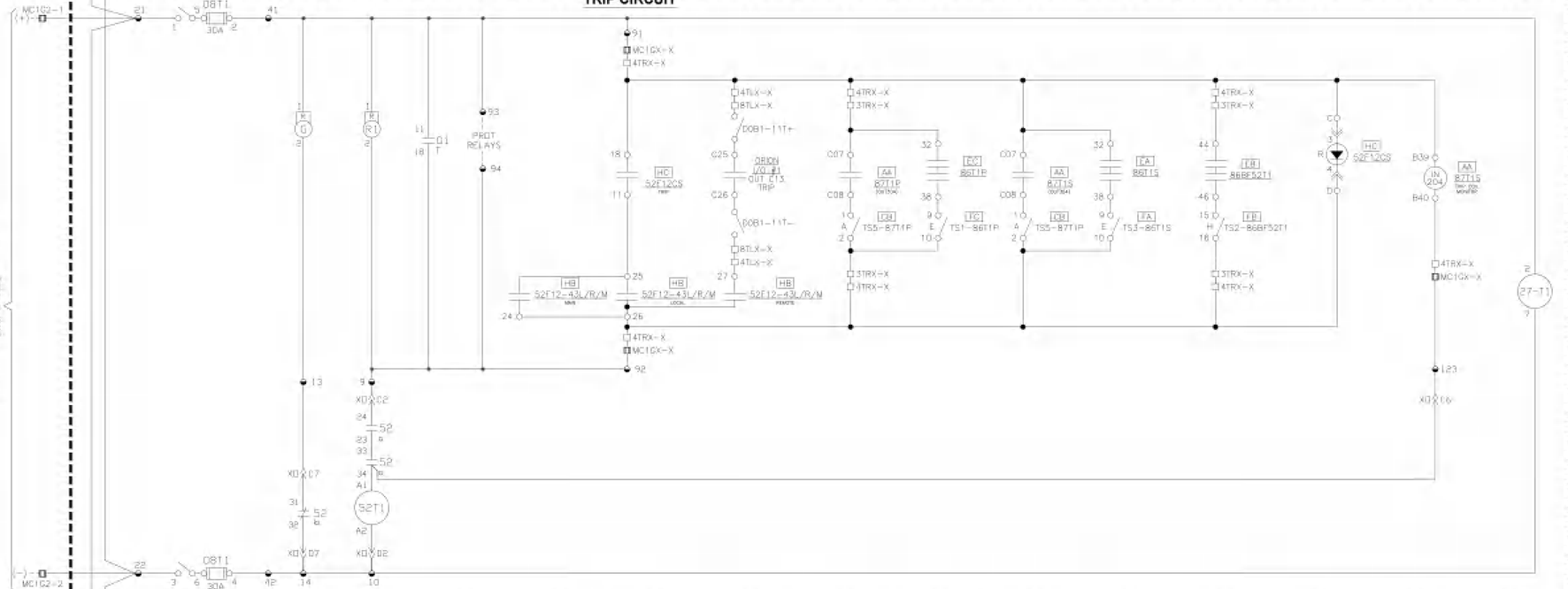
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1332
JOB NUMBER	24144-01
DRAWING NUMBER	1332

CLOSE CIRCUIT



TRIP CIRCUIT



DEVICE 52F12CS

ELECTROSWITCH SERIES 74PD202LT
ENGRAVING CODE 123B-2B23

52F12CS

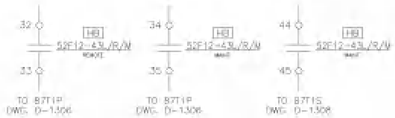
DECK	CONTACTS		POSITION: TRIP	POSITION: NORMAL	POSITION: CLOSE	FUNCTION
1	18	11	X			TC1
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

DEVICE 52F12-43L/R/M

ELECTROSWITCH SERIES 24204M/S
ENGRAVING CODE 100-2L24A

52F12-43L/R/M

DECK	CONTACTS		POSITION: MAINT	POSITION: LOCAL	POSITION: REMOTE	DESCRIPTION
1	18	11	X			
	11	12		X		
	12	13			X	
	14	15	X			
	15	16		X		
	16	17			X	
2	28	21	X			MAINT. CLOSE
	21	22			X	LOCAL CLOSE
	22	23			X	REMOTE CLOSE
	24	25	X			MAINT. TRIP
	25	26		X		LOCAL TRIP
	26	27			X	REMOTE TRIP
3	38	31	X			
	31	32		X		
	32	33			X	STATUS (SEE BELOW)
	34	35	X			STATUS (SEE BELOW)
	35	36		X		
	37	37			X	
4	48	41	X			
	44	45	X			STATUS (SEE BELOW)



EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◫	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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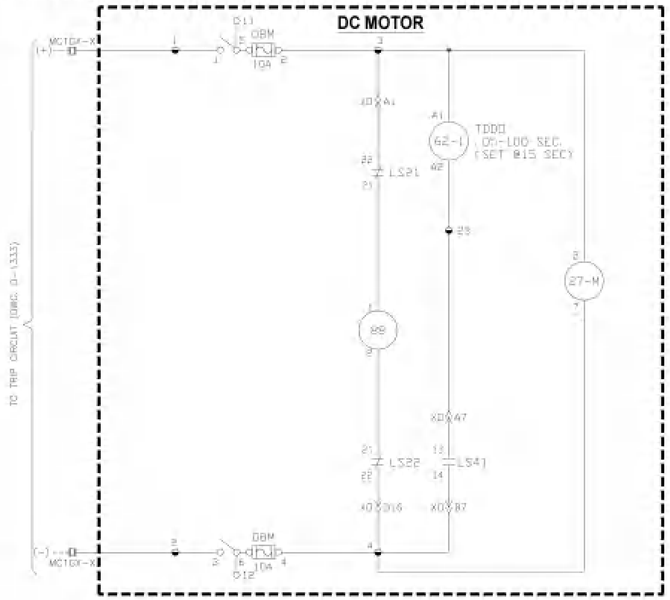
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

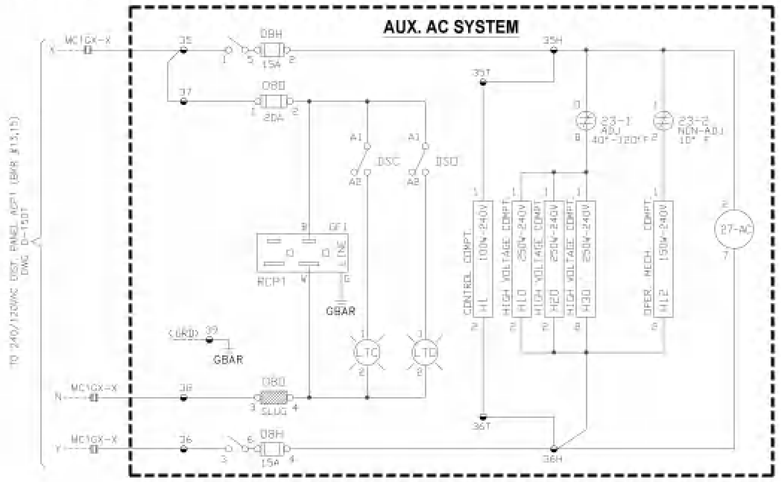
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

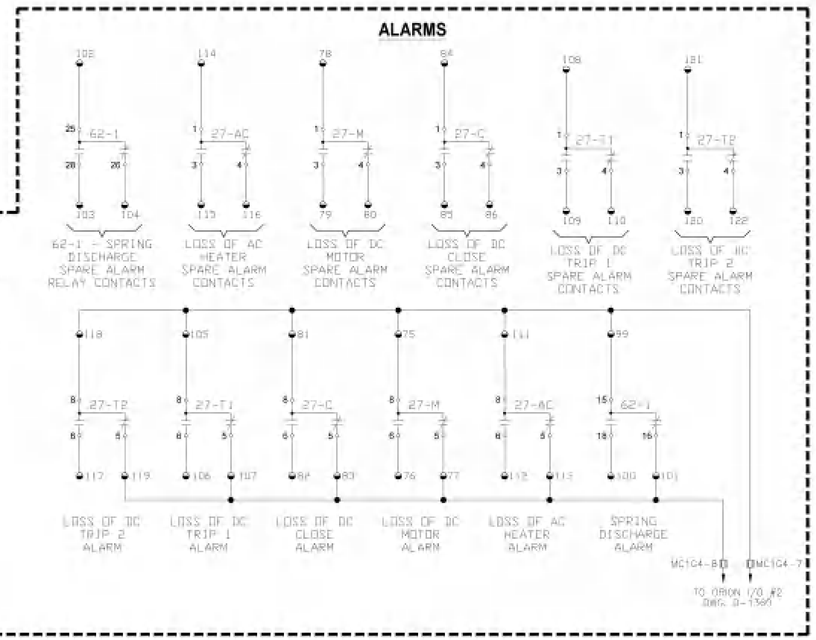
TITLE: 34.5kV BREAKER 52F12
CLOSE & TRIP

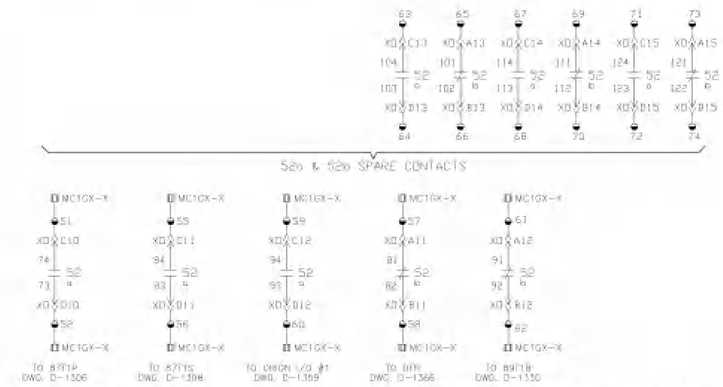
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1333
JOB NUMBER	24144-01
DRAWING NUMBER	1333









EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

LEGEND

☒	01 CONTROL SWITCH	LS3	CLOSING SPRING POSITION SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBC	CLOSE POWER DISCONNECT	LS9	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBH	HEATER POWER DISCONNECT	LS21	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBM	MOTOR POWER DISCONNECT	LS22	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBO	LIGHT & RECEPTACLE POWER FUSE	LS41	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBT1	TRIP POWER DISCONNECT (PRIMARY)	DSC	DOOR ACTIVATED LIGHT SWITCH(CONTROL COMPT)
DBT2	TRIP POWER DISCONNECT (SECONDARY)	DSO	DOOR ACTIVATED LIGHT SWITCH(OPERATOR COMPT)
23-1	ADJUSTABLE THERMOSTAT	LTC	CONTROL COMPARTMENT LIGHT
23-2	NON-ADJUSTABLE THERMOSTAT	LTO	OPERATOR COMPARTMENT LIGHT
27-AC	LOSS OF AC VOLTAGE (HEATER CIRCUIT)	☒ R1	RED INDICATING LIGHT (PRIMARY TRIP)
27-C	LOSS OF DC VOLTAGE (CLOSE CIRCUIT)	☒ R2	RED INDICATING LIGHT (SECONDARY TRIP)
27-M	LOSS OF DC VOLTAGE (MOTOR CIRCUIT)	RECPT	DUPLEX RECEPTACLE (GFCI)
27-T1	LOSS OF DC VOLTAGE (TRIP 1 CIRCUIT)	XD	PLUG CONNECTOR (OPERATOR CONNECTIONS)
27-T2	LOSS OF DC VOLTAGE (TRIP 2 CIRCUIT)		
52a	AUX SWITCH, OPEN WHEN BKR OPEN		
52b	AUX SWITCH, CLOSED WHEN BKR OPEN		
52SRC	CLOSING, SPRING RELEASE COIL		
52T1	TRIP COIL (PRIMARY)		
52T2	TRIP COIL (SECONDARY)		
62Y	ANTI-PUMP RELAY		
62-1	SPRING DISCHARGE ALARM RELAY		
69	CLOSING CUTOUT SWITCH		
88	MOTOR		
☒ G	GREEN INDICATING LIGHT		
HTR	HEATER		

NOTES

1. ALL EQUIPMENT SHOWN WITH CIRCUIT BREAKER OPEN, TRIP LATCH NOT-RESET, RELAY DE-ENERGIZED AND SPRINGS DISCHARGED.
2. ☒ = DEVICE LOCATED ON SWITCH PANEL.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

□	RELAY PANEL
☒	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◧	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

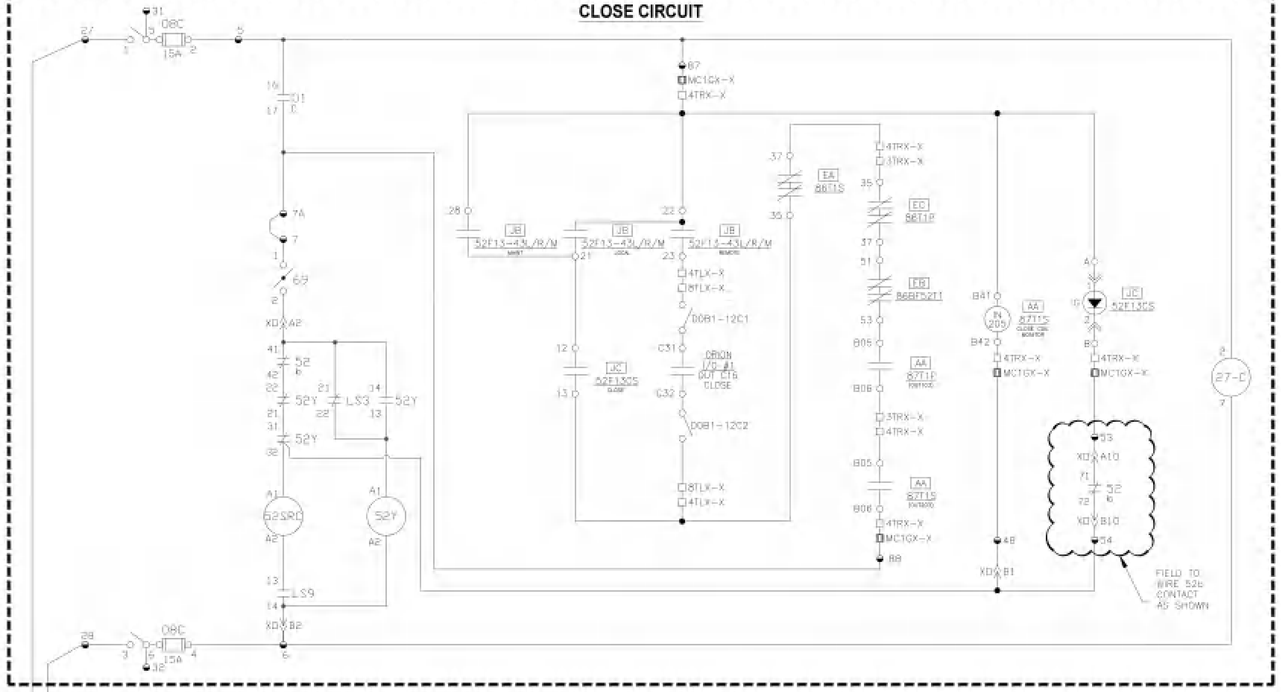
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F12
ALARMS & AC SYSTEM

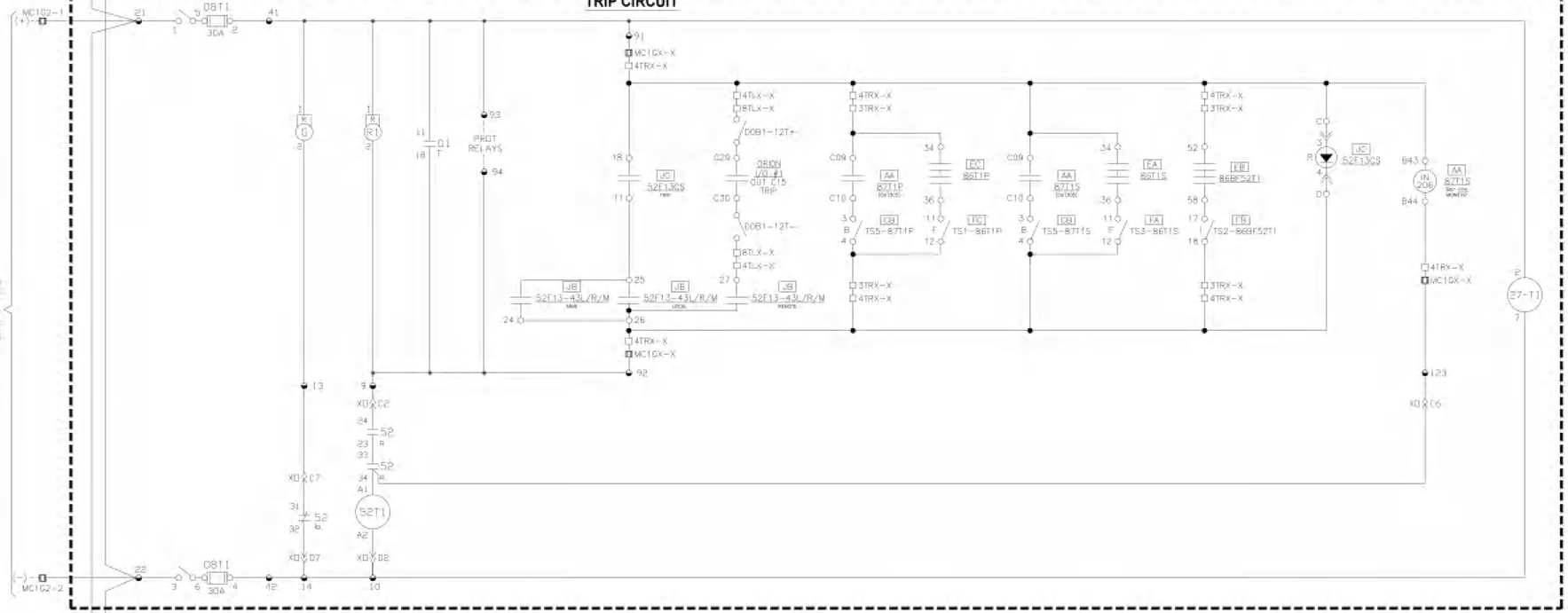
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1334
JOB NUMBER	24144-01
DRAWING NUMBER	1334

CLOSE CIRCUIT



TRIP CIRCUIT



DEVICE 52F13CS

ELECTROSWITCH SERIES 74PD202LT
ENGRAVING CODE 123B-2B23

52F13CS

DECK	CONTACTS		POSITION: TRIP	POSITION: NORMAL	POSITION: CLOSE	FUNCTION
1	18	11	X			TC1
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

DEVICE 52F13-43L/R/M

ELECTROSWITCH SERIES 24204AMS
ENGRAVING CODE 100-2L24A

52F13-43L/R/M

DECK	CONTACTS		POSITION: MAINT	POSITION: LOCAL	POSITION: REMOTE	DESCRIPTION
1	18	11	X			
	11	12	X			
	12	13			X	
	14	15	X			
	15	16	X			
	16	17			X	
2	28	21	X			MAINT. CLOSE
	21	22		X		LOCAL CLOSE
	22	23			X	REMOTE CLOSE
	24	25	X			MAINT. TRIP
	25	26		X		LOCAL TRIP
	26	27			X	REMOTE TRIP
3	38	31	X			
	31	32	X			
	32	33			X	STATUS (SEE BELOW)
	34	35	X			STATUS (SEE BELOW)
	35	36	X			
	37	37			X	
4	48	41	X			
	44	45	X			STATUS (SEE BELOW)

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
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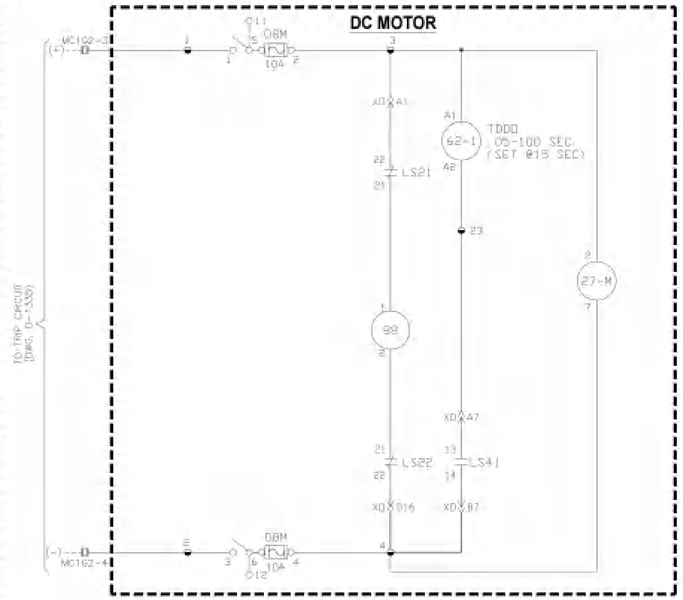
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

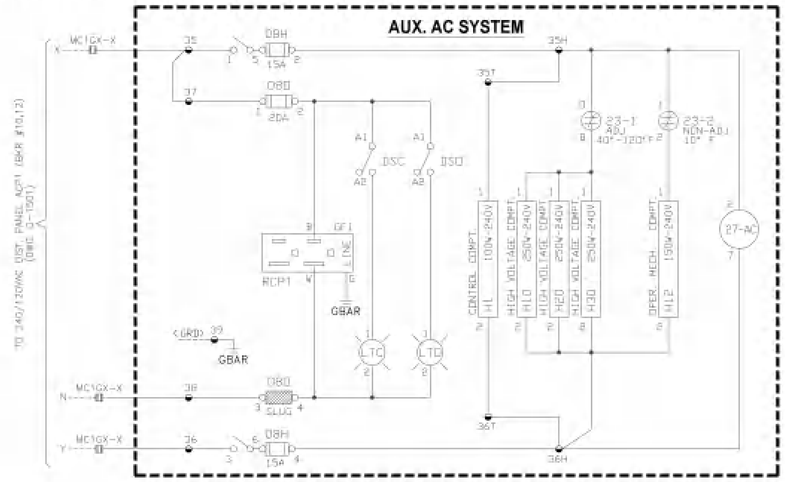
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

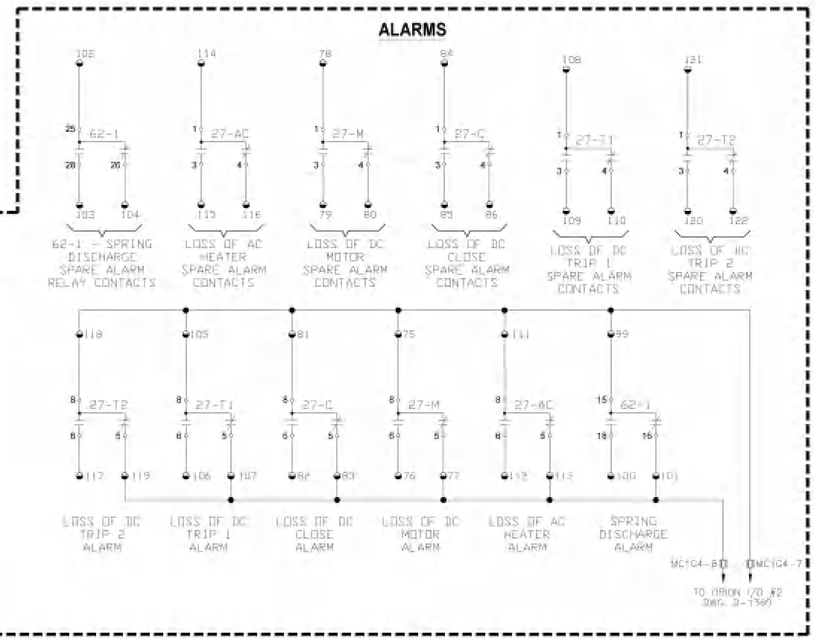
TITLE: 34.5kV BREAKER 52F13
CLOSE & TRIP

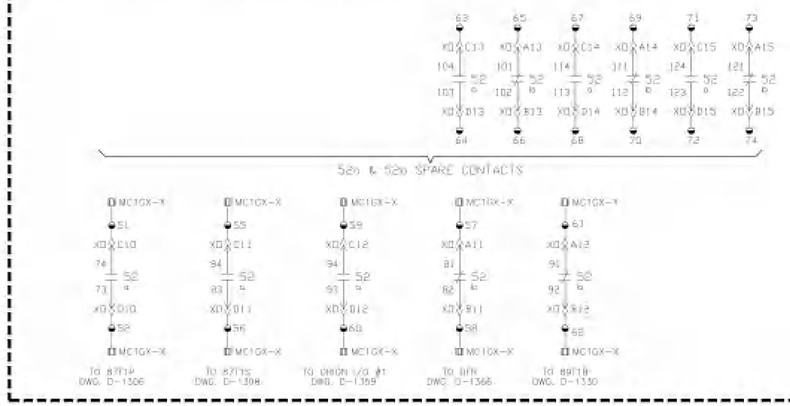
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1335
JOB NUMBER	24144-01
DRAWING NUMBER	1335









EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

LEGEND

☒01	CONTROL SWITCH	LS3	CLOSING SPRING POSITION SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBC	CLOSE POWER DISCONNECT	LS9	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBH	HEATER POWER DISCONNECT	LS21	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBM	MOTOR POWER DISCONNECT	LS22	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBO	LIGHT & RECEPTACLE POWER FUSE	LS41	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBT1	TRIP POWER DISCONNECT (PRIMARY)	DSC	DOOR ACTIVATED LIGHT SWITCH(CONTROL COMPT)
DBT2	TRIP POWER DISCONNECT (SECONDARY)	DSO	DOOR ACTIVATED LIGHT SWITCH(OPERATOR COMPT)
23-1	ADJUSTABLE THERMOSTAT	LTC	CONTROL COMPARTMENT LIGHT
23-2	NON-ADJUSTABLE THERMOSTAT	LTO	OPERATOR COMPARTMENT LIGHT
27-AC	LOSS OF AC VOLTAGE (HEATER CIRCUIT)	☒R1	RED INDICATING LIGHT (PRIMARY TRIP)
27-C	LOSS OF DC VOLTAGE (CLOSE CIRCUIT)	☒R2	RED INDICATING LIGHT (SECONDARY TRIP)
27-M	LOSS OF DC VOLTAGE (MOTOR CIRCUIT)	RECPT	DUPLEX RECEPTACLE (GFCI)
27-T1	LOSS OF DC VOLTAGE (TRIP 1 CIRCUIT)	XD	PLUG CONNECTOR (OPERATOR CONNECTIONS)
27-T2	LOSS OF DC VOLTAGE (TRIP 2 CIRCUIT)		
52a	AUX SWITCH, OPEN WHEN BKR OPEN		
52b	AUX SWITCH, CLOSED WHEN BKR OPEN		
52SRC	CLOSING, SPRING RELEASE COIL		
52T1	TRIP COIL (PRIMARY)		
52T2	TRIP COIL (SECONDARY)		
52Y	ANTI-PUMP RELAY		
62-1	SPRING DISCHARGE ALARM RELAY		
69	CLOSING CUTOUT SWITCH		
88	MOTOR		
☒G	GREEN INDICATING LIGHT		
HR	HEATER		

NOTES

1. ALL EQUIPMENT SHOWN WITH CIRCUIT BREAKER OPEN, TRIP LATCH NOT-RESET, RELAY DE-ENERGIZED AND SPRINGS DISCHARGED.
2. ☒ = DEVICE LOCATED ON SWITCH PANEL.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

□	RELAY PANEL
☒	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◧	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

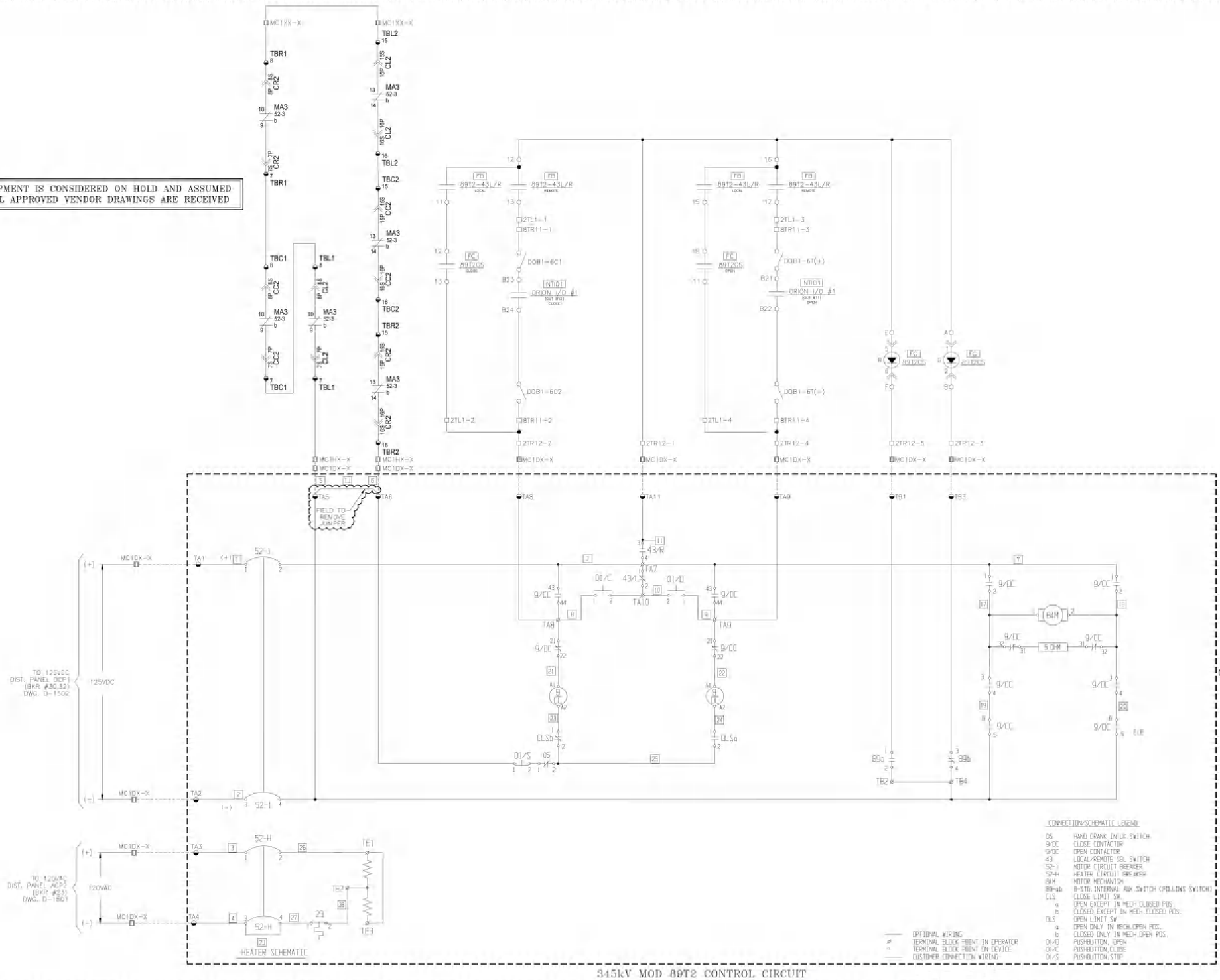
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F13
ALARMS & AC SYSTEM

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1336
JOB NUMBER	24144-01
DRAWING NUMBER	1336

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED



345kV MOD 89T2 CONTROL CIRCUIT

89T2CS

DEVICE 89T2CS
DISCONNECT SWITCH
C R
OPEN CLOSE

DECK	CONTACTS		TRIP	POSITION NORMAL	POSITION CLOSE	FUNCTION
1	15	11	X			OPEN
	12	13			X	CLOSE
	14	15	X			
	16	17		X		
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

ELECTROSWITCH SERIES 74PB202NN
ENGRAVING CODE 1238-2025MM

89T2-43L/R

DEVICE 89T2-43L/R
LOCAL REMOTE SW
LOCAL
REMOTE

DECK	CONTACTS		POS. LOCAL	POS. REMOTE	FUNCTION
1	12	11	X		LOCAL CLOSE
	12	13		X	REM. CLOSE
	16	15	X		LOCAL OPEN
	16	17		X	REM. OPEN
2	22	21	X		
	26	23		X	
	26	25	X		STATUS BELOW
		27		X	

ELECTROSWITCH SERIES 242028
ENGRAVING CODE 10D-2L24A

CONNECTION/SCHEMATIC LEGEND

05	HAND CRANK SWITCH
9/CC	CLOSE CONTACTOR
9/OC	OPEN CONTACTOR
43	LOCAL/REMOTE SEL SWITCH
52-1	MOTOR CIRCUIT BREAKER
52-H	HEATER CIRCUIT BREAKER
B4M	MOTOR MECHANISM
89-ab	8-STG INTERNAL AUX SWITCH (FOLLOWS SWITCH)
CLS	CLOSE LIMIT SW
a	OPEN EXCEPT IN MECH.CLOSED POS.
b	CLOSED EXCEPT IN MECH.CLOSED POS.
OLS	OPEN LIMIT SW
a	OPEN ONLY IN MECH.OPEN POS.
b	CLOSED ONLY IN MECH.OPEN POS.
01/O	PUSHBUTTON, OPEN
01/C	PUSHBUTTON, CLOSE
01/S	PUSHBUTTON, STOP

OPTIONAL WIRING
TERMINAL BLOCK POINT IN OPERATOR
TERMINAL BLOCK POINT ON DEVICE
CUSTOMER CONNECTION WIRING

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

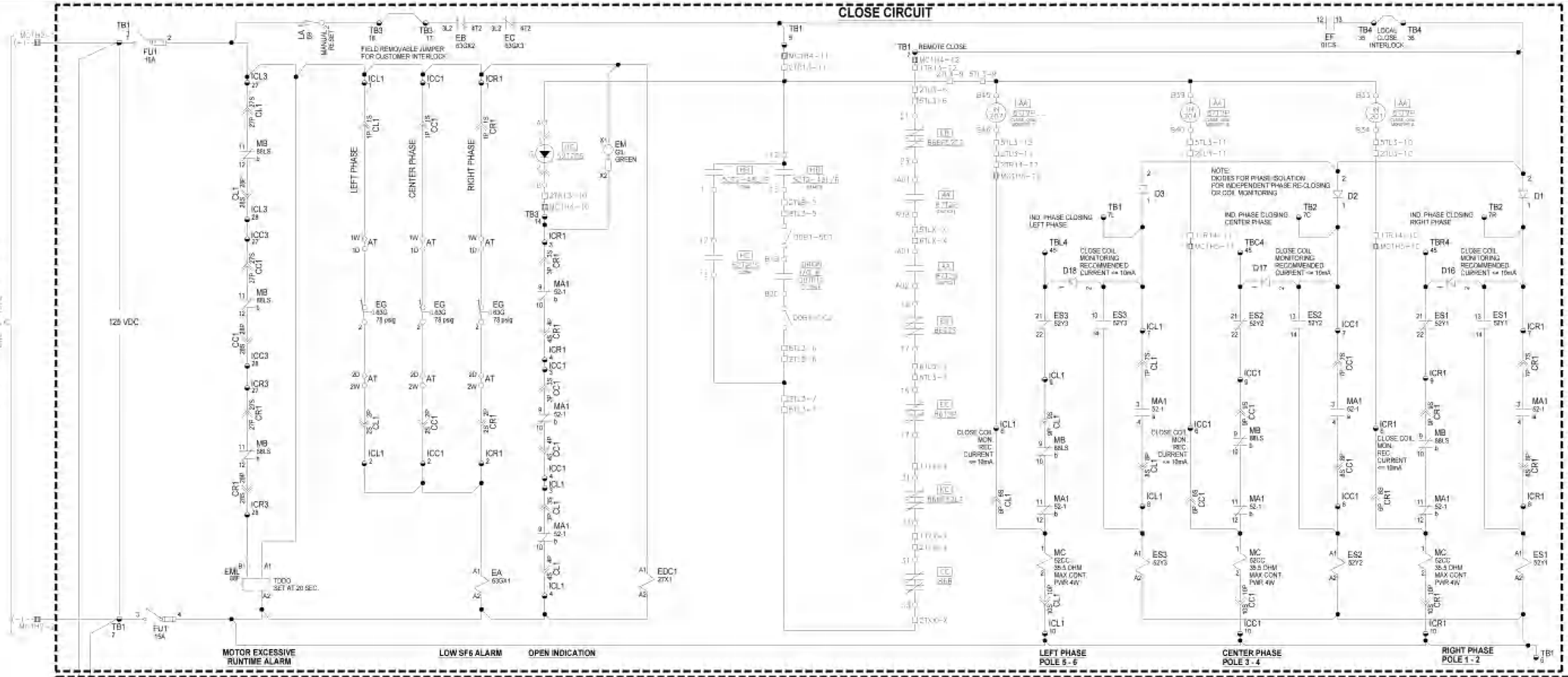
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV MOD SWITCH 89T2 DC SCHEMATIC

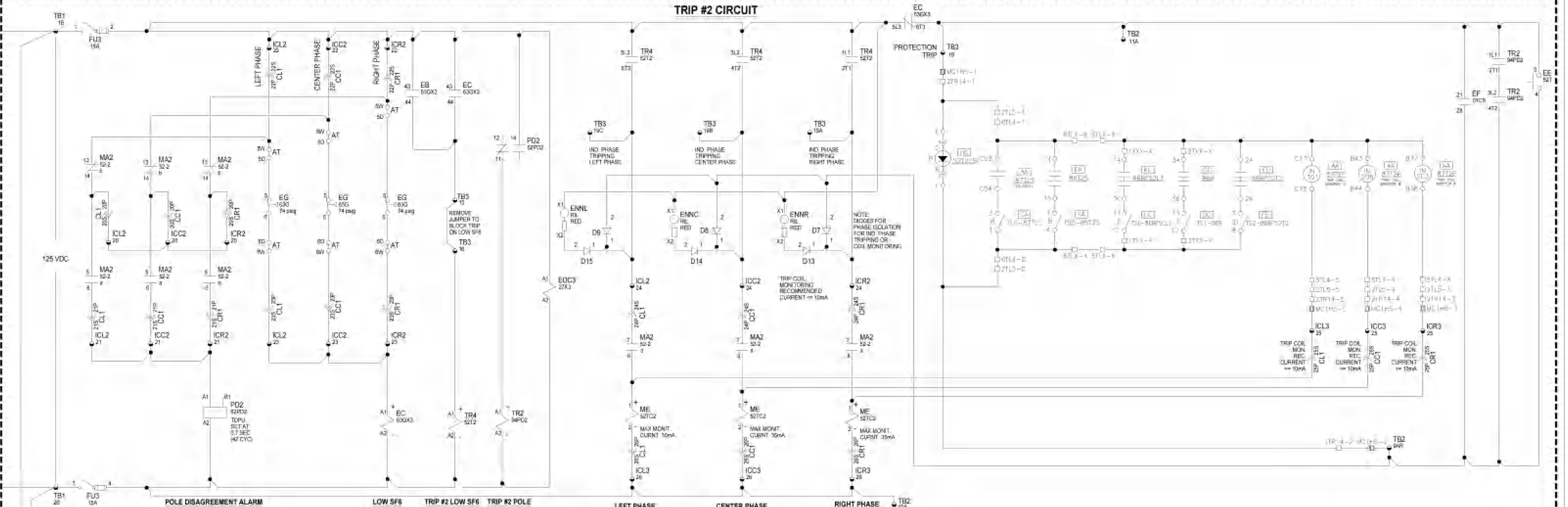
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1339
JOB NUMBER	24144-01
DRAWING NUMBER	1339

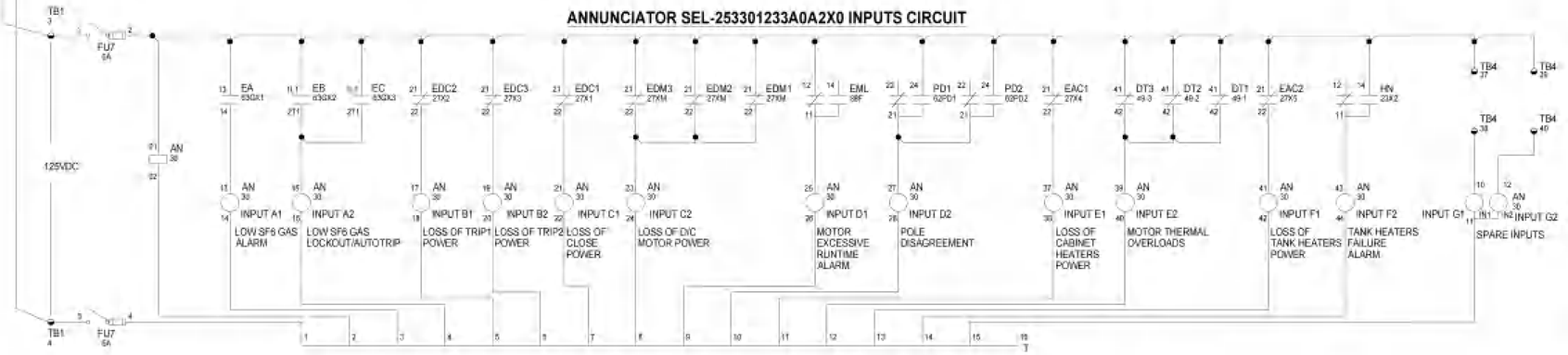
CLOSE CIRCUIT

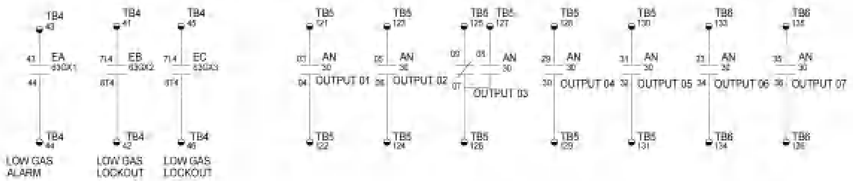


TRIP #2 CIRCUIT



ANNUNCIATOR SEL-253301233A0A2X0 INPUTS CIRCUIT





EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

NOTES:
1. ALL DEVICES SHOWN IN DE-ENERGIZED POSITION.
2. BREAKER SHOWN IN OPEN POSITION.
3. SF6 SHOWN AT ZERO PRESSURE.
4. CHARGING SPRING SHOWN IS CHARGED POSITION.

XXX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

- CIRCUIT BREAKER
- CABINET LIGHT
- COIL
- CONTACT, NORMALLY CLOSED
- CONTACT, NORMALLY OPEN
- CONNECTOR
- DENSITY MONITOR
- DOOR SWITCH
- FUSE BLOCK
- FUSE BLOCK, SLUGGED
- FUSED DISCONNECT
- FUSED DISCONNECT, SLUGGED
- FUSE PULLOUT
- FUSE PULLOUT, SLUGGED
- INTERNAL WIRING CONNECTION
- CUSTOMER CONNECTION
- INDICATOR LIGHT
- KNIFE SWITCH
- MOTOR
- PUSHBUTTON
- RESISTOR/ HEATER
- TERMINAL BLOCK
- TERMINAL BLOCK (AUXILIARY)
- THERMOSTAT
- TRIP COIL MONITOR
- TOGGLE SWITCH
- TRANSFORMER

STANDARD ANSI DESIGNATIONS

- 01CS BREAKER CONTROL SWITCH
- 23 THERMOSTAT
- 23X HEATER CONTACTOR
- 27X LOSS OF POWER RELAY
- 30 ANNUNCIATOR
- 37 UNDERCURRENT ALARM
- 49 MOTOR THERMAL OVERLOAD
- 52C CLOSE PUSHBUTTON
- 52CC BREAKER CLOSE COIL
- 52T TRIP PUSHBUTTON
- 52TC BREAKER TRIP COIL
- 52X CLOSING RELAY
- 52Y ANTIPUMP RELAY
- 52-MON BREAKER CONDITION MONITOR
- 63G SF6 PRESSURE / DENSITY GAUGE
- 63GX SF6 PRESSURE / DENSITY RELAY
- 69 PERMISSIVE CONTROL SWITCH
- 69-KI KEY INTERLOCK
- 74CC CLOSE COIL MONITOR
- 74TC TRIP COIL MONITOR
- 79X RECLOSE DELAY RELAY
- 83X MOTOR TRANSFER CONTACTOR
- 88 MOTOR
- 88F MOTOR FAILURE ALARM
- 88LS MOTOR LIMIT SWITCH
- AIL AMBER INDICATOR LIGHT
- GIL GREEN INDICATOR LIGHT
- HTR HEATER
- RIL RED INDICATOR LIGHT
- TCM TRIP COIL MONITOR
- 94D1(TR1) POLE DISAGREEMENT

REV	DATE	DESCRIPTION	DWN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EOR

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52T2
TRIP COIL 2 & ANNUCIATOR

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1341
JOB NUMBER	24144-01
DRAWING NUMBER	1341

TO 240/120VAC DIST. PANEL ACP2 (BKR #5,7)
DWG. D-1501

TANK HEATERS

MC1H1-1 — TBAT 1 — FU8 30A — TB10 4

240VAC 60Hz

NOTE: LOOP TEFZEL OR SIS WIRE THROUGH BP 3X
SET BP AT 45A

BP 37

TB10 1 — TB10 2

MC1H1-2 — TBAT 2 — FU8 30A

EHR 23X1 (1L1 / 2T1) — ICL4 39 / ICL4 40 — CL1 39P 39S 40S 40P — BPL — HL1 HTR-T3 750 W 76.8 OHMS — HL2 HTR-T3 750 W 76.8 OHMS — CL1 41P 41S 42S 42P — ICL4 41 / ICL4 42

EHR 23X1 (3L2 / 4T2) — ICC4 39 / ICC4 40 — CC1 39P 39S 40S 40P — BPC — HC1 HTR-T2 750 W 76.8 OHMS — HC2 HTR-T2 750 W 76.8 OHMS — CC1 41P 41S 42S 42P — ICC4 41 / ICC4 42

EHR 23X1 (5L3 / 6T3) — ICR4 39 / ICR4 40 — CR1 39P 39S 40S 40P — BPR — HR1 HTR-T1 750 W 76.8 OHMS — HR2 HTR-T1 750 W 76.8 OHMS — CR1 41P 41S 42S 42P — ICR4 41 / ICR4 42

TH3 23 25C / -13F — NC1 / C1

EHR 23X1 (13NO / 14NO) — BP 37 (NC / NO / C)

EHR 23X1 (A1 / A2)

TDPU SET AT 5 SEC — TDPU 23X2 (B1 / A1 / A2)

EAC2 27X5 (A1 / A2)

LEFT PHASE POLE 5 - 6 — CENTER PHASE POLE 3 - 4 — RIGHT PHASE POLE 1 - 2

CONTROL CABINET HEATERS

TBAC 1 — FU5 20A

240VAC 60Hz

AT1 — TH1 23 0C/ 32F — TH 23 45-90 F (7-32 C) — HT 95 W 600 OHM — H1 HTR 95 W 600 OHM — H 95 W 600 OHM

TBAC 2 — FU5 20A

LEFT PHASE POLE 5 - 6

MECHANISM CABINET HEATERS

ICL4 37 — CL1 37P 37S — TH2 23 45-90 F (7-32 C) — HT2 — H2 HTR 95 W 600 OHM — H3 HTR 95 W 600 OHM — CL1 39P 39S — ICL4 38

ICC4 37 — CC1 37P 37S — TH2 23 45-90 F (7-32 C) — HT2 — H2 HTR 95 W 600 OHM — H3 HTR 95 W 600 OHM — CC1 39P 39S — ICC4 38

ICR4 37 — CR1 37P 37S — TH2 23 45-90 F (7-32 C) — HT2 — H2 HTR 95 W 600 OHM — H3 HTR 95 W 600 OHM — CR1 39P 39S — ICR4 38

EAC1 27X4 (A1 / A2)

CENTER PHASE POLE 3 - 4 — RIGHT PHASE POLE 1 - 2

MOTOR CIRCUIT

TBM 1M

FU4L 20A — DT3 49-3 16-20A — ICL3 29 / ICL3 30 — CL1 29P 29S 30S 30P — MB 88LS — M 88 125VDC 2100 W — EDM3 27XM — MB 88LS — CL1 31P 31S 32S 32P — ICL3 31 / ICL3 32 — DT3 16-20A 49-3

125VDC

FU4C 20A — DT2 49-2 16-20A — ICC3 29 / ICC3 30 — CC1 29P 29S 30S 30P — MB 88LS — M 88 125VDC 2100 W — EDM2 27XM — MB 88LS — CC1 31P 31S 32S 32P — ICC3 31 / ICC3 32 — DT2 16-20A 49-2

125VDC

FU4R 20A — DT1 49-1 16-20A — ICR3 29 / ICR3 30 — CR1 29P 29S 30S 30P — MB 88LS — M 88 125VDC 2100 W — EDM1 27XM — MB 88LS — CR1 31P 31S 32S 32P — ICR3 31 / ICR3 32 — DT1 16-20A 49-1

TO TRIP COIL 1 DWG. D-1340

TBM 2M

LEFT PHASE — CENTER PHASE — RIGHT PHASE

CABINET RECEPTACLE

CABINET LIGHTING

TBAC 3 — FU6 20A

120VAC 60Hz

PL1 120 VAC
20 A
1 - LINE
2 - NEUTRAL
3 - GND
4 - LOAD LINE
5 - LOAD NEUTRAL

DSW — L1 — L2 — GND L1 — GND L2

GND TH 23 — GND AN 30

MC1H1-3 — TBAC 4

GND2 — AT — EG 63G — TH2 23 — 1 2 3 4 5 6 7 8

GND1 — 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

RED RIVER CLEAN ENERGY

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SCALE: NTS
DATE: 06/30/25
DRAWN: KWN
CHECKED: MC
APPROVED: EDR

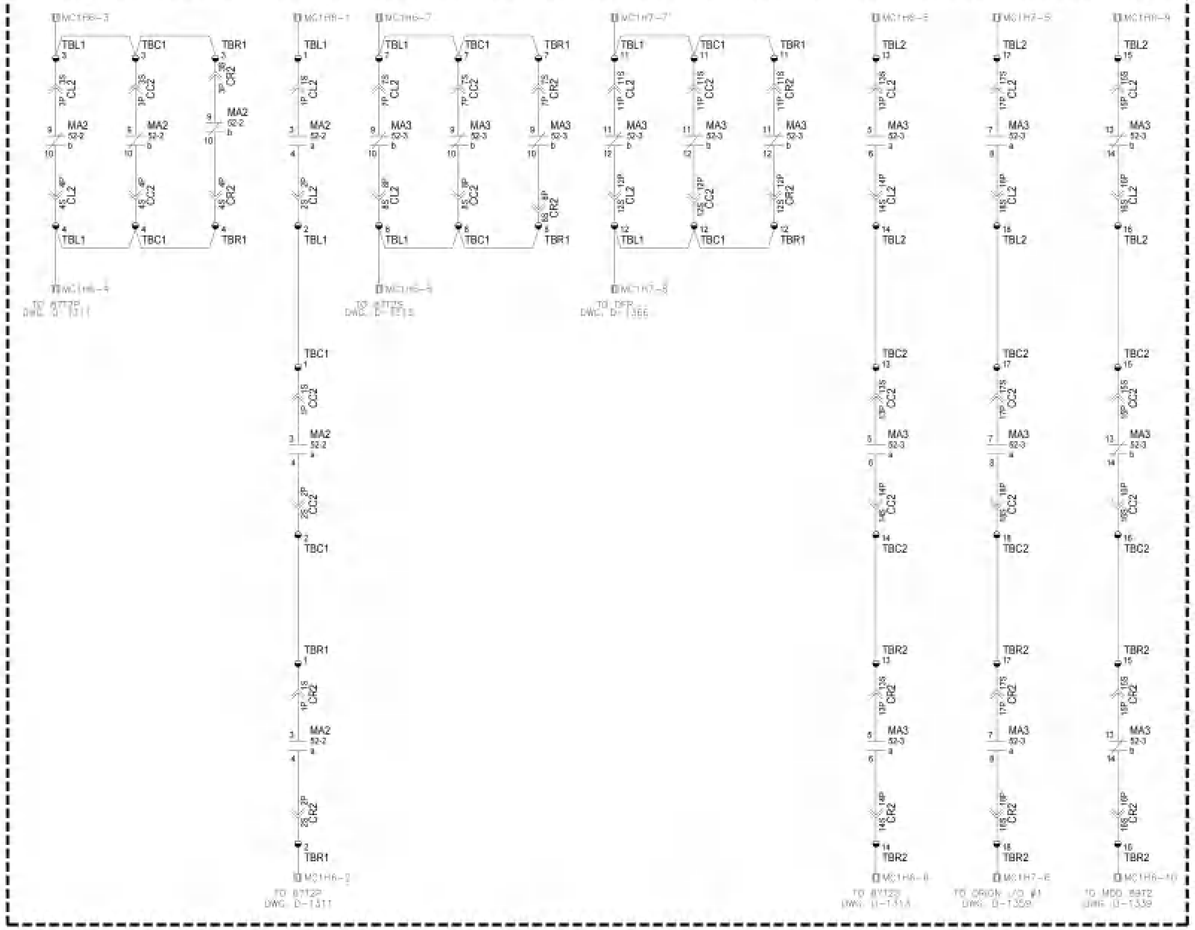
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52T2
AC SYSTEMS & MOTOR CIRCUIT

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

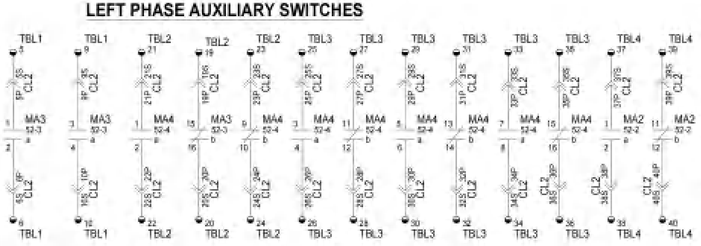
FILE NAME: 24144-01-1342
JOB NUMBER: 24144-01
DRAWING NUMBER: 1342

CONTACTS IN USE

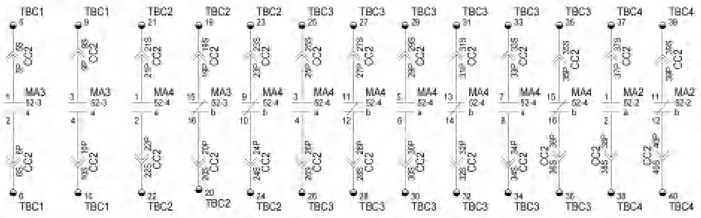


SPARE CONTACTS

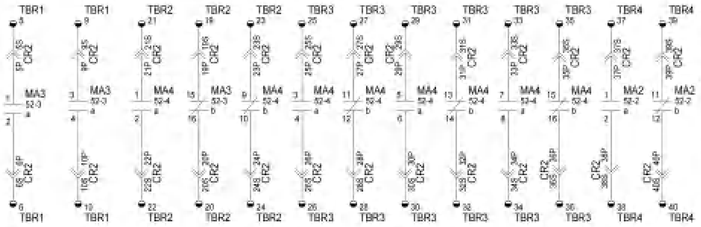
LEFT PHASE AUXILIARY SWITCHES



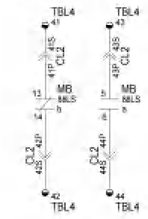
CENTER PHASE AUXILIARY SWITCHES



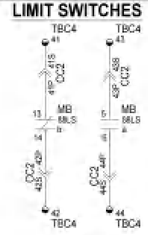
RIGHT PHASE AUXILIARY SWITCHES



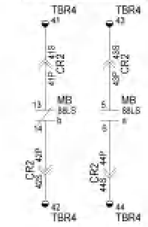
LEFT PHASE MOTOR LIMIT SWITCHES



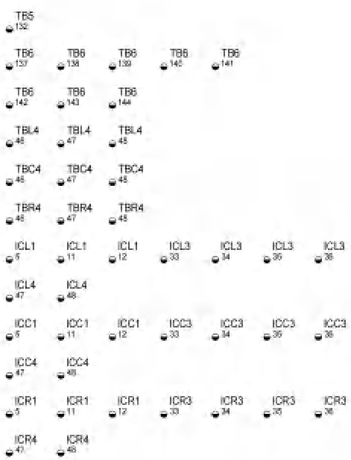
CENTER PHASE MOTOR LIMIT SWITCHES



RIGHT PHASE MOTOR LIMIT SWITCHES



SPARE TERMINALS FOR CUSTOMER USE



EQUIPMENT IS CONSIDERED ON HOLD
AND ASSUMED UNTIL APPROVED VENDOR
DRAWINGS ARE RECEIVED

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 345kV BREAKER 52T2
AUXILIARY CONTACTS

LOCATION: 8897 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1343
JOB NUMBER	24144-01
DRAWING NUMBER	1343

MAIN POWER SUPPLY
1Φ 120/240V AC 60Hz
TO AC PANEL #CP2
(DWG. #123)
(DWG. D-1381)

MC1E1-1 MC1E1-2 MC1E1-3

OLTC MAIN POWER
1Φ 120 AC 60Hz

TO TAP-CHANGER CONTROL
(DWG. D-1348)

TO DGA
(DWG. D-1345)

B-AC3
S8025-C10
10AT

B-AC4
S8025-C10
10AT

B
S8025-D80
60AT

3TRX-X
4TRX-X

LC
86T2P

EA
86T2S

MC1E4-4 MC1E4-5

JUMPER

TQ 11 TQ 12

NOTE: FIELD TO REMOVE JUMPER

B-AC1
S8015-C20
20AT

CONTACTS LOCATED FROM TOP OIL THERMOMETER
26Q1/26Q2
FAN COOLING
65 °C

CONTACTS LOCATED FROM ETM(49TM)
ETM
FAN COOLING
65 °C

ETM
FAN COOLING
75 °C

CONTACTS LOCATED FROM TOP OIL THERMOMETER
26Q1/26Q2
FAN COOLING
65 °C

27X1

27X2

43-1
MAN
AUTO

43-2
MAN
AUTO

43SF

4-1
AF26300013

4-2
AF26300013

52-1
S8025-D32
32AT

52-2
S8025-D32
32AT

52F1 52F2 52F3 52F4 52F5 52F6 52F7 52F8 52F9 52F10

52F11 52F12 52F13 52F14 52F15 52F16 52F17 52F18 52F19 52F20

TA1 1 2 3 ... 28 29 30
FAN MOTOR #1 ... FAN MOTOR #10
STAGE 1

TA2 1 2 3 ... 28 29 30
FAN MOTOR #11 ... FAN MOTOR #20
STAGE 2

B-AC2
S8015-C20
20AT

SW1 S8015-C10 10AT
SW2 S8025-C10 10AT
SW3 S8015-C10 10AT
SW4 S8015-C10 10AT
SW5 S8015-C10 10AT
SW6 S8015-C10 10AT

23-1 23-2
DS1 DS2
SH1 AC 120V 100W
SH2 AC 120V 100W
GFI AC 120V
FL1 AC 120V 9W
FL2 AC 120V 9W
SW2 S8025-C10 10AT

74DB1 74DB2 49T1&49T2 A26Q

27x1 (CM-ESSUM AC240V)			
○	11	14	DWG. 1345
●	11	12	DWG. 1345
●	21	22	
◇	21	24	

52F1~19 (MS116-16)			
○	13	14	
●	21	22	DWG. 1345

4-1 (AF26300013 AC240V)			
○	1	2	THS DWG.
○	3	4	
○	5	6	THS DWG.
○	13	14	DWG. 1345
●	21	22	

4-2 (AF26300013 AC240V)			
○	1	2	THS DWG.
○	3	4	
○	5	6	THS DWG.
○	13	14	DWG. 1345
●	21	22	

27X2 (CM-ESSUM AC120V)			
○	11	14	DWG. 1326
●	11	12	DWG. 1326
●	21	22	
○	21	24	

43-1~2
MAN OFF AUTO

43SF
A B

FAN MOTOR IS 1PHASE 60Hz 1/3HP 240V (FALL LOAD CURRENT: 1.8A)
⇒>52F1~52F20 SETTING VALUE: 1.8A X 1.2=2.16A(SET : 2.2A)
■ : THE LOCATION ON THE TRANSFORMER BODY OR LTC

REF. CHINT EQUIPMENT DRAWING DOC.NO:1ZD8207200P-00365 SHT 3 & 4 REV 01

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▥	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

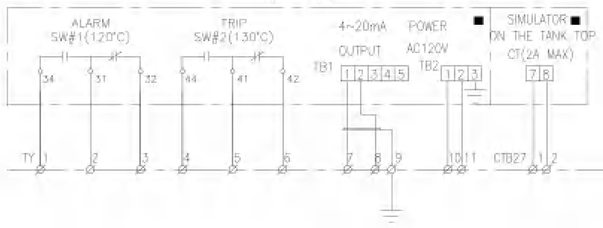
PROJECT
CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE
TRANSFORMER T2
DC SCHEMATIC

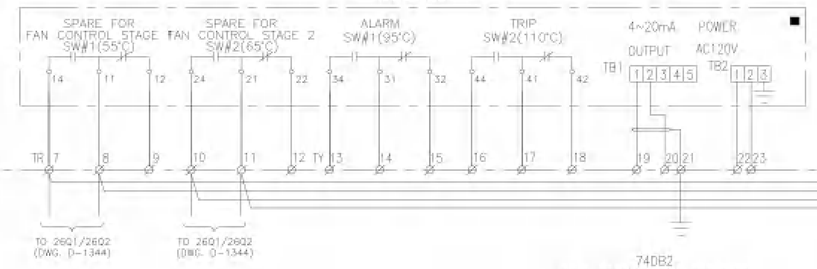
LOCATION
8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1344
JOB NUMBER	24144-01
DRAWING NUMBER	1344

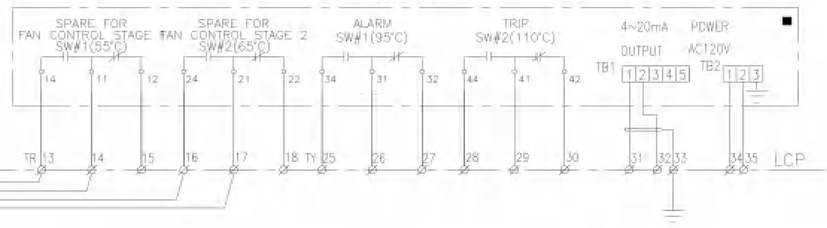
49T1
WINDING TEMPERATURE INDICATOR(LV)
QUALITROL



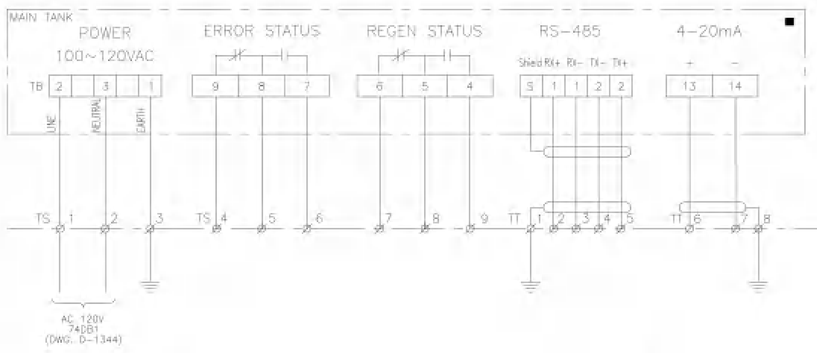
26Q1
TOP OIL TEMPERATURE THERMOMETER
QUALITROL



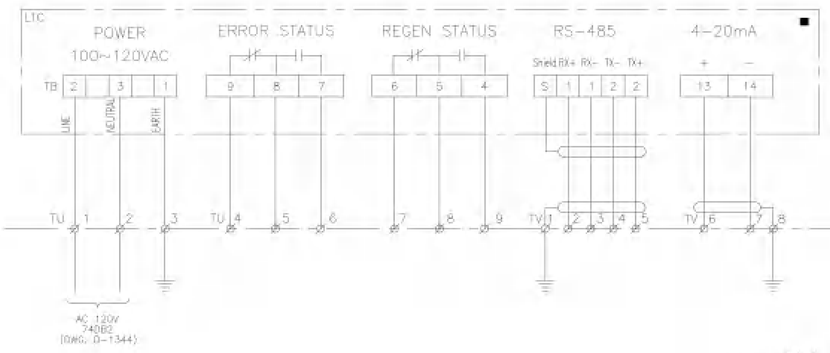
26Q2
TOP OIL TEMPERATURE THERMOMETER
QUALITROL



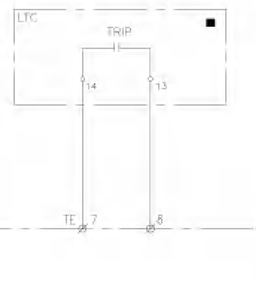
74DB1
SELF-REGENERATING BREATHER
MESSKO



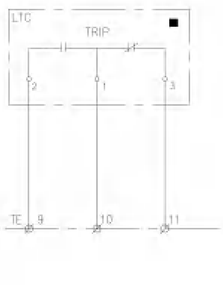
74DB2
SELF-REGENERATING BREATHER
MESSKO



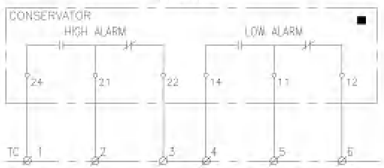
63PR3
PRESSURE RELIEF DEVICE
Messko from MR



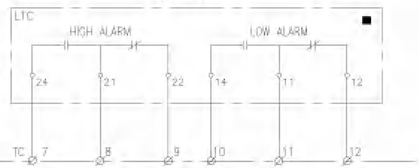
63G1
OIL FLOW RELAY
MR RS2001



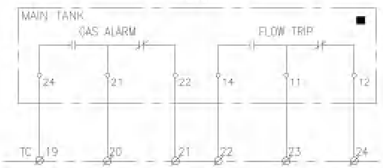
71Q1
OIL LEVEL INDICATOR
QUALITROL



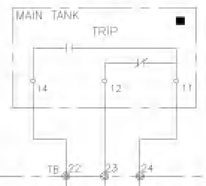
71Q2
OIL LEVEL INDICATOR
QUALITROL



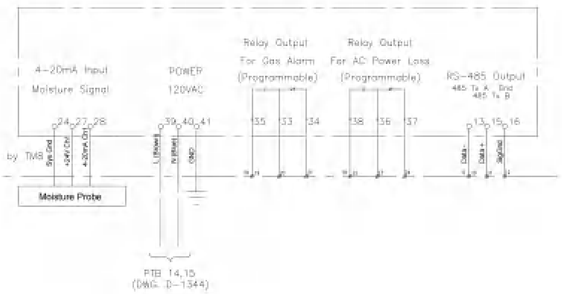
63B
BUCHHOLZ RELAY
EMB



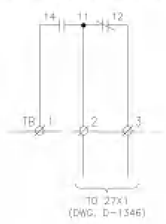
63FP1
SUDDEN PRESSURE RELAY
QUALITROL



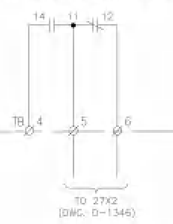
DGA
Dissolved Gas Analysis (DGA) Monitoring Device
Qualitrol TM8



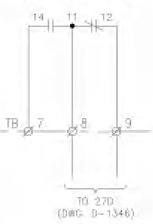
27X1
MAIN POWER LOSS ALARM



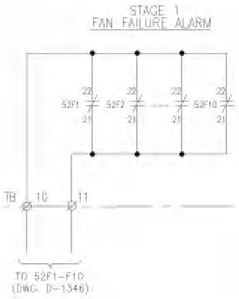
27X2
AC CONTROL POWER LOSS ALARM



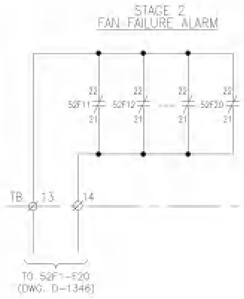
27D
DC CONTROL
POWER LOSS ALARM



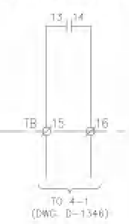
STAGE 1
FAN FAILURE ALARM



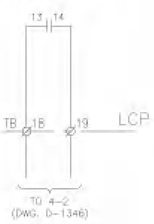
STAGE 2
FAN FAILURE ALARM

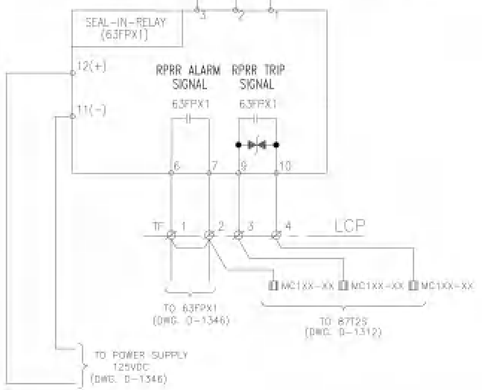


4-1
GROUP 1 RUNNING

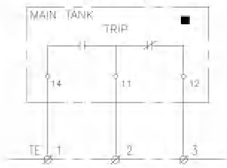


4-2
GROUP 2 RUNNING

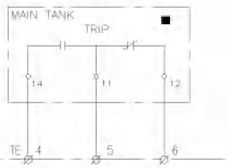




63PR1
PRESSURE RELIEF DEVICE 1#
QUALITROL



63PR2
PRESSURE RELIEF DEVICE 2#
QUALITROL



■ : THE LOCATION ON THE TRANSFORMER BODY OR LTC

REF. CHINT EQUIPMENT DRAWING DOC.NO:12080207280P-00365 SHT 5 REV 01

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
▥	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

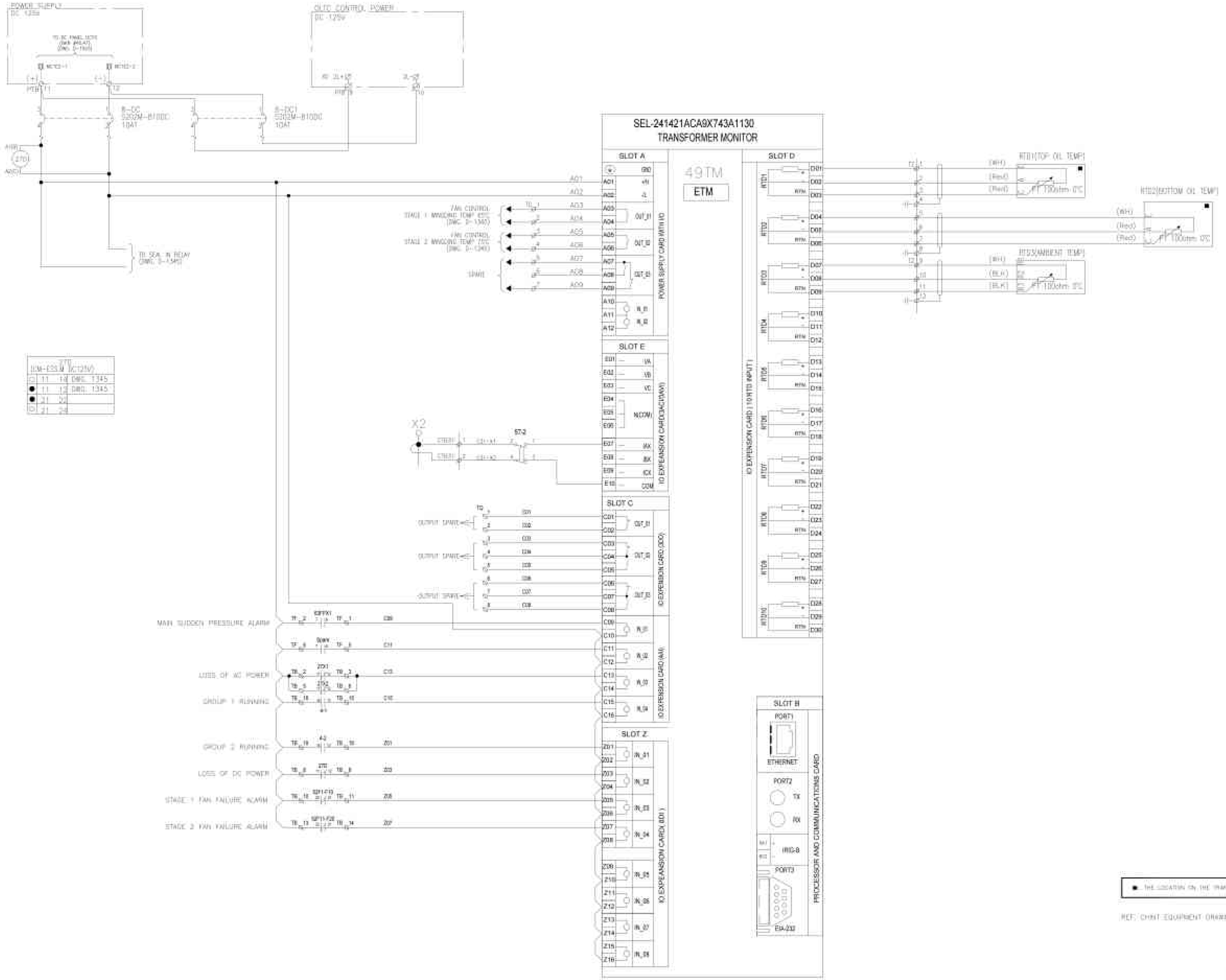
TITLE: TRANSFORMER T2
DC SCHEMATIC

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1345

JOB NUMBER: 24144-01

DRAWING NUMBER: 1345


POWER SUPPLY
DC -125V
TO DC PANEL 'MCB2'
(DWG. D-1345)
MCB2-1
MCB2-2
(+)
(-)
F1
F2
B-DC
52G2M-B100D
10AT
B-DC1
52G2M-B100D
10AT
A1(B)
27G1
A2(C)
TO SEAL IN RELAY
(DWG. D-1345)
OLTC CONTROL POWER
DC -125V
49
(+)
(-)
F10
F9
T10
SEL-241421ACA9X743A1130
TRANSFORMER MONITOR
49TM
ETM
SLOT A
POWER SUPPLY CARD WITH I/O
AO1
AO2
AO3
AO4
AO5
AO6
AO7
AO8
AO9
A10
A11
A12
OUT_01
OUT_02
OUT_03
IN_01
IN_02
FAN CONTROL
STAGE 1 WINDING TEMP (DWG. D-1345)
FAN CONTROL
STAGE 2 WINDING TEMP (DWG. D-1345)
SPARE
SLOT E
IO EXPANSION CARD(DI/AO)
E01
E02
E03
E04
E05
E06
E07
E08
E09
E10
VA
VB
VC
NCOM
AX
BX
CX
COM
X2
ST-2
SLOT C
IO EXPANSION CARD(DI/DO)
C01
C02
C03
C04
C05
C06
C07
C08
C09
C10
C11
C12
C13
C14
C15
C16
OUT_01
OUT_02
OUT_03
IN_01
IN_02
IN_03
IN_04
OUTPUT SPARE
OUTPUT SPARE
OUTPUT SPARE
MAIN SUDDEN PRESSURE ALARM
LOSS OF AC POWER
GROUP 1 RUNNING
GROUP 2 RUNNING
LOSS OF DC POWER
STAGE 1 FAN FAILURE ALARM
STAGE 2 FAN FAILURE ALARM
63PRX1
63WX
27G1
27G2
52F1-F13
52F11-F23
SLOT Z
IO EXPANSION CARD(I/DO)
Z01
Z02
Z03
Z04
Z05
Z06
Z07
Z08
Z09
Z10
Z11
Z12
Z13
Z14
Z15
Z16
IN_01
IN_02
IN_03
IN_04
IN_05
IN_06
IN_07
IN_08
SLOT D
IO EXPANSION CARD(10 RTD INPUT)
RTD1
RTD2
RTD3
RTD4
RTD5
RTD6
RTD7
RTD8
RTD9
RTD10
D01
D02
D03
D04
D05
D06
D07
D08
D09
D10
D11
D12
D13
D14
D15
D16
D17
D18
D19
D20
D21
D22
D23
D24
D25
D26
D27
D28
D29
D30
RTN
RTD1(TOP OIL TEMP)
RTD2(BOTTOM OIL TEMP)
RTD3(AMBIENT TEMP)
100ohm 0°C
(WH)
(Red)
(BLK)
SLOT B
PROCESSOR AND COMMUNICATIONS CARD
PORT1
ETHERNET
PORT2
TX
RX
IRIG-B
PORT3
EIA-232
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16
T17
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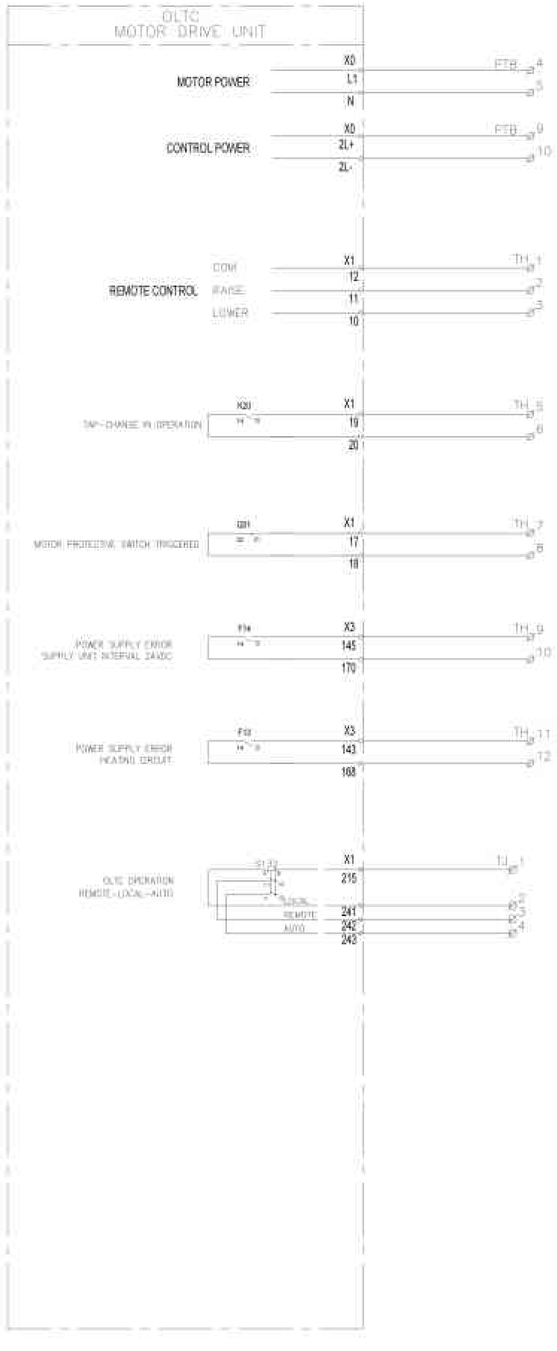
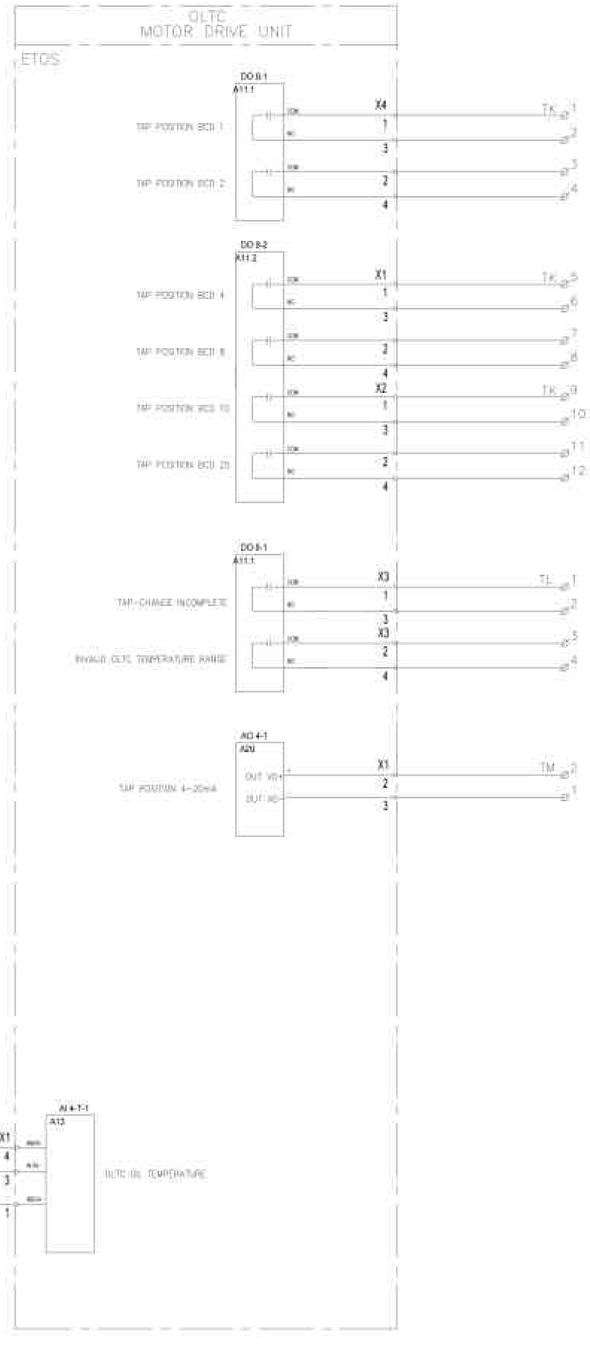
T38
T39
T40





REF. JOINT EQUIPMENT DRAWING DOC.NO.1ZEB3372002F-00365 SHT 8 REV 01

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T2
DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1347
JOB NUMBER	24144-01
DRAWING NUMBER	1347

CUSTOMER SUPPLY
FROM PREVIOUSLY ENERGIZED EQUIPMENT

OLTC
MOTOR DRIVE UNIT

LOCAL CONTROL PANEL

CONTROL HOUSE

OUT OF SCOPE

X2

C30

CB630-1

SCT-1

M-2001D
WITH M-2270B
TAPCHANGER CONTROL MOUNTING
90A

M-2001D

TAPCHANGER CONTROL

FIBER OPTIC
DNP 3.0
INTERFACE

RX

TX

P1

PT SOURCE TO SCH
(THIS DWG.)

User-Programmable
(Return)
User-Programmable
(Polarity)

COM

LOWER

RAISE

A3R
LOCAL

A3RA
AUTO

A3R
LOWER

A3RB
RAISE

REMOTE

MAN

AUTO

RAISE

LOWER

M-3270B
SCH

FROM: OLTC MOTOR DRIVE UNIT
(DWG. D-11269)

ALARM

RAISE/
RETURN

LOWER/
COMMON

PT SOURCE
(THIS DWG.)

TO: RTU 1
(DWG. D-11241)

LTC BACKUP CONTROL ALARM

SCC
M-3772SD
CURRENT LOCK INTERFACE MODULE

AO4-1
A20

OUT (+)

OUT (-)

X1

3

2

TAP POSITION 4-20mA

CURRENT RANGE	RESISTOR	LOWER POSITION
0 to 1mA	12K ohms	301-5 to 301-6
0 to 2mA	6.5 ohms	301-5 to 301-6
4 to 20mA	150 ohms	301-5 to 301-6
-1 to 1mA	1.5K ohms	301-4 to 301-6

RTD-1/5 (1Y2N, 4C12W)	
3	THIS DWG.
A	1
B	2
8	4

RTD-RS (1Y2N, 4C12W)	
5	THIS DWG.
A	1
B	2
8	4

43R

43MA

43LR

REF. JOINT EQUIPMENT DRAWING DOC.NO.1Z8833720GP-00365 SHT # REV 01

REV	DATE	DESCRIPTION	DRN	CAD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDK

STAMP

RED RIVER
CLEAN ENERGY

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SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDK

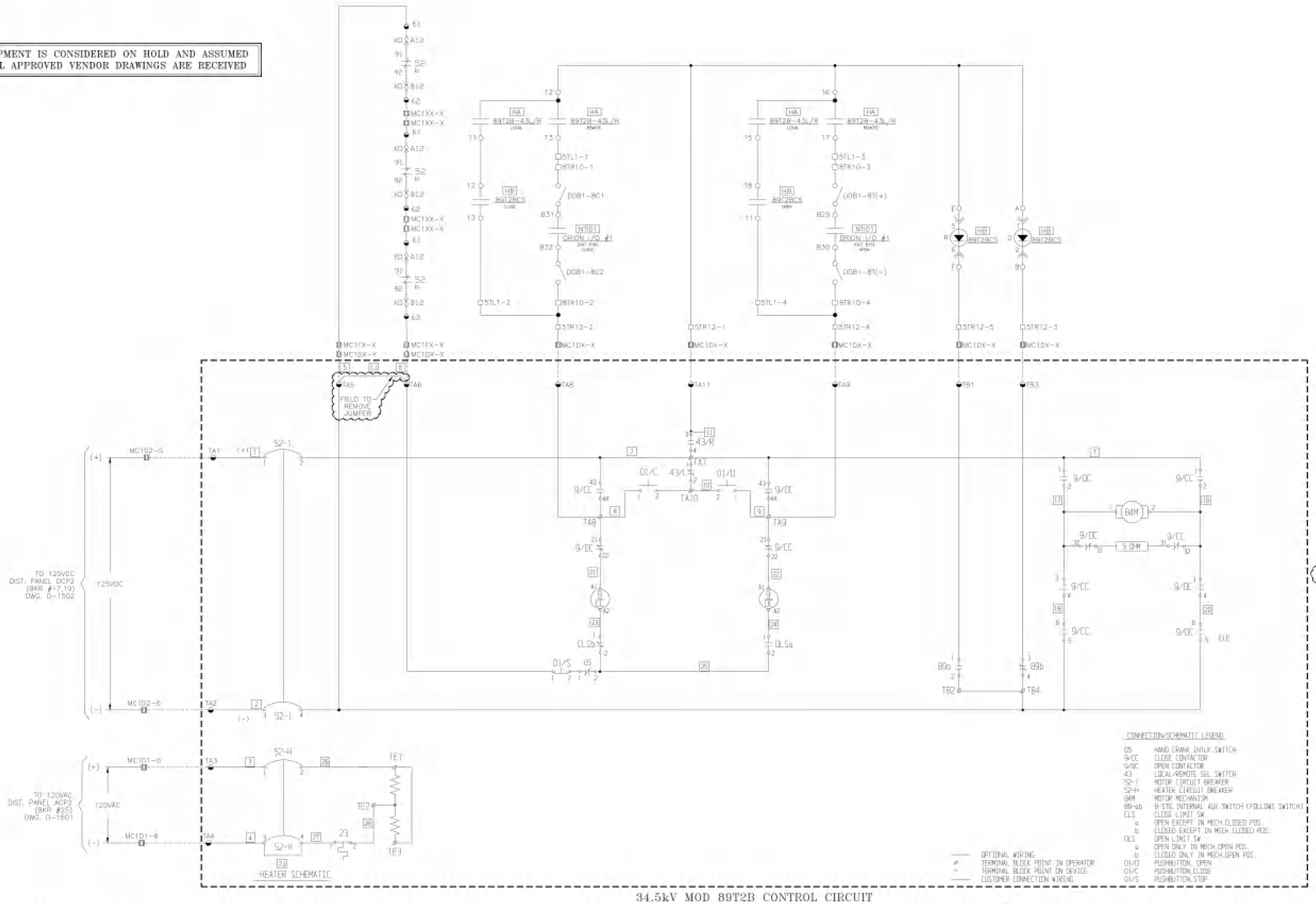
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T2
DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1348
JOB NUMBER	24144-01
DRAWING NUMBER	1348

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED



34.5kV MOD 89T2B CONTROL CIRCUIT

CONNECTION/SCHEMATIC LEGEND

05	HAND CRANK (MULK) SWITCH
9/CC	CLOSE CONTACTOR
9/OC	OPEN CONTACTOR
43	LOCAL/REMOTE SEL. SWITCH
52-1	MOTOR CIRCUIT BREAKER
52-H	HEATER CIRCUIT BREAKER
88M	MOTOR MECHANISM
89-ab	8-STG INTERNAL AUX SWITCH (FOLLOWS SWITCH)
CLS	CLOSE LIMIT SW
a	OPEN EXCEPT IN MECH.CLOSED POS.
b	CLOSED EXCEPT IN MECH.CLOSED POS.
OLS	OPEN LIMIT SW
a	OPEN ONLY IN MECH.OPEN POS.
b	CLOSED ONLY IN MECH.OPEN POS.
01/O	PUSHBUTTON, OPEN
01/C	PUSHBUTTON, CLOSE
01/S	PUSHBUTTON, STOP

OPTIONAL WIRING
TERMINAL BLOCK POINT IN OPERATOR
TERMINAL BLOCK POINT ON DEVICE
CUSTOMER CONNECTION WIRING

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▯	MARSHALLING CABINET

REV	DATE	DESCRIPTION			
A	06/20/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/20/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

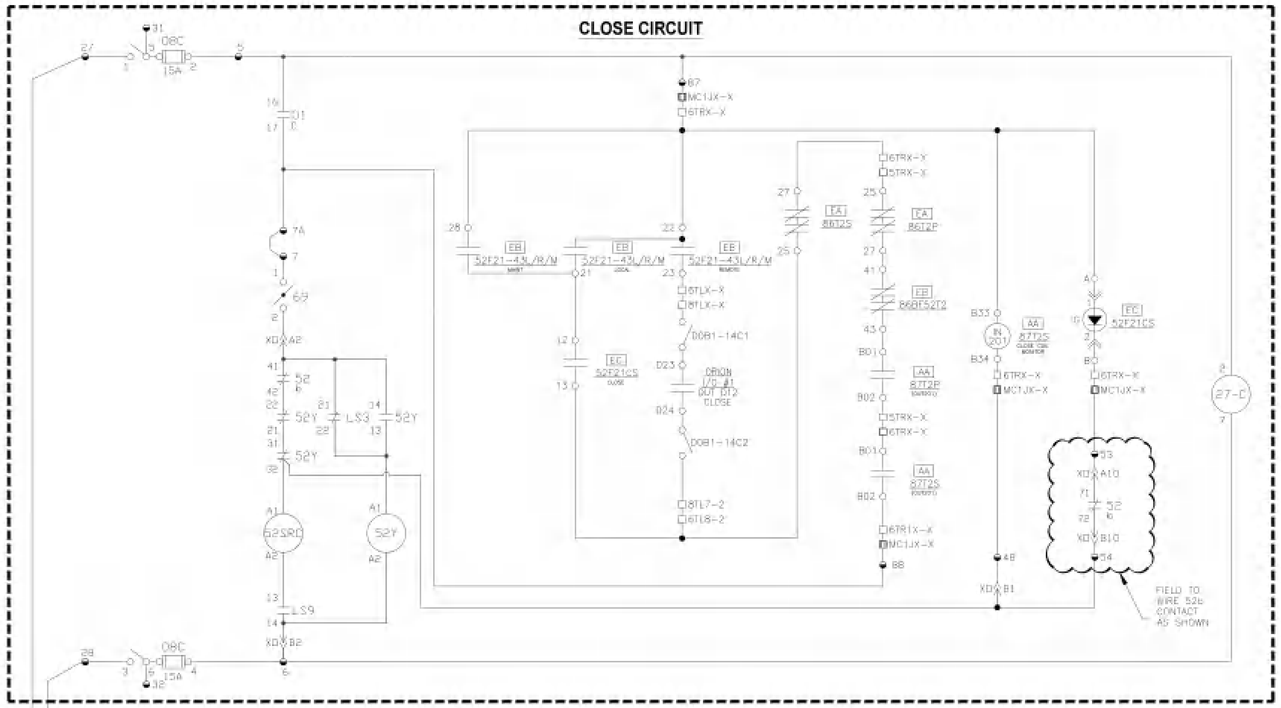
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV MOD SWITCH 89T2B DC SCHEMATIC

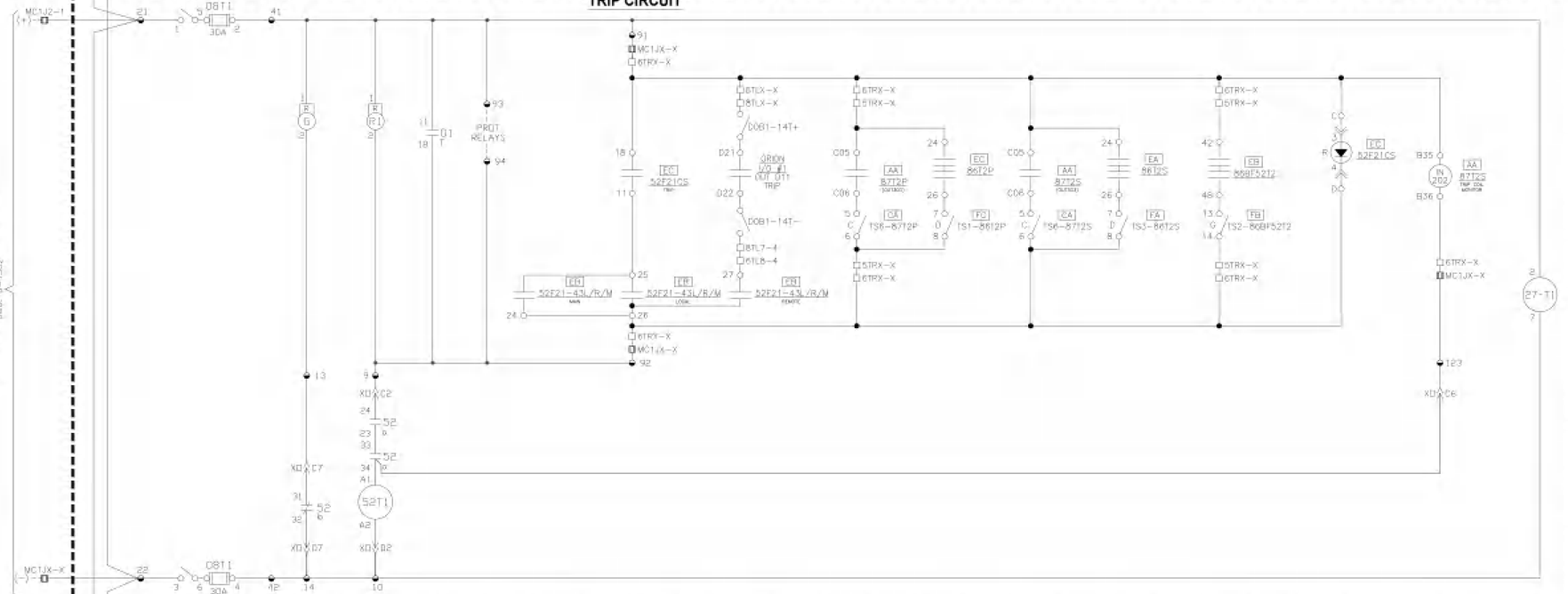
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1349
JOB NUMBER	24144-01
DRAWING NUMBER	1349

CLOSE CIRCUIT



TRIP CIRCUIT



DEVICE 52F21CS

ELECTROSWITCH SERIES 74PD202LT
ENGRAVING CODE 123B-2B23

52F21CS

DECK	CONTACTS		POSITION: TRIP	POSITION: NORMAL	POSITION: CLOSE	FUNCTION
1	10	11	X			TC1
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	20	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

DEVICE 52F21-43L/R/M

ELECTROSWITCH SERIES 24204AMS
ENGRAVING CODE 100-2L24A

52F21-43L/R/M

DECK	CONTACTS		POSITION: MAINT.	POSITION: LOCAL	POSITION: REMOTE	DESCRIPTION
1	10	11	X			
	11	12		X		
	12	13			X	
	14	15	X			
	15	16		X		
	16	17			X	
2	20	21	X			MAINT. CLOSE
	21	22		X		LOCAL CLOSE
	22	23			X	REMOTE CLOSE
	24	25	X			MAINT. TRIP
	25	26		X		LOCAL TRIP
	26	27			X	REMOTE TRIP
3	30	31	X			
	31	32		X		
	32	33			X	STATUS (SEE BELOW)
	34	35	X			STATUS (SEE BELOW)
	35	36		X		
	36	37			X	
4	40	41	X			
	44	45	X			STATUS (SEE BELOW)

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
□ RELAY PANEL
⊠ RELAY PANEL, SHORTING TYPE
◒ BREAKER, CIRCUIT SWITCHER, RECLOSER
○ INSTRUMENT TRANSFORMER
◪ POWER TRANSFORMER
▯ MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/20/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

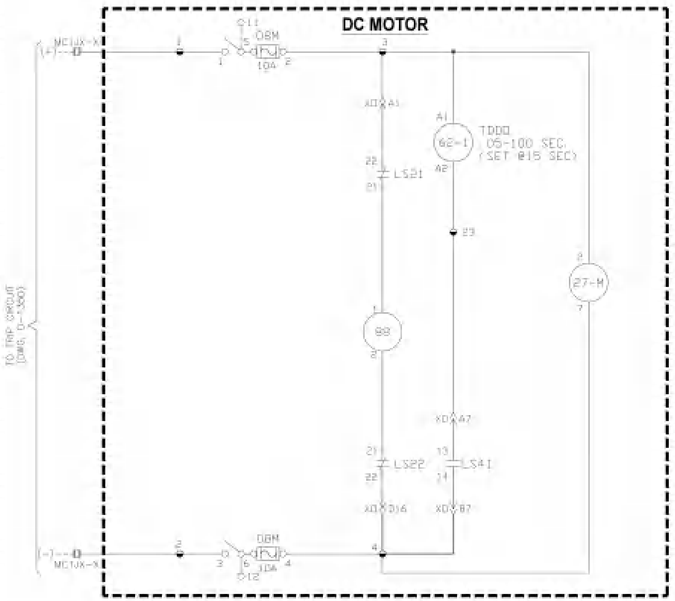
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F21
CLOSE & TRIP

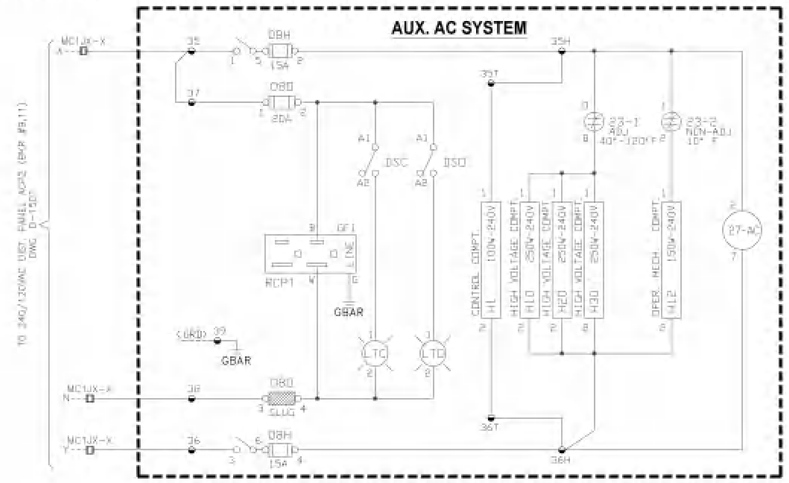
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1350
JOB NUMBER	24144-01
DRAWING NUMBER	1350

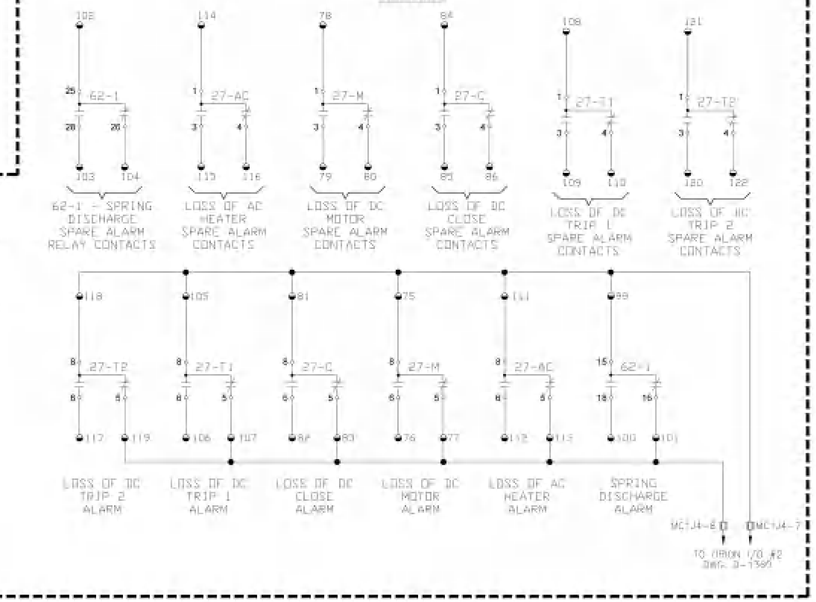
DC MOTOR

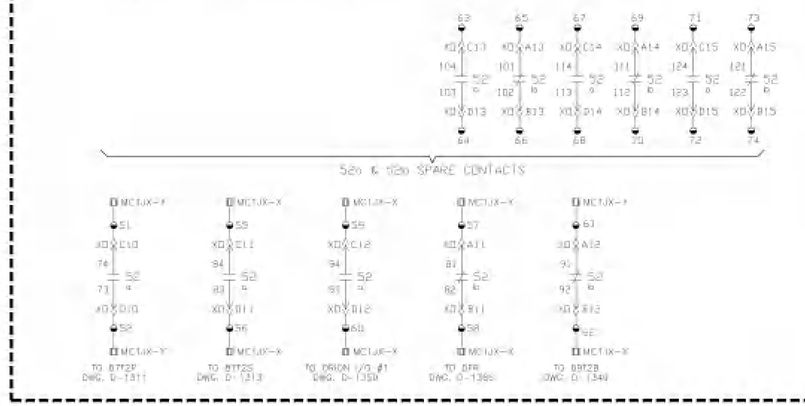


AUX. AC SYSTEM



ALARMS





EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF GREGORY D. KING, PE 118220 ON DECEMBER 26, 2024. IT IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.

LEGEND

☒01	CONTROL SWITCH	LS3	CLOSING SPRING POSITION SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBC	CLOSE POWER DISCONNECT	LS9	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBH	HEATER POWER DISCONNECT	LS21	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBM	MOTOR POWER DISCONNECT	LS22	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBD	LIGHT & RECEPTACLE POWER FUSE	LS41	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBT1	TRIP POWER DISCONNECT (PRIMARY)	DSC	DOOR ACTIVATED LIGHT SWITCH(CONTROL COMPT)
DBT2	TRIP POWER DISCONNECT (SECONDARY)	DSD	DOOR ACTIVATED LIGHT SWITCH(OPERATOR COMPT)
23-1	ADJUSTABLE THERMOSTAT	LTC	CONTROL COMPARTMENT LIGHT
23-2	NON-ADJUSTABLE THERMOSTAT	LTD	OPERATOR COMPARTMENT LIGHT
27-AC	LOSS OF AC VOLTAGE (HEATER CIRCUIT)	☒R1	RED INDICATING LIGHT (PRIMARY TRIP)
27-C	LOSS OF DC VOLTAGE (CLOSE CIRCUIT)	☒R2	RED INDICATING LIGHT (SECONDARY TRIP)
27-M	LOSS OF DC VOLTAGE (MOTOR CIRCUIT)	RECPT	DUPLEX RECEPTACLE (OPT.)
27-T1	LOSS OF DC VOLTAGE (TRIP 1 CIRCUIT)	XD	PLUG CONNECTOR (OPERATOR CONNECTIONS)
27-T2	LOSS OF DC VOLTAGE (TRIP 2 CIRCUIT)		
52a	AUX SWITCH, OPEN WHEN BKR OPEN		
52b	AUX SWITCH, CLOSED WHEN BKR OPEN		
52SRC	CLOSING, SPRING RELEASE COIL		
52T1	TRIP COIL (PRIMARY)		
52T2	TRIP COIL (SECONDARY)		
52Y	ANTI-PUMP RELAY		
62-1	SPRING DISCHARGE ALARM RELAY		
69	CLOSING CUTOUT SWITCH		
88	MOTOR		
☒G	GREEN INDICATING LIGHT		
HR	HEATER		

NOTES

1. ALL EQUIPMENT SHOWN WITH CIRCUIT BREAKER OPEN, TRIP LATCH NOT-RESET, RELAY DE-ENERGIZED AND SPRINGS DISCHARGED.
2. ☒ = DEVICE LOCATED ON SWITCH PANEL.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
☒	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◫	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

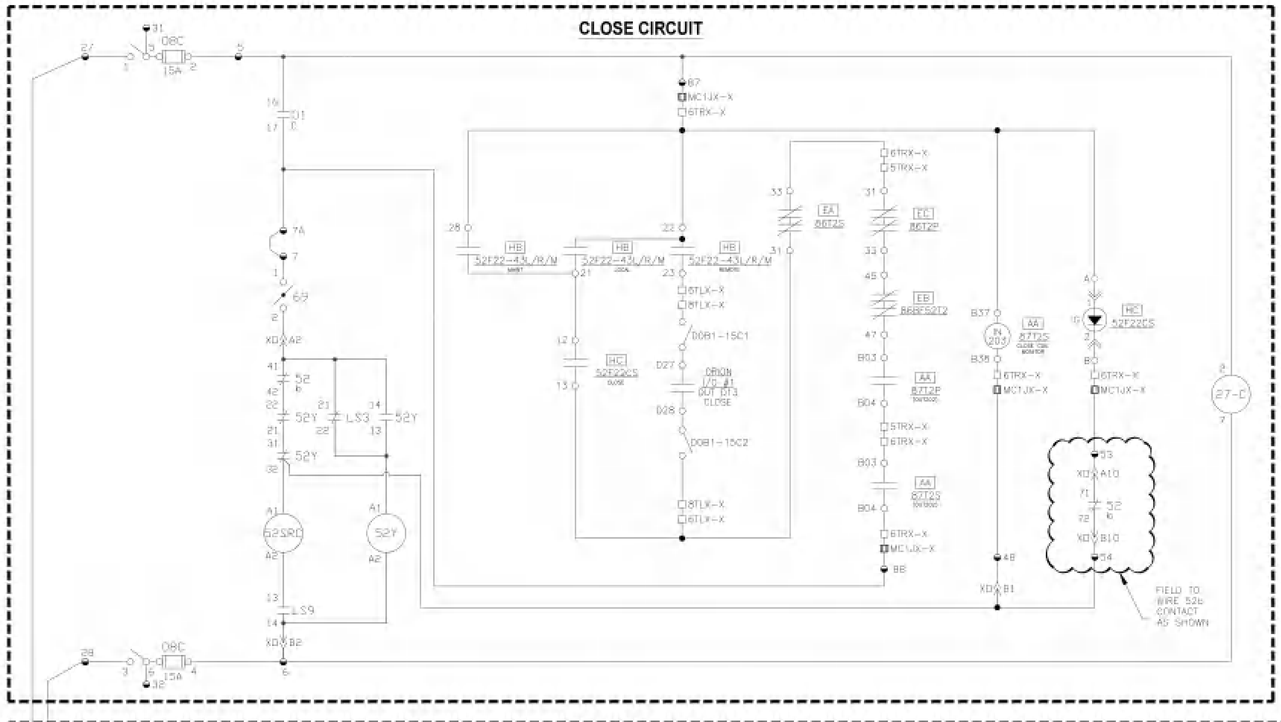
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F21
ALARMS & AC SYSTEM

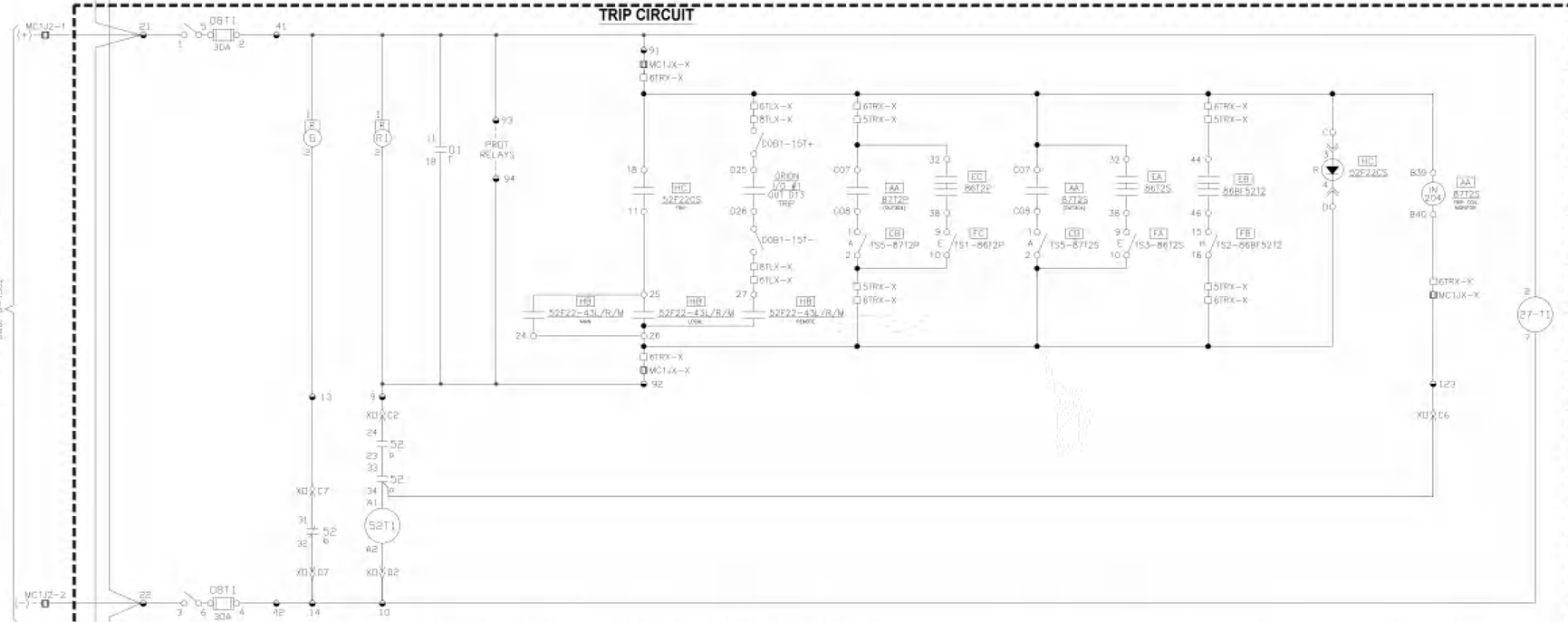
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1351
JOB NUMBER	24144-01
DRAWING NUMBER	1351

CLOSE CIRCUIT



TRIP CIRCUIT



DEVICE 52F22CS

ELECTROSWITCH SERIES 74PD202LT
ENGRAVING CODE 123B-2B23

52F22CS

DECK	CONTACTS		POSITION: TRIP	POSITION: NORMAL	POSITION: CLOSE	FUNCTION
1	18	11	X			TC1
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

DEVICE 52F22-43L/R/M

ELECTROSWITCH SERIES 24204AMS
ENGRAVING CODE 100-2L24A

52F22-43L/R/M

DECK	CONTACTS		POSITION: MAINT	POSITION: LOCAL	POSITION: REMOTE	DESCRIPTION
1	18	11	X			
	11	12		X		
	12	13			X	
	14	15	X			
	15	16		X		
	16	17			X	
2	28	21	X			MAINT. CLOSE
	21	22		X		LOCAL CLOSE
	22	23			X	REMOTE CLOSE
	24	25	X			MAINT. TRIP
	25	26		X		LOCAL TRIP
	26	27			X	REMOTE TRIP
3	38	31	X			
	31	32		X		
	32	33			X	STATUS (SEE BELOW)
	34	35	X			STATUS (SEE BELOW)
	35	36		X		
	37	37			X	
4	48	41	X			
	44	45	X			STATUS (SEE BELOW)

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
◫	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

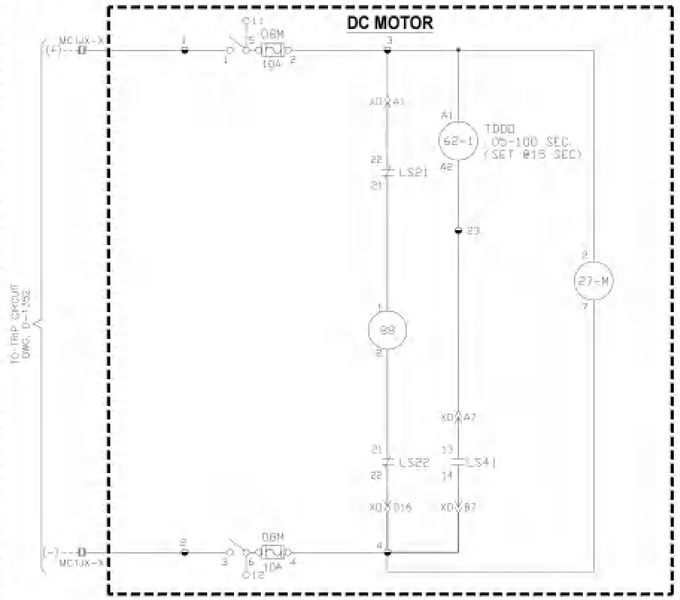
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F22
CLOSE & TRIP

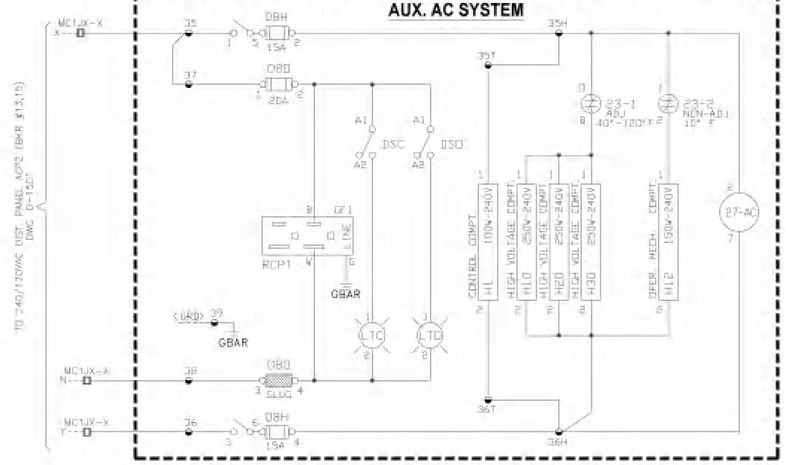
LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1352
JOB NUMBER	24144-01
DRAWING NUMBER	1352

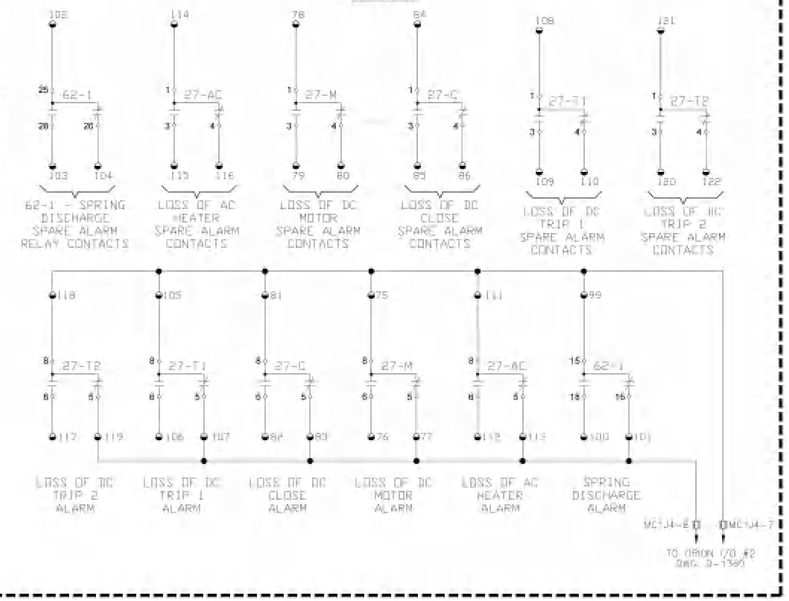
DC MOTOR

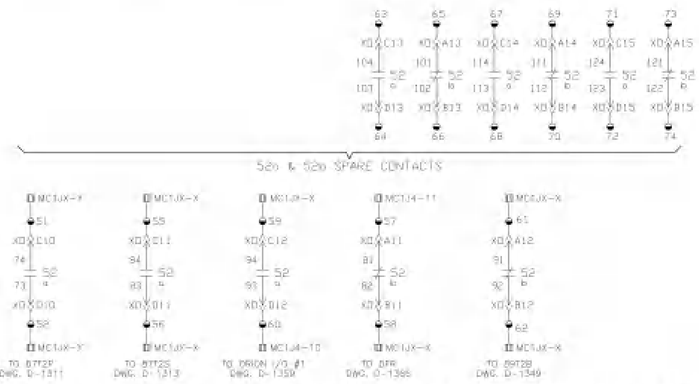


AUX. AC SYSTEM



ALARMS





EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

LEGEND

☒01	CONTROL SWITCH	LS3	CLOSING SPRING POSITION SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBC	CLOSE POWER DISCONNECT	LS9	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBH	HEATER POWER DISCONNECT	LS21	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBM	MOTOR POWER DISCONNECT	LS22	TRIP POWER DISCONNECT (SECONDARY) MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBD	LIGHT & RECEPTACLE POWER FUSE	LS41	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBT	TRIP POWER DISCONNECT (PRIMARY)	DSC	DOOR ACTIVATED LIGHT SWITCH(CONTROL COMPT)
DBT2	TRIP POWER DISCONNECT (SECONDARY)	DSO	DOOR ACTIVATED LIGHT SWITCH(OPERATOR COMPT)
23-1	ADJUSTABLE THERMOSTAT	LTC	CONTROL COMPARTMENT LIGHT
23-2	NON-ADJUSTABLE THERMOSTAT	LTO	OPERATOR COMPARTMENT LIGHT
27-AC	LOSS OF AC VOLTAGE (HEATER CIRCUIT)	☒R1	RED INDICATING LIGHT (PRIMARY TRIP)
27-C	LOSS OF DC VOLTAGE (CLOSE CIRCUIT)	☒R2	RED INDICATING LIGHT (SECONDARY TRIP)
27-M	LOSS OF DC VOLTAGE (MOTOR CIRCUIT)	RECPT	DUPLEX RECEPTACLE (OPT.)
27-T1	LOSS OF DC VOLTAGE (TRIP 1 CIRCUIT)	XD	PLUG CONNECTOR (OPERATOR CONNECTIONS)
27-T2	LOSS OF DC VOLTAGE (TRIP 2 CIRCUIT)		
52a	AUX SWITCH, OPEN WHEN BKR OPEN		
52b	AUX SWITCH, CLOSED WHEN BKR OPEN		
52SRC	CLOSING, SPRING RELEASE COIL		
52T1	TRIP COIL (PRIMARY)		
52T2	TRIP COIL (SECONDARY)		
52Y	ANTI-PUMP RELAY		
62-1	SPRING DISCHARGE ALARM RELAY		
69	CLOSING CUTOUT SWITCH		
88	MOTOR		
☒G	GREEN INDICATING LIGHT		
H#	HEATER		

NOTES

1. ALL EQUIPMENT SHOWN WITH CIRCUIT BREAKER OPEN, TRIP LATCH NOT-RESET, RELAY DE-ENERGIZED AND SPRINGS DISCHARGED.
2. ☒ = DEVICE LOCATED ON SWITCH PANEL.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
☒	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◧	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

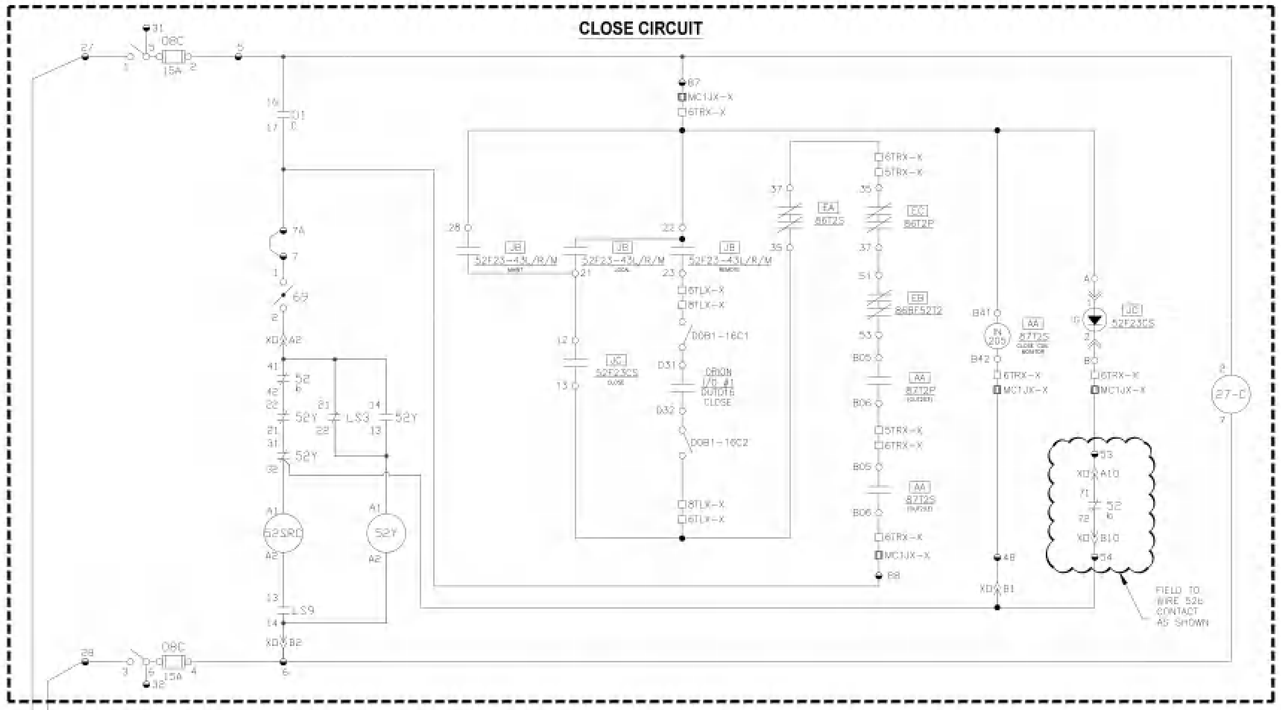
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F22
ALARMS & AC SYSTEM

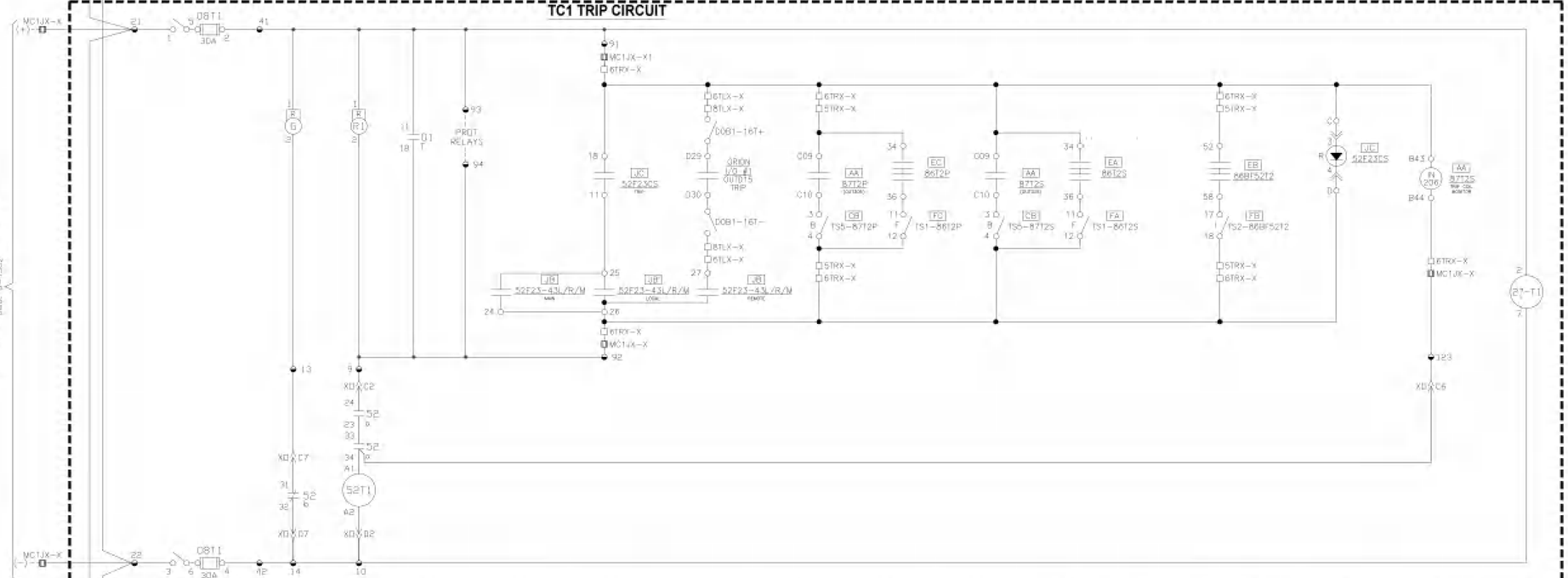
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1353
JOB NUMBER	24144-01
DRAWING NUMBER	1353

CLOSE CIRCUIT



TC1 TRIP CIRCUIT



DEVICE 52F23CS

ELECTROSWITCH SERIES 74PD202LT
ENGRAVING CODE 123B-2B23

52F23CS

DECK	CONTACTS		POSITION: TRIP	POSITION: NORMAL	POSITION: CLOSE	FUNCTION
1	18	11	X			TC1
	12	13			X	CLOSE
	14	15	X			
	16	17			X	
2	28	21	X			
	22	23			X	
	24	25	X			
	26	27			X	

DEVICE 52F23-43L/R/M

ELECTROSWITCH SERIES 24204M/S
ENGRAVING CODE 100-2L24A

52F23-43L/R/M

DECK	CONTACTS		POSITION: MAINT	POSITION: LOCAL	POSITION: REMOTE	DESCRIPTION
1	18	11	X			
	11	12	X			
	12	13			X	
	14	15	X			
	15	16		X		
	16	17			X	
2	28	21	X			MAINT. CLOSE
	21	22		X		LOCAL CLOSE
	22	23			X	REMOTE CLOSE
	24	25	X			MAINT. TRIP
	25	26		X		LOCAL TRIP
	26	27			X	REMOTE TRIP
3	38	31	X			
	31	32		X		
	32	33			X	STATUS (SEE BELOW)
	34	35	X			STATUS (SEE BELOW)
	35	36		X		
	37	37			X	
4	48	41	X			
	44	45	X			STATUS (SEE BELOW)

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
◫	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

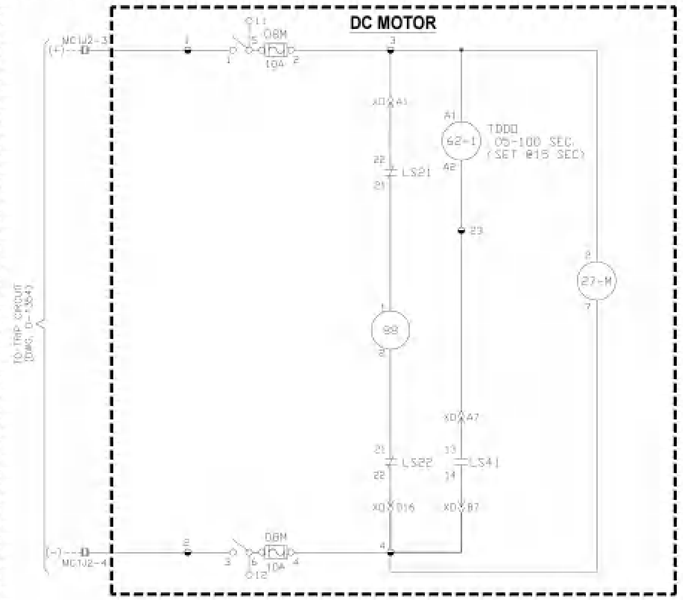
PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV BREAKER 52F23
CLOSE & TRIP

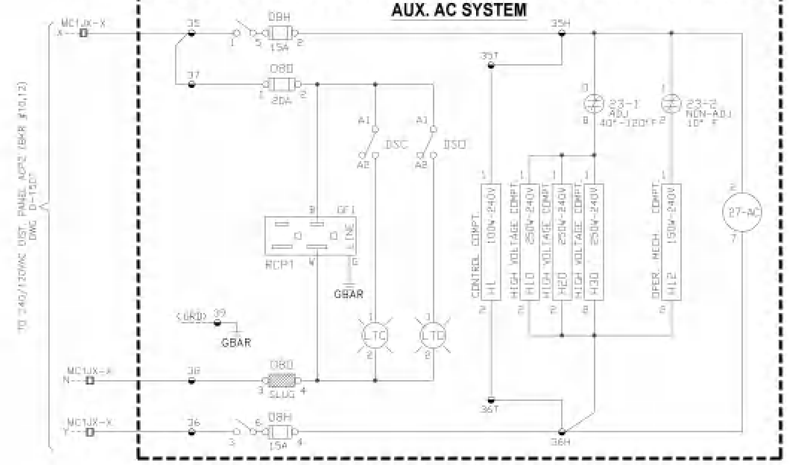
LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1354
JOB NUMBER	24144-01
DRAWING NUMBER	1354

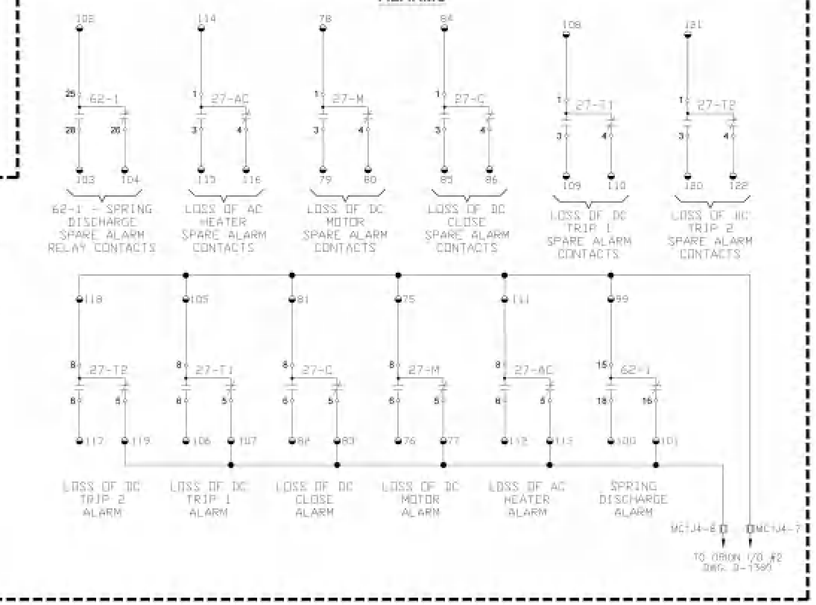
DC MOTOR



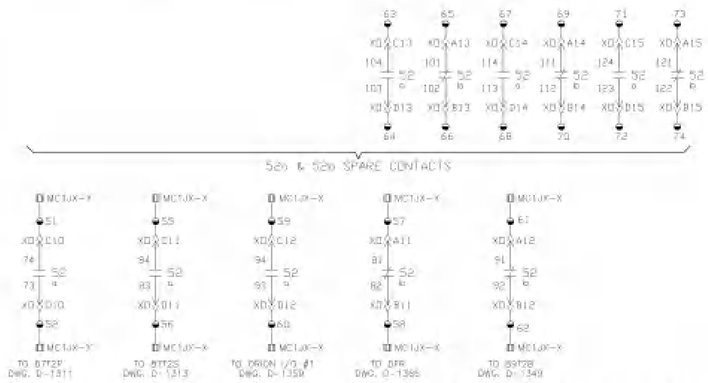
AUX. AC SYSTEM



ALARMS



52a & 52b SPARE CONTACTS



EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

LEGEND

☒01	CONTROL SWITCH	LS3	CLOSING SPRING POSITION SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBC	CLOSE POWER DISCONNECT	LS9	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBH	HEATER POWER DISCONNECT	LS21	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBM	MOTOR POWER DISCONNECT	LS22	MOTOR CUTOFF SWITCH, CLOSED WHEN CLOSING SPRING IS DISCHARGED
DBD	LIGHT & RECEPTACLE POWER FUSE	LS41	CLOSING SPRING POSITION SWITCH, OPEN WHEN CLOSING SPRING IS DISCHARGED
DBT1	TRIP POWER DISCONNECT (PRIMARY)	DSC	DOOR ACTIVATED LIGHT SWITCH(CONTROL COMPT)
DBT2	TRIP POWER DISCONNECT (SECONDARY)	DSD	DOOR ACTIVATED LIGHT SWITCH(OPERATOR COMPT)
23-1	ADJUSTABLE THERMOSTAT	LTC	CONTROL COMPARTMENT LIGHT
23-2	NON-ADJUSTABLE THERMOSTAT	LTD	OPERATOR COMPARTMENT LIGHT
27-AC	LOSS OF AC VOLTAGE (HEATER CIRCUIT)	☒R1	RED INDICATING LIGHT (PRIMARY TRIP)
27-C	LOSS OF DC VOLTAGE (CLOSE CIRCUIT)	☒R2	RED INDICATING LIGHT (SECONDARY TRIP)
27-M	LOSS OF DC VOLTAGE (MOTOR CIRCUIT)	RECPT	DUPLEX RECEPTACLE (OPT.)
27-T1	LOSS OF DC VOLTAGE (TRIP 1 CIRCUIT)	XD	PLUG CONNECTOR (OPERATOR CONNECTIONS)
27-T2	LOSS OF DC VOLTAGE (TRIP 2 CIRCUIT)		
52a	AUX SWITCH, OPEN WHEN BKR OPEN		
52b	AUX SWITCH, CLOSED WHEN BKR OPEN		
52SRC	CLOSING, SPRING RELEASE COIL		
52T1	TRIP COIL (PRIMARY)		
52T2	TRIP COIL (SECONDARY)		
52Y	ANTI-PUMP RELAY		
62-1	SPRING DISCHARGE ALARM RELAY		
69	CLOSING CUTOUT SWITCH		
88	MOTOR		
☒G	GREEN INDICATING LIGHT		
HR	HEATER		

NOTES

1. ALL EQUIPMENT SHOWN WITH CIRCUIT BREAKER OPEN, TRIP LATCH NOT-RESET, RELAY DE-ENERGIZED AND SPRINGS DISCHARGED.
2. ☒ = DEVICE LOCATED ON SWITCH PANEL.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
☒	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
◧	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

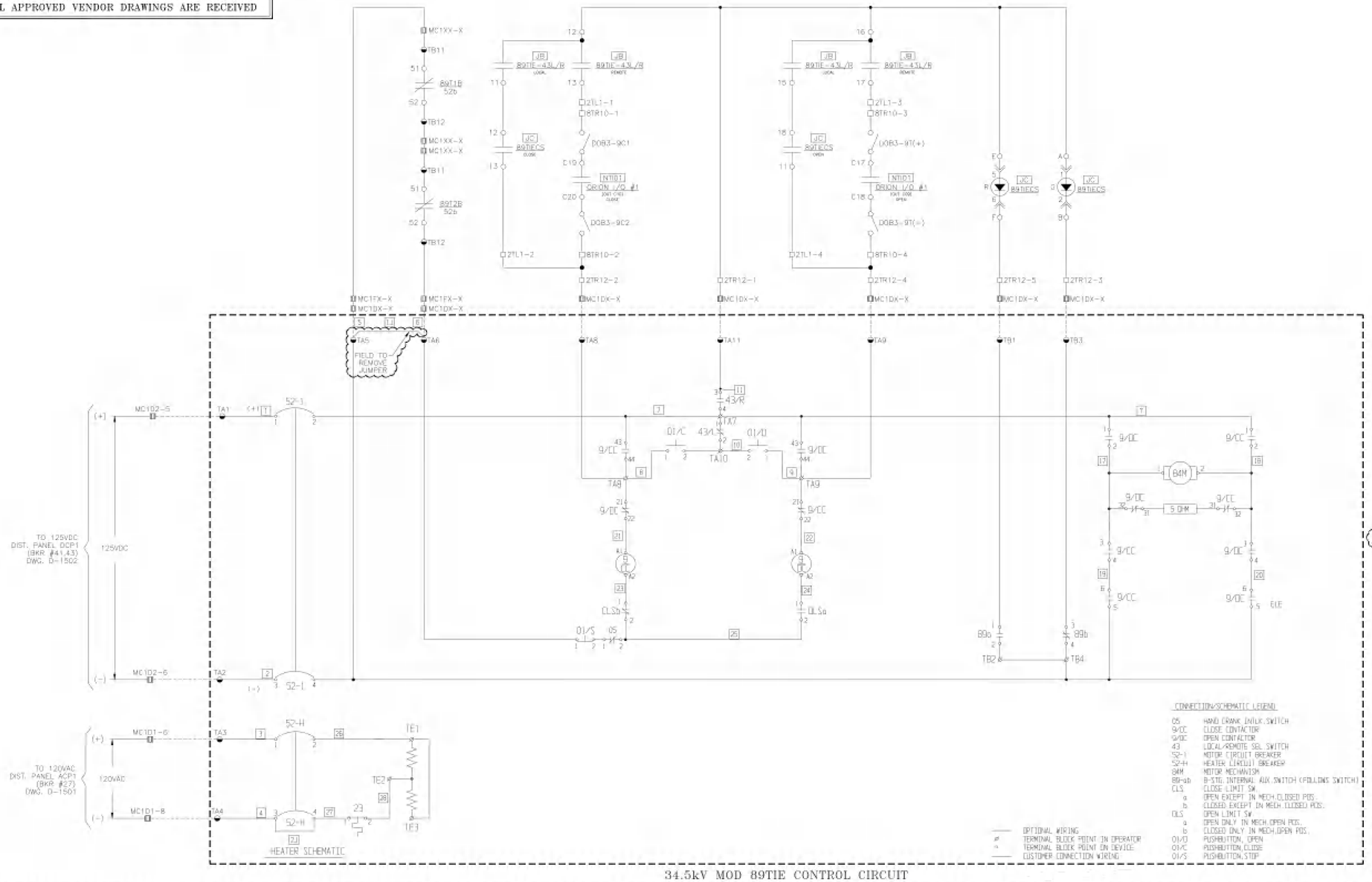
PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

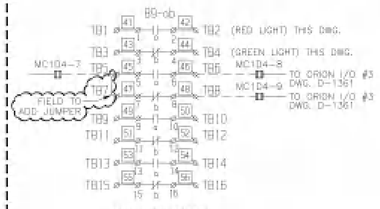
TITLE: 34.5kV BREAKER 52F23
ALARMS & AC SYSTEM

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1355
JOB NUMBER	24144-01
DRAWING NUMBER	1355

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED





89TIECS

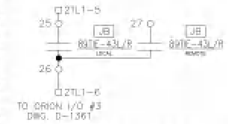
DEVICE 89TIECS	DECK	CONTACTS		TRIP	POSITION NORMAL	POSITION CLOSE	FUNCTION
DISCONNECT SWITCH	1	15	11	X			OPEN
(C) (R)		12	13			X	CLOSE
OPEN CLOSE		14	15	X			
		16	17		X		
	2	28	21	X			
		22	23		X		
		24	25	X			
		26	27		X		

ELECTROSWITCH SERIES 74PB202NN
ENGRAVING CODE 1238-2025MM

89TIE-43L/R

DEVICE 89TIE-43L/R	DECK	CONTACTS		POS. LOCAL	POS. REMOTE	FUNCTION
LOCAL REMOTE SW.	1	12	11	X		LOCAL CLOSE
LOCAL			13		X	REM. CLOSE
(O) REMOTE		16	15	X		LOCAL OPEN
			17		X	REM. OPEN
	2	22	21	X		
			23		X	
		28	25	X		STATUS BELOW
			27		X	

ELECTROSWITCH SERIES 242028
ENGRAVING CODE 10D-2L24A



CONNECTION/SCHEMATIC LEGEND

05	HAND CRANK (MAN.) SWITCH
9/CC	CLOSE CONTACTOR
9/OC	OPEN CONTACTOR
43	LOCAL/REMOTE SEL. SWITCH
52-1	MOTOR CIRCUIT BREAKER
52-H	HEATER (CIRCUIT) BREAKER
8M	MOTOR MECHANISM
89-ab	B-STG INTERNAL AUX SWITCH (FOLLOWS SWITCH)
CLS	CLOSE LIMIT SW.
a	OPEN EXCEPT IN MECH.CLOSED POS.
b	CLOSED EXCEPT IN MECH.CLOSED POS.
OLS	OPEN LIMIT SW.
a	OPEN ONLY IN MECH.OPEN POS.
b	CLOSED ONLY IN MECH.OPEN POS.
01/O	PUSHBUTTON, OPEN
01/C	PUSHBUTTON, CLOSE
01/S	PUSHBUTTON, STOP

OPTIONAL WIRING
TERMINAL BLOCK POINT IN OPERATOR
TERMINAL BLOCK POINT ON DEVICE
CUSTOMER CONNECTION WIRING

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND

□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▯	MARSHALLING CABINET

34.5kV MOD 89TIE CONTROL CIRCUIT

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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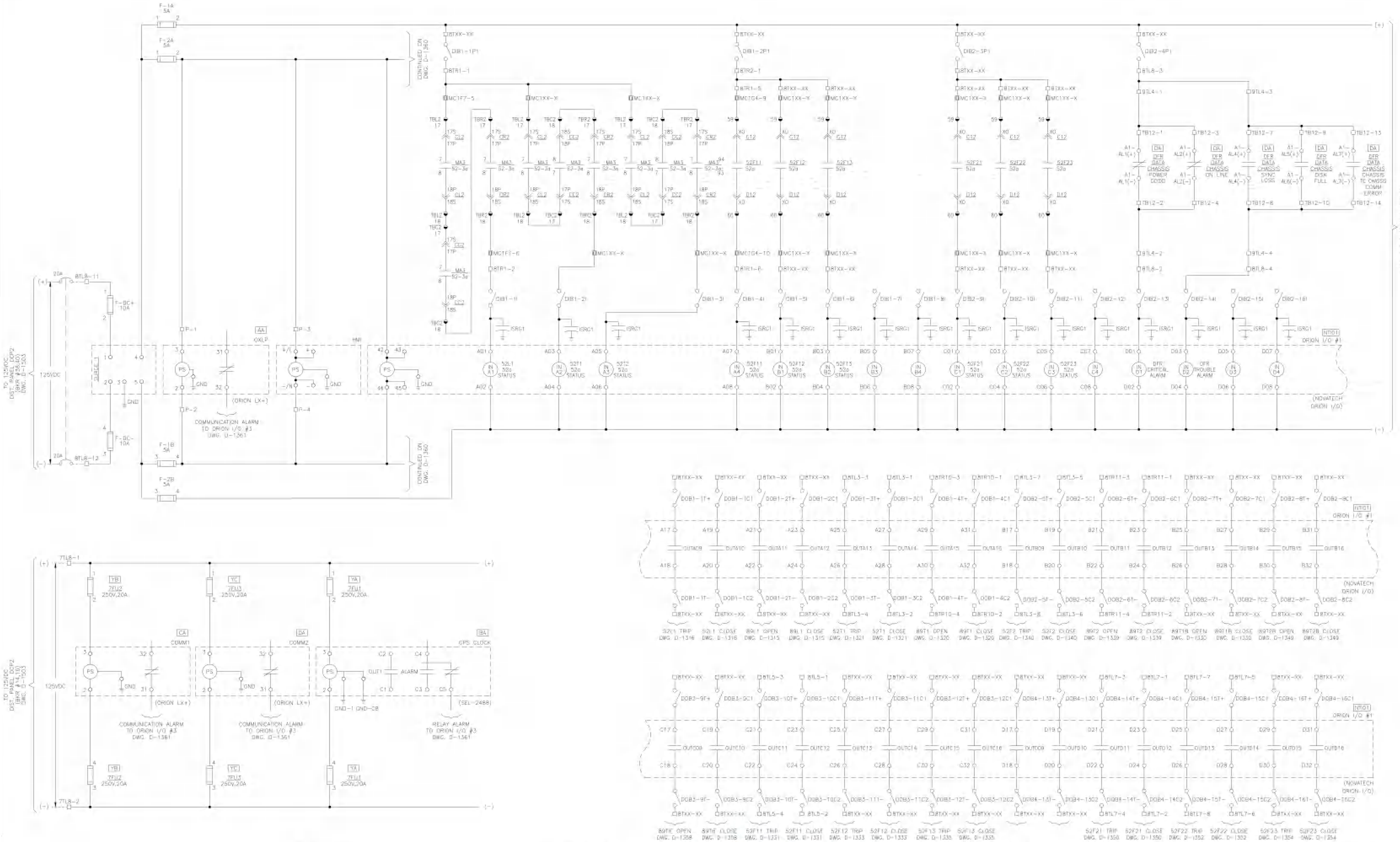
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 34.5kV MOD SWITCH 89TIE DC SCHEMATIC

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1358
JOB NUMBER	24144-01
DRAWING NUMBER	1358



REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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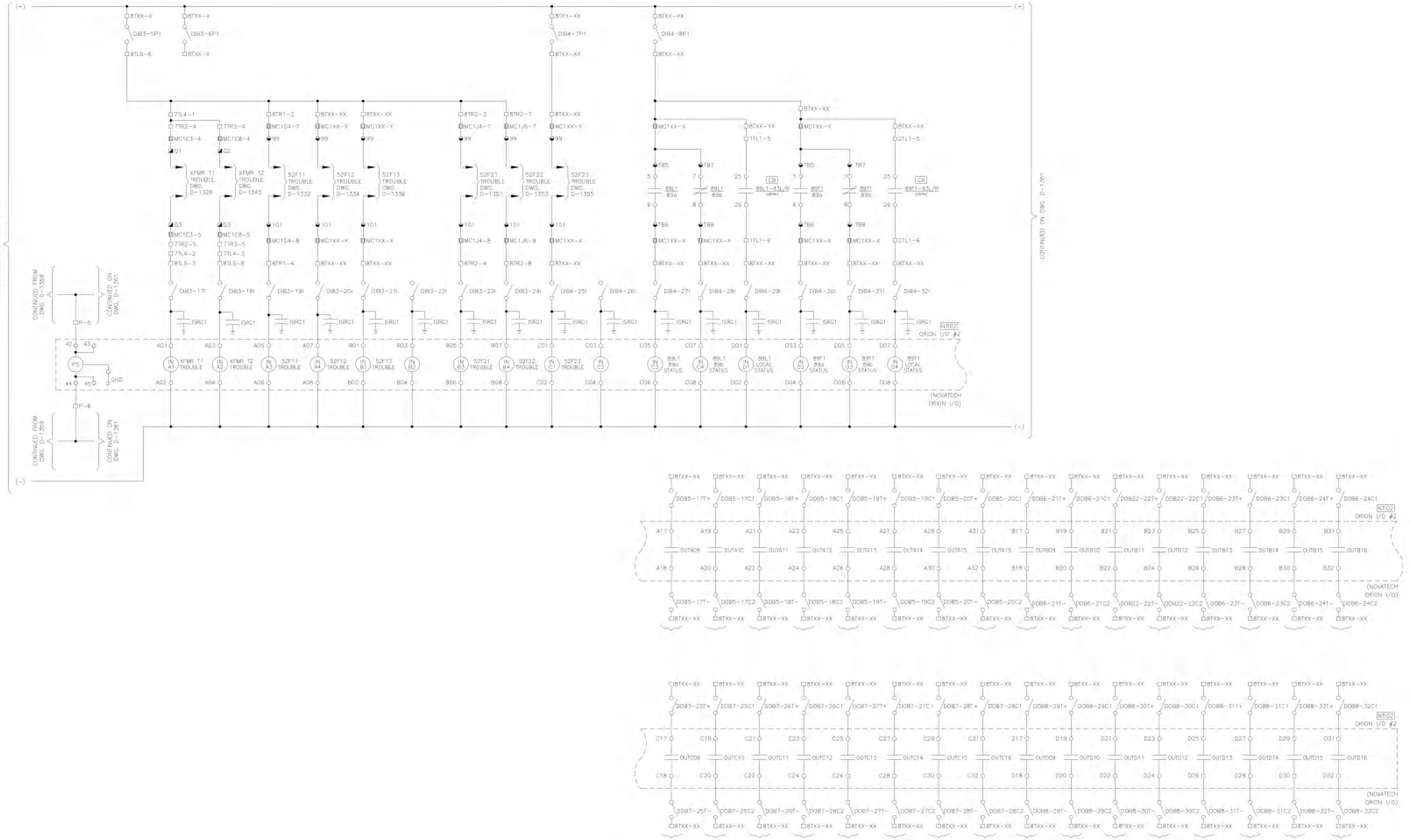
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RTU, ORION I/O #1
GPS CLOCK, & COMM1 DC SCHEMATIC

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1359
JOB NUMBER	24144-01
DRAWING NUMBER	1359



XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: ORION I/O #2 DC SCHEMATIC

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1360
JOB NUMBER	24144-01
DRAWING NUMBER	1360

CONTINUED FROM DWG. D-1360

CONTINUED BELOW

CONTINUED ABOVE

CONTINUED TO DWG. D-1362

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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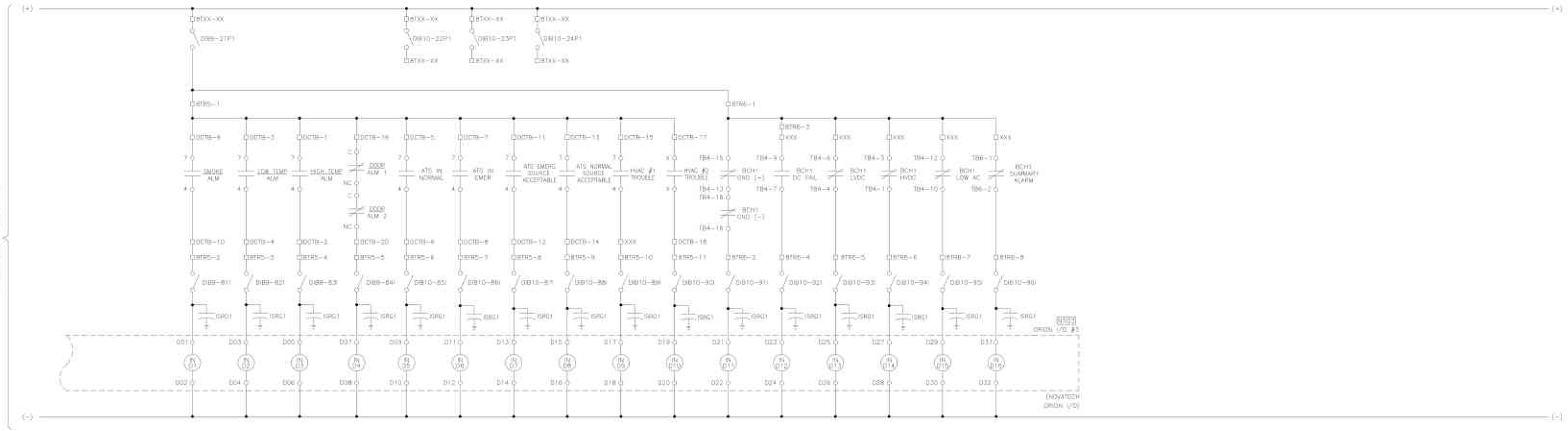
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: ORION I/O #3 DC SCHEMATIC

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1361
JOB NUMBER	24144-01
DRAWING NUMBER	1361



XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
●	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◢	POWER TRANSFORMER
⊞	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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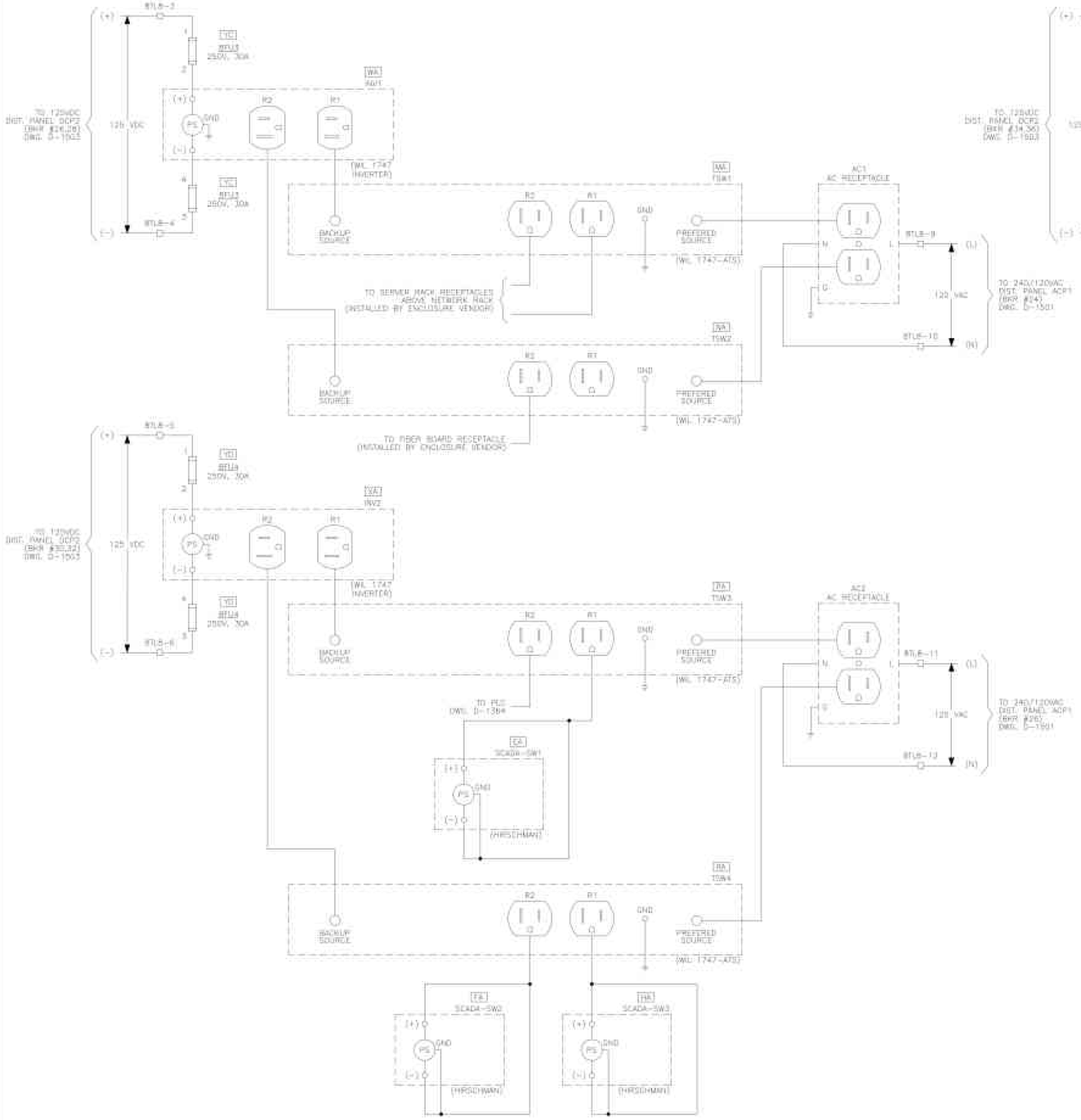
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EGR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: ORION I/O #3 DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1362
JOB NUMBER	24144-01
DRAWING NUMBER	1362



XX	WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
▬	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
▯	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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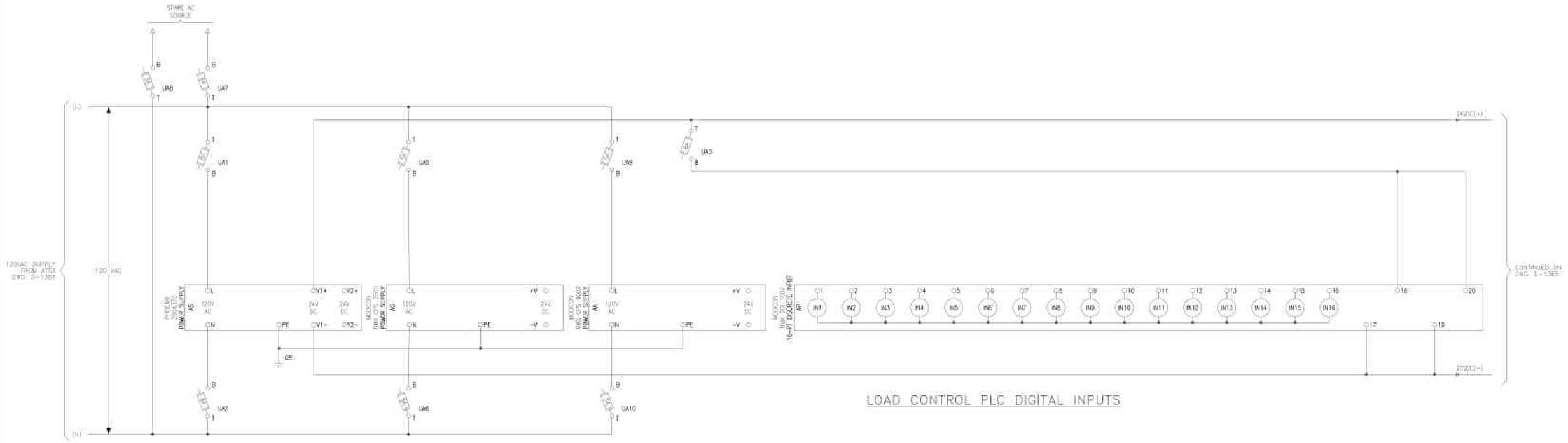
SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: RECPT & INVERTER POWER SUPPLY DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1363
JOB NUMBER	24144-01
DRAWING NUMBER	1363



LOAD CONTROL PLC DIGITAL INPUTS

[XX] WIRING DIAGRAM DEVICE CABEL

TERMINAL POINT LEGEND
☐ RELAY PANEL
☒ RELAY PANEL, SHORTING TYPE
◒ BREAKER, CIRCUIT SWITCHER, RECLOSER
○ INSTRUMENT TRANSFORMER
◪ POWER TRANSFORMER
▯ MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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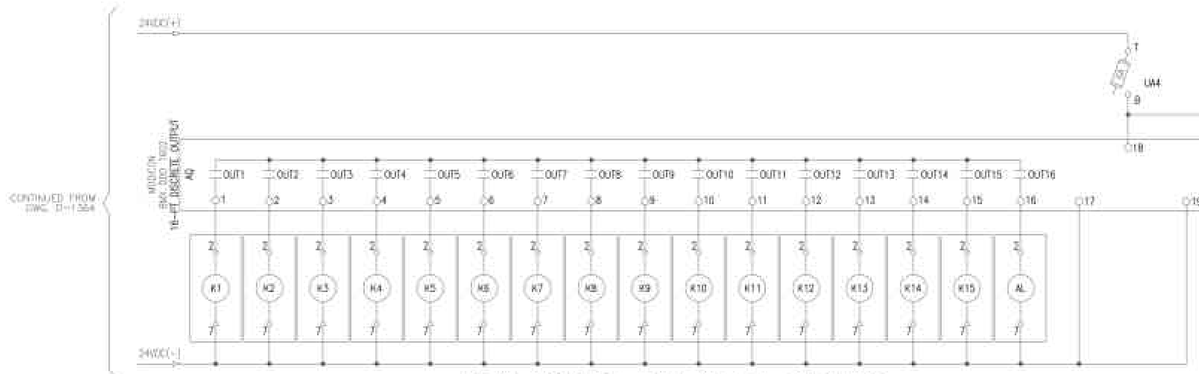
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EGS

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

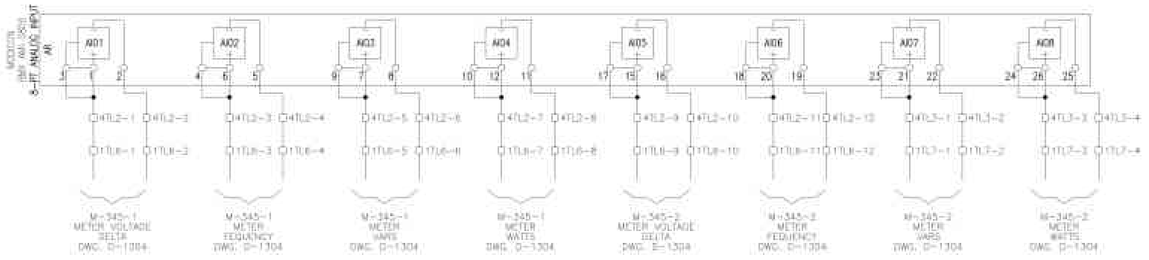
TITLE: PLC SHEET 1 OF 2
DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

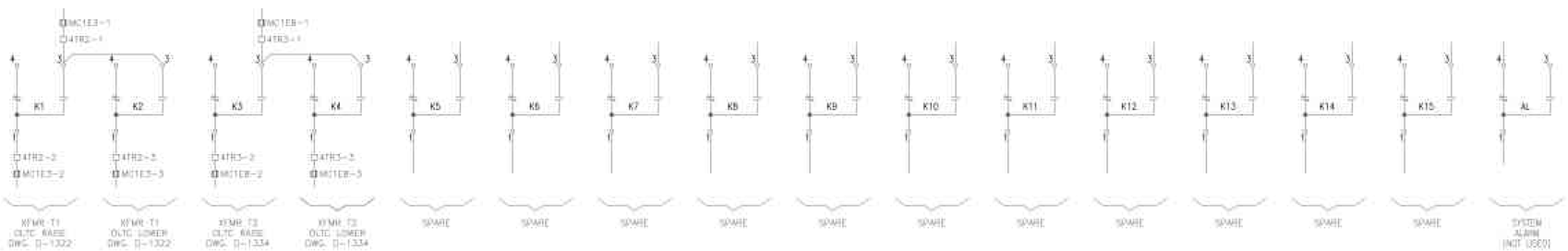
FILE NAME	24144-01-1364
JOB NUMBER	24144-01
DRAWING NUMBER	1364



LOAD CONTROL PLC DIGITAL OUTPUTS



LOAD CONTROL PLC 4-20MA ANALOG INPUTS



	RELAY PANEL
	RELAY PANEL, SHORTING TYPE
	BREAKER, CIRCUIT SWITCHER, RECLOSER
	INSTRUMENT TRANSFORMER
	POWER TRANSFORMER
	MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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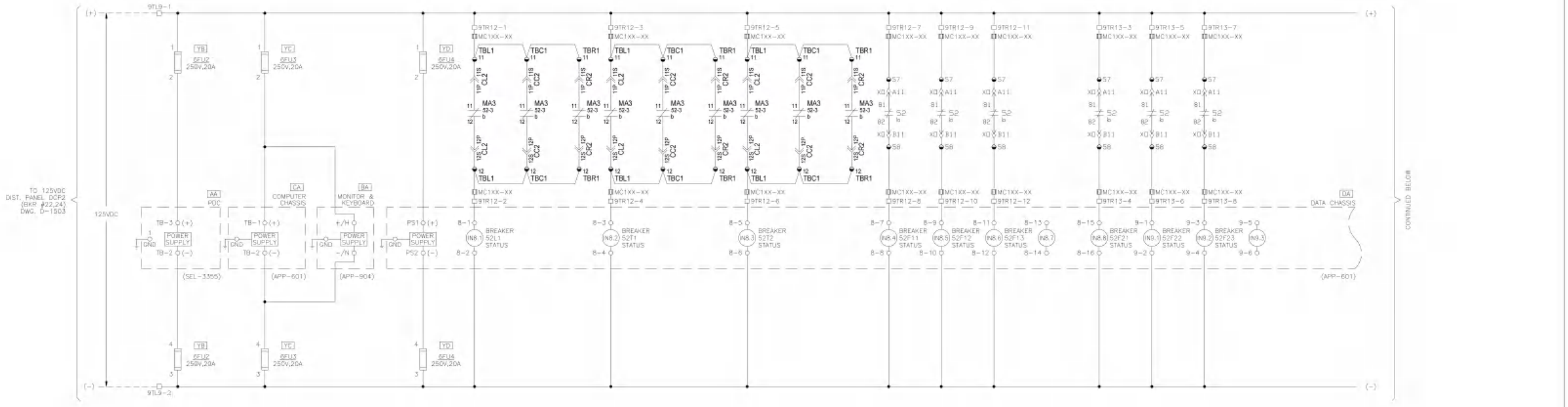
SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: PLC SHEET 2 OF 2
DC SCHEMATIC

LOCATION: 8087 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1365
JOB NUMBER	24144-01
DRAWING NUMBER	1365



XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
MARSHALLING CABINET

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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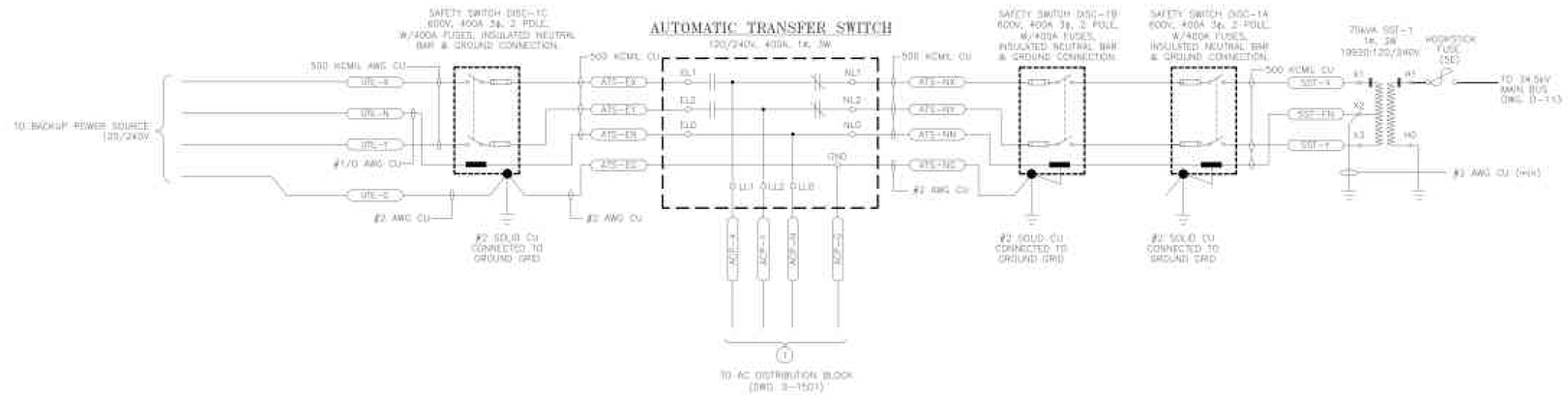
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: TRANSFORMER T2
LOCAL CONTROL CUBICLE

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1366
JOB NUMBER	24144-01
DRAWING NUMBER	1366



EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	08/30/25	60% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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SCALE	NTS
DATE	03/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701
345/34.5kV SUBSTATION

TITLE: AC DISTRIBUTION SYSTEM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1500
JOB NUMBER	24144-01
DRAWING NUMBER	1500

TO AUTOMATIC TRANSFER SWITCH (DWG. D-1510)

X Y N G

AC DISTRIBUTION BLOCK 1

AC1-G AC1-N AC1-Y AC1-X

AC2-G AC2-N AC2-Y AC2-X

#2 AWG CU

(3) 500 Kcmil CU

225A

3-1/C #4 W/GND — T1-AC1A — TRANSFORMER T1 COOLING FANS, RECEPTACLES (DWG. D-1325)

4/C #10 — 52T1-AC1A — 345kV BREAKER 52T1 LIGHTS, HEATER, RECEPTACLE (DWG. D-1323)

4/C #10 — 52F11-AC1A — 34.5kV BREAKER 52F11 LIGHTS, HEATER, RECEPTACLE (DWG. D-1332)

4/C #10 — 52F12-AC1 — 34.5kV BREAKER 52F12 LIGHTS, HEATER, RECEPTACLE (DWG. D-1334)

SPARE

2/C #10 — 89T1-AC1A — MOD SWITCH 89T1 HEATER (DWG. D-1320)

2/C #10 — 89T1B-AC1A — MOD SWITCH 89T1B HEATER (DWG. D-1330)

2/C #10 — 89T1E-AC1A — MOD SWITCH 89T1E HEATER (DWG. D-1338)

2/C #10 — CE-AC1-1 — CONTROL ENCLOSURE INTERIOR & EMERGENCY LIGHTS

2/C #10 — CE-AC1-2 — CONTROL ENCLOSURE EXTERIOR GFCI RECEPTACLE

2/C #10 — CE-AC1-3 — EXHAUST FAN W/ LOUVER

SPARE

100A 70A 30A 40A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A

3-1/C #4 AWG CU, W/#6 GND — RC1-AC1 — BATTERY CHARGER #1 RCH1 (DWG. D-1502)

4/C #10 — HVAC1-AC1 — TO BUILDING HVAC UNIT #1

4/C #10 — 52F13-AC1A — 34.5kV BREAKER 52F13 LIGHTS, HEATER, RECEPTACLE (DWG. D-1336)

SPARE

4/C #10 — YL-AC1 — TO YARD LIGHTING (DWG. D-1504)

2/C #10 — YLC-AC1 — TO YARD LIGHTING LIGHTING CONTACTOR (DWG. D-1504)

2/C #10 — PLC-AC1-1 — PLC/COM PANEL FEED 1 (DWG. D-1363)

2/C #10 — PLC-AC1-2 — PLC/COM PANEL FEED 2 (DWG. D-1363)

2/C #10 — PLC-AC1-3 — PLC/COM PANEL FEED 3 (DWG. D-1363)

2/C #10 — CE-AC1-4 — CONTROL ENCLOSURE HIGH/LOW TEMP THERMOSTATS

2/C #10 — CE-AC1-5 — CONTROL ENCLOSURE ALARM JUNCTION BOX

SPARE SPARE SPARE SPARE SPARE SPARE SPARE SPARE

H1 H2

GROUND BAR — CABLE GROUND CONNECTIONS HERE

NEUTRAL BAR — #6 SOLID CU CONNECTED TO GROUND GRID

120/240VAC DISTRIBUTION PANEL ACP1

(RATED 225A, 22KAIC)

(3) 600 Kcmil CU

#2 AWG CU

325A

3-1/C #4 W/GND — T2-AC2A — TRANSFORMER T2 COOLING FANS, RECEPTACLES (DWG. D-1344)

4/C #10 — 52T2-AC2A — 345kV BREAKER 52T2 LIGHTS, HEATER, RECEPTACLE (DWG. D-1342)

4/C #10 — 52F21-AC2A — 34.5kV BREAKER 52F21 LIGHTS, HEATER, RECEPTACLE (DWG. D-1351)

4/C #10 — 52F22-AC2A — 34.5kV BREAKER 52F22 LIGHTS, HEATER, RECEPTACLE (DWG. D-1353)

SPARE

2/C #10 — 89S1-AC2A — MOD SWITCH 89S1 HEATER (DWG. D-1315)

2/C #10 — 89T2-AC2A — MOD SWITCH 89T2 HEATER (DWG. D-1339)

2/C #10 — 89T2B-AC2A — MOD SWITCH 89T2B HEATER (DWG. D-1349)

2/C #10 — TELCO-AC2 — OWNER/TELCO CABINET

SPARE SPARE SPARE SPARE SPARE SPARE SPARE SPARE

100A 20A 30A 40A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A 20A

3-1/C #4 AWG CU, W/#6 GND — RC2-AC2 — BATTERY CHARGER #2 RCH2 (DWG. D-1503)

4/C #10 — HVAC2-AC2 — TO BUILDING HVAC UNIT #2

4/C #10 — 52F23-AC2A — 34.5kV BREAKER 52F23 LIGHTS, HEATER, RECEPTACLE (DWG. D-1355)

SPARE

SPARE

2/C #10 — CE-AC2-1 — CONTROL ENCLOSURE INTERIOR GFCI RECEPTACLE

2/C #10 — CE-AC2-2 — CONTROL ENCLOSURE SMOKE & FIRE ALARM

2/C #10 — CE-AC2-3 — CONTROL ENCLOSURE QUAD RECEPTACLE BY DESK

2/C #10 — CE-AC2-4 — CONTROL ENCLOSURE EXTERIOR LIGHTS

SPARE SPARE SPARE SPARE SPARE SPARE SPARE SPARE

H1 H2

GROUND BAR — CABLE GROUND CONNECTIONS HERE

NEUTRAL BAR — #6 SOLID CU CONNECTED TO GROUND GRID

120/240VAC DISTRIBUTION PANEL ACP2

(RATED 225A, 22KAIC)

EQUIPMENT IS CONSIDERED ON HOLD AND ASSUMED UNTIL APPROVED VENDOR DRAWINGS ARE RECEIVED

AUTOMATIC TRANSFER SWITCH

J5 OUTPUT RELAYS: K1 K2 PRETRAN ALARM

1 2 3 4 5 6 7 8 9 10

12/C #12 — BLDG-ALM — BK R Y BR

TO ORION I/O #5 (DWG. D-1362)

NOTES:

1. SEE CABLE SCHEDULE FOR DETAILS ON CABLES AND ROUTING.
2. FIELD TO GROUND ALL PANELBOARDS WITH A #6 (MIN.) SOLID LV BONDED TO BUILDING #4/0 GROUND CABLE.
3. BRANCH BREAKER DRAWINGS ON HOLD PENDING RECEIPT OF VENDOR DRAWINGS.

XXX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
- RELAY PANEL
- RELAY PANEL, SHORTING TYPE
- BREAKER, CIRCUIT SWITCHER, RECLOSER
- INSTRUMENT TRANSFORMER
- POWER TRANSFORMER
- SWITCHGEAR

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

QUALUS

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SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701 345/34.5kV SUBSTATION

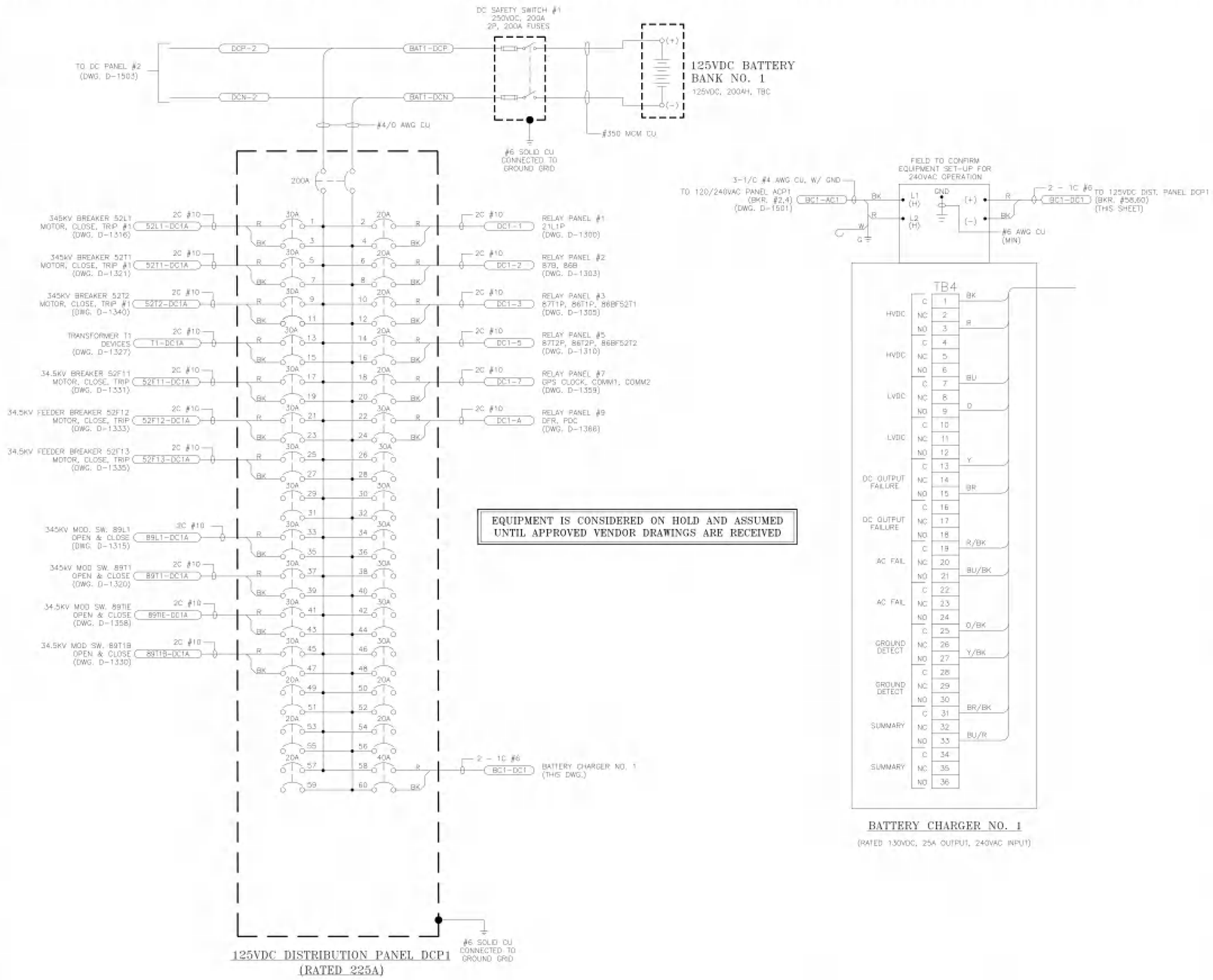
TITLE: 120/240 AC SYSTEM DIAGRAM

LOCATION: 8997 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1501

JOB NUMBER: 24144-01

DRAWING NUMBER: 1501



NOTES:

1. SEE CABLE SCHEDULE FOR DETAILS ON CABLES AND ROUTING.
2. FIELD TO GROUND ALL PANELBOARDS WITH A #6 (MIN.) SOLID CU BONDED TO BUILDING #4/0 GROUND CABLE.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND	
□	RELAY PANEL
⊠	RELAY PANEL, SHORTING TYPE
◒	BREAKER, CIRCUIT SWITCHER, RECLOSER
○	INSTRUMENT TRANSFORMER
◪	POWER TRANSFORMER
◇	UTILITY DEMARCATION CABINET
⊞	SWITCHGEAR

REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

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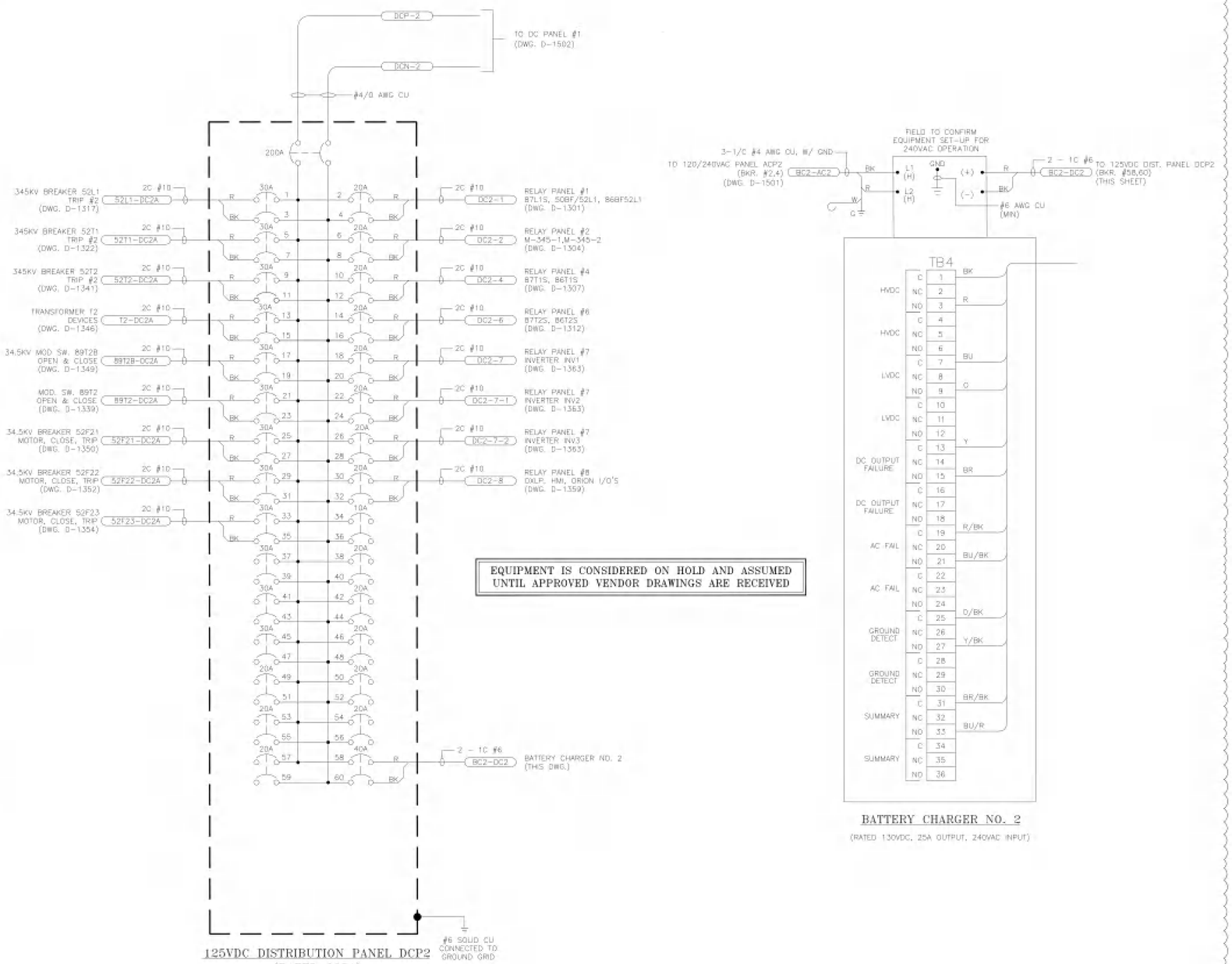
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 125 VDC SYSTEM DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1502
JOB NUMBER	24144-01
DRAWING NUMBER	1502



NOTES:

1. SEE CABLE SCHEDULE FOR DETAILS ON CABLES AND ROUTING.
2. FIELD TO GROUND ALL PANELBOARDS WITH A #6 (MIN.) SOLID CU BONDED TO BUILDING #4/0 GROUND CABLE.

XX WIRING DIAGRAM DEVICE LABEL

TERMINAL POINT LEGEND
RELAY PANEL
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
INSTRUMENT TRANSFORMER
POWER TRANSFORMER
UTILITY DEMARCATION CABINET
SWITCHGEAR

REV	DATE	DESCRIPTION	DRN	CKD	APP
B	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

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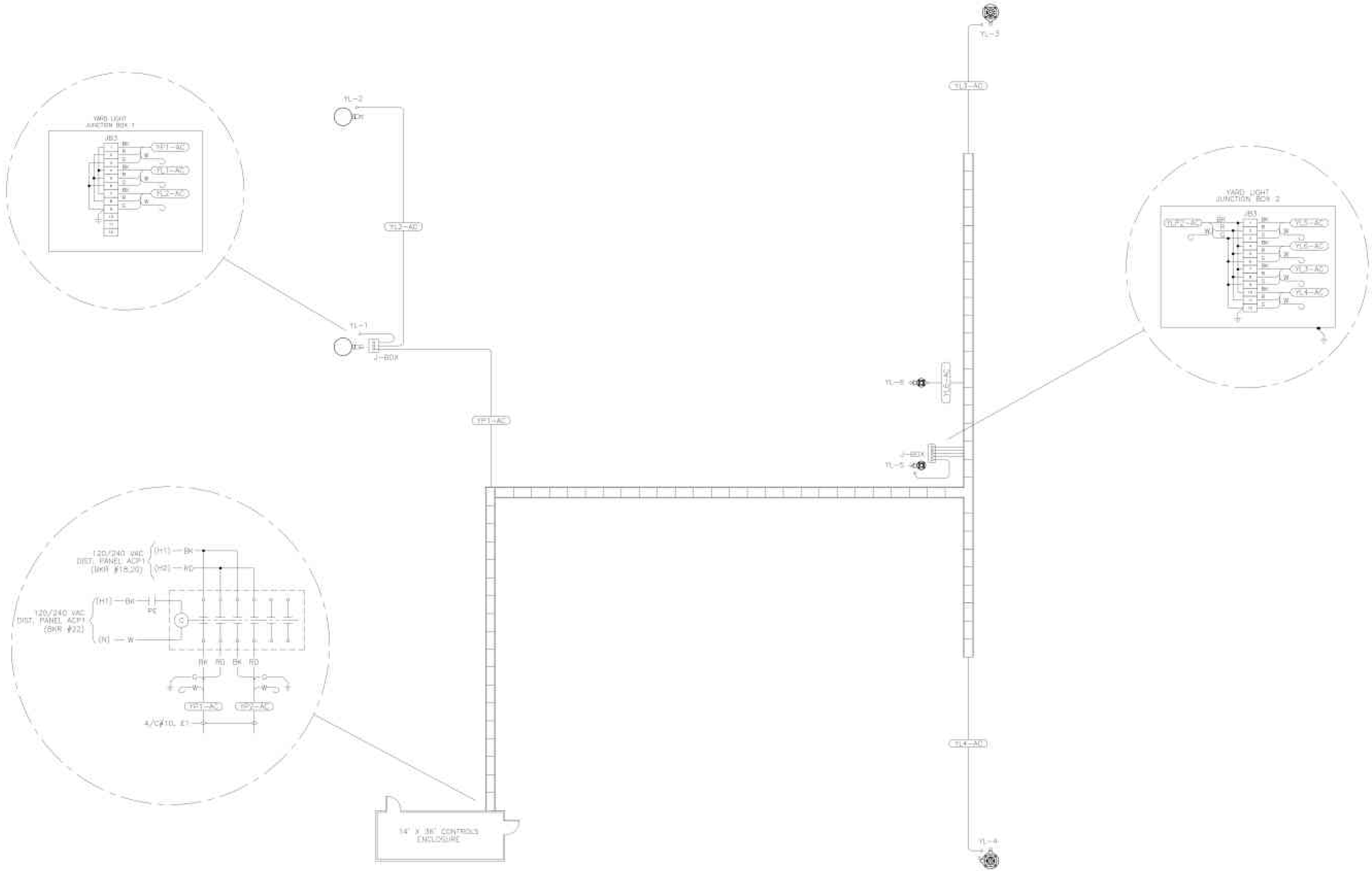
SCALE	NTS
DATE	06/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EOR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: 125 VDC SYSTEM DIAGRAM

LOCATION: 8987 CR 268, BROWN COUNTY, TEXAS

FILE NAME	24144-01-1503
JOB NUMBER	24144-01
DRAWING NUMBER	1503



REV	DATE	DESCRIPTION	DRN	CHD	APP
A	08/30/25	80% DESIGN SUBMITTAL	KWN	MC	EDR

STAMP

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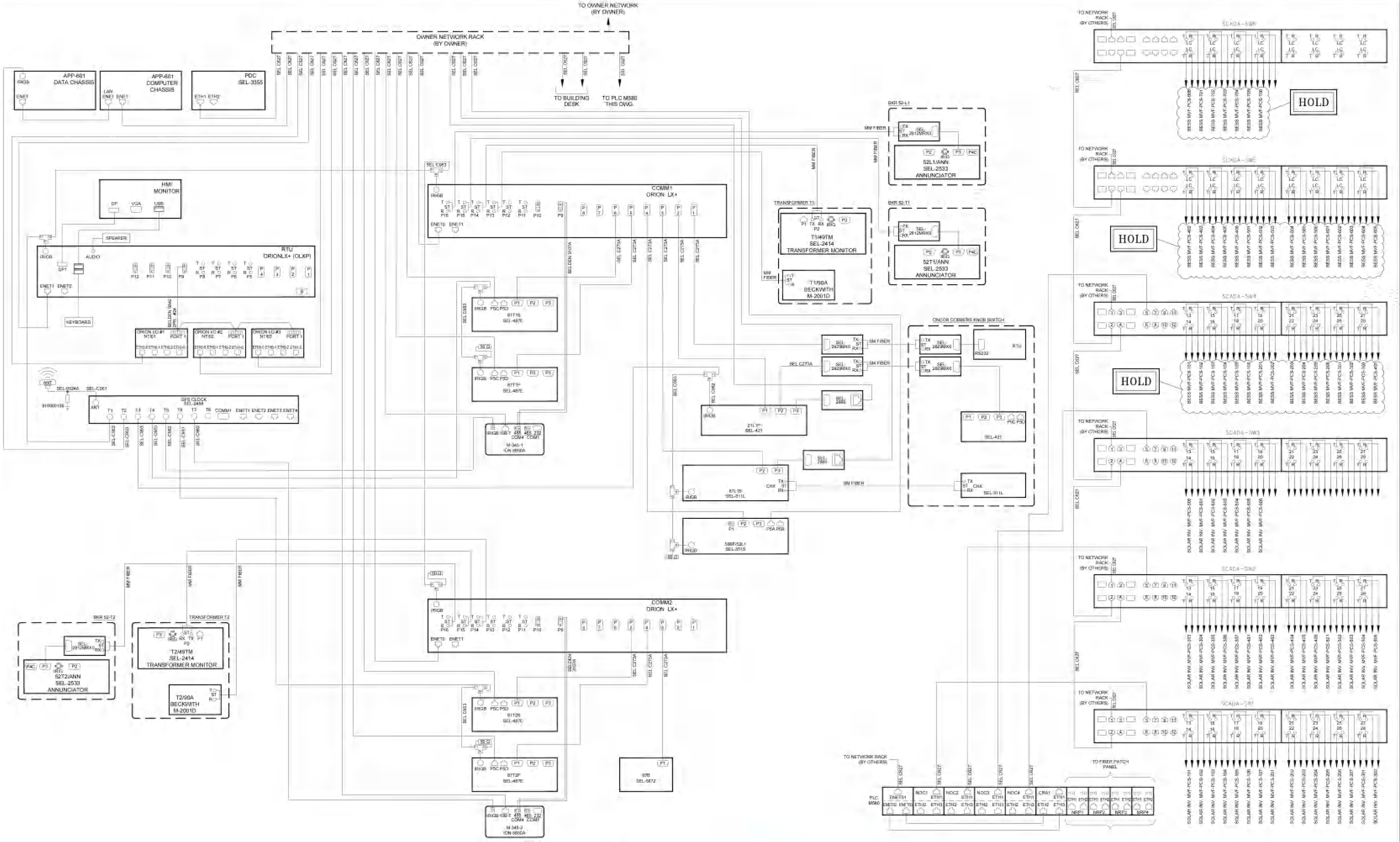
SCALE	NTS
DATE	08/30/25
DRAWN	KWN
CHECKED	MC
APPROVED	EDR

PROJECT: CHISME SOLAR AND STORAGE - TX-PS-2701
345/34.5kV SUBSTATION

TITLE: YARD LIGHTING SCHEMATIC

LOCATION: 2401 CR 1640 CONCHO COUNTY, TEXAS

FILE NAME	24144-01-1504
JOB NUMBER	24144-01
DRAWING NUMBER	1504



REV	DATE	DESCRIPTION	DRN	CKD	APP
A	06/30/25	60% DESIGN SUBMITTAL	KWN	MC	GDK

STAMP

RED RIVER CLEAN ENERGY

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SCALE: NTS
DATE: 06/30/25
DRAWN: KWN
CHECKED: MC
APPROVED: EOR

PROJECT: CHISME SOLAR AND STORAGE – TX-PS-2701 345/34.5kV SUBSTATION

TITLE: COMMUNICATIONS DIAGRAM

LOCATION: 8897 CR 268, BROWN COUNTY, TEXAS

FILE NAME: 24144-01-1600
JOB NUMBER: 24144-01
DRAWING NUMBER: 1600

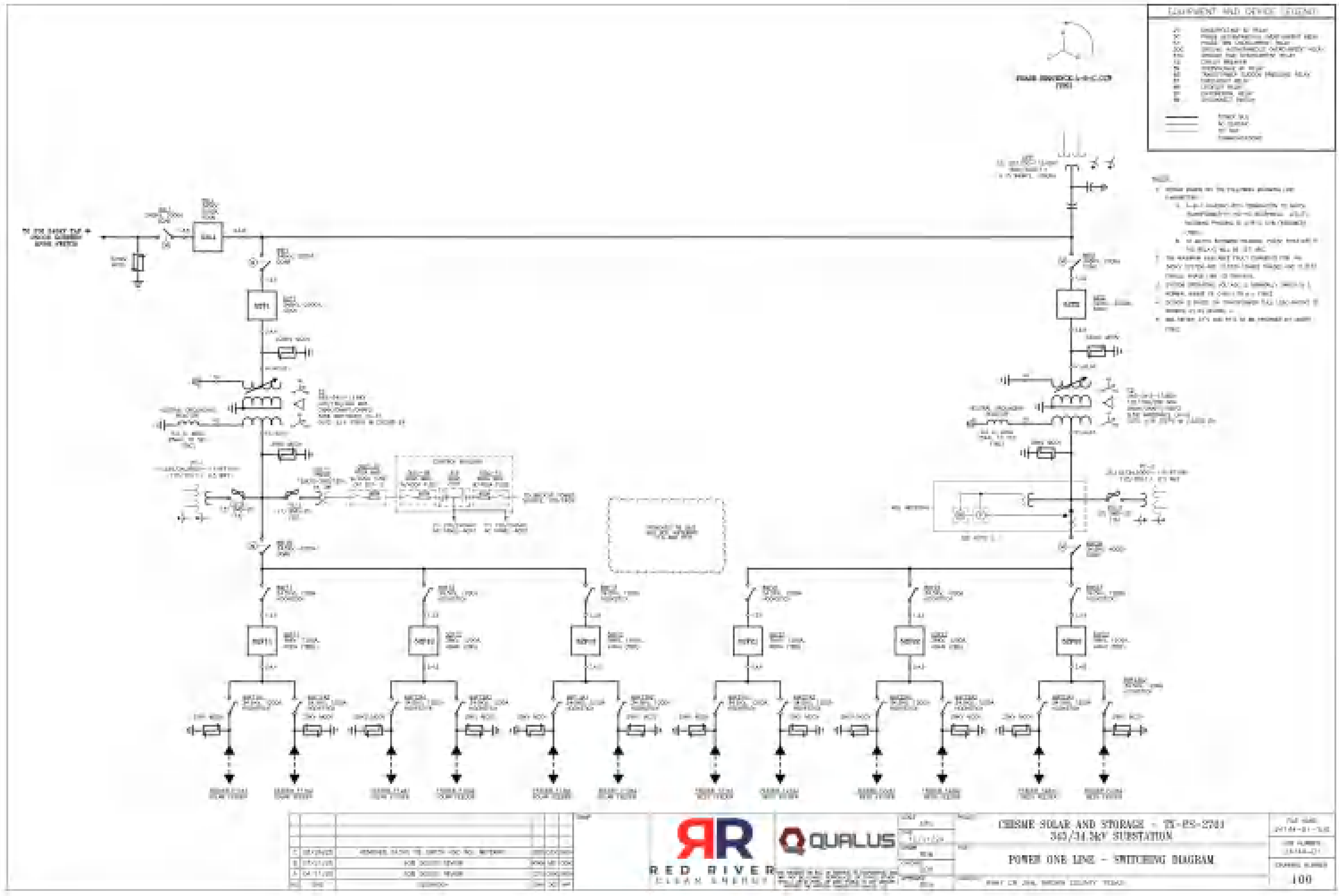

EQUIPMENT AND DEVICE LEGEND
NOTES
RED RIVER
CLEAN ENERGY
QUALUS
CHISUM SOLAR AND STORAGE - TX-RS-2703
345/34.5kV SUBSTATION
POWER ONE LINE - SWITCHING DIAGRAM
100

Exhibit A-2 - Owner Provided Materials

Project	Material	Manufacturer
Chisme	MPT Unit 1	Chint Electric Co.
Chisme	MPT Unit 2	Chint Electric Co.
Chisme	HV Circuit Breakers	Chint Electric Co.
Chisme	Solar Modules	Longi
Chisme	BESS Units	Sungrow
Chisme	PV Inverters	Sungrow

EXHIBIT B

CONTRACTOR DELIVERABLES

A. Overview

Contractor shall prepare and provide the Owner with the project documents described herein during the performance of the Agreement. Any documents required under or provided in connection with the performance of any LNTPs shall be considered a Contractor Deliverable and shall be managed in accordance with this Exhibit B.

All documents prepared by Contractor shall be in English and shall be provided in (i) one of Excel, Word, or PDF formats as agreed with Owner, and (ii) drawings shall also be provided in both PDF and DWG (or similar) file formats as agreed with Owner.

All documents shall bear the Project name and contain a title and/or short description that clearly identifies the contents of such document.

Standard ANSI sizes shall be used for drawings. Drawings shall be prepared such that when reduced to 11 x 17, they are still legible without the use of any visual aids.

Measurements shall be made in the US customary measurement system.

B. Document Registry

Contractor shall prepare and submit to Owner for its review and approval, the documents outlined in the Agreement. Once approved by Owner, such finalized document shall be uploaded by Contractor into the Owner's file-sharing system ("Sharepoint"). Contractor and Owner shall jointly review the documents uploaded onto Sharepoint at least every month (as part of the monthly meeting or otherwise), to verify all documents have been submitted in a timely manner in accordance with the provisions of the Agreement, and that such documents are correct and complete and otherwise meet the requirements therefor as set forth herein. The monthly reports shall serve as a submittal log for all reporting, accounting, drawing, specifications, quality documentation, testing, commissioning, turnover and closeout. Contractor shall be responsible for keeping the monthly reports up-to-date to reflect documents that have been finalized and updated to Sharepoint.

C. Document Storage

Owner has created a project specific file structure on Sharepoint for the storage of all final versions of the project documents. Contractor shall be responsible for transmitting the documents to the designated Owner representatives for review and uploading to the proper Sharepoint location. Contractor shall be responsible to provide the document required in a timely manner. For drawings, data sheets and other Equipment and Technology submittals, Contractor shall provide the documents prior to starting construction and installation of the respective scopes and equipment. Commissioning and Testing documentation shall be provided timely following the completion of the work as required in the Agreement.

D. Functional and Completion Testing

Contractor shall prepare and submit to Owner all Long-Term Energy, Capacity, and Availability Test Plans and Results in accordance with the Agreement.

Exhibit C

Applicable Permits

Part I: Contractor Responsible Permits

Agencies	**Permit/Authorization**
Federal:	
State: Texas	
TCEQ	SWPPP & SPCC
Texas Department of Transportation (TXDOT)	Not required
Local: Mills/Brown County	
AHJ – Fire Depts.	Notify before any controlled fire
Utility (Electric Company)	Utility coordination for power

Part II – Owner Responsible Permits/Consultations

Agency	**Permit/Consultations**
Federal:	No Federal permits required
State:	
Local:	
CUP	Not required

NoBull Energy LLC.
Health and Safety Program

Chisme Energy

Red River Project

Version: 02

Version Date: 10/09/2025

This document (“Procedure”) has been prepared by NoBull Energy LLC. (NBE) in accordance with internal procedures and mandates and is Confidential Information. If this Procedure is an exhibit to a contract or agreement, then this Procedure, in the form attached to the contract, shall be subject to only those express representations or warranties regarding the exhibits to such contract, if any. Except for such representations, NBE provides this Procedure “AS-IS” and does not represent, and NBE expressly disclaims, that the procedures or material contained in this Procedure have been prepared pursuant to any particular methodology, are accurate or complete, or that they reflect the current status of applicable law. Portions of this Procedure may be excerpted or redacted, and this Procedure is subject to revision or update at any time. Any party utilizing this Procedure, or any matter or information derived from it, ("Recipient") does so at his/her/its own risk and agrees to make his/her/its own investigation regarding his/her/its legal or other obligations for performance of his/her/its work. No Recipient shall have any right or claim against NBE or any of its affiliated companies with respect to the Procedure.

Version History

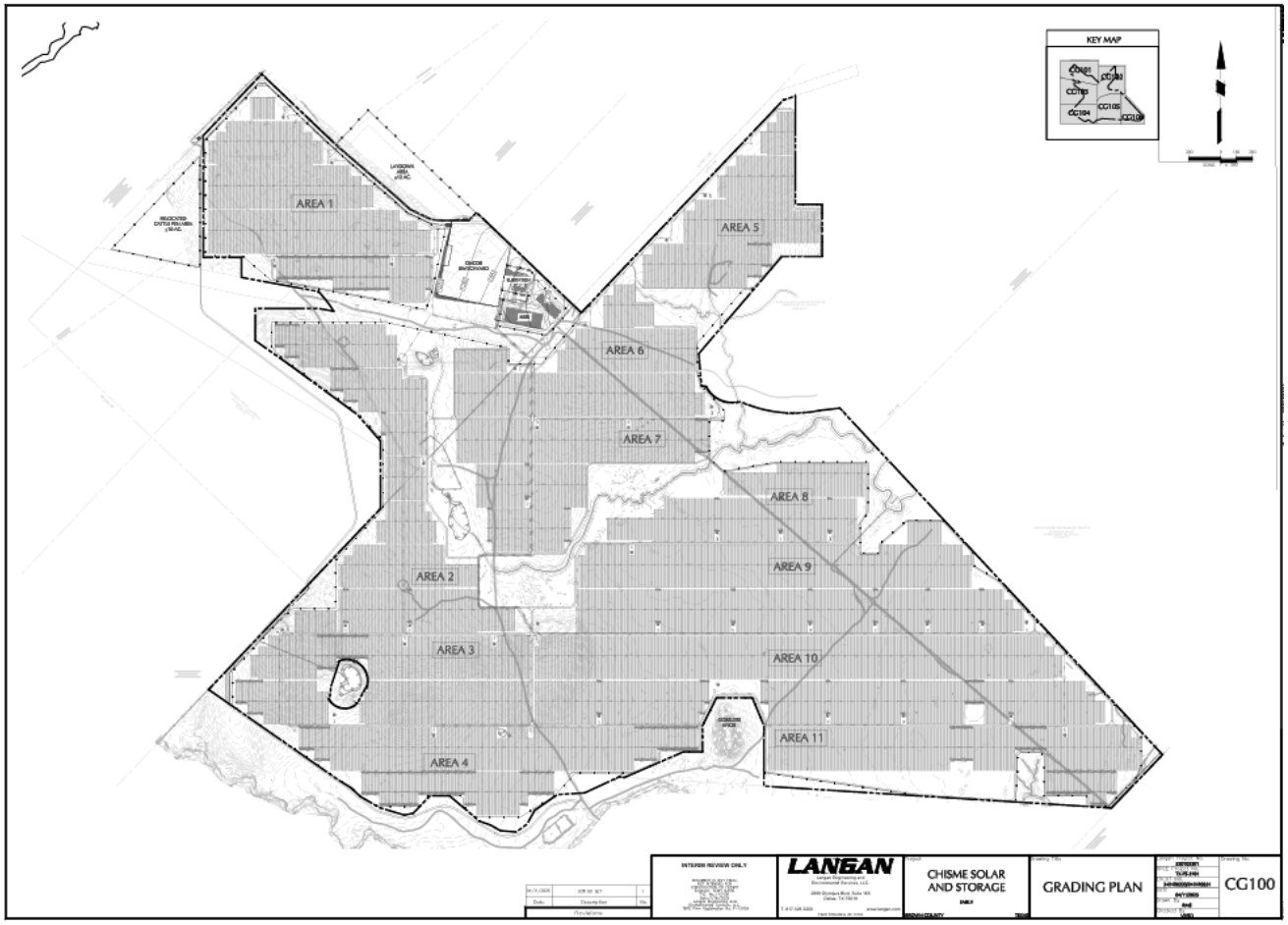
Version Number	Implemented By	Revision Date	Approved By	Approval Date	Description of Change
01	Mark Helmbrecht	09/26/2025	David Watts	09/29/2025	Chisme Energy Red River Project
02	David Watts	10/09/2025	David Watts		Chisme Energy Red River Project

PROJECT INFORMATION

Address

Chisme Solar and Storage
8987 CR 268
Brown County Texas 76802

Site Entrance Coordinates – **31.5798450 N ,-98.8355070 W**



Communication will be maintained via verbal communication, cell phones, and hand signals if needed. Contact information for key project members will be posted onsite.

Work Scope

Activities include:

- Land clearing, grubbing, and grading
- Pile installation
- Racking and module installation
- Electrical wiring and commissioning
- Energization of plant systems

PREFACE

The health and safety of employees and others on NoBuII Energy LLC property are of critical concern to NoBuII Energy LLC. NoBuII Energy LLC intends to comply with all health and safety laws applicable to our business. To this end, we must rely upon employees to ensure that work areas are kept safe and free of hazardous conditions. Employees are required to be conscientious about workplace safety, including proper operating methods, and recognize dangerous conditions or hazards. Any unsafe conditions or potential hazards should be reported to management immediately, even if the problem appears to be corrected. Any suspicion of a concealed danger present on NoBull Energy LLC's premises, or in a product, facility, piece of equipment, process, or business practice for which NoBuII Energy LLC is responsible should be brought to the attention of management immediately.

Periodically, NoBull Energy LLC may issue rules and guidelines governing workplace safety and health. NoBull Energy LLC may also issue rules and guidelines regarding the handling and disposal of hazardous substances and waste. All employees should familiarize themselves with these rules and guidelines, as strict compliance will be expected.

Any workplace injury, accident, or illness must be reported to the employee’s supervisor as soon as possible, regardless of the severity of the injury or accident.

INTRODUCTION

This document provides safety information specific to the **Chisme Energy Project**. It applies to all NBE employees, subcontractors, suppliers, and visitors. All personnel must read, understand, and sign an acknowledgment of this Safety Plan.

Project-specific safety information will also be delivered via:

- Specific Task Training
- Task-Specific Job Hazard Analyses (JHAs)
- Daily Toolbox Meetings
- OSHA Training

Welcome to the NoBull Energy team

SOLAR INTRODUCTION

This introduction to solar construction safety provides information to help develop safe work practices for typical solar construction projects including PV (Photo Voltaic), CPV (Concentrated Photo Voltaic) and CSP (Concentrating Solar Power) installations.

A typical construction safety plan will generally cover most issues that could potentially be encountered on a solar project. However, a few issues may arise that are unique to a specific branch of the solar industry.

This manual is intended to be useful to seasoned and new employees alike.

It is our intention that employees who work safely and efficiently are more valuable to NoBull Energy. This manual and the associated training will help ensure employees learn the basics of solar construction safety, while also being exposed to NoBull's Safety Culture.

This is an essential step for all employees new to the project and it should be followed up with the appropriate solar best practice training.

Solar Construction Safety

Solar construction safety, like general construction safety, requires more than knowledge of safety rules; it requires the ability to evaluate unique situations and to actively engage in safe work practices. The safety plan highlights many common conditions found in typical solar work and should be used as initial steps toward developing a culture of safety on the project.

Solar construction crews face many of the same conditions found in typical construction trades with notable exceptions that underscore the nature of solar electricity. Exposure to sunlight creates stored energy that is not present in other general construction trades. Managing this energy safely is an important aspect of solar construction.

ROLES AND RESPONSIBILITIES

Project Manager & Executive Leadership Hierarchy

- **David Watts Project Executive / Partner**
- **Rob Hague Director of Project Management**
- **Bestami Ortac Project Manager**
- **Robert Johnson Site Manager**
- **Mark Helmbrecht HSE Manager**

Site Safety Manager

- Full-time safety oversight
- OSHA recordkeeping
- Site audits
- Frequent site evaluations with site leadership
- Daily site reviews
- Incident investigations
- Training coordination
- Daily and weekly safety reporting

Construction Management

- Communicate and enforce safety requirements
- Conduct pre-activity meetings
- Ensure compliance and continuous improvement

Project Superintendent

- Oversee daily operations for safety compliance
- Enforce corrective actions for unsafe acts
- Coordinate subcontractor safety
- Incident reporting and investigations

All Workers

- Follow all site safety rules
- Report hazards and unsafe behaviors
- Attend required safety meetings
- Know evacuation procedures

Safety Personnel

- Engage employees in safety discussions
- Review incidents and near misses
- Provide recommendations for site safety improvements

SAFETY STAFFING REQUIREMENTS

NoBull Energy will:

- Assign a full-time Site Safety Manager.
- Increase safety staffing levels in accordance with project activities.
- Require subcontractors involved in high-risk activities to provide a Competent Person.
- Follow Blue Ridge Power staffing requirements for consistent, proactive safety coverage.

Safety Program Overview

1. **Mission Statement**
   To develop and manage the industry's safest worksites through cohesive and strategic partnerships with our project teams, clients, and public stakeholders utilizing all aspects of leadership throughout our organization.

2. **Company Strategic Safety Goal**
   "Safe place to work, everyone matters"

3. **NoBull Energy LLC Safety Statement**
   NoBull is committed to providing safe work environments for our employees. The companies' "*NoBull Way*" outlines our concern by saying "Safety Then Schedule and Budget" as our number one way. Safety is our highest priority in our line of business.

Safety Program Accountability

Management

1. The project manager must verify that all hand and power tools, equipment, trailers, etc. That are delivered to the jobsite are in a safe condition.
2. The project manager will confirm that current power tools, equipment, trailers, etc. have safety and operating manuals available to workers.
3. The project manager must verify that workers are trained and qualified to operate the tools they will use on the jobsite.
4. Project management will monitor site operations for compliance with requirements of this procedure, manufacturers' requirements, suppliers' requirements, and owner requirements.

Supervisors

1. Verify that this procedure and legislative jurisdictional requirements are readily available to the workers.
2. Validate that workers understand and are following: this procedure; manufacturers' specifications and recommendations; and company and site-specific requirements.
3. Verify that only workers trained and competent to operate hand and power tools are assigned duties that require little or no supervision.

4. Assist in verifying that the workers' level of competency is maintained through ongoing monitoring, mentoring, and/or periodic evaluation.
5. Project supervisors will monitor site operations for compliance with requirements of this procedure, manufacturers' requirements, suppliers' requirements, and owner requirements.

HSE Staff

1. Must maintain awareness of the condition of hand and power tools.
2. Will verify that workers using hand and power tools are properly trained.
3. Provide hand and power tools and equipment training as necessary.
4. HSE staff will monitor worker activities and conduct periodic reviews of this procedure to verify ongoing compliance with the following: this procedure; manufacturers' specifications and recommendations; company and site-specific requirements; legislative requirements and regulatory requirements.

Craft and Operators

1. Must understand and follow the requirements in this procedure.
2. Must always notify supervision if they do not believe that they have the necessary training to use the tool safely.
3. Must report defective/broken tools and verify replacement before continuing work.
4. Will adhere to manufacturers' specifications and recommendations.
5. Must comply with company and site-specific requirements, legislative requirements, and regulatory requirements.

Subcontractors

1. Follow the same accountability that is outlined in this plan. Please refer to the appropriate position for each employee.
2. The subcontractor has signed an agreement to follow NoBull Energy's Safety Policy as defined throughout this document

TRAINING REQUIREMENTS

NoBull Energy is committed to ensuring that all personnel receive the necessary safety training before beginning work onsite.

Training requirements include:

- Site-specific orientation for all employees, subcontractors, and visitors.
- OSHA 10-Hour or 30-Hour Construction Safety Training as appropriate.
- Fall Protection Training for any employee working at heights.
- Lockout/Tagout (LOTO) Training for authorized personnel.
- Hot Work Training for employees performing welding, cutting, or grinding.
- Equipment operator training and certifications for cranes, forklifts, aerial lifts, and heavy machinery.
- Daily Toolbox Talks covering job-specific hazards.
- Task-specific safety meetings before beginning new operations.

Records of completed training will be maintained onsite and verified during safety audits.

Job Site Safety Rules

1. Hard hats, ANSI Z87 Safety Glass, Safety Footwear, and Reflective Vests or T-Shirts are mandatory and must be worn at all times when on-site unless inside an office environment or entering/leaving the project site.
2. Appropriate work clothing consisting of long trousers and shirts with at least 4" sleeves shall be worn by all persons engaged in work on the project.
3. Additional personal protective equipment must be worn when the job task or conditions require. Examples including hearing protection around the pile driving job task.
4. All safety, fall protection, lifting/rigging equipment, and power tools must be inspected daily prior to the job task starting. Defective equipment shall be removed from field use and replace immediately.
5. Follow posted speed limits.
6. Seat belts must be worn at all times when traveling in vehicles.
7. Smoking on the project shall be in designated areas to reduce smoking in the field. Cigarette butts must be placed in an appropriate container.
8. Possession and/or use of illegal drugs, drug paraphernalia, alcohol, explosives, and firearms (including ammunition) are expressly prohibited.
9. All employees must be properly trained before operating machinery or equipment.
10. All accidents, injuries, and near misses must be reported to the NoBull Energy LLC. Site Safety Representative or Supervisor onsite.
11. All personnel onsite must attend site safety meetings conducted by NoBull Energy LLC.
12. All personnel must know the correct emergency procedure to be followed in the event of an accident or emergency.
13. All personnel must familiarize themselves with the location of fire extinguishers in the surrounding work areas.
14. No horseplay, fighting or careless acts will be tolerated on the project site.
15. NoBull Energy LLC. must orient all employees and subcontractors prior to working on the project site.
16. All employees, vendors and subcontractors working or located on the project are bound by these site safety rules as a condition of being onsite.
17. Meta-tarsal guards will be worn by pile driver rigging employees.
18. Lightening stand downs will be at 10 miles. Lightening alerts will begin at 30 miles out.
    - Designation in the event lightning continues?

RULES OF CONDUCT

NoBull Energy personnel and subcontractors working on the Chisme Energy Project shall comply with the following Rules of Conduct, based on Blue Ridge Power standards:

- Smoking permitted only in designated safe areas.
- Firearms, explosives, or weapons prohibited onsite unless approved by Owner.
- Be aware of hunting seasons and associated hazards.
- Illegal drug activity is strictly prohibited.
- Possession or influence of alcohol or impairing substances prohibited onsite.
- Maintain a clean, organized worksite at all times.
- Store materials and equipment properly to prevent nuisance and damage.
- Handle and store equipment per manufacturer's requirements.
- Drivers must hold a valid driver's license and report changes within 5 business days.
- Maintain up-to-date personnel records.
- Proper work attire required: shirts with sleeves, long pants, closed-toe shoes.
- Proper PPE required at all times outside administrative areas.
- Remove jewelry when working on energized equipment.
- Inspect climbing and lifting equipment daily.
- Adhere to posted speed limits; reduce speed to 5 mph near workers.
- Yield to farm vehicles and school buses.
- Stay on established roads; avoid parking where exhaust may ignite vegetation.
- Seat belts required for all vehicle occupants.
- Ride only in designated passenger areas of vehicles/equipment.
- No aggressive behavior, roughhousing, or horseplay.
- Do not harass or harm wildlife.
- Report findings of Cultural and Biological Conditions immediately.
- Respect protected areas and signage.
- Equipment operators must be trained and certified.
- Use high-visibility traffic controls when necessary.
- Obtain hot work permits before performing hot work.
- Properly contain all site waste and cover dumpsters.
- Report all incidents and near misses immediately.
- Report unsafe conditions to supervision.
- Minimize noise; no loud music onsite.
- Minimize dust, smoke, and emissions.
- Theft or unauthorized removal of property is prohibited.
- Do not tamper with safety devices.
- Manage waste and used chemicals properly.
- Maintain onsite roads used for construction in good condition.
- Obtain approval before moving crawler equipment onto public roads.

Failure to comply with these rules may result in removal from the site and further disciplinary action.

Orientation Information

Instruction and Training:

Instruction and training of employees are an OSHA/MSHA requirement and will be required on this project. Examples of such training to be provided:

	Training
Equipment	Forklift
	Pile Driver
	Skid Steer

Orientation:

All project personnel shall be instructed on the safety rules, policies, and practices required by their work assignments. Employees also need to understand the site-specific safety information as well. All daily work assignments will include specific attention to safety. The Job Hazard Analysis (JHA) process will be utilized each morning and prior to a new task being performed. Each employee will sign for each task, daily and records will be kept in the field office.

Daily Work Assignment:

All daily work assignments will include specific attention to safety. The Job Hazard Analysis (JHA) process will be utilized each morning and prior to a new task being performed. Each employee will sign for each task, daily and records will be kept in the field office.

Safety Meeting:

As warranted, safety meetings for specific topics, owner compliance, or special circumstances will be conducted. Attendance will be taken and filed.

Specific Instructions:

OSHA/MSHA requires that employees who perform specific tasks or operate specific equipment be trained in its usage. Only those personnel qualified by training or experience shall be permitted to perform specific functions or operate machinery. These qualifications need to be documented and kept on file at each project office.

Listing of Safety Topics

1. ## Accident Reporting:

Each occupational illness, injury or near miss shall be reported immediately to your supervisor. For emergency cases, ambulance services will be contacted immediately by the quickest means available (dial 911).

If it is determined that medical attention is necessary, the employee will be taken to a medical facility.

A daily record shall be kept on all employees requiring first aid treatment.

If medical treatment is required, NoBull Energy LLC. will provide transportation of the injured to a hospital or physician. A NoBull Management Employee shall accompany the injured employee and remain at the facility until the employee is ready to return. All reports from the

physician concerning treatment, diagnosis, return to work status and restrictions shall be brought back to the project and a copy forwarded to the owner's safety manager. A copy shall be maintained in the company's workers compensation case file.

i. Record Keeping

NoBull Energy LLC. will maintain all records required by Federal, State, Local Safety and Environmental Standards, Worker Compensation Insurance, or similar regulations. This includes the maintenance of an accident log, OSHA 300 report, annual summary, and posting of regulatory posters (OSHA 300 report and annual summary are maintained in the Corporate Office).

If you require specific forms for reporting contact the Project Manager.

ii. When to Call OSHA

Within 8 hours after the death of any employee from a work-related incident or the in- patient hospitalization of three or more employees as a result of a work-related incident, you must orally report the fatality/multiple hospitalization by telephone or in person to the Area Office of the Occupational Safety and Health Administration (OSHA), S.S. Department of Labor, that is nearest to the site of the incident. You may also use the OSHA toll-free central telephone number, 1-800-321-OSHA (1-800-321-6742).

iii. Record Keeping

NoBull Energy LLC. will maintain all records required by Federal, State, Local Safety and Environmental Standards, Worker Compensation Insurance, or similar regulations. This includes the maintenance of an accident log, OSHA 300 report, annual summary, and posting of regulatory posters (OSHA 300 report and annual summary are maintained in the Corporate Office).

If you require specific forms for reporting, contact the Project Manager.

iv. When to Call OSHA

Within 8 hours after the death of any employee from a work-related incident or the in- patient hospitalization of three or more employees as a result of a work-related incident, you must orally report the fatality/multiple hospitalization by telephone or in person to the Area Office of the Occupational Safety and Health Administration (OSHA), S.S. Department of Labor, that is nearest to the site of the incident. You may also use the OSHA toll-free central telephone number, 1-800-321-OSHA (1-800-321-6742).

v. Record Keeping

NoBull Energy LLC. will maintain all records required by Federal, State, Local Safety and Environmental Standards, Worker Compensation Insurance, or similar regulations. This includes the maintenance of an accident log, OSHA 300 report, annual summary, and posting of regulatory posters (OSHA 300 report and annual summary are maintained in the Corporate Office).

If you require specific forms for reporting contact the Project Manager.

vi. When to Call OSHA

Within 8 hours after the death of any employee from a work-related incident or the in- patient hospitalization of three or more employees as a result of a work-related incident, you must orally report the fatality/multiple hospitalization by telephone or in person to the Area Office of the Occupational Safety and Health Administration (OSHA), S.S. Department of Labor, that is nearest to the site of the incident. You may also use the OSHA toll-free central telephone number, 1-800-321-OSHA (1-800-321-6742).

2. Blood Born Pathogens

This policy has been implemented to safeguard employees against health and safety effects associated with occupational exposure to blood borne pathogens. It is not always possible to know when an employee may have a blood- or body-fluid-borne illness and/or pathogen; therefore, infection control is the best way to restrict or reduce the possibility of transmission of such diseases. This plan applies to all employees who have a primary responsibility to render medical first aid and/or CPR.

Everyone who is designated as first aid and/or CPR trained, or who is experienced with emergency medical procedures, must comply with this plan. Exposure determination shall be made without regard to the use of personal protective equipment.

Persons administering first aid and/or CPR shall be responsible for cleanup and proper disposal of biohazardous waste accumulated during medical emergencies.

3. Clothing Requirements and PPE

i. Clothing Requirements

- Shirts with at least a 4-inch over the shoulder sleeve shall be worn at all times. Tank tops are not permitted
- Long pants are required.
- Sandals, tennis shoes, or any other street type shoe will not be permitted.
- Loose fitting clothes or jewelry shall not be worn around moving machinery, grinding operations, welding operations, etc.

ii. Personal Protective Equipment (PPE)

- Job site Personal Protective Equipment Requirements are posted on signs upon entering the job site and are reviewed at orientation.

iii. Hard Hats

- All areas of this jobsite are hardhat areas. This includes while operating open cab equipment.
- NoBull Energy uses a color-coding system to quickly identify management, foremen/leads, and craft.
    - White Hard Hats – Management
    - Blue Hard Hats – Foremen/Leads
    - Yellow – Craft/Operators
    - Striped hardhats to identify new employees for a duration of a week or two?

iv. Eye Protection

- ANSI Z87.1 Safety glasses are always required in the construction areas.
- Face shields will be required to be properly worn at all times when in the area of operations, such as when welding, burning, grinding, chipping, chemical handling, corrosive liquids or molten materials, drilling, sawing, driving nails, power actuated tools, and gas fueled hand operated equipment (i.e. chainsaws).
- This section will also apply to those employees of Contractor who are assisting any worker as an apprentice or helper.
- Prescription glasses must meet ANSI Z87.1 approved, or safety goggles must be worn over the prescription glasses.

v. Hearing Protection

- OSHA approved hearing and respiratory equipment shall be worn when required.
- Shall meet the selection, fitting, and maintenance requirements of Federal, State, Local Safety and Environmental Standards.

vi. Seatbelts

- All employees operating any motor vehicle or equipment shall wear seat belts.

vii. Work Boots

- As a measure of safety awareness and personal protective equipment, NoBull Energy is requiring all employees and subcontractors working on NoBull Energy projects to utilize work boots.
- This also applies to both field and home office supervisors visiting projects.
- For the purposes of this policy, work boots are defined as eight (8) inch high leather boots in functional condition that are designed for an outdoor work environment.
- Safety shoes shall be composite or safety toe reinforced

viii. Reflective Vests and/or T-shirts

- All employees shall wear approved reflective vests and/or reflective T-shirts or other suitable garments marked with or made of reflectorized or high-visibility material.
- Reflective vests and/or Reflective T-shirts are required to be always worn to ensure that employees and reflective materials are visible.

ix. Work Gloves

- Work gloves: The specific glove for the specific process is required to be worn

for all manual material handling jobs and were identified in JHAs (Job Hazard Analysis).

4. Hand Tools and General Safety

General

- Before using any tool, whether powered or not, complete a Pre-Job Safety Instruction (PSI) with specific reference to usage, hazards, and hazard controls regarding specific risks related to use of the tool.
- Workers will inspect tools for safe condition before each daily use.
- Management and supervision will inspect tools during formal and informal inspections.
- Tools found to be unsafe, broken, or in disrepair shall be tagged “Do Not Use” or with a similar notice advising that the tool must be repaired or discarded.
- Use good body positioning to avoid pulling a tool toward your face and body.
- Always maintain proper footing and a stable body position.
- Wear close-fitting clothing that will not become entangled in moving parts.
- When using a safety knife, always cut away from yourself.
- Adhere to the manufacturer’s requirements for maintenance and operating limitations of tools.
- Keep a 20-pound fire extinguisher readily available in the work area if the operation of a tool produces sparks.
- Workers must be trained and experienced in the use of the tool they select for any task, or a mentor or foreman must be present to provide appropriate coaching and training.
- Keep floors clean. Remove grit, metal shavings, sawdust, and pieces of material and wood from floor surfaces to reduce/eliminate slip and trip hazards.
- Do not use conductive tools around live electrical circuits unless the tool is insulated and then only with the permission of your supervisor.
- Always use attachments and replacement components that come from the manufacturer of the tool.
- Tool service and repair must be completed by qualified repair personnel.
- Only trained and qualified workers are permitted to use or operate tools of any type.
- The operator of power tools is responsible for reading, understanding, and following the instructions in the manufacturers’ manual before using the equipment.
- The operator must read and follow all the manufacturers’ danger, warning, and caution labels or placards for that machine.
- The operator must perform a pre-use inspection as per the manufacturers’ manual and operation training.
- If any controls malfunction or do not operate or function as specified, do not use the tool. Remove the tool from service and report the malfunction or deficiencies to your supervisor.
- Verify that the design, installation, operation and maintenance, and safeguards for all tools and equipment meet the applicable regulatory requirements.
- Check tools frequently when they are in use, for wear, damage, cracks, and other defects.
- Never use a hand tool for any purpose other than that for which it is intended or designed for.
- Hand tools must be carried in tool pouches or tool bags.
- Tools must not be carried in pockets, as a fall by the worker onto these tools could cause a puncture wound and worsen other injuries.
- Tools can easily fall out of a pocket to a lower level and injure a coworker.

- Do not use metal tubing, pipe, or another wrench over a wrench or tool to gain more leverage.
- Use the correct hammer wrench, pneumatic impact, or nut splitter to remove rusted or seized nuts.
- Remove from service tools (e.g., chisels, hammer wrenches) whose ends have become deformed or mushroomed from being struck by a hammer.
- When these tools become mushroomed, they must be dressed to prevent fragments from flying off when the tool is struck.
- Hand tools must not be modified or altered from the original manufacturer's design, unless the modification or alteration is reviewed and approved by supervision, management, and a professional engineer.
- Once the task for which the tool was modified is complete, the tool must be destroyed, or it must be clearly stated on the tool what the tool was altered or modified for, and that it can be used for that purpose only.
- Job-built tools must not be made or used unless the design and use are reviewed and approved by supervision, management, and a professional engineer. The purpose of the tool must be clearly identified on the tool, and it must be stated that the tool is to be used for that purpose only.
- Before purchasing a new hand tool, complete a hazard review to assess any risks that might arise from the use of the new tool. All new tools must be approved by management, supervision, and safety. When new equipment arrives on-site, the trade that will be using it must do a thorough review of the manufacturer's safe-use instructions.
- Where there is a potential for hand tools to create a fall-from-height hazard or a hazard around a rotating/moving component, secure tools using tool lanyards.
- When working on ladders, ensure you always have 3 points of contact as well as level ground for the ladder to be placed on.

a. Electric Powered Tools & Cords

- Verify that all electrical tools and cords have the current monthly color code tape.
- Do not allow electrical cords to be exposed to standing water.
- All power tools will be inspected then Identified with Quarterly/monthly inspection tape by the toolroom attendant.
- When working outdoors, use extension cords rated for outdoor use.
    - Labeled "W-A" or "W"
- Replace worn and cracked electrical cords and plugs.
- Do not touch bare wire on tooling or cords, unplug immediately and remove from service.

b. Pneumatic & Hydraulic Tools

- Ensure all body parts are away from pinch points.
- Keep a tight grip on pneumatic tools as the potential to wrist injury is there due to torquing.

c. Grinding/Cutoff Tools

- Before performing an inspection or changing blades or abrasive wheels on a tool, verify that it is unplugged, or the battery is removed.
- Never remove guards that are designed to be in place during operation of the tool and verify that the guard is operable.
- Handles on hand tools must be kept in good repair. Loose handles can cause injury if the striking or cutting attachment comes free.
- Hands should always be located behind the cutting tool.

- Ensure proper PPE is worn and eyes are protected from flying debris.
- Do not use cutting wheels that are damaged as they have the risk of “exploding.”

d. Saws & Drills

- Do not operate saws in rainy conditions, wet or damp locations, or standing water.
- Verify that cutting tools such as drills and saws have sharp edges. Replace dull blades and bits immediately.
- Ensure that all body parts, hair, and baggy clothing is away from rotating parts.

5. Flammable Liquid

Storage & Handling

Definitions

1. Boiling Point: The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute
2. (p.s.i.a.) (760 mmHg).
3. Category 1 Flammable Liquid: Liquids having flashpoints below 73.4 °F (23 °C) and having a boiling point at or below 95 °F (35 °C).
4. Category 2 Flammable Liquid: Liquids having flashpoints below 73.4 °F (23 °C) and having a boiling point above 95 °F
5. (35 °C).
6. Category 3 Flammable Liquid: Liquids having flashpoints at or above 73.4 °F (23 °C) and at or below 140 °F (60 °C).
7. Category 4 Flammable Liquid: Liquids having flashpoints above 140 °F (60 °C) and at or below 199.4 °F (93 °C).
8. Double Walled Tank: A tank that has an inner and outer wall with an interstitial space (annulus) between the walls and that has a means for monitoring the interstitial space for a leak.
9. Flash Point: The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitable mixture with the air, near the surface of the liquid or within the vessel used, as determined by the appropriate test procedure.
10. Occupancy: The purpose for which a building or portion thereof is used or intended to be used.
11. Portable Tank: Any vessel having a liquid capacity under 60 gal. (227 L) intended for storing liquids and not intended for fixed installation.
12. Storage Cabinet: An approved metal storage cabinet labeled conspicuously with the words "Flammable-Keep Away from Open Flames”. Or a wooden storage cabinet constructed using exterior grade plywood at least 1-inch (2.54 cm) thick, which shall not break down or delaminate under standard fire test conditions. All joints shall be rabbeted and shall be fastened in two directions with flathead wood screws. When more than one door is used, there shall be a rabbeted overlap of not less than 1 inch (2.54 cm). Steel hinges shall be mounted in such a manner as to not lose their holding capacity due to loosening or burning out of the screws when subjected to fire. Such cabinets shall be painted inside and out with fire retardant paint and labeled conspicuously with the words "Flammable-Keep Away from Open Flames”.

Hazard Controls

- All flammable liquid storage, handling, and dispensing operations will be in accordance with current jurisdictional legislation unless the guidance in this procedure is determined to be more stringent.
- Fuel, oil, solvent, and other flammable liquid spills will be cleaned up immediately using the site-specific spill procedures and safeguarding the cleanup materials from fire and explosion.
- Dispense or use/apply flammable liquids only where there are no open flames or other sources of ignition, such as grinding area, within 50 feet (16.7 m) of the operation, unless conditions warrant greater distance.
- Fuel and solvent dispensing must cease, and all workers take shelter when lightning detection devices or other methods indicate that lightning is within 6 miles (10 km) of a project and/or the bang of a lightning strike is within 30 seconds or less of the flash. Wait for 30 minutes before returning to work. If detection devices show that the strikes are still within 6 miles and/or other flash-bangs under 30seconds occur during that wait period, a further 30-minute wait in shelter and suspension of fuel and solvent dispensing will be enforced.
- All flammable/combustible liquids must have the appropriate SDS/Hazcom on-site and available to workers.
- Category 1, 2 or 3 flammable liquids shall be kept in closed containers when not actually in use.
- When flammable liquids are stored inside any structure, a 20-pound ABC fire extinguisher will be available within 10 feet (3 meters) of the storage.
- Unless legislative jurisdictional or client requirements are more stringent, no more than 25 gal. (96 L) of flammable liquids will be stored in a room outside of an approved storage cabinet.
- Unless legislative jurisdictional or client requirements are more stringent, no more than 60 gal. (227 L) of category 1, 2, or 3 flammable liquids or 120 gal. (454 L) of category 4 flammable liquids will be stored in any one storage cabinet.
- Do not store flammable liquids in areas used for exits or stairways, or areas normally used for the safe passage of personnel.
- Unless legislative jurisdictional or client requirements are more stringent, the storage of spray-paint cans and other flammables in ventilated tool trailers and tool rooms must never exceed 20 gallons (76 L), which is approximately one hundred and sixty 16-ounce (473 ml) cans of solvent or spray paint. When feasible, flammables must be stored outside the trailer in an approved flammable storage cabinet.
- Flammable liquids must not be stored in non-vented tool trailers or tool rooms and/or structures.
- Locate all flammables stored in tool trailers and tool rooms at the rear of the trailer or room, at the furthermost point from the exit(s).
- Only containers and portable tanks approved by legislative jurisdictional authority can be used for storage and handling of flammable and combustible liquids, and they must be labeled as to content.
- Unventilated Sea-Can (Conex) or Truck Trailer Storage
    - Owing to the risk of flammable vapor accumulation and explosion, gasoline or diesel storage cans or containers that are not integral to portable equipment are not

permitted to be stored in a Sea-Can (Conex) or a truck trailer or other unventilated storage structure(s).
    - When motorized equipment with gasoline in a tank is kept in an unventilated Sea-Can (Conex) or truck trailer, do daily inspections for leakage, and placard the outside walls on all four sides with standard Flammable—Keep Fire Away signage.
    - Do not store any motorized equipment that has gasoline in a tank in a Sea-Can (Conex) or unventilated truck trailer which has electrical service, owing to the risk of fire and explosion. Such storage is only permitted if the electrical components meet the requirements of NFPA 30, Flammable and Combustible Liquids Code, for classified flammable storage and/or local electrical code requirements.
    - Only containers and portable tanks approved by legislative jurisdictional authority can be used for storage and handling of flammable and they must be labeled as to content according to HSEOP-6 Hazcom and WHMIS or local legislative requirements whichever is more stringent.
    - Storage of category 1, 2, or 4 flammable liquids shall not exceed 60 gal. (227L) within 50 feet (15 m) of a structure.
    - Maintain a minimum distance of 20 feet (6 m) between containers greater than 5 gal. (19 L) capacity and any building.
    - All skid tanks containing flammable liquids will be properly grounded.
    - Outside storage and dispensing locations will have a 20-pound ABC or larger fire extinguisher hung no closer than 25 feet (7.62 m) and not farther than 75 feet (22.86 m) from the tanks.
    - Storage tanks will have signs and placards identifying the flammable material according to legislative jurisdictional requirements.
    - Storage areas must have a manufactured containment or earthen berm to contain leaks or spills.
- Category 1, 2, and 3 flammable liquids shall be kept in approved safety containers.
- Hand carried or held containers will: not exceed 2 gallons (7.6 L) in capacity for Category 1 flammable liquids; not exceed 5 gallons (19 L) in capacity for Category 2, 3, or 4 flammable liquids be labeled as to what they contain per legislative jurisdictional requirements; and be, in the US, an approved safety can having a flash arresting screen, spring-closing lid, and spout cover so designed that it will safely relieve internal pressure is required on NBE projects must be in compliance with local jurisdictional requirements.
- Outside storage and dispensing locations will have a 20-pound ABC or larger fire extinguisher hung no closer than 25 feet (7.62 m) and not farther than 75 feet (22.86 m) from the tanks.
- Smoking is not permitted within 25 feet (7.62 m) of flammable storage tanks or dispensing operations.
- Transfer of category 1, 2, or 3 flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded). Bonding and grounding will be in accordance with legislative jurisdictional requirements.
- The dispensing nozzle shall be an approved automatic-closing type that does not include a latch-open device.
- When refueling, the nozzle shall be attended to at all times to make sure no overflow or spillage occurs.

- A spill kit shall be immediately available.
- The motors of all equipment being fueled shall be shut off during the fueling operation.
- An emergency power cutoff shall be clearly identified and easily accessible.
- Store all solvents in approved containers and mark them according to legislative jurisdictional requirements.
- Keep solvents for use in shops and fabrication areas outside a flammable storage cabinet in no greater quantity than would reasonably be expected for a day's use.
- Store flammable and combustible solvents in flammable storage cabinets according to legislative jurisdictional requirements.
- Do not purchase, store, or use carbon tetrachloride, or any solvent that is a confirmed or suspected carcinogen.
- Never use gasoline as a solvent.
- Any liquid spills must be contained with absorbent materials and subsequently removed from the site according to the contract and legislative jurisdictional requirements.
- Contaminated soil and absorbent materials must be placed in a metal container with a tight-fitting lid and disposed of according to legislative jurisdictional requirements.
- Workers tasked to contain or clean up a spill must have training according to legislative jurisdictional requirements.

6. Construction

Equipment

General

- Workers will inspect all equipment before daily use and fill out an Equipment Inspection Form to turn in daily to the Field Engineer for review.
    - Note: Any damage, defects, or maintenance is to be reported on the Equipment Inspection Form.
- Adhere to manufacturers' recommendations for service and maintenance of equipment.
- Verify that all protective covers/guards are in place and secured, and not damaged.
- Do not modify or alter the machine safety devices, controls, guards, structure, or configuration in any way.
- Equipment found to be unsafe, broken, or in disrepair shall be tagged "Do Not Operate."
- When working near pile drivers, ensure proper hearing protection is worn when in operation.
    - 100ft. Radius – single hearing protection
    - 50ft. Radius – double hearing protection
- Ensure spotter is competent and qualified to aid in any equipment scenario that requires a spotter.
- When moving equipment on a trailer, ensure the load is secured and plan your route.
- Verify that equipment will be clear of any overhead lines before passing under.
    - Refer to OSHA Standard Number 1926.1411 for minimum clearance distance.
- All equipment must be equipped with a fire extinguisher.
- If any leaks occur under equipment, ensure it is reported and a spill kit is used to properly dispose of the contaminated soil.

EMERGENCY ACTION PLAN

Emergency Contacts

- Emergency Services: 911
- ????????? County Fire Department
- ????????? Police Department
- Hendrick Medical Center Brownwood. 1501 Burnett Rd. Brownwood, TX 76801 PH:325-646-8541

Muster Points

Primary muster point at main construction trailers. Additional muster points added as needed.

Emergency Response Team

Key personnel assigned roles for incident communication, evacuation coordination, and logistics.

Please add detailed information no later than 10days after execution of the assigned response team and no less than five days prior to mobilization.

Emergency Scenarios

- Fire: Evacuate and notify emergency services
- Severe Weather: Lightning stand-down at 10 miles
- Tornado: Evacuate to safe shelter or secure vehicles
- Workplace Violence: Follow "Run, Hide, Fight" principles

First Aid

Primary first aid location at site office. AED located in safety office. SDS sheets stored in Safety trailer.

MEDICAL EMERGENCY PLAN

In the event of a medical emergency onsite:

First Response:

- Provide immediate assistance using basic first aid techniques.
- Ensure scene safety before intervening.

Emergency Medical Services (EMS):

- Call 911 immediately.
- Provide clear location information (Address Chisme Energy Red River Project).

Internal Notification:

- Notify Site Management and Safety Staff immediately after 911 call.

First Aid Kits and AEDs:

- Located at the site trailer and designated muster areas.

Incident Documentation:

- Complete an Incident Report Form immediately following the event.

Fire Department:

Police Department:

Hospital (Emergency Room):
Hendrick Medical Center Brownwood, TX
76801
(325) 646-8541

Occupational Clinic

Ambulance Service

Other

INCIDENT REPORTING AND INVESTIGATION

All incidents, including near misses, property damage, and injuries, must be reported immediately to Site Management.

Incident response process:

- Ensure the immediate safety of all personnel.
- Call emergency services if needed.
- Notify Site Management and the Site Safety Manager.
- Secure the scene of the incident.
- Complete an initial Incident Report Form within 24 hours.
- Conduct a Root Cause Analysis if required.
- Implement corrective actions to prevent recurrence.

All incident records will be documented and maintained according to OSHA recordkeeping requirements.

FALL PROTECTION PLAN

All fall protection activities on site must comply with OSHA 1926 Subpart M standards and Blue Ridge Power requirements:

- 100% fall protection is required at heights of 6 feet or greater.
- All workers exposed to fall hazards must wear an approved full-body harness with a lanyard or self-retracting lifeline (SRL).
- Leading edge and unprotected sides must be guarded or protected with warning lines, guardrails, or personal fall arrest systems.
- Fall Rescue Plans must be established prior to any elevated work.
- Equipment inspections must be conducted before each use.
- Only trained and authorized personnel may work at heights.

Stop Work Authority applies if fall protection is not properly used.

HOT WORK PROGRAM

Hot work includes welding, cutting, grinding, and any activity that produces sparks or open flames:

- Hot Work Permits are required prior to starting hot work operations.
- A fire watch must be assigned during all hot work and remain for 30 minutes after work is completed.
- All combustible materials must be removed or protected with fire-resistant blankets or shields.
- Fire extinguishers must be readily available within 25 feet of the work area.
- Proper PPE must be worn, including welding shields, gloves, fire-retardant clothing, and hearing protection as needed.

Unauthorized hot work activities are prohibited.

LIGHTNING SAFETY ACTION PLAN

To manage lightning hazards onsite, NoBull Energy will implement the following actions based on lightning distance, in accordance with Blue Ridge Power standards:

- Refer to previous comment: In the event of a shutdown due to lightning? What is the protocol?
- **30 Miles:**
  - Weather monitoring initiated.
  - Supervisors notified of approaching storm.
  - Preparations begin for possible evacuation or shutdown.
- **15 Miles:**
  - All elevated work (above 6 feet) suspended.
  - No crane or aerial lift operations.
  - Crews begin securing tools, materials, and equipment.
- **10 Miles:**
  - All field activities suspended.
  - Site evacuations initiated to designated muster points or safe shelters.
  - All personnel must be sheltered in safe areas (trailers, vehicles, equipment, school busses, etc.).
  - No outdoor activities permitted until All Clear is issued.
- **All Clear:**
  - Issued only after 30 minutes have passed without lightning within 30 miles.
  - Resumption of normal activities authorized by Site Management.

CONFINED SPACE ENTRY

NoBull Energy will manage confined space operations in strict accordance with Blue Ridge Power specifications and OSHA 29 CFR 1926 Subpart AA standards. The following requirements will apply to all confined space activities onsite:

- All confined spaces will be identified, assessed, and labeled appropriately.
- A written Confined Space Entry Permit Program will be implemented before any entry.
- Only authorized and trained personnel will be permitted to enter confined spaces.
- Atmospheric testing must be conducted before entry and continuously monitored during occupancy.
- Appropriate ventilation, retrieval equipment, and rescue procedures must be in place.
- Confined Space Entry Permits must be completed and posted at the point of entry.
- An Attendant will be posted outside each confined space at all times during entry operations.
- Communication must be maintained between entrants and attendants at all times.
- Rescue services will be coordinated in advance and documented within the site Emergency Response Plan.

Unauthorized entry into a confined space is strictly prohibited. All workers must follow the established permit system to ensure safe entry and exit procedures.

ENERGY CONTROL PROGRAM (LOCKOUT/TAGOUT)

To protect workers from the unexpected energization or release of stored energy:

- All energy sources must be isolated, locked, and tagged out before work begins.
- Only authorized and trained personnel may perform Lockout/Tagout (LOTO) procedures.
- Group LOTO procedures will be used when multiple crews are involved.
- LOTO devices must be durable, standardized, and clearly labeled.
- Verification of energy isolation must be performed prior to starting work.

Compliance with LOTO is mandatory to prevent serious injuries.

SUBSTANCE ABUSE POLICY

NoBull Energy maintains a Zero Tolerance Policy regarding substance abuse.

Requirements include:

- Pre-employment drug.
- Random, post-incident, and reasonable suspicion drug and alcohol testing will be conducted.
- Possession, distribution, or use of alcohol, illegal drugs, or unauthorized prescription drugs onsite is prohibited.
- Employees who violate this policy will be immediately removed from the project site and are subject to disciplinary action, up to and including termination.

SPECIAL AND HIGH-RISK OPERATIONS

Special and high-risk operations will be managed in accordance with the Owner's specifications and industry best practices. These will be reviewed with the Owner 10 days prior to the activity or in coordination with the Owner as needed. These activities include, but are not limited to:

- Energized electrical work.
- Confined space entry.
- Crane and heavy equipment operations.
- Hot work (welding, cutting, grinding).
- Excavation and trenching.
- Lifting operations.

Prior to performing any special or high-risk work:

- Complete a detailed Job Hazard Analysis (JHA) and review it with all affected personnel.
- Develop a Pre-Task Plan (PTP) and obtain appropriate permits before beginning work.
- Assign a Competent Person to oversee activities involving significant risk.
- Maintain direct oversight by site safety staff during high-risk tasks.
- Implement additional control measures such as barricading, spotters, fall protection systems, fire watches, and standby rescue services as required by the task.

- Empower all workers with Stop Work Authority to immediately halt unsafe operations.

HEAT AND COLD STRESS PLAN

Heat/Cold Stress & Work/Rest

NoBull Energy is committed to protecting workers from environmental exposures to heat and cold stress.

Heat Stress:

- Provide shaded rest areas and cooling stations.
- Encourage regular hydration with water and electrolyte beverages.
- Schedule heavy work during cooler parts of the day when possible.
- Allow frequent breaks to prevent heat exhaustion or heat stroke.
- Train employees to recognize symptoms of heat illness.

- **Heat Index Below 91°F:** Normal activities. Monitor for symptoms.
- **Heat Index 91°F - 103°F:**
    - Drink water frequently.
    - Take 10-minute breaks every 2 hours.
    - Monitor high-risk employees closely.
- **Heat Index 103°F - 115°F:**
    - Drink water every 15 to 20 minutes.
    - Take 10-minute breaks every hour.
    - Rotate employees through shaded or cooled areas.
- **Heat Index Above 115°F:**
    - Limit outdoor work to essential tasks only.
    - Mandatory breaks of 15 minutes per hour.
    - Provide immediate access to cooling stations.

Cold Stress:

- Provide heated break areas or warming stations.
- Require appropriate cold-weather clothing (layers, gloves, hats).
- Monitor employees for signs of hypothermia or frostbite.
- Allow scheduled warm-up breaks in heated shelters.
- Educate workers on cold-related health risks.

- **Wind Chill Above 30°F:** Normal activities. Minimal risk.
- **Wind Chill 10°F to 30°F:**
    - Schedule frequent breaks in warm areas.
    - Ensure workers are properly dressed in layers.
- **Wind Chill -10°F to 10°F:**
    - Limit outdoor exposure time.
    - Warm-up breaks every 2 hours.
    - Monitor employees for cold stress symptoms.
- **Wind Chill Below -10°F:**
    - Cease non-essential outdoor work.

- Provide warm-up breaks every hour.
- Use buddy system for cold stress monitoring.
- Supervisors will monitor environmental conditions daily and adjust work practices as needed to protect worker health.

PERMITS AND DOCUMENTS REQUIRED

Throughout the Chisme Energy Project, the following permits and documentation, including but not limited to, will be required to ensure compliance with NoBull Energy and Blue Ridge Power standards:

- Site-Specific Health and Safety Plan (SSSP)
- Confined Space Entry Permits
- Hot Work Permits
- Lockout/Tagout (LOTO) Procedures and Permits
- Job Hazard Analyses (JHAs) for all tasks
- Incident Report Forms
- Near Miss Report Forms
- First Aid and Medical Emergency Documentation
- Safety Data Sheets (SDS) for all hazardous materials
- Training Records (Orientation, OSHA, Equipment Certifications)
- Emergency Action Plan (EAP) with Muster Points Map
- Weekly Safety Inspection Checklists
- Equipment Inspection Checklists
- Subcontractor Safety Agreements
- Equipment Operator Licenses/Certifications
- Visitor Orientation and Sign-in Logs

All permits and documents must be maintained onsite and available for inspection upon request by Site Management, Blue Ridge Power, or regulatory agencies.

Chisme Solar and Storage Project
Exhibit D-2 - Quality Control Procedures

This Exhibit D-2 contains the following:

NoBull Energy Quality Control Manual. REV3-09-28-25
NoBull – Project Quality Plan Presentation – Site Specific
Template – ITP Inspection and Test Plan BESS Site Specific
Template – ITP Inspection and Test Plan Solar Site Specific
Template – Quality Plan Site Specific

NOBULL ENERGY QUALITY CONTROL MANUAL

Rev #	Rev Date	Author/Reviser
01	09/15/2025	Stacy Nail

Reviewed and Approved By	Name	Signature	Date

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NoBull Energy Quality Control Manual

1 Introduction

This manual outlines the basic Quality Control/Quality Assurance guidelines and procedures established and executed by NoBull Energy. These procedures should be used in conjunction with specific Project Quality Programs required by our clients. They have been developed in a format that allows the incorporation of specific client Quality Control requirements on a project-by-project basis. This will allow us to demonstrate to our clients NoBull Energy total commitment towards quality and customer satisfaction through written guidelines and procedures.

Aim and Scope

The aim of this Quality Control Manual is to establish written guidelines to assure compliance with material, fabrication, inspection, and testing specifications, drawings, and codes, and establish a process for organizational roles once a bid becomes a project.

This Quality Manual is provided to ensure that the quality requirements established by our clients, design engineering, and project management are maintained uninterrupted throughout the construction phase of the project.

NoBull Energy quality model moves the responsibility of quality to the front lines, promoting the discovery of issues and the prevention of repetitive errors.

This manual shall set the baseline quality requirements for all construction projects. This manual, the Construction Execution Plan, Inspection and Test Plans, Best Practices, kick-off meetings, standards, and the specific requirements of the construction contract define and govern all behaviors and related practices related to quality in the workplace. All members of the project management team, contractors, and visitors participating in construction and operations must adhere to these practices.

It is intended that all levels of NoBull Energy field supervision participate and be responsible for the overall quality of the work. Primary areas of construction that require quality supervised planning and quality control inspection are:

- Validation of the design and specification process of each task.
- Validation of the compliance of materials ordered as part of the project.
- Confirmation that materials are received with no defect and check related logistics for storage and distribution on the site.

- Confirmation that the construction contractors' labor force knows the best practices and that they are applied to ensure the proper performance of their duties. Validate the Project scope and construction contract specifications by identifying and communicating clearly and confirming that they will be met by the contractor and its subcontractors.
- Confirmation that Execution Procedures governed by regulatory bodies or external standards are executed, inspected, and properly documented.
- Confirmation that the test phase is carried out in accordance with the Execution Procedures and approved equipment.
- Providing documentation relating to the identification of materials and non-compliant products, as well as the correction of non-compliant procedures.
- Confirmation that the documents related to production activities are updated, revised, and certified to meet the conditions and specifications required by the scope of the Project and the construction contract.
- Receiving inspection, material storage, and issue control
- Civil survey, concrete, and structural
- Welding material control, welder qualification, and production welding control
- Electrical and instrumentation
- Final system inspection, pre-commissioning, and turnover

Related Documents/References

- *Construction Quality Plan*
- *Project Execution Plan Site Specific*
- Inspection and Test Plan

Acronyms and Definitions

The following table lists the acronyms and definitions used throughout this manual.

Table 1 Terminology and Definitions

Terminology	Definition
ANSI	American National Standards Institute
EOR	Engineer of Record
ITP	Inspection and Test Plan
MRB	Material Review Board
NETA	International Electrical Testing Association
QA/QC	Quality Assurance / Quality Control
RFI	Request for Information
SOW	Scope of Work

2 Manual Control

NoBull Energy Quality Control Manual is considered a controlled document and subject to review and revisions by NoBull Energy management and will be maintained by NoBull Energy document control team. Copies of this manual are considered uncontrolled, and revision control is not maintained on distributed copies.

3 Roles and Responsibilities

Job Title	Responsibility and Definition
Director of Construction	The responsibilities include the following: • Subject Matter Expert for field construction activities. • Leader of best practices development and implementation. • Reports to the Vice President.

Project Manager	The Project Manager reports to the Director of Project Management and is responsible for: • Responsible for planning the Project tasks, organizing the master schedule, proceeding with the work estimate, controlling costs, managing the project, and supervising staff. • Provides the necessary support to Project members in the implementation of the QA/QC Plan. • The total safety, quality, and productivity of the project. • Implementing this procedure on construction projects. • Reviewing construction progress and productivity assessments. • The Project Manager is responsible for reviewing the Monthly Cost Report in order to determine adverse trends and maintain control over the budget and implement corrective/ preventative actions before cost overruns become detrimental.
Site Manager	The Site Manager reports to the Project Manager and is responsible for the implementation of the site-specific QA/QC Plan. All the roles and responsibilities must align with the NoBull Energy site roles and responsibilities. • Ensure that those responsible for the quality inspections at work do their job and make the necessary inspections as required. • Supports the project members in the implementation of the QA/QC Plan. • Required to assist with the implementation of this QA/QC Plan. • Contractor Company representative on site. • Identifies issues and monitors corrective actions. • The total safety, quality, and productivity of the project. • Implementing this procedure on construction projects.

Project Engineer	The Project Engineer responsibilities include the following: • Ensure document control procedures.

	• Manages the general data and technical information related to the project and ensures they are compliant. • Supports the Project Manager for insurance claims. • Takes part in the resolution of non-compliance, and the control of corrective measures to implement. • Is responsible for the delivery and use of drawings issued for construction. • Oversees all changes to the as built drawings. • Monitors the design with consulting engineers in collaboration with the trade field engineer. • Assigned to specific projects and acts as a liaison between engineering, owner, and the project.
Quality Manager	The Quality Manager responsibilities include the following: • Performs periodic field audits to assure compliance with the quality control system requirements. • Results of the audits will be utilized to determine the effectiveness of quality functions, implemented procedures, personnel performance, and overall project quality.
Quality Control	The Quality Control responsibilities include the following: • Ensures the validity of documents related to the quality and monitors them. • Supports the project members in the implementation of the QA/QC Plan. • Acts as an intermediary between the contractor and the subcontractor, regarding the work quality of the trade in question. • Reports administratively to the NoBull Energy QC Manager and functionally to the NoBull Energy Site Manager. • Audit the activity of all craft disciplines to assure and report that construction meets code and accepts quality levels of workmanship and safety. • Responsible for managing the QA/QC functions for the project and has the organizational freedom to identify and seek resolution to deficiencies related to the quality function.

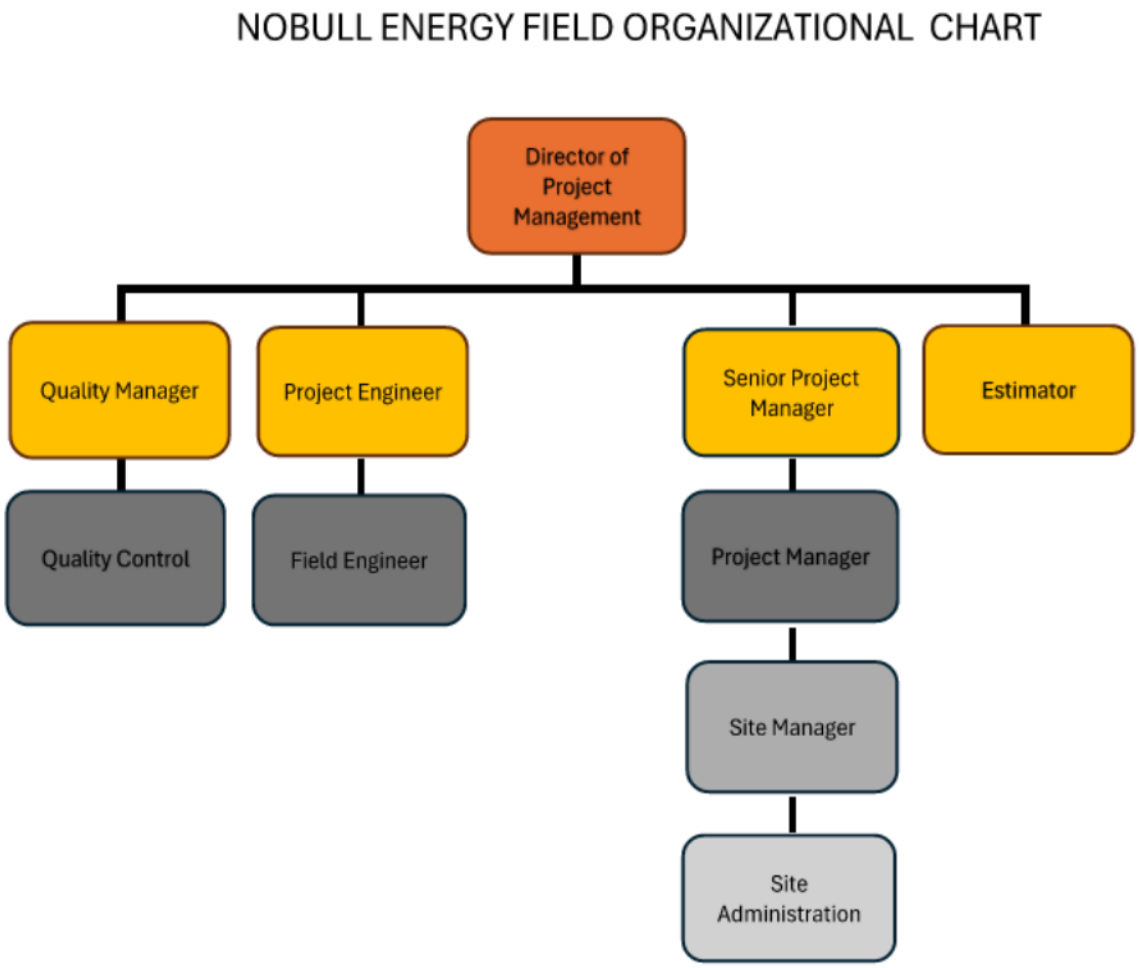
	• If preliminary ITP has not already been created, create ITP and gets approval from NoBull Energy QA/QC Manager prior to the start of construction. • Shall assure the quality standards, processes, and practices are communicated, implemented, and trained across the project team. • Shall be responsible for and be the unbiased quality representative independent of influences of production goals. • Shall follow the project audit schedule and assure that the site Construction Management Team are implementing the Company and client PQPs. • Coordinate with site project Construction Management to ensure that Company, Subcontractors, and suppliers follow the project PQP and ITP requirements. • Ensure all completed inspection forms are signed off for each Block by construction and field inspection staff. • Perform a sampling inspection per Block to validate compliance with drawing specifications and client requirements. See ITP for frequency of sampling per activity. • Review NCR and Observation logs to ensure corrective actions are completed and preventative actions are defined.

Quality Tech	• Audits and Inspections • Punch List Creation • Maintain accurate and organized documentation records. • Work with production teams to identify and address quality issues and maintain detailed inspection reports for management.
Superintendents	The Superintendents' responsibilities include the following: • Monitor projects from planning to completion, including tasks such as budgeting and scheduling, safety, quality, and productivity of the project. • Manages the nature of preventive and corrective actions necessary to correct NON-CONFORMITIES. • Supervises the implementation of the Execution Procedures.

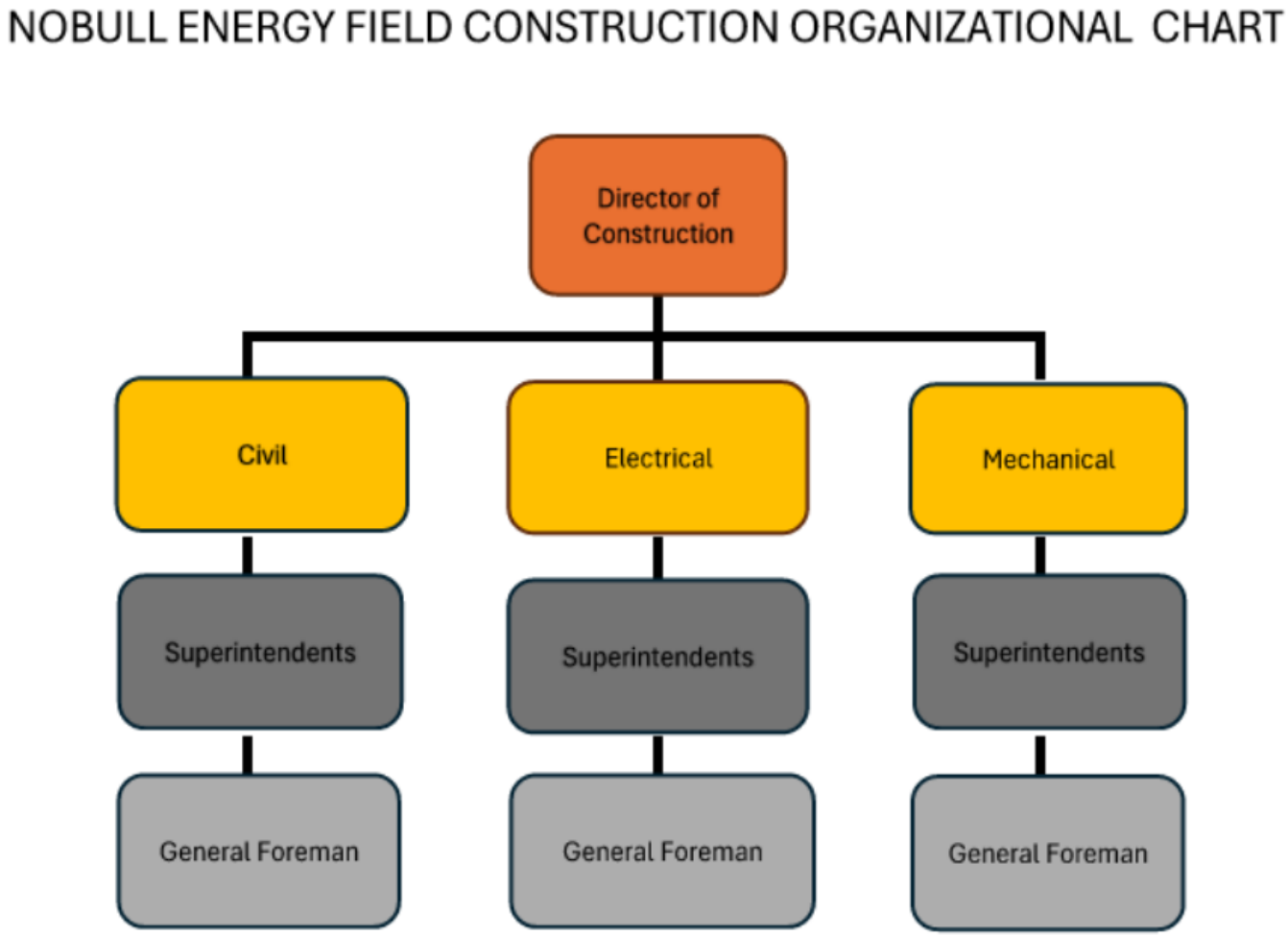
	• Ensures the completion of the work by the laborers and/or subcontractors in his/her field of activity. • Ensure the as-built drawings are marked. • Supervises inspections performed by field foremen, subcontractors, and any external participant. • Ensure that those responsible for the quality inspections of subcontractor's work do their job and make the necessary inspections as required. • Reviewing the inspection forms, which were created by the General Foremen and Foremen, and performs spot checks in the field. • Reviews and spot-checks the inspection check list/test forms and work, then signs off on the inspection in Procore. • Any project-specific forms shall be completed at the time of inspection, and originals shall be turned into Quality Control.
General Foreman	The General Foreman's responsibilities include the following: • The total safety, quality, and productivity of the project. • The work and services provided by each person in their respective fields are of high quality. • The Execution Procedures necessary for the tasks are adequate and updated if necessary. • Execution Procedures are approved, adopted, and used at all levels. • The appropriate people are assigned to tasks they are qualified for. • Staff are familiar with the Execution Procedures of the Project, and they have access to the documentation required. • Best practices are used; and the writing of required reports is completed (forms, internal report and/or inspection report). • Perform inspections of at least 10% of all work under their direction. This includes spot checking torques with a calibrated wrench.

Foreman	The Foreman responsibilities include the following: • The total safety, quality, and productivity of the project. • Coordinates the work of the crew he/she oversees and ensures the quality of production while respecting the construction requirements, QA/QC Plan, and safety standards. • Supervise the process of solving a problem until it is completely resolved. • Supports the project members in the implementation of the QA/QC Plan. • Ensure that all materials used in the work he/she oversees are deemed compliant by an independent laboratory or subcontractors' quality inspectors, as needed. • Identifies issues and monitors corrective actions. • Implementing this procedure on construction projects. • Responsible for being the point of contact between the construction workers and supervisors. • Perform a visual inspection of 100% of the work performed by their crew daily. • Inspections must be performed in accordance with the ITP and documented in Procore using the required inspection and checklist indicated in the ITP.

Field Organizational Chart



Field Construction Organizational Chart



4 Components

Quality Control Manual

This Quality Control Manual is provided to ensure that the quality requirements established by our clients, design engineering, and project management, are maintained uninterrupted throughout the construction phase of the project.

The NoBull Energy quality model moves the responsibility of quality to the front lines, promoting the discovery of issues and the prevention of repetitive errors.

This manual shall set the baseline quality requirements for all NoBull Energy construction projects.

Project Quality Plan

The Project Quality Plan aims to effectively implement the NoBull Energy Quality System, in conjunction with surveillance and inspection activities, to ensure compliance with standards, industry codes, and Engineering/Client specifications related to field construction.

The primary objectives of this document are to ensure that project activities are organized, controlled, and effectively implemented.

Inspection Test Plan

ITPs are established for each major phase of the work scope and/or discipline. If there is a unique scope of work item with special requirements that differ substantially from the rest of the discipline scope, then a specific ITP may be necessary. They are intended to be a comprehensive summary of all technical and inspection requirements, with inspection/hold points established as required by our Quality Management System and client specifications.

FAIs/Inspection Forms

A FAI (First Article Inspection) is a documented, first example of installed work that is approved and used as a template for future installations.

Inspection forms are a set of forms used to ensure that a particular task has been inspected. The person conducting the inspection is to verify that each component of the task has been inspected and is in correct working order (e.g., audits, check sheets, and final signoffs are some forms completed during and at the completion of each task).

Audits

Audits offer risk management and evaluate the effectiveness of the quality control, processes, and procedures implemented on the job site by the company to ensure the integrity of construction.

5 Program Methods

Jobsite Plan

This Quality Control Manual is issued for use by all NoBull Energy Project/Team Participants and

Subcontractors. All inspections, tests, and verifications will be conducted in accordance with Design Engineering, Project Specifications, and applicable codes. This plan outlines the systematic methods that will be employed to ensure a high-quality constructed project that meets the Design Engineers intent.

1. NoBull Energy is proactive in implementing its quality program and fosters a culture of high quality throughout the company. Our commitment to quality and continuous improvement in performance begins at the top management level and is communicated to and endorsed by all members of the project team.
2. The intent of QA/QC is the function of cooperation. It is not the responsibility of the QA/QC staff to police the job but to provide technical assistance and support. In addition to inspections of field operations (including subcontractors), it enables those involved to achieve a quality product. The goal is to be proactive in approach, anticipating problems and taking preventive actions before corrective actions become necessary.
3. Quality Control operates independently of field operations and is responsible for ensuring conformance to project specifications. Working with field operations instead of for them enables effective planning and decision-making, helping to prevent construction problems before they occur, and enhancing our ability to achieve our common quality goal of complying with the client's specification requirements.
4. Quality Control performs regular work process observations and surveillances in addition to supplementary inspections and testing required by the specifications and applicable code of construction.
5. Quality Control should have an open line of communication with the client's quality personnel on quality issues. The project Quality Control has the authority and organizational freedom to identify and evaluate quality problems. If a quality issue arises that cannot be resolved between the project Quality Control and the Site Manager, the issue shall be brought to the attention of the Quality Control Manager. The Quality Control Manager shall resolve the issue, taking into consideration applicable code requirements, job specifications, and contractual requirements.
6. The application of quality extends to all areas of a project, including management, subcontractors, field personnel, support personnel, vendors, and all other individuals who affect the quality of the products and services delivered. High-quality, effective communication within the NoBull Energy organization is a key element and must be practiced by all personnel.

1. Receiving inspections will be performed on all major equipment and selected bulk materials upon receipt by NoBull Energy at the jobsite.
2. Quality Control will continuously audit the welder qualification and testing.

Inspection Requirements

Foremen shall ensure the correct installation of work. Foremen shall conduct a daily visual inspection of 100% of the work performed by their crews.

General Foremen are required to perform random inspections of at least 10% of all work under their direction.

Superintendents are responsible for reviewing the inspection forms created by the General Foremen and Foremen, as well as conducting spot checks in the field.

Observations, NCRs, and Escalations

A primary function of any quality program is the control of nonconforming material, assemblies, or construction methods. This plan of action will be utilized by our field construction team when any condition does not comply with drawings, specifications, codes, or good construction practices. The nonconformity must be closed before final acceptance.

All deficient materials, assemblies, or construction methods will be assigned to one of three categories: Nonconformance, Deficiency, or Rework.

- **Nonconformance (NCR)** Any material or assembly completed or incomplete, which does not meet the owners' specifications, drawings, or requirements once turned over.
- **Deficiency** Any work activity or procedure that can lead to completed work that does not meet the owners' specifications, drawings, or requirements.
- **Rework (Failed Inspection)** Any work, completed or incomplete, that has been constructed out of tolerance of specifications, drawings, or applicable codes and requirements. This work has not been turned over and has failed inspection, resulting in rework.

Quality Control shall document all identified deficiencies using Observations or NCRs. Any item categorized as Non-conformance shall be documented on an NCR, and the appropriate red line drawings shall be created. Any items categorized as Deficiencies or Rework shall be reported on an Observation.

- The Quality Control will deliver Observations and NCRs to the relevant discipline Superintendent for immediate corrective actions and work with the Site Manager to adhere to the escalation policy.
- Quality Control shall compile all observations and NCRs into their respective logs and submit these logs to the Site Manager and discipline Superintendents. These logs shall be periodically reviewed, and adjustments to procedures shall be implemented as required. If Quality Control notices any trends in the deficiencies discovered, a Corrective Action Report shall be initiated to research and implement corrective actions to prevent further issues.
- Company, subcontractors, and suppliers shall correct all documented deficiencies and notify the Quality Control of the corrections in accordance with the escalation policy.
- The Quality Control and Site Manager, or appropriate Superintendent, shall validate completion of all corrective actions. Quality Control will close all observations and NCRs that have been fully validated.

- All documentation shall be kept in the file and stored for review.
- The Observation Log shall be updated on a weekly basis by Quality Control to ensure that all identified construction defects are corrected and documented, including both open and closed items.
- Any open observations at project substantial completion will be transferred to the Final Punch List for the Company, sub-contractor, and suppliers' corrective actions.
- Escalation: More than four (4) Observations of the same defect will automatically generate a Corrective Action Request for said defect.

Non-conformance reports submitted to the Company, sub-contractor, or supplier require:

- Corrective action to be determined either by restoring to the designed condition, or RFI for acceptable correction, or acceptance of the as-built condition.
- All Non-Conformance Reports shall be on record and provided to the Company and the client. All nonconformance-related corrective actions shall be completed prior to the next similar process being done to avoid repeating the same mistakes.
- The Non-Conformance Report Log is to be updated continuously by Quality Control and distributed to the project team as needed.
- Escalation: Two (2) Non-conformance Reports of the same issue will automatically generate a Corrective Action Request for said issue.

A Corrective Action Request must be initiated by Quality Control and completed by the Site Manager in coordination with the discipline Superintendent overseeing the work. The completed Corrective Action Request will be reviewed by Quality Control for compliance and closure.

Audits

Quality Control will create an audit schedule to audit the following items:

- **Required inspections by the Foremen, General Foremen, and Superintendent daily**. Any deficiencies found in the inspection frequency or inspection activity shall be reported to the Site Manager. Follow-up Audits shall be conducted by Quality Control to ensure any deficiencies found have been addressed. Items not addressed will be reported to the Quality Control Manager in the Quality Control weekly report.
- **Documents available in the field and in Procore**. Random audits will be conducted by the Field Engineers of their drawings according to the audit schedule, and Quality Control will be informed when the audit is complete. Quality Control will then conduct a random check of field drawings. If

issues are found, Quality Control will organize the field engineers to conduct a full audit and replace all out-of-date or voided documentation.

- Subcontractor and vendor PQP compliance and documentation.

The audit schedule/log and findings shall be periodically (once a month) transmitted to the Site Manager and Quality Control Manager to confirm compliance. Audits will be stored both on-site and in the electronic library within Procore.

The NoBull Energy QC Manager will create a Corporate Audit Schedule for each project. Audits shall be performed on-site by the NoBull Energy QC Manager to ensure that the requirements of this PQP and the NoBull Energy Quality Management Program are being implemented and followed.

Calibration and Test Equipment

All equipment used for inspection, measuring, and testing is properly calibrated and traceable to a known national standard in accordance with applicable codes, standards, manufacturers recommendations, and the subcontractors approved Quality Program.

Calibration stickers shall be affixed in plain sight on all inspection, measuring, and test equipment requiring calibration. The calibration sticker, at a minimum, shall include the identifying serial number, the date of calibration, and the required recalibration date.

Calibration Control

The company and subcontractors shall maintain adequate control and a log of all calibrated inspection, measuring, and test equipment to ensure proper calibration and condition prior to use.

All calibrated inspection, measuring, and test equipment shall be stored and used in a manner to prevent damage.

Where the accuracy of calibration is suspected for any reason (for example, being dropped, struck, or otherwise mishandled), the Quality Control shall ensure proper recalibration.

Where the calibration is found to be inaccurate, the Quality Control shall ensure re-inspection, remeasuring, or re-testing of all work performed since the last known date of accurate calibration.

All calibrated inspection, measuring, and test equipment shall be stored and used in a manner to prevent damage.

Calibration Records

The company and its subcontractors must maintain current calibration records at the project site throughout the duration of the contract.

Copies of all subcontractors' calibration records shall be submitted to the Quality Control for review and verification of compliance with this Quality Control Manual.

6 Document Control

Document Updates and Revisions

Periodically, documents will be revised and updated to reflect feedback, process improvements, and innovation. New documents or changes to existing documents will be updated in the NoBull Energy Document Library, as well as in all Procore project document sections. The document is to be distributed to all departments to which it pertains so that most current revisions are available for field use. The Quality Control shall be informed of any changes and revisions to documents.

The period of record retention depends on their usefulness to the NoBull Energy retention schedule.

Responsibilities

The Project Engineer is responsible for controlling and distributing internal and vendor project documents in accordance with this procedure. The Project Engineer will then distribute documents to the Field Engineers.

Documents include standards, drawings, specifications, engineering guides, and other technical documents that provide direction for the construction of the project.

The project field engineer or their designee is responsible for receiving, copying, filing, record keeping, and distribution. They shall determine the required distribution of documents to the job site personnel.

The Site Manager shall be responsible for distributing documents to the crafts.

As-Built Information

All as-built information will be marked up on the master as-built, which will need to be transcribed and published in the Procore drawings module by the field engineers of their respective disciplines. Upon completion of the project, the original as-builts shall be transmitted to the client, and a copy shall be retained by the field office.

Request for Information

Request for Information (RFI): A contractor/subcontractor initiated a technical question. An RFI is initiated if the contractor/subcontractor:

- Is unable to understand the technical documents (scope, specs, drawings, or data).
- Discovers or perceives a conflict, error, or omission in or among the technical documents.
- Has an alternate/substitute material or method to propose that will not affect cost or schedule.

7 Record Maintenance, Retention, and Distribution

- Quality records and documentation will be maintained to substantiate conformance to the specified requirements.
- All quality records and documentation should be legible and clearly identify the area of the work to which they pertain.
- Documentation shall be complete with all required data filled in. Any corrections or changes made to original documents shall have a single line through with the initials of the individual who made the correction/change and the date the correction/change was made. White Out correction is not allowed for making corrections or changes.
- Upon completion of each project, the above completed documentation will be forwarded to NoBull Energy document control team for retention. Documents will be transmitted to the Client representative, and NoBull Energy shall retain a copy of the records in accordance with the NoBull Energy document retention schedule.

8 Procurement of Material and Equipment

All materials shall conform to the specific requirements of the owner, as well as the applicable engineering technical specifications, codes, and standards.

Materials and equipment shall be purchased from qualified and approved vendors and/or manufacturers. If applicable, vendor and manufacturer selection shall be as directed by the owner/engineers approved vendor/manufacturer list.

Documentation for equipment shall include installation, maintenance, and operating instructions. Additional applicable information shall also be supplied, including short- and long-term storage and maintenance requirements and procedures, MSDS information bulletins, and any other safety or OSHA-required information.

9 Receiving and Inspection

Receiving and Inspection

All equipment, components, and bulk material received in the field require inspection. Inspection will vary in terms of equipment type, material quantities, and client requirements. All items received will be

inspected to ensure they conform to the purchase order, size, type, labeling, and shipping documents. Any damaged material will be documented, with photos taken, and submitted to the appropriate person daily. Materials shall be stored using a neat and organized method. Specific methods are up to the Site Manager and Materials Manager.

Responsibility

The receiving and inspection responsibility depends on the type of equipment, components, and materials subject to inspection and the extent to which inspection was performed at the source.

- Material tracker pulls the BOM and compares it to what's on the load.
- The material tracker ensures the correct module wattages are on the truck.
- Material Tracker ensures the correct quantities are being offloaded by the staging area.
- All BOMs and an MRF filled out by the material tracker are returned to the Material Manager, allowing the material tracker to be updated and tracked, so we know what has been delivered to the site.

Field Material Inspection

1. Provide facilities and personnel necessary to receive, inspect, and ensure the proper handling and storage of materials, component parts, and bulk commodities at the jobsite.
2. Assure proper identification of all items listed on the receiving report prior to signing the receiving documents.
3. Identify and record shipping damage at the time of delivery. Have the driver sign the receiving report, if possible, and notify the carrier.
4. Generate and maintain Over, Short, or Damage Reports, Shipping Records, and Receiving Reports, and tabulate them on the appropriate register form.

10 Storage, Preservation, and Maintenance

When required, a Damage Material Inspection must be prepared and transmitted to the vendor for correction or disposition.

In addition to manufacturer requirements, these minimum storage requirements must be met:

- All materials must be stored in a proper manner.
- A minimum ground clearance must be maintained to facilitate forklift access.
- A larger clearance is required for areas prone to flooding during weather events.

- Packaging specifically designed for storage in contact with the ground is exempt from this requirement.

Civil:

Piles:

- Piles must be staged by size and location per the pile plan.
- Piles need to be painted different colors on the ends, based on their size and length.
- Be sure the correct piles are staged in the correct locations.

Mechanical:

The module shall be offloaded on level ground. Look at every panel box for damage and wattages. Ensure module boxes are staged in the correct orientation for module installation. Ensure that the correct wattages are staged in the correct location in the field.

All bolts should be stored off the ground and checked periodically for signs of oxidation; proper action should be taken to prevent further damage.

Electrical:

Electrical equipment shall be stored under the roof and inside a protected area, unless the equipment is specifically designed to withstand exposure to the weather. Equipment not stored in a protected area must be adequately protected in accordance with the manufacturer's storage instructions.

Cable must be staged on flat, level ground. Cable spools must be set on dunnage to keep them elevated, preventing damage from reels sinking and cables meeting the ground.

When storing the cable spooler, blocks must be used to protect hydraulic fittings. Make sure the cable spooler is stored on dunnage and handled with care.

Sectionalizers: Ensure that sectionalizers are not located in an area that will be flooded during heavy rain.

11 Final Inspection/Turnover Books

Turnover Package

A Turnover Package is a consolidation of all contractually required documentation (including as-built drawings, installation, testing records, etc.) for a specific scope of work, verifying the components have been installed in accordance with the project specifications, drawings, applicable codes, and standards as required by the contract documents.

Turnover Documentation

Turnover documentation consists of all official records of the startup and commissioning efforts.

Documents are collected before the startup and commissioning process activities. They compile into block turnover packages and organize the job books. Completed System Turnover Packages are submitted to the owner as required to document the physical turnover.

Some startup and commissioning documents may be turned over separately from a system turnover package when a grouping of common documents is more logical than splitting them up by system.

Physical Turnover

The most common method of turnover is on a system-by-system basis, as each system is completed and the system turnover packages are handed over.

Turnover involves the transfer of substantial quantities of documentation and physical assets. Transfers shall be documented with detailed, itemized, signed manifests and receipts.

This includes the delivery of spare parts and/or special tools as required by contract for final acceptance.

Turnover shall include the transfer of physical care, custody, and control of the equipment and systems to the owner. Project-specific contract requirements will dictate the manner and timing of physical turnover and how to coordinate it with contractual matters such as the formal client acceptance.

Supplier/Vendor Information

Project personnel assemble supplier documentation on the project equipment and forward this information to the owner. Typically, these are O&M manuals and shop drawings. The personnel responsible for these activities are in Engineering and Procurement.

12 Work Disciplines

Civil:

Grading

Deviations from the grading plan shall be reviewed and approved by the Engineer of Record.

Stabilization of soils after grading shall be installed in accordance with the requirements of the SWPPP.

Trenching

Trenching shall be in accordance with all the civil and electrical drawings.

Deviations from the depth of trench shall be approved by the Engineer of Record.

Survey as-builts of the cable trenches shall be made prior to backfilling the trench. These as-builts shall be submitted to the project engineer on a weekly basis.

Compaction

Compaction testing must be performed by a third-party testing laboratory.

Compaction test reports must be of sufficient detail to describe the location and depth at which the test was taken.

Areas that did not pass compaction testing must be reworked and retested. The test report must indicate that the test is for a previously failed test.

Mechanical:

Pile Driving

Pile driving shall be done in accordance with the approved engineering drawings.

Pile alignment must be in accordance with the Manufacturer's specifications. Deviations from tolerances must be approved by the Manufacturer and/or structural engineer, as is appropriate.

Tracker Assembly

Alignment of piles and tracker components shall be in accordance with the manufacturer’s instructions.

Torquing of bolts is only required when the manufacturer's instructions specify a specific torque.

Wrench-tight or turn-of-nut methods should be employed whenever possible for steel-to-steel connections. The use of these methods in lieu of torquing must be approved by the manufacturer prior to implementation.

Motor and Driveline Installation

Motors and drivelines shall be installed in accordance with the manufacturer’s instructions.

Torquing the motor to the attachment plate is required. Use of a calibrated torque device is mandatory.

The driveline installation order must be considered to minimize potential damage to the driveline from equipment during construction activities.

Electrical:

MV Cables

MV Cables shall always be stored with caps on the ends.

Caps on MV cables may be temporary caps, provided they are replaced with acceptable cold or hot shrink caps, or other suitable means that assure there will be no moisture ingress. Replacement of the temporary cap must occur within 48 hours or before a weather event, whichever is soonest.

Use of tape only is not an acceptable temporary cap. Temporary caps must fully cover the ends of the cable and may be held in place using tape. Temporary caps must be of sufficient durability to withstand moderate abrasion, impact, or snag-induced damage.

MV cables shall be insulation resistance (Megger) tested in accordance with ANSI/NETA ATS-Table 100.1. A point-to-point test shall be performed prior to insulation resistance testing. Tests shall be performed after installation and partial backfill of the cable is complete. At the discretion of the Site Manager or Electrical Superintendent, a reel test of the spool may be performed between the inner conductor and the concentric neutral before installation.

An insulation resistance test shall be done between the core conductor and the concentric neutrals. If there are no concentric neutrals, then test between the core conductor and earth.

When testing cables with concentric neutrals, do not test the concentric neutral to earth unless the manufacturer has approved and provided a test procedure. If testing of the concentric neutrals to earth is required, use a test procedure recommended by the manufacturer.

MV cables shall be identified by phase and labeled on both ends after installation. The identification method must be sufficient to maintain the markings until terminations are made.

After installation, protect exposed MV cables from damage from construction activities. The method of protection may vary throughout the site, but it must be sufficient at each location.

Maintain cable bend radius in accordance with NFPA 70/NEC 300.34. A bend radius shall not be less than 12 times the cable diameter.

Cables shall be terminated only by technicians trained to install the approved termination supplies and equipment. All training shall be formal, conducted by a qualified trainer, and documented in a comprehensive manner.

After installation and termination are complete, all MV cables shall be acceptance tested using a VLF method.

DC Feeder Cables

DC Cables shall be stored with caps on the ends at all times.

Caps on DC cables may be temporary caps provided they are replaced with acceptable cold or hot shrink caps, or other suitable means that ensure there will be no moisture ingress within 48 hours, or before a weather event, whichever comes first.

Use of tape only is not an acceptable temporary cap. Temporary caps must fully cover the ends of the cable and may be held in place using tape. Temporary caps must be of sufficient durability to withstand moderate abrasion, impact, or snag-induced damage.

DC cables shall be insulation resistance tested in accordance with ANSI/NETA ATS-Table 100.1. A point-to-point test shall be performed prior to insulation resistance testing. The tests shall be performed after installation and partial backfill of the cable is complete.

DC cables shall be identified by polarity and run on both ends of the cables after installation. The identification method must be sufficient to maintain the markings until terminations are made.

After installation, protect exposed DC cables from damage from construction activities. The method of protection may vary throughout the site, but it must be sufficient at each location.

Maintain cable bend radius in accordance with NFPA 70/NEC 300.34. The bend radius shall not be less than 12 times the cable diameter.

Cables shall be terminated by qualified technicians who are trained in the equipment and supplies used for the terminations.

Fiber Optic and Other Cables

All cables shall have caps at the end.

Depending on the cable type, size, and Owner requirements, insulation resistance testing may be required. If insulation resistance testing is required, testing shall be done in accordance with ANSI/NETA ATS-Table 100.1. Testing shall be performed after installation and partial backfill is complete.

Cables shall be marked on both ends with identifying markings to clearly identify the cable. At a minimum, this is the run, but we must include more information as necessary for clarity.

After installation, protect exposed cables from damage from construction activities. The method of protection may vary throughout the site, but it must be sufficient at each location.

For electrical cables:

For cables exceeding 1000 V, maintain the cable bend radius in accordance with NFPA 70/NEC 300.34; the bend radius shall not be less than 12 times the cable diameter.

For cables with a voltage rating of 1000 V or less, maintain a cable bend radius that will not damage the cable or its insulation. No sharp bends are allowed.

Cables that are part of a manufactured component, for example, PV modules, shall have bend radii that meet the manufacturers' requirements.

Motor power cables shall be insulation resistance tested in accordance with ANSI/NETA ATS 7.3.2.B.2 and Table 100.1. Test cables rated at 300 V and less at 500 V. Test cables rated between 300 V up to and including 600 V at 1000 V.

At the discretion of the Electrical Superintendent, small control cables or small power cables may be point-to-point tested for continuity.

For fiber optic cables:

- Care must be taken in all handling of fiber optic cables to prevent internal damage to the cable's structure.
- Maintain a minimum bending radius as specified by the cable manufacturer. At no time shall the bend radius be less than 10 times the diameter of the cable.
- Cables must be terminated by a certified technician when making fiber optic terminations.
- Cable testing shall be done using calibrated equipment or by a certified testing company capable of performing Power Meter and OTDR tests.

Grounding

Grounding inverters, switchgear, and/or junction boxes shall be tested in accordance with NETA requirements.

Welding

This manual outlines the quality methods to ensure that welding performed by NoBull Energy and subcontractors is carried out in accordance with the contract documents and standards referenced therein.

This procedure may be modified or updated to meet the project's specific requirements.

References

- AWS D1.1 Structural Welding
- Project specifications and drawings

Requirements

Company Quality control shall be responsible for monitoring and verifying the following:

- Welding procedure specifications must comply with the project specifications.
- Welder qualification records are current and are applicable to the referenced codes and scope of work. A welder qualification log shall be maintained. A weld test log will be maintained.

- Welding procedures are being used in compliance with the applicable codes and project specifications.
- Welders are issued an identification letter/number.
- Storage, issuance, and use of filler metals are in accordance with applicable codes and project specifications.

Weld Material Control

Weld filler material will be controlled, stored, and issued per this Quality Control Manual and the rod manufacturers' recommendations.

All weld filler metals shall be SMAW E7018, FCAW NR-232, or other low-hydrogen, all-position wire. Open containers of weld fill material that require oven storage shall be placed into a rod oven immediately after opening the hermetically sealed container.

The welder shall use a stub bucket to contain the waste ends of used weld filler material.

Unused weld filler material shall be returned to a rod oven or at the end of each work shift for proper storage.

Inspection

- Inspections will be performed by qualified individuals as required by the project specifications.
- Welder appropriately qualified
- Correct filler metal
- Initials preheat and maintenance (monitor)
- Incomplete penetration, excessive penetration, incomplete fusion, cracks, undercut, and weld reinforcement

Concrete

This section outlines the methods to ensure that concrete work is performed in accordance with the contract documents.

References

- ACI (See ITP)
- ASTM (See ITP)
- Project Specifications

- Vendor instruction, procedures, drawings

Pre-placement Inspection

Each discipline Superintendent is responsible for ensuring all work in the concrete pour area is completed to specification/drawing requirements.

The Civil Superintendent shall notify Quality Control to perform the final inspection prior to releasing the pour to order concrete.

Mix designs are reviewed for acceptability and submitted for approval as required.

Quality Control shall verify that reinforcement materials are as specified on the approved drawing.

Receiving

Suppliers shall include on their truck tickets the batch weights of all materials and the number of gallons of water that may be added to the site, ensuring that the total does not exceed the design water-to-cement ratio.

Those persons given the authority to accept concrete and add water to the load to adjust the slump, as well as to manage concrete delivery, are assigned by the Civil Superintendent. Water added to a truck on site shall be documented. No water shall be added after 90 minutes from batch time or after concrete has already been placed from that truck.

Placement

Quality Control shall monitor in-progress concrete work, either personally or through a special inspector, including control of concrete trucks, concrete placement techniques, consolidation techniques, formwork stability, testing procedures, and finishing.

Testing

The Quality Control shall verify that all relevant field and laboratory tests (e.g., slump, air, yield, temperature, compressive strength, unit weight, and others) are completed according to the specifications.

The project shall establish with the testing agency the system by which test results will be communicated to Quality Control in a timely manner.

Quality Control shall review test results immediately following completion of testing to confirm that project requirements are being met. A Concrete Pour Log/Strength Report shall be maintained.

Failures shall be reported to the project manager and project engineer for resolution. The Site Manager and Superintendent must be informed of the issue.

Post Placement

Concrete shall be inspected for proper curing, surface defects, correct location, and embed locations.

Documentation

Acceptance of formwork, reinforcement, embeds, and so on, is documented on the Foundation Inspection form.

A summary of all concrete pours is documented on the Concrete Pour Log/Strength Report.

Test data is provided by a third-party subcontractor test form.

Release of Installed Concrete

After verifying that the placed concrete will achieve design strength within the specified time, and has been otherwise accepted, it may be released for the next work sequence if it has reached a strength adequate to support the planned loads.

Commissioning

There shall be a separate Commissioning Plan that details the entire scope and testing to be performed during the commissioning process. This plan must include all tests and checks that the Company determines to be necessary to safely commission the facility. In addition, the commissioning plan must include all client commissioning and testing requirements. The commissioning plan is separate and beyond the scope of this Quality Control Manual.

The information contained in this document is confidential and proprietary to NoBull Energy, LLC and its affiliates. No part of this document may be distributed or disclosed in any form to any third party without the written permission of NoBull Energy, LLC.

Project Quality Plan

Aim of PQP

- Assure Project team has knowledge of NoBull internal and external procedures and policies.
- Assure that the client standards and other requirements are met.
- Assure that federal, state, and local regulatory codes are met.

Scope

- Applies to all NoBull Solar and BESS projects, Subcontractors, and Suppliers depending on SOW.
- Shall be used and followed for the full duration of construction to build Solar and BESS projects.
- QC Manager will audit and monitor processes as well as assist and advise all parties on the required policies and procedures necessary to complete a quality product on time.

Supporting Documents

- Procedures
- Work instructions
- First Article Inspections
- Checklist and Forms
- Logs, Reports, and Trackers

Checklist and Forms

- MV Cable & Fiber Optic Installation [Plow]
- MV Cable & Fiber Optic Installation [Traditional]
- Combiner Box Installation and Rough-In
- DC and MV Inverter Ground Ring and Rough-In
- DC Cable Trench, Installation and Backfill
- ATI Pile Installation Inspection Checklist
- ATI Final Tracker Installation Inspection Checklist
- ATI Module Installation
- NT Pile Installation checklist
- NT Final Tracker Assembly - Slew Drive, Torque Tubes, BHA, Dampers, Mod Rails
- CAB Installation
- String Management
- PCU Skid Placement
- Combiner Box - DC Terminations, Grounding & Landing
- PCU - DC Terminations, Grounding & Landing
- Aux Rack Rough-in and Installation
- Motor Power & Control - DC Terminations
- NT Final Tracker Assembly - SPC, Motor installation
- MV Terminations
- MET Station Inspection
- Sectionalizing Cabinet Install
- Cable Splicing Inspection
- Fence Grounding Inspection

- ATI Motor Cable AC Insulation Resistance (Megger) Test
- MV Cable Insulation Resistance (Megger) Test
- Proof Load Testing
- Fall of Potential Ground Test Form
- DC Feeder Insulation Resistance (Megger) Test
- DC Feeder Ground Continuity & Polarity Test Form
- Combiner Box Thermal Imaging
- Inverter - DC Thermal Imaging
- MV Thermal Imaging
- AUX-LV Thermal Imaging
- VOC_ISC Test form
- VOC ISC IRT String Polarity Tests
- Steel Certificate of Conformance
- Material Receiving and Inspection Form [MRIF]

First Article Inspection

- FAI_ Non-Tracker & Tracker Pile Install
- FAI_ DC Trenching
- FAI_ MV Trenching
- FAI_ PCU Rough In
- FAI_ DC Cable Install
- FAI_ ATI Tracker Installation
- FAI_ ATI Module Installation
- FAI_ Module Installation
- FAI_ CAB System Installation
- FAI_ String and Harness Wire Management
- FAI_ PCU Install with Welding
- FAI_ DC Terminations at Combiner Box
- FAI_ DC Terminations at PCU
- FAI_ NT Final Tracker Assembly - SPC, Motor installation
- FAI_ SCADA Rack Installation and Termination
- FAI_ MV Termination at Transformer
- FAI_ Sectionalizer Cabinet Install
- FAI_ MET Station

Procedure, Logs, Reports, and Trackers

- Continual Improvement
- Tool Calibration Log
- Welder Qualification Log
- Damaged Module Log
- Weld Test Log
- Non-Conformance Report (NCR)
- Observation Report
- Overage, Shortage, Damaged, Defective (OSDD) Form
- Concrete Pour Card & Strength Report
- Inspection & Test Plan-Nex Tracker System
- Inspection & Test Plan-ATI Tracker System
- Inspection Summary and Signoff Tracker

Roles and Responsibilities

- Project Manager
- Quality Coordinator
- Site Manager
- Foreman
- General Foreman
- Trade Superintendent

Project Manager

- Ensure PQP is implemented through proper staffing and reporting for the project.
- Audit and assure the project team is implementing PQP.
- Review and approve NoBull, Subcontractor, and supplier PQPs.
- Ensure PQP aligns with NoBull and Client PQPs, requirements, and specifications.
- Ensure RCA is performed, and corrective preventive actions are implemented.

Quality Coordinator

- Coordinate with Site Manager to assure that NoBull, Subcontractors, and suppliers follow the project PQP requirements.
- Create site-specific Inspection & Test Plan (ITP) that aligns with NoBull and client requirements.
- Ensure all inspection sheets are signed off in accordance with client-approved ITP.
- Perform random sampling inspections to validate compliance to requirements.
- Keep records organized in Procore and prepare turnover documentation.
- Create site-specific Quality inspection checklist for each work activity, per each work instruction requirement.

Site Manager

- Ensures that PQP is implemented through proper staffing and reporting for the project.
- Perform site audits and ensure the Supervision team is implementing the PQP.
- Implement client Quality and documentation procedures and requirements are part of the site-specific PQP and are executed during the project.
- Review/Audit QA/QC data.
- Implement proper Root Cause Analysis and corrective preventive actions.

Foreman

- Performs 100% inspection per ITP on work under his supervision in accordance with inspection forms and other related documents per section #3.

General Foreman

- Shall ensure all inspection and Quality checklists are performed daily and reported to the Superintendent and Quality Manager.
- Performs random inspections of at least 10% of all work under his direction and on a daily basis.
- Review/Audit QA/QC data.
- Performs Observations, NCRs, and escalations.

Trade Superintendent

- Shall ensure that PQP is implemented through proper staffing and reporting for the disciplines.
- Perform site audits to ensure foremen are following the PQP and providing feedback.
- Implement client Quality and documentation procedures per the PQP and ensure they are executed during the project.
- Review and collaborate with QC coordinator, Subcontractor, and Supplier PQPs, procedures, implementation alignment with and Client PQP.
- Review/Audit QA/QC data.
- Participates and performs Root Cause Analysis and Corrective Preventive actions.

Requirements

- Audits
- First Article Inspection
- Observations, NCRs, Escalations
- Calibration
- Civil
- Mechanical
- Electrical
- Welding

Audits

- Random audits will be conducted by Superintendents and Field Engineers and provide feedback to Quality coordinator.
- Quality Control/Tech will also conduct random checks of field drawings.
- If issues are found? QC will have General Foreman to perform 100% checks.
- Quality Manager will create an audit schedule for Subcontractor and vendor PQP compliance and documentation.

First Article Inspection

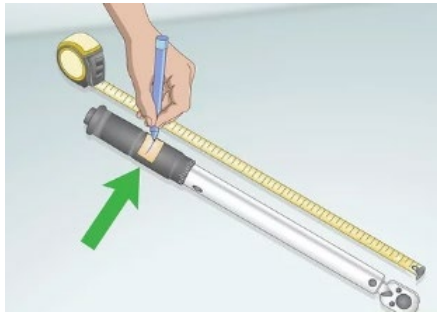
- A FAI for all relevant items that are not detailed on drawings shall be collaboratively documented and performed by the Superintendent, Quality Coordinator, and Field Engineer.
- Shall be reviewed and approved by all key process owners listed in FAI document immediately upon completion of the associated task.

Observation & NCR Definition

- Documented issues identified during inspections but not progressed to the next phase of work and can be easily corrected without requiring approvals or extensive work are called Observation.
- Documented issues to report any product or process that does not meet the agreed specifications, drawings, procedures, work instructions or Quality standards by NoBull or the referenced contract standards are called NCRs (Non-Conformance Reports).

Calibration

- Quality Control shall ensure that all equipment used for inspection, measuring, and testing are properly calibrated and maintain a log given in Section 3, to save all calibration checks.
- Calibration certificates and stickers shall be checked on all applicable equipment.
- Calibration certificate shall include at a minimum Serial #, Date of calibration, standards, by who, and expiration date.



Related Documents

- Civil Scope Inspection
- Fence Grounding Inspection
- DC Cable Trench, Installation and Backfill
- MV Cable & Fiber Optic Installation [Traditional]

Trenching/Backfill

- Trenching shall be in accordance with all the civil and electrical drawings and the DC Cable Trench, Installation, and Backfill for DC cable trenching and MV Cable & Fiber-optic Installation (Traditional).
- Deviations from the depth of trench shall be approved by the Engineer of Record.
- Survey as-builts of the cable trenches shall be made prior to backfilling the trench. These as-builts must be turned in by the Field Engineer to the project engineer or EOR upon completion of the task and then to the Owner with job books turnover.

Compaction

- Compaction testing must be performed by a third-party testing laboratory approved by the Engineer of Record.
- Compaction test reports must be of sufficient detail to describe the location and depth that the test was taken.
- Areas that did not pass compaction testing must be reworked and re-tested. The test report must indicate that the test is for a previously failed test.

Mechanical

Related Documents:

- Pile Installation Inspection Checklist
- Tracker Installation Inspection Checklist
- Module installation inspection Checklist
- Motors and drive-lines installation inspection Checklist

Piles

- Pile driving shall be done in accordance with:
  - Approved engineering drawings
  - Pile Installation Inspection Checklist for the specific tracker system.
- Pile alignment must be in accordance with manufacturer specifications.
- Deviations from tolerances must be approved by the manufacturer and/or Structural Engineer, as appropriate.

Trackers

Alignment of piles and tracker components shall be in accordance with manufacturer's instructions and the following inspection forms:

- For FTC tracker system: FTC Tracker Inspection
- For tracker system: Tracker Inspection
- Torquing of bolts is only required when the manufacturer instructions specify a specific torque.
- Wrench tight or turn-of-nut methods should be employed whenever possible for structure steel to steel connections, which have a low torque.
- Calibrated devices must have been calibrated within the last 12 months.
- Daily torque logs will be maintained for all calibrated devices using an on-site comparator. Refer to the Tool Calibration Log.
- Correction and recalibration of an out-of-tolerance device must be done at a qualified third-party testing facility that provides calibration certifications.

Tracker parts:

1. Post top
2. Slew drive assembly
3. Slew drive tube cradle
4. U-joint post top
5. Row end post top
6. Torque tube
7. Module clips
8. Row controller

FTC tracker parts:

1. Journal
2. Slew drive assembly
3. Torque tube
4. Damper
5. Module rails
6. Row controller

Modules

- Alignment of modules shall be in accordance with manufacturer's instructions and the Module Installation.
- **Verify torque specifications** in the site-specific tracker/ module drawing sheets and correlate with specifications listed in the installation manual.
- Calibrated devices must have been calibrated within the last 12 months.
- Daily torque logs will be maintained for all calibrated devices using an on-site Torque Tester. Refer to the Tool Calibration Log

Motors and Drive-lines (if applicable)

- Motors and drivelines shall be installed in accordance with the manufacturer’s instructions and the Motor and Driveline Inspection – TBD
- Torquing of the motor to the attachment plate may be required based on manufacturer's specifications. Use of a calibrated torque device is mandatory.

Electrical

Related documents:

- MV Cable & Fiber Optic Installation [Plow]
- MV Cable & Fiber Optic Installation [Traditional]
- Combiner Box Installation and Rough-in
- DC and MV Inverter Ground Ring and Rough-in
- DC Cable Trench, Installation and Backfill
- CAB Installation
- String Management
- Combiner Box - DC Terminations, Grounding & Landing
- PCU - DC Terminations, Grounding & Landing
- Aux Rack Rough-in and Installation
- Motor Power & Control - DC Terminations
- MV Terminations
- MET Station Inspection
- Sectionalizing Cabinet Install
- Cable Splicing Inspection

MV Cables

MV cables shall be stored with caps on the ends at all times.

Before termination:

- Point-to-point test
- Insulation resistance (Megger) tested – ATS 100.1
- All MV cables shall be identified by phase and run on both ends of cables after installation.
- Maintain cable bend radius (NEC 300.34) shall not be less than 12 x dia of cable.
- Cables shall be terminated only by trained Electricians. All training shall be documented in the Work Instructions training log.

DC Cables

- DC cables shall be stored with caps on the ends at all times.
- For DC Cable Installation, refer to the DC Cable Trench, Installation and Backfill.

Before termination:

- Point-to-point test shall be performed.
- Insulation resistance tested in accordance with ANSI/NETA ATS Table 100.1.
- Maintain cable bend radius in accordance with NFPA 70/NEC 300.34. The bend radius shall not be less than 12 times the cable diameter.
- Cables shall be terminated by qualified Electricians.
- Refer to Combiner box – DC Terminations, Grounding & Landing, and for DC terminations, Grounding, and landing at PCU.
- Refer to PCU – DC terminations, Grounding, and Landing at PCU.

Fiber Optic and Motor Cables

- All cable ends shall be appropriately labeled and sealed.
- Depending on the cable type and size, insulation resistance testing may be required.
- All cables shall be terminated by qualified Electricians.
- Maintain cable bending radius in accordance with NEC requirements.
  - Cables with >1000 V rating - NEC 300.34
  - Fiber optic cable - shall not have < 10 x dia
- Fiber optic cables shall be OTDR tested by a certified testing company.

Grounding

- Ground rings around inverters and Sectionalizer cabinets shall be ground step and touch potential testing during FOP test.
- Use Fall of Potential Ground Test Form.

Welding

NoBull Quality Control shall be responsible for maintaining, monitoring, and verifying the following:

- Welding procedure specifications as approved by client and EOR.
- Welding Qualification records are current and maintained in the weld test log.
- Storage, issuance and use of filler metals.

Testing and Commissioning

- ATI Motor Cable AC Insulation Resistance (Megger) Test
- MV Cable Insulation Resistance (Megger)Test
- Proof Load Testing
- Fall of Potential Ground Test Form
- DC Feeder Insulation Resistance (Megger) Test
- DC Feeder Ground Continuity & Polarity Test Form
- Combiner Box Thermal Imaging
- Inverter – DC Thermal Imaging
- MV Thermal Imaging
- AUX-LV Thermal Imaging
- VOC ISC Test Form
- VOC ISC IRT String Polarity Tests

Procore Inspection Module

- Walk the audience through Procore inspection module.

2 - ITP- Inspection and Test Plan (BESS) Atlas *

Name
ITP- Inspection and Test Plan (BESS) Atlas *

Type
Quality

Plan Manager
Stacy Nail

Location
Atlas 8 BESS

Status
In Progress

Progress
0/58

Private
Yes

Description

Plan Approver Signatures

Completed Plan Receiver Signatures

Deliveries/Receiving

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	69 KVA Transformer	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection- 74 Per a Project						
2	LG Integrated Skid	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-148 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
3	Battery Enclosure (B-LINK)	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-592 Per Project						
4	AUX MV XFMR Transformer	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-6 Per Project						
5	AUX Switchboard (SWBD)	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-12 Per Project						

Equipment Pad Installation

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	69 KVA Pad Installation	Open			_____ Contractor - Document Review _____ Subcontractor		
	Acceptance Criteria 100% Inspection-74 Per Project If Concrete needs poured.						
2	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Test Per a Lift and Per Fill-1 Report Per E-Station-74 Per Project						
3	As-Built Topography	Open			_____ Contractor - Document Review		
	Acceptance Criteria 1 Report generated in accordance with SOW.As-Built or .csv file with the proposed and actual points matching the minimum sampling requirements. Typically, each elevation break (4 corners of the pad), should be verified per pad.						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
4	AUX Transformer Pad Concrete Foundation First Article Inspection (FAI)	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 per project						
5	AUX Transformer Pad Concrete Foundation Pre-Pour Inspection	Open			_____ Contractor - Hold Point _____ Subcontractor - Witness Point		
	Acceptance Criteria Visual Inspection						
6	Equipment Pad Foundation Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection						
7	SWBD Concrete Foundation First Article Inspection	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
8	SWBD Concrete Foundation Pre-Pour Inspection	Open			_____ Subcontractor - Witness Point _____ Contractor - Hold Point		
	Acceptance Criteria Visual Inspection						
9	Equipment Pad Foundation Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection						
10	Concrete Design Mix	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Report Per Design						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
11	Concrete Batch Tickets	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Ticket Per Truck						
12	Concrete Testing (Slump Test, Etc.)	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria Site Specific						
13	Concrete Break Reports	Open					
	Acceptance Criteria 1 Test Per Truck						

Structural- Pile Foundations

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	LG AC Skid Pile First Article Inspection	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
2	LG AC Skid Foundation Pile Installation	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection- 148 Per Project						
3	Load Testing (Pull or Compression Testing)	Open					
	Acceptance Criteria NA for this Project						
4	B-Link Pile First Article Inspection	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
	1 Per Project						
5	B-Link Foundation Pile Installation	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection- 1 Per E-Station-74 Per Project						
6	Load Testing (Pull or Compression Testing)	Open					
	Acceptance Criteria NA for this Project						
7	Certified Welding Inspection	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 100% Inspection						

SWBD Distribution Trench

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	SWBD Distribution Trench First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
2	SWBD Distribution Trench & Backfilling Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per SWBD Trench- 6 Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Test Per a Lift and Per SWBD Trench Fill-6 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
4	AC Cable Insulation (Megger)	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per SWBD Trench -6 Per Project-Report to show conductor-conductor and conductor-ground						

AC Skid/-Link Skid Installation

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	DC/LVAC/Comms Conduit First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Run-1 Per Project						
2	DC/LVAC/Comms Inspection	Open					
	Acceptance Criteria 1 Per Skid-148 Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Per Skid -148 Per Project						
4	Insulation Resistance Test (DC/AC)	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Record Per AC Skid-148 Per Project						
5	E-Station Ground Grid First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
6	E-Station Ground Grid Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Inspection Per Ground Grid-148 Per Project						
7	LG AC Skid Completion First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
8	LG AC Skid Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per E-Station- Per Project						
9	B-Link Completion First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
10	B-Link Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria All B-Links will be inspected-1 Inspection Per Group-148 Per Project						

AUX Station

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	AUX Station Trench First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
2	AUX Station Trench Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Trench Per Circuit-6 Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Test Per a Lift and AUX Station Trench Fill-6 Per Project						
4	Insulation Resistance Test	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per Trench -6 Per Project-Report to show SWBD-SWBD and SWBD-AUX Transformer						
5	AUX Station Ground Grid First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
6	AUX Station Ground Grid Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per Ground Grid- 6 Per Project						
7	SWBD Termination First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
8	SWBD Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 12 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
9	AUX Transformer First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
10	AUX Transformer Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 6 Per Project						

MV & FO Trenching and Cable Layout

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	MV & FO Trenching and Cable Layout First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Run-1 Per Project						
2	MV & FO Trenching and Cable Layout Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 5-Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Per Lift- for every 1000ft. If run is less than 1000ft, 1 test per Lift. Trench/Road Crossings 1 test per a lift. at each crossing						
4	MV Cable Insulation Test	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per Run . Conductor-conductor and conductor-ground er run. 5- Per Project						

SMA/Transformer

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	SMA/Transformer First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
2	SMA/Transformer Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per E-Station-74 Per Project						
3	MV /AC Cable Insulation Resistance Test	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per Block- 74 Per Project						

Other-Electrical

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	Fence Grounding First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
2	Fence Grounding Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per Project						

2 - ITP- Inspection and Test Plan (BESS) Atlas *

Name
ITP- Inspection and Test Plan (BESS) Atlas *

Type
Quality

Plan Manager
Stacy Nail

Location
Atlas 8 BESS

Status
In Progress

Progress
0/58

Private
Yes

Description

Plan Approver Signatures

Completed Plan Receiver Signatures

Deliveries/Receiving

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	69 KVA Transformer	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection- 74 Per a Project						
2	LG Integrated Skid	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-148 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
3	Battery Enclosure (B-LINK)	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-592 Per Project						
4	AUX MV XFMR Transformer	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-6 Per Project						
5	AUX Switchboard (SWBD)	Open			_____ Subcontractor - Inspection- Procore _____ Contractor - Document Review		
	Acceptance Criteria 100% Inspection-12 Per Project						

Equipment Pad Installation

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	69 KVA Pad Installation	Open			_____ Contractor - Document Review _____ Subcontractor		
	Acceptance Criteria 100% Inspection-74 Per Project If Concrete needs poured.						
2	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Test Per a Lift and Per Fill-1 Report Per E-Station-74 Per Project						
3	As-Built Topography	Open			_____ Contractor - Document Review		
	Acceptance Criteria 1 Report generated in accordance with SOW.As-Built or .csv file with the proposed and actual points matching the minimum sampling requirements. Typically, each elevation break (4 corners of the pad), should be verified per pad.						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
4	AUX Transformer Pad Concrete Foundation First Article Inspection (FAI)	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 per project						
5	AUX Transformer Pad Concrete Foundation Pre-Pour Inspection	Open			_____ Contractor - Hold Point _____ Subcontractor - Witness Point		
	Acceptance Criteria Visual Inspection						
6	Equipment Pad Foundation Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection						
7	SWBD Concrete Foundation First Article Inspection	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
8	SWBD Concrete Foundation Pre-Pour Inspection	Open			_____ Subcontractor - Witness Point _____ Contractor - Hold Point		
	Acceptance Criteria Visual Inspection						
9	Equipment Pad Foundation Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection						
10	Concrete Design Mix	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Report Per Design						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
11	Concrete Batch Tickets	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Ticket Per Truck						
12	Concrete Testing (Slump Test, Etc.)	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria Site Specific						
13	Concrete Break Reports	Open					
	Acceptance Criteria 1 Test Per Truck						

Structural- Pile Foundations

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	LG AC Skid Pile First Article Inspection	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
2	LG AC Skid Foundation Pile Installation	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection- 148 Per Project						
3	Load Testing (Pull or Compression Testing)	Open					
	Acceptance Criteria NA for this Project						
4	B-Link Pile First Article Inspection	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
	1 Per Project						
5	B-Link Foundation Pile Installation	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 100% Inspection- 1 Per E-Station-74 Per Project						
6	Load Testing (Pull or Compression Testing)	Open					
	Acceptance Criteria NA for this Project						
7	Certified Welding Inspection	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 100% Inspection						

SWBD Distribution Trench

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	SWBD Distribution Trench First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
2	SWBD Distribution Trench & Backfilling Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per SWBD Trench- 6 Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Test Per a Lift and Per SWBD Trench Fill-6 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
4	AC Cable Insulation (Megger)	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per SWBD Trench -6 Per Project-Report to show conductor-conductor and conductor-ground						

AC Skid/-Link Skid Installation

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	DC/LVAC/Comms Conduit First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Run-1 Per Project						
2	DC/LVAC/Comms Inspection	Open					
	Acceptance Criteria 1 Per Skid-148 Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Per Skid -148 Per Project						
4	Insulation Resistance Test (DC/AC)	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Record Per AC Skid-148 Per Project						
5	E-Station Ground Grid First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
6	E-Station Ground Grid Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Inspection Per Ground Grid-148 Per Project						
7	LG AC Skid Completion First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
8	LG AC Skid Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per E-Station- Per Project						
9	B-Link Completion First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
10	B-Link Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria All B-Links will be inspected-1 Inspection Per Group-148 Per Project						

AUX Station

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	AUX Station Trench First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
2	AUX Station Trench Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Trench Per Circuit-6 Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Test Per a Lift and AUX Station Trench Fill-6 Per Project						
4	Insulation Resistance Test	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per Trench -6 Per Project-Report to show SWBD-SWBD and SWBD-AUX Transformer						
5	AUX Station Ground Grid First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
6	AUX Station Ground Grid Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per Ground Grid- 6 Per Project						
7	SWBD Termination First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
8	SWBD Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 12 Per Project						

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
9	AUX Transformer First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
10	AUX Transformer Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 6 Per Project						

MV & FO Trenching and Cable Layout

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	MV & FO Trenching and Cable Layout First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Run-1 Per Project						
2	MV & FO Trenching and Cable Layout Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 5-Per Project						
3	Compaction Records	Open			_____ 3rd Party - Document Review		
	Acceptance Criteria 1 Per Lift- for every 1000ft. If run is less than 1000ft, 1 test per Lift. Trench/Road Crossings 1 test per a lift. at each crossing						
4	MV Cable Insulation Test	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per Run . Conductor-conductor and conductor-ground er run. 5- Per Project						

SMA/Transformer

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	SMA/Transformer First Article Installation	Open			_____ Contractor - Hold Point _____ Subcontractor - First Article Inspection (FAI)		
	Acceptance Criteria 1 Per Project						
2	SMA/Transformer Completion Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per E-Station-74 Per Project						
3	MV /AC Cable Insulation Resistance Test	Open			_____ Subcontractor - Test		
	Acceptance Criteria 1 Report Per Block- 74 Per Project						

Other-Electrical

#	Activity Title	Status	References	Due Date	Assignees and Verification Method	Records	Notes
1	Fence Grounding First Article Installation	Open			_____ Subcontractor - First Article Inspection (FAI) _____ Contractor - Hold Point		
	Acceptance Criteria 1 Per Project						
2	Fence Grounding Inspection	Open			_____ Subcontractor - Inspection- Procore		
	Acceptance Criteria 1 Per Project						

Construction Quality Plan – *XXX*

Report No:

Issue No:

Revision History

Issue	Date	Nature and Location Of Change
01	11/09/2022	First Created

This document (“Procedure”) has been prepared by NoBull Energy LLC. (NBE) in accordance with internal procedures and mandates and is Confidential Information. If this Procedure is an exhibit to a contract or agreement, then this Procedure, in the form attached to the contract, shall be subject to only those express representations or warranties regarding the exhibits to such contract, if any. Except for such representations, NBE provides this Procedure “AS-IS” and does not represent, and NBE expressly disclaims, that the procedures or material contained in this Procedure have been prepared pursuant to any particular methodology, are accurate or complete, or that they reflect the current status of applicable law. Portions of this Procedure may be excerpted or redacted, and this Procedure is subject to revision or update at any time. Any party utilizing this Procedure, or any matter or information derived from it, ("Recipient") does so at his/her/its own risk and agrees to make his/her/its own investigation regarding his/her/its legal or other obligations for performance of his/her/its work. No Recipient shall have any right or claim against NBE or any of its affiliated companies with respect to the Procedure.

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APPENDIX A **9**

1.0 PURPOSE

This Construction Quality Plan describes in concise terms the specific means of implementing the No Bull Energy, LLC (NBE) Quality Management System, as described in the No Bull Energy LLC (NBE) Quality Manual, in accordance with the Contract Documents, relative to the *Name of Project*

2.0 SCOPE

This Construction Quality Plan details which procedures and associated resources shall be applied, by whom and when during the *Name of Project*

The Plan is based upon the requirements of ISO 9001: 2015.

3.0 BRIEF DESCRIPTION OF THE PROJECT

3.1 Project Details

Name of Project	Name of Project
Address of Project	Site Address
Client Name	
NBE Project Number	
Project Start Date	
Projected End Date	
Project Type	Solar ☐ Other ☐
If Other, describe	
Generating Capacity	

4.0 ISSUE AND CONTROL

4.1 Issue and Control of Construction Quality Plan

This Construction Quality Plan, prepared by Site Manager (or his/her designee) reflects the major parameters of this Project, and has been prepared in accordance with the NBE Management System procedures, and the project contract between No Bull Energy LLC (NBE) and the General Contractor.

The Site Manager, HSQE Manager, and other senior project personnel shall review this Construction Quality Plan at planned intervals throughout the life of the contract, to assure continued compliance with the contract terms and conditions.

This Construction Quality Plan is a controlled document and shall be issued in accordance with ISO 9001:2015

5.0 CONSTRUCTION QUALITY PLAN REFERENCES

5.1 No Bull Energy, LLC (NBE) Quality Manual

5.2 Contract Documents

5.3 Inspection and Test Plan

6.0 CONTRACT DOCUMENTS

A complete set of the below shall be maintained on site by the Project/Site Manager.

6.1 Contract Documents

6.2 Construction Specifications and Drawings

6.3 Schedule of Project Drawings

6.4 Non-Conformance and Corrective/Preventive Action Log

6.5 Transmittal Log

6.6 RFI Log

6.7 Drawing Log

6.8 Training Log

7.0 KEY PERSONNEL AND RESPONSIBILITIES

7.1 Personnel and Responsibilities

Managing Partner and Site/Construction Manager to assure appropriate application of, and compliance with the No Bull Management Systems.

Responsibilities include:

a) Providing programmatic and administrative management and guidance and support to the project staff for the application and management of the (NBE) Management Systems to the Project.

b) Assuring that No Bull project personnel are suitably trained and qualified for their role on the Project in accordance with (NBE) Management System requirements.

c) Performing Management System audits of the project including the identification and verification of any necessary corrective actions to the project or management systems, and review of any site generated nonconformance.

d) As necessary, providing or assuring the provision of training of (NBE) personnel to company procedures.

7.1.2 Managing Partner-

Responsibilities include:

a) Assisting the Construction Projects in assuring that experienced and qualified No Bull Energy personnel are assigned and briefed to carry out their various roles in an efficient and effective manner.

b) Assuring that the Site/Construction Manager maintains and complies with this Construction Quality Plan.

c) Ensuring the quality of the Contract works, including all necessary Inspections and Tests, are conducted and recorded by the Project Manager or QA/QC personnel in accordance with the ITP.

d) The Managing Partner and Site/Construction Manager shall assure coordination of design information requirements and control of receipt and issue of drawings, specifications and other design/technical information.

e) Maintain specified quality through monitoring progresses against the construction program and Contract requirements to ensure suitable resources are applied to all activities.

f) Reviewing the technical capability and capacity of prospective Subcontractors and Suppliers and assuring that they meet or exceed (NBE) standards.

g) Review of all contract or schedule variations and scope change orders.

7.1.3 Site/ Construction Manager –

Reports to the Managing Partner.

Shall liaise with the Managing Partner and Manager HSQE, as necessary to assure appropriate application of, and compliance with the (NBE) Management Systems.

Responsibilities include:

a) Liaison with the Client to ensure the Quality Plan satisfies all Contract and design requirements.

b) Management and supervision of all on-site activity by (NBE) and its Subcontractors to assure compliance with the Contract requirements and No Bull Management Systems.

c) Implementation and management to this Construction Quality Plan.

d) Development and approval of project specific procedures, work instructions, or method statements.

The quality of all site works assuring all necessary Inspections and Tests are conducted and recorded, and Quality Records are maintained

e) Monitoring of progress at site including preparation and maintenance of the construction program, preparation of weekly progress reports, and producing monthly valuations.

f) Assisting in the selection of Subcontractors and Suppliers to ensure compliance of the Construction Quality Plan.

7.1.4 Onsite Quality Representative –

The Project Quality Representative is the onsite person identified by the Project Manager that is responsible for the day to day functions in managing application of the No Bull Quality Program at the project.

They report administratively (for Quality program guidance and direction) to the Managing Partner

Responsibilities include:

a) Oversight of project inspections and documentation to verify compliance with quality program and contract requirements.

b) As directed inspection of completed works with strict utilization of (NBE) and project inspection forms to assure compliance with this Construction Quality Plan and ITP.

c) Issues nonconforming reports (NCR's) or corrective/preventive action reports (CPAR's) for noncompliance items, as appropriate.

d) Identifying and documenting nonconforming inspections and notifying these to the Construction/ Site Manager, Site Superintendents & or Discipline Managers.

e) Maintaining a NCR/CPAR log nonconforming items, corrective actions implemented, and verification of completed corrective actions.

f) Liaise with the Managing Partner & Construction/Site Manager as necessary to assure that quality issues affecting the Project are addressed.

g) Audit of project documentation and job books assembly for accuracy and completeness.

h) Conduct random audits, including field audits, to verify compliance to quality program and contract requirements.

i) Managing assembly and review of Job Book and other deliverable documentation.

7.1.5 Field Coordinators/Engineers-

Field Engineer(s) are identified No Bull Energy, LLC. or third-party employees responsible for completing all testing and inspection requirements in accordance with the ITP.

Field Engineers will be assigned to specific scopes of work. Inspector will receive training on the design and contract requirements of the applicable scopes of work and associated procedures.

8.0 QUALITY ASSURANCE

8.1 Quality Procedures

8.1.1 No Bull Quality Procedures detail how the overall planning and administration of the quality system activities are managed.

8.1.2 A list of Quality Procedures that are applicable to the Project will be developed by the Project Construction Manager and the Onsite Quality Representative, with support from the Managing Partner.

8.2 Contract Reviews

8.2.1 In order to assure that contract and customer expectations are being met, Contract review meetings (Initial and Final) will be held during Project kickoff and closeout meetings.

8.2.2 Contract kickoff meetings shall also be held with each subcontractor utilizing the same process.

8.3 Request for Information (RFI)

8.3.1 RFIs are used between (NBE) and the Client/GC, Subcontractor, or other entity to request information and approval on any changes that result in changes physically or financially for the receiving party on the project. RFIs will be processed accordingly

8.4 Nonconformance Identification and Control

8.4.1 Materials or product (components, units, parts etc.) identified as nonconforming at any stage shall be controlled in accordance with (NBE) Corrective and Preventive Action and Control of Non-conformance Procedure.

8.5 Audits

8.5.1 The Managing Partner establishes an audit schedule for the project in consultation with the Site /Construction Manager and the Onsite Quality Representative.

8.5.2 Planned audits of project activities shall be undertaken by the Managing Partner, Quality Representative and/or designated auditors who shall be independent of the functions being audited.

8.6 Project Completion/Turnover

8.6.1 The turnover of the completed Project to the Client shall be carried out in accordance with the Project Contract.

9.0 QUALITY CONTROL

9.1 Inspection and Testing Plan Development

9.1.1 An ITP shall be developed upon finalized designs and contracts using a standard (NBE) ITP template. Contract documents, design specifications, and procedure form the basis of the ITP.

9.1.2 The ITP shall list the applicable scope/tasks of the project and the associated inspections, test, and frequencies required for a particular scope/task.

9.1.3 The ITP is a living document, and thus will likely change throughout the project duration due to changes in the Project. Some cause may include changes to scope,

delay of finalized designs, change to contract requirements, and changes to design requirements.

9.1.4 A checklist shall be developed based on applicable scope and requirements of the project. These documents shall be listed in the ITP.

9.1.5 Documents produced from the ITP will be provided in the Project Job Books Electronically.

9.2 Control of Measuring and Testing Equipment

9.2.1 Measuring and testing equipment shall be controlled in order to ensure that equipment conforms to specified requirements.

9.2.2 All such equipment shall be uniquely numbered.

9.2.3 Calibration certificate and calibration logs shall be maintained throughout the Project.

9.3 Project Document and Records Control

9.3.1 Document control shall be conducted in accordance with (NBE) procedures.

9.3.2 A schedule of Project Drawings will be maintained onsite, which will include a mechanism for storage and maintenance of Drawing Issue Record Sheets.

9.3.3 Transmittals, RFIs, and NCR's/CPAR's will be submitted to the Client, Subcontractor, or other entity.

9.3.4 Following completion of the Project, all Job Books documentation shall be submitted to the Client in accordance with Contract requirements.

APPENDIX A – ITP EXAMPLE DOCUMENTAPPENDIX A

KEY MAP

300 0 150 300
SCALE: 1" = 300'

LEGEND

- LEASE LINE
- 26" INUNDATION DEPTH
- 32" INUNDATION DEPTH
- 36" INUNDATION DEPTH
- ONCOR ACCESS ROAD (20,500 LF)
- EMERGENCY/OWNER ACCESS ROAD (8,000 LF)
- INTERIOR ACCESS ROAD (29,500 LF)
- PERIMETER ROAD (33,500 LF)
- RELOCATED CATTLE PEN AREA
- GAME FENCE
- CHAIN LINK FENCE
- TEMPORARY CONSTRUCTION FENCE
- SOLAR TABLES
- PCS PAD

SIGN LEGEND

- STOP SIGN — STOP, R1-1, 30" X 30", (1)
- FIRST AID AREA — (2)
- MUSTER AREA — (3)

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE LAYDOWN AREA(S) ON-SITE. IT IS MANDATORY FOR THE CONTRACTOR TO IMPLEMENT ALL EROSION CONTROL MEASURES SHOWN ON THE "SOIL EROSION & SEDIMENT CONTROL" PLAN SHEET, ESPECIALLY THOSE ADJACENT TO THE 100-YR INUNDATION AREAS.

Revisions		
04/11/2025	30% DD SET	1
Date	Description	No.

INTERIM REVIEW ONLY

DOCUMENT IS NOT FINAL; NOT INTENDED FOR CONSTRUCTION OR PERMIT
Engineer: SONY DAVID
P.E. No.:142436
Date:7/16/2025
Langan Engineering and Environmental Services, LLC.
TBPE Firm Registration No.:F-13709

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TBPE FIRM REG. #F-13709

Project
CHISME SOLAR AND STORAGE
EARLY
BROWN COUNTY TEXAS

Drawing Title
OVERALL SITE PLAN

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR	24INR0333/24INR0331
Date	04/11/2025
Drawn By	RMS
Checked By	VP/SD

Drawing No.
CS100

Project No. 520102301

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Date: 7/16/2025 Time: 11:16 User: rsims Style Table: Langan.stb Layout: CS100 Document Code: 520102301-0501-CS101-0101

EXHIBIT F-1

Conditional Waiver and Release on Progress Payment

Project Owner:	Subcontractor:
Project Address / Premises:	Work Performed:
Contractor:	Applicable to Invoice / Payment Application No.____
Job Number:	

On receipt by the signer of this document of a check or an electronic funds transfer from _____ (maker of check) in the sum of $_____ payable to _____ (payee or payees of check) and when the check has been properly endorsed and has been paid by the bank on which it is drawn, this document becomes effective to release any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position that the signer has on the property of _____ (owner) located at _____ (location) to the following extent: _____ (job description).

This release covers a progress payment for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted) as indicated in the attached statement(s) or progress payment request(s), except for unpaid retention, pending modifications and changes, or other items furnished.

Before any recipient of this document relies on this document, the recipient should verify evidence of payment to the signer.

The signer warrants that the signer has already paid or will use the funds received from this progress payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project in regard to the attached statement(s) or progress payment request(s).

IN WITNESS WHEREOF the undersigned has signed this Lien Waiver:

Contractor/ Subcontractor Name:_____

Signature:_____

Name (Printed):_____

Title:_____ Date:_____

STATE OF _____)
) ss.:
COUNTY OF _____)

_____
Notary Public

My Commission Expires:_____

Subscribed and sworn to before me on this date: _____

EXHIBIT F-2
Conditional Waiver and Release on Final Payment

NOTICE:

This document waives rights unconditionally and states that you have been paid for giving up those rights. It is prohibited for a person to require you to sign this document if you have not been paid the payment amount set forth below. If you have not been paid, use a conditional release form.

UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT

Project Owner:	Subcontractor:
Project Address / Premises:	Work Performed:
Contractor:	Final Payment Request
Job Number:	

The signer of this document has been paid and has received a progress payment in the sum of $_____ for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted) on the property of _____ (owner) located at _____ (location) to the following extent: _____ (job description). The signer therefore waives and releases any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position that the signer has on the above referenced project to the following extent:

This release covers a progress payment for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted) as indicated in the attached statement(s) or progress payment request(s), except for unpaid retention, pending modifications and changes, or other items furnished.

The signer warrants that the signer has already paid or will use the funds received from this progress payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project in regard to the attached statement(s) or progress payment request(s).

IN WITNESS WHEREOF the undersigned has signed this Lien Waiver:

Contractor/ Subcontractor Name:_____

Signature:_____

Name (Printed):_____

Title:_____ Date:_____

STATE OF _____)
) ss.:
COUNTY OF _____)

_____
Notary Public

My Commission Expires:_____

EXHIBIT F-3
Conditional Waiver and Release on Final Payment

Project Owner:	Subcontractor:
Project Address / Premises:	Work Performed:
Contractor:	Final Payment Request
Job Number:	

On receipt by the signer of this document of a check or an electronic funds transfer from _____ (maker of check) in the sum of $_____ payable to _____ (payee or payees of check) and when the check has been properly endorsed and has been paid by the bank on which it is drawn, this document becomes effective to release any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position that the signer has on the property of _____ (owner) located at _____ (location) to the following extent: _____ (job description).

This release covers the final payment to the signer for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted).

Before any recipient of this document relies on this document, the recipient should verify evidence of payment to the signer.

The signer warrants that the signer has already paid or will use the funds received from this final payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project up to the date of this waiver and release.

IN WITNESS WHEREOF the undersigned has signed this Lien Waiver:

Contractor/ Subcontractor Name:_____

Signature:_____

Name (Printed):_____

Title:_____ Date:_____

STATE OF _____)
) ss.:
COUNTY OF _____)

_____
Notary Public

My Commission Expires:

Subscribed and sworn to before me on this date: _____

EXHIBIT F-4
Unconditional Waiver and Release on Final Payment

NOTICE:

This document waives rights unconditionally and states that you have been paid for giving up those rights. It is prohibited for a person to require you to sign this document if you have not been paid the payment amount set forth below. If you have not been paid, use a conditional release form.

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

Project Owner:	Subcontractor:
Project Address / Premises:	Work Performed:
Contractor:	Final Payment Request
Job Number:	

The signer of this document has been paid in full for all labor, services, equipment, or materials furnished to the property or to _____ (person with whom signer contracted) on the property of _____ (owner) located at _____ (location) to the following extent: _____ (job description). The signer therefore waives and releases any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position.

The signer warrants that the signer has already paid or will use the funds received from this final payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project up to the date of this waiver and release.

IN WITNESS WHEREOF the undersigned has signed this Lien Waiver:

Contractor/ Subcontractor Name:_____

Signature:_____

Name (Printed):_____

Title:_____ Date:_____

STATE OF _____)
) ss.:
COUNTY OF _____)

_____

Notary Public
My Commission Expires:_____

Subscribed and sworn to before me on this date: _____

Exhibit G

Form of Monthly Construction Progress Report

[Project name]

Monthly Construction Progress Report

TABLE OF CONTENTS

1. Executive Summary
2. Project Team
3. Health, Safety & Environment
4. Project Execution Status
5. Issues & Remedies
6. Construction Photos
7. Other Applicable Add-on's

[contractor logo]

Date:
Prepared by:

[Project name]

Section 1: Executive Summary

The following is a summary of the _____ project:

1. Start Summary:

[End of Section 1: Executive Summary]

Section 2: Project Team

2.1 General Contractor:

2.2 Major Contractors/Suppliers:

[End of Section 2: Project Team]

Section 3: Health, Safety and Environmental

3.1 Workforce Report (employees currently working on site):

3.2 Reportable Incidents:

3.3 Environmental Compliance:

3.4 Activities Planned for Next Month:

[End of Section 3: Health, Safety and Environmental]

Section 4: Project Execution Status

4.1 Major Accomplishments Project to Date:

4.2 Major Accomplishments this Month:

4.3 Goals for Next Month:

4.4 Key Dates Status (Identification and status of critical path activities, including project float):

4.5 Project Schedule

a. Updates & modifications:

4.6 Progress Curves

a. Updates & Modifications:

b. Manufacturing status:

c. Arrival of materials at site and planned deliveries for the next ## months:

d. Mobilization of key contractors and planned mobilization of the ## months:

e. Shop inspection and testing

4.7 Quality Control

a. :

b. Non-conformance metrics:

c. Areas of concern and action plans:

4.8 Change Order Status:

4.9 Payment Status:

4.10 Startup and commissioning:

4.11 Deliverables:

4.12 Interconnection agreement milestones and interconnection facilities:

[End of Section 4: Project Execution Status]

Section 5: Issues and Remedies

1. Construction issues and remedies:

2. Comments:

[End of Section 5: Issues and Remedies]

Section 6: Construction Photos

[End of Section 6: Job Photos]

Chisme Solar and Storage Project
Exhibit H – Commissioning & Testing

This Exhibit H contains the following:

Exhibit H-1(a) – Solar PV Commissioning
Exhibit H-1(b) – HV Commissioning
Exhibit H-1(c) – BESS Commissioning
Exhibit H-2 – Solar PV Availability Test
Exhibit H-3 – Solar PV Capacity Test
Exhibit H-4 – Solar PV Long Term Energy Test
Exhibit H-5 – BESS Performance Test

Exhibit H-1(a)

Solar PV Commissioning Requirements

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2.0 Safety During Commissioning Phase 1
3.0 Lockout/Tagout 1
4.0 Commissioning Execution 2
5.0 Reporting 2
6.0 Procedures 3
7.0 Commissioning Schedule 4
8.0 Commissioning Log and Plan of the Day Meetings 4
9.0 Notification 4
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11.0 PV Plant Testing 5
12.0 Polarity and Open Voltage Circuit Checks 6
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14.0 Fiber Optic Splicing and OTDR 6
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1.0 Commissioning Concept

The Commissioning Program consists of testing activities through the construction phase, equipment supplier testing, and systems energization and startup through final acceptance. Owner is to follow up with the detailed commissioning scope for the substation no later than 10 days after the execution of the Agreement.

1.1 Overarching objectives are as follows:

a. Ensuring personnel and equipment safety during commissioning.

b. Implementation of a formal lockout/tagout (LOTO) program.Adherence to prescribed testing criteria including applicable codes and standards.

c. Demonstration of functionality of the plant equipment and systems including conformance with specifications and guarantees.Creation of appropriate plans and schedules prior to commissioning execution.

d. Clear handoff from construction groups, and interface with construction activities.

e. Maintenance of a daily log which documents significant accomplishments, issues, and resolution.

f. Creation, presentation, and maintenance of evidence of completed testing via test reports and documentation.

Contractor may self-perform or contract third-party testing firm to complete various testing. Third-party testers generally perform the following tests:

a. Fall-of-Potential ground testing.

b. Very Low Frequency (VLF) of Medium Voltage AC cables.

c. International Electrical Testing Association (NETA) required transformer testing of Medium Voltage and Auxiliary Transformers.

d. Fiber Optics Termination and Optical Time Domain Reflectometer (OTDR) Testing.

2.0 Safety During Commissioning Phase

Contractor will ensure that the additional safety considerations surrounding testing and commissioning tasks and activities are captured in the comprehensive Site Safety Plan. The Contractor will submit the safety plan to Owner prior to construction for review and approval. A minimum of 10 days shall be allowed for Owner approval. Any revisions to the Safety Plan shall be submitted to Owner which will trigger a separate 10-day review period in force. Revisions to the Safety Plan may be appropriate prior to the commissioning phase to recognize and incorporate unique hazards created by commissioning activities.

The Contractor will follow its Safety Plan for all Construction, Testing, and Commissioning activities, and will act as the safety guidelines for the project. All personnel associated with construction or commissioning activities shall receive safety orientation and task-specific training consistent with the Contractor’s Site Safety Plan.

The Safety Plan shall address all concerns in the construction, testing, and commissioning phases.
Lockout/Tagout

The Contractor shall compile a site-specific LOTO plan or procedure which shall be submitted for approval 10 days prior to the commissioning phase. The LOTO procedure or plan establishes requirements and a process for the lockout and tagout of energy isolating devices to protect personnel from potentially hazardous energy.

2.1 The LOTO procedure or plan shall include, at a minimum, the following:

a. Pre-planned LOTO Schemes.

b. Description of LOTO Practices.

c. Identification LOTO Authorities.

d. Training Requirements.

e. Signage/Barricading.

3.0 Commissioning Execution

Individuals performing the photovoltaic (PV) system testing shall be qualified per OSHA 10 training at a minimum and trained on the procedures within the Commissioning Program.Conducting electrical testing on any PV system shall be performed by qualified individuals having knowledge and experience with electrical systems measurements, the test equipment used, the equipment or systems being tested, and an awareness of the hazards involved.

3.1 Since working with PV systems involves exposure to energized circuits with high voltages and currents, presenting electrical shock hazards, it is imperative for those installing and testing PV systems to follow all applicable safety standards and guidelines.

3.2 The Contractor’s execution strategy applicable to commissioning, startup, and testing shall, at a minimum, contain the following requirements:

a. Performance of Job Hazard Analysis or Electrical Hazard Analysis before conducting any work at the site.

b. Planning and review all testing, safety, and emergency procedures in advance.

c. Maintenance of an orderly work site and cautious approach.

d. Utilization of appropriate precautions when working on energized equipment is unavoidable.

e. Proper selection and usage of personal protective equipment (PPE).

f. Ensuring NFPA70E compliant arc flash labels are available and properly installed..

g. Mandating the usage of barricading and specialized PPE as necessary.

h. Adherence to manufacturer’s instructions for the safe operation of test instruments.

i. Ensuring that test instruments are inspected, calibrated, and used only for their intended purpose, and within their established limits and ratings.

j. Ensuring that personnel are capable and willing to perform tasks that cause exposure to electrical hazards.

k. Ensuring that all employees potentially impacted by the hazards caused by Commissioning activities are provided training or briefings to ensure that they clearly understand the purpose and function of the LOTO process, as well as their roles and responsibilities when performing potentially hazardous activities. Reporting

Contractor shall perform and document the results of all testing performed in the field. All tests and data collection shall be in accordance with NETA and other accepted industry standards. Prior to submittal, Contractor shall review test data to confirm compliance with the acceptance criteria defined in the approved Commissioning Plan. Any deviations identified within Contractor's scope shall be reviewed, corrected, or re-tested as appropriate. Test results affected by the corrective action shall be repeated.

Tests listed as manufacturer's responsibility shall be conducted and documented by the equipment manufacturer or supplier, under Contractor oversight. The Contractor shall verify that test documentation is completed for each component or system. All testing results and data shall be submitted to the Owner for review.

3.3 Contractor shall develop and utilize written, approved procedures as deemed necessary by the Contractor to safely and effectively perform specified tasks. It is recognized that some tasks are within the skill of the qualified commissioning individual and do not require a procedure.

Testing equipment shall be calibrated as defined by the manufacturer. Testing calibration certificates shall be submitted to the Owner prior to use of testing equipment.

3.4 Test reports shall clearly present data collected during performance of the testing and include the following:

a. Identification of circuits tested, and tests performed.

b. Calibrated tools and equipment used.

c. Data recorded and acceptance criteria.

d. Interpretation and summary of results, and a clear indication of pass/fail.

e. Identification of responsible person(s) and date(s) of tests. Contractor shall troubleshoot and correct all failures discovered during testing at no additional cost to the Owner, unless the failures are a result of a pre-existing defect in Owner-Furnished equipment or design error by the Engineer of Record. Procedures

Detailed procedures shall be provided by Contractor for testing, startup, and commissioning activities. The utilization of procedures will enable the project to be tested and commissioned safely in accordance with the contract. Testing procedures shall be provided to Owner. Procedures shall be provided for the following activities.

a. Commissioning Field Testing.

b. System Energization.

c. Operational/Functional testing.

d. Capacity Testing.

3.5 The following shall be included in each procedure, as applicable:

a. A list of prerequisites, including safety concerns.

b. Purpose of test.

c. Procedural steps that outline actions that are to be followed in the performance of the test and/or data collection.

d. Required Test Equipment.

e. Specific Site Information: This includes specific equipment identification, tagging, conventions, cable numbers and I/O references for testing.

Procedures shall be made available to Owner for review and comment prior to commencing work with such procedures. A minimum of 10 business days shall be allotted to Owner for review and comment before commencement of the test delineated in the procedure.

4.0 Commissioning Schedule

The commissioning schedule shall be integrated into the overall project schedule with emphasis on the construction activities that gate commissioning performance. The commissioning schedule will be submitted to Owner.

5.0 Commissioning Log and Plan of the Day Meetings

Commissioning shall maintain a daily log which describes the following:

a. Work completed.

b. Status of commissioning completion.

c. Significant achievements.

d. Issues identified.

e. Resolution of Issues.

Commissioning shall conduct a daily meeting to discuss wok complete and work forecasted. The Owner shall be invited to these meetings. The Commissioning Log shall be reviewed at Commissioning Plan of the Day meetings.

6.0 Notification

Contractor shall provide written notifications to Owner for significant evolutions. Unless otherwise indicated, 5 business days shall be allocated prior to commencement of specific tests.

6.1 Formal notifications shall be provided at the following times:

a. Completion of testing for a contractual milestone

b. Circuit Mechanical Completion

c. Circuit Substantial Completion

d. Facility Mechanical Completion

e. Energization of Systems

7.0 Energization of Systems

Contractor shall perform the initial switching and energization of electrical equipment including both AC and DC. Written procedures shall be provided to the Owner at least 10 business days prior to energization for review and approval by the Owner. No equipment shall be energized without the Owner's written consent to energization/switching procedures.

Prior to system energization, Contractor shall verify readiness as defined in energization procedures. Energization procedures shall include the following requirements, but not be limited to:

a. All safety equipment in place and functional.

b. Permanent and/or temporary warning notices and barricades in place where required for safety.

c. Permanent guards installed on DC connection cabinet within the inverters. While permissible to remove guards to perform testing, appropriate PPE shall be donned.

d. "Hot Work" permitting and other applicable safety procedures implemented.

e. Access for emergency vehicles not obstructed.

f. All relevant documentation available (calibration sheets, log sheets, process manuals or datasheets).

g. Manufacturer's construction testing checklists complete.

h. Verification of all system protective interlocks and protective devices.

i. Conducting operational and performance tests on all facility systems in accordance with contract agreements.

j. Contractor and equipment suppliers, when required, have performed required tests, checkouts, and commissioning activities.

Initial sync or generation shall not be implemented until written permission from Owner is obtained.

8.0 PV Plant Testing

Contractor shall ensure the following system tests are completed prior to system energization, performed by qualified personnel or third-party testers as defined in the Commissioning Plan.

Test	Equipment	Applicability	Performed By
Construction Acceptance Testing or Pre-Commissioning			
AC Continuity and Insulation Resistance Testing	MV/LV Cable	VLF of MV Cables	Contractor or Third-Party Tester
DC Continuity and Insulation Resistance Testing	PV Combiner Box (DC) Homerun, PV Combiner Boxes, PV Strings	DC Megger of DC Cabling, Strings and Feeders	Contractor
Three-Point Fall of Potential	Ground Grid	Inverter Ground Grids	Contractor or Third-Party Tester
Two Point Grounding Resistance Test	Equipment Grounds	Inverter Skid/Racking/Combiner Boxes, LBD	Contractor
Inverter Medium Voltage Transformer	NETA Testing - Winding Insulation Integrity Test, TTR, DGA (oil filled), Power Factor	On/By Inverter Skid	Inverter Manufacture (Pending Make) Contractor or Third-Party Tester
Auxiliary Transformer(s)	NETA Testing - Winding Insulation Integrity Test, TTR	On/By Inverter Skid	Contractor
Commissioning Pre-Energization Testing			

Test	Equipment	Applicability	Performed By
Polarity and Open Circuit Voltage (VOC)	PV Strings, DC Feeders	By Combiner Box	Contractor
Polarity and Open Circuit Voltage	CAB System, IPCs, DC Feeders	By LBD Circuit	Contractor
IV Curve Testing	PV Strings	By String	Contractor
Fiber Optic Terminations and OTDR	Fiber Optic Cable	By MV Circuit	Specialty Contractor or Third-Party Tester
SCADA Devices	Ethernet switches in Inverters, Trackers, Met Stations	Visibility, Command and Control	SCADA Technician

9.0 Polarity and Open Voltage Circuit Checks

Contractor shall measure the open circuit voltage and verify proper polarity for every PV string. In Combiner Box systems, VOC and polarity shall be measured at the combiner box prior to fusing. In CAB systems, open circuit voltage and polarity shall be measured at harnesses and Insulation Piercing Connectors (IPCs) prior to connecting IPCs to CAB trunk line.

Open circuit voltage and polarity shall also be measured at the DC feeder connection to inverter the inverter DC circuits.

10.0 I-V Curve Trace Testing

PV string voltage and current characteristics shall be measured and verified by I-V curve trace testing of PV stings. Testing shall be conducted in accordance with IEC standards. A minimum of 10% of system strings shall be tested. A proportionate sample of all string configurations shall be represented.

11.0 Fiber Optic Splicing and OTDR

Contractor shall terminate fiber strands using the fusion method and perform an OTDR test after termination is complete. The OTDR tests shall verify the integrity of the fiber optic cable installation by establishing continuity and attenuation losses through the cable, splices, and connectors. Testing shall be in accordance with TIA/EIA standards.

12.0 SCADA Interface Devices

Contractor shall install firmware and establish system control and data acquisition (SCADA) visibility with interfacing devices in Inverters, Trackers, and Met station components.

13.0 Post Energization Testing

Contractor will perform the following system tests after backfeed has been established. System testing is done prior to or in conjunction with initial energization.

Commissioning Testing After Energization (Backfeed)			
Commissioning Task	**System/Equipment**	**Applicability**	**Performed By**
SCADA Commissioning	Inverters Met Stations Trackers	After Backfeed	Contractor SCADA Engineer
Inverter Commissioning	Inverters and all Inverter Subsystems	After Backfeed	Inverter Manufacturer (OEM) with Contractor support
Tracker Commissioning	Trackers and all tracker subsystems	Prior to and after Backfeed	Tracker Manufacturer
Met Station Commissioning	Met Station, Soiling Stations, and Reference Cells	After Backfeed	Met Station Manufacturer SCADA Engineer
Thermal Flyover and Report	All PV Modules per Exhibit E-14	After entire PV plant is placed in service	Specialty Contractor
Operational and/or Functional Testing	Entire Facility	After entire PV plant is placed in service	Contractor
Capacity Test	Entire Facility	After Operational Testing	Contractor Specialty Contractor

14.0 SCADA Commissioning

SCADA system shall be fully inspected, and its operation shall be verified during start-up testing to assure that it is ready to command and control PV plant devices during the functional/operational test and during plant operation. The SCADA system must be capable of accumulating data for the Capacity Test.

The Contractor will support the Owner's SCADA engineer in performing loop checks of devices which are connected to the SCADA system. The loop checks shall verify expected data points from the applicable

equipment as well as providing alarm and fault automatic functions. Contractor shall support SCADA integration with Owner's Remote Operations Center as applicable.

15.0 Inverter Commissioning

Contractor shall coordinate and support inverter hot and cold commissioning by inverter manufacturer. Contractor shall submit all completed commissioning reports provider by inverter manufacturer along with test procedures for on-site commissioning and testing of inverters. Contractor's responsibility is limited to facilitating and documenting OEM commissioning activities; the OEM shall remain responsible for execution, results, and performance verification. Final ("as-left") settings and operating parameters shall be compared to design setpoints, and the results documented and submitted to the Owner for record. Contractor shall not be responsible for OEM control logic or proprietary parameter adjustments..

Initial sync or generation from inverters (pushing power) shall not be implemented until written permission from Owner's obtained.

16.0 Tracker Commissioning

Tracker commissioning is performed by the Tracker System OEM. All individual trackers are placed in service, visibility on the network verified, and SCADA reporting and control established.

17.0 Met Station Commissioning

Met Station commissioning is performed by the Met Station OEM. Met Stations, as well as Reference Cells and Soiling Stations (as applicable) are placed in service, visibility on the network verified, and SCADA reporting established.

18.0 Voltage and Phase Rotations

Voltage and phase rotations shall be verified to match the interconnected existing system. Inverter OEM shall be consulted as inverters may automatically perform this function.

19.0 Thermal Flyover and Report

The services of a specialty contractor shall be procured to conduct a drone flyover and IR scan of the entire PV solar plant. Specialty contractor shall provide a detailed analysis and report to identify areas of the system that are either underperforming or contain other anomalies.

20.0 Operational/Functional Testing

20.1 Once the commissioning of a system is complete, the system can be released for startup and operation of the entire facility as a fully integrated system.

The objective of the Operational Test is to help ensure the Block/PV Power Plant is operating reliably by demonstration of normal and safe operation for a 5-day period.

Contractor shall develop an Operational Test procedure that contains instructions for evaluating the ability of the power plant to operate reliably. Acceptance criteria for trackers and inverters shall be included. The procedure shall be submitted by Contractor to Owner for review and approval at minimum of 10 business days prior to commencement of the Operational Test.

21.0 Performance/Capacity Testing

Performance/Capacity Testing shall be conducted to prove contractual generation obligations. Each of the Performance Tests shall be carried out using contract specified procedures. Capacity Testing is to be conducted in accordance with the Capacity Testing Exhibit.Turn Over Documentation

Contractor shall provide all requisite documentation such as test reports and checklists to Owner for review and acceptance. If required, the Contractor shall upload turnover documents into Owner's Asset Management System.

22.0 Commercial Operation

The generating facility shall be deemed ready for commercial operation after each circuit is commissioned and full capacity is available. Contractor shall assist the Owner in notification to all necessary parties that the facility has achieved commercial operation.

23.0 Turnover to Operations

After successful completion of the startup and operational testing, the system or applicable portion of the system shall be turned over to the Operations team. During the startup and operational testing phases, the Operations team shall work with the Commissioning team to develop familiarization and identify any outstanding items that require completion prior to turnover. These items shall be added to the punch list. Included in the turnover shall be the documentation identified in Exhibit E-9.

EXHIBIT H-1(b)

Interconnection Commissioning & Functional Testing Requirements

1.0 Interconnection - Commissioning and Testing General Requirements

1. Contractor shall provide all labor and Equipment necessary to perform testing of the mechanical and electrical Equipment for the Project. All Work shall meet the applicable requirements of applicable Law, applicable Permit and good Industry Standards.
2. This specification delineates the testing requirements for solar Project Interconnection

substations. The testing will fall into several categories:

A. Mechanical Completion – Interconnection Facilities requirement, including:
    a. Pre and during Construction testing requirement
    b. Post Construction, pre-commissioning testing requirements
    c. Commissioning requirements
B. Substantial Completion – Interconnection Facilities requirements, including:
    a. Energization requirements

3. All Equipment shall be commissioned following all manufacturer recommendations and be conducted such that the warranties or guarantees, etc. of the Equipment shall in no way be affected or voided by these tests.
4. All testing shall meet ANSI/NETA ATS-2013 or later (Acceptance Testing Standards) requirements. Procedures and pass/fail criteria shall be defined.
5. Contractor shall provide written procedures for use by Contractor's commissioning team and Operator for all commissioning procedures.
6. Owner, Operator or Owner may elect to witness any or all pre-commissioning or startup activities. The coordination meeting shall serve as the mechanism for notifying Owner of when activities are taking place.
7. Contractor shall maintain a single integrated punch-list of outstanding activities for the construction, commissioning, startup, and initial operation of the project. Owner shall have the authority to add or delete items from the punch-list. All test reports shall be submitted electronically, unless otherwise specified. The onsite Project Manager shall be responsible for overseeing all commissioning activities. An Interconnection Commissioning Manager shall be on Site for the duration of commissioning; this person shall have no duties other than commission related work and report directly to the Project Manager. From commencement of startup activities, Contractor's startup personnel, under the direction of Contractor's Project Manager and Interconnection Commissioning Manager, will directly coordinate all such activities for energization and operation of Equipment and systems being started up. Contractor's Interconnection Commissioning Manager will initially hold weekly and later, daily startup coordination meetings. Contractor's Project Manager, Commissioning Manager and Owner will mutually agree on the frequency of the meetings. performing work in areas currently being readied for subsystem turnover for operation shall attend, as well as Contractor's Construction Superintendent, appropriate manufacturer's technical representatives, and Owner's representative. The meeting shall include a review of activities since the last meeting and a look ahead at activities planned for the next two weeks. The meeting shall be scheduled to allow all personnel associated with commissioning activities to attend. An Interconnection Commissioning Plan shall be submitted by Contractor for Owner approval at least thirty (30) days prior to Mechanical Completion - Interconnection. The Interconnection Commissioning Plan shall include a commissioning log, which will be developed and issued by Contractor for the tracking of all commissioning issues, observations, and deficiencies. The commissioning log will enable current status and resolution tracking of any open items. The log is to be included in the weekly report and be available upon request.
8. The Interconnection Commissioning Plan shall include the following at a minimum:

    A. A checklist for physical construction completion.
    B. Include associated documentation for code compliance, QA/QC, and design basis.
    C. All post construction testing (i.e. bolt torque, electrical insulation, contact resistance for field assembled electrical connections, and continuity tests, etc.).
    D. Complete cleanup, labeling, painting, insulation and/or punch-list items sufficiently to safely perform the startup testing and initial operation.

E. As the pre-commissioning for each individual item of major equipment, subsystem and major system is completed, it will be documented with a turnover package demonstrating that it is ready for commissioning. The pre-commissioning package shall contain the procedures for executing the above activities, and documentation of their results. This package may be a subset of the commissioning plan.

F. Setup and testing of all relay functions, control, status, alarm, and interlock functions, and metering functional tests, including Owner provided transformers and associated devices.

G. Record any malfunctions noted in the operations and when repairs are completed, repeat the tests and record on the connection drawings the date that the scheme functioned satisfactorily and who conducted the tests.

H. After completion of bench testing and after connection of all external wiring, conduct in-case tests by manually or electronically closing each relay contact to see the proper breaker is tripped and/or annunciator drop actuated.

I. Testing of relays shall include the tests wherein current and voltage are applied to the disconnected leads to relaying at current and potential transformers as well as phase angle and current checks after relays are actually in service and carrying load current.

J. Maintain correct phasing on all circuits and buses. Switching station buses and connections shall conform to the phasing of the existing substation. Make phasing tests on all circuits that can be energized from two (2) or more sources to prevent paralleling of sources out of phase.

K. After initial energization, Contractor shall complete load tests and checks to include current checks on all applicable relays, meters, transducers, etc. Perform voltage checks on all applicable relays, meters, transducers, etc. Perform angle checks on all applicable relays, meters, transducers, etc.

2.0 Mechanical Completion – Interconnection Requirements

2.1 Equipment Electrical Testing Requirements

1. General Testing requirements (Applies to all Equipment as applicable)

A. Control wire connections shall be checked for tightness. Control wire terminations shall be installed with ratcheting, aircraft style, compression tool that matches the requirements of the lug manufacturer. Any termination installed otherwise shall be cut off and replaced.

B. Inspect control wire crimps to ensure that the wire protrudes through the lug barrel.

C. At start of commissioning, ensure that no battery ground is introduced in the battery circuit.
    a. At the beginning and end of each work shift, verify battery has no ground.
    b. After turning on a new circuit, check for a ground on the system.
    c. Any ground shall be found and mitigated prior to continued testing.

D. Testing of all control circuits

a. Verify fusing is appropriate for all the applications.
b. Check phase rotation and phasing on all equipment to assure correctness and to assure transformers can be paralleled without interruption (if applicable).

2. HV/34.5 kV, Generating Step-up

A. The main power transformer installation, as well as dress and test, are usually included in the main power transformer supplier scope of Work. If it is not in the manufacturer's scope of delivery, the Contractor shall insure that the manufacturers installation instructions are followed, and at least the following is performed.

B. Shipping impact recorder shall be checked before offloading, and again after setting into final location on pad. If manufacturer is the owner of the impact recorder, it may be dismounted and returned to manufacturer's representative after having been read.

C. Record all nameplate data and provide nameplate picture to Owner

D. Perform core to tank insulation resistance on the unit (@ 500VDC min. 10 mega ohm)

E. Perform physical inspection of the main power transformer on arrival, and external and internal inspections after unit has been opened. Record all findings on the inspection record.

F. Perform physical inspection of control circuit connections and verify all control cable connections are tight.

G. Ensure bushing oil level is correct prior to installation (as applicable).

H. Perform dielectric oil tests before filling the transformer.

I. Ensure proper oil fill level inside transformer and LTC with respect to the oil temperature. Verify that oil level indicator reads correctly for the oil temperature at installation. Note that a qualitrol (or equivalent) oil level indicator should only read "normal" at the indicated 25° C temperature. Should oil be filled at temperature other than the nominal 25 °C, the oil level must be adjusted higher (when hotter) or lower (when colder) as appropriate.

J. Perform power factor test (Doble) tests on the bushings, windings and lightning arresters.
    a. Physical verification
    b. Perform testing for all the used parameters
    c. Verify potential & current phasing

K. Ensure proper operation of all cooling Equipment (both automatic & manual)

L. Check all the transformer supervisory control Equipment, including online oil monitoring (if included) is set and tested for operation.

M. Ensure all valve positions are per the valve schedule plate.

N. Ensure proper air venting from all the ports provided on the transformer tank. Verify that air is not trapped in radiators during filling.

O. Observe proper standing time after filling/topping up & before energization of the transformer.

P. Perform the following oil tests before energization, but a minimum of twenty-four (24) hours after oil filling.
    a. Dielectric strength
    b. Moisture
    c. Interfacial tension
    d. Power factor
    e. Neutralization number

Q. Verify transformer is set on the service off load-tap position.

3. HV or MV SF6 Circuit Breakers

A. Testing and commissioning shall be performed according to manufacturer's instruction manual.

B. Record nameplate data for circuit breaker & bushing current transformers & verify with specifications / drawings.

C. Perform visual inspection of circuit breaker for
   a. Interrupting tank
   b. Mechanism cabinet
   c. High voltage bushings
   d. SF6 gas leakage

D. Verify the rating of the circuit breaker meets or exceeds the voltage requirements.

E. Verify that circuit breaker control voltage is compatible with station battery voltage requirements.

F. Check the factory wiring.

G. Verify current transformers, nameplate, polarity, ratios & Impedance. Verify that external connections are on the proper tap.

H. Perform contact resistance test on the circuit breaker main contacts.

I. Main terminal connections shall be installed with a torque wrench. After torqueing, connections shall be checked with a micro-ohm meter. All resistance shall be essentially even, any resistance difference of greater twenty-five percent (25%) shall be investigated and corrected.

J. Perform insulation resistance test on the breaker. Pole-to-pole test is necessary if poles are contained in the same compartment, otherwise pole to ground is sufficient. Pole-to-pole insulation resistance test shall be performed at manufacturers recommended values or @ 5000VDC. Typical values will be >10,000 mega ohm.

K. Perform timing test on each phase, if manufacture requires independent timing.

L. If high-speed auxiliary contacts are supplied, time the high-speed auxiliary contacts with the main breaker contacts, if applicable.

M. Perform complete functional tests on the circuit breaker including close and open blocks as required by the scheme.
   a. Anti-pump
   b. Bucking test in case of 2 trip coils
   c. Pole disagreement, if applicable
   d. Low SF6 close/trip block & alarm etc.
   e. Spring charging motor alarm, if applicable.
   f. Trip and Close from relay systems, local, remote control.

N. Check the charging time of the hydraulic operating mechanism from '0' to operating pressure/level, if applicable. Verify within manufacturer specification.

O. Check the hydraulic operating mechanism for any leaks, proper alarms etc. as described by the manufacturer, if applicable.

P. Perform insulation tests (power factor) in accordance with test Equipment manufacturers published data.

4. 34.5 kV Vacuum Circuit Breaker

A. Record nameplate data for circuit breaker & bushing current transformers & verify with specifications / drawings.

B. Perform visual inspection of circuit breaker for
    a. Interrupting vacuum bottles (if accessible)
    b. Mechanism cabinet
    c. High voltage bushings
C. Verify the rating of the circuit breaker meets or exceeds the voltage requirements.
D. Verify that circuit breaker control voltage is compatible with station battery voltage requirements.
E. Check the factory wiring.
F. Verify current transformers, nameplate, polarity, ratios & Impedance. Verify that external connections are on the proper tap.
G. Power factor (Doble) test on bushings if manufacture requires.
H. Perform contact resistance test on the circuit breaker main contacts.
I. Main terminal connections shall be installed with a torque wrench. After torqueing, connections shall be checked with a micro-ohm meter. All resistances shall be essentially even, any resistance difference of greater than fifty percent (<50%) shall be investigated and corrected.
J. Perform insulation resistance test on the breaker. Pole-to-pole test is necessary if poles are contained in the same compartment, otherwise pole to ground is sufficient. Pole-to-pole insulation resistance test shall be performed at manufacturers recommended values or @ 5000VDC. Typical values will be >10,000 mega ohm.
K. Perform circuit breaker main contact timing. (open, close & close, open)
L. Perform time test on each phase if required by manufacturer. The test will include measuring the opening speeds, closing speeds and closing into a pre-existing trip and verify the operating times with the manufacturer's limits.
M. Perform complete functional tests on the circuit breaker including close & open blocks as required by the scheme.
    a. Anti-pump
    b. Spring charging motor alarm, if applicable.
    c. Trip and close from relay systems, local, control and SCADA/RTU.
N. Check the reduced voltage operation of the trip coils if required by the manufacturer.
O. Record the counter reading after first energization.

5. HV & MV Disconnect Switches

A. Record nameplate data for the disconnect switch & verify with specifications / drawings.
B. Perform physical inspections for:
    a. External damage of insulators.
    b. Control cabinet inspection including verification of factory wiring (if applicable).
    c. Auxiliary switches (if applicable).
    d. If stacked aux switch is adjusted, validate that all other switches have not changed or readjust.
    e. Operating mechanism & general appearance.
    f. Check and adjust blade alignment. Tighten all connections, but do not set piercing bolts until all adjustments have been set and verified.
C. Perform insulation resistance on the disconnect switches, phase to phase (if with shared insulators) otherwise phase to ground.
D. Manually Open and Close the disconnect switch.
E. If electrically operated, perform electrical operation:

a. Perform a functional check of the controls. Verify proper open and close functions.
b. Verify auxiliary contact function
c. Verify indicating light, local and remote, on Mimic and/or SCADA/HMI
d. Check for proper blade alignment.
e. Record Operational timing for an Open Command (if applicable).
f. Record Operational timing for a Close Command (if applicable).
g. Motor Current for opening (if applicable).
h. Motor Current for closing (if applicable).
i. Travel stops & proper arc interrupter operation.
j. Verify anti-condensation heaters are on and operating.

F. Verify that the main contacts are lubricated per manufacturer's recommendations.
G. Perform contact resistance test on the disconnect switch main contacts if required by the manufacturer.
H. Perform contact resistance of ground switch, if equipped. Verify ground connections, if required by the manufacturer or if applicable.
I. Verify the operation of auxiliary switches. Verify all interlocks.
J. Check proper remote indications at open/close and during travel (if applicable) positions.

6. HV & MV Lines & Buses

A. Verify the size of conductors / aluminum bus etc. as per the drawings.
B. Inspect and ensure that all the support insulators are in a good physical condition.
C. Verify bolted aluminum connections have been wire brushed and coated with anti-oxidant as per manufacturers recommendations.
D. Check the contact resistance at all the joints. Contact resistance will normally be about 100μOhms. Investigate any connection that measures less than fifty percent (>50%) from the lowest reading of a similarly bolted connection.

7. Station Auxiliary System

A. Battery Bank
   a. Perform all installation tests & checks as required by the battery vendor, including:
      i. Nameplate data.
      ii. Quantity of cells.
      iii. Terminal verification for corrosion.
      iv. Leaks or Damage
   b. Record and verify the data in accordance with the specifications.
   c. Battery charge voltages, float and equalize, must be calculated and set from battery manufacturers data sheet. Battery chargers do not come pre-set from the factory.
   d. Record each cell voltage before connecting the batteries into a bank.
   e. Record the battery electrolyte specific gravity & temperature. (Not applicable for sealed type construction)
   f. Record all intercell resistance.
   g. Check the main DC cable insulation resistance @ 500VDC before connection to battery.
   h. Equalize battery bank per the battery manufacturer's recommendations.

i. Measure cell voltage, specific gravity and temperature tests.
j. Measure and record the battery system voltage from positive and negative to ground. Voltage to ground should be equal magnitude, opposite polarity. If magnitudes are not equal and opposite, this must be investigated and corrected.
k. Perform a load test in accordance with manufacturer's published data or ANSI/IEEE 450.

B. Battery Charger

a. Perform all installations tests and checks as required by the vendor.
b. Record the nameplate data and verifying the data in accordance with the specifications.
c. Set & test alarms
    i. Calculate, set battery charger float & equalize voltages. Calculations should be based on battery manufacturers VPC recommendations.
    ii. Low DC voltage.
    iii. High DC voltage.
    iv. Battery ground detector.
    v. Any other, if applicable
d. Check the battery charger transformer taps & connection before energization.
e. Functionally test the charger control circuit.
f. Functionally test alarms into RTAC system, if applicable.

C. Auxiliary Power Transformer

a. Record and verify the nameplate data.
b. Perform physical inspection of the transformers (bushings, oil leaks etc.)
c. Verify grounding as applicable. This will be a separately derived system as per NEC and must be grounded accordingly.
d. Perform turns/voltage ratio test, on all taps, if taps available. Final check shall be on expected service/operating tap. Leave on Service Tap.
e. Perform insulation resistance test.
f. Perform power-factor/dissipation-factor test on all windings in accordance with test equipment manufacturer's data. Check primary & secondary side terminations. Verify tightening torque for the same.
g. Energize transformer and verify secondary voltages & phasing, if applicable.

D. Panel Boards (AC and DC)

a. Perform visual inspection.
b. Record/verify data per specifications.
c. Perform insulation-resistance tests on each bus section, phase-to-phase and phase-to-ground for one minute.
d. Check the conductor size and connections for correctness as per specifications/drawings.
e. Check tightness of all connections.
f. Exercise all breakers.
g. Check all breakers and fuses for proper ratings as per drawings. Verify that wiring, one-lines, schematics, and breaker designations and marked labels match. Correct as necessary so that all documentation matches.
h. Set adjustable breakers per Engineer of Record setting orders.

i. Test current settings on Main Breakers, if adjustable.

E. Safety Switches

a. Perform visual inspection.
b. Record/verify data per specifications.
c. Measure contact resistance across each switchblade and fuse holder.
d. Perform insulation-resistance tests for one minute on each.
e. Check the conductor size & connections for correctness as per specifications/drawings.
f. Check tightness of all connections.
g. Check all fuses for proper ratings.
h. Verify properly marked labels for each circuit.

8. Grounding Systems

A. Check that the primary conductor /grounding electrode is of proper dimension as per drawing.
B. The electrode depth should be verified in accordance with the grounding specifications.
C. The ground cable connections, if exothermic welds, should be checked for proper fills. (No cold joints or burnouts)
D. All the electrodes should be checked for continuity, point to point test, between each other thereby ensuring continuity of the whole ground grid loop.

9. Surge Arresters

A. Perform physical inspection of insulator and surge counter, if applicable.
B. Record the nameplate data and verify with respective drawings.
C. Perform insulation resistance test.
D. Verify grounding is proper and ground conductor is not excessively long. Lightning is a high frequency event; ground connections shall be as short as possible. Do not leave loops, slack or similar.
E. Verify proper stack mounting in case of multi-stack arresters.
F. Verify the grading ring is properly assembled & fitted.
G. Ensure enough phase and ground clearances as required by the drawings.

10. Power Cables

A. Perform physical inspection.
B. Phase out low side power cables prior to connection.
C. Verify phasing is not crossed between equipment.
D. Verify shield continuity & connections.

11. 34.5 kV Capacitor Banks (if applicable)

A. Record the name plate data and verify the rating as per drawings/specifications. Capacitors are voltage dependent – verify rating and voltage match, otherwise true rating must be calculated.
B. Check for any oil leakage in the capacitor cans.
C. Verify capacitor interconnections as per manufacturer drawings.
D. Ensure the capacitor bank is connected as per the schematic drawings.
E. Measure the capacitance value of each phase. Capacitance should match calculations, if not investigate and correct.
F. Measure values of switching reactor inductance and record on the CR, if

applicable.

G. Verify the ratings of all the surge protection equipment in the circuit are as per drawings.
H. Verify that the capacitor bank switch cannot be reclosed for a minimum of five (5) minutes, if applicable, or as per manufacturer recommendations, after opening.
I. Ensure proper ground connection/grounding switch is available for discharge of capacitors.
J. Ensure zero voltage closing of the circuit breakers or circuit switcher, if applicable.
K. Ensure the neutral PT secondary circuit is closed and correct as per scheme.
L. Check insulation resistance of the capacitor banks at 5000VDC.

A. 12. Neutral Grounding Reactor (if applicable)Verify and record name plate data and compare with the drawings/specifications.
B. Check for oil leakage, corrosion or any mechanical damage.
C. Verify installation including grounding connections, clearances to other equipment.
D. Verify all wiring is correctly done including CT's, PT's or other monitoring devices and ensure correct phase and polarity.
E. Verify all protection and control systems functionality.
F. Perform an insulation and continuity test
G. Verify impedance and reactance.

2.2 Component Testing

1. Current Transformer Testing

A. CT testing (Applicable for all CTs)

a. Record the nameplate data.
b. Perform physical inspection, if possible.
c. Perform insulation resistance test on primary if applicable and on the secondary.
d. Perform ratio test.
e. Perform polarity test.
f. Perform saturation test.
g. Perform DC resistance of the CT secondary.
h. Perform demagnetization of the CT after the above two tests to ensure minimum effect of residual flux.
i. Verify all secondary taps by low voltage tap progression.
j. Verify secondary wiring is connected to the appropriate terminals for the expected ratio.
k. Short and ground all unused CTs. Proper shorting is from end to end (X1 to X5) with X5 wired to a ground bus, on the CT side of the terminals strip.
l. Check the primary connections for proper torque.

B. Current Circuit Testing (Applicable to all current circuits)

a. Perform insulation resistance test.
b. Verify wire size per drawing.
c. Perform continuity test and point-to-point test.
d. Confirm single point ground.

e. Check the CT secondary DC burdens for high Impedance Relaying Application.
f. Verify make-before-break characteristics of all shorting switches & all relay current plugs. If possible, primary current should be used, and secondary monitored and verified at all locations in the secondary circuit.
g. Verify proper polarity of all the elements (relay & metering) in the circuit.
h. Verify phasing & polarity of the test switches & all relaying in the CT secondary circuit is as per the scheme.
i. Verify correct magnitudes of current both at the incoming & outgoing at each device location.

C. CCVT testing.

a. Record the nameplate data.
b. Perform insulation resistance test on high voltage V and on low voltage with respect to tank ground.
c. Perform physical inspection.
d. Check all the capacitances of the transformer.
e. Check the grounding switch, if applicable.
f. Measure power factor and dissipation factor of the unit as recommended by the manufacturer.
g. Perform ratio test.
h. Perform polarity test.
i. Check the primary connections for tightness (using torque wrench).

2. Voltage Circuit Testing (Applicable to all voltage circuits)

a. Perform insulation resistance test.
b. Verify that unused secondaries are open & that only the neutral is grounded.
c. Verify wire size per drawing.
d. Perform continuity test & point-to-point test.
e. Check the PT secondary burdens for high Impedance Relaying Application.
f. Confirm single point ground.
g. Verify proper phasing, polarity continuity and insulation resistance of all the associated potential circuits.
h. Check all fuses with respect to the specifications.
i. After energization verify phasing & magnitude of the secondary voltage with respect to known reference.

3. CT/PT Combo Unit testing.

A. PT Testing

a. Record the nameplate data.
b. Perform insulation resistance test on high voltage & on low voltage with respect to tank ground.
c. Perform physical inspection.
d. Check the grounding switch, if applicable.
e. Measure power factor and dissipation factor of the unit as recommended by the manufacturer.

f. Perform ratio test.
g. Perform polarity test.
h. Check the primary connections for tightness (using torque wrench).

B. Voltage Circuit Testing (Applicable to all voltage circuits)

a. Perform insulation resistance test.
b. Verify that unused secondaries are open & that only the neutral is grounded.
c. Verify wire size per drawing.
d. Perform continuity test & point-to-point test.
e. Check the PT secondary burdens for high Impedance Relaying Application.
f. Confirm single point ground.
g. Verify proper phasing, polarity continuity & insulation resistance of all the associated potential circuits.
h. After energization versify phasing & magnitude of the secondary voltage with respect to known references.

C. CT Testing

a. Record the nameplate data.
b. Perform physical inspection.
c. Perform insulation resistance test on primary if applicable & on the secondary.
d. Perform ratio test.
e. Perform polarity test.
f. Perform saturation test.
g. Perform DC resistance of the CT secondary.
h. Perform demagnetization of the CT after the above two tests to ensure minimum effect of residual flux.

D. Current Circuit Testing (Applicable to all current circuits)

a. Perform insulation resistance test.
b. Verify wire size per drawing.
c. Perform continuity test and point-to-point test.
d. Confirm single point ground.
e. Check the CT secondary DC burdens for high Impedance Relaying Application.
f. Verify make before break characteristics of all shorting switches & all relay current plugs.
g. Verify proper polarity of all the elements (relay & metering) in the circuit.
h. Verify phasing & polarity of the test switches & all relaying in the CT secondary circuit is as per the scheme.
i. Verify correct magnitudes of current both at the incoming & outgoing at each device location.

4. Potential Transformer Testing.

A. PT testing (Applicable for all PTs)

a. Record the nameplate data.
b. Perform insulation resistance test using 2500 V on high voltage & 500V on low voltage with respect to tank ground.
c. Perform physical inspection.
d. Perform ratio test.

e. Perform polarity test.

B. Voltage Circuit Testing (Applicable to all voltage circuits)

a. Perform insulation resistance test.
b. Verify that unused secondaries are open and that only the neutral is grounded.
c. Check the PT secondary burdens for high impedance relaying application.
d. Verify wire size per drawing.
e. Perform continuity test and point-to-point test.
f. Confirm single point ground.
f. Verify proper phasing, polarity continuity and insulation resistance of all the associated potential circuits.
g. Check all fuses with respect to the specifications.
h. After energization verify phasing & magnitude of the secondary voltage with respect to known reference.

2.3 Protection and Control

1. The following tests shall be performed on all the protective relaying including lockout relays and associated Equipment:
   A. Perform physical inspection.
   B. Perform acceptance tests (initial checkout) as specified in the manufacturers' manual.
   C. Test relays as per manufacturer instructions.
   D. Set relays as per the electronic relay settings provided.
   E. Perform functional operational checks to verify proper trips/interlocks/alarms per schematics. All the relay outputs must initiate appropriate devices. This will include a trip and close operation of the circuit breaker from the local controls, the station control switches, and the protective relaying.
   F. Functionally assert each applicable element and verify appropriate target actuation.
   G. Each output should operate the end device, at least once.
   H. Verify all relay alarms & outputs with the schematic diagrams.
   I. After completion of testing, print the relay settings for each relay, for numerical relays.
   J. Perform in service voltage & current measurements to verify relay is sensing the proper parameters.
   K. Report should be signed, dated & added to the final report.

2. Tests on Lockout relays:

   A. Perform physical inspection and verify the relay as per specifications/drawings.
   B. Perform a functional test on the lockout relays by electrical operation in accordance with the scheme.
   C. Check all the contacts operated by the operation of the lockout relay as per the scheme including alarm/inputs etc.

3. Meters & Transducers:

   A. Verify physical and mechanical conditions.
   B. Calibrate power factor & energy meters according to manufacturer's data.

C. Verify that current & voltage transformer secondary circuits are intact.
D. Check the mid and full-scale reading of panel meters by using known voltage & currents.

2.4 SCADA Factory Acceptance Test

1. A Factory Acceptance Test (FAT) of the full system shall be performed, with the option for the Owner to be present during the FAT. Owner and all involved Facility Parties and Contractors shall be notified thirty (30) days prior to test. All data points shall be tested (simulated if necessary) to ensure all point maps, scaling factors, etc., are applied correctly.

2. The FAT shall include the following:

   A. Point-by-point verification and exercising of all I/O, to ensure all point maps, scaling factors, etc., are applied correctly;

   B. Point-by-point continuity check of the terminal cabinets (if not checked as part of I/O verification);

   C. Repeated powering up and powering down of all system components;

   D. Demonstration of the proper functioning of all hardware;

   E. Demonstration of single failure responses to detectable failures including proper operation during failover from primary to backup control processor and back again to primary, failure of one channel of each redundant communication system, and power supply failures;

   F. Demonstration of required spare system capacity;

   G. A closed loop checkout of all analog control logic using a simulation of the process;

   H. A closed loop checkout of all discrete control logic using simulation of the field devices;

   I. Demonstration of all operator interface functions;

   J. Functional review of all the Contractor-configured control and information displays;

   K. Demonstration of the proper functioning of the Contractor-supplied software. Included in the software tests shall be procedures to verify the proper operation of the following system software functions: all on-line editing functions; all analog scan conversion and limit checking routines; all digital scan routines; all operator communication routines; all editors, configurators, compilers, and assemblers; all software debug programs; all software diagnostic routines; all display and printing routines; all alarm output routines; and all programming support routines. Included in the software tests shall be procedures to verify the proper operation of the applications programs using simulated I/O, all real-time variable calculations, and all performance calculations;

   L. All prefabricated cables supplied under the Agreement. The prefabricated cables shall be connected for the tests in exactly the same configuration as they will be installed at the Site. Temporary test cables may be used during the test for all cable being supplied in bulk lots without factory installed connectors.

3. Prior to the start of the FAT, the exact FAT testing procedure that is to be used shall be submitted to the Owner with sufficient time for review and comment. Following Owner approval, the Contractor shall submit a final test procedure and schedule.
4. Furnish all power supplies, switch and light panels, meters, signal generators, test cables and jumpers, logic simulators, and emulators required to perform the FAT.
5. Following the FAT, if, in the opinion of the Owner, the system has not been adequately manufactured, tested, or debugged, the FAT shall be rerun. All of the Contractor's costs associated with such retesting the system shall be the responsibility of the Contractor. The SCADA system shall not be shipped without prior approval of the Owner.
6. The FAT results shall be documented and submitted to the Owner.

3.0 Substantial Completion – Interconnection Requirements

3.1 Energizing

1. General: Contractor will perform the energization process, as follows:
    A. A procedure shall be submitted to the Owner by Contractor on proposed energizing.
    B. Updated set of as built prints shall be available at the site before energizing.
    C. All testing and commissioning shall be complete and results satisfactory before energizing.
    D. A pre-energizing walk down shall be done.
    E. All the personnel at the site will be informed about the energization & must be directed to remain in a safe area.
    F. Ensure all protective relays are set in for initial energization.
    G. Ensure all the test switches are in their normal positions.
    H. Ensure all control switches are in their normal positions.
    I. Any bypassed/opened protections will be documented.
    J. All the AFTER-ENERGIZING checks of all the Major Equipment shall be completed as mentioned in the respective Commissioning records.
    K. Soak the transformer on no-load for a minimum of eight (8) hours, or as per manufacturer recommendations. During extreme cold, -20℃/0℉ or colder, transformer shall be allowed twenty-for (24) hours soak at no-load before adding load. Record the temperature of the transformer oil and winding before energization and after soaking period, and before real load is introduced to the system.
    L. Perform electrical testing after initial energization:
        a. Verify voltage phasing at primary against a known source.
        b. Verify voltage phasing at the secondary of the bus potential transformers against a known source, if available.
        c. Perform in-service testing under load recording all voltage, current & phase angles at all available locations (test switches, relay terminals & solid-state relays)

3.2 In- Service Testing

1. General

A. After energizing, verify the phasing of primary and secondary voltages, as applicable.
B. Check voltage of the potential transformer secondary at every switch and relay for magnitude and phase angle with respect to the known reference.
C. Current magnitude, direction and phase angle should be measured at every available location. Relay digital reads are calculations and should not be considered proven until measured and compared.
D. Check the direction of power flow.
E. Verify that check meter readings match with the revenue meter reads (usually located in the utility substation). If values do not match, they must be corrected.
F. Zero (0) current values are expected in neutral and operating coil of differential relays.
G. Directional relays should be verified for proper directionality.
H. All the results should be evaluated and compared with the expected values.
I. All the temporary circuits used to prove proper operations should be documented & the circuit should be returned to normal at the end of the test & all trip circuits restored, if disabled during test.

Exhibit H-1(c)

BESS Commissioning Requirements

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1.0 Commissioning Concept

The Commissioning Program will be implemented in accordance with the Owner-approved Commissioning Plan and includes testing activities through the construction phase, equipment supplier testing, and system energization and startup through final acceptance.

1.1 Overarching objectives are as follows:

a. Ensuring personnel and equipment safety during commissioning.

b. Implementation of a formal lockout/tagout (LOTO) program.

c. Adherence to prescribed testing criteria including applicable codes and standards as defined in the approved Commissioning Plan and referenced contract documents..

d. Demonstration of functionality of the plant equipment and systems including conformance with specifications and guarantees.

e. Creation of appropriate plans and schedules prior to commissioning execution.

f. Clear handoff from construction groups and interface with construction activities.

g. Maintenance of a daily log which documents significant accomplishments, issues, and resolution for commissioning activities under Contractor's scope.

h. Creation, presentation, and maintenance of evidence of completed testing via test reports and documentation.

Contractor will perform the BESS commissioning activities in coordination with the BESS Manufacturer (OEM) in accordance with the approved Commissioning Plan. Contractor's responsibility is limited to execution, documentation, and functional testing support as defined the OEM documentation. The OEM shall remain responsible for equipment-level and system-level functionality, software and controls validation, and performance guarantees associated with the BESS. Contractor may self-perform or contract third-party testing firm to complete various testing. Third-party testers generally perform the following tests:

a. Fall-of-Potential ground testing.

b. Very Low Frequency (VLF) of Medium Voltage AC cables.

c. International Electrical Testing Association (NETA) required transformer testing of Medium Voltage and Auxiliary Transformers.

d. Fiber Optics Termination and Optical Time Domain Reflectometer (OTDR) Testing.

2.0 Safety During Commissioning Phase

Contractor will ensure that the additional safety considerations surrounding testing and commissioning tasks and activities are captured in the comprehensive Site Safety Plan. The Contractor will submit the safety plan to Owner prior to construction for review and approval. A minimum of 10 days shall be allowed for Owner approval. Any revisions to the Safety Plan shall be submitted to Owner which will trigger a separate 10-day review period in force. Revisions to the Safety Plan may be appropriate prior to the commissioning phase to recognize and incorporate unique hazards created by commissioning activities.

The Contractor will follow its Safety Plan for all Construction, Testing, and Commissioning activities, and will act as the safety guidelines for the project.

All personnel associated with construction and commissioning activities shall receive safety orientation and tas-specific training consistent with the Contractor's Site Safety Plan.

The Safety Plan shall address all concerns in the construction, testing, and commissioning phases.Lockout/Tagout

The Contractor shall compile a site-specific LOTO plan or procedure which shall be submitted for approval 10 days prior to the commissioning phase. The LOTO procedure or plan establishes requirements and a process for the lockout and tagout of energy isolating devices to protect personnel from potentially hazardous energy.

2.1 The LOTO procedure or plan shall include, at a minimum, the following:

a. Pre-planned LOTO Schemes.

b. Description of LOTO Practices.

c. Identification LOTO Authorities.

d. Training Requirements.

e. Signage/Barricading.

3.0 Commissioning Execution

Individuals performing the BESS system testing shall be qualified per OSHA 10 training at a minimum and trained on the procedures within the Commissioning Program.Conducting electrical testing on any BESS or Auxiliary System shall be performed by qualified individuals having knowledge and experience with electrical systems measurements, the test equipment used, the equipment or systems being tested, and an awareness of the hazards involved.

3.1 Since working with BESS systems involves exposure to energized circuits with high voltages and currents, presenting electrical shock hazards, it is imperative for those installing and testing BESS systems to follow all applicable safety standards and guidelines.

3.2 The Contractor's execution strategy applicable to commissioning, startup, and testing shall, at a minimum, contain the following requirements:

a. Performance of Job Hazard Analysis or Electrical Hazard Analysis before conducting any work at the site.

b. Planning and review of all testing, safety, and emergency procedures in advance.

c. Maintenance of an orderly work site and cautious approach.

d. Utilization of appropriate precautions when working on energized equipment is unavoidable.

e. Proper selection and usage of personal protective equipment (PPE).

f. Ensuring NFPA70E compliant arc flash labels are available and properly installed.Mandating the usage of barricading and specialized PPE as necessary.

g. Adherence to manufacturer's instructions for the safe operation of test instruments.

h. Ensuring that test instruments are inspected, calibrated, and used only for their intended purpose, and within their established limits and ratings.

i. Ensuring that personnel are capable and willing to perform tasks that cause exposure to electrical hazards.

j. Ensuring that all employees potentially impacted by the hazards caused by Commissioning activities are provided training or briefings to ensure that they clearly understand the purpose and function of the LOTO process, as well as their roles and responsibilities when performing potentially hazardous activities. Reporting

Contractor shall perform and document the results of testing activities within its defined scope. All tests and data collection shall be in accordance with NETA and other accepted industry standards. Prior to submittal, Contractor shall review test data to confirm compliance with the acceptance criteria defined in the approved Commissioning Plan. Any deviations identified within Contractor's scope shall be reviewed, corrected, or re-tested as appropriate. Test results affected by the corrective action shall be repeated.Tests listed as manufacturer's responsibility shall be conducted and documented by the equipment manufacturer or supplier, under Contractor oversight. The Contractor shall verify that test documentation is completed for each component or system. All testing results and data shall be submitted to the Owner for review.

Contractor shall develop and utilize written, approved procedures as deemed necessary by the Contractor to safely and effectively perform specified tasks. It is recognized that some tasks are within the skill of the qualified commissioning individual and do not require a procedure.

3.3 Testing equipment shall be calibrated as defined by the manufacturer. Testing calibration certificates shall be submitted to the Owner prior to use of testing equipment.

3.4 Test reports shall clearly present data collected during performance of the testing and include the following:

a. Identification of circuits tested, and tests performed.

b. Calibrated tools and equipment used.

c. Data recorded and acceptance criteria.

d. Interpretation and summary of results, and a clear indication of pass/fail.

e. Identification of responsible person(s) and date(s) of tests. Contractor shall troubleshoot and correct all failures discovered during testing at no additional cost to the Owner, unless the failures are a result of a defect in Owner-Furnished equipment or design error by the Engineer of Record Procedures

Detailed procedures shall be provided by Contractor for testing, startup, and commissioning activities. The utilization of procedures will enable the project to be tested and commissioned safely in accordance with the contract. Testing procedures shall be provided to Owner. Procedures shall be provided for the following activities.

a. BESS OEM interface (if necessary).

b. Commissioning Field Testing.

c. System Energization.

d. Operational/Functional Testing.

e. Capacity Testing.

3.5 The following shall be included in each procedure, as applicable:

a. A list of prerequisites, including safety concerns.

b. Purpose of test.

c. Procedural steps that outline actions that are to be followed in the performance of the test and/or data collection.

d. Required Test Equipment.

e. Specific Site Information: This includes specific equipment identification, tagging, conventions, cable numbers, and I/O references for testing.

Procedures shall be made available to Owner for review and comment prior to commencing work with such procedures. A minimum of 10 business days shall be allotted to Owner for review and comment before commencement of the test delineated in the procedure.

4.0 Commissioning Schedule

The commissioning schedule shall be integrated into the overall project schedule with emphasis on the construction activities that gate commissioning performance. The commissioning schedule will be submitted to Owner.

5.0 Commissioning Log and Plan of the Day Meetings

5.1 Commissioning shall maintain a daily log which describes the following:

a. Work completed.

b. Status of commissioning completion.

c. Significant achievements.

d. Issues identified.

e. Resolution of Issues.

Commissioning shall conduct a daily meeting to discuss work complete and work forecasted. The Owner shall be invited to these meetings. The Commissioning Log shall be reviewed at Commissioning Plan of the Day meetings. Notification

Contractor shall provide written notifications to Owner for significant evolutions. Unless otherwise indicated, 5 business days shall be allocated prior to commencement of specific tests.

5.2 Formal notifications shall be provided at the following times:

a. Completion of testing for a contractual milestone

b. Circuit Mechanical Completion

c. Circuit Substantial Completion

d. Facility Mechanical Completion

e. Energization of Systems

6.0 Energization of Systems

Contractor shall perform the initial switching and energization of electrical equipment including both AC and DC. Written procedures shall be provided to the Owner at least 10 business days prior to energization for review and approval by the Owner. No equipment shall be energized without the Owner's written consent to energization/switching procedures.

6.1 Prior to system energization, Contractor shall verify readiness as defined in energization procedures. Energization procedures shall include the following requirements, but not be limited to:

a. All safety equipment in place and functional.

b. Permanent and/or temporary warning notices and barricades in place where required for safety.

c. Permanent guards installed on DC connection cabinet within the inverters. While permissible to remove guards to perform testing, appropriate PPE shall be donned.

d. "Hot Work" permitting and other applicable safety procedures implemented.

e. Access for emergency vehicles not obstructed.

f. All relevant documentation available (calibration sheets, log sheets, process manuals or datasheets).

g. Manufacturer's construction testing checklists complete.

h. Verification of all system protective interlocks and protective devices.

i. Conducting BESS capacity testing in accordance with contract agreements.

j. Contractor and equipment suppliers, when required, have performed required tests, checkouts, and commissioning activities.

10.2 BESS Charge and Discharge shall not be implemented until written permission from Owner is obtained.

7.0 BESS System Testing

Contractor shall ensure the following system tests are completed prior to system energization, performed by qualified personnel or third-party testers as defined in the Commissioning Plan.

Test	Equipment	Applicability	Performed By
Construction Acceptance Testing or Pre-Commissioning			
AC Continuity and Insulation Resistance Testing	MV/LV Cable	VLF of MV Cables	Contractor or Third-Party Tester
DC Continuity and Insulation Resistance Testing	DC Cable	DC Megger of DC Cabling	Contractor
Three-Point Fall of Potential	Ground Grid	BESS System or Inverter Ground Grids	Contractor or Third-Party Tester
Fiber Optic Terminations and OTDR	Fiber Optic Cables	SCADA Equipment Connections	Specialty Contractor or Third-Party Tester
Two-Point Grounding Resistance Test	Equipment Grounds	Inverters, Transformers	Two-Point Grounding Resistance Test

Test	Equipment	Applicability	Performed By
NETA Testing - Winding Insulation Integrity Test, TTR, DGA (oil filled), Power Factor	Inverter Medium Voltage Transformer	On/By Inverter Skids or BESS Containers	Contractor or Third-Party Tester
NETA Testing - Winding Insulation Integrity Test, TTR	Auxiliary Transformer(s)	On/By Inverter Skid	Contractor or Third-Party Tester
BESS OEM Cold Commissioning	BESS Containers	BESS Containers	BESS OEM

8.0 Fiber Optic Splicing and OTDR

Contractor shall terminate fiber strands using the fusion method and perform an OTDR test after termination is complete. The OTDR tests shall verify the integrity of the fiber optic cable installation by establishing continuity and attenuation losses through the cable, splices, and connectors. Testing shall be in accordance with TIA/EIA standards.

9.0 SCADA Interface Devices

Contractor shall install firmware and establish system control and data acquisition (SCADA) visibility with interfacing devices in Inverters, Trackers, and Met station components.

Initial Energization and Capacity Testing			
Test	**Equipment**	**Applicability**	**Performed By**
SCADA Interface	Battery Management System Energy Management System	SCADA/BESS System	Owner Contractor SCADA Contractor
Inverter Commissioning	Inverters and all Inverter Subsystems	After Backfeed	Inverter/BESS Manufacturer with Contractor coordination
BESS Hot Commissioning (Initial Charge/Discharge)	SCADA/BESS System	By BESS Circuit or Entire BESS System	BESS OEM, Contractor
BESS Capacity Testing	SCADA/BESS System	Entire BESS System	Contractor SCADA Contractor

10.0 SCADA Commissioning

10.1 The SCADA system shall be fully inspected, and its operation shall be verified during start-up testing to assure that it is ready to command and control BESS System Charge and Discharge. The SCADA system must be capable of accumulating data for the Capacity Test.

10.2 The Contractor will support the Owner's SCADA engineer in performing loop checks of devices which are connected to the SCADA system. The loop checks shall verify expected data points

from the applicable equipment as well as providing alarm and fault automatic functions. Contractor shall support SCADA integration with Owner's Remote Operations Center as applicable.

11.0 Inverter Commissioning

Contractor shall coordinate and support Inverter hot and cold commissioning by inverter or BESS (packaged systems) manufacturer. Contractor shall submit all completed commissioning reports provider by BESS or inverter manufacturer along with test procedures for on-site commissioning and testing of BESS and inverters. Contractor's responsibility is limited to facilitating and documenting OEM commissioning activities; the OEM shall remain responsible for execution, results, and performance verification. Final ("as-left") settings and operating parameters shall be compared to design setpointsand the results documented and submitted to the Owner for record. Contractor shall not be responsible for OEM control logic or proprietary parameter adjustments.Initial sync or BESS discharge to the grid shall not be implemented until written permission from Owner's obtained.

12.0 Voltage and Phase Rotations

Contractor shall verify voltage and phase rotation for circuits and equipment installed under its scope of work prior to system energization to ensure conformance with the designated interconnection phasing. The Inverter OEM shall confirm correct rotation and phasing internal to its equipment during OEM commissioning. Contractor will coordinate and support such verification as required.Operational/Functional Testing

Once the commissioning of a system is complete, the system can be released for startup and operation of the entire facility as a fully integrated system. Contractor shall ensure initial sync of BESS system discharge with support from BESS Vendor.

The objective of the Operational Test is to help ensure the BESS is operating reliably by demonstration of normal and safe operation for a 5-day period.

Contractor shall develop an Operational Test procedure that contains instructions for evaluating the ability of the power plant to operate reliably. Acceptance criteria for trackers and inverters shall be included. The procedure shall be submitted by Contractor to Owner for review and approval at minimum of 10 business days prior to commencement of the Operational Test.

13.0 Performance/Capacity Testing

Performance Performance/Capacity Testing shall be conducted to prove contractual obligations. Each of the Performance Tests shall be carried out using contract specified procedures. Capacity testing is to be conducted in accordance with the capacity testing Exhibit.Turn Over Documentation

Contractor shall provide all requisite documentation such as test reports and checklists to Owner for review and acceptance. If required Contractor shall upload turnover documents into Owner's Asset Management System.

14.0 Commercial Operation

The generating facility shall be deemed ready for commercial operation after each circuit is commissioned and full capacity is available. Contractor shall assist the Owner in notification to all necessary parties that the facility has achieved commercial operation.

15.0 Turnover to Operations

After successful completion of the startup and operational testing, the system or applicable portion of the system shall be turned over to the Operations team. During the startup and operational testing phases, the Operations team shall work with the Commissioning team to develop familiarization and identify any outstanding items that require completion prior to turnover. These items shall be added to the punch list.

Exhibit H-2

Solar PV Availability Test

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1.0 Availability Test

1.1 Purpose

The Availability Test will verify that the inverters are fully commissioned and ready for commercial operation by demonstrating all inverters are able to operate for at least three (3) consecutive days. The Availability Test may run in parallel to other performance related tests, provided the other tests do not negatively impact the inverter or plant operation.

1.2 Definitions

- **Availability Test Measurement Period –** A minimum of three (3) day period during which the Availability Test is conducted to verify inverter operation, extended as permitted in this Exhibit.
- **Availability Test Procedure –** A detailed plan for administering the Availability Test to be provided by Contractor as detailed in Section 1.5 of this Exhibit and include, at a minimum, all points to be monitored and identification of key personnel and parties.
- **Availability Test Report –** A summary report of the Availability Test results, conditions during the test, the Inverter Availability Test Procedures, and calibration certificates of equipment used in the test, which shall meet all the requirements of this Exhibit.
- **Eligible Time Intervals –** Time intervals during the Availability Test Measurement Period where the plane of array irradiance is greater than 100 W/m^2. The selected time interval shall be five (5) minutes unless otherwise agreed to in writing by Owner.

Guaranteed Availability – 99.5%

- **Inverter Operational Time Intervals –** For each inverter, the total number of time intervals when the inverter is producing power during Eligible Time Intervals only.
- **Measured Availability –** A percentage (rounded up or down to the nearest 0.1%), calculated as the sum of all Inverter Operational Time Intervals divided by the total Eligible Time Intervals, multiplied by the number of inverters.
- **Multiple Measurements –** Any measurement device or sensor where multiple devices or sensors measure the same parameter.
- **Operational Inverter –** An inverter reporting non-zero power output that successfully and automatically transitions from quiescent (overnight) states to operational states (daylight power processing) without fault, interruption, or operator intervention.

1.3 Availability Test Procedure

The Availability Test Procedure shall include (at a minimum) the following information:

- This Exhibit.
- Identification of key personnel and parties to be involved in the test.
- Identification of all data points to be monitored during the test.
- The starting and ending dates of the scheduled Availability Test Measurement Period.
- Identification of SCADA nomenclature for data channels and any SCADA calibration parameters (default or custom) for those data channels.

- Identification of SCADA data channels intended for use as auxiliary measurements.

Identification of known data quality concerns, such as time intervals, when inter-row shading or tree shading may be expected to occur.

1.4 Data Sets and Instrumentation

1.4.1 Data Quality and Instrumentation Requirements

1.4.1.1 Plane of array irradiance sensors shall be at a minimum "High Quality" classified pyranometer(s) as defined in ASTM2848-A1.2 (Secondary Standard per ISO 9060). Pyranometers shall include device-specific characterization data that shall, at minimum, include cosine and temperature response.

1.4.1.2 Alternative pyranometers may only be used if approved by the Owner.

1.4.1.3 Pyranometers shall be used only within their valid calibration period and shall be cleaned at the start of the Availability Test Measurement Period.

All measurement devices and sensors shall meet the minimum accuracy requirements and range requirements set forth in Capacity Test Exhibit XH-3

1.4.1.4 Inverter power measurements shall be as reported by the inverters through the Project SCADA.

1.5 Test Procedure

1.5.1 No less than thirty (30) Business Days prior to the first day of the scheduled Availability Test Measurement Period, the Availability Test Procedures shall be submitted to the Owner by the Contractor for Owner's review and comment. Contractor shall incorporate all of Owner's reasonable comments into the final Availability Test Procedures and resubmit the same for Owner's review and approval (such approval not to be unreasonably withheld or delayed).

The Contractor shall give written notice to the Owner five (5) Business Days prior to the start of the Availability Test (including any re-performance thereof).

1.5.2 Contractor may perform the Availability Test in conjunction with other Performance Tests (e.g., the Capacity Test).

1.5.3 Contractor shall perform the Availability Test in accordance with the final approved Availability Test Procedures.

1.5.4 During the Availability Test Measurement Period, the Contractor shall record all inverter power, revenue meter, and plane of array irradiance data.

1.5.5 Measured data are to be made available to the Owner upon request during the Availability Test Measurement Period, for use in evaluating the progress of the Availability Test.

1.5.6 During the Availability Test, the Contractor shall document all inverter or plant-related interruption events, including the identification of the event, the reason for the interruption, the time and duration of the event, and any corrective actions undertaken as applicable. In the event that inverter or plant-related interruptions do occur, the Contractor has the option to restart or extend the Availability Test, provided that Contractor shall notify Owner and provide detailed documentation of identified issues and proposed resolutions.

1.5.7 During the test, the Contractor shall document all interruption events caused by grid operations; force majeure; Owner caused downtime; utility or ISO directive; system outages beyond the control of Contractor, including the identification of the event, the reason for the interruption, and the time and duration of the event; and any corrective actions undertaken. To the extent that such interruption event was not caused by the Project, such events are excusable, and the test shall be extended by the amount of excluded time on a minute-by-minute basis to achieve Guaranteed Availability.

1.5.8 The Measured Availability test result shall be calculated as follows:

$$Measured\ Availability = \frac{\sum O_i}{\sum E_i \times n}$$

1.5.8.1 O_i is the number of operational inverters per eligible interval,

1.5.8.2 E_i is an eligible interval, and

1.5.8.3 n is the number of inverters in the project,

1.5.8.4 with summation over the Test Period.

If the Measured Availability of the Project does not meet or exceed the Guaranteed Availability, the Contractor shall identify and promptly resolve the source of the problem until the Measured Availability of the Project achieves the Guaranteed Availability.

1.6 Availability Test Report

No later than Seven (7) Business Days following the end of the Availability Test Measurement Period for a Successfully Completed Availability Test, a draft Availability Test Report will be submitted to the Owner by the Contractor.

1.6.1 Owner shall have five (5) Business Days to accept or reject the results of the draft Availability Test Report and provide in writing any comments from Owner. In the event that Owner rejects all or any part of the draft Availability Test Report, Contractor shall, within five (5) Business Days thereafter, address any comments of Owner and re-submit the draft Availability Test Report to Owner. This procedure shall continue until Owner accepts the draft Availability Test Report. Any dispute regarding the results of the Availability Test or the Availability Test Report shall constitute a Dispute as described in the Agreement.

1.6.2 The Availability Test Report shall contain the following

- The Availability Test Procedures, including all requirements as outlined herein.
- The actual start and end date/times of the Availability Test Measurement Period.
- Comments on environmental conditions during the Availability Test Measurement Period that affect the results of the test.
- Summary of data quality control results for all data records.
- Summary of test results.

1.6.3 Raw data used as input to the Availability Test, along with QC disposition for each input data record, shall be provided electronically (via .CSV, .XLS, or .XLSX formats) to the Owner with the Availability Test Report.

Exhibit H-3

Solar PV Capacity Test Exhibit

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1.0 Capacity Test

1.1 Purpose

The purpose of the Capacity Test is to verify the as-built Project capacity. This document establishes the references, standards, and procedures to be used to calculate the Project capacity. The PV Plant Capacity Test follows a modified version of ASTM-E2848-13, Standard Test Method for Reporting Photovoltaic Non-Concentrator System Performance.

The results of this test will determine if the Project has successfully met the capacity requirements of the design.

1.2 Reference Standards

- ASTM E2848-13, 2018 – Standard Test Method for Reporting Photovoltaic Non-Concentrator System Performance
- ASTM E2939-13, 2018 – Standard Practice for Determining Reporting Conditions and Expected Capacity for Photovoltaic Non-Concentrator Systems
- NREL 73982 – Suggested Modifications for Bifacial Capacity Testing
- Sandia SAND2004-3535 – Photovoltaic Array Performance Model
- IEC 61853-1 – Photovoltaic Module Performance Testing and Energy Rating
- IEC 61724-2 - Photovoltaic System Performance - Part 2: Capacity Evaluation Method

1.3 Definitions

- Auxiliary Parameters – A parameter used to verify the operating condition of the Project. This includes parameters such as inverter operating status, DC voltage, and inverter AC power.
- Capacity Test – A short-term test for the entire Project meeting the requirements of this document to verify the Project is fully commissioned and producing energy as per design.
- Data Record – A set of measurements representing aggregate values during a defined time interval.
- Expected Capacity – Power output expected to be generated by the Project when exposed to Reporting Conditions.
- Guaranteed Capacity – Shall mean ninety-seven percent (97.0%) of Expected Capacity.
- Input Parameter - Effective value used as input to the performance regression.
- Minimum Guaranteed Capacity – Shall mean ninety-five percent (95.0%) of Expected Capacity.
- Measured Capacity – Power output measured by the Project during the PV Plant Capacity Test Measurement Period.
- Measured Capacity Ratio – The Measured Capacity divided by the Expected Capacity rounded to the nearest 0.1%.
- Project Model – The PVsyst model and post-processing calculations/models as provided to Contractor by Owner.

- PV Plant Capacity Test Measurement Period – A period of at least five (5) consecutive days during which the minimum irradiance requirement has been satisfied and over which data will be evaluated to establish whether the Project has met the requirements of the Capacity Test.
- Reporting Conditions – A defined set of measurements of the plane-of-array irradiance, ambient temperature, wind speed, and PV module temperature. One Reporting Condition is defined for each month of the year.
- Revenue Meter – A revenue grade meter, as agreed to by all parties, located at the Point of Interconnection (POI).

1.4 Pre-Test Activities

1.4.1 PV Plant Capacity Test Plan

1.4.1.1 No less than 45 Business Days prior to the first day of the scheduled Capacity Test, a draft Capacity Test Procedure shall be submitted to the Owner for review and approval.

1.4.1.2 The PV Plant Capacity Test Plan shall include the following minimum information:

1.4.1.2.1 This Solar PV Capacity Test Exhibit.

1.4.1.2.2 The as-built Project Model including all PVsyst native files (PAN, OND, SHD, MET, PRJ, and VC).

1.4.1.2.3 For the purposes of this test, the following modifications shall be made to the Project Model:

- Soiling/snow loss shall be set to zero percent (0%).
- Availability shall be set to one hundred percent (100%).

1.4.1.2.4 Identification of all parties involved.

1.4.1.2.5 The estimated starting and ending dates of the PV Plant Capacity Test Measurement Period.

1.4.1.2.6 Project parameters including, at a minimum, manufacturer/model/quantity of PV Modules, array orientation, location, racking type, tracker range of motion, and manufacturer/model/quantity of inverters.

1.4.1.2.7 Identification of all sensors and transducers to be used, including cut sheets, calibration certificates and records, and map locating sensors with sufficient detail to locate.

1.4.1.2.8 Identification of the SCADA System data channels and calibration parameters for each data channel.

1.4.1.2.9 Identification of the sensors intended for Redundant Measurement.

1.4.1.2.10 Identification of multiple measurement formulas and weighting factors.

1.4.1.2.11 Identification of known times or areas of data quality concerns.

1.4.1.2.12 Time stamp convention and data logging averaging method and interval.

1.4.1.2.13 Expected Capacity calculations as described in Section 1.7 and monthly Reporting Conditions.

Written notification must be made to the Owner five (5) business days before starting the PV Plant Capacity Test.

1.4.2 No less than two (2) business days prior to commencement of the PV Plant Capacity Test, a pre-test meeting shall be held. The meeting shall review the PV Plant Capacity Test Plan, instrumentation locations, calibration sheets, safety requirements, and other relevant topics. Meeting minutes shall be recorded and published by the Seller.

1.5 Data Sets and Instrumentation

1.5.1 Data Quality and Instrumentation Requirements

1.5.1.1 Data quality shall be identified as one item from a set of quality categories for each Data Record analyzed. Only data where all Input Parameters are valid and within the specified limits shall be used for computing capacity estimates.

1.5.1.2 Recorded data shall be sampled at no greater than at five (5) second intervals and averaged at no greater than five (5) minute intervals. Data shall be averaged and filtered based on requirements within this Capacity Test Requirements.

1.5.1.3 The PV Plant Capacity Test Measurement Period shall be no less than five (5) consecutive days and contain at a minimum 150 valid data points after filtering, including secondary data exclusions, considering a Five (5) minute data interval. The PV Plant Capacity Test Measurement Period shall be extended for consecutive days until the minimum irradiance requirement and the minimum number of valid data points can be met.

1.5.1.4 If the Test Measurement Period exceeds eight (8) days without reaching the required number of valid data points, Contractor may propose lowering the minimum required number of valid data points or expanding the secondary data exclusion range. In no case shall the number of valid data points be less than one hundred (100) or the secondary data exclusion range exceed 50%.

1.5.1.5 Sensor Requirements

1.5.1.5.1 Irradiance sensors shall be, at a minimum, ISO 9060 Secondary Standard rated pyranometers. Pyranometers shall include device specific characterization data that shall, at a minimum, include cosine and temperature response.

1.5.1.5.2 Pyranometers shall only be used within their valid calibration period and shall be cleared at the start of the Capacity Test of any debris or soiling and daily during the PV Plant Capacity Test Measurement Period. Calibration shall have certificates from the National Institute of Standards and Technology or equivalent.

1.5.1.5.3 Sensors shall have the following minimum range and accuracy:

Table 1-1 Instrument Ranges and Accuracy

Measurement	Instrument Type	Range	Accuracy
Plane of Array Irradiance	Front & Rear Pyranometers	0 to 1600 W/m^2 285 to 2800 nm	±1.8%
Global Horizontal Irradiance	Pyranometer	0 to 1600 W/m^2 285 to 2800 nm	±1.8%

Measurement	Instrument Type	Range	Accuracy
Ambient Air Temperature	Temperature Probe	-40° C to +60° C	±1°C
Back of Module Temperature	Temperature Probe	-40° C to +120° C	±0.5°C
Wind Speed	Sonic Wind Sensor	0 – 60 m/s	±5%
PV Plant Power	PV Power Revenue Meter	0 to PV Power Plant size +20%	ANSI C-12.20
Inverter Power	Inverter Internal Meter	Inverter Specific	Inverter Specific

1.5.1.6 Input Parameters: The following inputs are required for completing the PV Plant Capacity Test:

1.5.1.6.1 Plane-of-Array (POA) Irradiance: An estimate of the average irradiance incident upon each PV array in the Project. Provisions for addressing multiple orientations and geographic diversity are identified through multiple measurements from Multiple Measurement Sets. No provision is allowed for shading. Any significant shading shall be excluded from the Data Record.

1.5.1.6.2 Ambient Temperature: This is the ambient temperature for the location of the Project.

1.5.1.6.3 Back of Module Temperature: This is characteristic of the operating temperature at which the PV Module is producing power, which effects PV Module efficiency.

1.5.1.6.4 Revenue Meter Energy: Energy generation is the sum of actual power output from the Project as recorded by the Revenue Meter during the PV Plant Capacity Test Measurement Period.

1.5.1.6.5 Inverter-Level Energy: AC output data for each inverter shall be provided to identify periods of inverter clipping.

1.5.1.6.6 Wind Speed: Wind velocity.

1.5.1.7 Sensor Redundancy: A Redundant Measurement dataset shall consist of sensors located sufficiently close to each other such that recorded data is expected to be in agreement within the range of the sensor uncertainty.

1.5.1.8 Multiple Measurements: Multiple measurements from Multiple Measurement Sets shall be recorded for all environmental data throughout the Project Site to capture operating conditions for all regions. All measurements, whether from a single sensor or a Redundant Measurement Set identified as part of a Multiple Measurement Set, must be valid for the Data Record to be included for calculations.

POA Irradiance – One sensor shall be installed for each orientation within the Project Site (within +-2 degrees) for up to twenty (20) MWp. Multiple orientations and large arrays shall require multiple measurements from Multiple Measurement Sets as defined in Exhibit A.

Rear Plane of Array (RPOA) irradiance - One sensor shall be installed for each orientation within the Project Site (within ±2 degrees) for up to twenty (20) MWp. Multiple orientations and large arrays shall require multiple measurements from Multiple Measurement Sets as defined in Exhibit A.

Total Plane of Array (TPOA) Irradiance – Calculated based on POA and RPOA.

Back of Module Temperature – A minimum of three (3) temperature sensors shall be installed for every twenty (20) MWp of array or as defined in Exhibit A..

Ambient Temperature – One sensor shall be installed for every twenty (20) MWp or as defined in Exhibit A.

Wind Speed – One wind speed sensor shall be installed for every twenty (20) MWp Or as defined in Exhibit A.

1.5.1.9 Multiple Measurement datasets will be aggregated, and a weighted average shall be calculated. Averaging of multiple quality checked sensors is required.

1.5.2 Primary Data Exclusions

1.5.2.1 All data shall be reviewed and filtered as noted in ASTM 2848. Primary data exclusions shall include the following:

1.5.2.1.1 Missing Data (ASTM E2848-9.1.4). Missing data shall be marked with a non-numeric value. Missing data shall not be included in the analysis but shall be documented.

1.5.2.1.2 Data Acquisition System Equipment Malfunction (ASTM E2848-9.1.5). Data Records with invalid Input Parameters shall also be marked as invalid.

1.5.2.1.3 Below Minimum Irradiance. Prior to the application of the ASTM E2848 9.1.6 irradiance requirements, a minimum irradiance filter must be applied. Any front plane of array irradiance measurements below the minimum irradiance threshold of 400 W/m^2 must be marked as too low and excluded from the analysis.

Unstable Irradiance (ASTM E2848-9.1.7). For each of the irradiance sensors used in computing the irradiance Input Parameter, calculate the mean and standard deviation of all five (5) second interval measurements to be averaged into a five (5) minute interval record. If any of the standard deviations of samples within the aggregation interval exceed the specifications of ASTM E2848-9.1.7.2 of the corresponding irradiance mean value for that aggregation interval, then the record shall be marked as unstable. Any record for which any of the standard deviations of samples for irradiance is missing shall be marked as indeterminate stability, unless Buyer agrees not to mark it. The visual technique option of ASTM E2848-9.1.7.2 may be used.

Inverter not peak power tracking (ASTM E2848-9.1.8). The PV Plant Capacity Test Plan shall indicate how marking Data Records for this condition will be determined. Inverters with power output greater than 98% of rated capacity shall be deemed to be “clipping” and not operating in peak power tracking mode.

Plant output greater than 98% of POI power limit, requiring curtailment of one or more plant inverters, and any periods of inverter curtailment by PPC (power plant controller) action.

1.5.2.1.4 Internal and External array shading (ASTM E2848-9.1.9). A schedule of expected shade periods shall be defined in the PV Plant Capacity Test Plan. Environmental shading, such as snow, shall be noted by onsite observers and documented.

1.5.2.1.5 Radiometer not coplanar with system under test (ASTM E2848-9.1.10). For a fixed array, this condition disqualifies all data acquired while the condition exists. For a tracking array, this condition may occur intermittently so the Project Performance Test portion of the

Commissioning Plan shall identify Auxiliary Parameters (e.g., measured and commanded tracker position) and algorithms for confirming tracking position.

1.5.2.1.6 Wind Speed. Any intervals in which the average wind speed is greater than 15 m/s will be excluded from the dataset.

1.5.3 Secondary Data Exclusions

1.5.3.1 The secondary data exclusion is that front plane of array irradiance values must be within ±20% of the Reporting Condition per ASTM E2848-9.1.6.

1.6 Reporting Conditions

1.6.1 Reporting Conditions are defined as the set of total irradiance, wind speed, and temperature values entered into Table 1-2. The following algorithm shall be used to identify Reporting Conditions.

1.6.1.1 Procure simulated Data Records from the annual energy production simulation (i.e., Project Model).

1.6.1.1.1 The simulated Data Records shall exclude any assumed soiling, snow, curtailment, and availability losses (i.e. set the soiling loss value to 0% and the availability to 100%).

1.6.1.1.2 Simulated Data Records shall not be of intervals longer than one (1) hour.

1.6.1.1.3 Simulated Data Records shall include the following assumed data points:

- POA irradiance (GlobInc).
- Bifacial POA irradiance (GlobBak).
- Bifacial shading loss (BackShd).
- Ambient temperature (T_Amb).
- Back of module temperature (TArray).
- Wind speed input parameters (WindVel).
- Any simulated Auxiliary Parameters necessary for making Data Records according to the primary data exclusion criteria.

1.6.1.2 Apply the primary data exclusion criteria identified in Section 1.5.2 of this document to the simulated Data Records. Secondary data exclusion criteria are not to be applied to the simulated Data Records.

Grouping the remaining simulated Data Records by month, find the 60th percentile value of incident Total POA irradiance, the mean of the ambient air temperature, and the mean of the wind speed. The Reporting Condition for Total POA irradiance shall not be less than 400 W/m^2 unless agreed to by the Owner in writing before the test.

1.6.1.3 Round the monthly Total POA irradiance to the nearest integer (W/m^2), mean temperatures to the nearest degree (°C), and corrected mean wind speed to the nearest 0.1 m/s. Use these values to populate the table shown in Table 1-2 as Reporting Conditions.

1.7 Expected Capacity Calculations

1.7.1 Expected Capacity is a predicted Project power output value measured at the Revenue Meter at the POI as set forth in Table 1-2 that defines the power output the completed Project is expected to produce when exposed to specified Reporting Conditions at an average monthly level. Values for Table 1-2 shall be provided 45 business days prior to commissioning based on as-built information as part of the PV Plant Capacity Test Plan in Section 1.4.1.

1.7.1.1 Reporting Conditions shall be calculated per Section 1.6 and shall be populated in Table 1-2. Test Reporting Conditions and Expected Capacity used for the actual plant Capacity Testing shall be based on 30-day averages centered on the middle of the testing period. For example, if the plant Capacity Testing was centered on June 10, then test Reporting Conditions shall be computed from the annual data for +/- 15 days before and after June 10.

1.7.1.2 Calculate the regression coefficients for each simulation month by performing a least squares regression of $P_{Expected}$ as defined below:

$$E_{total,E} = E_{POA,E} + (E_{Rear,E} + E_{RearLoss,E}) * \varphi$$

$$P_{Expected} = E_{total,E} * (a_{1,E} + a_{2,E} * E_{total,E} + a_{3,E} * T_{a,E} + a_{4,E} * v_E)$$

1.7.1.2.1 $P_{Expected}$ is the expected power value (W).

1.7.1.2.2 $E_{POA,E}$ is the average front side plane of array irradiance (W/m^2).

1.7.1.2.3 $E_{Rear,E}$ is the average rear side irradiance (W/m^2).

1.7.1.2.4 $E_{ReaLossr,E}$ is the rear side shading loss (W/m^2).

1.7.1.2.5 $E_{Total,E}$ is the total front and rear side irradiance as described in the equation above (W/m^2).

1.7.1.2.6 $T_{a,E}$ is the ambient temperature (°C).

1.7.1.2.7 v_E is the wind speed (m/s).

1.7.1.2.8 φ is the bifaciality factor of the PV Module from the datasheet, or from a 3rd party test report, if available.

1.7.1.2.9 $a_{1,E}$, $a_{2,E}$, $a_{3,E}$, *and* $a_{4,E}$ are the Expected Capacity regression coefficients to be solved.

Using the calculated Expected Capacity regression coefficients $a_{1,E}$, $a_{2,E}$, $a_{3,E}$, *and* $a_{4,E}$ from Section 1.7.1.2, calculate the Expected Capacity for each Reporting Condition month using the equation below for $P_{Expected,RC}$.

$$P_{Expected,RC} = E_{total,RC} * (a_{1,E} + a_{2,E} * E_{total,RC} + a_{3,E} * T_{a,RC} + a_{4,E} * v_{RC})$$

1.7.1.2.10 $P_{Expected,RC}$ is the expected power value for the Reporting Condition Month (W).

1.7.1.2.11 $E_{Total,RC}$ is the total irradiance for the Reporting Condition Month (W/m^2).

1.7.1.2.12 $T_{a,RC}$ is the ambient temperature at the Reporting Condition Month (°C).

1.7.1.2.13 $v_{,RC}$ is the wind speed of the Reporting Condition Month (m/s).

$a_{1,E}$, $a_{2,E}$, $a_{3,E}$, *and* $a_{4,E}$ are the Expected Capacity regression coefficients calculated in Section 1.7.1.2.

1.7.1.2.14 The R^2 value of the linear regression analysis must be greater than 0.90.

1.7.1.3 The expected power output values shall be rounded to four (4) significant figures. If Capacity Test period spans multiple months, Reporting Conditions and Expected Capacity shall be based on the weighted average of the months covered during the test.

Table 1-2 Reporting Conditions and Expected Capacity

Month	Total Plane of Array Irradiance (W/m²) $E_{Total,RC}$	Ambient Temperature (°C) $Ta_{,RC}$	Wind Speed (m/s) v_{RC}	Expected Capacity (kW) $P_{Expected,\ RC}$
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
30-day test window	TBD	TBD	TBD	TBD

1.8 Measured Capacity Identification

1.8.1 The following procedure shall be used to identify the Measured Capacity value for the Project.

1.8.1.1 Use measured Data Records acquired in accordance with the PV Plant Capacity Test Plan.

1.8.1.2 Apply the primary data exclusion criteria identified in Section 1.5.2 of this document.

1.8.1.3 Apply the secondary data exclusion criteria identified in Section 1.5.3 of this document.

1.8.1.4 The PV Plant Capacity Test Measurement Period is to be extended until sufficient data is collected but shall not be less than five (5) consecutive days. Measured Capacity shall be measured at the Revenue Meter without any adjustments to account for losses in components of the Project prior to the POI.

1.8.1.5 Calculate the Measured Capacity regression coefficients by performing a least squares regression of $P_{Measured}$ as defined below.

$$E_{total,M} = E_{POA,M} + E_{Rear,M} * \varphi$$

$$P_{Measured} = E_{total,M} * (a_{1,M} + a_{2,M} * E_{total,M} + a_{3,M} * T_{a,M} + a_{4,M} * v_M)$$

1.8.1.5.1 $P_{Measured}$ is the measured power value (W).

1.8.1.5.2 $T_{a,M}$ is the measured ambient temperature (°C).

1.8.1.5.3 E_{POA} is the front side plane of array irradiance (W/m^2).

1.8.1.5.4 E_{Rear} is the rear side irradiance (W/m^2).

1.8.1.5.5 $E_{total,M}$ is the total plane of array irradiance (W/m^2).

1.8.1.5.6 φ is the bifaciality factor of the PV Module from the datasheet.

1.8.1.5.7 v_m is the measured wind speed at the site (m/s)

1.8.1.5.8 $a_{1,M}$, $a_{2,M}$, $a_{3,M}$, *and* $a_{4,M}$ are the Measured Capacity regression coefficients to be solved.

1.8.1.6 Using the Measured Capacity regression coefficients $a_{1,M}$, $a_{2,M}$, $a_{3,M}$, *and* $a_{4,M}$, along with the Reporting Condition from Table 2, or as calculated in this section, as applicable, corresponding to the month of the PV Plant Capacity Test Period.

$$Measured\ Capacity = E_{total,RC} * (a_{1,M} + a_{2,M} * E_{total,RC} + a_{3,M} * T_{a,RC} + a_{4,M} * v_{RC})$$

1.8.1.6.1 Measured Capacity is the calculated power value based on Reporting Conditions using Measured Capacity regression coefficients (W).

1.8.1.6.2 $T_{a,RC}$ is the ambient temperature at the Reporting Condition (°C).

1.8.1.6.3 $E_{total,RC}$ is the total plane of array irradiance at the Reporting Condition (W/m^2).

1.8.1.6.4 $v_{m,RC}$ is the wind speed at the Reporting Condition (m/s).

1.8.1.6.5 $a_{1,M}$, $a_{2,M}$, $a_{3,M}$, *and* $a_{4,M}$ are the Measured Capacity regression coefficients calculated in Section 1.8.1.6.

1.8.1.6.6 The R^2 value of the linear regression analysis must be greater than 0.90.

1.8.2 All measured data shall be made available to the Owner upon request during the PV Plant Capacity Test Measurement Period

1.9 Test Reporting

1.9.1 PV Plant Capacity Test Report

No more than seven (7) business days following the end of the PV Plant Capacity Test Measurement Period, a draft PV Plant Capacity Test Report shall be submitted to the Owner. The Owner shall review

and accept or reject the results of the draft PV Plant Capacity Test report within ten (10) business days. The Owner shall submit all comments and reasoning for rejecting such report.

1.9.1.1 The PV Plant Capacity Test Report shall contain:

1.9.1.1.1 The portions of the Commissioning Plan applicable to the Project Performance Test to determine PV Plant Capacity.

1.9.1.1.2 The actual start and end dates/times of the PV Plant Capacity Test Measurement Period.

1.9.1.1.3 General environmental conditions during the PV Plant Capacity Test Measurement Period.

1.9.1.1.4 Summary of quality control results for all Data Records.

1.9.1.1.5 Summary of the test and test results.

1.9.1.1.6 Uncertainty analysis.

1.9.1.1.7 Comparison of test results with the Guaranteed PV Plant Capacity and Minimum PV Plant Capacity.

1.9.1.1.8 Summary of findings if the test results are less than the Guaranteed PV Plant Capacity.

1.9.1.1.9 Raw data of all test points shall be provided to the Buyer electronically (.CSV, .XLS or .XLSX format).

1.9.2 Pass/Failure of PV Plant Capacity Test

1.9.2.1 The Guaranteed Capacity and Minimum Guaranteed Capacity shall be as defined in Section 1.3. The Measured Capacity shall be as calculated in Section 1.8.

1.9.2.2 If the Measured Capacity is equal to or greater than the Guaranteed Capacity, then the Contractor has achieved the Guaranteed Capacity.

$$Measured\ Capacity \geq Guaranteed\ Capacity$$

1.9.2.3 If the Measured Capacity is equal to or greater than the Minimum Guaranteed Capacity and the Measured Capacity is less than the Guaranteed Capacity, then the Contractor has achieved the Minimum Guaranteed Capacity.

$$Measured\ Capacity < Guaranteed\ Capacity$$
$$and$$
$$Measured\ Capacity \geq Minimum\ Guaranteed\ Capacity$$

1.9.2.4 If the Measured Capacity is less than the Minimum Guaranteed Capacity, then the Contractor has not achieved the Minimum Guaranteed Capacity.

$$Measured\ Capacity < Minimum\ Guaranteed\ Capacity$$

Exhibit H-4

Solar PV Long-Term Energy Test Exhibit

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1.0 Energy Test

1.1 Purpose

The objective of the Energy Test is to compare measured energy yield to expected energy yield for a defined, limited plant test duration. The Energy Test shall be conducted in accordance with IEC 61724-3, with additional specifications provided herein. In the event of any conflict with IEC 61724-3 and these specifications, the terms of these specifications shall take precedent. The Energy Test period shall be no less than thirty (30) and no longer than 60 days and shall be performed in late spring, summer, or early fall months, as part of Final Acceptance Test Plan certification requirements.

The Contractor shall furnish a detailed Energy Test Plan document to the Owner no later than thirty (30) days before the Energy Test start date.

1.2 Reference Standards

- NREL 73982 – Suggested Modifications for Bifacial Capacity Testing
- IEC 61853-1 – Photovoltaic Module Performance Testing and Energy Rating

1.3 Definitions

- "Ee" means Expected Energy Production (in kWh) calculated using the Base Case PVsyst Model.
- "Em" means Measured Energy Production (in kWh) calculated as the accumulation (sum) of the measured energy from the beginning of the Energy Test through the end of the Energy Test.
- "EP" means Energy Performance calculated as the ratio of Measured Energy Production (Em) and Expected Energy Production (Ee) calculated using the Base Case PVsyst Model.
- "Guaranteed EP" means 97 percent of the ratio of Measured Energy (Em) to Expected Energy (Ee).
- "kWh" means electric energy expressed in kilowatt-hours and measured by multiplying the average value of electric power delivered (measured in kilowatts) by the amount of time over which the electricity was consumed (measured in hours). One (1) kilowatt-hour equals one thousand (1000) watt-hours.
- "Minimum EP" means 95 percent of the ratio of Measured Energy (Em) to Expected Energy (Ee).
- "Plane of Array" or "POA" means the plane in which the modules are configured.
- Project Model – The PVsyst model and post-processing calculations/models.
- Revenue Meter – A revenue grade meter, as agreed to by all parties, located at the Point of Interconnection.
- Test Period means a period of thirty (30) days during which the Energy Test requirements have been satisfied, and over which data will be evaluated to establish whether the Project has met the requirements of the Energy Test.

1.4 Facility Requirements

1. Site averaged 1-minute measurements of the following parameters that are to be recorded during the Energy Test:
    - Global Horizontal Irradiance.
    - Plane of Array Irradiance [POAI].

- Rear POAI (for bifacial modules only).
- Ambient air temperature.
- Wind speed.
- Energy production from project revenue meter.
- Ground Albedo values measured from 11 AM – 1 PM local solar time for monthly average values (for bifacial modules only).
- Soiling loss (averaged from on-site measurements over the testing period).

2. All measurement devices and sensors shall meet the minimum accuracy requirements and range requirements set forth in Capacity Test Exhibit H-3.
3. Energy Solar Facility availability shall be no less than 100%. All the long-term failures of major equipment (inverters, AC cables/switchgear, and/or substation equipment) during the test shall cause data collection to cease. Once failure root cause(s) have been remedied to Owner's approval, Energy Test shall be resumed. A minimum of thirty (30) days of test data shall be recorded after accounting for site availability losses.
4. The Energy Test shall continue during extreme weather, save for the following specific cases: snow or ice accumulation on PV modules, or terms of Force Majeure as described in the Agreement. In the event of either of these conditions, data collection shall cease, and energy testing shall re-start or resume accordingly when the extreme weather conditions clear.
5. If grid disturbances beyond the Point of Interconnection impede the project's performance, Contractor shall document such conditions for Owner's review, including precise date(s) and time(s) when the issues occurred. The Contractor and Owner shall decide whether the Energy Test may be resumed with some data exclusions upon restoration of expected grid conditions, or if the test needs to be restarted with a request to restart the test by the Contractor.
6. Should issues with the project SCADA system prevent complete and accurate data collection, Contractor shall document such conditions for Owner's review, including precise date(s) and time(s) when the issues occurred. Contractor and Owner will discuss to decide whether the Energy Test may be resumed upon restoration of the SCADA System, or if the test needs to be restarted.

1.5 Expected Energy Production

Expected Energy Production, Ee (kWh), shall be calculated using the Project Model. The Project Model shall have the following considerations:

1. Solar facility availability shall be set to 100% (as per conditions stated in Point 2 of Section 1.4, "Facility requirements"). Long-term module degradation/aging losses shall be set to 0.5%.
2. Soiling losses shall remain the same as defined and agreed to in the Project Model Configuration Assumptions (PVsyst) table. Alternatively, on-site soiling measurements may be utilized during the Energy Test period to determine the representative value of soiling losses. If electing the soiling measurement option, Contractor shall develop and submit the methodology for Owner approval as part of the Energy Test Plan documentation.
3. The Project Model shall be updated for as-built conditions, including the as-installed module bin-class distribution, AC and DC losses, and MVT and MPT transformer losses per their respective FAT reports.The Expected Energy (Ee) Production shall be computed by inputting the Measured Level Met Data into the Project Model adapted for the Energy Test. The Measured Data shall be

averaged to 1-hour intervals and be made compatible to be incorporated into the PVsyst with required formatting. The Project Model run shall be based on the agreed upon Project Model Configuration Assumptions (PVsyst) table.

4. Only the hours corresponding to the Test Period will be used to calculate the Expected Energy Production from the adapted Project Model, and corresponding time periods that have missing values in the measured data shall be removed from the data.Measured Energy Production

The Measured Energy Production, "Em" (kWh) shall be calculated as follows:

1. The accumulation (sum) of the Measured Energy from the beginning of the Energy Test through the end of the Energy Test.
2. Excluding any energy produced during any hours where there was any excluded data during the Energy Test period.Test Uncertainty Allowance

The Test Uncertainty Allowance shall be 3%.Performance Calculation

Energy Performance (EP) shall be calculated as the ratio of Measured Energy (Em) and Expected Energy (Ee) calculated from base case PVsyst model with actual met data.

$$EP\ \% = \frac{Em}{Ee}\ x\ 100$$

1.6 Test Pass Criteria

The test shall be considered as passed if the resulting EP is greater than or equal to 97%.

1.7 Test Results Reporting

The Contractor shall deliver initial Energy Test results to the Owner within Seven (7) business days after completing the test. A detailed Test Report with results shall be submitted within ten (10) business days after completing the test and shall be supported with raw data and relevant calculations to the Owner for review. The Owner shall review and send comments to the Contractor within ten (10) business days upon receiving the detailed Test Report.

The PV Plant Energy Test Report shall contain the following:

- The portions of the Commissioning Plan applicable to the Energy Test.
- The actual start and end dates/times of the PV Plant Energy Test Measurement Period.
- General environmental conditions during the PV Plant Energy Test Measurement Period.
- Summary of quality control results for all Data Records.
- Summary of the test and test results.
- Uncertainty analysis.
- Comparison of test results with the Guaranteed EP and Minimum EP.
- Summary of findings if the test results are less than the Guaranteed EP.
- Raw data of all test points shall be provided to the Buyer electronically (.CSV, .XLS, or .XLSX format).

1.7.1 Pass/Failure of Energy Test

- If the EP is equal to or greater than the Guaranteed EP, then Contractor has achieved the Guaranteed EP.

If the EP is equal to or greater than the Minimum EP but is less than the Guaranteed EP, then Contractor has achieved the Minimum EP but has failed to achieve the Guaranteed EP.

If the EP is less than the Minimum EP, then Contractor has not achieved the Minimum EP or the Guaranteed EP.

Exhibit H-5

BESS Performance Test

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1.0 Performance Tests

1.1 Purpose

The purpose of the Capacity Test is to verify the as-built Project capacity. This document establishes the references, standards, and procedures to be used to calculate the Project capacity. The battery energy storage system (BESS) Capacity Test follows a adapted version of the IEC 62933-2-1 unit parameters and testing methods of BESS. The results of this test will determine if the Project has successfully met the capacity requirements of the design.Reference Standards

- IEEE Std 2030.3 – Standard Test Procedures for Electric Energy Storage Equipment and Systems for Electric Power Systems Applications.
- IEEE Std 1881 – IEEE Standard Glossary of Stationary Battery Terminology.
- IEEE Std 2962 – IEEE Draft Recommended Practice for the Installation, Operation, Maintenance, Testing, and Replacement of Lithium-ion Batteries for Stationary Applications.
- IEC 62933-2 – Electrical energy storage (EES) systems – Part 2-1: Unit parameters and testing methods – General specification.

1.2 Definitions

- BESS – Battery Energy Storage System
- EES – Electrical Energy Storage
- BOL – Beginning of Life
- PCS – Power Conversion System
- POI – Point of Interconnection
- Revenue Meter – A revenue grade meter, as agreed to by all parties, located at the Point of Interconnection and any other locations as required.
- RTE – Round Trip Efficiency

1.3 Pre-Test Activity

The following lists detail the prerequisite tasks required prior to the initiation of the BESS Capacity Plan. These include both the site prerequisite tasks and parameters, and the Capacity Test specific requirements.

1.3.1 Site Prerequisites

- All Contractor-supplied systems within Contractor's Scope of Work shall be complete and ready for energization. All Owner-furnished systems shall be completed and commissioned by the Owner (or OEM, where applicable) prior to commencement of Capacity Testing.Visual inspection of all equipment.
- BESS thermal systems fully operational and commissioned.
- Any fire alarm systems fully operational and commissioned.
- BMS fully operational and commissioned.
- EMS fully operational and commissioned.

- Grounding tests completed.
- Conductor tests including insulation resistance, and continuity tests.
- Protection system tests completed.
- Equipment factory tests, UL9540A, UL1741, etc.
- All equipment functional tests as required.

1.3.2 BESS Capacity Plan

- The as-built Project Model from the BESS supplier showing identification of all parties involved.
- The estimated starting and ending dates of the BESS Capacity Test Measurement Period.
- Project parameters including, at a minimum, manufacturer/model/quantity of BESS modules, containers, manufacturer/model/quantity of inverters.
- Identification of all sensors and transducers to be used including cut sheets, calibration certificates and records, map locating sensors with sufficient detail to locate.
- Identification of the SCADA System data channels and calibration parameters for each data channel.
- Identification of the sensors intended for Redundant Measurement.
- Identification of multiple measurement formulas and weighting factors.
- Identification of known times or areas of data quality concerns.
- Time stamp convention and data logging averaging method and interval.
- Expected Capacity calculations as described in Section 1.7 and monthly Reporting Conditions.
- Written notification must be made to the Owner 5 business days before starting the BESS Capacity Test.
- No less than 2 business days prior to commencement of the BESS Capacity Test, a pre-test meeting shall be held. The meeting shall review the BESS Capacity Test Plan, instrumentation locations, calibration sheets, safety requirements, and other relevant topics. Meeting minutes shall be recorded and published by the Contractor.

1.4 Combined BESS Capacity Test

1.4.1 Expected Energy Capacity

The energy Capacity Test verifies that the available energy (the energy that can be output at the point of connection by operating at rated power) is in accordance with the Project requirements. The expected energy capacity value per the procurement plan is rated for AC power at the point of interconnection (POI) for 2 hours. This includes a 3-year minimum overbuild and is inclusive of the auxiliary power (which shall be measured based on atmospheric conditions). Additional requirements and restrictions from the BESS supplier like throughput limits, rest periods, etc., must be considered as well. A table of values to be utilized and compared against for testing is demonstrated below. The energy Capacity Test values shall be inclusive of overbuild to address full installed capacity not just the rated capacity.

	Beginning of Life (BOL) (Year Zero)

Installed Energy Capacity (DC Nominal), (MWh)	361
Installed Energy Capacity (AC Usable), (MW)	185

Coordination with the grid operator per the Agreement will be necessary to perform the charging and discharging tests. Adequate time must be reserved and scheduled with the operator such that any outages required are coordinated. This will avoid any delay of testing due to grid operator scheduling.

The points of connection that a meter will be placed at to measure the rated power values are:

Location	Equipment
AC Bus	Power Meter
POI	Power Meter
Auxiliary Feed	Power Meter

Note that the Auxiliary feed location and use is dependent on project specific Aux requirements.

The table of values required to be measured at the POC to calculate the energy capacity is shown below.

Po_i	Active Power Output at Time i (W)	XXX
Δt	Sampling time of measurement (h)	XXX
E_{aux_o}	Energy consumption of the aux system measured (if included) (Wh)	XXX
n	Discharge time in (h)	XXX

1.4.2 Measured Energy Capacity

The energy Capacity Test shall perform two full cycles of charging and discharging. The procedure is as follows:

A. Verify the BESS system is charged to full capacity.

B. The BESS system shall be discharged at rated power. Once at the minimum value, it should be confirmed that continuous discharge is available. Calibrated meters shall measure the values during discharge and confirm that it matches the expected capacity.

C. The system shall be charged to full power once more.

D. The system shall be discharged and measured again as described in Step A.

E. The average of the results shall be used.

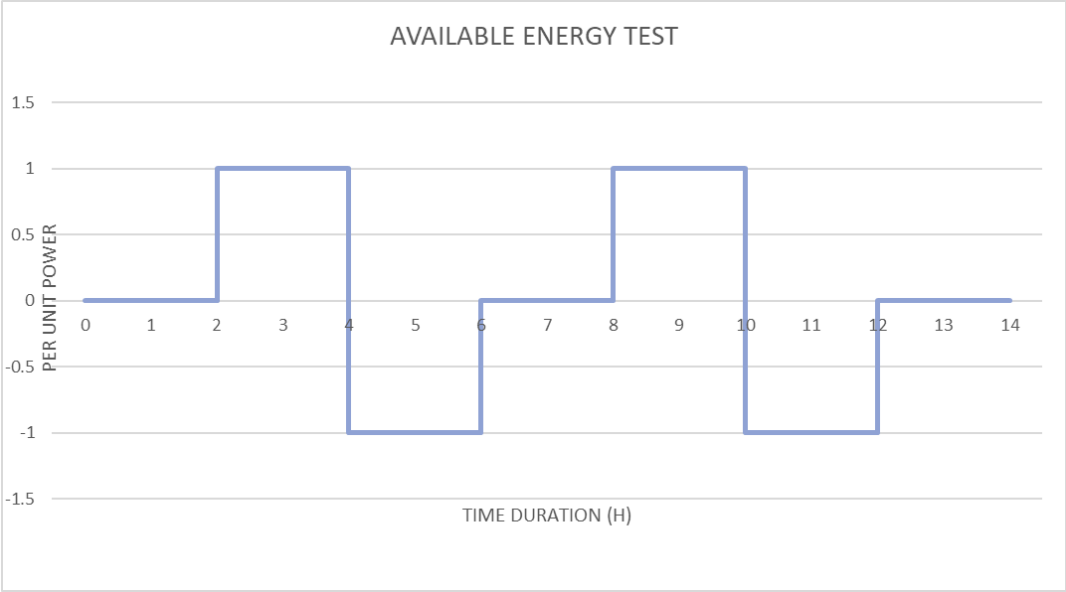

Figure 1 Energy Capacity Test Duty Cycle

The operating conditions for the test above must be in accordance with the following:

- Daily average temperature of 23° C.
- Instantaneous variation of temperature within the enclosure better than +/- 5° C.
- String Uniformity less than 5° C (maximum and minimum string temperature difference, daily average).
- Ambient Humidity: < 80% (non-condensing)
- Storage Temperature: 5 to 28° C (0° C to 40° C for BCU).
- Temperature in Outage Mode: 5° C to 28° C (0° C to 40° C for BCU).

1.5 Test Uncertainty Allowance

The Test Uncertainty Allowance shall be ±0.5%.

1.6 Performance Calculation

The average values calculated per the two cycle measurements shall be used.

Energy Performance (EP) shall be calculated as the ratio of Measured Energy (Em) and Expected Energy (Ee) calculated from the average values of the two tests (E_{test1} and E_{test2}) determined per the two cycle measurements in the Capacity Test.

$$Em = \frac{E_{test1} + E_{test2}}{2}$$

$$EP\ \% = \frac{Em}{Ee}\ x\ 100$$

1.6.1 Excluded Energy

Energy is discharged during ramping when output power is less than rated power. This is not included in the performance calculation due to its small contribution.

1.7 Power Calculation

Power shall be calculated for both charging and discharging in accordance with IEC 62933-2-1 Section 6.2.2.2.

Charging power test:

It shall be confirmed that BESS can absorb (or be charged at) constant power for a specified duration at the POI in accordance with the following procedures. The rated input active power of the BESS shall be applied as the constant power value in this test.

1. In Step B of the actual energy Capacity Test in 6.2.1, the rated power is input to the BESS Control system.
2. The input power and the charging duration shall be measured.
3. The measured values of the input active power and the charging time duration shall be compared to the specified unit parameters.

Discharging power test:

It shall be confirmed that the BESS can output constant power for a specified duration at the POC in accordance with the following procedures. The rated output active power of the BESS shall be applied as the constant power value in this test.

1. In Step C of the actual energy Capacity Test in 6.2.1, the rated power is the output from the EES system at constant power.
2. The output power and the discharge time shall be measured.
3. The measured values of the output power and the discharge time duration shall be compared to the specified unit parameters.

If time interval between test case a) and b) is needed, it shall be measured and recorded.

Power Performance shall be calculated as the ratio of Measured Power (Pm) and Expected Power (Pe) calculated from the average values determined per the two cycle measurements in the Capacity Test.

$$Pm = \frac{P_{test1} + P_{test2}}{2}$$

$$PP\ \% = \frac{Pm}{Pe} x\ 100$$

1.8 Round Trip Efficiency (RTE) Calculation

This test shall be performed using the energy Capacity Test routine and the cycle performed shall deliver the total amount of energy at the POC which equals the energy capacity of the system. The formula for round trip efficiency is shown below.

$$\eta_{rt} = \frac{E_O - E_{aux-O}}{E_I - E_{aux-I}}$$

The roundtrip efficiency shall be reported as shown in the table below for the two tests.

	E_O (Wh)	E_I (Wh)	E_{aux_I} (Wh)	E_{aux_O} (Wh)	Roundtrip Efficiency ηrt (%)
Test 1					
Test 2					
Average					

1.9 Test Pass Criteria

The test shall be considered as passed if values are greater than or equal to the following:

EP%	95%
PP%	97%
ηrt (%)	90%

1.10 Test Results Reporting

The contractor shall deliver initial Energy Test results to the Owner within 5 business days after completing the test.

A detailed test report with results shall be submitted within 10 business days after completing the test and shall be supported with raw data and relevant calculations to the Owner for review. The Owner shall review and send comments to the Contractor within 10 business days upon receiving the detailed test report.

The BESS Energy Test Report shall contain:

- The portions of the Commissioning Plan applicable to the Energy Test.
- The actual start and end dates/times of the BESS Energy Test Measurement Period.
- General environmental conditions during the BESS Energy Test Measurement Period.
- Summary of quality control results for all Data Records.
- Summary of the test and test results.
- Uncertainty analysis.
- Comparison of test results with the Guaranteed EP and Minimum EP.

- Summary of findings if the test results are less than the Guaranteed EP.
- Raw data of all test points shall be provided to the Owner electronically (CSV, .XLS or .XLSX format).

1.10.1 Pass/Failure of Energy Test

- If the EP is equal to or greater than the Guaranteed EP, then Contractor has achieved the Guaranteed EP.
- If the EP is equal to or greater than the Minimum EP but is less than the Guaranteed EP, then Contractor has achieved the Minimum EP but has failed to achieve the Guaranteed EP.
- If the EP is less than the Minimum EP, then Contractor has not achieved the Minimum EP or the Guaranteed EP.

1.11 Exclusions

Various tests listed in the 2023 ERPI Commissioning Guide can provide a thorough detailed analysis of a BESS installation. They may be referenced for informational purposes but not required for full test procedures or parameters.

Certain specific project use cases, specific grid interconnection, or some AHJs may have unique requirements for testing which are not broadly applicable to all projects except for where these are explicitly required in other places. The following are to be excluded from the BESS Capacity Testing.

1.11.1 Excluded Tests

- Reactive Power Test – Where required by the interconnecting utility or independent system operator (ISO), this can be performed. Requirements and scheduling are provided by the utility or ISO.
- Harmonics – Where the engineering studies calculate probable harmonic issues, a site-specific measurement programming would be set up to validate any suspected harmonic issues and inform the design of proposed remediations.
- Ramp Rates – When the ISO or interconnect agreement have specific limitations to the ramp rates for the PCS, those will be provided and tested as a part of other grid integration tests.
- Black Start – When the project is required to have black start capability, site specific testing shall be developed to validate this capability.
- Self-discharge – When desired, this test may be performed according to the IEC methods.
- Noise tests – Far field noise tests shall be performed if required by the authority having jurisdiction and in accordance with their provisions and industry best practices.
- Grid Integration tests such as:
    - Frequency and voltage ride through – Where required by the interconnecting utility or independent system operator (ISO), this can be performed. Requirements and scheduling are provided by the utility or ISO.
    - Model Quality Testing – PCS model quality verification is performed under a separate specification and exhibit.

- Other NERC testing – NERC specific testing is performed under a separate specification and exhibit.

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ERCOT STANDARD GENERATION INTERCONNECTION AGREEMENT

BLUE HERON SOLAR, LLC

CHISME SOLAR
GINR 24INR0333
&
CHISME STORAGE
GINR 24INR0331

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ERCOT STANDARD GENERATION INTERCONNECTION AGREEMENT

This Standard Generation Interconnection Agreement is made and entered into this **31** day of October 2024, between Oncor Electric Delivery TSP LLC, a Delaware limited liability TSP ("Transmission Service Provider") and **Blue Heron Solar, LLC** ("Generator"), hereinafter individually referred to as "Party," and collectively referred to as "Parties". In consideration of the mutual covenants and agreements herein contained, the Parties hereto agree as follows:

Transmission Service Provider represents that it is a public utility that owns and operates facilities for the transmission and distribution of electricity. Generator represents that it will own and operate the Plant. Pursuant to the terms and conditions of this Agreement, Transmission Service Provider shall interconnect Generator's Plant with Transmission Service Provider's System consistent with the Facilities Study Agreement executed between the Parties on **April 28, 2023**.

This Agreement applies only to the Plant and the Parties' interconnection facilities as identified in Exhibit "C".

This Agreement shall become effective upon execution, subject to Governmental Authority approval, if required, and shall continue in full force and effect until terminated in accordance with Exhibit "A".

This Agreement will be subject to the following, all of which are incorporated herein:

A. The "Terms and Conditions of the ERCOT Standard Generation Interconnection Agreement" attached hereto as Exhibit "A";

B. The ERCOT Requirements (unless expressly stated herein, where the ERCOT Requirements are in conflict with this Agreement, the ERCOT Requirements shall prevail);

C. The PUCT Rules (where the PUCT Rules are in conflict with this Agreement, the PUCT Rules shall prevail);

D. The Time Schedule attached hereto as Exhibit "B";

E. The Interconnection Details attached hereto as Exhibit "C";

F. The notice requirements attached hereto as Exhibit "D"; and

G. The Security Arrangement Details attached hereto as Exhibit "E"

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IN WITNESS WHEREOF, the Parties have executed this Agreement in duplicate originals, each of which shall constitute and be an original effective Agreement between the Parties.

ONCOR ELECTRIC DELIVERY TSP LLC	BLUE HERON SOLAR, LLC
By: DocuSigned by: D86522A7E0764AE...	By: Signed by: Mike Luo 3E3F890114A4489...
Name: Jim Greer (Print or type)	Name: Mike Luo (Print or type)
Title: EVP & COO	Title: Director
Date: 11/4/2024 | 7:50:49 AM PST	Date: 10/31/2024 | 9:49:55 AM PDT

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Exhibit "A"

Terms and Conditions of the ERCOT

Standard Generation Interconnection Agreement

ARTICLE 1. DEFINITIONS

Capitalized terms shall have the meanings as set forth below, except as otherwise specified in the Agreement:

1.1 "CCN" shall mean a Certificate of Convenience and Necessity issued by the PUCT.

1.2 "Commercial Operation" shall mean the date on which Generator declares that the construction of the Plant has been substantially completed, Trial Operation of the Plant has been completed, and the Plant is ready for dispatch.

1.3 "Control Area" shall have the meaning ascribed thereto in PUCT Rule 25.5(19) or its successor.

1.4 "ERCOT" shall mean the Electric Reliability Council of Texas, Inc.

1.5 "ERCOT Requirements" means the ERCOT Operating Guides, ERCOT Generation Interconnection Procedures as well as any other documents adopted by ERCOT relating to the interconnection and operation of generators and transmission systems in ERCOT as amended from time to time, and any successors thereto. Any requirement in the foregoing documents imposed upon generation entities or generation facilities shall become the responsibility of the Generator, and any requirements imposed on transmission providers or transmission facilities shall become the responsibility of the TSP.

1.6 "Facilities Study" shall have the meaning as described in PUCT Rule 25.198(d) or its successor.

1.7 "Facilities Study Agreement" shall mean an agreement executed by the Parties relating to the performance of the Facilities Study.

1.8 "GIF" shall mean Generator's interconnection facilities as described in Exhibit "C".

1.9 "Good Utility Practice" shall have the meaning described in PUCT Rule 25.5(56) or its successor.

1.10 "Governmental Authority(ies)" shall mean any federal, state, local or municipal body having jurisdiction over a Party.

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1.11 "In-Service Date" shall be the date, as reflected in Exhibit "B", that the TIF will be ready to connect to the GIF.

1.12 "Plant" shall mean the electric generation facility owned and operated by the Generator, as specified in Exhibit "C".

1.13 "Point of Interconnection" shall mean the location(s) where the GIF connects to the TIF as negotiated and defined by the Parties and as shown on Exhibit "C" of this Agreement.

1.14 "PUCT" shall mean the Public Utility Commission of Texas.

1.15 "PUCT Rules" shall mean the Substantive Rules of the PUCT.

1.16 "Reasonable Efforts" shall mean the use of Good Utility Practice and the exercise of due diligence (pursuant to PUCT Rule 25.191(d)(3)).

1.17 "System Protection Equipment" shall mean those facilities located within the TIF and the GIF as described in Section 5.6 and Exhibit "C".

1.18 "System Security Study" shall have the meaning as described in PUCT Rule 25.198(c) or its successor.

1.19 "TCOS" shall mean the TSP's transmission cost of service as allowed by the applicable Governmental Authority.

1.20 "TIF" shall mean the TSP's interconnection facilities as described in Exhibit "C" to this Agreement.

1.21 "Trial Operation" shall mean the process by which the Generator is engaged in on-site test operations and commissioning of the Plant prior to Commercial Operation.

1.22 "TSP" shall mean the Transmission Service Provider.

1.23 "TSP System" shall mean the electric transmission facilities, including the TIF, and all associated equipment and facilities owned and/or operated by the TSP.

ARTICLE 2. TERMINATION

2.1 Termination Procedures. This Agreement may be terminated as follows:

A. the Generator may terminate this Agreement after giving the TSP thirty (30) days advance written notice; or

B. the TSP may terminate this Agreement (subject to Governmental Authority approval, if required) on written notice to the Generator if the Generator's Plant has not achieved Commercial Operation within one year after the scheduled Commercial Operation date reflected in Exhibit "B"; or

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C. either Party may terminate this Agreement in accordance with Section 10.6.

2.2 Termination Costs. If a Party elects to terminate the Agreement pursuant to Section 2.1 above, the Generator shall pay all costs incurred (or committed to be incurred) by TSP, as of the date of the other Party's receipt of such notice of termination, that are the responsibility of the Generator under this Agreement. In the event of termination by either Party, both Parties shall use commercially reasonable efforts to mitigate the damages and charges that they may incur as a consequence of termination. The provisions of the Sections 2.2 and 2.3 shall survive termination of the Agreement.

2.3 Disconnection. Upon termination of this Agreement, the Parties will disconnect the GIF from the TIF.

ARTICLE 3. REGULATORY FILINGS

3.1 Filing. The TSP shall file this executed Agreement with the appropriate Governmental Authority, if required. Any portions of this Agreement asserted by Generator to contain competitively sensitive commercial or financial information shall be filed by the TSP identified as "confidential" under seal stating, for the TSP's showing of good cause, that Generator asserts such information is confidential information and has requested such filing under seal. If requested by the TSP, Generator shall provide the TSP, in writing, with the Generator's basis for asserting that the information referred to in this Section 3.1 is competitively sensitive information, and the TSP may disclose such writing to the appropriate Governmental Authority.

3.2 Regulatory Approvals. Unless exempt, the TSP shall timely request ERCOT and all regulatory approvals necessary for it to carry out its responsibilities under this Agreement. Such approvals shall include any CCN required for the construction of the TIF.

ARTICLE 4. INTERCONNECTION FACILITIES ENGINEERING, PROCUREMENT, AND CONSTRUCTION

4.1 Options. The Generator shall select one of the following options (subsection A or subsection B) and include the selected option in Exhibit "B" for completion of the TIF:

A. The TSP shall design, procure, and construct the TIF, using Reasonable Efforts to complete the TIF by the In-Service Date reflected in Exhibit "B". The TSP will utilize its own resources and will contract for additional resources, as reasonably necessary, to meet the In-Service Date. Such resources shall include, as the TSP believes is reasonable, use of other contractors, other equipment suppliers, other material suppliers, additional contract personnel,

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additional payments to contractors for expedited work, and premiums paid to equipment and material suppliers for expedited delivery. The TSP shall not be required to undertake any initiative which is inconsistent with its standard safety practices, its material and equipment specifications, its design criteria and construction procedures, its labor agreements, applicable laws and regulations, and ERCOT Requirements. In the event the TSP reasonably expects that it will not be able to complete the TIF by the In-Service Date, the TSP will promptly provide written notice to the Generator and will undertake Reasonable Efforts to meet the earliest date thereafter.

B. (i) The TSP shall design, procure, and construct the TIF by the In-Service Date reflected in Exhibit "B". The Parties acknowledge that the In-Service Date was either agreed upon through good faith negotiations or designated by the Generator upon failure of the Parties to agree. In the process of negotiating the In-Service Date, Generator will request a date upon which it reasonably expects it will be ready to begin use of the TIF and upon which it reasonably expects to begin doing so. Any date designated by the Generator shall in no event be less than fifteen months from the date that all conditions of Sections 4.2 and 4.3 have been satisfied. The designated In-Service Date will be extended day for day for each day that the ERCOT refuses to grant clearances to install equipment. If the TSP fails to complete the TIF by the In-Service Date reflected in Exhibit "B", the TSP shall pay the Generator liquidated damages in accordance with this Section 4.1.B.

(ii) The Parties agree that actual damages to the Generator, in the event the TIF are not completed by the In-Service Date, may include Generator's fixed operation and maintenance costs and lost opportunity costs. Such actual damages are uncertain and impossible to determine at this time. The Parties agree that, because of such uncertainty, any liquidated damages paid by the TSP to the Generator shall be an amount equal to ½ of 1% of the actual cost of the TIF, per day. However, in no event shall the total liquidated damages exceed 20% of the actual cost of the TIF. The Parties agree that such liquidated damages are less than the Generator's actual damages. The Parties agree that the foregoing payments will be made by the TSP to the Generator as just compensation for the damages caused to the Generator, which actual damages are uncertain and impossible to determine at this time, and as reasonable liquidated damages, but not as a penalty or a method to secure performance of this Agreement.

(iii) The TSP shall apply to have the full costs of the TIF included in TCOS. If the PUCT issues a final, appealable order excluding from TCOS any portion of the TIF costs,

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including higher contractor and vendor costs due to liquidated damage provisions in those contracts and insurance costs to cover liquidated damages, which costs may have been reasonably incurred but which the PUCT finds should not be recovered through TCOS, the Generator shall reimburse the TSP for such costs in an amount not to exceed the difference between the TSP's estimate of the cost of the TIF under section 4.1.A and the TSP's estimate of the cost of the TIF under Section 4.1.B as reflected in Exhibit "C". Such costs shall be estimated using Good Utility Practice.

(iv) No liquidated damages shall be paid to Generator if the Generator is not ready to commence use of the TIF for the delivery of power to the Plant for Trial Operation or export of power from the Plant on the In-Service Date, unless the Generator would have been able to commence use of the TIF for the delivery of power to the Plant for Trial Operation or export of power from the Plant but for TSP's delay.

(v) If the In-Service Date has been designated by the Generator upon a failure of the Parties to agree on the In-Service Date, the TSP may, at its option, require the Generator to subcontract with the TSP for all or part of the design, procurement and construction of the TIF in accordance with the TSP's standard subcontractor agreements. In such event, the TSP shall be subject to the payment of liquidated damages to the Generator only if the In-Service Date is not met solely due to the TSP's failure to complete the portion of the TIF for which the TSP has retained responsibility. It is the intent of this subsection to give the TSP full control of the contents and quality of the TIF. To the extent the Generator acts as a subcontractor to the TSP, the following will apply: 1) The Generator shall engineer, procure equipment, and construct the TIF (or portions thereof) using Good Utility Practice and using standards and specifications provided in advance by the TSP; 2) In its engineering, procurement and construction of the TIF, the Generator shall comply with all requirements of law to which the TSP would be subject in the engineering, procurement or construction of the TIF; 3) The TSP shall review and approve the engineering design, acceptance tests of equipment, and the construction of the TIF; 4) The TSP shall have the right to approve and accept for operation the TIF in accordance with the standards and specifications provided in advance by the TSP, such approval and acceptance shall not be unreasonably withheld, conditioned, or delayed; 5) Should any phase of the engineering, equipment procurement, or construction of the TIF, including selection of subcontractors, not meet the standards and specifications provided by the TSP, and therefore be deemed unacceptable, then

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the Generator shall be obligated to remedy that portion of the TIF or selection of subcontractors that is deemed unacceptable, the TSP's approval of the Generator's selection of subcontractors will not be unreasonably withheld, conditioned or delayed; and 6) Once the TIF is accepted for operation by the TSP, then the TSP shall reimburse the Generator for the reasonable and necessary costs incurred by the Generator to complete the TIF, not to exceed the amount specified in the subcontract. Such reimbursement shall be made within thirty days after receipt of the invoice, unless otherwise agreed to by the Parties.

4.2 Equipment Procurement. If responsibility for construction of the TIF is borne by the TSP, then the TSP shall commence design of the TIF and procure necessary equipment within a reasonable time after all of the following conditions are satisfied:

A. The TSP has completed the Facilities Study pursuant to the Facilities Study Agreement;

B. The TSP has received written authorization to proceed with design and procurement from the Generator by the date specified in Exhibit "B"; and

C. The Generator has provided security to the TSP in accordance with Section 8.3 by the dates specified in Exhibit "B".

4.3 Construction Commencement. The TSP shall commence construction of the TIF as soon as practicable after the following additional conditions are satisfied:

A. Approval of the appropriate Governmental Authority has been obtained for any facilities requiring regulatory approval;

B. Necessary real property rights, if any, have been obtained;

C. The TSP has received written authorization to proceed with construction from the Generator by the date specified in Exhibit "B"; and

D. The Generator has provided security to the TSP in accordance with Section 8.3 by the dates specified in Exhibit "B".

4.4 Work Progress. The Parties will keep each other advised periodically as to the progress of their respective design, procurement and construction efforts. If, at any time, the Generator becomes aware that the completion of the TIF will not be required until after the specified In-Service Date, the Generator will promptly provide written notice to the TSP of a new, later In-Service Date.

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4.5 Conditions Precedent Delay. To the extent this Agreement incorporates a specified In-Service Date and the Generator fails to satisfy conditions precedent under Sections 4.2 and 4.3 so that the TSP may meet the In-Service Date, the Parties will negotiate in good faith to establish a new schedule for completion of the TIF.

ARTICLE 5. FACILITIES AND EQUIPMENT

5.1 Information Exchange. The Parties shall exchange information and mutually agree upon the design and compatibility of the Parties' interconnection facilities. The Parties shall work diligently and in good faith to make any necessary design changes to ensure compatibility of the GIF to the TSP System.

5.2 GIF Construction. Generator agrees to cause the GIF to be designed and constructed in accordance with Good Utility Practice, ERCOT Requirements and the National Electrical Safety Code in effect at the time of construction. Within one-hundred and twenty (120) days after Commercial Operation, unless the Parties agree on another mutually acceptable deadline, the Generator shall deliver to the TSP the following "as-built" drawings, information and documents for the GIF: a one-line diagram, a site plan showing the Plant and the GIF, plan and elevation drawings showing the layout of the GIF, a relay functional diagram, relaying AC and DC schematic wiring diagrams and relay settings for all facilities associated with the Generator's main-power transformers, the facilities connecting the Generator to the main power transformers and the GIF, and the impedances (determined by factory tests) for the associated main power transformers and the generators.

5.3 TIF Construction. The TSP agrees to cause the TIF to be designed and constructed in accordance with Good Utility Practice, ERCOT Requirements and the National Electrical Safety Code in effect at the time of construction.

5.4 Equipment Changes. For facilities not described in Exhibit "C", if either Party makes equipment changes to the Plant, the GIF, the TIF or the TSP System which it knows will affect the operation or performance of the other Party's interconnection facilities, the Parties agree to notify the other Party, in writing, of such changes. Such changes shall be made in accordance with ERCOT Requirements and coordinated between the Parties.

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5.5 Metering, Telemetry and Communications Requirements.

A. Metering and telemetry of data will be accomplished in accordance with ERCOT Requirements. The specific metering, telemetry and communications equipment to be installed and data to be telemetered are described in Exhibit "C".

B. At the Point of Interconnection, the metering and telemetry equipment shall be owned by the TSP. However, the TSP shall provide the Generator with metering and telemetry values in accordance with ERCOT Requirements.

C. A minimum set of inputs to the telemetry equipment are specified in Exhibit "C". Additional sets of inputs may be subsequently mutually agreed upon.

D. The TSP will notify the Generator at least five (5) working days in advance of any planned maintenance, inspection, testing, or calibration of the metering equipment, unless otherwise agreed to in writing. The Generator, or its designated representative, shall have the right to be present for these activities and to receive copies of any documents related to the procedures and results.

E. Prior to the connection of the GIF to the TIF, acceptance tests will be performed by the owning Party to ensure the proper functioning of all metering, telemetry and communications equipment associated with the Point of Interconnection and both Parties' interconnection facilities, and to verify the accuracy of data being received by the TSP, the Control Area(s) in which the Plant and the TSP are located and the Generator. All acceptance tests will be performed consistent with ERCOT Requirements.

F. The TSP shall, in accordance with Good Utility Practice and ERCOT Requirements, specify communications facilities, including those necessary to transmit data from the metering equipment to the TSP, that are necessary for the effective operation of the Plant and the GIF with the TSP System. Such communication facilities shall be included in Exhibit "C". The Generator shall make arrangements to procure and bear the cost of such facilities.

G. Any changes to the meters, telemetry equipment, voltage transformers, current transformers, and associated panels, hardware, conduit and cable, which will affect the data being received by the other Party must be mutually agreed to by the Parties.

H. Each Party will promptly advise the other Party if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the

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attention and/or correction by the other Party. The Party owning such equipment shall correct such error or malfunction as soon as reasonably feasible in accordance with ERCOT Requirements.

5.6 System Protection and Other Controls Requirements.

A. Each Party's facilities shall be designed to isolate any fault, or to correct or isolate any abnormality, that would negatively affect the other Party's system or other entities connected to the TSP System.

B. The Generator shall be responsible for protection of its facilities consistent with ERCOT Requirements.

C. Each Party's protective relay design shall incorporate the necessary test switches to perform the tests required in Section 5.6.F. The required test switches will be placed such that they allow operation of lockout relays while preventing breaker failure schemes from operating and causing unnecessary breaker operations and tripping the Generator's units.

D. Recording equipment shall be installed to analyze all system disturbances in accordance with ERCOT Requirements.

E. Each Party will test, operate and maintain System Protection Equipment in accordance with ERCOT Requirements. Each Party will provide reasonable notice to the other Party of any testing of its System Protection Equipment allowing such other Party the opportunity to have representatives present during testing of its System Protection Equipment.

F. Prior to the In-Service Date, and again prior to Commercial Operation, each Party or its agent shall perform a complete calibration test and functional trip test of the System Protection Equipment. At intervals suggested by Good Utility Practice or at intervals described in the ERCOT Requirements if so defined therein, and following any apparent malfunction of the System Protection Equipment, each Party shall perform both calibration and functional trip tests of its System Protection Equipment. These tests do not require the tripping of any in-service generation unit. These tests do, however, require that all protective relays and lockout contacts be activated.

5.7 No Annexation. Any and all equipment placed on the premises of a Party shall be and remain the property of the Party providing such equipment regardless of the mode and manner of annexation or attachment to real property, unless otherwise mutually agreed by the Parties.

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ARTICLE 6. OPERATION AND MAINTENANCE

6.1 Operation and Maintenance of Interconnection Facilities. The Parties agree to operate and maintain their systems in accordance with Good Utility Practice, National Electrical Safety Code, the ERCOT Requirements, PUCT Rules and all applicable laws and regulations. Subject to any necessary ERCOT approval, each Party shall provide necessary equipment outages to allow the other Party to perform periodic maintenance, repair or replacement of its facilities. Such outages shall be scheduled at mutually agreeable times, unless conditions exist which a Party believes, in accordance with Good Utility Practice, may endanger persons or property. No changes will be made in the normal operation of the Point of Interconnection without the mutual agreement of the Parties except as otherwise provided herein. All testing of the Plant that affects the operation of the Point of Interconnection shall be coordinated between the TSP, the Control Area(s) in which the Plant and the TSP are located, and the Generator and will be conducted in accordance with ERCOT Requirements.

6.2 Control Area Notification. The Control Area within ERCOT is a single Control Area with ERCOT assuming authority as the Control Area operator in accordance with the ERCOT Protocols.

6.3 Land Rights and Easements. Terms and conditions addressing the rights of the TSP and the Generator regarding any facilities located on the other Party's property shall be addressed in a separate, duly executed and recorded easement agreement between the Parties. Prior to Commercial Operation, the Parties will mutually agree upon procedures to govern access to each other's property as necessary for the Parties to fulfill their obligations hereunder.

6.4 Service Interruption. The Parties recognize that the interruption of service provisions of the PUCT Rules give TSP the right to disconnect the TSP System from the Plant under the conditions specified therein. The Generator will promptly disconnect the Plant from the TSP System when required by and in accordance with the PUCT Rules and ERCOT Requirements.

6.5 Switching and Clearance.

A. Any switching or clearances needed on the TIF or the GIF will be done in accordance with ERCOT Requirements.

B. Any switching and clearance procedure necessary to comply with Good Utility Practice or ERCOT Requirements that may have specific application to the Plant shall be addressed in Exhibit "C".

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6.6 Start-Up and Synchronization. Consistent with ERCOT Requirements and the Parties' mutually acceptable procedure, the Generator is responsible for the proper synchronization of the Plant to the TSP System.

6.7 Routine Operational Communications. On a timely basis, the Parties shall exchange all information necessary to comply with ERCOT Requirements.

6.8 Blackstart Operations. If the Plant is capable of blackstart operations, Generator will coordinate individual Plant start-up procedures consistent with ERCOT Requirements. Any blackstart operations shall be conducted in accordance with the blackstart criteria included in the ERCOT Requirements and the TSP Blackstart Plan on file with the ERCOT. Notwithstanding this section, the Generator is not required to have blackstart capability by virtue of this Agreement. If the Generator will have blackstart capability, then Generator shall provide and maintain an emergency communication system that will interface with the TSP during a blackstart condition.

6.9 Power System Stabilizers. The Generator shall procure, install, maintain and operate power system stabilizers if required to meet ERCOT Requirements and as described in Exhibit "C".

ARTICLE 7. DATA REQUIREMENTS

7.1 Data Acquisition. The acquisition of data to realistically simulate the electrical behavior of system components is a fundamental requirement for the development of a reliable interconnected transmission system. Therefore, the TSP and the Generator shall be required to submit specific information regarding the electrical characteristics of their respective facilities to each other as described below in accordance with ERCOT Requirements.

7.2 Initial Data Submission by TSP. The initial data submission by the TSP shall occur no later than 120 days prior to Trial Operation and shall include transmission system data necessary to allow the Generator to select equipment and meet any system protection and stability requirements.

7.3 Initial Data Submission by Generator. The initial data submission by the Generator, including manufacturer data, shall occur no later than 90 days prior to the Trial Operation and shall include a completed copy of the following forms contained in the ERCOT's Generation Interconnection Procedure: (1) Plant Description/Data and (2) Generation Stability Data. It shall also include any additional data provided to the ERCOT for the System Security Study. Data in the initial submissions shall be the most current Plant design or expected performance data. Data

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submitted for stability models shall be compatible with the ERCOT standard models. If there is no compatible model, the Generator will work with an ERCOT designated consultant to develop and supply a standard model and associated data.

7.4 Data Supplementation. Prior to Commercial Operation, the Parties shall supplement their initial data submissions with any and all "as-built" Plant data or "as-tested" performance data which differs from the initial submissions or, alternatively, written confirmation that no such differences exist. Subsequent to Commercial Operation, the Generator shall provide the TSP any data changes due to equipment replacement, repair, or adjustment. The TSP shall provide the Generator any data changes due to equipment replacement, repair, or adjustment in the directly connected substation or any adjacent TSP-owned substation that may affect the GIF equipment ratings, protection or operating requirements. The Parties shall provide such data no later than 30 days after the date of the actual change in equipment characteristics. Also, the Parties shall provide to each other a copy of any additional data later required by the ERCOT concerning these facilities.

7.5 Data Exchange. Each Party shall furnish to the other Party real-time and forecasted data as required by ERCOT Requirements. The Parties will cooperate with one another in the analysis of disturbances to either the Plant or the TSP's System by gathering and providing access to any information relating to any disturbance, including information from oscillography, protective relay targets, breaker operations and sequence of events records**.**

ARTICLE 8. PERFORMANCE OBLIGATION

8.1 Generator's Cost Responsibility. The Generator will acquire, construct, operate, test, maintain and own the Plant and the GIF at its sole expense. In addition, the Generator may be required to make a contribution in aid of construction in the amount set out in and for the facilities described in Exhibit "C", if any, in accordance with PUCT Rules.

8.2 TSP's Cost Responsibility. The TSP will acquire, own, operate, test, and maintain the TIF at its sole expense, subject to the provisions of Section 4.1.B and the contribution in aid of construction provisions of Section 8.1 of this Agreement.

8.3 Financial Security Arrangements. The TSP may require the Generator to pay a reasonable deposit or provide another means of security, to cover the costs of planning, licensing, procuring equipment and materials, and constructing the TIF. The required security arrangements shall be specified in Exhibit "E". Within five business days after the Plant achieves Commercial Operation, the TSP shall return the deposit or security to the Generator. However, the TSP may

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retain an amount to cover the incremental difference between the TSP's actual out of pocket costs associated with the choice of Section 4.1.B over Section 4.1.A, pending a final PUCT Order as contemplated in Section 4.1.B(iii). If the Plant has not achieved Commercial Operation within one year after the scheduled Commercial Operation date identified in Exhibit "B" or if the Generator terminates this Agreement in accordance with Section 2.1 and the TIF are not required, the TSP may, subject to the provisions of Section 2.2, retain as much of the deposit or security as is required to cover the costs it incurred in planning, licensing, procuring equipment and materials, and constructing the TIF. If a cash deposit is made pursuant to Exhibit "E", any repayment of such cash deposit shall include interest at a rate applicable to Generator deposits as established from time to time by the PUCT or other Governmental Authority.

ARTICLE 9. INSURANCE

9.1 Each Party shall, at its own expense, maintain in force throughout the period of this Agreement and until released by the other Party the following minimum insurance coverages, with insurers authorized to do business in Texas:

A. Employers Liability and Worker's Compensation Insurance providing statutory benefits in accordance with the laws and regulations of the State of Texas. The minimum limits for the Employer's Liability insurance shall be One Million Dollars ($1,000,000) each accident bodily injury by accident, One Million Dollars ($1,000,000) each employee bodily injury by disease, and One Million Dollars ($1,000,000) policy limit bodily injury by disease.

B. Commercial General Liability Insurance including premises and operations, personal injury, broad form property damage, broad form blanket contractual liability coverage (including coverage for the contractual indemnification) products and completed operations coverage, coverage for explosion, collapse and underground hazards, independent contractors coverage, coverage for pollution to the extent normally available and punitive damages to the extent normally available and a cross liability endorsement, with minimum limits of One Million Dollars ($1,000,000) per occurrence/One Million Dollars ($1,000,000) aggregate combined single limit for personal injury, bodily injury, including death and property damage.

C. Comprehensive Automobile Liability Insurance for coverage of owned, non-owned and hired vehicles, trailers or semi-trailers designed for travel on public roads, with a minimum combined single limit of One Million Dollars ($1,000,000) per occurrence for bodily injury, including death, and property damage.

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D. Excess Public Liability Insurance over and above the Employer's Liability, Commercial General Liability and Comprehensive Automobile Liability Insurance coverage, with a minimum combined single limit of Twenty Million Dollars ($20,000,000) per occurrence/Twenty Million Dollars ($20,000,000) aggregate.

E. The Commercial General Liability Insurance, Comprehensive Automobile Liability Insurance, and Excess Public Liability Insurance policies shall name the other Party, its parent, associated and affiliated companies and their respective directors, officers, agents, servants and employees ("Other Party Group") as additional insured. All policies shall contain provisions whereby the insurers waive all rights of subrogation in accordance with the provisions of this Agreement against the Other Party Group and provide thirty (30) days advance written notice to Other Party Group prior to anniversary date of cancellation or any material change in coverage or condition.

F. The Commercial General Liability Insurance, Comprehensive Automobile Liability Insurance and Excess Public Liability Insurance policies shall contain provisions that specify that the policies are primary and shall apply to such extent without consideration for other policies separately carried and shall state that each insured is provided coverage as though a separate policy had been issued to each, except the insurer's liability shall not be increased beyond the amount for which the insurer would have been liable had only one insured been covered. Each Party shall be responsible for its respective deductibles or retentions.

G. The Commercial General Liability Insurance, Comprehensive Automobile Liability Insurance and Excess Public Liability Insurance policies, if written on a Claims First Made basis, shall be maintained in full force and effect for two (2) years after termination of this Agreement, which coverage may be in the form of tail coverage or extended reporting period coverage if agreed by the Parties.

H. The requirements contained herein as to the types and limits of all insurance to be maintained by the Parties are not intended to and shall not in any manner, limit or qualify the liabilities and obligations assumed by the Parties under this Agreement.

I. Within ten (10) days following execution of this Agreement, and as soon as practicable after the end of each fiscal year or at the renewal of the insurance policy and in any event within ninety (90) days thereafter, each Party shall provide certification of all insurance

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required in this Agreement, executed by each insurer or by an authorized representative of each insurer.

J. Notwithstanding the foregoing, each Party may self-insure to the extent it maintains a self-insurance program; provided that, such Party's senior long term debt is rated at investment grade, or better, by Standard & Poor's or Moody's Investor's Service. For any period of time that a Party's senior long term debt is unrated by Standard & Poor's and Moody's Investor's Service or is rated at less than investment grade by Standard & Poor's and Moody's Investor's Service, such Party shall comply with the insurance requirements applicable to it under Sections 9.1.A through 9.1.I. In the event that a Party is permitted to self-insure pursuant to this Section 9.1.J, it shall not be required to comply with the insurance requirements applicable to it under Sections 9.1.A through 9.1.I.

K. The Parties agree to report to each other in writing as soon as practical all accidents or occurrences resulting in injuries to any person, including death, and any property damage arising out of this Agreement.

ARTICLE 10. MISCELLANEOUS

10.1 Governing Law and Applicable Tariffs.

A. This Agreement for all purposes shall be construed in accordance with and governed by the laws of the State of Texas, excluding conflicts of law principles that would refer to the laws of another jurisdiction. The Parties submit to the jurisdiction of the federal and state courts in the State of Texas.

B. This Agreement is subject to all valid, applicable rules, regulations and orders of, and tariffs approved by, duly constituted Governmental Authorities.

C. Each Party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, rules, or regulations of a Governmental Authority.

10.2 No Other Services. This Agreement is applicable only to the interconnection of the Plant to the TSP System at the Point of Interconnection and does not obligate either Party to provide, or entitle either Party to receive, any service not expressly provided for herein. Each Party is responsible for making the arrangements necessary for it to receive any other service that it may desire from the other Party or any third party. This Agreement does not address the sale or purchase of any electric energy, transmission service or ancillary services by either Party, either before or after Commercial Operation.

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10.3 Entire Agreement. This Agreement, including all Exhibits, Attachments and Schedules attached hereto, constitutes the entire agreement between the Parties with reference to the subject matter hereof, and supersedes all prior and contemporaneous understandings or agreements, oral or written, between the Parties with respect to the subject matter of this Agreement. There are no other agreements, representations, warranties, or covenants which constitute any part of the consideration for, or any condition to, either Party's compliance with its obligations under this Agreement. Notwithstanding the other provisions of this Section, the Facilities Study Agreement, if any, is unaffected by this Agreement.

10.4 Notices. Except as otherwise provided in Exhibit "D", any formal notice, demand or request provided for in this Agreement shall be in writing and shall be deemed properly served, given or made if delivered in person, or sent by either registered or certified mail, postage prepaid, overnight mail or fax to the address or number identified on Exhibit "D" attached to this Agreement. Either Party may change the notice information on Exhibit "D" by giving five business days written notice prior to the effective date of the change.

10.5 Force Majeure.

A. The term "Force Majeure" as used herein shall mean any cause beyond the reasonable control of the Party claiming Force Majeure, and without the fault or negligence of such Party, which materially prevents or impairs the performance of such Party's obligations hereunder, including but not limited to, storm, flood, lightning, earthquake, fire, explosion, failure or imminent threat of failure of facilities, civil disturbance, strike or other labor disturbance, sabotage, war, national emergency, or restraint by any Governmental Authority.

B. Neither Party shall be considered to be in Default (as hereinafter defined) with respect to any obligation hereunder (including obligations under Article 4), other than the obligation to pay money when due, if prevented from fulfilling such obligation by Force Majeure. A Party unable to fulfill any obligation hereunder (other than an obligation to pay money when due) by reason of Force Majeure shall give notice and the full particulars of such Force Majeure to the other Party in writing or by telephone as soon as reasonably possible after the occurrence of the cause relied upon. Telephone notices given pursuant to this Section shall be confirmed in writing as soon as reasonably possible and shall specifically state full particulars of the Force Majeure, the time and date when the Force Majeure occurred and when the Force Majeure is reasonably expected to cease. The Party affected shall exercise due diligence to remove such

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disability with reasonable dispatch, but shall not be required to accede or agree to any provision not satisfactory to it in order to settle and terminate a strike or other labor disturbance.

10.6 Default

A. The term "Default" shall mean the failure of either Party to perform any obligation in the time or manner provided in this Agreement. No Default shall exist where such failure to discharge an obligation (other than the payment of money) is the result of Force Majeure as defined in this Agreement or the result of an act or omission of the other Party. Upon a Default, the non-defaulting Party shall give written notice of such Default to the defaulting Party. Except as provided in Section 10.6.B, the defaulting Party shall have thirty (30) days from receipt of the Default notice within which to cure such Default; provided however, if such Default is not capable of cure within 30 days, the defaulting Party shall commence such cure within 30 days after notice and continuously and diligently complete such cure within 90 days from receipt of the Default notice; and, if cured within such time, the Default specified in such notice shall cease to exist.

B. If a Default is not cured as provided in this Section, or if a Default is not capable of being cured within the period provided for herein, the non-defaulting Party shall have the right to terminate this Agreement by written notice at any time until cure occurs, and be relieved of any further obligation hereunder and, whether or not that Party terminates this Agreement, to recover from the defaulting Party all amounts due hereunder, plus all other damages and remedies to which it is entitled at law or in equity. The provisions of this Section will survive termination of this Agreement.

10.7 Intrastate Operation. The operation of the Plant by Generator shall not cause there to be a synchronous or an asynchronous interconnection between ERCOT and any other transmission facilities operated outside of ERCOT unless ordered by the Federal Energy Regulatory Commission under Section 210 of the Federal Power Act. The Parties recognize and agree that any such interconnection will constitute an adverse condition giving the TSP the right to immediately disconnect the TIF from the GIF, until such interconnection has been disconnected. The Generator will not be prohibited by this Section from interconnecting the Plant with facilities operated by the Comisión Federal de Electricidad of Mexico, unless such interconnection would cause ERCOT utilities that are not "public utilities" under the Federal Power Act to become subject to the plenary jurisdiction of the Federal Energy Regulatory Commission.

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10.8 No Third Party Beneficiaries. This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest and, where permitted, their assigns.

10.9 No Waiver. The failure of a Party to this Agreement to insist, on any occasion, upon strict performance of any provision of this Agreement will not be considered a waiver of obligations, rights, or duties imposed upon the Parties. Termination or Default of this Agreement for any reason by the Generator shall not constitute a waiver of the Generator's legal rights to obtain an interconnection from the TSP under a new interconnection agreement.

10.10 Headings. The descriptive headings of the various articles and sections of this Agreement have been inserted for convenience of reference only and are of no significance in the interpretation or construction of this Agreement.

10.11 Multiple Counterparts. This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

10.12 Amendment. This Agreement may be amended only upon mutual agreement of the Parties, which amendment will not be effective until reduced to writing and executed by the Parties.

10.13 No Partnership. This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

10.14 Further Assurances. The Parties agree to (i) furnish upon request to each other such further information, (ii) execute and deliver to each other such other documents, and (iii) do such other acts and things, all as the other Party may reasonably request for the purpose of carrying out the intent of this Agreement and the documents referred to in this Agreement. Without limiting the generality of the foregoing, the TSP shall, at the Generator's expense, when reasonably requested to do so by the Generator at any time after the execution of this Agreement, prepare and provide such information in connection with this Agreement (including, if available, resolutions, certificates, opinions of counsel or other documents relating to the TSP's corporate authorization to enter into this Agreement and to undertake the obligations set out herein) as may be reasonably required by any potential lender to the Generator under a proposed loan agreement. The TSP will

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use commercially reasonable efforts to obtain any opinion of counsel reasonably requested by Generator, but the TSP shall not be in Default of any obligation under this Agreement if the TSP is unable to provide an opinion of counsel that will satisfy any potential lender to the Generator. Specifically, upon the written request of one Party, the other Party shall provide the requesting Party with a letter stating whether or not, up to the date of the letter, that Party is satisfied with the performance of the requesting Party under this Agreement.

10.15 Indemnification and Liability. The indemnification and liability provisions of the PUCT Rule 25.202(b)(2) or its successor shall govern this Agreement.

10.16 Consequential Damages. OTHER THAN THE LIQUIDATED DAMAGES HERETOFORE DESCRIBED, IN NO EVENT SHALL EITHER PARTY BE LIABLE UNDER ANY PROVISION OF THIS AGREEMENT FOR ANY LOSSES, DAMAGES, COSTS OR EXPENSES FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT OR REVENUE, LOSS OF THE USE OF EQUIPMENT, COST OF CAPITAL, COST OF TEMPORARY EQUIPMENT OR SERVICES, WHETHER BASED IN WHOLE OR IN PART IN CONTRACT, IN TORT, INCLUDING NEGLIGENCE, STRICT LIABILITY, OR ANY OTHER THEORY OF LIABILITY; PROVIDED, HOWEVER, THAT DAMAGES FOR WHICH A PARTY MAY BE LIABLE TO THE OTHER PARTY UNDER ANOTHER AGREEMENT WILL NOT BE CONSIDERED TO BE SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES HEREUNDER.

10.17 Assignment. This Agreement may be assigned by either Party only with the written consent of the other; provided that either Party may assign this Agreement without the consent of the other Party to any affiliate of the assigning Party with an equal or greater credit rating and with the legal authority and operational ability to satisfy the obligations of the assigning Party under this Agreement; and provided further that the Generator shall have the right to assign this Agreement, without the consent of the TSP, for collateral security purposes to aid in providing financing for the Plant, provided that the Generator will require any secured party, trustee or mortgagee to notify the TSP of any such assignment. Any financing arrangement entered into by the Generator pursuant to this Section will provide that prior to or upon the exercise of the secured party's, trustee's or mortgagee's assignment rights pursuant to said arrangement, the secured creditor, the trustee or mortgagee will notify the TSP of the date and particulars of any such exercise of

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assignment right(s). Any attempted assignment that violates this Section is void and ineffective. Any assignment under this Agreement shall not relieve a Party of its obligations, nor shall a Party's obligations be enlarged, in whole or in part, by reason thereof. Where required, consent to assignment will not be unreasonably withheld, conditioned or delayed.

10.18 Severability. If any provision in this Agreement is finally determined to be invalid, void or unenforceable by any court having jurisdiction, such determination shall not invalidate, void or make unenforceable any other provision, agreement or covenant of this Agreement; provided that if the Generator (or any third-party, but only if such third-party is not acting at the direction of the TSP) seeks and obtains such a final determination with respect to any provision of Section 4.1.B, then none of the provisions of Section 4.1.B. shall thereafter have any force or effect and the Parties' rights and obligations shall be governed solely by Section 4.1.A.

10.19 Comparability. The Parties will comply with all applicable comparability and code of conduct laws, rules and regulations, as amended from time to time.

10.20 Invoicing and Payment. Unless the Parties otherwise agree (in a manner permitted by applicable PUCT Rules and as specified in writing in an Exhibit "E" attached hereto), invoicing and payment rights and obligations under this Agreement shall be governed by PUCT Rules or applicable Governmental Authority. Invoices shall be rendered to the paying Party at the address specified on, and payments shall be made in accordance with the requirements of, Exhibit "D".

10.21 Confidentiality.

A. Subject to the exception in Section 10.21.B, any information that a Party claims is competitively sensitive, commercial or financial information under this Agreement ("Confidential Information") shall not be disclosed by the other Party to any person not employed or retained by the other Party, except to the extent disclosure is (i) required by law; (ii) reasonably deemed by the disclosing Party to be required to be disclosed in connection with a dispute between or among the Parties, or the defense of litigation or dispute; (iii) otherwise permitted by consent of the other Party, such consent not to be unreasonably withheld; or (iv) necessary to fulfill its obligations under this Agreement or as a transmission service provider or a Control Area operator including disclosing the Confidential Information to the ERCOT. The Party asserting confidentiality shall notify the other Party in writing of the information it claims is confidential. Prior to any disclosures of the other Party's Confidential Information under this subsection, or if any third party or Governmental Authority makes any request or demand for any of the information described in this

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subsection, the disclosing Party agrees to promptly notify the other Party in writing and agrees to assert confidentiality and cooperate with the other Party in seeking to protect the Confidential Information from public disclosure by confidentiality agreement, protective order or other reasonable measures.

B. This provision shall not apply to any information that was or is hereafter in the public domain (except as a result of a breach of this provision).

10.22 Representations and Restrictions on Certain Foreign Ownership and Affiliation. Generator represents and warrants that it does not meet any of the ownership, control, or headquarters criteria listed in Lone Star Infrastructure Protection Act, Chapter 117 of the Texas Business & Commerce Code (relating to China, Iran, North Korea, Russia, and any other country designated by the Texas governor as a threat to critical infrastructure).

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Exhibit "B"
Time Schedule

Interconnection Option chosen by Generator (check one): __X__ Section 4.1.A. or ____ Section 4.1.B

If Section 4.1.B is chosen by Generator, the In-Service Date(s) was determined by (check one): (1) ____ good faith negotiations, or (2) _____ Designated by Generator upon failure to agree.

Date by which Generator must provide notice to proceed with design, procurement, and construction, and provide security, as specified in Sections 4.2 and 4.3, so that TSP may maintain schedule to meet the In-Service Date: **December 6, 2024**

In - Service Date(s): **December 3, 2026**

Scheduled Trial Operation Date: **December 13, 2026**

Scheduled Commercial Operation Date: **April 13, 2027**

Date by which TSP will submit the Metering Design Proposal to ERCOT: **June 3, 2026**

Date by which Generator will provide one-line drawings and Information required for sizing the EPS Metering CT's: **September 3, 2025**

Date by which Generator will provide one line drawings and Information required for sizing the Wholesale Storage Load ("WSL") EPS Metering CT's and PT's, including if Neutral Grounding Resistors/Reactors (NGR's) are to be utilized on the "Main Power Transformer": **October 3, 2025**

Date by which TSP will provide to Generator information for the WSL EPS Metering typical layout and installation details including CT and PT outlines: **November, 3 2025**

Date by which Generator will provide to TSP complete One Line Diagrams to show in detail the BESS System from the Point of Interconnection and EPS WSL Metering Point through the batteries to ground: **February 3, 2026**

Date by which Generator will provide drawings showing in detail the proposed location and installation of TSP's WSL EPS Metering equipment: **March 3, 2026**

Date by which TSP will provide the Generator the WSL EPS Metering instrument transformers for installation in Generator Collector Station: **September 3, 2026**

Date by which Generator will complete the installation of WSL EPS Metering instrument transformers for TSP termination and testing: **October 2, 2026**

Date by which Generator will make contact with TSP to communicate land conveyance type and provide a contact for TSP Right of Way coordination: **July 28, 2025**

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Date by which Generator will provide its proposed protection system design to TSP in accordance with Attachment 3 to Exhibit "C": **June 3, 2026**

Date by which Generator will provide its proposed protection system device settings and other information to TSP in accordance with Attachment 3 to Exhibit "C": **September 3, 2026**

Date by which Generator will provide its proposed names of its equipment, as referenced in Exhibit "C", to TSP: **April 3, 2026**

Date by which TSP must take ownership or possession of the deed or easement(s), in accordance with Exhibit "C", for property for the TIF, so that TSP may maintain schedule to meet the In-Service Date: **April 17, 2026**

Date by which Generator must have removed or relocated any existing Generator or third party underground and aboveground facilities from the property where the Gobbers Knob Switch will be constructed to a location acceptable to TSP and have caused any existing Generator or third-party easements on such property to be terminated, as referenced in Exhibit "C": **March 20, 2026**

Date by which Generator will provide to TSP site drawings showing the proposed routes and locations of all generating units, transmission lines, distribution lines, and roads planned to be constructed by Generator: **February 3, 2026**

Date by which Generator will provide to TSP the Latitude and Longitude and a kmz of all solar panel and BESS generating units: **June 3, 2026**

Date by which Generator will have in place the communication facilities specified in Exhibit C: **October 22, 2026**

Date by which Generator must provide an all-weather road acceptable to TSP for TSP's ingress and egress to and from the TIF site, so that TSP may maintain schedule to meet the In-Service Date: **March 20, 2026**

Date by which Generator will provide its design of the facilities and operating scheme to comply with the reactive power requirements specified in Exhibit C, when the plant is not generating real power into the ERCOT grid: **June 3, 2026**

Date by which Generator will provide its design of the facilities to comply with the unit reactive power requirements specified in Exhibit C, when the plant is generating real power into the ERCOT grid: **June 3, 2026**

Date by which Generator will submit the grading and drainage design for Gobbers Knob Switch and entrance drives, and the All-Weather Road to TSP for review and approval pursuant to Exhibit C: **November 28, 2025**

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Date by which Generator will complete the grading and drainage design for Gobbers Knob Switch and entrance drives and the All-Weather Road pursuant to Exhibit C, so that TSP may maintain schedule to meet the In-Service Date: **January 23, 2026**

Generator to notify TSP 4 weeks before beginning grading installation

Date by which Generator will complete the Gobbers Knob Switch and entrance drives grading, and the All-Weather Road, and provide access for Oncor inspection, pursuant to Exhibit C: **March 20, 2026**

Date by which Generator will provide preliminary survey exhibits for the deeds/easements for Gobbers Knob Switch and entrance drive, and the All-Weather Road, pursuant to Exhibit C, so that TSP may maintain schedule to meet the In-Service Date: **November 28, 2025**

Date by which Generator will provide final survey exhibits for the deeds/easements for Gobbers Knob Switch and entrance drive, the All-Weather Road, pursuant to Exhibit C, so that TSP may maintain schedule to meet the In-Service Date: **January 23, 2026**

Date by which TSP will provide preliminary survey exhibits for the deeds/rights of way for Gobbers Knob Switch associated transmission lines, pursuant to Exhibit C, so that TSP may maintain schedule to meet the In-Service Date: **November 28, 2025**

Date by which TSP will provide final survey exhibits for the deeds/rights of way for Gobbers Knob Switch associated transmission lines, pursuant to Exhibit C, so that TSP may maintain schedule to meet the In-Service Date: **January 23, 2026**

Date by which Generator will have the 4-hole pads installed at the Point of Interconnection for TSP's jumper terminations: **October 8, 2026**

Date by which the Generator will have the Generator breaker(s), system protective equipment (including fiber termination and testing), and any equipment necessary for station to station relaying and SCADA communications installed and ready for acceptance and functional trip testing with TSP to ensure proper functioning: **November 5, 2026**

Due to the nature of the subject of this Agreement, the Parties may mutually agree to change the dates and times of this Exhibit "B".

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Exhibit "C"
Interconnection Details

1. Name: **Blue Heron Solar, LLC**

2. Point of Interconnection location: The Point of Interconnection is located in Brown County, Texas, at the proposed Gobbers Knob Switch in TSP's 345 kV Brown Switch to Buckhorn Switch transmission line. Specifically, the Point of Interconnection shall be defined as the points where TSP's jumpers connected to TSP's 4-hole pad bus connections, connect to Generator owned 4-hole pad bus connections located near the common fence separating TSP's Gobbers Knob Switch from Generators Collector Station. Gobbers Knob Switch will be located approximately 13.3 miles southeast of Brownwood, Tx and approximately 0.78 miles southeast from County Road 268. (See attached one-line diagram.)

3. Delivery Voltage: **345 kV**

4. Number and size of Generating Units:

   Chisme Solar 24INR0333: thirty-nine (39) Sungrow SG4400-UD Solar inverters resulting in 148.9410 MW gross real power at the inverter terminal (147 MW measured at the 34.5 kV Collector)

   Chisme Storage: sixty-eight (68) Sungrow SC210HX-US x 12 Storage inverters resulting in 147.56 MW gross real power at the inverter terminal (146 MW measured at the 34.5 kV Collector)

   The Parties will amend this Exhibit "C" as necessary to reflect any changes Generator makes to the number and size of generating units.

5. Type of Generating Unit:
   Chisme Solar 24INR0333: Sungrow SG4400-UD Solar Inverters
   Chisme Storage 24INR0331: Sungrow SX210HX-US x 12 Storage Inverters

   The Parties will amend this Exhibit "C" as necessary to reflect any changes Generator makes to the manufacturer, model, or type of generating units.

6. Metering and Telemetry Equipment: Metering (voltage, location, losses adjustment due to metering location, and other), telemetry, and communications requirements shall be as follows:

   a. TSP shall, in accordance with ERCOT Requirements and Good Utility Practice, install, own, operate, inspect, test, calibrate, and maintain **345 kV** metering accuracy potential and current transformers and associated metering and telemetry equipment (including an RTU) located in the TIF. A one-line diagram showing TSP's ERCOT-polled settlement ("EPS") metering location is attached to this Exhibit "C" as Attachment 1. TSP will connect its EPS primary meter(s) to its RTU

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via a communication link. Primary EPS metering data may be made available to Generator via a Generator-owned communication link connected to TSP's RTU, using TSP's available RTU protocol. Such data, if provided to Generator, will be for Generator's informational purposes only. Generator shall not rely on such data, as the primary source, for the metering data addressed in item 6b. below, or for any other scheduling or operational purposes. TSP makes no guarantee of the quality or availability of such data. The provisions of Exhibit "A", Section 5.5G., shall not apply to TSP's RTU.

b. Generator shall, in accordance with Good Utility Practice, install, own, operate, inspect, test, calibrate, and maintain the necessary metering potential and current transformers and associated metering and telemetry equipment in the GIF and/or Plant to satisfy the ERCOT Requirements for the provision of metering data by Generator's "Qualified Scheduling Entity".

c. Generator shall, in accordance with ERCOT Requirements and Good Utility Practice, install, own, operate, inspect, test, calibrate, and maintain the metering and telemetry equipment (including an RTU or other equipment acceptable to TSP) to supply all electrical parameters of the Plant and GIF, as specified in the SCADA Table in Attachment 2 to this Exhibit "C", to TSP at a location designated by TSP.

d. Generator shall, in accordance with ERCOT Requirements and Good Utility Practice, provide communications facilities that are, or may in the future be, necessary for effective interconnected operation of the Generator's Plant with the transmission system. Generator will directly make arrangements to procure and will bear the procurement, installation and ongoing costs of items (i) and (ii) below. The communications facilities will include (see Attachment 2A to Exhibit "C"):

   (i) one private line voice circuit (an off-premise extension of TSP's PBX) in the Control Center referenced in Section 12(b) below, as shown on Exhibit D. The telephone handset for this voice line will be located in the Control Center such that personnel responsible for controlling voltage of the Plant will have continuous, ready access to the handset to receive calls from TSP's control center.

   (ii) one communication path, acceptable to TSP, that will deliver the Generator switchyard data specified in Attachment 2 to Exhibit "C" from Generator's RTU (using an RS-232 output) to TSP's control center. Generator shall use DNP 3.0 protocol (or other protocol acceptable to TSP). The communication path shall avoid the use of the public internet. TSP will provide rack space at a location designated by TSP for Generator's communication interface equipment.

e. Prior to the In-Service Date, acceptance tests will be performed by TSP and Generator to ensure the proper functioning of all metering, telemetry, and communications equipment, and to verify the accuracy of data being received by TSP.

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f. Following the Commercial Operation date, each Party shall test its metering, telemetry, and communications equipment in accordance with ERCOT Requirements and Good Utility Practice. Each Party shall give the other Party reasonable advance notice of such testing. Each Party shall have the right to observe testing performed by the other Party.

g. Any changes to Generator's metering, telemetry, and communication equipment, including meters, voltage transformers, current transformers, and associated RTU, panels, hardware, conduit and cable, that will affect the data being received by TSP hereunder must be mutually agreed to by the Parties.

h. Each Party will promptly advise the other Party if it detects or otherwise learns of any metering, telemetry, or communications equipment or related situation that requires attention and/or correction by the other Party.

7. Generator Interconnection Facilities: The GIF shall include the following facilities. (See the attached one-line diagram)

Generator Switchyard Facilities

Generator Provided Equipment for Generator 345 kV Substation.

(1 ea.) Circuit breaker, 345 kV with two sets of 3000/5, C800 multi-ratio CT's with a TRF = 2.0 for line current differential relaying

(1 lot) Switches, air break, 345 kV, gang operated, 3 phase, with provisions for TSP pad lock

(1 lot) PT or CCVT, 345 kV, dual secondary windings as required for Generator metering and relaying.

(1 lot) Protective relaying equipment necessary to interface with TSP relaying equipment for protection of the 345 kV Gobbers Knob Switch to Generator bus connection, and related breaker failure protection schemes.

(1 ea.) Supervisory equipment, SCADA RTU, complete with Generator-provided dedicated data communication circuit back to TSP's Central Control Center

(1 ea.) Fault Recording equipment (as required by ERCOT)

(1 ea.) Phasor Measurement Unit (PMU) (as required by ERCOT)

(1 ea.) Multi-fiber, fiber optic cable with 1300nm single-mode fibers, 48 fibers minimum (24 fibers per tube), to be used for primary and redundant line relaying and optional SCADA communications for EPS metering information to Generator.

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Generator will route its fiber optic cable in underground conduit to a TSP owned splice box on the TSP side of the common fence between Gobbers Knob Switch and the Generator 345 kV Plant Switchyard. Generator will terminate its fiber optic cable at a TSP owned fiber patch panel and be responsible for testing of Generator fibers. TSP will be responsible for providing the fiber patch cables.

(1 lot) Associated structures, bus work, conductor, connectors, grounding, conduit, control cable, fiber, foundation work, perimeter fencing, grading/dirt work and any appurtenances necessary for construction and operation of the Generator 345 kV Plant Switchyard.

(1 lot) Ground connections to Oncor Switchyard ground grid

All-Weather Road – Generator will construct and maintain an all-weather road acceptable to TSP for TSP's ingress and egress to and from Gobbers Knob Switch from County Road 268 ("All-Weather Road").

TSP Provided Equipment for EPS Metering of the Chisme Solar and Storage Wholesale Storage Load (WSL)

The following list of metering equipment will be provided by TSP and installed by Generator for the Generator 345 kV Substation.

(3 ea.) Metering PT's, 34.5 kV

(3 ea.) Metering CT's, 34.5 kV

Generator Provided Equipment and Structures for EPS Metering of the Chisme Solar and Storage WSL

The following list of metering equipment will be provided and installed by Generator for the Generator 34.5 kV Substation.

(1 ea.) Metering stand for Oncor Supplied Metering PT's, and Metering CT's. Stand to include Generator supplied fused cutouts for protection of Oncor provided Metering PT's.

(1 ea.) Junction Box. Box to be lockable type and include two (2) CT shorting blocks and one

(1) PT fuse block. Junction box to be locked with TSP lock. Location and requirements of junction box to be finalized during detailed design and provided by TSP to Generator.

(1 lot) Wiring and conduit for the metering stand to include:
(1) 4 conductor shielded # 10 from CT's to Junction Box. Terminated by TSP

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(1) 4 conductor shielded # 10 from PT's to Junction Box. Terminated by TSP

(1 lot) Wiring and PVC conduit from the metering junction box to the TSP Metering Cabinet to include:
(1) 2" PVC conduit
(1) 4 conductor shielded # 10 for CT's. Terminated by TSP
(1) 4 conductor shielded # 10 for PT's. Terminated by TSP

(1 lot) Wiring and PVC conduit from dedicated Generator 125 VDC source to the TSP Metering Cabinet to include:
(1) 2 conductor shielded # 10 for power supply to meters. Terminated by TSP

The above list is not intended to be a complete list of all facilities that are part of the GIF.

8. Transmission Service Provider Interconnection Facilities: The TIF shall include the following facilities. (See the attached one-line diagram)

TSP Gobbers Knob Switch

TSP has evaluated the general switchyard requirements for Gobbers Knob Switch. These switchyard facilities are considered TSP's "through flow" transmission system and shall be owned, operated, and maintained by TSP. The switchyard facilities shall consist of two 345 kV sources and provide Generator with one interconnection point from a 345 kV three breaker, ring bus arrangement. Please note that the total property required for Gobbers Knob Switch will be dependent upon TSP's and Generator's final contours and grading design and will include additional area around the entire station fence perimeter for transmission line terminations, future expansion, grounding, and grading work ("Gobbers Knob Switch Property") and is subject to change during the project detailed design. Generator will either acquire, or have an option to acquire, or have a perpetual easement, or an option for a perpetual easement (in a form acceptable to TSP) for the Gobbers Knob Switch Property, entrance drives, All Weather Road and transmission line Rights of Way, with non-restricted right of ingress and egress, and will transfer such land in fee or land rights to TSP. The easement for the Gobbers Knob Switch Property shall be an exclusive perpetual easement.

Generator shall connect at a delivery voltage of 345 kV with the change of ownership of facilities to be designated at the points where TSP's jumpers connected to TSP's 4-hole pad bus connections, connect to the Generator-owned 4-hole pad bus connections located near the common fence separating TSP's Gobbers Knob Switch from the Generator's Substation. TSP will install and own the jumpers from TSP's 4-hole pad connections to the Generator-owned 4-hole pad connections.

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The estimate also includes the installation of ADSS fiber-optic cable with 1300 nm single-mode fibers, 48 fibers minimum (24 fibers per tube), to be used for primary and redundant line relaying and optional supervisory control and data acquisition ("SCADA") communications for ERCOT Polled Settlement ("EPS") metering information to the Generator in underground conduit between the TSP control house in Gobbers Knob Switch and a TSP owned splice box on the TSP side of the common fence between Gobbers Knob Switch and the Generator Substation. TSP will route its fiber optic cable to the splice box and terminate at a TSP owned fiber patch panel. TSP will be responsible for providing the fiber patch cables and the testing of Oncor fibers.

TSP Switchyard Facilities

The following list of major switchyard equipment will be necessary for Gobbers Knob Switch.

(3 ea.) Circuit breaker, 362 kV, 5000 A, 63 kA

(7 ea.) Switch, air break, 362 kV, 5500 A, gang operated, 3 phase

(2 ea.) Switch, air break, 362 kV, 5500 A, gang operated, 3 phase, with grounding switch

(1 ea.) Switch, air break, 362 kV, 3200 A, gang operated, 3 phase, with grounding switch

(3 ea.) Metering Current Transformers, 362 kV

(3 ea.) CCVT's, 362 kV, dual secondary windings for metering and relaying

(6 ea.) CCVT's, 362 kV, dual secondary windings for relaying

(2 ea.) Line trap, 345 kV, 5000 A

(2 ea.) Line tuner

(2 ea.) SSVT, 345 kV, for station service

(9 ea.) Surge arresters, 276 kV

(1 lot) All galvanized steel structures, including dead ends, switch stands, metering structures, surge arrester supports, CCVT supports, static mast, and bus supports necessary for construction and operation of the TSP switchyard facilities

(1 ea.) Supervisory equipment, SCADA RTU

(1 ea.) Digital Fault Recorder (DFR)

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(1 ea.) Control house w/2-125 VDC battery sets and associated indoor accessories

(1 lot) Emergency switchyard generator and associated propane storage facilities

(1 lot) Associated buswork, conductor, connectors, grounding, conduit, control cable, foundation work, perimeter fencing, grading/dirt work and any appurtenances necessary for construction and operation of the TSP switchyard facilities

(1 lot) Ground connections to Generator Substation ground grid

(1 ea.) Metering cabinet mounting structure, for WSL Metering, to be located on the TSP side of the common fence between Gobbers Knob Switch and the Generator 345 kV Substation

(1 ea.) Metering cabinet with meters for WSL Metering.

(1 lot) Multi-fiber fiber optic cabling from the TSP Metering Cabinet to the Gobbers Knob Switch control house.

Relaying Equipment

The following relay panels will be necessary for Gobbers Knob Switch.

(1 ea.) Buckhorn Switch line, ring bus, line current differential (LCD) with directional comparison blocking (DCB) over carrier relay panel

(1 ea.) Brown Switch line, ring bus, line current differential LCD) with directional comparison blocking (DCB) over carrier relay panel

(1 ea.) Generator Line, ring bus line current differential (LCD) relay panel

(1 ea.) Metering panel with totalizing equipment

(1 ea.) Carrier tester and communications panel

The above lists are not intended to be complete lists of all facilities that are part of the TIF.

9. Communications Facilities: See Item 6 above.
10. System Protection Equipment: See Section 5.6 of Exhibit "A" and Attachment 3 to this Exhibit "C".
11. Inputs to Telemetry Equipment: See Attachment 2 to this Exhibit "C".

12. Supplemental Terms and Conditions:

For additional supplemental terms and conditions, see Attachments 1, 2, and 3 to this Exhibit "C".

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a. Generator Control Center - Generator will establish a control center that shall be staffed 24 hours per day, 7 days per week, by personnel capable of making operating decisions and possessing the ability and authority to directly control voltage at the Plant, including the control of all devices at the Plant (such as generators, reactors and capacitors) associated with controlling such voltage ("Generator Control Center"). In the event that the Generator Control Center is not located at the Plant, the voltage control described in the preceding sentence will be accomplished directly by Generator Control Center personnel via a supervisory control and data acquisition (SCADA) system directly asserting control over all voltage control equipment at the Plant. Prior to TSP completing the TIF and placing such facilities in service, the Parties will revise Exhibit D to incorporate any missing telephone numbers for the Generator in Section (a).

b. If Generator Owns Land - If Generator will own the land in fee upon which TSP will construct the TIF or upon which Generator will construct the All Weather Road, or portion thereof, Generator will provide to TSP, at no cost to TSP, a deed and/or easement(s) in perpetuity, in form and substance satisfactory to TSP, for such land or land rights as are needed for the TIF and TSP's use of the All Weather Road on any land owned in fee by Generator. Generator will provide such deed and/or easement(s) to TSP by the date(s) specified in Exhibit "B". The easement for the Gobbers Knob Switch property shall be an exclusive perpetual easement.

c. If Generator Does Not Own Land – The following provisions will apply if Generator will not own the land in fee upon which TSP will construct the TIF or upon which Generator will construct the All Weather Road

   a. TSP's completion of the TIF by the date specified in Exhibit "B" is contingent upon the land owner(s) granting to TSP either a deed or easement(s) in perpetuity, in form and substance satisfactory to TSP, for such land or land rights needed for the by the date specified in Exhibit "B". The easement for the Gobbers Knob Switch property shall be an exclusive perpetual easement.
   b. If the Generator has obtained certain land rights from the fee owner of the land upon which the TIF will be constructed, Generator will (i) enter into good faith negotiations with the fee owner of such land to assist TSP in obtaining, at no cost to TSP, either a deed or easement(s) in perpetuity, in form and substance satisfactory to TSP, for such land or land rights needed for the TIF by the date(s) specified in Exhibit "B" and (ii) cooperate with TSP and the fee owner of such land in the development of legal documentation, satisfactory to TSP, which specifies that the land rights to be granted to TSP by the fee owner of such land will control in the event of conflict between such land rights and the aforementioned land rights held by Generator.

d. Names and Device Numbers – Generator and TSP will collaborate and reach mutual agreement on the establishment of: i) unique name(s) for the Generator's substations, unit main transformers, and switching station(s) connected at

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transmission voltage), ii) device numbers for all transmission voltage level switches and breakers which will be owned by Generator, and iii) unique names for Generator's generating units, in accordance with ERCOT Requirements. Generator will submit to TSP, its proposed name(s) as referenced in this paragraph, to the TSP by the date specified in Exhibit "B". Generator will register the name(s) of the facilities specified in this paragraph and Generator-owned device numbers at ERCOT, in accordance with ERCOT Requirements, and such names and device numbers will be consistent with the names and numbers mutually agreed upon pursuant to this paragraph. Generator will not change any of the names or device numbers, established pursuant to this paragraph, without written approval of TSP. Generator will label the devices, referenced in item (ii) above, with the numbers assigned to such devices.

e. Encroachments – If Generator desires to conduct any of the following activities within any portion of TSP's right of way associated with TSP's transmission or distribution lines: i) construct transmission lines, distribution lines, communication facilities, roads, water lines, sewer lines, gas pipelines, or any other facilities, ii) store any equipment or materials, or iii) change the grade, elevation, or contour of the land, Generator must submit its request to TSP using a form of request acceptable to TSP and obtain written authorization from TSP for such encroachment prior to Generator installing such facilities or conducting such activities. **TSP RESERVES THE RIGHT TO DELAY THE ENERGIZATION OF THE POINT OF INTERCONNECTION UNTIL GENERATOR OBTAINS ALL REQUIRED WRITTEN AUTHORIZATIONS FROM TSP FOR SUCH ENCROACHMENTS, IF ANY**. The Generator will be responsible for the cost of all modifications needed on facilities owned by TSP which are the result of such encroachment. The provision of overall site plans by Generator shall not relieve Generator from the obligation to submit all encroachment requests in accordance with this subsection (f).

f. Site Plan - Generator will provide to TSP, by the date specified in Exhibit "B", a site plan in sufficient detail to reflect the proposed routes and locations of Generator's generating units, transmission lines, distribution lines, substations, transformers, and roads.

g. Location of Solar Panels and BESS units – Generator will provide to TSP, by the date specified in Exhibit "B", the Latitude and Longitude and a kmz of each solar panel and BESS unit to enable the identification of the PUCT certificated service area in which each turbine is located.

h. Additional Studies – If it is necessary for TSP to perform any additional generation interconnection studies associated with the Plant in accordance with ERCOT Requirements ("Additional Studies"), the Parties will enter an agreement to perform the Additional Studies and Generator shall pay TSP for the Additional Studies pursuant to that agreement. The completion of such Study may reveal that additional TSP facilities will be required to be installed in conjunction with the interconnection of the Plant. If TSP determines, as a result of the Additional

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Studies, that this Agreement needs to be amended to include additional facilities, the Parties will amend this Agreement to include (i) such additional facilities identified in the Additional Studies, and (ii) additional security requirements. Generator will provide an additional level of security in accordance with this Agreement to reflect any such additional facilities.

i. Federal Income Tax – To the extent that a payment made by Generator to TSP pursuant to Sections 2.2 and 8.3 of Exhibit A is taxable income for federal income tax purposes, as determined by TSP, such payment shall be increased by an adder, as determined by TSP in accordance with its normal practices, to cover the effects of Generator's payment on TSP's tax liability.

j. Reactive Power (Plant neither charging or discharging) – Generator will install, operate, and maintain Plant and/or GIF facilities and implement an automatic operating scheme, as necessary, to establish and maintain reactive power within a range of +/- 5 Mvar, as measured at the Point of Interconnection Bus (as defined in the ERCOT Nodal Protocols), at all times when the Plant is neither charging nor discharging. Generator may utilize any available static reactive devices to hold the real-time voltage set point provided by TSP, even if this results in reactive power at the Point of Interconnection Bus outside the +/-5 MVAR range specified above. Such facilities and automatic operating scheme will be installed and functional prior to the Trial Operation of the Plant. Generator will provide, for review and comments, written documentation to TSP specifying the design details of all equipment (including size, number, and location of any capacitors and/or reactors and controls) and automatic operating scheme which it will install to meet these requirements by the date specified in Exhibit "B". Notwithstanding TSP's obligations in the remainder of this Agreement, TSP shall have no obligation to establish an electrical interconnection with the GIF until Generator completes the installation of the reactive power facilities and automatic operating scheme specified in this paragraph.

k. Reactive Power (Plant charging or discharging) – Generator will install, operate, and maintain Plant and GIF reactive power facilities, as necessary, to comply with the unit reactive power capability requirements at all times when the Plant is charging or discharging, in accordance with ERCOT Requirements. Such facilities will be installed and functional prior to the Trial Operation of the Plant. Generator will provide, for review and comments, written documentation to TSP specifying the design details of all equipment (including size, number, and location of any capacitors and/or reactors and controls) which it will install to meet these requirements by the date specified in Exhibit "B". Notwithstanding TSP's obligations in the remainder of this Agreement, TSP shall have no obligation to establish an electrical interconnection with the GIF until Generator completes the installation of the reactive power facilities specified in this paragraph

l. Switching Procedures – To address the safety of field operations personnel of both Parties, the Parties will conduct the switching of transmission voltage devices owned by the TSP at the Point of Interconnection and all transmission voltage

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devices owned by Generator in accordance with TSP's procedures. TSP will provide a copy of such procedures to Generator upon request.

m. Facility Connection Requirements – Generator will construct its facilities in accordance with the version of Oncor Standard 520-108 that is in effect at the time the Generator gives its notice to proceed with design and procurement, as referenced in Exhibit "B".

n. Relocation of Facilities - Unless otherwise agreed to in writing by TSP, Generator will (i) remove or relocate any existing Generator or third party underground and aboveground facilities from the property where the Gobbers Knob Switch will be constructed to a location acceptable to TSP and (ii) cause any existing Generator or third-party easements on such property to be terminated by the date specified in Exhibit "B".

o. Grading and Drainage – Since Gobbers Knob Switch will be located adjacent to the Generator Switchyard on property being developed for the Generator facility, and in order to ensure that the Gobbers Knob Switch grading and drainage design is consistent with Generator's overall grading and drainage design, Generator will be responsible for, in coordination with TSP, the design of the grading and drainage of TSP's Gobbers Knob Switch site and associated All-Weather Road and entrance drives in accordance with TSP design specifications and requirements. Upon TSP approval of the grading designs, Generator will, at its cost, be responsible for grading of the TSP Gobbers Knob Switch site and associated All-Weather Road and entrance drives from **County Road 268** to Gobbers Knob Switch. Station site grading will be to top of Station subgrade elevations as identified in TSP's notes and details "the subgrade elevations" as shown on the grading design drawings prepared by Generator and approved by TSP. TSP will install the final 6" of compacted flex base and 2" of topping rock surfacing to the station site at the end of construction. Generator will be responsible for complete installation of the All-Weather Road and entrance drives including the base material (no topping rock) in accordance with TSP design specifications. TSP shall have the option to test and inspect the material and installation. Generator will also be responsible for any required drainage improvements necessary to protect the Gobbers Knob Switch site and All-Weather Road and entrance drives against possible erosion.

Grading and Drainage design associated with the TSP Gobbers Knob Switch site and associated All-Weather Road and entrance drives shall be performed in accordance with TSP specification number 500-051 - Site Preparation, and other site-specific design criteria, which will be provided by the TSP to the Generator. TSP shall review and approve the grading and drainage design for Gobbers Knob Switch with the associated All-Weather Road and entrance drives prior to construction. TSP reserves the right to provide an on-site inspector during site preparation construction to confirm site construction follows TSP requirements. The grading and drainage design for the Gobbers Knob Switch site

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and associated All-Weather Road and access drives shall be submitted to TSP for review and approval and shall be completed by the dates specified in Exhibit "B".

In addition, Generator will be responsible for continuing maintenance of site drainage beyond the Gobbers Knob Switch site and associated All-Weather Road and entrance drives property/easement as it affects the station site and associated All-Weather Road and entrance drives integrity.

13. The difference between the estimated cost of the TIF under 4.1.A ($____) and the estimated cost of the TIF under 4.1.B ($_____) is: _____ , if applicable.

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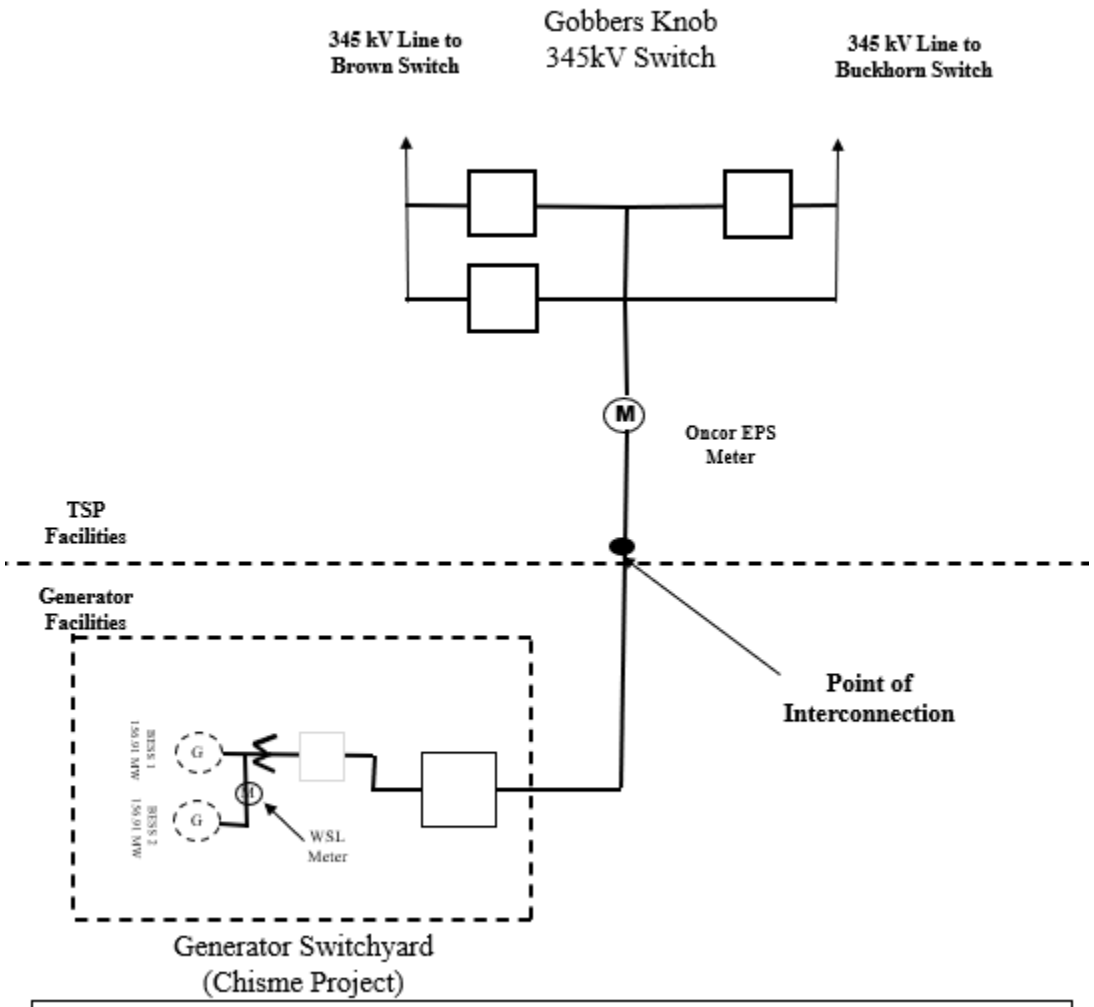
Attachment 1 to Exhibit "C"

ONE LINE DIAGRAM
Gobbers Knob Switch



NOTE: This one-line diagram is for illustration only and shall not be used for purposes of design construction or operations.

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Attachment 2 to Exhibit "C"

SCADA TABLE
INFORMATION REQUIRED BY TSP FROM GENERATOR

GIF DEVICE/BUS	DATA REQUIRED
Each 345 kV Breaker	Status indication, three phase megawatts, and three phase megavars (Dry type breaker "A" contacts required for indication and 0 - 1 milliamp analog signal required for megawatt and megavar information)
Each 345 kV Bus	A, B and C Phase voltages (0 – 1 milliamp analog signal required for voltage information)
Each Reactive Device Breaker	Status indication, three phase megawatts, and three phase megavars (Dry type breaker "A" contacts required for indication and 0 - 1 milliamp analog signal required for megawatt and megavar information)
Each 345 kV Switch Each Reactive Device Switch	Status indication (Dry type "A" contacts required for indication)

Note: The SCADA Table above does not include real-time operational metering data or other data required by ERCOT from the Generator or its Qualified Scheduling Entity.

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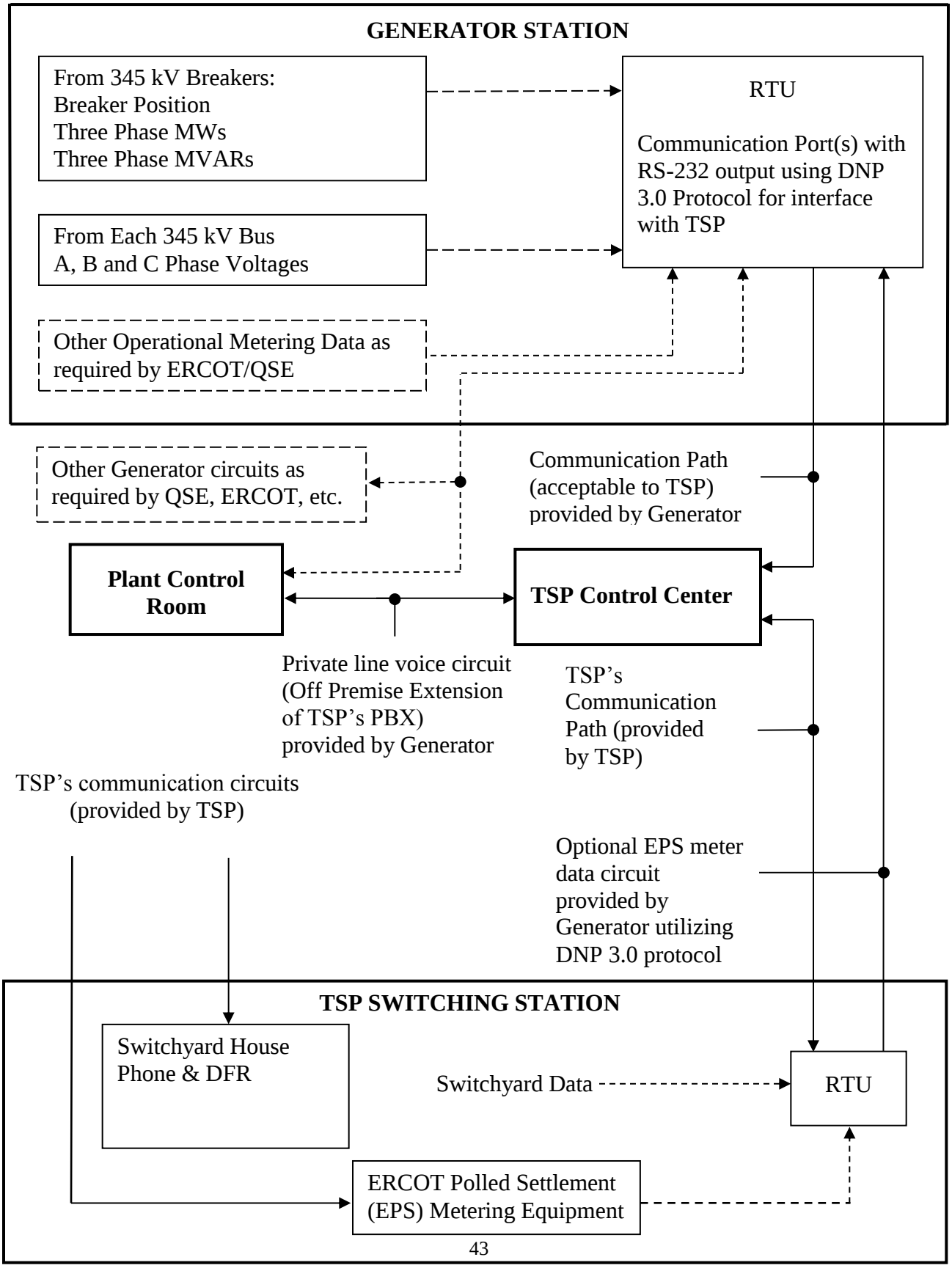
Attachment 2A to Exhibit "C"
COMMUNICATION GUIDELINE



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Attachment 3 to Exhibit "C"
SYSTEM PROTECTION REQUIREMENTS

In addition to the provisions of Sections 5.6 and 6.1 of this Agreement, the following provisions shall apply with respect to system protection issues. To the extent there is a conflict between Sections 5.6 or 6.1 of this Agreement and this Attachment 3 to Exhibit "C", the provisions of this Attachment 3 to Exhibit "C" shall apply.

Generator and TSP shall design, install, operate, maintain, and test system protection equipment consistent with the applicable criteria as described in the ERCOT Requirements and any applicable requirements of Governmental Authorities, including NERC Reliability Standards. To the extent necessary to comply with the testing provisions of these requirements, including the time intervals of such requirements, the circuit breakers in the TIF will be tripped during the required testing, and thus may require an outage or reduction of generation at the Plant. Generator shall, at its expense, provide modifications or additions to its control and protective equipment required to comply with changes in ERCOT Requirements or requirements of Governmental Authorities, including complying with NERC Reliability Standards.

Generator, using Good Utility Practice, shall install sufficient digital fault recording equipment to thoroughly analyze all system disturbances occurring on the GIF and the Plant and to thoroughly analyze the Plant and GIF performance during system disturbances on the ERCOT system. This equipment shall monitor the voltages at major nodes, current at major branches, breaker and switch positions, and dc logic in the relay control scheme.

Generator will provide to the TSP its proposed system protection design, device settings, and other information, as referenced below ("Generator System Protection Components") for review by TSP, by the date specified on Exhibit "B". Generator shall not modify its Generator System Protection Components, at any time during the term of this Agreement, without first submitting such planned modifications to TSP for review. Such review by TSP will be for the limited purpose of determining if Generator's System Protection Equipment is compatible with TSP's System Protection Equipment. The Generator System Protection Components submitted by Generator shall include, but shall not necessarily be limited to:

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1) Design components: scheme types, one line diagram, relay functional, type of protective relays and associated communication equipment, and trip circuit diagrams for the interconnection breakers.

2) Device settings and other information: device settings, CT and VT/CCVT information, transformer connection configuration, transformer tap position(s) and associated positive and zero sequence impedances, transmission line positive and zero sequence impedances, and generator impedances, including the saturated sub-transient impedance, when appropriate.

TSP shall specify system protection and control schemes for the Point of Interconnection. Generator shall have the right to review and comment on such schemes and TSP shall consider Generator's comments when determining such schemes. Generator will install and maintain System Protection Equipment that is compatible with TSP's System Protection Equipment. TSP will work with the Generator to coordinate the establishment of the relay settings for System Protection Equipment owned by both Generator and TSP associated with the Point of Interconnection.

If the GIF facilitates the interconnection of generators to the Southwest Power Pool (or any other reliability council other than ERCOT), Generator will utilize open circuit breakers and air-break switches (which provide visible open indication) as a means of isolating such generators from ERCOT prior to switching them to such other reliability council.

Generator will design, construct, and operate its electrical facilities such that all unit auxiliary power sources will come from the same reliability council to which the unit output is connected.

Exhibit J

October 9, 2025

Project: Chisme Solar and Storage

Subcontractors/Suppliers

Substation - Saber Power
SCADA - Merit SI
Fiber Terminations - RFIP
Electrical Testing - RESA
Performance Testing - McHale
Compaction/Construction Testing – Terracon
Nick Donegan drilling
Fence – TBD

EXHIBIT K

DELAY LIQUIDATED DAMAGES CALCULATIONS

Guaranteed Substation Completion Date:

Delay Liquidated Damages shall be, with respect to the failure to achieve Project Substation Completion by the Guaranteed Project Substation Completion Date, an amount equal to:

Length of Delay	Damages
1-30 days	$10,000 per day
≥ 31 days	$300,000 plus $50,000 per day of delay greater than 30 days

Guaranteed Mechanical Completion Date:

Delay Liquidated Damages shall be, with respect to the failure to achieve the Mechanical Completion by the Guaranteed Mechanical Completion Date, an amount equal to Fifty-Five Thousand Dollars ($55,000) per day, capped at 15% of the Contract Price.

Guaranteed Project Substantial Completion Date:

Delay Liquidated Damages shall be, with respect to the failure to achieve Project Substantial Completion by the Guaranteed Project Substantial Completion Date, an amount equal to:

Length of Delay	Damages
1-30 days	$75,000 per day
31-60 days	$2,250,000 plus $175,000 per day of delay greater than 30 days
≥ 61 days	$7,500,000 plus $400,000 per day of delay greater than 60 days

For the avoidance of doubt, the aggregate cap for all Liquidated Damages is 15% of the Contract Price.

No-Harm, No-Foul. If Project Substantial Completion is achieved prior to the date that is twenty (20) days after the Guaranteed Project Substantial Completion Date, Delay Liquidated Damages incurred shall be waived if and to the extent that such Delay Liquidated Damages exceed Owner's actual damages, which damages shall be demonstrable to Contactor and including but not limited to:

a) lost revenues associated with not being able to generate energy resulting from such delay, beginning on the Guaranteed Project Substantial Completion Date,
b) any penalties or liquidated damages assessed to Owner for Owner's failure to comply with its own obligations under the PPA or Interconnection Agreement, due to Contractor's failure to achieve Guaranteed Substation Completion Date, Guaranteed Mechanical Completion Date or Guaranteed Substantial Completion Date,
c) increased cost of insurance, borrowing, etc.

For the avoidance of doubt, if Project Substantial Completion is not achieved on or prior to the date that is twenty (20) days after the Guaranteed Project Substantial Completion Date, Owner shall be entitled to all Delay Liquidated Damages accrued.

EXHIBIT L

FORM OF NOTICE TO PROCEED

[*Insert Letterhead for project*]

[Date]

[Contractor Name]
[Address]
[Address]

Dear [___]:

Reference is made to that certain Procurement and Construction Agreement, by and between_____, a Delaware limited liability company ("Owner") and _____ ("Contractor"), dated , 202_ (the "**Agreement**"). Unless otherwise stated herein, all capitalized terms shall have the meaning given such terms as set forth in the Agreement.

Owner hereby gives Contractor the **Notice to Proceed** with the Work under the Agreement.

[OWNER]

By:_____

Name:_____

Title:_____

Agreed and Accepted:

[Conttractor]

By:_____

Name:_____

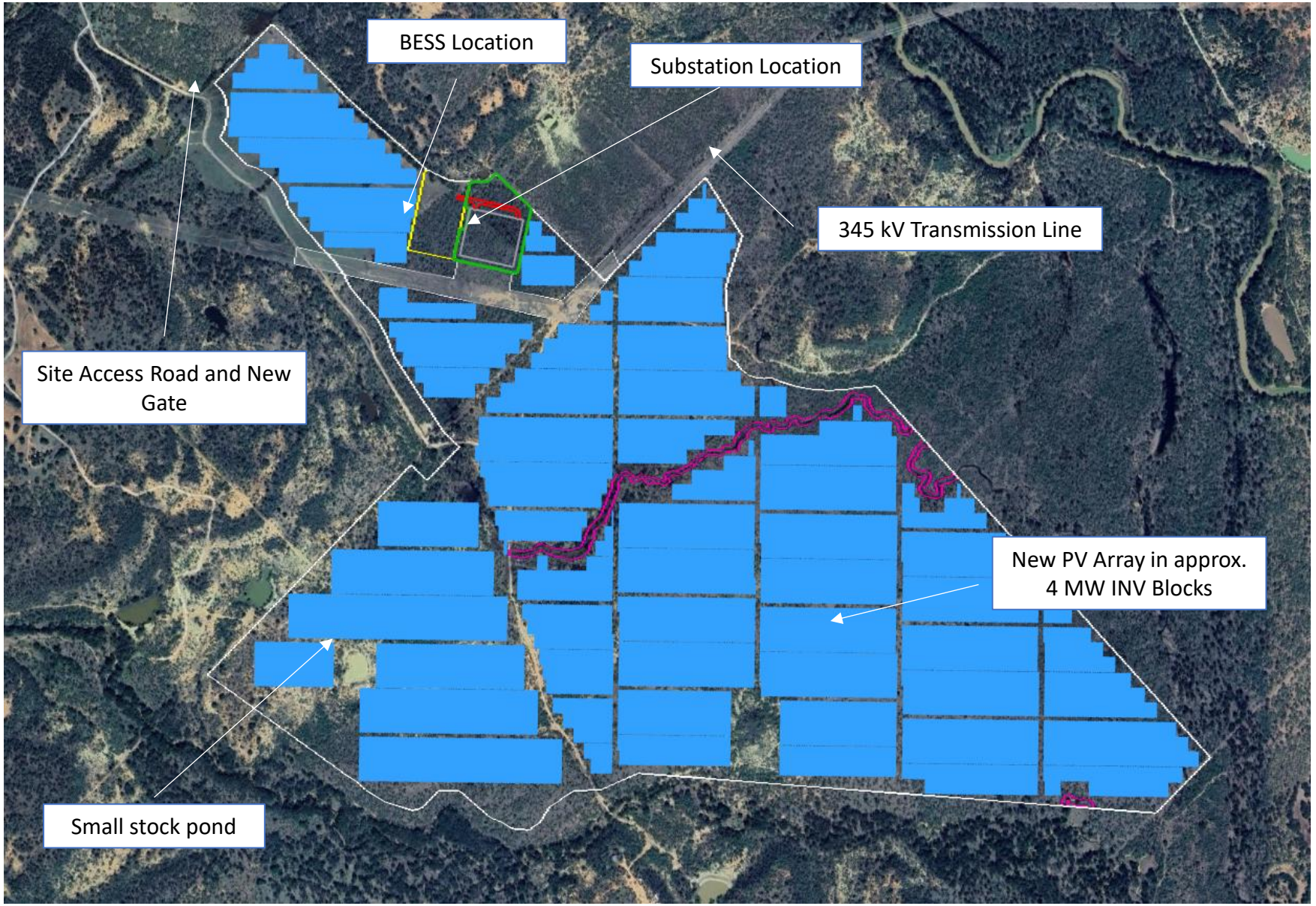
Title:_____

Chisme Solar + Storage Project
Exhibit N – Site Description and Documents

This Exhibit N - Site Description and Documents contains the following:

Project Description
Childress Lease – final executed document pending
2400415 Childress Memo of 1st Amend.Brown Co.
2301166 Childress Memo of 1st Amend Mills Co.
63-601 Easement Brown Co to Childress
2025-08-18 520102301-VL101-0101 ALTA Survey

Exhibit N - Project Description



RED RIVER CLEAN ENERGY

Chisme Solar & Storage Project
Specs valid as of 8/9/2024

Project Location:
31.583027°
-98.839109°

Project Specs:
PV DC Capacity – Approx. 207 MW
PV AC Capacity – 147 MWac
BESS AC Capacity – 146 MWac
BESS Storage – Approx. 300 MWh

General PV System Topology:
- Single Axis Tracker – 1500 VDC System
- Approx. 3-4 MW INV blocks
- MV Accumulation
- New Substation
- System interconnection at existing 345 kV transmission line on property (Transmission operator is Oncor)

General BESS System Topology:
- AC-coupled containerized system, output at MV, located adjacent to Substation

Project Timeline:
- IA submittal/Study Kickoff – September 2022
- SGIA execution/NTP/Security – October 2024
- Estimated COD – April 2027

GROUND LEASE AND EASEMENT AGREEMENT

This GROUND LEASE AND EASEMENT AGREEMENT (this "**Agreement**") dated as of the _____ day of _____, 20__ (the "**Effective Date**"), is entered into by and between **Charles Grady Childress, Sr. and wife, Alice Elaine Childress,** whose address is P.O. Box 869, Blanco, TX 78606 ("**Owner**"), and **Blue Heron Solar, LLC**, a Delaware limited liability company, whose address is 107 Spring St., Seattle, WA 98104 ("**Tenant,**" whether one or more). Owner and Tenant are sometimes referred to herein individually as a "**Party**" and together as the "**Parties**."

RECITALS:

A. Owner owns certain real property located in Brown and Mills Counties, Texas, as more particularly described on Exhibit A-1 hereto (the "**Land**") which is suitable for development of a utility-scale solar energy system (the "**Project**").

B. Tenant desires to lease that portion of the Land described on Exhibit A-2 (the "**Property**") and obtain from Owner fully paid-up easements and rights, in each case for the Term (as defined below), in the airspace above the Property and on, over, under and across the Property for the purposes of development, erection, installation, construction, improvement, reconstruction, enlargement, removal, relocation, replacement, operation and maintenance of energy generation, collection, storage, conversion, distribution and transmission systems and improvements for Solar Energy Facilities (as defined below).

AGREEMENT:

In consideration of the covenants and agreements contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. **LEASE AND EASEMENTS**.

1.1 **Grant of Lease**. Owner hereby leases, lets and demises exclusively to Tenant, and Tenant leases, lets and demises from Owner, the Property (the "**Lease**"). The Lease is solely and exclusively for the development, erection, installation, construction, improvement, reconstruction, enlargement, removal, relocation, replacement, operation and maintenance of energy generation, collection, storage, conversion, distribution and transmission systems and improvements, for Solar Energy Facilities and not for any other purpose, and Tenant shall have the exclusive right to develop and use the Property to accomplish the such purposes, to undertake the following activities and to derive all profits therefrom, in each case in Tenant's sole discretion (collectively, "**Operations**"):

(a) Conducting studies of soils, species, habitat, and other meteorological, geotechnical and biological data and determining the feasibility of energy generation, collection, storage, conversion, distribution and transmission on the Property, including taking photographs, showing the property to consultants, project advisors, potential partners or lenders and extracting soil samples;

(b) Investigating, developing, constructing, installing, using, replacing, relocating, reconstructing, improving and removing from time to time, and monitoring, maintaining, repairing and operating the following for the benefit of one or more Projects (i) energy storage systems, which use mechanical, chemical, thermal or other processes to store energy generated at one time for use at a later time, including without limitation, battery storage, (ii) solar panels or other solar renewable energy generation equipment (including the foundations, racking equipment and any other associated equipment or structures); (ii) inverters, underground and/or overhead electrical distribution, collection, transmission and communications lines, wires, poles, towers, electric transformers, electric substations, interconnection and switching facilities, electricity converters, electricity and energy storage equipment and facilities, telecommunications equipment, and power generation facilities; (iii) related foundations, pads and footings, access roads, operation and maintenance facilities; (iv) meteorological towers and measurement equipment; (v) entrance gates in existing fences on the Property to allow Tenant access to the Property and security devices such as fencing or other security safeguards; and (vi) control buildings, maintenance yards, and related facilities and equipment (all of the above, collectively, the "**Solar Energy Facilities**");

(c) Removing, trimming, pruning, topping or otherwise controlling the growth of any tree, shrub, plant or other vegetation; dismantling, demolishing, and removing any improvement, structure, embankment, impediment, berm, wall, fence or other object, on the Property that could obstruct, interfere with or impair the Solar Energy Facilities or the use of the Property intended by Tenant hereunder; and excavating, grading, leveling and otherwise modifying the land, all in Tenant's sole discretion as Tenant may deem desirable or necessary in connection with Tenant's intended use of the Property under this Agreement;

(d) Undertaking the foregoing activities and any other lawful activities, whether accomplished by Tenant or a third party authorized by Tenant (including any utility or transmission provider) that relate to the collection, storage, transmission, distribution, and sale of electric power or that Tenant reasonably determines are necessary, useful or appropriate to accomplish any of the foregoing; and

(e) For the benefit of the Project, exercising the right of ingress to and egress from such Project over and across the Property by means of roads and lanes thereon, if existing, later constructed, or otherwise by such route or routes as Tenant may construct from time to time.

1.2 **Grant of Easements**. In addition to the leasehold interests and other rights granted to Tenant pursuant to Section 1.2 above, Owner hereby grants and conveys to Tenant the following easements (collectively, the "**Easements**"):

(a) The non-exclusive easement on, about, over, under, through and across the portions of the Land, outside of the Property, as identified on Exhibit A-3 attached hereto (such portions collectively herein, the "**Access Areas**") for the construction, installation, operation, use, maintenance, repair, replacement, and enlargement, as Tenant determines necessary or desirable, of the Solar Energy Facilities and any other improvements, fixtures,

facilities, appliances, machinery and equipment (whether temporary or permanent) related to or associated with any of the Energy Facilities.

(b) The right of subjacent and lateral support for the Solar Energy Facilities to whatever extent is necessary for the safe construction, operation and maintenance of the Solar Energy Facilities. In connection with the foregoing, Owner expressly covenants that Owner shall not excavate, nor permit others to excavate, so near to any Solar Energy Facilities as to affect their stability.

(c) The sole and exclusive right to convert all solar energy resources on, about or at the Property, and to conduct the Operations (including, without limitation, the installation or placement of the Solar Energy Facilities) on, about or at the Land.

(d) The non-exclusive easement to permit the Solar Energy Facilities located on the Property or on any Access Areas to: (i) impact view or visual effects from the Land; and (ii) cause or emit noise, vibration, and electromagnetic and frequency interference to any portion of the Land. In connection with the foregoing, Owner hereby acknowledges and agrees that (1) if any component of the Solar Energy Facilities to be installed or constructed on the Property is limited or restricted by any private leases, licenses, restrictions or other agreements or by any law, rule or regulation, Owner hereby waives such limitations and restrictions, and (2) Owner shall cooperate with any efforts by Tenant to obtain similar waivers and rights of encroachment from the owners of properties adjoining the Property.

(e) The non-exclusive easement for vehicular and pedestrian access, ingress and egress to, from and over the Access Areas, at such locations as Tenant shall reasonably determine, for purposes related to or associated with the Solar Energy Facilities installed or to be installed on the Property, the Access Areas, on adjacent property or elsewhere in connection with the Solar Energy Facilities or any other project operated by Tenant; provided, however, Owner's consent (which shall not be unreasonably withheld, conditioned or delayed) shall be required if such easement is used to access property not belonging to Owner or its affiliate, if Solar Energy Facilities or access roads relating to the Solar Energy Facilities are not located on or about such property. Without limiting the generality of the foregoing, this easement shall grant Tenant the non-exclusive right to: (i) construct, use and improve any existing and future roads, bridges and access routes as Tenant reasonably deems necessary or desirable (x) from time to time located on or providing access to the Property, (y) across any other property owned by Owner, and (z) across any access routes over which Owner has the right to travel; (ii) construct, use and maintain erosion control facilities related to the Energy Facilities; (iii) construct, use and maintain signs, fences, gates (whether locked or unlocked) and other safety and protection facilities on, about or at the Energy Facilities (including, without limitation, the transmission facilities); and (iv) utilize portions of the Land for staging and laydown areas in connection with the rights of development, erection, installation, construction, improvement, reconstruction, enlargement, removal, relocation or replacement of the Solar Energy Facilities and/or any other use of the Easements granted to Tenant in this Agreement. To the extent reasonably practicable, Tenant will use existing roads or field roads for ingress and egress. Tenant may construct and maintain new roads on the Property

reasonably necessary for its operations. So long as Tenant uses a particular road for hauling heavy equipment or material, Tenant shall properly surface and/or improve that road prior to using the same for hauling heavy equipment or material and shall thereafter maintain each road, so long as Tenant uses same, including bridges and culverts, in good condition. Tenant shall be responsible for any damage caused by it or its agents or invitees to any existing or newly constructed roads and shall promptly repair any such damages, and maintain such roads in good condition.

(f) The non-exclusive easement to enter the Land to remove, trim, prune, top or otherwise control the growth of any tree, shrub, plant or other vegetation; dismantle, demolish, and remove any improvement, structure, embankment, impediment, berm, wall, fence or other object, on or that intrudes (or upon maturity could intrude) into the Property and/or the Access Areas, or could obstruct, interfere with or impair the Operations, any component of the Solar Energy Facilities or any other intended uses of the Property and Access Areas by Tenant under this Agreement.

(g) Tenant shall have the right to cut existing fences as necessary to exercise its rights hereunder. Temporary fence gaps and gates will be kept closed at all times, except when being used for the passage of equipment or personnel. Tenant shall not cut nor create any opening in any fence or fences on Owner's property without first adequately bracing same. All openings in fences shall be braced with dead-man bracing utilizing all new materials prior to the fence being cut. Tenant agrees after making such cut to promptly install and maintain a cattle guard or gate (of a type and design reasonably satisfactory to Owner), and such gates shall become the property of Owner upon the final termination of this lease. To the extent any gates installed by Tenant are locked, duplicate keys shall be provided to Owner or its representatives. Tenant agrees to promptly close, and at all times to keep locked, all gates on the perimeter of the Property which Tenant, or any agents, servants, employees and/or representatives of Tenant, may use in Tenant's operations on the Property in order to prevent the passage of livestock through any open gates and to prevent any unauthorized persons from coming onto the Property. Tenant shall reimburse Owner for its loss or the loss of its tenants occasioned by Tenant's failure to close or lock any gate, such reimbursement amount shall be the fair market value of the loss. Unless otherwise mutually agreed by the Parties, all fence corners and braces shall be constructed as follows: An 'H' push brace type system will be used for bracing the fence at each end of all openings. These braces shall be installed prior to cutting the fence allowing adequate time for concrete to set prior to tying the fence wire to the braces. When tying wire to brace it should be stretched so that the wire is as tight or tighter than before the fence was cut, thus preventing sagging or leaning of the fence. Care will be taken to assure that the fence braces are in line with the existing fence so that the fence remains straight. Braces or corners for fencing will be constructed to a minimum of the following: Posts shall be four inches (4") O.D. with 3/16" wall eight feet (8') long structural pipe. Post shall be buried three feet (3') in the ground with concrete poured from top to bottom so that no soil will touch pipe at any time (this includes at the surface). A second post shall be placed eight feet (8') from the first. A horizontal pipe four inches (4") O.D. with 3/16" wall will be welded between these two posts within one foot from the top. A 3rd post will be placed eight feet (8') from the 2nd post with a push brace made of a minimum of four inches (4") O.D. with 3/16" wall pipe welded from within the top one foot (1') of the 2nd post to the

bottom six inches (6") (above ground) of the 3rd post. All posts will be capped with a metal cap. Tenant shall promptly repair any fences cut by Tenant after completion of its applicable work. All pits, well and wellhead equipment, tanks, compressors, separators, and all other surface installations and equipment of Tenant shall be fenced to prevent the exposure of livestock to any hazardous conditions, and such fences shall be maintained by Tenant in good condition and repair. All pits dug in cultivated farmland shall be sealed or lined, and constructed and maintained so as to prevent the escape of substances and fluids by leakage, seepage, or overflow, and no fluids, salt water, or other substances will be drained or otherwise escape onto lands of Owner.

1.3 **Exclusive Use; No Hunting, Farming, or Mineral Exploration**. Owner recognizes, acknowledges and agrees that: (i) Tenant shall have the exclusive occupancy of the Property and Owner shall not grant any easements, licenses or other rights in the Property to third parties without obtaining Tenant's prior written consent; and (ii) Tenant at its sole expense may clear, grade and maintain as barren ground all of the ground within the area occupied by the Solar Energy Facilities in accordance with applicable laws and regulations governing soil disturbance. Tenant shall cause all areas of soil distribution to be actively controlled by all reasonable methods to stop soil erosion and specifically prevent soil, sand, rocks, silt and clay from migrating from the disturbed area into any waterway, stream or river. Owner agrees to provide Tenant with current information concerning the status and location of all current and pending oil and gas exploration and production activities on the Property, if any, to the extent the Owner also owns the mineral rights or otherwise possesses such information. Any renewals or extensions of existing oil and gas leases, options to lease, seismic permits or any other agreements made by Owner with a third party in search of oil, gas or other minerals at any portion of the Land or its subsurface shall be subject to the prior written consent of Tenant. Under no circumstances shall Owner or Tenant (or any of their respective invitees) hunt or farm on the Property or utilize the surface or any portion of the subsurface of the Property lying within five hundred feet (500') below the surface thereof, for the exploration or the development of oil, gas or other minerals. Methods for development of oil, gas and minerals may be used by the Owner, his heirs or assigns that do not interfere with the Solar Energy Facilities upon the surface, or the first five hundred feet (500') below the surface, of the Property. Tenant shall not be responsible to pay Owner any losses of income, rent, business opportunities, profits or other losses arising out of Owner's inability to grow crops, graze livestock, or otherwise use the Property.

1.4 **Data**. Any and all data collected by or on behalf of Tenant in connection with the Operations shall be the sole property of Tenant.

1.5 **No Obligation to Develop**. Notwithstanding the exclusive nature of the Lease and certain of the Easements, nothing expressly stated or implied in this Agreement or represented to Owner shall be construed as requiring Tenant to: (a) undertake construction, installation or operation of any Solar Energy Facilities on the Property or elsewhere; (b) generate, store, charge, discharge or sell any minimum or maximum amount of energy from the Property; (c) continue operations of any component of the Solar Energy Facilities from time to time located on the Property or elsewhere; or (d) prohibit Tenant from removing any component of the Solar Energy Facilities from the Property.

1.6 **Site Rules**. Tenant and all Tenant personnel, and all personnel of third parties authorized to enter the Property by Tenant, shall follow the following rules while on the Property. Owner may bar further access to the Property as to any individual who commits repeated violations of these rules. In addition, any individual violating rules (c)(i), (iv), (v), or (vi) once, shall be immediately expelled from the Property and will be banned from the Property thereafter. The rules are:

(a) All exterior access gates shall remain padlocked at all times, with keys to each lock provided to Owner for each gate (to the extent such gate is installed by Tenant). Except during construction with a gate monitor, all access gates, as well as all interior gates, shall remain closed at all times, other than to enter or exit such gate.

(b) Smoking is prohibited except in designated construction areas and in vehicles. Tenant will employ prudent precautions to prevent fires, including avoiding the build-up of plant materials under vehicles. In the event a grass fire is started, Tenant shall be promptly notified. Tenant agrees to pay to Owner a reasonable fee per acre for fire damage but not less than $15.00 per acre for fire damage to pasture land (whether located on the property or adjacent lands owned by Owner) that is caused by Tenant, its employees, contractors, agents, or any individuals allowed onto the Property by Tenant. Such payment shall be due and payable within sixty (60) days of such fire. Such payment shall in no way limit or waive Owner's right to obtain payment for fire damage to animals, structures, equipment or other things located on the Property, or lands adjacent to the Property.

(c) Tenant shall at all times maintain the Property in a neat, clean and presentable condition. Tenant shall not willfully or negligently damage or destroy the Property and shall keep the Property clean and free of debris created by Tenant, its contractors, or others brought on to the Property by Tenant. Tenant shall not use the Property for storage, except for materials, construction equipment and vehicles directly associated with its construction, operation and maintenance activities on the Property or adjacent properties that are part of the Solar Power Generation Facility. At no time shall any employees of Tenant, or any third parties authorized to enter the Property by Tenant bring any of the following onto the Property:

(i) weapons of any type, including but not limited to, guns, bows and arrows, or sling shots;
(ii) animal calling devices;
(iii) fishing equipment or nets;
(iv) dogs, cats or any other animals;
(v) alcoholic beverages;
(vi) illegal drugs or related paraphernalia.

(d) Company, its employees, contractors, agents and any individual allowed onto the Property by Company will confine their activities on the Property to the designated access routes and to the areas upon which operations are then being conducted..

(e) No wood, plants, animals (dead or alive), antlers, artifacts, military equipment or artifacts, Native American or manmade artifacts or any other item that was

not originally brought onto the Property by Tenant's personnel shall be removed from the Property, except that Tenant can burn and clear brush on the Property.

(f) A speed limit of 25 miles per hour (15 miles per hour at night) shall be strictly observed while using roads on the Property.

(g) This Agreement does not cover or include any right or privilege of hunting or fishing on the Property, all such rights being expressly reserved to Owner.

2. **EASEMENTS RUNNING WITH THE LAND; USE OF WATER**.

2.1 **Covenants Running With the Land**. The Easements and other related rights granted by Owner in this Agreement to Tenant are easements in gross for the benefit of Tenant as owner of the rights created by the Easements. The burdens of the Lease and Easements and all other rights granted to Tenant in this Agreement shall run with and against the Property and shall be a charge and burden on the Property and shall be binding upon and against Owner and its successors, assigns, permittees, licensees, Tenants, employees and agents.

2.2 **Sale of Water**. Subject to the terms and conditions of this Agreement, Owner hereby agrees to sell to Tenant water produced from under the Property which Tenant shall utilize in the construction, operation or maintenance of the Solar Energy Facilities. Tenant shall have the exclusive right to purchase or otherwise utilize water from water wells located or to be located on the Property which Tenant, in the exercise of its sole discretion, desires to purchase. Tenant may draw an unlimited number of barrels of water per day from the Lands. For the purposes of this agreement, a barrel shall be the equivalent of a 42-gallon U.S. fluid barrel. Tenant shall have the right to produce, transport, and deliver such water from existing water wells or wells drilled upon said Property for use only in the construction, operation or maintenance of the Solar Energy Facilities as agreed upon in this Agreement. Owner reserves the right to use water produced from the Water Well(s) for its farm and ranch operations on Owner's Lands so long as it does not unreasonably interfere with the rights granted to Tenant hereunder. Tenant agrees to deliver notice to Owner of Tenant's intent to use water, no later than fifteen (15) days prior to the date of usage.

2.3 **Additional Water Wells**. Owner grants the Tenant the right, at its sole risk and expense, to drill water well(s) on the Property ("**Wells**") which are necessary for the production of water to be used by the Tenant. Such Wells shall be completed pursuant to all state and federal regulations and meet any underground water conservation requirements of any local water district. Upon the expiration or termination of this Agreement, subject to the immediately succeeding sentence, Tenant shall convey on an "AS-IS," "WHERE-IS," "WITH ALL FAULTS BASIS," to Owner, all of Tenant's right, title, and interest in and to any and all additional water meters or metering equipment, pumps, motors, panel boxes, wiring, casing and associated equipment used on the Property by the Tenant, excluding all storage tanks on the Property by or for Tenant. Tenant shall provide Owner with written notice of Tenant's intent to cease operations on the Property. For a period of one hundred-eighty (180) days following Owner's receipt of such notice, Owner shall have the option to takeover, free of cost to the Owner, all Wells, including all pumps, panel boxes, wiring and pipe by providing Tenant written notice of its election to do so. If Owner chooses to take such Wells the Tenant shall surrender such Wells to Owner in an "as is" condition. Upon assignment to Owner from Tenant , Owner shall assume all future cost, expense and liability with

regard to the assigned Wells, including the plugging and abandonment of said Wells. If Owner chooses not to take over the operations of the Wells, Tenant agrees to plug the Wells in accordance with the rules, regulations, and specifications of the Texas Railroad Commission or any Underground Water Conservation District within nine (9) months after the termination of this Agreement. In the event Tenant fails to properly plug and abandon the Wells within nine (9) months after the termination of this Agreement, Tenant shall pay to the Owner a sum of Two Hundred Fifty Dollars ($250.00) per Well per month until such time as the Wells are properly plugged in accordance with the rules, regulations, and specifications of the Texas Railroad Commission or any Underground Water Conservation District.

2.4 **Metering; Payments for Water Volumes Purchased by Purchaser**. Tenant agrees to meter the volume of all water pumped, taken, or used by Tenant from water wells or wells now or hereafter located on the Property at the wellhead prior to entry of water into any pipe storage or transportation equipment. Tenant shall install and maintain at all times during the term of this Agreement, a meter at each water well now or hereafter located on the Property and which is used or pumped by or for Tenant. Owner may at its own cost install and own check meters on all water wells. Tenant shall measure and report, for each calendar month in which Tenant uses water from a well on the Property, the volume of water used by Tenant by written record reflecting the volume shown by the meter. At such time after Tenant has recovered its actual out-of-pocket costs associated with the drilling of a water well and the equipping of such water well, only then shall Tenant pay to Owner the sum of TWENTY-FIVE CENTS ($.25) per barrel (calculated as forty two (42) gallons) of water removed by Tenant as full and complete consideration for Tenant's retrieval and conveyance of the water located on the Property. Calculation of the payment will be based on the meter reading quantity at the above stated rate. The fee shall be paid monthly by Tenant on or before thirty (30) days after the last day of each month during the Term for water, if any, obtained by Tenant from a well on the Property during the preceding month. The Owner acknowledges that Tenant is not obligated to purchase or retrieve a minimum or maximum amount of water from the Property during the term of this Agreement. Upon completion of any water well on the Property, Tenant shall provide to the Owner a written detail of the cost of drilling and equipping each well, evidenced by copies of receipts for any cost incurred, that shall be recouped by Tenant.

2.5 **Surface Tanks.** Tenant shall have the right to install and equip one or more free-standing surface tanks on the Property for the purposes of storing water to be utilized in Tenant's operations and activities, along with a truck turnaround area. Upon abandonment of any surface tank by Tenant, Tenant shall remediate the area used and remove all caliche and rock and contaminated soil, and the land will be filled, leveled, and contoured to as near its original condition as is reasonably practical with like kind of topsoil to the surrounding area. Owner shall have the option to retain any surface tank upon the termination of this Agreement. Tenant shall also have the right to construct one or more earthen surface tanks on the Property for the purpose of catching and storing water to be utilized in Tenant's operations and activities pursuant to the same conditions set forth above in this Section with respect to standing surface tanks. Upon abandonment of any earthen surface tank, such tank shall be left as is for the future use of the Owner.

2.6 **Electrical Services, Pumps and Materials**. During the term Term, Tenant shall furnish all electrical service, pumps, material, and services for delivery of water from all water

wells located on the Property from which Tenant pumps or uses water. Owner shall provide the water well or wells that are in existence at the time of this Agreement in good working order for the Tenant's use. If Tenant and Owner are utilizing the same well, Tenant shall be responsible for furnishing all electrical services, pumps, material, and services for delivery of water, regardless of Owner's use of said well. Tenant, at its own cost and expense, shall keep all equipment for the pumping of water in good working condition during the Term; provided, however, that Tenant shall at all times during the Term exercise reasonable care in using such equipment and reimburse Owner for any damage to such equipment owned by the Owner caused by accident, neglect, or abuse by the Tenant, it's employees, agents, or invitees. At the termination of this Agreement, Tenant shall surrender the equipment to Owner in good working order and condition, reasonable wear and tear resulting from the proper use of the equipment alone excepted.

3. **TERM**. Except as provided in Section 3.5, the term of this Agreement shall commence on the Effective Date and may continue for the following described periods (collectively, the "Term"):

3.1 **Development Term**. The Term shall commence on the Effective Date and continue until the earlier of the following to occur: (a) five (5) years after the Effective Date or (b) the date on which Tenant begins selling electrical energy from the Solar Energy Facilities to a third party power purchaser (excluding start-up and testing of the Solar Energy Facilities) (the "**Development Term**"). During the Development Term, Tenant agrees to use commercially reasonable efforts to investigate and determine the feasibility of obtaining entitlements, utility meters, interconnection points, and other agreements for Tenant's proposed Operations. Within five (5) days following the Effective Date, Owner shall make available to Tenant copies of all environmental, geotechnical and other site assessments, surveys, plans and other such records of Owner to the extent such information exists and relates directly to the proposed Operations and/or the proposed Solar Energy Facilities to the extent that Owner has not already provided such materials to Tenant. Owner shall assist and fully cooperate with Tenant, at Tenant's sole cost and expense, in complying with or obtaining any land use permits and approvals, tax-incentive or tax-abatement program approvals, building permits, environmental impact reviews or any other approvals necessary or deemed desirable by Tenant in connection with the development, financing, construction, installation, replacement, relocation, maintenance, operation or removal of the proposed Energy Facilities and/or the other aspects of Tenant's proposed Operations, including, without limitation, execution of applications for such approvals and delivery of information and documentation related thereto, and execution, if required, of any orders or conditions of approval.

3.2 **Tenant Pre-Operation Termination**. If Tenant determines, in the exercise of Tenant's sole and absolute discretion, that the Property is not adequate for the proposed Operations or that Tenant will not be able to timely obtain the necessary entitlements, utility meters, interconnection points, and other agreements for Tenant's proposed Operations, Tenant may elect to terminate this Agreement by providing written notice ("**Pre-Operation Termination Notice**") to Owner on or prior to the expiration of the Development Term. If Tenant delivers a Pre-Operation Termination Notice to Owner, then (i) Tenant shall pay Owner all amounts owed by Tenant under this Agreement through the effective date of such termination; (ii) Tenant shall deliver to Owner a Release of Lease in recordable form or other termination notice with respect to the Property, and (iii) except for rights and obligations that expressly survive termination as set forth herein, Tenant shall have no further liability under this Agreement.

3.3 **Tenant Pre-Operation Partial Surrender**. Subject to this Section 3.3 but notwithstanding any other provision of this Agreement to the contrary, Tenant may, in the exercise of Tenant's sole and absolute discretion (for any reason or no reason at all), elect to terminate this Agreement as to any portion of the Property at any time during the Development Term by giving Owner written notice ("**Partial Surrender Notice**"). If Tenant delivers a Partial Surrender Notice to Owner, then (i) if the partial surrender results in the Property constituting less than five hundred (500) acres (in the aggregate between this Agreement and that certain Ground Lease Agreement dated on or around the date hereof between Tenant and George Robert Hardberger, Trustee of the Seven Seas Trust dated December 20, 2012), Owner shall have the option to terminate this Agreement by providing written notice of such election to Tenant within thirty (30) days following Tenant's delivery of the Partial Surrender Notice, provided Tenant does not rescind such Partial Surrender Notice within ten (10) Business Days of its receipt of Owner's election to terminate, (ii) Tenant shall pay Owner all amounts owed by Tenant under this Agreement with respect to the portion of the Property so surrendered through the effective date of such surrender and termination; (iii) Tenant shall deliver to Owner a Release of Lease in recordable form designating by a metes and bound legal description of the portion of the Property surrendered, and (iv) except for rights and obligations that expressly survive termination as set forth herein, Tenant shall have no further liability under this Agreement as to such surrendered portion of the Property. Without limiting the foregoing, for any partial termination of the Property, the amount of Rent under this Agreement following the date of such surrender and termination shall be proportionally reduced to reflect the reduced number of acres then comprising the Property.

3.4 **Operational Term**. Provided that Tenant has not fully surrendered or terminated this Agreement, then upon the expiration of the Development Term, the term of this Agreement shall automatically extend for an additional period commencing upon the expiration of the Development Term and continuing (unless sooner terminated pursuant hereto) for a period ending on the date that is twenty-five (25) years thereafter (the "**Operational Term**").

3.5 **Renewal Options**. Tenant shall have two (2) separate, consecutive options (each such option being referred to herein as a "**Renewal Option**", and all options collectively referred to herein as the "**Renewal Options**") to extend the Term of this Agreement for a consecutive period of five (5) years beyond the then applicable expiration of the Term (each such extension a "**Renewal Term**"). Each Renewal Option must be exercised, if at all, by written notice ("**Election Notice**") from Tenant to Owner given not less than sixty (60) days prior to the then applicable expiration of the Term. Owner shall provide Tenant written notice not less than ninety (90) days prior to the then applicable expiration of the Term that the then current Term is expiring and the date for exercising the next applicable Renewal Option. Any such Election Notice given by Tenant to Owner shall be irrevocable. If Tenant fails to exercise any Renewal Option in a timely manner, as provided for above, Owner shall give Tenant written notice that Owner has not received an Election Notice from Tenant pertaining to the next applicable Renewal Term (the "**Non-Receipt Notice**") and that Tenant shall have an additional thirty (30) days from the date of Tenant's receipt of the Non-Receipt Notice (the "**Extension Period**") to exercise an applicable Renewal Option by sending an Election Notice to Owner. If Tenant has not exercised a Renewal Option by sending Owner an Election Notice within the Extension Period, then the Renewal Option shall be deemed not exercised and this Agreement shall terminate at the end of the then applicable expiration of the Term. The Parties recognize that the Renewal Options have significant value to Tenant and that Tenant should not forfeit such Renewal Options for inadvertence in giving notices, but should

affirmatively choose whether to exercise a Renewal Option, and the Parties have accordingly provided for the above notices from Owner so that Renewal Options will not be unintentionally lost. If Tenant validly exercises a Renewal Option in a timely manner, as provided for above, but fails to exercise a subsequent Renewal Option in a timely manner, as provided for above, such subsequent Renewal Options shall be void. Each Renewal Term shall be upon the same terms and conditions as the initial Term.

4. **RENT**.

4.1 **Development Term Rent**. Commencing on the Effective Date and continuing until the date which is the earlier of (i) the day immediately preceding the commencement of the Operational Term, or (ii) the effective date of termination of this Agreement as set forth in a Pre-Operation Termination Notice delivered by Tenant pursuant to Section 3.2 above, Tenant shall pay to Owner annual rent with respect to the Property (and also in consideration of the Access Areas, including the Easements), in an amount equal to Two Hundred and No/100 Dollars ($200.00) per acre of the Property (the "**Development Term Rent**"). Payments of Development Term Rent shall be made in arrears on the last business day of each calendar year. Notwithstanding anything to the contrary herein, no Development Period Payments shall be due or payable with respect to any periods from and after commencement of the Operational Term.

4.2 **Operational Term Rent**. Commencing upon commencement of the Operational Term and continuing thereafter during the remainder of the Term (and any extensions or renewals thereof), Tenant shall pay to Owner annual rent with respect to the Property (and also in consideration of the Access Areas, including the Easements), in an amount equal to Four Hundred Fifty and No/100 Dollars ($450.00) per acre of the Property (the "**Operational Term Rent**" and collectively with the Development Term Rent, the "**Rent**"). Payments shall be made in arrears on the last business day of each calendar quarter. The Operational Term Rent shall increase each year on January 1 (pro-rated for any periods of less than twelve months at the start of the Operational Term) by an amount equal to one percent (1.0%) multiplied by the prior year's Operational Term Rent for the duration of the Operational Term.

4.3 **General Terms**. All Rent due to Owner under this Agreement shall be "gross rent" paid to Owner at the address set forth in Section 14.9, or any other place or places that Owner may designate by written notice to Tenant from time to time. There are no "net" or pass-through charges to Tenant under this Agreement. If either the Effective Date or commencement of the Operational Term occurs on a day other than the first day of a calendar year, then Development Term Rent or Operational Term Rent, as applicable, provided for such partial calendar year shall be prorated and the prorated amount shall be paid on the first day of the calendar year following the Effective Date, or the first day of the calendar year following the commencement of the Operational Term, as applicable, together with any other amounts payable on that day. If the Term terminates on other than the last day of a calendar year, then Development Term Rent or Operational Term Rent, as applicable, provided for such partial calendar year shall be prorated and the prorated installment shall be paid on the expiration date of the Term. If Owner's interest in all or any portion of the Property constitutes anything less than the entire and undivided fee simple estate thereof (whether Owner's interest is herein specified or not), or no interest therein, then the moneys accruing (including, without limitation, the Rent) from any such part constituting less than

such full interest, shall be paid only in the proportion which the interest therein, if any, covered by this Agreement, bears to the whole and undivided fee simple estate therein.

5. **OWNERSHIP OF ENERGY FACILITIES AND OTHER ATTRIBUTES.** Owner agrees that all Solar Energy Facilities installed or placed on any portion of the Property or the Land by Tenant and its successors or assigns, whether real, personal or mixed, shall remain the property of Tenant and shall be removable by Tenant at any time. Owner further acknowledges and agrees that notwithstanding that the Solar Energy Facilities may be fixtures and the manner of installation of the Solar Energy Facilities, the Solar Energy Facilities shall not become a part of the real property comprising the Property, and Owner shall have no ownership interest in the Solar Energy Facilities. Without limiting the generality of the foregoing, Owner hereby waives any statutory or common law lien that it might otherwise have in or to the Solar Energy Facilities or any part thereof and agrees that the Solar Energy Facilities may not be sold, leased, assigned, mortgaged, pledged or otherwise alienated or encumbered by Owner with Owner's interest in the Property. In addition, Owner agrees that, notwithstanding the occurrence of an Event of Default beyond all applicable notice and cure periods (including those granted to Mortgagee), Owner has not and shall not thereafter acquire any interest in the Solar Energy Facilities and Tenant or Mortgagee (or its designee) may remove the Solar Energy Facilities from the Property. Owner hereby acknowledges and agrees that Owner shall have no ownership or other interest in any (and Tenant is the sole and exclusive owner of all) Solar Energy Facilities installed on the Property or any environmental attributes produced therefrom, including, without limitation, any and all federal, state and/or local benefits and credits (including tax credits, investment credits, carbon credits and renewable energy credits (including as defined in 16 Texas Administrative Code § 25.173(c)(13)), rebates, incentives, benefits, emissions reductions, entitlements, reporting rights, deductions, depreciation, offsets and allowances of any kind, howsoever entitled, attributable to the Solar Energy Facilities or the electric energy, generation capacity or other storage-based or generator-based products produced therefrom, whether in effect as of the date of this Agreement or as may come into effect in the future.

6. **TAXES, ASSESSMENTS AND UTILITIES.**

6.1 **Owner's Obligations**. Owner shall pay the taxes, assessments or other fees attributable to any improvements installed by Owner or others (excluding Tenant and its agents) on the Property and to the underlying value of the Property. Tenant shall be liable for any roll-back or similar taxes resulting from change in use of the Property because of Tenant's use of the Property as contemplated by this Agreement and all increases to taxes, assessments attributable thereto. Owners shall be liable for all real property taxes and assessments attributable to the underlying value of the Property itself or resulting from a sale or transfer by Owner of the Property. If Owner shall fail to pay any tax owed by Owner under this Section 6.1 when due, Tenant may, at its option, pay such delinquent taxes and assessments and any accrued interest and penalties, and deduct and set off the amount of its payment from any Rent or any other payment otherwise due to Owner from Tenant.

6.2 **Tenant's Obligations**. During the Term and after the termination of this Agreement until all Solar Energy Facilities have been removed from the Property to the extent required by Section 13.2, Tenant shall pay all taxes that are attributable solely to any increase in Owner's real property taxes attributable to the Energy Facilities and other improvements to the

Property installed by Tenant; *provided* that Owner provides Tenant with copies of the applicable current and past statements of real estate taxes payable for the Property and any related information demonstrating the reasons for the increase in real estate taxes together with the current statement of real estate taxes from the taxing authority in accordance with this Section 6.2. Owner and Tenant agree jointly to use commercially reasonable efforts to cause the relevant tax assessor to issue separate property tax bills to Owner and Tenant. If the relevant tax assessor does not issue separate property tax bills to Owner and Tenant, Owner shall provide a copy of each property tax bill to Tenant within ten (10) days of receipt and Tenant shall have the right to pay its portion of the real property taxes directly to the taxing authority. In all cases where Tenant pays real estate taxes directly to the tax assessor, Tenant shall provide Owner with evidence of such payment promptly thereafter.

6.3 **Right To Contest**. Either Party may contest the validity or amount of any levied taxes, assessments, or other charges for which each is responsible under this Agreement as long as such contest is pursued in good faith and with due diligence and the Party contesting the tax, assessment, or charge has paid the obligation in question or established adequate reserves to pay the obligation in the event of an adverse determination. Upon request by Tenant, Owner shall execute any authorization or other instrument required to give Tenant the legal standing to file and pursue any such contest.

6.4 **Utilities.** Tenant shall pay for all water, electric, telecommunications, and any other utility services used by the Solar Energy Facilities or Tenant on the Property and make all deposits that are required by the companies affording the utilities.

7. INDEMNIFICATION; INSURANCE.

7.1 **Indemnification**. Each Party (the "**Indemnifying Party**") shall defend, indemnify and hold harmless the other Party and such other Party's Related Persons (as defined below) (each, an "**Indemnified Party**" from and against any and all claims, litigation, actions, proceedings, losses, damages, liabilities, obligations, costs and expenses, including reasonable attorneys', investigators' and consulting fees, court costs and litigation expenses (collectively, the "**Claims**") suffered or incurred by such Indemnified Party, arising from (a) physical damage to the Indemnified Party's property (which in Tenant's case, shall include damage to any Solar Energy Facilities), to the extent caused by the Indemnifying Party or any Related Person thereof, (b) physical injuries or death (including by reason of any hunting on the Property by Owner or any party claiming under Owner) to or of the Indemnified Party or a third party, to the extent caused by the Indemnifying Party or any Related Person thereof, (c) any breach of any covenant, and any failure to be true of any representation or warranty, made by the Indemnifying Party under this Agreement, (d) the presence or release of Hazardous Materials (as defined in Section 9.5) in, under, on or about the Property, which are or were brought or permitted to be brought onto the Property by the Indemnifying Party or any Related Person thereof, (e) the violation of any Environmental Law (as defined in Section 9.5) by the Indemnifying Party or any Related Person thereof, (f) Claims by neighboring or area landowners arising from the Indemnifying Party's use of the Property, (g) the failure to be true of any representation or warranty made by the Indemnifying Party in this Agreement, (h) any breach of this Agreement by the Indemnifying Party or (i) any negligence or willful misconduct on the part of the Indemnifying Party; *provided*, however, that in no event shall the Indemnifying Party be responsible for defending, indemnifying

or holding harmless any Indemnified Party to the extent of any Claim caused by, arising from or contributed to by the negligence or willful misconduct of such Indemnified Party. The reference to property damage in this Section 7 above does not include the loss of: (a) timber; (b) rent; (c) business opportunities; (d) profits and the like that may result from Tenant's exercising its rights granted pursuant to this Agreement (it being understood that any such losses will be compensated solely through the provisions of Section 4). The foregoing indemnity shall not extend to a Party's lawful enforcement of its rights under this Agreement. "**Related Person**" shall mean any affiliates, contractors, tenants, grantees, and sub-lessees, and each of their respective, principals, officers, employees, servants, agents, representatives, subcontractors, licensees, invitees, guests, successors and/or assigns of a Party.

7.2 **Insurance**. Upon the date of this Agreement, Tenant shall, at its expense, obtain and maintain, or cause to be maintained, insurance policies having the coverage limits and for the purposes set forth on Exhibit B. Tenant shall name Owner as an additional insured on its comprehensive or commercial general liability insurance policy and shall provide for 30 days' prior written notice to Owner of any cancellation or material change. Certificates of such insurance shall be provided to Owner upon written request. Notwithstanding the provisions of this Section 7.2, Tenant shall have the right, at its sole election but upon not less than thirty (30) days' prior notice to Owner, to self-insure some or all of the risks for which insurance is required to be carried by Tenant pursuant to the terms of this Agreement.

8. **TENANT'S REPRESENTATIONS, WARRANTIES, AND COVENANTS.** Tenant hereby represents, warrants, and covenants to Owner that:

8.1 **Keeping the Property Clean**. Tenant shall use commercially reasonable efforts to maintain its Solar Energy Facilities and keep the same free from debris and waste including weeds. Tenant shall use commercially reasonable efforts to keep the Property in a neat, clean, orderly, and safe condition at all times, and shall remove from the Property all refuse, litter and debris created by Tenant and its invitees, licensees, agents and contractors; *provided,* however, that Tenant shall not be required to remove the remains of any improvements on the Property made by the Owner as of the Effective Date. Tenant must take all actions at its own expense as required by applicable law for the suppression of ambient dust. Tenant shall not use any pesticides or herbicides on the Property other than as may be reasonably required for the maintenance of the Property or development, construction or operation of the Solar Energy Facilities, in compliance with this Agreement and applicable law.

8.2 **Requirements of Governmental Agencies**. Tenant, at its expense, shall comply in all material respects with valid laws, ordinances, statutes, orders, and regulations of any governmental agency applicable to the Solar Energy Facilities; it being understood and acknowledged that Owner shall have no obligations to pay for any improvements or other exactions as may be required to gain final approval of the Solar Energy Facilities by the permitting authorities having jurisdiction. Tenant shall have the right, in its sole discretion and its sole expense, to contest by appropriate legal proceedings, the validity or applicability to the Property or Solar Energy Facilities of any law, ordinance, statute, order, regulation, property assessment, or the like now or hereafter made or issued by any federal, state, county, local or other governmental agency or entity. Any such contest or proceeding shall be controlled and directed, and entirely financed, by Tenant.

8.3 **Construction Liens**. Subject to the following sentence, Tenant shall keep the Property free and clear of all liens and claims of liens for labor and services performed on, and materials, supplies, or equipment furnished to, the Property in connection with Tenant's use of the Property pursuant to this Agreement. Tenant shall be entitled to contest any such lien without posting a bond as long as (and only so long as) no sale date has been established for a sale affecting Owner's interest in the Property. In the event such a sale has been scheduled, Tenant shall, within thirty (30) days after it receives notice thereof, remove or bond over such lien from the Property pursuant to applicable law.

8.4 **Hazardous Materials**. Tenant shall not violate any Environmental Laws (as defined below in this Section) relating to the use, storage, release, discharge, disposal, transportation or presence of any Hazardous Material (as defined in Section 9.5), on or under the Property. Tenant shall defend, indemnify and hold harmless Owner and its Related Persons against any such violation, and shall remediate to the full extent required by Law any Environmental Claim, that is caused by Tenant or Tenant's agents or contractors. "**Environmental Claims**" shall mean all Claims asserted by governmental bodies or other legally permitted third parties for pollution or environmental damage, or for noncompliance with Environmental Laws, arising from or attributable to Tenant's operations on the Property and all cleanup and remediation costs, fines and penalties associated therewith. Environmental Claims shall not include the costs of any remediation undertaken voluntarily by any party, unless such remediation is performed under the imminent threat of a Claim by a governmental body or other third party or to comply with any applicable Environmental Law. "**Environmental Laws**" shall mean any laws, regulations, rules, ordinances, or orders of any governmental authority(ies), which relate to or otherwise impose liability, obligation, or standards with respect to pollution or the protection of the human health, safety or the environment, including but not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. §9601 et seq.), the Resource Conservation and Recovery Act of 1976 (42 U.S.C. §§6901 et seq.), the Clean Water Act (33 U.S.C. §§466 et seq.), the Safe Drinking Water Act (14 U.S.C. §§1401 1450), the Hazardous Material Transportation Act (49 U.S.C. §§1801 et seq.), the Clean Air Act, and the Toxic Substances Control Act (15 U.S.C. §§2601 2629) or their state counterparts that are applicable to solar energy operations. The obligation in this Section 8.4 to indemnify and hold harmless Owner shall survive the termination of this Agreement.

8.5 **Tenant's Authority**. Tenant has the full power and authority to execute and deliver this Agreement. Each person signing this Agreement on behalf of Tenant is authorized to do so. When executed and delivered by Tenant, this Agreement constitutes a valid and binding agreement of Tenant enforceable against Tenant in accordance with its terms except as enforceability may be limited by applicable bankruptcy or other similar laws affecting the rights of creditors generally.

9. **OWNER'S REPRESENTATIONS, WARRANTIES, AND COVENANTS**. Owner hereby represents, warrants, and covenants as follows:

9.1 **Owner's Authority**. Owners are the sole owner of the Property and ha the full power and authority to execute and deliver this Agreement. Each person signing this Agreement on behalf of Owner is authorized to do so. When executed and delivered by Owner, this Agreement constitutes a valid and binding agreement of Owner enforceable against Owner in

accordance with its terms except as enforceability may be limited by applicable bankruptcy or other similar laws affecting the rights of creditors generally.

9.2 **No Interference**. Tenant shall have the quiet use and enjoyment of the Property in accordance with the terms of this Agreement without any interference of any kind by Owner or any person claiming through Owner. Without limiting the generality of the foregoing, Owner shall not undertake any activities on the Property during the Term nor grant any rights to any person or entity with respect to the Property other than Mortgagee (as defined below) during the Term, and Owner's activities and any grant of rights Owner makes to any person or entity, located on other property, shall not currently or prospectively, disturb or interfere with: the construction, installation, maintenance, or operation of the Solar Energy Facilities, whether located on the Property or elsewhere; access over the Property to such Solar Energy Facilities; any other Operations; or the undertaking of any other activities permitted hereunder. Without limiting any other rights of Tenant under this Agreement, Owner shall not (a) disturb or interfere with the sunlight or solar energy falling on or available to the Property or any other solar resources of the Property, whether by placing solar panels, wind turbines, telecommunication towers or antennas, planting trees or constructing buildings or other structures, or by engaging in any other activity on the Property or elsewhere that could be reasonably expected to cause a decrease in the output or efficiency of the Solar Energy Facilities, or (ii) disturb the subsurface such that it could be reasonably expected to damage or interfere with the structural integrity of the Energy Facilities.

9.3 **Real Property**.

(a) Owner has good and marketable indefeasible fee simple title in, and the right to possess, the Land, free and clear of all liens other than (a) those matters set forth on Exhibit C of this Agreement and (b) liens for taxes not yet due and payable (collectively, the "**Permitted Liens**").

(b) Other than this Agreement, neither Owner nor any of its affiliates has entered into any assignment, lease, license, sublease, easement, concession, lease option or other agreement (written or oral) granting to any person the right to possess, use or occupy all or any portion of the Land.

(c) Other than this Agreement, there are no outstanding or unrecorded deeds, land contracts, agreements, debts, demands, equity interests, options, rights of first offer or rights of first refusal to purchase the Land or any portion thereof or interest therein, or other instruments which adversely affect title to, or the Owner's right to possess, the Land.

(d) There are no liens or other covenants, conditions, restrictions (private or governmental), reservations (including, without limitation, for minerals, oil and gas), rights of way, easements, exceptions or other title defects affecting the Land that individually or in the aggregate could reasonably be expected to materially and adversely affect the development, building, construction, installation, ownership, use, operation or maintenance of the Project.

(e) Owner has not received any notice of any appropriation, condemnation or like proceeding, or of any violation of any applicable zoning law, regulation or rule or other law, order, regulation, rule or requirement relating to or affecting any of the Land.

(f) To Owner's knowledge, there are no unsatisfied mechanic's or materialman's liens or lien rights pending against the Land.

(g) The Property has direct frontage or deeded rights of access to a dedicated public roadway.

9.4 **Requirements of Governmental Agencies**. Owner shall assist and fully cooperate with Tenant, at no out-of-pocket expense to Owner, in complying with or obtaining any land use permits and approvals, building permits, environmental impact reviews or any other approvals required for the financing, construction, installation, monitoring, replacement relocation, maintenance, operation or removal of the Solar Energy Facilities, including execution of applications for such approvals, and including participating in any appeals or regulatory proceedings (at no Owner expense) respecting the Solar Energy Facilities. Tenant shall reimburse Owner for all reasonable and demonstrable attorney fees actually incurred by Owner in connection with review and revision of any document requiring the signature or agreement of the Owner as requested by Tenant pursuant to this Section 9.4, such amount not to exceed $2,500 in connection with any one (1) document. To the extent permitted by law, Owner hereby waives enforcement of any applicable setback requirements respecting the Solar Energy Facilities to be placed on the Land or any such facilities to be placed upon property adjacent to any other property owned by Owner.

9.5 **Hazardous Materials**. Owner shall not knowingly violate any federal, state or local law, ordinance or regulation relating to the generation, manufacture, production, use, storage, release, discharge, disposal, transportation or presence of any substance, material or waste which is classified as hazardous or toxic, or which is regulated under federal, state or local laws or regulations (each, a "**Hazardous Material**") on or under the Property. Owner shall defend, indemnify and hold harmless Tenant and its Related Persons against any such violation that is caused by: (i) any person and exists as of the Effective Date; or (ii) Owner or Owner's agents and occurs after the Effective Date. Owner shall promptly notify Tenant of any such violation. Without limiting the generality of the foregoing, to Owner's actual knowledge without investigation or inquiry other than review of its internal records, (i) no underground tanks are now located or at any time in the past have been located on the Property or any portion thereof, (ii) no asbestos-containing materials, petroleum, explosives or other substances, materials or waste which are now or hereafter classified or regulated as hazardous or toxic and in regulated quantities under any law, regulation rule, guideline or other legal requirement has been generated, manufactured, transported, produced, used, treated, stored, released, disposed of or otherwise deposited in or on or allowed to emanate from the Property or any portion thereof other than as permitted by all health, safety, environmental and other laws, regulations, rules, guidelines or other legal requirements, including the Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (PL 99-499); the Hazardous Materials Transportation Act, 49 U.S.C. Section 1801, et. seq; the Toxic Substance Control Act, 15 U.S.C. Section 2661, et. seq.; the Resource Conservation and Recovery Act, as amended 42 U.S.C. Section 6961, et. seq.; the Federal Water Pollution Control Act, as

amended. 33 U.S.C. Section 1251, et. seq. and any environmental law promulgated by the State of Texas(each, an "**Environmental Law**") that govern the same or are applicable thereto and (iii) there are no other substances, materials or conditions in, on or emanating from the Property or any portion thereof in regulated quantities which may support a claim or cause of action under any Environmental Law. Owner has not received any notice or other communication from any governmental authority alleging that the Property is in violation of any Environmental Law.

9.6 **Litigation**. No litigation is pending, and, to the best of Owner's knowledge, no actions, claims or other legal, administrative or condemnation proceedings are pending, threatened or anticipated with respect to, or which could affect, the Property. If Owner learns that any such litigation, action, claim or proceeding is threatened or has been instituted, Owner shall promptly deliver notice thereof to Tenant.

9.7 **Owner's Cooperation**. Owner shall cooperate at no out of pocket expense with Tenant in support of Tenant's activities contemplated by this Agreement, including obtaining and maintaining any permits needed for the Solar Energy Facilities. Without limiting the generality of the foregoing, Owner agrees, at Tenant's request, sole cost and expense, to cooperate and to execute all documents including any waivers (including waivers of setbacks and setback requirements), permits, petitions and statements, and attend (if necessary) all meetings and hearings required under the terms of applicable zoning and land use regulations reasonably necessary to obtain all necessary zoning, land use and other approvals for the development, construction and operation of the Solar Energy Facilities on the Property. Owner further agrees to support and not to contest or oppose or support any contest or opposition to, any such approvals. Without limiting the generality of the foregoing, within ten (10) days after receipt of a written request made from time to time by Tenant, Owner shall: (i) execute and deliver to Tenant any Owner's affidavit reasonably requested by any title company or attorney reviewing title to the Property and (ii) join in any grants for rights-of-way, easements and/or leases for electric and other public utilities and facilities and any other electric power purpose (including any power transmission line) as Tenant may deem necessary or desirable for its development and use of the Solar Energy Facilities. Tenant shall reimburse Owner for all reasonable and demonstrable attorney fees actually incurred by Owner in connection with review and revision of any document requiring the signature or agreement of the Owner as requested by Tenant pursuant to this Section 9.7, such amount not to exceed $2,500 in connection with any one (1) document.

10. ASSIGNMENT.

10.1 Assignments.

(a) Tenant shall at all times have the right to sell, assign, encumber, transfer, or grant subordinate rights and interests (including subleases and licenses) in, the Lease, the Easements and/or any or all of its other rights and interests under this Agreement, in each case without Owner's consent; provided, however, that any and all such transfers shall be subject to all of the terms, covenants and conditions of this Agreement. No such sale, assignment, transfer, or grant shall relieve Tenant of its obligations under this Agreement unless Tenant assigns its entire interest under this Agreement and the assignee expressly assumes all obligations under this Agreement, in which event (a) the assigning Tenant shall have no liability hereunder for any obligations that relate to or acts or omissions that occur

after any period following the effective date of such assignment, and (b) from and after the effective date of such assignment, all references to "Tenant" in this Agreement shall be deemed to mean the assignee of such interest. Tenant shall notify Owner in writing of any such assignment. Failure of Tenant to give notice of any such assignment shall not constitute a default under this Agreement and shall not invalidate such assignment. For the avoidance of doubt, the Parties agree and acknowledge that the Property following an assignment of this Agreement as described above shall be used for the same purposes as intended hereunder.

(b) Owner may assign, transfer, or convey the payments, rights to payment or similar interests in this Agreement without Tenant's consent provided that (i) Owner notifies Tenant in writing of the terms of the assignment if those terms require Tenant to make payments to the assignee; (ii) in the case of a collateral assignment by Owner, the assignee acknowledges the validity and superiority of this Agreement and executes a recordable subordination and non-disturbance agreement in form and substance reasonably acceptable to Tenant; (iii) at the time of the assignment, Owner is not in default under the terms of this Agreement; and (iv) Owner shall not be relieved from liability for any of its accrued obligations under this Agreement by virtue of the assignment or conveyance, *provided* that Owner shall be relieved of its un-accrued obligations if the assignment or conveyance occurs in conjunction with a transfer or conveyance of Owner's interests in the Property (including to a trust or like estate planning vehicle or to the estate of any of the persons constituting Owner or to a person in connection with a domestic relations order) and the assignee or transferee assumes the obligations, covenants, and conditions of the Owner under this Agreement in their entirety. Owner may assign, transfer or convey the Property or this Agreement upon the prior written consent of Tenant, which consent shall not be unreasonably withheld, conditioned or delayed.

10.2 **Acquisition of Interest**. For avoidance of doubt and without limiting the generality of Section 10.1(a), the acquisition of all or any portion of Tenant's interest in the Property or the Solar Energy Facilities or this Agreement or the Lease or the Easements by another person or entity shall not require the consent of Owner or constitute a breach of any provision or a default under this Agreement, and Owner shall recognize the person as the Tenant's proper successor.

10.3 **Division into Separate Agreements**. Tenant may divide the Property into two (2) or more separate solar energy projects or phases of development if such division becomes necessary to further the development of the Project. If Tenant elects to divide the Property into two (2) or more solar energy projects or phases of development, then Owner shall, within twenty (20) days after written request from Tenant, and without demanding any additional consideration, bifurcate this Agreement by entering into and delivering to Tenant new stand-alone Agreements (as many as are necessary for each division) (which shall supersede and replace this Agreement) that provide Tenant with separate leasehold estates in different portions of the Property, as designated by Tenant. Each of such new Agreements shall: (i) specify the portion(s) of the Property to be covered thereby (and the term "Property", as used therein, shall refer only to such portion(s)), (ii) contain the same terms and conditions as this Agreement (except for any requirements that have been fulfilled by Tenant, any assignee, or any other person or entity prior to the execution of such new Agreements, and except for any modifications that may be required to ensure that Tenant's and Owner's respective combined obligations under such new

options/leases do not exceed their respective obligations under this Agreement) and be in a form reasonably acceptable to Tenant and Owner; (iii) be for a term equal to the then-remaining term of this Agreement; (iv) contain a grant of access, transmission, communications, utility and other easements for the benefit of the bifurcated option and leasehold estates, covering such portion or portions of the Property as Tenant may designate (but only to the extent permitted in this Agreement); (v) require payment to Owner of only an acreage-proportionate part of the amounts hereof; and (vi) to the extent permitted by law, enjoy the same priority as this Agreement over any lien, encumbrance or other interest against the Property. Tenant shall reimburse Owner for all reasonable and demonstrable attorney fees actually incurred by Owner in connection with review and revision of any document requiring the signature or agreement of the Owner as requested by Tenant pursuant to this Section 9.4, such amount not to exceed $2,500 in connection with any one (1) document.

11. **DEFAULT**.

11.1 **Event of Default**. If a Party (the "**Defaulting Party**") fails to perform an obligation under this Agreement (an "**Event of Default**") such Defaulting Party shall not be in default of the terms of this Agreement if, (a) in the case of the failure to pay when due any amounts payable under this Agreement, including, for the avoidance of doubt, the payment of any taxes in accordance with this Agreement (a "**Monetary Default**"), the Defaulting Party pays the past due amount within fifteen (15) days of receiving notice of the Event of Default (a "**Notice of Default**") from the other Party (the "**Non Defaulting Party**"), and (b) in the case of an Event of Default other than a Monetary Default (a "**Non-Monetary Default**"), the Event of Default is cured within ninety (90) days of receiving the Notice of Default; *provided*, that if the nature of the Non-Monetary Default requires, in the exercise of commercially reasonable diligence, more than ninety (90) days to cure, in such event, then the Defaulting Party shall not be in default as long as it commences performance of the cure within ninety (90) days and thereafter completes such cure with commercially reasonable diligence. Further, the Defaulting Party may cure any Monetary Default by depositing the amount in good faith dispute as to sums owed (not including claimed consequential, special, exemplary or punitive damages, which have been mutually waived pursuant to Section 14.17) in escrow with any reputable third party escrow, or by interpleading the same, which amount shall remain undistributed until final decision by a court of competent jurisdiction or upon agreement by the Parties. No such deposit shall constitute a waiver of the Defaulting Party's right to institute legal action for recovery of such amounts. If Owner prevails, in whole or part by ruling of a court of competent jurisdiction, in pursuit of a monetary judgment against Tenant, Tenant shall pay all sums determined by the court plus interest accruing at ten percent (10%) per annum from the date of default until paid in full (including attorney fees, expert fees, and court cost) to Owner within thirty (30) days.

11.2 **Remedies**.

(a) Except as qualified by Section 12 regarding Mortgagee Protections, should an Event of Default remain uncured by the Defaulting Party, the Non-Defaulting Party shall have and shall be entitled to exercise any and all remedies available to it at law or in equity, all of which remedies (including, without limitation, those expressly set out in this Section 11.2) shall be cumulative; *provided* that, notwithstanding anything in this Agreement to the contrary or any rights or remedies the Owner might have at law or in

equity, if any of Tenant's Solar Energy Facilities are located on the Property, then (a) Owner shall be limited to pursuing a claim for damages in the event Tenant fails to perform its non-monetary obligations hereunder, and (b) Owner shall not commence (and hereby waives its rights to assert) any action to terminate or cancel this Agreement so long as within twenty (20) days of the date that all cure periods hereunder with respect to the Non-Monetary Default have expired, Tenant has delivered a bond or letter of credit issued by a creditworthy bonding company or financial institution, as applicable, or other security reasonably acceptable to Owner, in an amount equal to the lesser of (i) the amount of direct economic damages claimed by Owner or a third party in connection with such Non-Monetary Default and (ii) an amount equal to five (5) times the then-current Rent equal to the sum that would be due for one year; *provided* that the foregoing clause (ii) shall not apply in the event the Non-Monetary Default arose or resulted from a third-party claim against Tenant. Owner hereby acknowledges and agrees that money damages would not be a sufficient remedy for a breach by Owner of this Agreement and that in addition to all other available remedies, Tenant shall be entitled to specific performance and injunctive or other equitable relief as a remedy for any such breach.

(b) Abatement. Notwithstanding any other provision of this Agreement, the Parties agree that Tenant shall be entitled to abate Rent upon the occurrence and during the continuation of any Event of Default by Owner which causes a material interference of Tenant's use of the Property as permitted by this Agreement.

(c) Tenant's Right To Cure. If Owner fails to pay the taxes or any other monetary obligations for which it is responsible hereunder, or otherwise defaults in the performance of any other obligation of Owner under this Agreement, then Tenant shall have the right to pay such taxes and other obligations, and/or remedy any such default, by any appropriate means; and the cost thereof (including attorney fees, expert fees and court costs) plus interest accruing at 10% per annum on a per diem basis from the date of demand until paid in full shall be reimbursed to Tenant by Owner within thirty (30) days. Without limiting the foregoing, if Owner fails to reimburse such costs to Tenant within such thirty (30) day period, then Tenant may offset such cost against any amounts owed to Owner under this Agreement.

12. **MORTGAGEE PROTECTION**. In the event that any mortgage, deed of trust or other security interest in this Agreement, the Lease, the Easements or in any Energy Facilities, or any portion thereof, is entered into by Tenant (a "Mortgage"), then any person or entity who is the mortgagee of a Mortgage (a "Mortgagee") shall, for so long as its Mortgage is in existence and until the lien thereof has been extinguished, be entitled to the protections set forth in this Section 12. Tenant shall send notice to Owner of the name and address of any such Mortgagee. Failure of Tenant to give notice of any such Mortgagee shall not constitute a default under this Agreement and shall not invalidate such Mortgage. No Mortgagee shall have any obligations under this Agreement until such time as it exercises its rights to acquire Tenant's interests subject to the lien of Mortgagee's Mortgage by foreclosure or otherwise assumes the obligations of Tenant directly.

12.1 **Mortgagee's Right to Possession, Right to Acquire and Right to Assign**. A Mortgagee shall have the absolute right: (i) to assign its security interest; (ii) to enforce its lien and

acquire title to the leasehold and/or easement estate by any lawful means; (iii) to take possession of and operate the Energy Facilities or any portion thereof and to perform all obligations to be performed by Tenant hereunder, or to cause a receiver to be appointed to do so; and (iv) to acquire the leasehold and/or easement estate by foreclosure or by an assignment in lieu of foreclosure and thereafter to assign or transfer the leasehold and/or easement estate to a third party. Without limiting the foregoing, Owner's consent shall not be required for the acquisition of the encumbered leasehold, easement or sub-easement estate by a third party who acquires the same by foreclosure or assignment in lieu of foreclosure.

12.2 **Notice of Default: Opportunity to Cure**. As a precondition to exercising any rights or remedies as a result of any Event of Default of Tenant, Owner shall give a Notice of Default to each Mortgagee of which it has notice (including notice of such Mortgagee's name and address), concurrently with delivery of such notice to Tenant and the following provisions shall apply:

(a) The Mortgagee shall have the same period after receipt of the Notice of Default to remedy the default, or cause the same to be remedied, as is given to Tenant, plus, in each instance, the following additional time periods: (i) thirty (30) days (for a total of sixty (60) days) after receipt of the Notice of Default in the event of any Monetary Default; and (ii) sixty (60) days (for a total of one hundred fifty (150) days) after receipt of the Notice of Default in the event of any Non-Monetary Default, *provided* that such 150-day period shall be extended for the time reasonably required to complete such cure, including the time required for the Mortgagee to perfect its right to cure such Non-Monetary Default by obtaining possession of the Property (including possession by a receiver) or by instituting foreclosure proceedings, *provided* that the Mortgagee acts with reasonable diligence, which shall be defined as commencing a trustee's sale or judicial action to foreclose on the collateral within the sixty (60) day period described above. The Mortgagee shall have the absolute right to substitute itself for Tenant and perform the duties of Tenant hereunder for purposes of curing such defaults. Owner expressly consents to such substitution, agrees to accept such performance, and authorizes the Mortgagee (or its employees, agents, representatives or contractors) to enter upon the Property to complete such performance with all the rights, privileges and obligations of the original Tenant hereunder. Owner shall not terminate this Agreement prior to the expiration of the cure periods available to a Mortgagee as set forth above.

(b) During any period of possession of the Property by a Mortgagee (or a receiver requested by such Mortgagee) and during the pendency of any foreclosure proceedings instituted by a Mortgagee, the Mortgagee shall pay or cause to be paid the Rent and all other monetary charges payable by Tenant hereunder which have accrued and are unpaid at the commencement of said period and those which accrue thereafter during said period. Following acquisition of Tenant's leasehold and easement estate by the Mortgagee or its assignee or designee as a result of either foreclosure or acceptance of an assignment in lieu of foreclosure, or by a purchaser at a foreclosure sale, this Agreement shall continue in full force and effect and the Mortgagee or party acquiring title to Tenant's leasehold and/or easement estate shall, as promptly as reasonably possible, commence the cure of all defaults, which are reasonably susceptible of being cured by the Mortgagee or

party acquiring title, hereunder and thereafter diligently process such cure to completion, whereupon such Events of Default shall be deemed waived.

(c) Any Mortgagee or other party who acquires Tenant's leasehold and/or easement interest pursuant to foreclosure or assignment in lieu of foreclosure shall be liable to perform the obligations imposed on Tenant by this Agreement so long as such Mortgagee or other party has ownership of the leasehold and/or easement estate or possession of the Property.

(d) Neither the bankruptcy nor the insolvency of Tenant shall be grounds for terminating this Agreement as long as all material obligations of Tenant under the terms of this Agreement are performed by the Mortgagee in accordance with the terms hereunder.

(e) Nothing herein shall be construed to extend the Agreement beyond the Term or to require a Mortgagee to continue foreclosure proceedings after the Event of Default has been cured. If the Event of Default is cured and the Mortgagee discontinues foreclosure proceedings, the Agreement shall continue in full force and effect.

12.3 **New Agreement to Mortgagee**. If this Agreement terminates because of Tenant's default or if the leasehold and/or easement estate is foreclosed upon, or if the Agreement is rejected or disaffirmed pursuant to bankruptcy law or other law affecting creditors' rights, Owner shall, upon written request from any Mortgagee within ninety (90) days after such event, enter into a new lease and easement agreement for the Property, on the following terms and conditions:

(a) The terms of the new lease and easement agreement shall commence on the date of termination, foreclosure, rejection or disaffirmance and shall continue for the remainder of the Term, at the same rent and subject to the same terms and conditions set forth in this Agreement.

(b) The new lease and easement agreement shall be executed within thirty (30) days after receipt by Owner of written notice of the Mortgagee's election to enter a new lease and easement agreement, *provided* that said Mortgagee: (i) pays to Owner all Rent and other monetary charges payable by Tenant under the terms of the Agreement up to the date of execution of the new lease and easement agreement, as if the Agreement had not been terminated, foreclosed, rejected or disaffirmed; (ii) performs all other obligations of Tenant under the terms of the Agreement, to the extent performance is then due and susceptible of being cured and performed by the Mortgagee; and (iii) agrees in writing to perform, or cause to be performed, all non-monetary obligations which have not been performed by Tenant and that accrued under this Agreement up to the date of commencement of the new lease and easement agreement, except those obligations which constitute noncurable defaults. Any new lease or easement granted to the Mortgagee shall enjoy the same priority as this Agreement over any lien, encumbrances or other interest created by Owner.

(c) At the option of the Mortgagee, the new lease and easement agreement may be executed by a designee of such Mortgagee without the Mortgagee assuming the burdens and obligations of Tenant thereunder.

(d) If more than one Mortgagee makes a written request for a new lease and easement agreement pursuant hereto, the new lease and easement agreement shall be delivered to the Mortgagee requesting such new lease and easement agreement whose Mortgage is superior in lien priority, and the written request of any other Mortgagee whose lien is subordinate shall be void and of no further force or effect.

(e) The provisions of Section 12 shall survive the termination, rejection or disaffirmance of the Agreement and shall continue in full force and effect thereafter to the same extent as if Section 12 were a separate and independent contract made by Owner, Tenant and such Mortgagee, and, from the effective date of such termination, rejection or disaffirmation of the Agreement to the date of execution and delivery of such new lease and easement agreement, such Mortgagee may use and enjoy said Property without hindrance by Owner or any person claiming by, through or under Owner; *provided* that all of the conditions for a new lease and easement agreement as set forth herein are complied with.

12.4 **Mortgagee's Consent to Amendment, Termination or Surrender**. Notwithstanding any provision of this Agreement to the contrary, the Parties agree that so long as there exists an unpaid Mortgage, this Agreement shall not be modified or amended, and Owner shall not accept a surrender of the Property or any part thereof or a cancellation, termination or release of this Agreement from Tenant prior to expiration of the Term without the prior written consent of any Mortgagee of whose existence Owner has been given notice. This provision is for the express benefit of and shall be enforceable by such Mortgagee.

12.5 **No Waiver**. No payment made to Owner by a Mortgagee shall constitute an agreement that such payment was, in fact, due under the terms of the Agreement; and a Mortgagee, having made any payment to Owner in the event of Owner's wrongful, improper or mistaken notice or demand, shall be entitled to the return of any such payment.

12.6 **Assignment Consents, Etc**. Owner shall execute such consents to assignment (whether or not such consent is actually required) and non-disturbance agreements as Tenant, or any Mortgagee may reasonably request from time to time so long as such agreements do not increase Owner's obligations under this Agreement or diminish its rights hereunder.

13. **TERMINATION**.

13.1 **Tenant's Right to Terminate**. In addition to any other rights Tenant has to terminate this Agreement pursuant to the other Sections of this Agreement, Tenant shall also have the right to terminate this Agreement as to all or any part of the Property at any time during the Operational Term or any Renewal Term, effective upon thirty (30) days' notice to Owner from Tenant; provided that Tenant pays an amount equal to the sum of any unpaid accrued Rent plus an amount equal to the then-current Rent that would be due for one year for all of the Property or the portion of the Property so released, as applicable, multiplied by two; it being acknowledged for the avoidance of doubt that Tenant shall be responsible for fulfilling its obligations under Sections 3.6 and 13.2 in connection with any such termination. Tenant shall pay such amount on or before the effective date of such termination, and such payment shall constitute liquidated damages for any claim by Owner arising out of the early termination of this Agreement excluding Tenant's

obligations to remove the Energy Facilities and to restore the Property in accordance with the terms of this Agreement. The Parties acknowledge and agree that the applicable payment amount set forth above is bargained for and a reasonable estimate of the damages Owner will suffer because of a termination of all or a portion of the lease. Notwithstanding anything to the contrary in this Section, Tenant shall not be liable for the payment of the aforementioned sums if Tenant terminates this Agreement as a result of an Event of Default committed by Owner and continuing beyond the applicable cure period.

13.2 **Effect of Termination; Surrender**. Upon termination of this Agreement, the Parties shall be released from all obligations hereunder except for those specified to survive the termination of this Agreement. Tenant shall, as soon as practicable thereafter, but not later than one hundred eighty (180) days after the termination, remove all above-ground and below-ground Solar Energy Facilities from the Property, and Owner hereby grants Tenant the needed license to enter the Property for such removal and restoration purposes. All Property disturbed by Tenant shall be restored to a condition and grade reasonably similar to its original condition as it existed upon the Effective Date including termination of all temporary easements granted to Tenant in the public records, if any. If Tenant fails to remove such Solar Energy Facilities within one hundred eighty (180) days of termination of the Agreement, or such longer period as Owner may provide by extension, Owner may do so. Tenant shall continue to pay amounts equal to the then-current Rent at such times and in accordance with Section 4 hereof during the period of restoration and removal as required by this provision. Tenant's obligations under this provision shall survive the termination or expiration of this Agreement.

13.3 Restoration Security. In the event that: (i) Tenant is not required to post a bond or other undertaking as security for the restoration obligation set forth in Section 13.2 above (the "**Restoration Obligation**") as a condition of approval from any governmental agency with jurisdiction over the Project; or (ii) such a condition is imposed, but is then removed and any bond or other undertaking is actually released, then Tenant shall provide security for payment of the costs of satisfying the Restoration Obligation (the "**Restoration Security**") as follows: no later than the tenth (10th) year of the Operational Term, Tenant shall obtain and deliver to Owner for Owner's benefit a third party bond or letter of credit from an unaffiliated, reputable financial institution approved by Owner in its reasonable discretion, securing Tenant's performance of the Restoration Obligation. Such Restoration Security shall remain in place for the remainder of the Operational Term and any extension thereof. Written verification of such Restoration Security shall be provided to the Owner on an annual basis in a form reasonably satisfactory to the Owner. The Restoration Security shall be in an amount equal to a reasonable determination of the estimated amount by which the cost of removing the Project in accordance with this Agreement (the "**Removal Costs**"). The determination of the Removal Costs shall be supported by analysis from a professional civil engineer licensed in the State of Texas with expertise in environmental matters and decommissioning solar energy and energy storage systems similarly situated to the Project every five (5) years for the remainder of the Agreement, and shall be binding upon the Parties. The determination of the Removal Costs shall be at Tenant's sole cost and expense. If Tenant fails to satisfy the Restoration Obligation in accordance with this Agreement, then Owner may resort to the Restoration Security to recover any reasonable and actual costs of removing the Project and restoring the Property incurred by Owner. The foregoing notwithstanding, the Restoration Security shall meet any minimum requirements of applicable law at the time of removal.

14. **MISCELLANEOUS**.

14.1 **Force Majeure**. If performance of the Agreement or of any obligation hereunder is prevented or substantially restricted or interfered with by reason of an event of Force Majeure (as defined below), the affected Party, upon giving notice to the other Party, shall be excused from such performance to the extent of and for the duration of such prevention, restriction or interference, and the Term or any other time periods herein shall be extended for such period of time. The affected Party shall use its reasonable efforts to avoid or remove such causes of nonperformance and shall continue performance hereunder whenever such causes are removed. "**Force Majeure**" shall mean fire, earthquake, flood, or other casualty or accident; a governmental closure of United States airspace to civilian traffic, strikes or labor disputes; war, civil strife or other violence; any law, order, proclamation, regulation, ordinance, action, demand or requirement of any government agency or utility, including any failure or refusal by an electric transmission company or service provider to accept for transportation electricity generated on the property; or any other act or condition beyond the reasonable control of a Party hereto.

14.2 **Condemnation; Proceeds.** If eminent domain proceedings are commenced against all or any portion of the Property and the taking and proposed use of such property would prevent or adversely affect Tenant's construction, installation, or operation of the Solar Energy Facilities on the Property, the Parties shall either amend this Agreement to reflect any necessary relocation of the Solar Energy Facilities which will preserve the value and benefit of the Lease and the Easements to Tenant, together with any corresponding payments, or, at Tenant's option, this Agreement shall terminate in which event the Parties shall be released from all obligations hereunder except for those specified to survive the termination of this Agreement. In the event of any condemnation or other taking of the Property, or any part thereof, for public use, Tenant shall have the right to any part of the award of damages to Owner for such taking attributable to the existence of this Agreement and the Solar Energy Facilities, other than as attributable to the receipt of the Rent by Owner, and for any award made directly to Tenant by the acquiring authority, including in each instance, without limitation, any award attributable to: (a) any removal and relocation costs associated with the Solar Energy Facilities, (b) any loss of or damage to any property including, without limitation, the Solar Energy Facilities, (c) the loss of use of the Property and the Access Areas by Tenant for the remainder of the Term, and (d) any loss of goodwill and Tenant's lost profits resulting from or arising out of such condemnation, including, without limitation, as a result of interruption in the Operations from the Property and Access Areas and/or any increased costs of relocation and operation from a new site. Owner shall not be liable to Tenant for any damage which Tenant may suffer by reason of such taking, including, but not limited to, the value of the unexpired Term.

14.3 **Confidentiality**. To the full extent allowed by law, Owner shall maintain in the strictest confidence, for the sole benefit of Tenant, all information pertaining to the financial terms of or payments under this Agreement, Tenant's identity, the location of the Solar Energy Facilities, product design, methods of operation, maps and drawings of all Project areas or property provided by Tenant to Owner, methods of construction, power production or availability of the Energy Facilities, and the like, whether disclosed by Tenant or otherwise discovered by Owner, unless such information either (a) is in the public domain by reason of prior publication through no act or omission of Owner or its employees or agents, or (b) was already known to Owner, prior to the time of disclosure and which Owner is free to use or disclose without breach of any obligation to

any person or entity. To the full extent permitted by law, Owner shall not use such information for its own benefit, publish or otherwise disclose it to others, allow media or press representatives to view it or have knowledge of it or permit its use by others for their benefit or to the detriment of Tenant. Notwithstanding the foregoing, Owner may disclose such information to any auditor or to Owner's family members, lenders, attorneys, accountants and other professional advisors; or pursuant to lawful process, subpoena, or court order; *provided* that Owner, in making such disclosure, advises the party receiving the information in writing of the confidentiality of the information and obtains the agreement of said party in writing not to disclose the information, except that such written confirmation shall not be required for communications among family members. The obligations of the Parties under this Section 14.3 shall survive the termination of this Agreement.

14.4 **Successors and Assigns**. All of the provisions of this Agreement shall be binding upon, and inure to the benefit of, the Parties, assignees, and their respective heirs, legal representative, and permitted successors and assigns. References to Tenant in this Agreement shall be deemed to include assignees that hold a direct ownership interest in this Agreement and actually are exercising rights under this Agreement to the extent consistent with such interest.

14.5 **No Third-Party Beneficiaries.** Except for the rights of Mortgagees and the Indemnified Parties, no provision of this Agreement is intended to nor shall it in any way inure to the benefit of any third party so as to constitute any such person a third-party beneficiary under this Agreement, or of any one or more of the terms of this Agreement, or otherwise give rise to any cause of action in any person not a party to this Agreement.

14.6 **No Partnership**. This Agreement is not intended to, and shall not create any partnership, joint venture or other arrangement between Owner and Tenant that would render a Party liable for the action of the other Party. Neither Party shall have any right, power or authority to act or create any duty or obligation, express or implied, on behalf of the other Party, or to hold itself out as a representative or agent of the other Party.

14.7 **No Merger**. There shall be no merger of this Agreement, or of the leasehold or easement estate created by the Agreement, with the fee estate in the Property by reason of the fact that the Agreement or the leasehold estate or the easement estate or any interest therein may be held, directly or indirectly, by or for the account of any person or persons who shall own the fee estate or any interest therein, and no such merger shall occur unless and until all persons at the time having an interest in the fee estate in the Property and all persons (including all Mortgagees) having an interest in the Agreement or in the leasehold estate or in the estate of Owner and Tenant shall join in a written instrument effecting such merger and shall duly record the same.

14.8 **Memorandum of Agreement**. Tenant shall prepare and Owner shall sign a notarized memorandum of this Agreement ("**Memorandum**") contemporaneously with the execution of this Agreement, and deliver the Memorandum to Tenant with the instruction to record the Memorandum with the County recorder contemporaneously with the Effective Date. The Memorandum shall include all material provisions of this Agreement, but shall not make any reference to specific amounts set forth in any payment provisions herein. In the event the recording of such memorandum, or amendments to the memorandum, if applicable, is subject to recording

fees or transfer taxes, the Parties shall share such expense and each Party shall pay one-half (1/2) of the fees and costs due.

14.9 **Notices**. Unless otherwise required by law, all notices required to be given hereunder shall be in writing and shall be conveyed by (i) personal delivery (including by any messenger, courier service or common carrier) or (ii) the United States Postal Service by certified or registered mail, postage prepaid, with return receipt requested, as follows:

If to Owner, to:

Charles Grady Childress, Sr. and wife, Alice Elaine Childress
1213 14th Street
P.O. Box 869
Blanco, TX 78606-0869

If to Tenant, to:

Blue Heron Solar, LLC
107 Spring Street
Seattle, WA 98104

Notice given by personal delivery (other than facsimile) shall be deemed to have been given upon delivery to the appropriate address (or upon refusal of acceptance), notice by facsimile shall be deemed to have been given upon receipt during normal business hours (i.e., 8 a.m. to 5 p.m. recipient's local time Monday through Friday) (a written confirmation of successful transmission from the transmitting facsimile machine being prima facie evidence of such receipt) and notice given by U.S. mail shall be deemed to have been given five (5) days after deposit in the U.S. mail. Each Party may designate from time to time, another address in place of the address hereinabove set forth by notifying the other Parties in the same manner as provided in this Section 14.9.

14.10 **Entire Agreement; Amendments**. This Agreement (including all Exhibits hereto) together with the representations and warranties made by Owner in Section 4.1 of that certain Option Agreement, dated as of the ____ day of August, 2021, between Owner and Tenant, which are hereby incorporated by reference constitute the entire agreement between Owner and Tenant respecting its subject matter, and supersedes any and all oral or written agreements. Any agreement, understanding or representation respecting the Property, or any other matter referenced herein not expressly set forth in this Agreement or a subsequent writing signed by both parties is null and void. This Agreement shall not be modified or amended except in a writing signed by both Parties. No purported modifications or amendments, including without limitation any oral agreement (even if supported by new consideration), course of conduct or absence of a response to a unilateral communication, shall be binding on either Party. Provided that no material default in the performance of Tenant's obligations under this Agreement shall have occurred and remain uncured, Owner shall cooperate with Tenant in amending this Agreement from time to time to include any commercially reasonable provision that may be reasonably requested by Tenant for the purpose (to be restricted to such purposes) of implementing the provisions contained in this Agreement or for the purpose of preserving the security interest of any assignee or Mortgagee. To

the extent an amendment is requested by a Mortgagee, Tenant shall pay Owner's reasonable attorneys' fees incurred in the review of such amendment.

14.11 **Legal Matters**. This Agreement shall be governed by and interpreted in accordance with the laws of the State of Texas without giving effect to the conflict of laws provisions thereof. If the Parties are unable to resolve amicably any dispute arising out of or in connection with this Agreement, each of the Parties hereby submits to the exclusive jurisdiction of federal or state district court sitting in or covering the County where the Real Property is located and for the purposes of all legal proceedings arising out of or relating to this Agreement of the transactions provided for herein. Each of the Parties irrevocably waives, to the fullest extent not prohibited by law, any objection that it may now or hereafter have to the laying of the venue of any such proceeding brought in such a court and any claim that any such proceeding brought in such court has been brought in an inconvenient forum. To the extent that such courts refuse to exercise jurisdiction hereunder, the Parties agree that jurisdiction shall be proper in any court in which jurisdiction may be obtained.

TO THE EXTENT PERMITTED BY LAW, THE PARTIES HEREBY KNOWINGLY AND VOLUNTARILIY WAIVE THEIR RESPECTIVE RIGHT TO TRIAL BY JURY OF ANY CAUSE OF ACTION, CLAIM, COUNTERCLAIM OR CROSS-COMPLAINT IN ANY ACTION, PROCEEDING OR HEARING BROUGHT BY A PARTY HERETO OR ITS SUCCESSORS AND ASSIGNS ON ANY MATTER WHATSOEVER ARISING OUT OF, OR IN ANY WAY CONNECTED WITH, THIS AGREEMENT, THE RELATIONSHIP OF THE PARTIES HERETO, OR THE ENFORCEMENT OF ANY REMEDY UNDER ANY LAW, STATUTE, OR REGULATION, EMERGENCY OR OTHERWISE, NOW OR HEREAFTER IN EFFECT.

14.12 **Partial Invalidity**. Should any provision of this Agreement be held, in a final and unappealable decision by a court of competent jurisdiction, to be either invalid, void or unenforceable, the remaining provisions hereof shall remain in full force and effect, unimpaired by the holding. Notwithstanding any other provision of this Agreement, the Parties agree that in no event shall the term of this Agreement, the Lease or the Easements be longer than, respectively, the longest period permitted by applicable law.

14.13 **No Waiver.** No failure or delay by any Party hereto in exercising any right, power or privilege hereunder and no course of dealing between the Parties shall operate as a waiver of any such right, power or privilege, except as this Agreement may provide otherwise. No waiver of any default or right on any one occasion shall constitute a waiver of any subsequent default of the same or other right on a subsequent occasion. No single or partial exercise of any right, power or privilege shall preclude the further or full exercise thereof. No waiver shall be effective unless it is in writing and is signed by the Party asserted to have granted such waiver.

14.14 **Transaction Costs**. Each Party shall bear its own expenses and costs, including the fees of any attorney retained by it, incurred in connection with the preparation of this Agreement and the consummation of the transactions contemplated hereby except as described in Section 14.10.

14.15 **Further Assurances**. In addition to the obligations specifically required to be performed under this Agreement by Owner and Tenant, Owner and Tenant shall perform, from time to time, such other acts, and shall execute, acknowledge and/or deliver such other instruments, documents and other materials, as may be reasonably required in order to consummate the transactions contemplated by this Agreement.

14.16 **Attorneys' Fees**. If any legal proceeding is brought by either Party with respect to this Agreement, the prevailing Party shall be entitled to recover, in addition to any other relief to which it is entitled, its costs and expenses incurred in connection with such legal proceeding, including reasonable attorneys' fees.

14.17 **Limitation on Damages.** NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THIS AGREEMENT, NEITHER PARTY SHALL BE ENTITLED TO, AND EACH OF OWNER AND TENANT HEREBY WAIVES ANY AND ALL RIGHTS TO RECOVER, CONSEQUENTIAL (EXCEPT WITH RESPECT TO INDEMNITY CLAIMS IN RESPECT OF THIRD PARTIES PURSUANT TO SECTION 7), INCIDENTAL, AND PUNITIVE OR EXEMPLARY DAMAGES, HOWEVER ARISING, WHETHER IN CONTRACT, IN TORT, OR OTHERWISE, UNDER OR WITH RESPECT TO ANY ACTION TAKEN IN CONNECTION WITH THIS AGREEMENT.

14.18 **Rule of Construction**. Owner and Tenant are each sophisticated parties with substantial prior business experience with transactions of the sort contemplated by this Agreement, and each has had the opportunity to have this Agreement reviewed by its own counsel. In the event an ambiguity or question of intent or interpretation of this Agreement arises, this Agreement shall be construed as if jointly drafted by the Parties, and no presumption or burden of proof shall arise favoring or disfavoring a Party as a result of authorship or drafting of any provision of this Agreement.

14.19 **Headings; Plurality and Gender**. The headings used in this Agreement are for reference and convenience only and shall not enter into the interpretation of this Agreement. Wherever in this Agreement the singular number is used, the same shall include the plural, and the masculine gender shall include the feminine and neuter genders, and vice versa, as the context shall require. The words "this Agreement," "herein," "hereof," "hereby," "hereunder" and words of similar import refer to this Agreement as a whole and not to any particular subdivision unless expressly so limited. The phrase "this Section," refers only to the Section hereof in which the phrase occurs. The word "or" is not exclusive, and "including" (and its various derivatives), means "including without limitation." All references to days are to calendar days unless otherwise specifically stated.

14.20 **Estoppel Certificates**. Each Party agrees that it shall, at any time and from time to time during the Term of this Agreement and within (10) days after a written request by the other Party, execute, acknowledge and deliver to the requesting Party a written statement certifying that this Agreement is unmodified and in full force and effect (or modified and stating the modifications), the dates to which the payments and any other charges have been paid, and that there are no defaults existing (or that defaults exist and stating the nature of such defaults), and stating such other facts as the requesting Party may reasonably provide. The failure of a Party to deliver any such certificate within such time shall be conclusive upon such Party that this

Agreement is unmodified and in full force and effect, all payments to such Party are current, there are no defaults existing, and such other facts are true and correct. Each Party shall reimburse the other Party for all reasonable and demonstrable attorney fees actually incurred by the first Party in connection with review and revision of any estoppel requested by the second Party pursuant to this Section 14.20, such amount not to exceed $2,500 in connection with any one (1) estoppel.

14.21 **Counterparts; Telecopied Signatures**. This Agreement may be executed in one or more counterparts, each of which when so executed shall be an original, but all of which together shall constitute one agreement. This Agreement shall become binding when one or more counterparts hereof, individually or taken together, shall bear the signature of all the Parties hereto. This Agreement, and any amendments hereto or, to the extent signed and delivered by means of a facsimile machine or electronic transmission in portable document format (pdf), shall be treated in all manner and respects as an original Agreement and shall be considered to have the same binding legal effects as if it were the original signed version thereof delivered in person. At the request of any Party, each other Party shall re- execute original forms thereof and deliver them to the other Party. No Party shall raise the use of a facsimile machine or electronic transmission in pdf to deliver a signature or the fact that any signature was transmitted or communicated through such means as a defense to the formation of a contract and each Party forever waives any such defense.

14.22 **Brokerage Commissions**. Each of Owner and Tenant represents to the other that such Party has not incurred, directly or indirectly, any liability on behalf of the other Party for the payment by the other Party of any real estate brokerage commission, finder's fee or other compensation to any agent, broker or finder in connection with this Agreement. Owner and Tenant do each hereby agree to indemnify, defend and hold the other Party harmless from and against any claim for any brokerage commissions, finder's fees or other compensation claimed to be due and owing by reason of the indemnifying Party's activities.

14.23 **Tax and Renewable Energy Credits**. If under applicable law, the holder of a leasehold or easement estate becomes ineligible for any tax credit, renewable energy credit (including, without limitation, renewable energy credits as defined in 16 Texas Administrative Code § 25.173(c)(13)), environmental credit or any other benefit or incentive for renewable energy established by any local, state or federal government, then, at Tenant's option, Owner and Tenant shall exercise good faith and negotiate an amendment to this Agreement or replace it with a different instrument so as to convert Tenant's interest in the Property to a substantially similar interest that makes Tenant eligible for such credit, benefit or incentive.

14.24 **No Cost to Landowner.** During the term of this Agreement, Landowner shall not be obligated to incur and Grantee shall reimburse Landowner for any costs, including reasonable attorney's fees, associated with any request by Grantee to execute additional documentation or to undertake any obligation imposed by this Agreement or to the benefit of Grantee, a Lender, or assignee of Grantee.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK;
SIGNATURE PAGE FOLLOWS]

This Ground Lease and Easement Agreement is executed and delivered to be effective as of the Effective Date, and the Parties certify that they have read this Agreement and understand and agree to the terms and conditions hereunder.

OWNER:

CHARLES GRADY CHILDRESS, SR.

_____

Date: _____

STATE OF TEXAS

COUNTY OF _____

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the _____ day of _____, 2021 by _____.

_____

NOTARY PUBLIC

[Signatures continued on following page]

OWNER:

ALICE ELAINE CHILDRESS

_____

Date: _____

STATE OF TEXAS

COUNTY OF _____

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the _____ day of _____, 2021 by _____.

_____

NOTARY PUBLIC

[Signatures continued on following page]

TENANT:

Blue Heron Solar, LLC,
a Delaware limited liability company

By: _____
Name: _____
Title: _____
Date: _____

STATE OF _____

COUNTY OF _____

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the _____ day of _____, 2021 by _____.

_____
NOTARY PUBLIC

EXHIBIT A-1
(to Ground Lease and Easement Agreement)

Legal Description of the Land

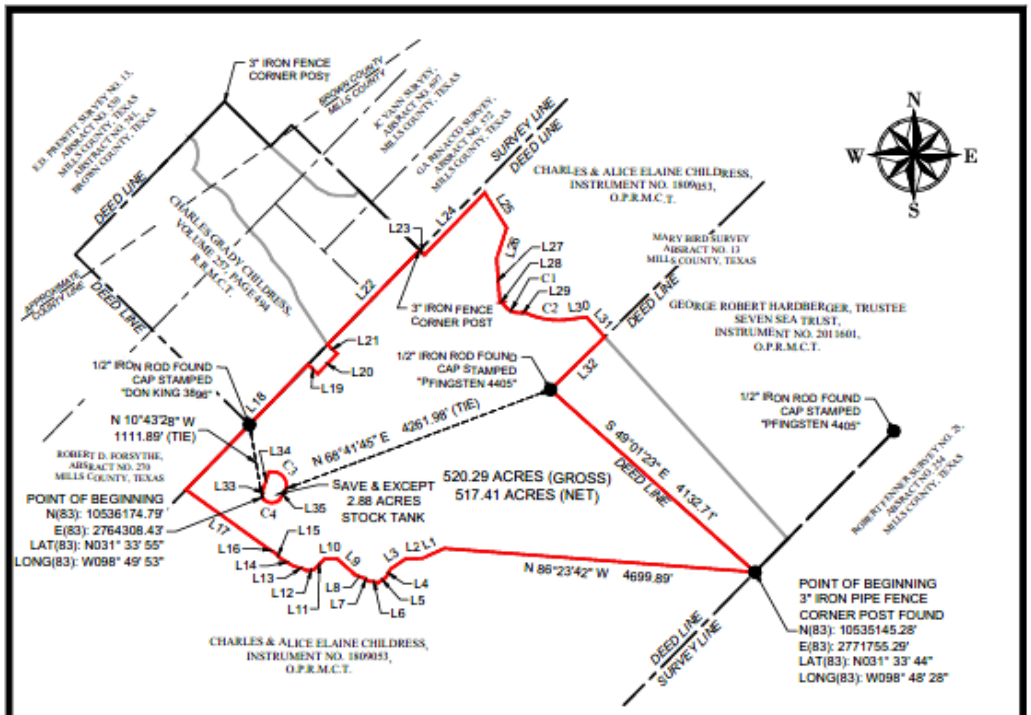
Tract 1: Being 300.00 acres, more or less, situated in Robert D Forsythe Survey, A-270 and the E. D. Prewit Survey, A-350, Brown and Mills Counties Texas, being more particularly described in that certain Warranty Deed dated May 23, 1983, from Joyclin Callaway Quick Neefe, as her sole and separate property, to P. L. Childress, recorded in Volume 171, Page 682, Deed records of Mills County, Texas.

Tract 2: Being 1,589 acres, more or less, situated in the Mary Bird Survey, A-13, Mills County Texas, being more particularly described in that certain Special Warranty Gift Deed dated December 28, 2020, from Charles Grady Childress, Sr. (aka Charles Grady Childress) and wife, Alice Elaine Childress, to George Robert Hardberger, Trustee of the Seven Seas Trust dated December 20, 2012, recorded in Instrument 2012698, Official Public Records of Mills County, Texas, being part of that certain 1,949 acres, more or less, situated in the Mary Bird Survey, A-13, Mills County, Texas, being more particularly described in that certain Conveyance and Partition Deed dated July 212, 1972, between Joe L Clayton and wife, Mary Williams Clayton; Joe D Williams and wife, Jeane Reeves Williams and Please L Childress and wife, Mary Geneice Childress, recorded in Volume 139, Page 857, Deed Records of Mills County, Texas.

EXHIBIT A-2-1
(to Ground Lease and Easement Agreement)

Legal Description of the Property
With Respect to Which Owner Holds a Ten Percent (10%) Undivided Ownership Interest

(See attached.)



LINE TABLE		
LINE NO.	DIRECTION	LENGTH
L1	S85° 06' 40"W	360.50'
L2	S86° 27' 09"W	258.62'
L3	S55° 16' 24"W	263.73'
L4	S29° 16' 48"W	151.02'
L5	S54° 00' 26"W	126.83'
L6	N84° 57' 59"W	151.30'
L7	N60° 14' 18"W	108.48'
L8	N70° 49' 00"W	112.02'
L9	N49° 42' 04"W	378.30'
L10	S87° 21' 06"W	185.35'
L11	S44° 05' 16"W	224.59'
L12	S78° 24' 54"W	86.00'
L13	N73° 27' 36"W	244.00'
L14	N59° 55' 00"W	215.39'
L15	N46° 09' 46"W	115.17'
L16	N58° 33' 06"W	149.03'
L17	N55° 05' 51"W	1504.07'
L18	N43° 32' 03"E	2638.74'

LINE TABLE		
LINE NO.	DIRECTION	LENGTH
L19	S46° 24' 20"E	200.00'
L20	N43° 32' 03"E	419.01'
L21	N46° 24' 20"W	200.00'
L22	N43° 32' 03"E	1989.30'
L23	S46° 13' 54"E	100.00'
L24	N43° 32' 03"E	1304.17'
L25	S32° 53' 36"E	622.98'
L26	S17° 17' 38"W	489.98'
L27	S04° 46' 36"E	653.10'
L28	S81° 52' 12"E	46.12'
L29	N86° 33' 12"E	35.90'
L30	N83° 19' 07"E	192.25'
L31	S42° 57' 05"E	400.55'
L32	S44° 59' 58"W	1139.53'
L33	N06° 42' 23"E	133.12'
L34	N18° 22' 32"E	254.43'
L35	S29° 18' 34"W	189.01'

LEGEND

- MONUMENT – TYPE AS NOTED
- PROPOSED SURFACE SITE
- COUNTY LINE
- DEED/SURVEY LINE AS NOTED
- R.R.M.C.T. REAL RECORDS OF MILLS COUNTY TEXAS
- O.P.R.M.C.T. OFFICIAL PUBLIC RECORDS MILLS COUNTY TEXAS

CURVE TABLE					
CURVE NO.	LENGTH	RADIUS	DELTA	CHORD	CH-DIST
C1	355.65'	278.07'	73°16'50"	S63° 16' 48"E	331.90'
C2	764.39'	1234.09'	35°29'19"	S83° 46' 36"E	752.23'
C3	435.45'	200.96'	124°09'15"	S47° 07' 53"E	355.12'
C4	303.43'	171.86'	101°09'32"	N82° 55' 03"W	265.53'

NOTES:

1.) BEARINGS, COORDINATES, DISTANCE AND AREA SHOWN HEREON ARE GRID BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE AS DETERMINED BY GPS OBSERVATIONS AT THE POINT OF BEGINNING CORNER OF SAID PROPOSED SURFACE SITE. THE CONVERGENCE ANGLE IS 00° 47' 08.94" AND A SCALE FACTOR OF 0.99992948.

2.) LATITUDE & LONGITUDE SHOWN ARE BASED NAD 83 GEOGRAPHIC.

3.) THIS IS A PROPOSED SURFACE SITE EXHIBIT AND DOES NOT REPRESENT A TRUE BOUNDARY SURVEY. THIS SURVEY IS BASED ON OWNERSHIP AND EASEMENT INFORMATION PROVIDED BY THE CLIENT. SURVEYOR DID NOT ABSTRACT SUBJECT TRACT AND THERE MAY BE EASEMENTS OR OTHER ENCUMBRANCES THAT AFFECT THE SUBJECT TRACT THAT ARE NOT SHOWN HEREON.

I, GARRETT JAMES SMELKER, TEXAS R.P.L.S. NO. 6870, DO HEREBY CERTIFY THAT THE PLAT AND ACCOMPANYING FIELD NOTES ARE THE RESULTS OF AN ON THE GROUND SURVEY CONDUCTED UNDER MY DIRECT SUPERVISION, AND ARE CORRECT AND TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

STATE OF TEXAS REGISTERED GARRETT JAMES SMELKER 6870 PROFESSIONAL LAND SURVEYOR

GARRETT JAMES SMELKER — DATE: 4-13-2021
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS RPLS NO. 6870

2000' 0' 2000' 4000'

SCALE: 1" = 2000'

PROJECT NO. 210310

AMERICAN MERIDIAN, LLC Surveying · GIS Services

TBPELS FIRM# 10194663
321 E. Northwest Highway
Grapevine, Texas 76051
(817) 948-2667

PREPARED FOR
CONCORD NEW ENERGY GROUP, LLC
PROPOSED SURFACE SITE,
A 520.29 ACRE TRACT OF LAND,
BEING PART OF A THE MARY BIRD SURVEY, ABSTRACT NO. 13,
MILLS COUNTY, TEXAS

SHEET 3 OF 7

LEGAL DESCRIPTION:

BEING A 520.29 ACRE PROPOSED SURFACE SITE BEING PART OF THE MARY BIRD SURVEY, ABSRACT NO. 13, MILLS COUNTY, TEXAS, BEING PART OF A CALLED 1949 ACRE TRACT OF LAND CONVEYED TO CHARLES & ALICE ELAINE CHILDRESS IN INSTRUMENT NO. 1809053 OF THE OFFICIAL PUBLIC RECORDS OF MILLS COUNTY, TEXAS, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A 3" IRON FENCE CORNER POST FOUND ON THE EAST LINE OF SAID 520.29 ACRE SURFACE SITE ALSO BEING A POINT ON THE EAST LINE OF SAID CALLED 1949 ACRE TRACT, SAID 3" IRON FENCE CORNER POST FOUND BEING CALLED THE **POINT OF BEGINNING** AND HAVING A TEXAS COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE (4203), STATE PLANE COORDINATE OF N: 10535145.28 FEET, E: 2771755.29 FEET, FOR REFERENCE;

THENCE FROM SAID POINT OF BEGINNING, N 86°23'42" W, A DISTANCE OF 4696.89 FEET TO A POINT;

THENCE, S 65°06'40" W, A DISTANCE OF 360.50 FEET TO A POINT;

THENCE, S 86°27'09" W, A DISTANCE OF 258.62 FEET TO A POINT;

THENCE, S 55°16'24" W, A DISTANCE OF 263.73 FEET TO A POINT;

THENCE, S 25°16'48" W, A DISTANCE OF 151.02 FEET TO A POINT;

THENCE, S 54°00'26" W, A DISTANCE OF 126.83 FEET TO A POINT;

THENCE, N 84°57'59" W, A DISTANCE OF 151.20 FEET TO A POINT;

THENCE, N 60°14'18" W, A DISTANCE OF 108.46 FEET TO A POINT;

THENCE, N 70°49'00" W, A DISTANCE OF 112.02 FEET TO A POINT;

THENCE, N 49°42'04" W, A DISTANCE OF 378.30 FEET TO A POINT;

THENCE, S 87°21'09" W, A DISTANCE OF 166.35 FEET TO A POINT;

THENCE, S 44°05'16" W, A DISTANCE OF 224.59 FEET TO A POINT;

THENCE, S 78°24'54" W, A DISTANCE OF 86.00 FEET TO A POINT;

THENCE, N 73°27'36" W, A DISTANCE OF 244.00 FEET TO A POINT;

THENCE, N 69°55'00" W, A DISTANCE OF 215.39 FEET TO A POINT;

THENCE, N 46°09'46" W, A DISTANCE OF 115.17 FEET TO A POINT;

THENCE, N 68°33'06" W, A DISTANCE OF 149.09 FEET TO A POINT;

THENCE, N 55°05'51" W, A DISTANCE OF 1504.07 FEET TO A POINT ON THE NORTHERLY LINE OF SAID CALLED 1949 ACRE TRACT;

THENCE, N 43°32'03" E, A DISTANCE OF 2638.74 FEET TO A POINT ON THE NORTHERLY LINE OF SAID CALLED 1949 ACRE TRACT;

THENCE, S 46°24'20" E, A DISTANCE OF 200.00 FEET TO A POINT;

THENCE, N 43°32'03" E, A DISTANCE OF 419.01 FEET TO A POINT;

THENCE, N 46°24'20" W, A DISTANCE OF 200.00 FEET TO A POINT ON THE NORTHERLY LINE OF SAID CALLED 1949 TRACT;

THENCE, N 43°32'03" E, A DISTANCE OF 1668.30 FEET TO A 3" IRON FENCE CORNER POST;

THENCE, S 46°13'54" E, A DISTANCE OF 100.00 FEET TO A POINT;

THENCE, N 43°32'03" E, A DISTANCE OF 1304.17 FEET TO A POINT;

THENCE, S 32°53'36" E, A DISTANCE OF 822.98 FEET TO A POINT;

THENCE, S 17°17'36" W, A DISTANCE OF 468.98 FEET TO A POINT;

THENCE, S 04°46'36" E, A DISTANCE OF 853.10 FEET TO A POINT;

THENCE, S 81°52'12" E, A DISTANCE OF 46.12 FEET TO A POINT FOR THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE WITH SAID NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 278.07 FEET, ARC LENGTH OF 355.65 FEET, DELTA OF 73°16'53", CHORD BEARING OF S 83°16'48" E AND A CHORD DISTANCE OF 331.90 FEET TO A POINT;

THENCE, N 89°33'12" E, A DISTANCE OF 35.90 FEET TO A POINT FOR THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE WITH SAID NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 1234.09 FEET, ARC LENGTH OF 764.39 FEET, DELTA OF 35°29'19", CHORD BEARING OF S 83°48'36" E AND A CHORD DISTANCE OF 752.23 FEET TO A POINT;

THENCE, N 83°19'07" E, A DISTANCE OF 192.25 FEET TO A POINT;

THENCE, S 42°57'05" E, A DISTANCE OF 400.55 FEET TO A POINT;

THENCE, S 44°59'58" W, A DISTANCE OF 1139.53 FEET TO A 1/2" IRON ROD WITH A CAP STAMPED "PFINGSTEN 4405" FOUND;

THENCE, S 49°01'23" E, A DISTANCE OF 4132.71 FEET TO THE **POINT OF BEGINNING**, CONTAINING 520.29 ACRES OF LAND, MORE OR LESS.

SAVE & EXCEPT A 2.88 ACRE EXISTING STOCK TANK FURTHER DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT WITHIN SAID CALLED 1949 ACRE TRACT FROM WHICH A 1/2" IRON ROD WITH A CAP STAMPED "DON KING 3696" FOUND BEARS N 10°43'26" W A DISTANCE OF 1111.89 FEET;

THENCE FROM SAID POINT OF BEGINNING, N 06°42'29" E, A DISTANCE OF 133.12 FEET TO A POINT;

THENCE, N 18°22'32" E, A DISTANCE OF 254.43 FEET TO A POINT AT THE BEGINNING OF A NON-TANGENT CURVE TO THE RIGHT;

THENCE WITH SAID NON-TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 200.96 FEET, ARC LENGTH OF 435.45 FEET, DELTA OF 124°09'15", CHORD BEARING OF S 47°07'53" E AND A CHORD DISTANCE OF 355.12 FEET TO A POINT FROM WHICH A 1/2" IRON ROD WITH A CAP STAMPED "PFINGSTEN 4405" FOUND FOR THE WEST CORNER OF SAID CALLED 360 ACRE TRACT BEARS N 68°41'45" E A DISTANCE OF 4561.98 FEET;

THENCE, S 25°16'34" W, A DISTANCE OF 169.01 FEET TO A POINT AT THE BEGINNING OF A NON-TANGENT CURVE TO THE RIGHT;

THENCE WITH SAID NON-TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 171.88 FEET, ARC LENGTH OF 303.43 FEET, DELTA OF 101°09'32", CHORD BEARING OF N 82°55'03" W AND A CHORD DISTANCE OF 265.53 FEET TO THE **POINT OF BEGINNING** CONTAINING 2.88 ACRES OR 125,479 SQUARE FEET OF LAND MORE OR LESS.

PROJECT NO. 210310

AMERICAN MERIDIAN, LLC
Surveying · 3D Scanning

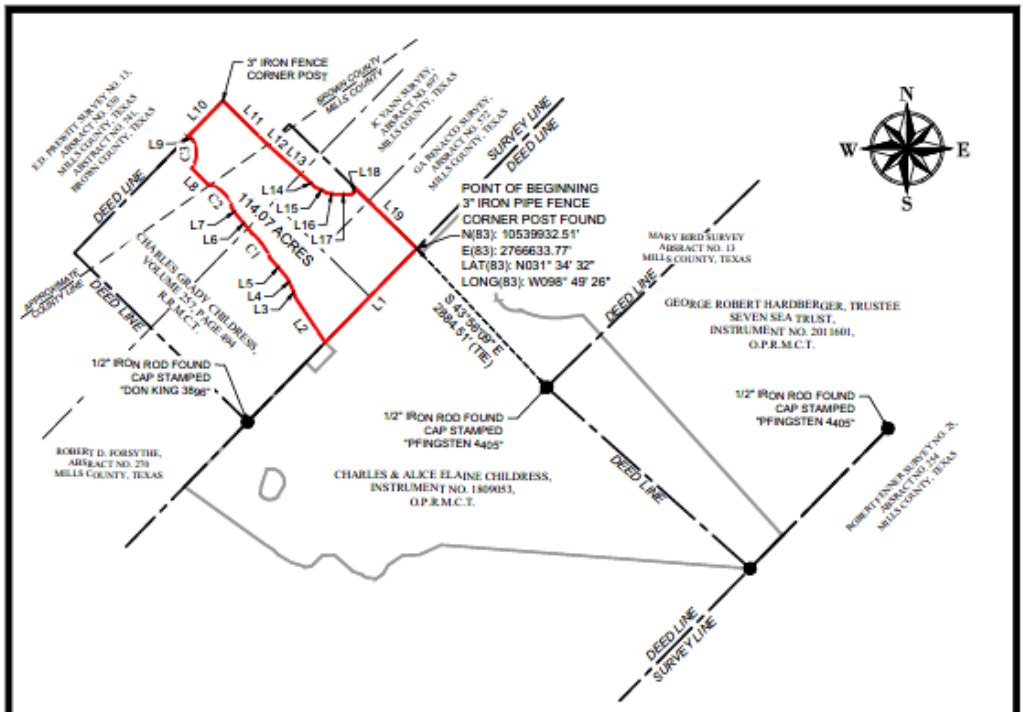
TBPELS FIRM# 10194663
321 E. Northwest Highway
Grapevine, Texas 76051
(817) 948-2667

PREPARED FOR
CONCORD NEW ENERGY GROUP, LLC
PROPOSED SURFACE SITE,
A 520.29 ACRE TRACT OF LAND,
BEING PART OF A THE MARY BIRD SURVEY, ABSTRACT NO. 13,
MILLS COUNTY, TEXAS

EXHIBIT A-2-2
(to Ground Lease and Easement Agreement)

Legal Description of the Property
With Respect to Which Owner Holds One Hundred Percent (100%) Ownership

(See attached.)



LINE TABLE		
LINE NO.	DIRECTION	LENGTH
L1	S43° 32' 03"W	1989.30'
L2	N34° 15' 34"W	804.07'
L3	N21° 57' 36"W	189.16'
L4	N28° 12' 33"W	163.74'
L5	N41° 26' 51"W	382.75'
L6	N40° 35' 45"W	356.34'
L7	N34° 47' 07"W	97.46'
L8	N45° 01' 01"W	336.15'
L9	N47° 27' 04"W	101.48'
L10	N43° 33' 09"E	749.69'

LINE TABLE		
LINE NO.	DIRECTION	LENGTH
L11	S46° 27' 02"E	967.97'
L12	S47° 30' 55"E	80.68'
L13	S49° 19' 12"E	689.55'
L14	S47° 28' 18"E	173.36'
L15	S64° 51' 30"E	227.28'
L16	S83° 57' 27"E	102.91'
L17	N89° 32' 16"E	252.13'
L18	N44° 38' 04"E	106.17'
L19	S46° 13' 54"E	1280.34'

LEGEND

- MONUMENT – TYPE AS NOTED
- PROPOSED SURFACE SITE
- COUNTY LINE
- DEED/SURVEY LINE AS NOTED
- N.R.M.C.T. REAL RECORDS OF MILLS COUNTY TEXAS
- O.P.R.M.C.T. OFFICIAL PUBLIC RECORDS MILLS COUNTY TEXAS

CURVE TABLE					
CURVE NO.	LENGTH	RADIUS	DELTA	CHORD	CH-DIST
C1	484.86'	1066.83'	26°02'25"	N37° 13' 48"W	480.70'
C2	568.50'	499.39'	65°13'33"	N45° 59' 15"W	538.30'
C3	436.69'	425.97'	58°44'13"	N02° 00' 25"E	417.82'

NOTES:

1.) BEARINGS, COORDINATES, DISTANCE AND AREA SHOWN HEREON ARE GRID BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE AS DETERMINED BY GPS OBSERVATIONS AT THE POINT OF BEGINNING CORNER OF SAID PROPOSED SURFACE SITE. THE CONVERGENCE ANGLE IS 00° 47' 08.94" AND A SCALE FACTOR OF 0.99992848.

2.) LATITUDE & LONGITUDE SHOWN ARE BASED NAD 83 GEOGRAPHIC.

3.) THIS IS A PROPOSED SURFACE SITE EXHIBIT AND DOES NOT REPRESENT A TRUE BOUNDARY SURVEY. THIS SURVEY IS BASED ON OWNERSHIP AND EASEMENT INFORMATION PROVIDED BY THE CLIENT. SURVEYOR DID NOT ABSTRACT SUBJECT TRACT AND THERE MAY BE EASEMENTS OR OTHER ENCUMBRANCES THAT AFFECT THE SUBJECT TRACT THAT ARE NOT SHOWN HEREON.

I, GARRETT JAMES SMELKER, TEXAS R.P.L.S. NO. 6870, DO HEREBY CERTIFY THAT THE PLAT AND ACCOMPANYING FIELD NOTES ARE THE RESULTS OF AN ON THE GROUND SURVEY CONDUCTED UNDER MY DIRECT SUPERVISION, AND ARE CORRECT AND TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

STATE OF TEXAS REGISTERED GARRETT JAMES SMELKER 6870 PROFESSIONAL LAND SURVEYOR

GARRETT JAMES SMELKER
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS RPLS NO. 6870

DATE: 4-13-2021

2000' 0' 2000' 4000'

SCALE: 1" = 2000'

PROJECT NO. 210310

AMERICAN MERIDIAN, LLC
Surveying | 3D Scanning
TBPELS FIRM# 10194663
321 E. Northwest Highway
Grapevine, Texas 76051
(817) 948-2667

PREPARED FOR
CONCORD NEW ENERGY GROUP, LLC

PROPOSED SURFACE SITE,
A 114.07 ACRE TRACT OF LAND,
BEING PART OF A THE THE ROBERT D. FORSYTHE SURVEY, ABSTRACT NO. 270,
THE GA RENACCO SURVEY, ABSTRACT NO. 572,
THE JC VANN SURVEY, ABSTRACT NO. 697,
AND THE E.D. PREWITT SURVEY NO. 13, MILLS COUNTY, TEXAS
AND THE E.D. PREWITT SURVEY NO. 13, BROWN COUNTY, TEXAS.

SHEET 6 OF 7

LEGAL DESCRIPTION:

BEING A 114.07 ACRE PROPOSED SURFACE SITE BEING PART OF THE ROBERT D. FORSYTHE SURVEY, ABSTRACT NO. 270, MILLS COUNTY, TEXAS, BEING PART OF THE GA RENACCO SURVEY, ABSRACT NO. 572, MILLS COUNTY, TEXAS, BEING PART OF THE JC VANN SURVEY, ABSTRACT NO. 697, MILLS COUNTY, TEXAS, AND BEING PART OF THE E.D. PREWITT SURVEY NO. 13, ABSTRACT NO. 530, MILLS COUNTY TEXAS ALSO KNOWN AS ABSTRACT NO. 741, BROWN COUNTY, TEXAS. BEING A PORTION OF A CALLED 300 ACRE TRACT CONVEYED TO CHARLES GRADY CHILDRESS IN VOLUME 257, PAGE 494 OF THE REAL RECORDS OF MILLS COUNTY TEXAS, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A 3" IRON FENCE CORNER POST FOUND FOR THE EAST CORNER OF SAID 114.07 ACRE SURFACE SITE ALSO BEING THE EAST CORNER OF SAID CALLED 300 ACRE TRACT, FROM WHICH A 1/2" IRON ROD WITH A CAP STAMPED "PFINGSTEN 4426" FOUND BEARS S 43°56'09" E A DISTANCE OF 2694.51 FEET. SAID 3" IRON FENCE CORNER POST FOUND BEING CALLED THE **POINT OF BEGINNING** AND HAVING A TEXAS COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE (4203), STATE PLANE COORDINATE OF N: 10539932.51 FEET, E: 2769833.77 FEET, FOR REFERENCE;

THENCE FROM SAID POINT OF BEGINNING, S 43°32'03" W, A DISTANCE OF 1989.30 FEET TO A POINT;

THENCE, N 34°15'34" W, A DISTANCE OF 804.07 FEET TO A POINT;

THENCE, N 21°57'36" W, A DISTANCE OF 189.16 FEET TO A POINT;

THENCE, N 28°12'33" W, A DISTANCE OF 163.74 FEET TO A POINT;

THENCE, N 41°26'51" W, A DISTANCE OF 382.75 FEET TO A POINT FOR THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE WITH SAID NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 1066.83 FEET, ARC LENGTH OF 484.86 FEET, DELTA OF 26°02'29", CHORD BEARING OF N 37°13'48" W AND A CHORD DISTANCE OF 480.70 FEET TO A POINT;

THENCE, N 40°35'45" W, A DISTANCE OF 356.24 FEET TO A POINT;

THENCE, N 34°47'07" W, A DISTANCE OF 97.46 FEET TO A POINT FOR THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE WITH SAID NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 499.39 FEET, ARC LENGTH OF 568.50 FEET, DELTA OF 65°13'33", CHORD BEARING OF N 45°58'15" W AND A CHORD DISTANCE OF 538.30 FEET TO A POINT;

THENCE, N 45°01'01" W, A DISTANCE OF 336.15 FEET TO A POINT FOR THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE WITH SAID NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 425.07 FEET, ARC LENGTH OF 436.69 FEET, DELTA OF 58°51'13", CHORD BEARING OF N 03°55'25" E AND A CHORD DISTANCE OF 417.82 FEET TO A POINT;

THENCE, N 47°27'04" W, A DISTANCE OF 101.48 FEET TO A POINT ON THE WEST LINE OF SAID CALLED 300 ACRE TRACT ;

THENCE, N 43°33'09" E, A DISTANCE OF 748.69 FEET TO A 3" IRON FENCE CORNER POST;

THENCE, S 46°27'02" E, A DISTANCE OF 997.97 FEET TO A POINT;

THENCE, S 47°30'55" E, A DISTANCE OF 80.68 FEET TO A POINT;

THENCE, S 46°19'12" E, A DISTANCE OF 699.55 FEET TO A POINT;

THENCE, S 47°28'18" E, A DISTANCE OF 173.36 FEET TO A POINT;

THENCE, S 64°51'30" E, A DISTANCE OF 227.28 FEET TO A POINT;

THENCE, S 63°57'27" E, A DISTANCE OF 102.91 FEET TO A POINT;

THENCE, N 89°32'16" E, A DISTANCE OF 252.13 FEET TO A POINT;

THENCE, N 44°38'04" E, A DISTANCE OF 106.17 FEET TO A 3" IRON FENCE CORNER POST;

THENCE, S 46°13'54" E, A DISTANCE OF 1280.34 FEET TO THE **POINT OF BEGINNING**, CONTAINING 114.07 ACRES OF LAND, MORE OR LESS.

PREPARED FOR
CONCORD NEW ENERGY GROUP, LLC
PROPOSED SURFACE SITE,
A 114.07 ACRE TRACT OF LAND,
BEING PART OF A THE THE ROBERT D. FORSYTHE SURVEY, ABSTRACT NO. 270,
THE GA RENACCO SURVEY, ABSTRACT NO. 572,
THE JC VANN SURVEY, ABSTRACT NO. 697,
AND THE E.D. PREWITT SURVEY NO. 13, MILLS COUNTY, TEXAS
AND THE E.D. PREWITT SURVEY NO. 13, BROWN COUNTY, TEXAS.
SHEET 7 OF 7

PROJECT NO. 210310

AMERICAN MERIDIAN, LLC
Surveying + 3D Scanning
TBPELS FIRM# 10194663
321 E. Northwest Highway
Grapevine, Texas 76051
(817) 948-2667

EXHIBIT A-3
(to Ground Lease and Easement Agreement)

Legal Description of the Access Areas

EXHIBIT B
(to Ground Lease and Easement Agreement)

Tenant Insurance

Tenant agrees to provide the following insurance coverages at its own expense for purposes of personal injuries or accidents that may occur as a direct result of the activities conducted by Tenant (including any activities of Tenant's employees, consultants, contractors or other agents) on the Property pursuant to this Agreement:

a. Comprehensive or Commercial General Liability on an "occurrence" basis, including coverage for Bodily Injury; Personal Injury and Death, Property Damage, Contractual Liability (particularly applicable to the provisions of the Indemnity Article of this Agreement); and Products and Completed Operations with limits as follows:

$1,000,000 each occurrence and $2,000,000 in the annual aggregate.

b. Workers Compensation and Employers Liability, including coverage under United States Longshoremen and Harbor Worker's Act and Jones Act where applicable, and additional insurance as required by law with limits as follows:

Worker's Compensation – Statutory limits

Employer's Liability – $1,000,000 each accident and in the aggregate

c. Business automobile liability insurance which shall include coverage for all owned, non-owned and hired vehicles with the following limit:

$1,000,000 Combined Single Limit Bodily Injury and Property Damage

d. Umbrella/Excess Liability Insurance of not less than $1,000,000 per occurrence and $1,000,000 annual aggregate. Such coverage shall be on a per occurrence basis and over and above coverage provided by the policies described in paragraphs a., b., c. above.

e. Pollution/Environmental Liability Insurance with limits of at least $1,000,000 per occurrence.

EXHIBIT C
(to Ground Lease and Easement Agreement)

Permitted Liens

None.

Recording Requested By And
When Recorded Mail to:

Blue Heron Solar, LLC
107 Spring St.
Seattle, WA 98104

(Space above this line for Recorder's Use)

Brown and Mills Counties, Texas

MEMORANDUM OF FIRST AMENDMENT TO OPTION AGREEMENT

THIS MEMORANDUM OF FIRST AMENDMENT TO OPTION AGREEMENT ("***Memorandum***") is dated February 1, 2023 (the "***Effective Date***"), by and between **Charles Grady Childress, Sr. and wife, Alice Elaine Childress**, whose address is 1213 14th Street, P.O. Box 869, Blanco, TX 78606-0869 ("***Optionor***"), and **Blue Heron Solar, LLC**, a Delaware limited liability company, whose address is 107 Spring St., Seattle, WA 98104 ("***Optionee***").

1. Initial Option and Memoranda. Pursuant to that certain Option Agreement dated as of August 19, 2021 (the "***Existing Option***"), Optionor granted an option to Optionee to lease certain lands more particularly described in **Exhibit A** attached thereto (the "***Existing Property***") upon the terms and conditions of the Initial Option. A memorandum of the Existing Option was recorded as Instrument Number 213959 in the Official Public Records of Mills County, Texas and as Instrument Number 2105910 in the Official Public Records of Brown County, Texas (the "***Existing Memorandum***").

2. First Amendment to Option Agreement. On or around the date hereof, Optionor and Optionee entered into that certain First Amendment to Option Agreement (the "***First Amendment to Option***"), which served to amend the Existing Option. The primary purpose of the First Amendment to Option was to extend the Option Period. As amended, the Option Period commenced on the Effective Date and continues for sixty (60) months thereafter or the earlier termination as provided in the Existing Option, provided that following Optionee's issuance of an Exercise Notice, the Option Period shall be extended until the Closing Date. The Existing Option, as amended by the First Amendment to Option, is collectively referred to herein as the "***Lease Option Agreement***." Optionor has granted and hereby does grant to Optionee, and Optionee has accepted and hereby does accept from Optionor, an option exercisable during the Option Period to lease the Property and to obtain an easement on, over, under and across a certain part of the Property, pursuant to the terms of the Lease Option Agreement.

3. Incorporation of Option. This Memorandum incorporates herein all of the terms and provisions of the Lease Option Agreement as though fully set forth herein.

4. Purpose of Memorandum. The purpose of this Memorandum is to give record notice of the existence of the First Amendment to Option and it shall not be construed to alter, modify, amend or supplement the First Amendment to Option. If there is any inconsistency between the terms of this Memorandum and the terms of the First Amendment to Option, the terms of the First Amendment to Option shall prevail. Except as otherwise stated in this Memorandum, the terms, conditions, and representations made in the Existing Memorandum are hereby ratified.

[Remainder of page intentionally left blank - signature page follows]

IN WITNESS WHEREOF, the Parties have executed this Memorandum of First Amendment to Option Agreement as of the date first above written.

OPTIONOR:

Charles Grady Childress, Sr. (aka Charles Grady Childress)

Charles Grady Childress Sr.

STATE OF TEXAS

COUNTY OF Blanco

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the 6th day of February, 202[illegible] by Charles Grady Childress, Sr. (aka Charles Grady Childress).

PAULA K. DREYER
ID #1921736
My Commission Expires
June 30, 2024

Paula K Dreyer
NOTARY PUBLIC

[Signatures continued on following page]

OPTIONOR:

Alice Elaine Childress

Alice Elaine Childress

STATE OF TEXAS

COUNTY OF Blanco

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the 6th day of February, 2023 by Alice Elaine Childress.

PAULA K. DREYER
ID #1921736
My Commission Expires
June 30, 2024

Paula K Dreyer
NOTARY PUBLIC

[Signatures continued on following page]

OPTIONEE:

Blue Heron Solar, LLC,
a Delaware limited liability company

By: _____
Name: Mike Cho
Title: President

STATE OF Washington

COUNTY OF King

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the 3RD day of August, 2023 by MIKE CHO, as President of Blue Heron Solar, LLC, a Delaware limited liability company on behalf of said company.

_____
NOTARY PUBLIC

Danielle Carroll
Notary Public
State of Washington
Commission Expires 04/27/2026
Lic. No. 22024137

THE STATE OF TEXAS

COUNTY OF MILLS

I hereby certify that this instrument was FILED on the date and the time stamped hereon by me and was duly RECORDED in the Records of Mills County, Texas.

2301166 MEMO
12/18/2023 11:10:30 AM Total Fees: $42.00

Sonya Scott, County Clerk
Mills County, TX
By Julie Fincher Deputy

SHARON FERGUSON

COUNTY CLERK

200 SOUTH BROADWAY, SUITE 101
BROWNWOOD TX 76801

PHONE (325) 643-2594

DO NOT DESTROY

WARNING-THIS IS PART OF THE OFFICIAL RECORD

INSTRUMENT NO. 2400415

FILED FOR REGISTRATION JANUARY 29,2024 01:35PM 5PGS $41.00

SUBMITTER: MAJR E

RETURN TO:

MAJR E
303 S ALLEN AVE STE 6
MONAHANS TX 79756

I hereby certify that this instrument was FILED in file number Sequence on the date and at the time stamped hereon by me, and was duly RECORDED in the Official Public Records of Brown County, Texas.

By: Sharon Ferguson

ANY PROVISION WHICH RESTRICTS THE SALE, RENTAL OR USE OF THE DESCRIBED REAL PROPERTY BECAUSE OF COLOR OR RACE IS INVALID AND UNENFORCEABLE UNDER FEDERAL LAW

Receipt #117894

01/25/2024 10:17 AM

Glasscock County Court County/District Clerk
209 S Myrl PO Box 190
Garden City, TX 79739

Customer: MAJR RESOURCES, INC
PO BOX 795
MONAHANS, TX 79756

User: pbalcazar
Drawer: Cash 1

Fees:

Doc #2024-0152	MEMORANDUM	12 pages	$65.00
Doc #2024-0153	MEMORANDUM	11 pages	$61.00
Doc #2024-0154	MEMORANDUM	13 pages	$69.00

Total Fees:	$195.00
Amount Received:	$195.00
Change:	$0.00

Payments & Refunds:

Check 11716	$195.00

2301166 MEMO Total Pages: 5

Recording Requested By And
When Recorded Mail to:

Blue Heron Solar, LLC
107 Spring St.
Seattle, WA 98104

(Space above this line for Recorder's Use)

Brown and Mills Counties, Texas

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3. Incorporation of Option. This Memorandum incorporates herein all of the terms and provisions of the Lease Option Agreement as though fully set forth herein.

4. Purpose of Memorandum. The purpose of this Memorandum is to give record notice of the existence of the First Amendment to Option and it shall not be construed to alter, modify, amend or supplement the First Amendment to Option. If there is any inconsistency between the terms of this Memorandum and the terms of the First Amendment to Option, the terms of the First Amendment to Option shall prevail. Except as otherwise stated in this Memorandum, the terms, conditions, and representations made in the Existing Memorandum are hereby ratified.

[Remainder of page intentionally left blank - signature page follows]

IN WITNESS WHEREOF, the Parties have executed this Memorandum of First Amendment to Option Agreement as of the date first above written.

OPTIONOR:

Charles Grady Childress, Sr. (aka Charles Grady Childress)

Charles Grady Childress Sr.

STATE OF TEXAS

COUNTY OF Blanco

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the 6th day of February, 202[illegible] by Charles Grady Childress, Sr. (aka Charles Grady Childress).

PAULA K. DREYER
ID #1921736
My Commission Expires
June 30, 2024

Paula K Dreyer
NOTARY PUBLIC

[Signatures continued on following page]

OPTIONOR:

Alice Elaine Childress

Alice Elaine Childress

STATE OF TEXAS

COUNTY OF Blanco

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the 6th day of February, 2023 by Alice Elaine Childress.

PAULA K. DREYER
ID #1921736
My Commission Expires
June 30, 2024

Paula K Dreyer
NOTARY PUBLIC

[Signatures continued on following page]

OPTIONEE:

Blue Heron Solar, LLC,
a Delaware limited liability company

By: _____
Name: Mike Cho
Title: President

STATE OF Washington

COUNTY OF King

ACKNOWLEDGEMENT

This instrument was acknowledged before me on the 3RD day of August, 2023 by MIKE CHO, as PRESIDENT of Blue Heron Solar, LLC, a Delaware limited liability company on behalf of said company.

_____
NOTARY PUBLIC

Danielle Carroll
Notary Public
State of Washington
Commission Expires 04/27/2026
Lic. No. 22024137

THE STATE OF TEXAS

COUNTY OF MILLS

I hereby certify that this instrument was FILED on the date and the time stamped hereon by me and was duly RECORDED in the Records of Mills County, Texas.

2301166 MEMO
12/18/2023 11:10:30 AM Total Fees: $42.00

Sonya Scott, County Clerk
Mills County, TX
By Julie Fincher Deputy

32

BVM/JB/1207098

EASEMENT AGREEMENT

THE STATE OF TEXAS ()

COUNTY OF BROWN ()

WHEREAS, John Robert Gilger and wife, Susan Gilger, residents of Brown County, Texas, are the owners of a tract of land containing 99-4/5ths acres of land, more or less, out of the E. D. Prewitt Survey No. 13, Abstract No. 741, in Brown County, Texas, and being Parcel No. Two of Fourth Tract, described in deed from L. L. Gilger and wife, Lucile Gilger, to John Robert Gilger and wife, Susan Gilger, dated the 28th day of February, 1978, and recorded in Volume 727, Page 330, Real Property Records of Brown County, Texas, and in various other deeds from the said L. L.Gilger and wife, Lucille Gilger, to John Robert Gilger and wife, Susan Gilger; and

WHEREAS, 3 Esses I, L.P., a Texas limited partnership is the owner of an 8.96 acre tract of land out of and a part of the E. D. Prewitt Survey No. 13, Abstract No. 74, in Brown County, Texas, conveyed by deed of even date herewith from John Robert Gilger and wife, Susan Gilger, to Lisa Ann Quick Flood, Trustee, and conveyed by deed of even date herewith from Lisa Ann Quick Flood, Trustee, to 3 Esses I, L.P.; and

WHEREAS, a 1.72 acre tract of land lying within a roadway, believed to be a portion of old County Road No. 268, as shown on a plat of record in Volume 93, Page 255, Deed Records of Brown County, Texas, provides access, ingress and egress to and from said 99-4/5ths acre Gilger tract and said 8.96 acre 3 Esses I, L.P., tract AND to a tract of 300 acres of land described in deed from Joyclin Callaway Quick Neefe to P. L. Childress, dated the 23rd day of May, 1983, and recorded in Volume 833, Page 217, Deed Records of Brown County, Texas; and

WHEREAS, a question has arisen as to whether or not said 1.72 acre tract of land does in fact constitute a public roadway, and as to whether or not said 7.72 acre tract of land is, in fact, a part of the County Road No. 268 in Brown County, Texas; and

WHEREAS, John Robert Gilger and wife, Susan Gilger, and 3 Esses I, L.P., desire to memoralize the fact that said road does in fact provide access, ingress and egress to and from a tract of land owned by the said John Robert Gilger and wife, Susan Gilger, and a tract owned by the said 3 Esses I, L.P., and to the aforementioned tract described in Deed to P. L. Childress, and insodoing, by the execution hereof desire to execute cross easements to themselves, and to the said P. L. Childress, his successors and assigns.

NOW, THEREFORE, for and in consideration of the premises and ---TEN AND NO/100--- DOLLARS ($10.00), and other good and valuable consideration, in hand paid

to those executing this easement, the receipt and sufficiency of which is hereby acknowledged, this agreement is made on this the 9th day of October, 2012, at Brownwood, Texas, by and between John Robert Gilger and wife, Susan Gilger, and 3 Esses I, L.P., for the benefit of themselves, and also for the benefit of the said P. L. Childress, his successors and assigns, said agreement being as follows:

1. For the consideration described above, John Robert Gilger and wife, Susan Gilger, , doES hereby grant to 3 Esses I, L.P., its successors and assigns, herein called Grantee, and to P. L. Childress, his successors and assigns, an easement and right of way upon and across the following described tract more fully described on Exhibit "A" attached hereto and made a part hereof for all purposes, and 3 Esses I, L. P., for the consideration described above, sometimes herein called Grantor Two, grants to the said John Robert Gilger and wife, Susan Gilger, and their heirs, successors and assigns, and to P. L. Childress, his successors and assigns, an easement and right of way across the property more fully described on Exhibit "A" attached hereto and made a part hereof for all purposes.

2. This instrument grants an easement appurtenant to the above referenced tracts of land owned by the said John Robert Gilger and wife, Susan Gilger, and 3 Esses I, L. P., and P. L. Childress, his successors and assigns, all as described above.

3. The easement and right of way is located on, over and across the tract of land described in Exhibit "A" attached hereto.

This right of way easement, with its rights and privileges shall be used for the purpose of providing access, ingress and egress, to and from the tracts of land referred to above, and County Road 268, a recognized public roadway in Brown County, Texas.

This easement shall be perpetual.

John Robert Gilger and wife, Susan Gilger, and 3 Esses I, L.P., for and on behalf of themselves, and their respective heirs, successors and assigns, are and shall be bound to warrant and defend the easement and rights conveyed in this instrument and to those who are the beneficiary thereof, by, through or under John Robert Gilger and wife, Susan Gilger, and 3 Esses I, L.P., as to their respective interests in said 1.72 acre tract of land described on Exhibit "A" attached hereto, and to the extent said 1.72 acre tract is not a recognized public roadway, but not further.

The easement, rights and privileges granted by this conveyance are non-exclusive, and John Robert Gilger and wife, Susan Gilger, and 3 Esses I, L.P., retain the right to convey similar rights and easement to such other persons, as they may deem proper, and the right is herewith granted to the said P. L. Childress, his heirs, successors and assigns, to convey similar rights and easements to such persons as the said P. L. Childress and his heirs, successors and assigns may deem proper.

Each party hereto shall hold harmless, defend and indemnify each other party hereto or receiving the benefit hereof, against any suits, liabilities, claims, demands, or damages, including but not limited to personal injuries and attorney's fees, arising from the exercise of the easement rights granted by this instrument.

This agreement contains the entire agreement between the parties hereto relating to its subject matter. Any oral representations or modifications concerning this agreement shall be of no force and effect. Any subsequent amendment or modification must be in writing and agreed to by the parties hereto.

This agreement shall bind and inure to the benefit of the respective parties hereto, and their personal representatives, successors and assigns.

EXECUTED this the 9th day of October, 2012.

John Robert Gilger

Susan Gilger

3 Esses I, L.P.

By: 3 Esses Management, LLC,
Its General Partner

By: _____
Scott R. Esse, President and Secretary

THE STATE OF TEXAS
COUNTY OF BROWN

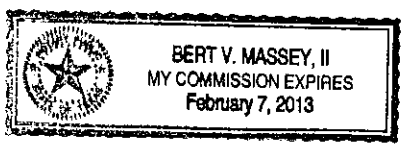
The foregoing instrument was duly acknowledged on this 9th day of October 2012, by **John Robert Gilger and Susan Gilger.**

BERT V. MASSEY, II
MY COMMISSION EXPIRES
February 7, 2013

_____
Notary Public, State of Texas

THE STATE OF TEXAS
COUNTY OF BROWN

The foregoing instrument was duly acknowledged on this 9th day of October, 2012, by **Scott R. Esse, President and Secretary of 3 Esses Management, LLC, General Partner of 3 Esses I, L.P., a Texas limited partnership,** and in the capacity therein stated.



Notary Public, State of Texas

2012 BK 6716 OP VOL 63 PG 605

P.O. Box 1909
117 Vick Dr.
Brownwood, Texas 76804

Phone: 325-646-3036
Fax: 325-643-2312
E Mail: kingland@verizon.net

King Land Surveying

EXHIBIT "A"

All of that certain 1.72 acre strip of land or parcel of land of which being out of the ED Prewitt Survey No. 13, Abstract No. 74 of Brown County, Texas, and being part of a 99 4/5 acre tract as conveyed by deed from LL Gilger et.ux., to John Robert Gilger et.ux., dated February 28, 1978, being of record in Volume 727, Page 330 of the Real Property Records of Brown County, Texas, said Strip of land is purported to be old County Road No. 268, as shown on a plat being of record in Volume 93, Page 255, of the Deed Records of Mills County, Texas and excepts to in a Deed from the U.S.A., being of record in Volume 371, Page 286, of the Deed Records of Brown County, Texas, and is further described as occupied as follows;

BEGINNING at a steel fence corner post at the south west corner of a concrete bridge of County Road No. 268, being in the Northeasterly line of a 610.10 acre tract from which its North Corner bears N 33° 20' 20" W, 79.61 feet;

THENCE with the southwesterly line of said Roadway, being the Northeasterly lines of said 610.10 acre tract, South 07 degrees 04 minutes 40 seconds East, 192.09 feet to a 2 ½" steel fence corner post, South 21 degrees 32 minutes 23 seconds East, 320.76 feet to a 2 " steel fence gate post, South 22 degrees 05 minutes 47 seconds East, 221.26 feet to a 2 ½" steel fence corner post in concrete, South 60 degrees 11 minutes 48 seconds East, 381.34 feet to a 2 ½" steel fence corner post in concrete, South 62 degrees 00 minutes 57 seconds East, 530.93 feet to a 2 ½" steel fence corner post in concrete, and South 82 degrees 33 minutes 36 seconds East, 91.53 feet to a 2 ½" steel fence corner post in concrete in the northwesterly line of a 300 acre tract as conveyed by deed to Genelle Childress Berry et.al., dated July 31, 1998, being of record in Volume 1300, Page 437, of the Real Property Records of Brown County, Texas, for the Southerly Corner of this;

THENCE North 10 degrees 17 minutes 15 seconds East, crossing said roadway, 21.62 feet to a 3" steel fence corner post in concrete, for the Southerly East Corner of this;

THENCE with the northeasterly line of said occupied roadway, North 75 degrees 28 minutes 14 seconds West, 18.83 feet to a rail road tie, North 61 degrees 49 minutes 06 seconds West, 570.04 feet to a wood fence corner post, North 61 degrees 21 minutes 39 seconds West, 387.06 feet to a 3/8" iron rod found by fence corner post; North 22 degrees 25 minutes 22 seconds West, 223.77 feet to a wood fence post, North 22 degrees 28 minutes 58 seconds West, 305.74 feet to a 3/8" iron pipe found by fence post, North 03 degrees 47 minutes 24 seconds West, 161.47 feet to a 3/8" iron pipe found by fence corner post, and North 54 degrees 25 minutes 31 seconds West, 27.24 feet to a 3" steel fence corner post at the East Corner of said concrete bridge, for the North Corner of this;

THENCE South 83 degrees 51 minutes 16 seconds West, crossing the southerly line of said bridge and roadway, 23.68 feet to the Place of beginning and calculated to contain 1.72 acres within existing roadway.

2012 BK VOL PG
6716 OP 63 606

INSTRUMENT NO. 6716

FILED OCTOBER 10,2012 04:12 PM

RETURN TO:

RECORDED
COMPARED
INDEXED

BROWN COUNTY ABSTRACT CO INC
201 S BROADWAY
BROWNWOOD TX 76801

32- STATE OF TEXAS
COUNTY OF BROWN

I hereby certify that this instrument was FILED in File Number Sequence on the date and at the time stamped hereon by me, and was duly RECORDED in the Official Public Records of Brown County, Texas.

DEPUTY: R McLaughlin

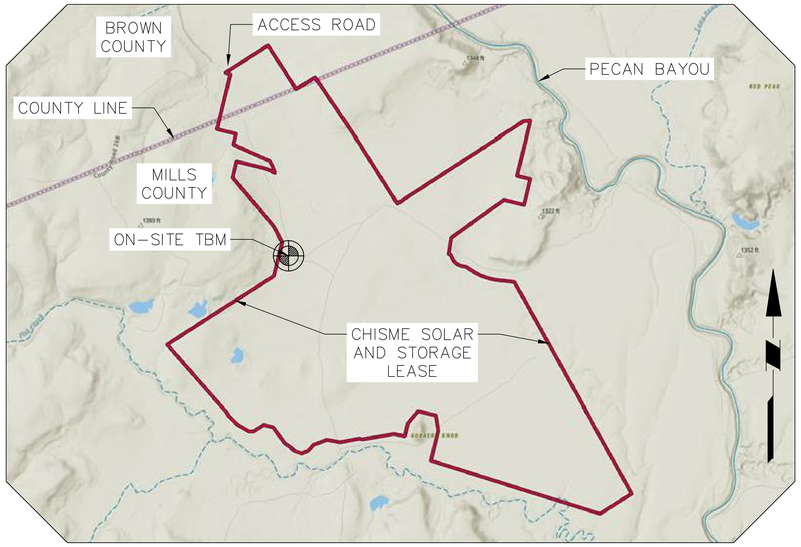
SHARON FERGUSON, COUNTY CLERK
BROWN COUNTY, TEXAS

ALTA\NSPS LAND TITLE SURVEY
CHISME SOLAR AND STORAGE
792.19 ACRES

ELIJA D. PREWITT SURVEY, ABSTRACT NO. 741 (BROWN COUNTY)
ELIJA D. PREWITT SURVEY, ABSTRACT NO. 530 (MILLS COUNTY)
ROBERT D. FORSYTHE, ABSTRACT NO. 270 (MILLS COUNTY)
JOHN C. VANN SURVEY, ABSTRACT NO. 697 (MILLS COUNTY)
GIUSEPPE A. RENACCO SURVEY, ABSTRACT NO. 572 (MILLS COUNTY)
& MARY BIRD SURVEY, ABSTRACT NO. 13 (MILLS COUNTY)

BROWN & MILLS COUNTIES, TEXAS

LEASE LOCATION MAP



NOT TO SCALE

INDEX:
1-COVER SHEET
2-EXHIBIT
3-NOTES

OWNER/DEVELOPER:

RED RIVER CLEAN ENERGY
107 SPRING STREET
SEATTLE, WA 98104

SURVEYOR, CIVIL &
GEOTECHNICAL ENGINEER:

LANGAN
2999 Olympus Blvd, Suite 165
Dallas, TX 75019
TBPELS Firm #10194888
T: 817.328.3200 www.langan.com

Date	Description	No.
Revisions		

Drawing Title: ALTA\NSPS LAND TITLE SURVEY

Langan Project No. 520102301
RRCE Project No. TX-PS-2701
ERCOT INR: 24INR0333/24INR0331
Date 8/18/2025
Drawn By RB
Checked By JC

VL101
SHEET 1 OF 3

LANGAN
Project No. 520102301
© 2025 Langan

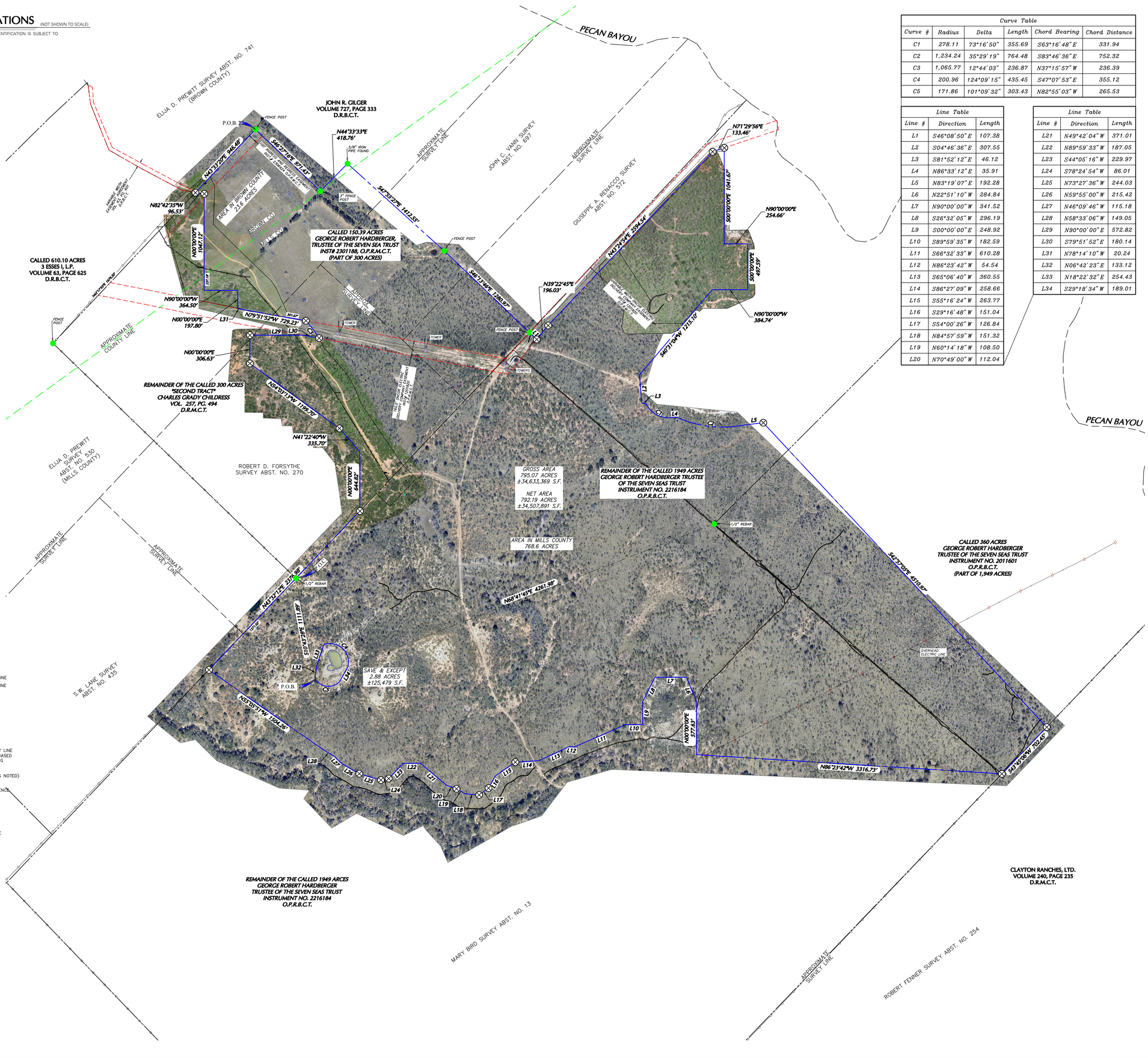
LEGEND AND ABBREVIATIONS (NOT SHOWN TO SCALE)

SOME ITEMS MAY NOT PERTAIN TO THIS SURVEY. THE IDENTIFICATION IS SUBJECT TO INTERPRETATION, VERIFICATION MAY BE REQUIRED.

- HYDRANT
- STREET LIGHT
- AREA LIGHT
- SIGNAL POLE
- POLE
- GUY WIRE
- ANCHOR POLE
- MANHOLE
- MANHOLE (DRAINAGE)
- MANHOLE (SANITARY SEWER)
- MANHOLE (ELECTRIC)
- MANHOLE (WATER)
- MANHOLE (NATURAL GAS)
- MANHOLE (TELEPHONE)
- MANHOLE (FORCE MAIN)
- MANHOLE (STEAM)
- MANHOLE (UNKNOWN UTILITY)
- WATER VALVE
- GAS VALVE
- SHRUB
- CATCH BASIN
- CLEAN OUT
- TREE
- SIGN
- BOLLARD
- PEDESTRIAN WALK SIGNAL
- DOOR
- DOUBLE DOOR
- OVERHEAD DOOR
- PARKING METER
- METAL COVER
- ELECTRIC BOX
- SOIL BORING
- MONITORING WELL
- TEST PIT
- BENCHMARK
- ROOF DRAIN
- x322.35 SPOT ELEVATION
- SET IRON AND CAP STAMPED "LANGAN"
- FOUND MONUMENT (AS NOTED)

EP	EDGE OF PAVEMENT
CC	CONCRETE CURB
CONC	CONCRETE
ASPH	ASPHALT
DP	DETECTABLE PAD
GI	GRATE INLET
MH	MANHOLE
DC	DROP CURB
BWS	BROKEN WHITE STRIPE
SYS	SINGLE YELLOW STRIPE
DYS	DOUBLE YELLOW STRIPE
SWS	SINGLE WHITE STRIPE
RCP	REINFORCED CONCRETE PIPE
DIP	DUCTILE IRON PIPE
CMP	CORRUGATED METAL PIPE
NVP	NO VISIBLE PIPE
PVC	POLYVINYL CHLORIDE PIPE
FWW	FILLED WITH WATER
FWD	FILLED WITH DEBRIS
N	NOTHING
E	EASTING
EL	ELEVATION
LSA	LANDSCAPED AREA
VOL.	VOLUME
INST.#	INSTRUMENT
PG.	PAGE NUMBER
R/W	RIGHT OF WAY
No.	NUMBER
S.F.	SQUARE FEET
P.O.B.	POINT OF BEGINNING
P.O.C.	POINT OF COMMENCING
A.K.A.	ALSO KNOWN AS
F.K.A.	FORMERLY KNOWN AS
R	RADIUS
A	ARC LENGTH
CB	CHORD BEARING
CL	CHORD DISTANCE
D	CENTRAL ANGLE
ESMT	EASEMENT
BL	BUILDING LINE OR BUILDING SETBACK
ETJ	EXTRATERRITORIAL JURISDICTION
FEMA	FEDERAL EMERGENCY MANAGEMENT ADMINISTRATION
O.P.R.M.C.T.	OFFICIAL PUBLIC RECORDS MILLS COUNTY TEXAS
D.R.M.C.T.	DEED RECORDS MILLS COUNTY TEXAS
O.P.R.B.C.T.	OFFICIAL PUBLIC RECORDS BROWN COUNTY TEXAS
D.R.B.C.T.	DEED RECORDS BROWN COUNTY TEXAS
NAVD'88	NORTH AMERICAN VERTICAL DATUM OF 1988

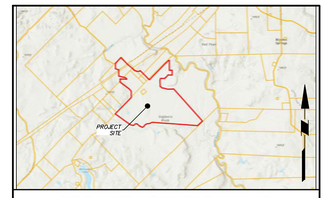
- D — STORM DRAIN
- S — SANITARY LINE
- COMB — COMBINED UTILITY LINE
- UNK — UNKNOWN UTILITY LINE
- G — GAS LINE
- W — WATER LINE
- E — ELECTRIC LINE
- T — TELEPHONE LINE
- C — CABLE TV LINE
- ST — STEAM LINE
- FM — FORCE MAIN
- FO — FIBER OPTIC
- (...)* — REFERENCED UTILITY LINE (TYPE AS NOTED) BASED ON RECORD MAPPING
- OVERHEAD WIRE
- GUIDE RAIL(TYPE AS NOTED)
- CHAIN LINK FENCE
- WOOD/STOCKADE FENCE
- WIRE FENCE
- IRON FENCE
- TREE LINE
- EASEMENT LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- 322 CONTOUR LINE



Curve Table					
Curve #	Radius	Delta	Length	Chord Bearing	Chord Distance
C1	278.11	73°16'50"	355.69	S63°16'48"E	331.94
C2	1,234.24	35°29'19"	764.48	S83°46'36"E	752.32
C3	1,065.77	12°44'03"	236.87	N37°15'57"W	236.39
C4	200.96	124°09'15"	435.45	S47°07'53"E	355.12
C5	171.86	101°09'32"	303.43	N82°55'03"W	265.53

Line Table		
Line #	Direction	Length
L1	S46°08'50"E	107.38
L2	S04°46'36"E	307.55
L3	S81°52'12"E	46.12
L4	N86°33'12"E	35.91
L5	N83°19'07"E	192.28
L6	N22°51'10"W	284.84
L7	N90°00'00"W	341.52
L8	S26°32'05"W	296.19
L9	S00°00'00"E	248.92
L10	S89°59'35"W	182.59
L11	S66°32'33"W	610.28
L12	N86°23'42"W	54.54
L13	S65°06'40"W	360.55
L14	S86°27'09"W	258.66
L15	S55°16'24"W	263.77
L16	S29°16'48"W	151.04
L17	S54°00'26"W	126.84
L18	N84°57'59"W	151.32
L19	N60°14'18"W	108.50
L20	N70°49'00"W	112.04

Line Table		
Line #	Direction	Length
L21	N49°42'04"W	371.01
L22	N89°59'33"W	187.05
L23	S44°05'16"W	229.97
L24	S78°24'54"W	86.01
L25	N73°27'36"W	244.03
L26	N59°55'00"W	215.42
L27	N46°09'46"W	115.18
L28	N58°33'06"W	149.05
L29	N90°00'00"E	572.82
L30	S79°51'52"E	180.14
L31	N78°14'10"W	20.24
L32	N06°42'23"E	133.12
L33	N18°22'32"E	254.43
L34	S29°18'34"W	189.01



PROJECT LOCATION MAP

SCALE: NOT TO SCALE

SOURCE: USGS

400 0 100 200 400

SCALE: 1 INCH = 400 FEET

Date	Description	No.

Revisions

SURVEYOR: JEWEL OHADD
REGISTERED PROFESSIONAL
LAND SURVEYOR NO. 5754
Date:8/18/25
Langan Engineering and Environmental Services, LLC.
TBPELS Firm # 10194888

LANGAN
Langan Engineering and Environmental Services, LLC.
2999 Olympus Blvd, Suite 165
Dallas, TX 75019
T: 817.328.3200 www.langan.com
TBPELS Firm #10194888

Project

CHISME SOLAR AND STORAGE

13-MILES SOUTHEAST OF BROWNWWOD

BROWN & MILLS COUNTIES TEXAS

Drawing Title

ALTA/NSPS LAND TITLE SURVEY

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR.	24INR0333/24INR0331
Date	8/18/2025
Drawn By	RB
Checked By	JC

VL101

SHEET 2 OF 3

Project No. 520102301

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Filename: C:\bms\langan-pw-01\80430955\520102301-VL101-0101_recover (1).dwg Date: 8/18/2025 Time: 12:11 User: dnaud Style Table: Langan.stb Layout: 30x42 Sheet (2)

SURVEYED DESCRIPTION

FIELD NOTES TO THAT CERTAIN 792.19-ACRE TRACT SITUATED IN THE

- ELIJA D. PREWITT SURVEY, ABSTRACT NO. 741, BROWN COUNTY
- ELIJA D. PREWITT SURVEY, ABSTRACT NO. 530, MILLS COUNTY
- ROBERT D. FORSYTHE SURVEY, ABSTRACT NO. 270, MILLS COUNTY
- JC VANN SURVEY, ABSTRACT NO. 697, MILLS COUNTY
- GA RENACCO SURVEY, ABSTRACT NO. 572, MILLS COUNTY,
- AND MARY BIRD SURVEY, ABSTRACT NO. 13, MILLS COUNTY, TEXAS;

SAID TRACT BEING 18.89 ACRES (TWO PORTIONS 3.79 & 15.10 ACRES) OF THE REMAINDER OF THE CALLED 300-ACRE TRACT DESCRIBED IN THE DEED TO CHARLES GRADY CHILDRESS RECORDED IN VOLUME 257, PAGE 494, DEED RECORDS, MILLS COUNTY, TEXAS, A 143.68-ACRE PORTION OF THE CALLED 150.39-ACRE TRACT DESCRIBED IN THE DEED TO GEORGE ROBERT HARDBERGER, TRUSTEE, RECORDED UNDER INSTRUMENT NUMBER 2301188, OFFICIAL PUBLIC RECORDS, MILLS COUNTY, TEXAS (O.P.R.M.C.T.), AND A 629.62-ACRE PORTION (632.50 ACRES, SAVE & EXCEPT 2.88 ACRES) OF THE CALLED 1,949-ACRE TRACT DESCRIBED IN THE DEEDS TO SAID GEORGE ROBERT HARDBERGER, TRUSTEE, RECORDED UNDER INSTRUMENT NUMBERS 2011601 & 2216184, O.P.R.M.C.T.; THE SUBJECT TRACT SURVEYED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, LLC, IS MORE PARTICULARLY DESCRIBED AS FOLLOWS (BEARINGS ARE BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE):

BEGINNING AT FENCE POST FOUND IN BROWN COUNTY AT THE MOST NORTHERLY CORNER OF THE SAID 150.39-ACRE TRACT;

THENCE WITH THE PERIMETER OF THE 150.39-ACRE TRACT, THE FOLLOWING CALLS:

1. SOUTH 46°27'16" EAST, A DISTANCE OF 971.43 FEET TO A FOUND 3-INCH DIAMETER POST;
2. NORTH 44°33'33" EAST, A DISTANCE OF 418.76 FEET TO A FOUND 3/8-INCH PIPE;
3. SOUTH 47°55'27" EAST, A DISTANCE OF 1,412.55 FEET TO A FOUND FENCE POST;
4. SOUTH 46°13'46" EAST, A DISTANCE OF 1,280.97 FEET TO A FENCE POST FOUND ON THE NORTHWEST LINE OF THE SAID 1,949-ACRE TRACT AT THE EAST CORNER OF THE 150.39-ACRE TRACT;

THENCE SOUTH 46°08'50" EAST, THROUGH THE INTERIOR OF 1,949-ACRE TRACT, A DISTANCE OF 107.38 FEET TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET ON THE SOUTHEAST LINE OF THE VARIABLE-WIDTH ONCOR ELECTRIC DELIVERY COMPANY EASEMENT RECORDED UNDER INSTRUMENT NUMBER 1201820, O.P.R.M.C.T.;

THENCE CONTINUING THROUGH THE INTERIOR OF THE 1,949-ACRE TRACT AND WITH THE SAID SOUTHEAST LINE OF THE ONCOR EASEMENT, THE FOLLOWING CALLS:

1. NORTH 39°22'45" EAST, A DISTANCE OF 196.03 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
2. NORTH 43°24'54" EAST, A DISTANCE OF 2,594.54 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
3. NORTH 71°29'56" EAST, A DISTANCE OF 133.46 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN;

THENCE CONTINUING THROUGH THE INTERIOR OF THE 1,949-ACRE TRACT, THE FOLLOWING CALLS:

1. SOUTH 00°00'00" EAST, A DISTANCE OF 1,041.67 FEET;
2. NORTH 90°00'00" EAST, A DISTANCE OF 254.66 FEET;
3. SOUTH 00°00'00" EAST, A DISTANCE OF 497.59 FEET;
4. NORTH 90°00'00" WEST, A DISTANCE OF 384.74 FEET;
5. SOUTH 40°31'04" WEST, A DISTANCE OF 1,215.10 FEET;
6. SOUTH 04°46'36" EAST, A DISTANCE OF 307.55 FEET;
7. SOUTH 81°52'12" EAST, A DISTANCE OF 46.12 FEET, BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE NORTHEAST (CURVE TO THE LEFT) HAVING A RADIUS OF 278.11 FEET;
8. IN A SOUTHEASTERLY DIRECTION, ALONG THE ARC OF THE SAID CURVE, AN ARC LENGTH OF 355.69 FEET (A CHORD BEARING OF SOUTH 63°16'48" EAST, A CHORD DISTANCE OF 331.94 FEET) TO THE END OF THE CURVE;
9. NORTH 86°33'12" EAST, A DISTANCE OF 35.91 FEET, BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE NORTH (CURVE TO THE LEFT) HAVING A RADIUS OF 1,234.24 FEET;
10. IN AN EASTERLY DIRECTION, ALONG THE ARC OF THE SAID CURVE, AN ARC LENGTH OF 764.48 FEET (A CHORD BEARING OF SOUTH 83°46'36" EAST, A CHORD DISTANCE OF 752.32 FEET) TO THE END OF THE CURVE;
11. NORTH 83°19'07" EAST, A DISTANCE OF 192.28 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
12. SOUTH 42°57'05" EAST, A DISTANCE OF 4,510.97 FEET TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET ON THE SOUTHEAST LINE OF THE 1,949-ACRE TRACT;

THENCE SOUTH 43°45'06" WEST, WITH THE SAID SOUTHEAST LINE OF THE 1,949-ACRE TRACT, A DISTANCE OF 702.45 FEET TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET AT THE BASE OF A FOUND 2-INCH DIAMETER METAL POST;

THENCE THROUGH THE INTERIOR OF THE 1,949-ACRE TRACT, THE FOLLOWING CALLS:

1. NORTH 86°23'42" WEST, A DISTANCE OF 3,316.73 FEET;
2. NORTH 00°00'00" EAST, A DISTANCE OF 577.63 FEET;
3. NORTH 22°51'10" WEST, A DISTANCE OF 284.84 FEET;
4. NORTH 90°00'00" WEST, A DISTANCE OF 341.52 FEET;
5. SOUTH 26°32'05" WEST, A DISTANCE OF 296.19 FEET;
6. SOUTH 00°00'00" EAST, A DISTANCE OF 248.92 FEET;
7. SOUTH 89°59'35" WEST, A DISTANCE OF 182.59 FEET;
8. SOUTH 66°32'33" WEST, A DISTANCE OF 610.28 FEET;
9. NORTH 86°23'42" WEST, A DISTANCE OF 54.54 FEET;
10. SOUTH 65°06'40" WEST, A DISTANCE OF 360.55 FEET;
11. SOUTH 86°27'09" WEST, A DISTANCE OF 258.66 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
12. SOUTH 55°16'24" WEST, A DISTANCE OF 263.77 FEET;
13. SOUTH 29°16'48" WEST, A DISTANCE OF 151.04 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
14. SOUTH 54°00'26" WEST, A DISTANCE OF 126.84 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
15. NORTH 84°57'59" WEST, A DISTANCE OF 151.32 FEET;
16. NORTH 60°14'18" WEST, A DISTANCE OF 108.50 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
17. NORTH 70°49'00" WEST, A DISTANCE OF 112.04 FEET;
18. NORTH 49°42'04" WEST, A DISTANCE OF 371.01 FEET;
19. NORTH 89°59'33" WEST, A DISTANCE OF 187.05 FEET;
20. SOUTH 44°05'16" WEST, A DISTANCE OF 229.97 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
21. SOUTH 78°24'54" WEST, A DISTANCE OF 86.01 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
22. NORTH 73°27'36" WEST, A DISTANCE OF 244.03 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
23. NORTH 59°55'00" WEST, A DISTANCE OF 215.42 FEET;
24. NORTH 46°09'46" WEST, A DISTANCE OF 115.18 FEET;
25. NORTH 58°33'06" WEST, A DISTANCE OF 149.05 FEET;
26. NORTH 55°05'51" WEST, A DISTANCE OF 1,504.26 FEET TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET ON THE NORTHWEST LINE OF THE 1,949-ACRE TRACT;

THENCE NORTH 43°32'12" EAST, WITH THE SAID NORTHWEST LINE OF THE 1,949-ACRE TRACT, PASSING AT A DISTANCE OF 1,371.02 FEET A 1/2 INCH REBAR FOUND AT THE SOUTH CORNER OF THE SAID 300-ACRE TRACT, AND CONTINUING WITH THE NORTHWEST LINE OF THE 1,949-ACRE TRACT, IN ALL, A TOTAL DISTANCE OF 2,376.98 FEET TO SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";

THENCE THROUGH THE INTERIOR OF THE REMAINDER OF THE 300-ACRE TRACT, THE FOLLOWING CALLS:

1. NORTH 00°00'00" EAST, A DISTANCE OF 644.82 FEET;
2. NORTH 41°22'40" WEST, A DISTANCE OF 335.70 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
3. NORTH 54°03'13" WEST, A DISTANCE OF 1,199.70 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";
4. NORTH 00°00'00" EAST, A DISTANCE OF 306.63 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";

THENCE NORTH 90°00'00" EAST, CONTINUING THROUGH THE INTERIOR OF THE REMAINDER OF THE 300-ACRE TRACT, PASSING AT A DISTANCE OF 489 FEET THE SOUTHWEST LINE OF THE 150.39-ACRE TRACT, CONTINUING ON SAID COURSE, NOW THROUGH THE INTERIOR OF THE 150.39-ACRE TRACT, IN ALL, A TOTAL DISTANCE OF 572.82 FEET TO THE SOUTHWEST LINE OF THE SAID ONCOR EASEMENT;

THENCE SOUTH 79°51'52" EAST, CONTINUING THROUGH THE INTERIOR OF THE 150.39-ACRE TRACT AND WITH THE SAID SOUTHWEST LINE OF THE ONCOR EASEMENT, A DISTANCE OF 180.14 FEET TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET AT THE BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE SOUTHWEST (CURVE TO THE LEFT) HAVING A RADIUS OF 1,065.77 FEET;

THENCE IN A NORTHWESTERLY DIRECTION, CONTINUING THROUGH THE INTERIOR OF THE 150.39-ACRE TRACT AND WITH THE ARC OF THE SAID CURVE, AN ARC LENGTH OF 236.87 FEET (A CHORD BEARING OF NORTH 37°15'57" WEST, A CHORD DISTANCE OF 236.39 FEET) TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET ON THE NORTHEAST LINE OF THE ONCOR EASEMENT AT THE END OF THE CURVE;

THENCE NORTH 79°51'52" WEST, CONTINUING THROUGH THE INTERIOR OF THE 150.39-ACRE TRACT AND WITH THE SAID NORTHEAST LINE OF THE ONCOR EASEMENT, PASSING AT A DISTANCE OF 301.67 FEET THE SOUTHWEST LINE OF THE 150.39-ACRE, CONTINUING ON SAID COURSE, NOW THROUGH THE INTERIOR OF THE REMAINDER OF THE 300-ACRE TRACT, IN ALL, A TOTAL DISTANCE OF 729.23 FEET;

THENCE NORTH 78°14'10" WEST, CONTINUING THROUGH THE INTERIOR OF THE 300-ACRE TRACT AND WITH THE NORTHEAST LINE OF THE ONCOR EASEMENT, A DISTANCE OF 20.24 FEET;

THENCE NORTH 00°00'00" EAST, CONTINUING THROUGH THE INTERIOR OF THE REMAINDER OF THE 300-ACRE TRACT, A DISTANCE OF 197.80 FEET;

THENCE NORTH 90°00'00" WEST, CONTINUING THROUGH THE INTERIOR OF THE REMAINDER OF THE 300-ACRE TRACT, A DISTANCE OF 364.50 FEET;

THENCE NORTH 00°00'00" EAST, CONTINUING THROUGH THE INTERIOR OF THE REMAINDER OF THE 300-ACRE TRACT, PASSING AT A DISTANCE OF 237.18 FEET THE SOUTHWEST LINE OF THE 150.39-ACRE TRACT, CONTINUING ON SAID COURSE, NOW THROUGH THE INTERIOR OF THE 150.39-ACRE TRACT A DISTANCE OF 1,047.12 FEET TO A SET 1/2 INCH CAPPED REBAR STAMPED "LANGAN";

THENCE NORTH 82°42'35" WEST, CONTINUING THROUGH THE INTERIOR OF THE 150.39-ACRE TRACT, A DISTANCE OF 96.53 FEET TO A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET ON THE NORTHWEST LINE OF THE 150.39-ACRE TRACT;

THENCE NORTH 43°33'20" EAST, PASSING THE TERMINUS OF THE VARIABLE-WIDTH EASEMENT AGREEMENT FOR ACCESS FROM THE 300-ACRE TRACT TO COUNTY ROAD 268 RECORDED UNDER INSTRUMENT NUMBER 20126716, OFFICIAL PUBLIC RECORDS, BROWN COUNTY, TEXAS, IN ALL, A TOTAL DISTANCE OF 946.48 FEET RETURNING TO THE **POINT OF BEGINNING** AND ENCLOSING 792.19 ACRES.

SAVE & EXCEPT THAT 2.88-PORTION OF THE 1,949-ACRE TRACT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A 1/2 INCH REBAR FOUND ON THE NORTHWEST LINE OF THE 1,949-ACRE TRACT, AT THE SOUTH CORNER OF THE 300-ACRE TRACT, FROM WHICH A 1/2 INCH CAPPED REBAR STAMPED "LANGAN" SET ON THE SAID NORTHWEST LINE OF THE 1,949-ACRE TRACT BEARS SOUTH 43°32'02" WEST, A DISTANCE OF 1,371.02 FEET; **THENCE** SOUTH 10°43'28" EAST, A DISTANCE OF 1,111.89 FEET TO THE **POINT OF BEGINNING**;

THENCE NORTH 06°42'23" EAST, A DISTANCE OF 133.12 FEET;

THENCE NORTH 18°22'32" EAST, A DISTANCE OF 254.43 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE SOUTHWEST (CURVE TO THE RIGHT) HAVING A RADIUS OF 200.96 FEET;

THENCE IN AN EASTERLY DIRECTION, ALONG THE ARC OF THE SAID CURVE, AN ARC LENGTH OF 435.45 FEET (A CHORD BEARING OF SOUTH 47°07'53" EAST, A CHORD DISTANCE OF 355.12 FEET) TO THE END OF THE CURVE;

THENCE SOUTH 29°18'34" WEST, A DISTANCE OF 189.01 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE TO THE NORTH (CURVE TO THE RIGHT) HAVING A RADIUS OF 171.86 FEET;

THENCE IN A WESTERLY DIRECTION, ALONG THE ARC OF THE SAID CURVE, AN ARC LENGTH OF 303.43 FEET (A CHORD BEARING OF NORTH 82°55'03" WEST, A CHORD DISTANCE OF 265.53 FEET) RETURNING TO THE **POINT OF BEGINNING** AND ENCLOSING 2.88 ACRES.

SURVEYOR'S NOTES

1. SUBJECT PROPERTY'S RECORD DESCRIPTION ERROR OF CLOSURE= 0.00'.
2. THE BENCHMARK IS A MAG NAIL WITH A WASHER STAMPED "LANGAN BENCHMARK" SET ±3,800' SOUTH OF THE NORTH ENTRANCE TO THE LEASE SITE NEAR THE DIRT TRAIL. BENCHMARK ELEVATION =1273.57' (NAVD88). SEE LEASE LOCATION (COVER SHEET) MAP FOR GENERAL LOCATION.
3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET DISPLAYED IN SURFACE VALUES AND ARE SCALED BY A FACTOR OF 1.0001257377 FROM POINT NUMBER 90,000, SAID POINT HAVING GRID COORDINATES OF N=10,538,413.23', E=2,765,058.59', (TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE)
4. ACCESS IS VIA EASEMENT AGREEMENT RECORDED UNDER VOLUME 63, PAGE 601, DEED RECORDS, BROWN COUNTY, TEXAS (B|2 GRID).
5. THE LOCATION OF NON-CRITICAL IMPROVEMENTS ARE SHOWN VIA A SURVEY-GRADE ORTHOMOSAIC IMAGE, HAVING A RELATIVE POSITION OF 0.2' OR BETTER, OVERLAID ONTO A CAD DRAWING. CRITICAL IMPROVEMENTS (THE BOUNDARY, IMPROVEMENTS TIED TO THE BOUNDARY, AND THOSE DEEMED CRITICAL BY LANGAN) WERE LOCATED WITH GROUND MEASUREMENTS. THE VIEW OF NON-CRITICAL IMPROVEMENTS CAN BE LIMITED BY TREES AND OTHER OBSTRUCTIONS.
6. ADDRESS: CR 268 EARLY, TEXAS 76802 (PID#28342 - BROWN COUNTY APPRAISAL DISTRICT), 750 N CR 531 (PID#R000008464, R000008465 & R000001461 - MILLS COUNTY APPRAISAL DISTRICT), .
7. A PORTION OF THIS PROPERTY LIES WITHIN ZONE(S) X (UNSHADED) OF THE FLOOD INSURANCE RATE MAP FOR BROWN COUNTY, TEXAS AND INCORPORATED AREAS, MAP NO. 48049C0550E , DATED AUGUST 28, 2018, VIA SCALED MAP LOCATION AND GRAPHIC PLOTTING AND/OR THE NATIONAL FLOOD HAZARD LAYER (NFHL) WEB MAP SERVICE (WMS) AT HTTP://HAZARDS.FEMA.GOV. ** (FIRM MAPS FOR MILLS COUNTY ARE UNAVAILABLE)**

TITLE COMMITMENT NOTES

THIS SURVEY WAS PERFORMED WITH THE BENEFIT OF A TITLE COMMITMENT PROVIDED BY AMTRUST TITLE INSURANCE COMPANY, COMMITMENT # FN-61102-TX, EFFECTIVE APRIL 30, 2024, AND ISSUED MAY 16, 2024. COMPLETE COPIES OF THE RECORD DESCRIPTION OF THE PROPERTY, ANY RECORD EASEMENTS BENEFITING THE PROPERTY, THE RECORD EASEMENTS OR SERVITUDES AND COVENANTS AFFECTING THE PROPERTY ("RECORD DOCUMENTS"), DOCUMENTS OF RECORD REFERRED TO IN THE RECORD DOCUMENTS, AND ANY OTHER DOCUMENTS CONTAINING DESIRED APPROPRIATE INFORMATION AFFECTING THE PROPERTY BEING SURVEYED AND TO WHICH THE SURVEY SHALL MAKE REFERENCE WERE NOT PROVIDED TO THIS SURVEYOR FOR NOTATION ON THE SURVEY EXCEPT FOR THOSE ITEMS LISTED WITHIN SCHEDULE B OF SAID COMMITMENT. THEREFORE, EASEMENTS, AGREEMENTS, OR OTHER DOCUMENTS, EITHER RECORDED, OR UNRECORDED MAY EXIST THAT AFFECT THE SUBJECT PROPERTY THAT ARE NOT SHOWN ON THIS SURVEY.
THE FOLLOWING SCHEDULE B ITEMS WERE ADDRESSED ACCORDING TO THE MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS SECTION 6(C)II AND IDENTIFIED BY THE TRACT DESIGNATOR LISTED IN THE TITLE COMMITMENT.

		IF MORE THAN ONE TRACT IS BEING ADDRESSED, THE CHART BELOW WILL USE THE TRACT DESIGNATORS USED IN THE TITLE COMMITMENT.										
SCHEDULE B EXCEPTION #	RECORDING INFORMATION (MAY INCLUDE GRANTEE AND EXCEPTION TYPE)	LABEL GRID LOCATION (SEE EDGE OF SHEET FOR GRID VALUES)	ITS LOCATION IS SHOWN	LIES WITHIN, CROSSES, OR TOUCHES THE INDICATED TRACT	IT IS NOT ON, DOES NOT TOUCH, AND/OR - BASED ON THE SURVEY - DOES NOT OR NOT DIRECTLY AFFECT THE INDICATED TRACT	IT IS BLANKET IN NATURE	ITS LOCATION COULD NOT BE DETERMINED FROM THE RECORD DOCUMENT	THERE WAS NO OBSERVED EVIDENCE AT THE TIME OF THE SURVEY	IT LIMITS ACCESS TO AN OTHERWISE ABUTTING RIGHT OF WAY	DOCUMENTS ARE ILLEGIBLE	MAY HAVE BEEN RELEASED OR OTHERWISE TERMINATED	
10f	EASEMENT AND RIGHT-OF-WAY FOR ELECTRIC TRANSMISSION LINES INST.# 1201820, O.P.R.M.C.T.	C|4	X	X								**150.39–ACRE TRACT | 1949–ACRE TRACT*
10m	TERMS, CONDITIONS AND STIPULATIONS OF ASSIGNMENT AND ASSUMPTION OF EASEMENTS, INST.# 1708914, O.P.R.M.C.T.			X		X						**150.39–ACRE TRACT*
10n	EASEMENT AGREEMENT, INST.# 1809052, O.P.R.M.C.T.	B|2	X	X								**150.39–ACRE TRACT*
10o	TERMS CONDITIONS AND STIPULATIONS OF A MEMORANDUM OF OPTION AGREEMENT, INST.# 2113958, O.P.R.M.C.T.			X		X						**150.39–ACRE TRACT*
10p	TERMS CONDITIONS AND STIPULATIONS OF A MEMORANDUM OF OPTION AGREEMENT, INST.# 2113960, O.P.R.M.C.T.			X		X						**150.39–ACRE TRACT | 1949–ACRE TRACT*
10q	TERMS, CONDITIONS AND STIPULATIONS OF A WAIVER OF SURFACE RIGHTS, INST.# 2214810, O.P.R.M.C.T.			X		X						**150.39–ACRE TRACT*
10r	TERMS, CONDITIONS AND STIPULATIONS OF A WAIVER OF SURFACE RIGHTS, INST.# 2214811, O.P.R.M.C.T.			X		X						
10s	TERMS, CONDITIONS AND STIPULATIONS OF A WAIVER OF SURFACE RIGHTS, INST.# 2214812, O.P.R.M.C.T.			X		X						
10t	TERMS, CONDITIONS AND STIPULATIONS OF A WAIVER OF SURFACE RIGHTS, INST.# 2301165, O.P.R.M.C.T.			X		X						
10u	TERMS, CONDITIONS AND STIPULATIONS OF A WAIVER OF SURFACE RIGHTS, INST.# 2301166, O.P.R.M.C.T.			X		X						
10v	EASEMENT & RIGHT-OF-WAY, INST.# 2301188, O.P.R.B.C.T.	B|2	X	X								
10bb	EASEMENT AGREEMENT, VOL. 63, PG. 601, D.R.B.C.T.	B|2	X	X								
10ff	RESERVATION OF EASEMENT, INST.# 2306924, O.P.R.B.C.T.	B|3	X	X								
10gg	MEMORANDUM OF OPTION AGREEMENT, INST.#'S 2105910 & 2400415, O.P.R.B.C.T.			X		X						
10hh	WAIVER OF SURFACE, INST.# 2200241, O.P.R.B.C.T.			X		X						
10ii	WAIVER OF SURFACE, INST.# 2200242, O.P.R.B.C.T.			X		X						
10jj	WAIVER OF SURFACE, INST.# 2200243, O.P.R.B.C.T.			X		X						
10kk	160' WIDE EASEMENT IN FAVOR OF ONCOR ELECTRIC DELIVERY COMPANY, INST.# 1201820, O.R.M.C.T.	C|4	X	X								
10ll	TERMS, CONDITIONS AND STIPULATIONS OF ASSIGNMENT AND ASSUMPTION OF EASEMENTS, INST.# 1707232, O.P.R.B.C.T.			X		X						

UTILITY WARNING

REGARDING TABLE A ITEMS 11(A) & 11(B), UNLESS OTHERWISE STATED, THE CLIENT OR CLIENT'S REPRESENTATIVE DID NOT PROVIDE LANGAN WITH PLANS AND/OR REPORTS, AND LANGAN DID NOT COORDINATE A PRIVATE UTILITY LOCATE REQUEST. IF THESE TABLE A ITEMS ARE LISTED IN THE CERTIFICATION, THE CLIENT, BEING AWARE OF THE FACTORS LISTED ABOVE, HAS AGREED FOR THESE TABLE A ITEM(S) TO BE ADDRESSED FROM A COMBINATION OF ONLINE GIS MAPS, MARKINGS FROM LOCATE REQUEST(S) TO MUNICIPALITIES AND 811 AND OBSERVED EVIDENCE OF UTILITIES. THE CLIENT IS AWARE LOCATE REQUESTS TO 811 AND THE LIKE, MAY BE IGNORED OR RESULT IN AN INCOMPLETE RESPONSE, IN WHICH CASE UTILITIES MAY NOT HAVE BEEN MARKED, OR NOT COMPLETELY MARKED, AT THE TIME THE FIELDWORK WAS PERFORMED. THEREFORE, UTILITIES MAY EXIST WHICH ARE NOT SHOWN ON THIS SURVEY. LACKING EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED.

TO: AMTRUST TITLE INSURANCE COMPANY
CHARLES GRADY CHILDRESS
GEORGE ROBERT HARDBERGER, TRUSTEE OF THE SEVEN SEAS TRUST
RED RIVER CLEAN ENERGY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 8, 11A, 11B, & 15 OF TABLE A THEREOF. THE FIELDWORK WAS COMPLETED ON JULY 18, 2025.

JEWEL CHADD
REGISTERED PROFESSIONAL
LAND SURVEYOR NO. 5754
JCHADD@LANGAN.COM
DATE: 8/18/2025

Date	Description	No.
Revisions		

SURVEYOR: JEWEL CHADD
REGISTERED PROFESSIONAL
LAND SURVEYOR NO. 5754
Date:8/18/25
Langan Engineering and
Environmental Services, LLC.
TBPELS Firm # 10194888

LANGAN
Langan Engineering and
Environmental Services, LLC.
2999 Olympus Blvd, Suite 165
Dallas, TX 75019
T: 817.328.3200 www.langan.com
TBPELS Firm #10194888

Project
CHISME SOLAR AND STORAGE
13-MILES SOUTHEAST OF BROWNWOOD
BROWN & MILLS COUNTIES TEXAS

Drawing Title
ALTA/NSPS LAND TITLE SURVEY

Langan Project No.	520102301
RRCE Project No.	TX-PS-2701
ERCOT INR.	24INR0333/24INR0331
Date	8/18/2025
Drawn By	RB
Checked By	JC

VL101
SHEET 3 OF 3

Project No. 520102301

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EXHIBIT O

FORM OF CHANGE ORDER

PROCUREMENT AND CONSTRUCTION AGREEMENT (THE "AGREEMENT"), DATED , , BY AND BETWEEN _____("OWNER") AND _____("CONTRACTOR").

CHANGE ORDER NO. _____

Contractor _____

Date _____

In consideration of the mutual benefits and obligations to be derived by each party from the change set forth herein, Owner and Contractor hereby agree that, effective as of the date below, the Agreement shall be amended and supplemented by the inclusion of the following terms and conditions. Terms used but not otherwise defined herein shall have the meanings set forth in the Agreement.

Pursuant to Article 13 ("Changes in the Work") of the Agreement, the following changes are made in the terms and conditions of the Agreement.

Description

_____

_____

_____

This Change Order
Contract Price $ _____

Cost of Change:

Non-Manual Labor Man-hours / Cost: _____

Non-Manual Labor Expenses: _____

Manual Labor Man-hours / Cost: _____

Material Cost: _____

Subcontracts Cost: _____

Mobilization/Demobilization Cost: _____

Equipment Cost: _____

Other Cost (if any) _____

Pass-Through Item Cost (no markup): _____

Mark-up (Profit and Overhead): _____

Total Cost of Change: _____

Impact on the Guaranteed Milestones, Project Substantial Completion Date, and other dates or periods:

_____

_____

Impact on payment schedule: _____

_____

Other impacts on Agreement: _____

_____

Revised Contract Price (Including change): $_____

It is acknowledged and agreed by the parties hereto that the foregoing constitutes the agreement of the parties for all changes set forth in this Change Order. The parties further acknowledge and agree that Contractor's performance of its obligations under this Change Order shall be deemed to be included in the Work and that all terms and conditions of the Agreement shall apply to such performance.

Except as hereby modified, all terms and conditions of the Agreement remain unchanged and in full force and effect.

IN WITNESS WHEREOF, THE PARTIES HERETO HAVE EXECUTED THIS CHANGE ORDER BY THEIR PROPER OFFICERS OR DULY AUTHORIZED AGENTS THIS ____ DAY OF ____, ____.

Owner Approval:	Contractor Approval:
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____

Date: _____ Date: _____

Distribution:

Owner
Other: _____

EXHIBIT P

PROJECT SUBSTATION COMPLETION, MECHANICAL COMPLETION, PLACED IN SERVICE, PROJECT SUBSTANTIAL COMPLETION, AND FINAL COMPLETION CERTIFICATES

Exhibit P-1 Notice of Project Substation Completion

Exhibit P-2 Notice of Mechanical Completion

Exhibit P-3 Notice of Placed in Service Completion

Exhibit P-4 Notice of Project Substantial Completion

Exhibit P-5 Notice of Final Completion

EXHIBIT P-1

NOTICE OF PROJECT SUBSTATION COMPLETION

TO: Owner

RE: Notice of Project Substation Completion in accordance with Sections 11.2 and 11.2.1 of the Agreement

---

This Notice of Project Substation Completion is delivered to you pursuant to Sections 11.2 and 11.2.1 of the Procurement and Construction Agreement (the "**Agreement**"), dated as of , between Blue Heron Solar, LLC ("**Owner**") and _____ ("**Contractor**").

Capitalized terms used herein and not otherwise defined shall have the meanings specified in the Agreement.

The undersigned, in [his][her] capacity as an officer of Contractor and not in [his][her] personal capacity, and without undertaking any personal liability, certifies that all requirements of Section 11.2 of the Agreement have been satisfied:

(a) The Project Substation is mechanically completed, assembled, erected and installed (and ready for energization) in accordance with the Project Substation installation specifications contained in Exhibit A and otherwise in accordance with this Agreement (other than Punchlist items) and is free from detectable and patent defects and deficiencies in installation, including any free of any defects that would prevent the safe, normal, and reliable operation of the Project Substation;

(b) Contractor has completed the relevant mechanical quality control inspections for the Project Substation and has provided such documentation to Owner,

(c) Contractor has assisted Owner in attempting to obtain or obtaining any permits, certificates and approvals otherwise necessary to commence operating the Project Substation;

(d) The plant control system located in the Project Substation and all required protective and control features are installed and tested, and are operational; and

(e) The SCADA and all communication equipment for the Project to be located at the Project Substation have been properly installed and tested and are operational.

(f) Contractor has delivered this Notice of Project Substation Completion to Owner pursuant to Section 11.2.1 of the Agreement.

In Witness Whereof the undersigned has executed this Notice of Project Substation Completion this day of , 202[_].

By:

Date: _____

In accordance with Section 11.2 of the Agreement, Owner on this day of , 202[_], hereby indicates its acceptance of the achievement of Project Substation Completion.

By:

Date: _____

EXHIBIT P-2

NOTICE OF MECHANCIAL COMPLETION

TO: Owner

RE: Notice of Mechanical Completion in accordance with Sections 11.3 of the Agreement

---

This Notice of Mechanical Completion is delivered to you pursuant to Section 11.3 of the Procurement and Construction Agreement (the "**Agreement**"), dated as of , between Blue Heron Solar, LLC ("**Owner**") and _____ ("**Contractor**").

Capitalized terms used herein and not otherwise defined shall have the meanings specified in the Agreement.

(check applicable box)

_____ BESS Mechanical Completion
_____ Block Mechanical Completion for Block Number: _____

The undersigned, in [his][her] capacity as an officer of Contractor and not in [his][her] personal capacity, and without undertaking any personal liability, certifies that all requirements of Section 11.3 of the Agreement have been satisfied:

(a) the BESS or such Block is mechanically completed, assembled, erected and installed (and ready for backfeed) in accordance with the BESS or Block installation specifications contained in Exhibit A and otherwise in accordance with the Agreement (other than Punchlist items) and is free from detectable and patent defects and deficiencies in installation, including any free of any defects that would prevent the safe, normal, and reliable operation of the BESS or Block;

(b) Contractor has completed the relevant mechanical quality control inspections for the BESS or such Block and has provided such documentation to Owner;

(c) Contractor has assisted Owner in attempting to obtain or obtaining any permits, certificates and approvals otherwise necessary to commence commissioning;

[Include only for the First Portion to achieve Mechanical Completion:

(d) (1) no Block has generated any electricity that has been dispatched across the Point of Change of Ownership;

(2) no module shall have received any backfeed power;

(3) no Block shall have been interconnected to its respective breaker in the Project Substation;

(4) no electric power shall have been transmitted from any module through the Project Substation to the Gen-Tie Line;

(5) the synchronization of the Project or any part thereof with the transmission system as provided in Section 11.4(e) shall not have begun;

(6) one hundred percent (100%) of the posts, trackers and inverters have been installed for the Project; and

(7) modules have been installed for at least [___] (____)Blocks in addition to the First Portion.]

(e) Contractor has delivered this Notice of Mechanical Completion to Owner pursuant to Section 11.3 of the Agreement.

In Witness Whereof the undersigned has executed this Notice of Mechanical Completion this day of , 202[_].

By:

Date: _____

In accordance with Section 11.3 of the Agreement, Owner on this day of , 202[_], hereby indicates its acceptance of the achievement of Mechanical Completion.

By:

Date: _____

EXHIBIT P-3

NOTICE OF PLACED IN SERVICE

TO: Owner

RE: Notice of Placed in Service Completion in accordance with Sections 11.4 and 11.4.1 of the Agreement

---

This Notice of Placed in Service Completion is delivered to you pursuant to Sections 11.4 and 11.4.1 of the Procurement and Construction Agreement (the "**Agreement**"), dated as of , between Blue Heron Solar, LLC ("**Owner**") and _____ ("**Contractor**").

Capitalized terms used herein and not otherwise defined shall have the meanings specified in the Agreement.

(check applicable box)

_____ BESS Placed in Service
_____ Block Placed In Service for Block Number: _____
_____ Project

The undersigned, in [his][her] capacity as an officer of Contractor and not in [his][her] personal capacity, and without undertaking any personal liability, certifies that all requirements of Section 11.3 of the Agreement have been satisfied:

(a) all Contractor Permits necessary to commence operation of the BESS, the Block or the Project (including on a commercial basis), as applicable, have been obtained and Owner has legal title to the Project pursuant to Section 15.1.4 of the Agreement;

(b) Owner has physical and operational control of the BESS, the Block or the Project, as applicable, pursuant to Section 15.1.4 of the Agreement;

(c) all critical pre-operation testing has been completed with respect to the BESS, the Block or the Project, as applicable;

(d) regular and daily operations of the BESS, the Block or the Project, as applicable, have commenced; and

(e) the BESS, the Block or the Project, as applicable, has been synchronized with the power grid.

(f) Contractor has delivered this Notice of Placed In Service to Owner pursuant to Section 11.4.1 of the Agreement.

In Witness Whereof the undersigned has executed this Notice of Placed In Service this day of , 202[_].

By:

Date: _____

In accordance with Section 11.4.1 of the Agreement, Owner on this day of , 202[_], hereby indicates its acceptance of the achievement of Placed in Service.

By:

Date: _____

EXHIBIT P-4

NOTICE OF PROJECT SUBSTANTIAL COMPLETION

TO: Owner

RE: Notice of Project Substantial Completion in accordance with Sections 11.5 and 11.6 of the Agreement

---

This Notice of Project Substantial Completion is delivered to you pursuant to Sections 11.5 and 11.6 of the Procurement and Construction Agreement (the "**Agreement**"), dated as of , between Blue Heron Solar, LLC ("**Owner**") and _____ ("**Contractor**").

Capitalized terms used herein and not otherwise defined shall have the meanings specified in the Agreement.

The undersigned, in [his][her] capacity as an officer of Contractor and not in [his][her] personal capacity, and without undertaking any personal liability, certifies that all requirements of Section 11.5 of the Agreement have been satisfied:

(a) the procurement and construction of the Project and every part thereof (other than any Non-Critical Deficiency included on the Punchlist) has been completed;

(b) the connection of all equipment (including each Block) and wiring to the Interconnection Facilities of the Project as required by way of wiring, controls, and safety systems has been completed.

(c) (i) all instruments and relays have been installed and are functional and (ii) all required protective and control features are operational;

(d) the Project is capable of unattended continuous operation in a safe manner without damage to the Project or any sub-system thereof, or any other property on or off the Site, and without injury to any Person in compliance with the Requirements and any other standards of performance set forth herein;

(e) the Project is synchronized with the transmission system and all testing under the PPAs required as a condition to achievement of "Commercial Operation Date" (as defined in the PPA), including testing required by the Power Purchasers to each respective PPA for delivery of electricity, has been satisfactorily completed;

(f) Owner has received all Contractor Deliverables and applicable spare parts in respect of the Project that are required to be delivered by the Project Substantial Completion Date, including all Required Manuals identified

therein, in accordance with the requirements in Exhibit B of the Agreement;

(g) the Punchlist for the Project is in final form as provided for in Section 11.1.1 of the Agreement;

(h) the following shall have been installed and placed into full operation by Contractor and be capable of unattended operation in a safe manner without damage to the Project or any sub-system thereof, or any other property on or off the Site, and without injury to any Person in compliance with the Requirements and any other standards of performance set forth herein:

(i) the Meteorological Stations for the Project;

(ii) the telemetry system for the Project; and

(iii) the telecommunications system for the Project.

(i) the Commissioning tests, the BESS Performance Test, the Availability Test and the Initial Capacity Test have each been Successfully Run, and the Project is ready to commence commercial operation;

(j) the Interconnection Facilities (and all testing under the Interconnection Agreement required as a condition to commencing parallel operation with the Participating TO's Interconnection Facilities) have been satisfactorily completed by Contractor as required under the Interconnection Agreement in accordance with the requirements thereof;

(k) without limiting the requirement under Section 11.5(i) of the Agreement that the Initial Capacity Test has been Successfully Run, either (i) the results of the Initial Capacity Test reflect achievement of the Capacity Guaranty, or (ii) the results of the Initial Capacity Test reflect achievement of at least the Minimum Guaranteed Capacity, and demonstrated to satisfaction of Owner that the shortfall in the Initial Capacity Test is not due to any of the Work:

(l) Contractor has paid to Owner all undisputed amounts due and payable to Owner hereunder, including any undisputed Delay Liquidated Damages accrued up to Substantial Completion;

(m) No Contractor Liens in respect of amounts paid to Contractor hereunder shall be outstanding against the Project (unless bonded over) and Contractor has provided, as applicable, each Conditional Waiver and Release Upon Progress Payment and each Waiver and Release Upon Final Payment, as required pursuant to Section 21.2 of the Agreement;

(n) All Subcontractor warranties required to have been assigned to Owner pursuant to Section 14.6 of the Agreement have been so assigned to Owner in accordance with Section 14.6, and copies of all such

Subcontractor warranties have been provided to Owner in accordance with Section 14.6; and

(o) Contractor has delivered this Notice of Project Substantial Completion to Owner pursuant to Section 11.6 of the Agreement.

In Witness Whereof the undersigned has executed this Notice of Substantial Completion this day of , 202[_].

By:

Date: _____

In accordance with Section 11.6 of the Agreement, Owner on this day of , 202[_], hereby indicates its acceptance of the achievement of Project Substantial Completion.

By:

Date: _____

EXHIBIT P-5

NOTICE OF FINAL COMPLETION

TO: Owner

RE: Notice of Final Completion in accordance with Sections 11.7 and 11.8 of the Agreement

---

This Notice of Final Completion is delivered to you pursuant to Sections 11.7 and 11.8 of the Procurement and Construction Agreement (the "**Agreement**"), dated as of , between Blue Heron Solar, LLC ("**Owner**") and _____ ("**Contractor**").

Capitalized terms used herein and not otherwise defined shall have the meanings specified in the Agreement.

The undersigned, in [his][her] capacity as an officer of Contractor, and not in [his][her] personal capacity, and without undertaking any personal liability, certifies that all requirements of Section 11.6 of the Agreement have been fulfilled:

(a) Project Substantial Completion shall have been achieved;

(b) all items on the Punchlist shall have been completed by Contractor or, pursuant to Section 6.7.2 of the Agreement, including all restoration and reclamation as required under this Agreement, Owner has withheld any remaining Punchlist Holdback to complete any items on the Punchlist not completed by Contractor in accordance with the terms hereof;

(c) the Final Capacity Test of the Project (if any) shall have been Successfully Run;

(d) all Contractor's and Subcontractors' personnel shall have left the Site, and all supplies, tools, equipment, machinery, surplus materials, waste materials, rubbish and construction facilities other than those to which Owner holds title shall have been removed from the Site (other than Contractor's personnel, supplies, tools, machinery, materials and equipment required for the performance of its obligations under any operations and maintenance agreement executed between the Parties, if applicable);

(e) Owner shall have received all Contractor Deliverables in relation to the Project;

(f) Contractor shall have delivered to Owner copies of final as-built and record drawings of the Project in accordance with the requirements set forth in Exhibit B (other than requirements related to timing for delivery for which any failure to comply has been cured) and the other documents and information required under the PPAs and Interconnection Agreement in accordance with the requirements thereof;

(g) Contractor shall have delivered the Notice of Final Completion to Owner pursuant to Section 11.8 of the Agreement;

(h) All amounts due and payable by Contractor to Owner under the Agreement shall have been paid in full; and

(i) No Contractor Liens in respect of amounts paid to Contractor hereunder shall be outstanding against the Project (unless bonded over) and Contractor shall have provided each Conditional Waiver and Release on Progress Payment, each Unconditional Waiver and Release on Progress Payment, each Conditional Waiver and Release on Final Payment and each Unconditional Waiver and Release on Final Payment as required under Section 21.2 of the Agreement.

In Witness Whereof the undersigned has executed this Notice of Final Completion this day of , 202[_].

By:

Date: _____

In accordance with Section 11.8 of the Agreement, Owner on this day of , 202[_], hereby indicates its acceptance of the achievement of Final Completion.

By:

Date: _____

NoBull Energy

10435 Commerce Drive Suite 120
Carmel, IN 46032

Invoice

Invoice Number: Next #
Invoice Date: Sep 30, 2025
Due Date: Oct 30, 2025

Bill To:

Job Site:

Billing Details:

Description	***Amount***
Standard Form Invoice	0.00

Subtotal	
Retainage	0.00
Tax	
Total	**$**

Sales Tax Number:

Please remit payment to:

NoBull Energy LLC

ABA Routing: 074909153
Account No: 4735093

NoBull Energy LLC
10435 Commerce Drive Suite 120
Carmel, IN 46032

APPLICATION AND CERTIFICATE FOR PAYMENT

Job No.:
Job:
Application No: 2.0
Application Date: Jan 23, 2024
Period To: Feb 29, 2024

CONTRACT

A	B	C	D	E	F	G		H	I
Item #	Description of Work	Scheduled Value	Work Completed		Materials Presently Stored	Total Completed and Stored To Date	%	Balance to Finish	Retainage (If Variable Rate)
			From Previous Application(s)	This Period					
01	LNTP-001 02-08-04-400194.S	402,500.00	402,500.00	0	0	402,500.00	100	0	40,250.00
02	LNTP-001 02-11-07-4000216.L	205,000.00	205,000.00	0	0	205,000.00	100	0	20,500.00
1.1.1	02-11-07-40000123.LE Module Installation	4,473,651.00	0	0	0	0	0	4,473,651.00	0
1.1.2	02-11-07-4000110.S Tracker System Installation Single Axis	7,098,315.00	0	0	0	0	0	7,098,315.00	0
1.1.3	02-11-07-4000121.LE Post/Pile Installation	4,424,095.00	0	0	0	0	0	4,424,095.00	0
1.1.4	02-11-07-4000216.L Mechanical Survey & Pile Layout	315,453.00	0	0	0	0	0	315,453.00	0
1.1.5	02-08-04-4000127.0 Performance and Payment Bond	395,000.00	0	0	0	0	0	395,000.00	0
1.1.6	02-08-04-4000194.S Mobilization	3,116,426.00	0	3,116,426.00	0	3,116,426.00	100	0	155,821.30
1.1.7	02-08-04-4000090.S Sub Contractor OH/Margin/MGMT	5,253,700.00	0		0	0	0	5,253,700.00	0
		25,684,140.00	607,500.00	3,116,426.00	0	3,723,926.00	15	21,960,214.00	216,571.30

Sample

ADDITIONS TO CONTRACT

0	0	0	0	0	0	0	0	

Grand TOTAL:	**25,684,140.00**	**607,500.00**	**3,116,426.00**	**0**	**3,723,926.00**	**15**	**21,960,214.00**	216,571.30

APPLICATION AND CERTIFICATE FOR PAYMENT

To: Project:

From:

Contract For: Via Architect:

Application No: 2.0
App. Date: Jan 23, 2024
Period to: Feb 29, 2024
Project No:
Contract Date: Jan 22, 2024

Distribution to:
□ Owner
□ Architect
□ Contractor
□ Field
□ Other

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet is attached.

1. ORIGINAL CONTRACT SUM		25,684,140.00
2. NET CHANGE BY CHANGE ORDERS		0
3. CONTRACT SUM TO DATE		25,684,140.00
4. TOTAL COMPLETED AND STORED TO DATE		3,723,926.00
5. RETAINAGE:		
a. 5.82% of Completed work	216,571.30	
b. 0.00% of Stored Material	0	
TOTAL RETAINAGE		216,571.30
6. TOTAL EARNED LESS RETAINAGE		3,507,354.70
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT		546,750.00
8. CURRENT PAYMENT DUE		2,960,604.70
9. BALANCE TO FINISH, INCLUDING RETAINAGE		22,176,785.30

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changed approved in previous months by owner	0	0
Total approval this month	0	0
TOTALS	$0	$0
NET CHANGES by Change Order	$0	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR: NoBull Energy LLC

By: _____ Date: _____

Subscribed and sworn before me this _____ day of _____

Notary Public: My Commission expires:

Sample

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED

_____

(Attach explanation if amount certified differs from the amount applied for. Initial all figures on this Application and on the Continuation Sheet that are changed to conform to the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

EXHIBIT R

INSURANCE REQUIREMENTS

Contractor Requirements

Contractor shall maintain, or cause to be maintained by its Subcontractors, from the Commencement Date until Substantial Completion, the insurance coverage outlined in (a) through (f) below, in the amounts specified and all such other insurance as required by Applicable Law. Within five (5) Business Days after the Commencement Date, and annually thereafter through the warranty period, Contractor shall deliver to Owner certificates of insurance signed by Contractor's insurance broker evidencing the insurance coverage required under the Agreement, accompanied by copies of the endorsements required hereunder. Notwithstanding any deductibles or self-insured retentions in such policies, Contractor shall be responsible for the first dollar of loss. All Insurance Carriers will be rated A-VIII or better by A.M. Best and Company.

(a) Workers' Compensation and Employers' Liability.

(i) Contractor shall obtain workers' compensation and basic employers' liability insurance for all employees in accordance with applicable Law.

(ii) Contractor shall obtain employers' liability insurance with limits of $1,000,000 for injury, $1,000,000 for disease, or $1,000,000 for death occurring as a result of each accident.

(b) Business Auto.

(i) Contractor shall obtain commercial automobile liability insurance with bodily injury, death and property damage combined single limits of $1,000,000 per occurrence covering vehicles any owned (if any), hired or non-owned.

(c) Commercial General Liability.

(i) Contractor shall obtain commercial general liability insurance written on an occurrence basis with a limit of $1,000,000 per occurrence and $2,000,000 in the aggregate, including premises and operations liability, products and completed operations liability, blanket contractual liability to the extent coverage applies, personal injury liability, bodily injury and "broad form" property damage coverage, explosion, collapse and underground hazard coverage. If coverage includes an aggregate limit, that limit should be $2,000,000. Coverage should be provided on a per project/per location basis.

(d) Umbrella/Excess Liability Insurance.

(i) Contractor shall obtain umbrella or excess liability insurance with a limit of $20,000,000 per occurrence and in the aggregate, in excess of the limits of insurance provided above. Coverage shall be "following form" of the underlying general liability policy. Auto and Employers Liability policies shall also be

scheduled on the underlying umbrella policy schedule. Coverage limits may be structured using any combination of underlying, excess, or umbrella policies

(e) Professional Liability Insurance.

(i) Contractor will obtain and maintain, at its sole cost and expense, throughout the term of the agreement, professional liability (errors and omissions) insurance covering loss or damages due to Contractor's acts, errors or omissions in the delivery of Contractor's Work involving design, engineering, architectural or stamped drawings, with a limit of $2,000,000 per occurrence or in the aggregate. If the policy shall be written on a "claims made" basis then the policy shall include 1) a retroactive date that is no later than the construction start date and 2) any time a policy is written on a claims made basis is not renewed or the retroactive date changed the Contractor shall obtain or cause to obtain the broadest "tail" or extended reporting coverage commercially available.

(f) Contractor's Pollution Liability Insurance.

(i) Contractor shall obtain Contractor's Pollution Liability insurance coverage with a limit of $2,000,000 each incident or in the aggregate. If the policy shall be written on a "claims made" basis then the policy shall include 1) a retroactive date that is no later than the construction start date and 2) any time a policy is written on a claims made basis is not renewed or the retroactive date changed the Contractor shall obtain or cause to obtain the broadest "tail" or extended reporting coverage commercially available. This coverage may be obtained in a single policy or included as part of (c) or (d) above.

(g) Additional Insurance Provisions.

(i) Such insurance and to the extent Contractor is found negligent or to have caused a claim, loss or damages shall include (1) provisions or endorsements naming the other Owner and any financing parties as with additional insured status (except as regards Workers Compensation, Employers Liability, and Professional Liability) to the extent losses or claims are caused in whole or in part from the negligence or alleged negligence of Contractor using the customary CG 2010 1219 and CG 2037 1219 endorsements, or equivalent forms for coverages other than Commercial General Liability, to the extent that the loss or claim in question is caused by the Contractor's negligence in its operations in and during the performance of the Work, and to no greater extent than is necessary to provide insurance coverage for the covered indemnity obligations expressly assumed by Contractor under this Agreement, it being the express intent and understanding of the Parties that, up to specified limits, additional insured status is provided hereunder as a support to performance of Contractor's expressly assumed, covered indemnity obligations hereunder; (2) provisions that such insurance is primary insurance with respect to Owner and that any other insurance maintained by the other underwriters is excess and not contributory insurance, to the extent of the indemnity obligations expressly assumed by each party hereunder, each party agrees that all insurance policies

required under this Agreement of such indemnifying party shall be primary to the other party's insurance and the other party's insurance shall likewise be non-contributing; (3) a cross-liability or severability of interest clause; (4) provisions that require 30 days' prior Notice (except 10 days' prior Notice for non-payment of premiums) be given to the Owner prior to the cancellation, non-renewal or reduction of required limits of liability with respect to any such required policies. Contractor shall provide the Owner and any financing parties with certificates of insurance annually through the warranty period evidencing the policies, and required endorsements listed above within 10 days after they have been obtained. As above, to the extent of Contractor's negligence or alleged negligence, the insurance coverage described above in this section shall be primary and not excess to Owner's insurance and shall not be deemed to limit the Contractor's liability under this Agreement, as detailed herein. All insurance required to be maintained by Contractor pursuant to this Exhibit R except for Professional Liability insurance shall provide for a waiver of all rights of subrogation which Contractor's insurance carriers might exercise against Owner Indemnified Parties.Waiver of Subrogation provided where and to the extent permitted by law and to the extent of Contractor's expressly assumed indemnity obligations hereunder, and except to the extent any loss, claim, damage, etc. is caused by the negligence, recklessness or willful misconduct of any party indemnified hereunder by Contractor.

(ii) Contractor shall require all first-tier Subcontractors to comply with the insurance requirements set forth in paragraphs (a) through (c) above. Contractor shall require all Subcontractors to include provisions in all lower-tier Subcontracts requiring such lower-tier Subcontractors to comply with such insurance requirements set forth in paragraphs (a) through (c) above. Contractor shall obtain insurance certificates from each Subcontractor and, upon the written request of Owner, Contractor shall furnish Owner evidence of insurance for its Subcontractors. Contractor will be responsible for any deficiencies in any Subcontractor's insurance coverage.

(iii) Any failure of any certificates delivered pursuant to this Exhibit R to conform to the contractual requirements specified in this Exhibit R shall not result in a waiver by Owner of any rights under this Agreement or Contractor's required insurance and indemnity obligations herein and such obligations shall continue in full force and effect.

(iv) To the extent allowed by Applicable Law, Contractor shall furnish Owner with accident report(s) covering accidents occurring in connection with or as a result of the performance only of the scope of Work defined herein within ten (10) days after the occurrence of such an accident and to the extent such accident involves Owner.

(v) Contractor shall be responsible for any deductibles or self-insured retentions applicable to the insurance provided in compliance with this Exhibit R

(vi) Contractor shall notify Owner when coverages required herein have been reduced as a result of claim payments, expenses or both.

(vii) None of the requirements contained in this Exhibit R as to types, limits or Owner's reasonable approval of insurance coverages to be maintained by Contractor are intended to and shall not in any manner limit, qualify or quantify the liabilities and obligations assumed by Contractor hereunder, in any other agreement with Owner, or as otherwise provided by Applicable Law

(viii) Contractor hereby waives all rights of subrogation against the Owner Indemnified Parties for the policies procured by Contractor, as detailed herein. Failure of Contractor to provide insurance and herein required or failure of Owner to require evidence of insurance or to notify Contractor of any breach by Contractor of the requirements of this Exhibit R shall not be deemed to be a waiver by Owner of any of the terms and conditions of this Agreement, nor shall they be deemed to be a waiver of the obligation of Contractor to indemnify, defend and hold harmless Owner as required in the Agreement to the extent Contractor's negligence or alleged negligence caused in whole or in part from the Work.

Owner Requirements

Owner shall maintain, from the Commencement Date until Substantial Completion, the insurance coverage outlined in (a) through (d) below, in at least the minimum amounts specified and all such other insurance as required by Applicable Law. Within five (5) Business Days after the Commencement Date, and through the warranty period, Owner shall deliver to Contractor certificates of insurance signed by Owner's insurance broker evidencing the insurance coverage required under the Agreement. Notwithstanding any deductibles or self-insured retentions in such policies, Owner shall be responsible for the first dollar of loss, except as otherwise specified herein. All Insurance Carriers will be rated A-VIII or better by A.M. Best and Company.

(a) Workers' Compensation and Employers' Liability.

(i) If applicable, Owner shall obtain workers' compensation and employers' liability insurance for all employees in accordance with applicable Law.

(ii) If applicable, Owner shall obtain employers' liability insurance with limits of at least $1,000,000 for injury, $1,000,000 for disease, or $1,000,000 for death occurring as a result of each accident.

(b) Business Auto.

(i) If applicable, Owner shall obtain comprehensive automobile liability insurance with bodily injury, death and property damage with combined single limits of at least $1,000,000 per occurrence covering vehicles any owned (if any), hired or non-owned.

(c) Commercial General Liability.

(i) Owner shall obtain commercial general liability insurance written on an occurrence basis with a combined single limit of at least $1,000,000 per occurrence and $2,000,000 in the aggregate on a project specific basis, including premises and operations liability, products and completed operations liability, blanket contractual liability, personal injury liability, bodily injury and "broad form" property damage coverage, explosion, collapse, and underground hazard coverage. If coverage includes an aggregate limit, that limit should be at least $2,000,000.

(d) Umbrella/Excess Liability Insurance.

(i) Owner shall obtain umbrella or excess liability insurance with a limit of at least $20,000,000 per occurrence and in the aggregate, in excess of the limits of insurance provided above. Coverage shall be "following form" of the underlying general liability policy. The coverage require of the Owner in (c) and (d) above may be obtained in a single policy or combination or primary and excess policies.

(e) Builder's All Risk insurance / Inland Marine or Installation Floater: Owner shall obtain or cause to be maintained Builder's All Risk insurance insuring all risks of physical loss or damage (including testing and commissioning), lighting, strike, riot, vandalism, theft and malicious mischief. Sublimits for following perils:

- Earthquake and Flood with sublimits and deductibles approved by Owner & any financing parties;
- Severe Convective Storm (hail or tornado) and Named Windstorm with sublimit and deductible approved by Owner & any financing parties;
- All real and personal property of either Loan Party, Contractor or Subcontractor of any tier, whether fixed, in-transit, or off-site which is intended to become a permanent part of the project and has been included in the contract value covered by the policy. This policy does not provide coverage for tools and equipment that are owned, rented or leased by the Contractor or subcontractors of any tier that have been brought to the site for the purpose of the construction project
- Debris removal subject to a customary sublimit;
- Contractor shall be included as an insured, at least the LEG 2 endorsement shall be included, and Contractor shall be provided a copy of the Builder's All Risk (BAR) coverage or at least a summary of the BAR coverage from Owner's insurance broker.

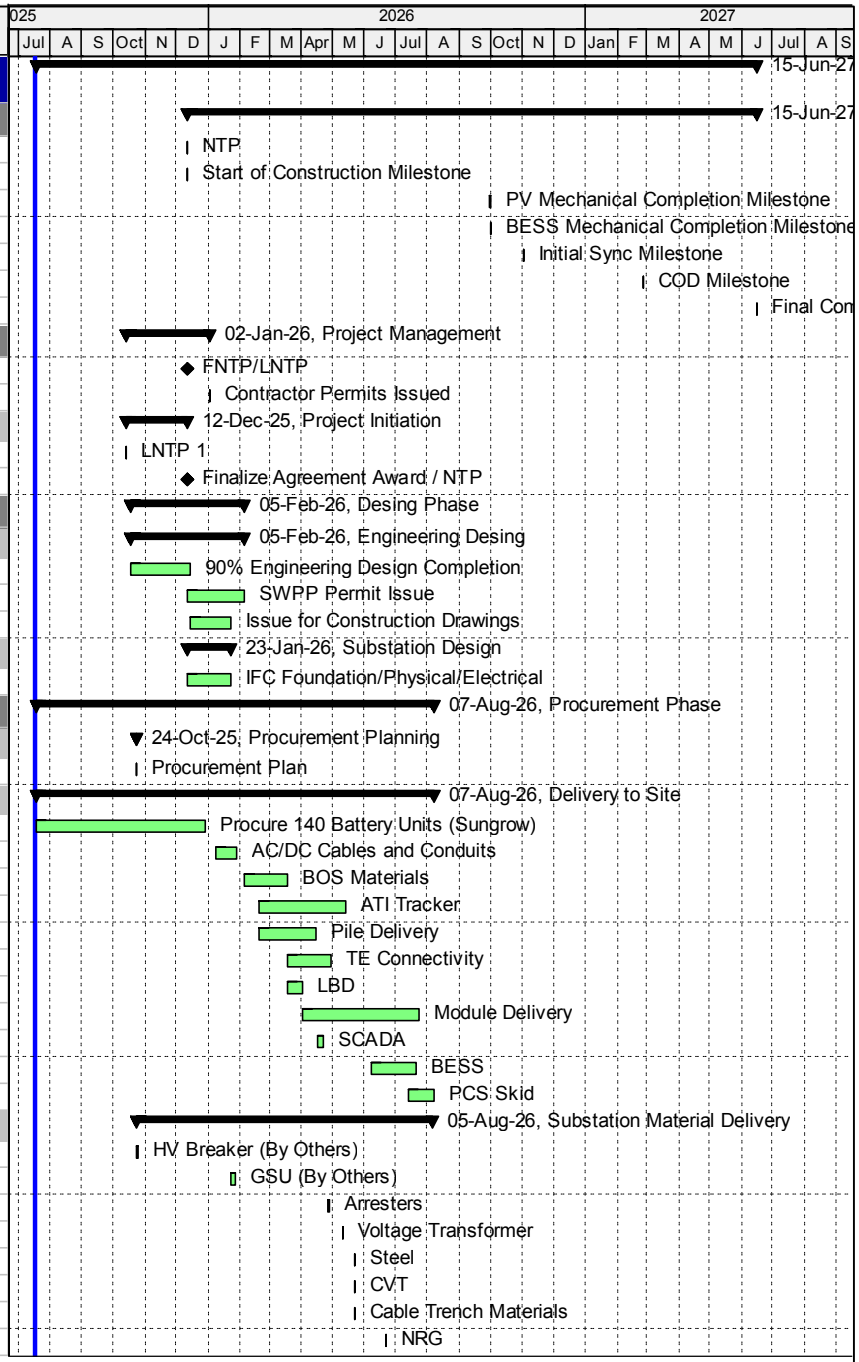
The construction site shall be specifically scheduled on the policy as a Covered Location. Limits of policy will be at least the full replacement value of the completed Project, except for industry standard sublimits for certain perils. Coverage and limits shall be extended to include Materials In Transit and Stored Offsite, Extra and Expediting Expenses, Delay in Start Up (DSU) in an amount equal to 12 months revenues less non continuing expenses. The waiting period shall be for no more than 60 days.

Policy shall provide for claims to be paid based upon Replacement Cost of the damaged property without deduction for depreciation. The policy shall have a deductible of no greater than $250,000 per occurrence, except for certain perils (earthquake, flood, water damage, severe convective storm, named windstorm, wildfire, hot testing) which shall have deductibles no greater than 5% of the values. The policy shall not contain Coinsurance provisions unless Agreed Amount is endorsed. The Contractor and all Subcontractors shall be an Additional Insured on the policy. The policy shall include an endorsement naming any financing parties as Loss Payee and Additional Insured, if applicable.

The Owner shall pay the deductible for such reported losses, except to the extent such loss or damage giving rise to the claim is a result of the actions of Contractor or its Subcontractors, in which case Contractor shall be responsible for no more than $250,000 per occurrence for any loss insured under the Builder's All Risk policy.

The policy shall include a Waiver of Subrogation against Contractor and all Subcontractors for any claims that are paid or should have been paid by this required Builder's All Risk insurance.

Activity ID	Activity Name	Original Duration	Start	Finish
Chisme Solar and Storage Project		484	18-Jul-25	15-Jun-27
Milestones		382	12-Dec-25	15-Jun-27
A1030	NTP	0	12-Dec-25	12-Dec-25
A1050	Start of Construction Milestone	0	12-Dec-25	12-Dec-25
A1510	PV Mechanical Completion Milestone	1	30-Sep-26	01-Oct-26
A1400	BESS Mechanical Completion Milestone	0	01-Oct-26	01-Oct-26
A1420	Initial Sync Milestone	0	02-Nov-26	02-Nov-26
A1440	COD Milestone	0	26-Feb-27	26-Feb-27
A1500	Final Completion	0	15-Jun-27	15-Jun-27
Project Management		56	13-Oct-25	02-Jan-26
A1020	FNTP/LNTP	0	12-Dec-25*	
A1040	Contractor Permits Issued	1	02-Jan-26	02-Jan-26
Project Initiation		42	13-Oct-25	12-Dec-25
A1070	LNTP 1	1	13-Oct-25*	13-Oct-25
A1060	Finalize Agreement Award / NTP	0	12-Dec-25*	
Desing Phase		75	17-Oct-25	05-Feb-26
Engineering Desing		75	17-Oct-25	05-Feb-26
A1080	90% Engineering Design Completion	39	17-Oct-25	15-Dec-25
A1100	SWPP Permit Issue	38	12-Dec-25	05-Feb-26
A1110	Issue for Construction Drawings	28	15-Dec-25	23-Jan-26
Substation Design		29	12-Dec-25	23-Jan-26
A1730	IFC Foundation/Physical/Electrical	29	12-Dec-25	23-Jan-26
Procurement Phase		269	18-Jul-25	07-Aug-26
Procurement Planning		0	24-Oct-25	24-Oct-25
A1120	Procurement Plan	0	24-Oct-25*	24-Oct-25
Delivery to Site		269	18-Jul-25	07-Aug-26
A1140	Procure 140 Battery Units (Sungrow)	113	18-Jul-25	29-Dec-25
A1290	AC/DC Cables and Conduits	15	08-Jan-26	28-Jan-26
A1300	BOS Materials	30	05-Feb-26	18-Mar-26
A1280	ATI Tracker	60	19-Feb-26	13-May-26
A1460	Pile Delivery	40	19-Feb-26	15-Apr-26
A1570	TE Connectivity	30	19-Mar-26	29-Apr-26
A1600	LBD	10	19-Mar-26	01-Apr-26
A1490	Module Delivery	80	02-Apr-26	24-Jul-26
A1480	SCADA	5	16-Apr-26	22-Apr-26
A1260	BESS	30	08-Jun-26	20-Jul-26
A1270	PCS Skid	20	13-Jul-26	07-Aug-26
Substation Material Delivery		198	24-Oct-25	05-Aug-26
A1810	HV Breaker (By Others)	1	24-Oct-25	24-Oct-25
A1740	GSU (By Others)	1	23-Jan-26	26-Jan-26
A1780	Arresters	1	27-Apr-26	27-Apr-26
A1850	Voltage Transformer	1	11-May-26	11-May-26
A1820	Steel	1	22-May-26	22-May-26
A1830	CVT	1	22-May-26	22-May-26
A1880	Cable Trench Materials	1	22-May-26	22-May-26
A1790	NRG	1	22-Jun-26	22-Jun-26



Remaining Level of Effort
Actual Level of Effort
Actual Work

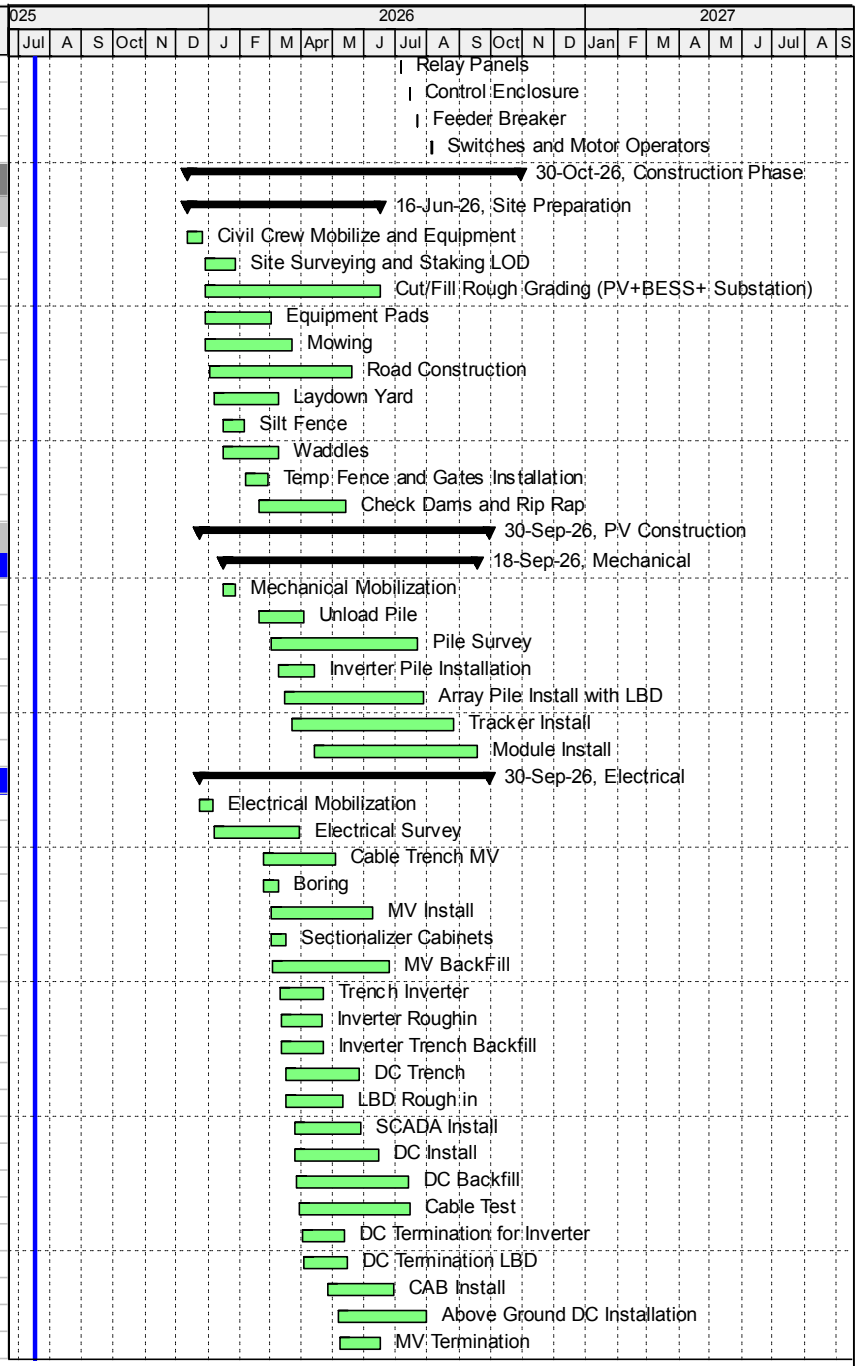
Data Date = 18-Jul-25
Schedule Printed on 27-Oct-25, at 12:59

Chisme Solar and Storage Project

Full Schedule - Standard Layout

NOBULL ENERGY

Activity ID	Activity Name	Original Duration	Start	Finish
A1870	Relay Panels	1	06-Jul-26	06-Jul-26
A1760	Control Enclosure	1	15-Jul-26	15-Jul-26
A1840	Feeder Breaker	1	22-Jul-26	22-Jul-26
A1770	Switches and Motor Operators	1	05-Aug-26	05-Aug-26
Construction Phase		226	12-Dec-25	30-Oct-26
Site Preparation		130	12-Dec-25	16-Jun-26
A1320	Civil Crew Mobilize and Equipment	10	12-Dec-25	26-Dec-25
A1330	Site Surveying and Staking LOD	20	29-Dec-25	26-Jan-26
A1350	Cut/Fill Rough Grading (PV+BESS+ Substation)	120	29-Dec-25	16-Jun-26
A1380	Equipment Pads	45	29-Dec-25	02-Mar-26
A1540	Mowing	60	29-Dec-25	23-Mar-26
A1360	Road Construction	98	02-Jan-26	20-May-26
A1530	Laydown Yard	45	06-Jan-26	09-Mar-26
A1370	Silt Fence	15	15-Jan-26	05-Feb-26
A1520	Waddles	38	15-Jan-26	09-Mar-26
A1390	Temp Fence and Gates Installation	15	06-Feb-26	27-Feb-26
A1340	Check Dams and Rip Rap	60	19-Feb-26	14-May-26
PV Construction		197	23-Dec-25	30-Sep-26
Mechanical		174	15-Jan-26	18-Sep-26
A1890	Mechanical Mobilization	8	15-Jan-26	26-Jan-26
A1960	Unload Pile	31	19-Feb-26	03-Apr-26
A2140	Pile Survey	100	03-Mar-26	22-Jul-26
A2130	Inverter Pile Installation	25	10-Mar-26	13-Apr-26
A1910	Array Pile Install with LBD	95	16-Mar-26	28-Jul-26
A1930	Tracker Install	110	23-Mar-26	25-Aug-26
A1970	Module Install	112	13-Apr-26	18-Sep-26
Electrical		197	23-Dec-25	30-Sep-26
A1900	Electrical Mobilization	8	23-Dec-25	05-Jan-26
A2160	Electrical Survey	60	06-Jan-26	30-Mar-26
A1920	Cable Trench MV	50	24-Feb-26	04-May-26
A2360	Boring	10	24-Feb-26	09-Mar-26
A2170	MV Install	70	03-Mar-26	09-Jun-26
A2240	Sectionalizer Cabinets	10	03-Mar-26	16-Mar-26
A2180	MV BackFill	80	04-Mar-26	25-Jun-26
A2230	Trench Inverter	30	11-Mar-26	22-Apr-26
A2210	Inverter Roughin	28	12-Mar-26	20-Apr-26
A2560	Inverter Trench Backfill	28	13-Mar-26	22-Apr-26
A2150	DC Trench	50	17-Mar-26	26-May-26
A2220	LBD Rough in	40	17-Mar-26	11-May-26
A2340	SCADA Install	45	26-Mar-26	29-May-26
A2190	DC Install	56	26-Mar-26	15-Jun-26
A2200	DC Backfill	75	27-Mar-26	14-Jul-26
A2250	Cable Test	75	30-Mar-26	15-Jul-26
A2290	DC Termination for Inverter	28	02-Apr-26	12-May-26
A2280	DC Termination LBD	30	03-Apr-26	15-May-26
A2260	CAB Install	45	27-Apr-26	29-Jun-26
A2270	Above Ground DC Installation	60	06-May-26	31-Jul-26
A2300	MV Termination	26	08-May-26	16-Jun-26



Remaining Level of Effort
Actual Level of Effort
Actual Work

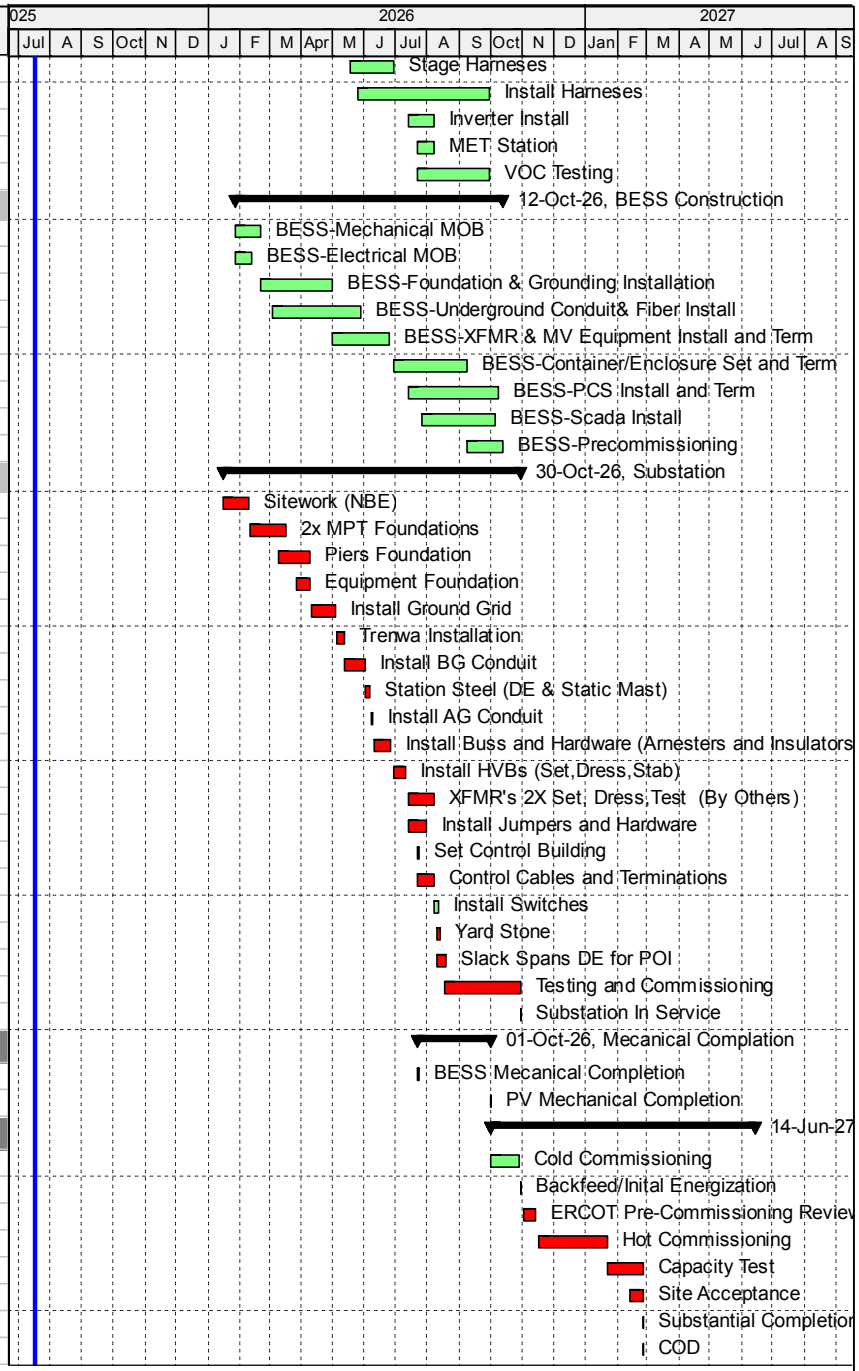
Data Date = 18-Jul-25
Schedule Printed on 27-Oct-25, at 12:59

Chisme Solar and Storage Project

Full Schedule - Standard Layout

NOBULL ENERGY

Activity ID	Activity Name	Original Duration	Start	Finish
A2310	Stage Harneses	30	18-May-26	29-Jun-26
A2320	Install Harneses	90	26-May-26	30-Sep-26
A1950	Inverter Install	20	13-Jul-26	07-Aug-26
A2330	MET Station	13	22-Jul-26	07-Aug-26
A2350	VOC Testing	50	22-Jul-26	30-Sep-26
BESS Construction		182	27-Jan-26	12-Oct-26
A2010	BESS-Mechanical MOB	19	27-Jan-26	20-Feb-26
A2020	BESS-Electrical MOB	13	27-Jan-26	12-Feb-26
A2030	BESS-Foundation & Grounding Installation	50	20-Feb-26	01-May-26
A2040	BESS-Underground Conduit& Fiber Install	60	04-Mar-26	28-May-26
A2070	BESS-XFMR & MV Equipment Install and Term	38	01-May-26	25-Jun-26
A2050	BESS-Container/Enclosure Set and Term	50	29-Jun-26	08-Sep-26
A2060	BESS-PCS Install and Term	63	13-Jul-26	08-Oct-26
A2080	BESS-Scada Install	50	27-Jul-26	05-Oct-26
A2090	BESS-Precommissioning	25	08-Sep-26	12-Oct-26
Substation		203	16-Jan-26	30-Oct-26
A2380	Sitework (NBE)	17	16-Jan-26	09-Feb-26
A2390	2x MPT Foundations	25	10-Feb-26	16-Mar-26
A2440	Piers Foundation	23	10-Mar-26	09-Apr-26
A2430	Equipment Foundation	10	27-Mar-26	09-Apr-26
A2450	Install Ground Grid	17	10-Apr-26	04-May-26
A2570	Trenwa Installation	6	05-May-26	12-May-26
A2460	Install BG Conduit	13	13-May-26	01-Jun-26
A2480	Station Steel (DE & Static Mast)	4	02-Jun-26	05-Jun-26
A2470	Install AG Conduit	2	08-Jun-26	09-Jun-26
A2490	Install Buss and Hardware (Arnesters and Insulators)	13	10-Jun-26	26-Jun-26
A2510	Install HVBs (Set,Dress,Stab)	9	29-Jun-26	10-Jul-26
A2400	XFMR's 2X Set, Dress,Test (By Others)	20	13-Jul-26	07-Aug-26
A2520	Install Jumpers and Hardware	13	14-Jul-26	30-Jul-26
A2410	Set Control Building	2	22-Jul-26	23-Jul-26
A2530	Control Cables and Terminations	12	23-Jul-26	07-Aug-26
A2500	Install Switches	3	07-Aug-26	11-Aug-26
A2540	Yard Stone	3	10-Aug-26	12-Aug-26
A2550	Slack Spans DE for POI	8	10-Aug-26	19-Aug-26
A2420	Testing and Commissioning	54	17-Aug-26	30-Oct-26
A2100	Substation In Service	0	30-Oct-26	30-Oct-26
Mecanical Complation		50	22-Jul-26	01-Oct-26
A1700	BESS Mecanical Completion	1	22-Jul-26	23-Jul-26
A1990	PV Mechanical Completion	0	01-Oct-26	01-Oct-26
BESS/PV Commissioning and Test		178	01-Oct-26	14-Jun-27
A1680	Cold Commissioning	20	01-Oct-26	28-Oct-26
A2120	Backfeed/Inital Energization	1	30-Oct-26	30-Oct-26
A1710	ERCOT Pre-Commissioning Review	10	02-Nov-26	13-Nov-26
A1690	Hot Commissioning	45	16-Nov-26	21-Jan-27
A1940	Capacity Test	25	22-Jan-27	25-Feb-27
A1980	Site Acceptance	10	12-Feb-27	25-Feb-27
A2110	Substantial Completion	1	26-Feb-27	26-Feb-27
A2370	COD	1	26-Feb-27	26-Feb-27



Remaining Level of Effort
Actual Level of Effort
Actual Work

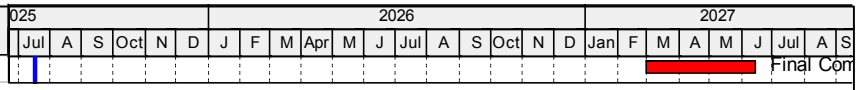
Data Date = 18-Jul-25
Schedule Printed on 27-Oct-25, at 12:59

Chisme Solar and Storage Project

Full Schedule - Standard Layout

NOBULL ENERGY

Activity ID	Activity Name	Original Duration	Start	Finish
A1720	Final Completion	75	01-Mar-27	14-Jun-27



Remaining Level of Effort
Actual Level of Effort
Actual Work

Data Date = 18-Jul-25
Schedule Printed on 27-Oct-25, at 12:59

Chisme Solar and Storage Project

Full Schedule - Standard Layout

NOBULL ENERGY

Chisme Solar + Storage Project
Exhibit T – Major Equipment Warranties and Information

BESS
Sungrow Supplier Warranty (SG 2-21-2025)(68e01cdcc7)

Breakers
Chint Chisme Warranty Information

Inverters
PV Pre-Commissioning Checklist for Customers
SG4400UD-MV Cold Commissioning & Hot Commissioning Version 5
Warranty Sungrow North America PV 07.2023

Modules
Longi Spec Sheet, Warranty and Module Quality Criteria
Longi Module Unpacking + Handling + Storage Guide 2025

MPTs
Chint Spec Information and Warranty

SUNGROW USA CORPORATION
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Sales: info@sungrowamericas.com
Service: BESStechsupport@sungrowamericas.com
Web: www.sungrowpower.com

ENERGY STORAGE SYSTEMS

NORTH AMERICA STANDARD /EXTENDED PRODUCT WARRANTY

1. DEFINITIONS

1.1. The Warrantor for the limited warranties set forth herein is Sungrow USA Corporation, as well as Sungrow Power Supply Co., Ltd. (collectively referred to as "Sungrow").

1.2. "**Commissioned**" shall mean when the Product is fully installed and/or placed in service, as applicable.

1.3. "**Commissioning**" shall mean cold and hot commissioning tests according to the Product commissioning protocol.

1.4. "**Defect**" shall mean any defect(s) in the design, engineering, materials, manufacturing, production, workmanship or assembly of the Product or Product Components that does not conform to the Product Specifications.

1.5. "**Discontinued**" (or any term deriving from it) shall mean that Sungrow has ceased manufacturing and selling the Product or Product Components.

1.6. "**End-user aka End Client, Client or Customer**" means the party who purchases the Products from Sungrow, or any subsequent owner of the Product with valid assignment of ownership, for which Service, as defined herein, will be performed under the Warranty.

1.7. "**Manual**" shall mean all manuals, guides, or similar documents which are provided in writing by Sungrow to End-users and which relate to the installation, operation, maintenance, or storage of the Products.

1.8. "**Person**" means any individual, entity, corporation, general or limited partnership, limited liability company, joint venture, estate, trust, association or other entity or governmental authority.

1.9. "**Product**" shall mean a complete energy storage system ("**BESS**"), consisting of some or all the following "**Product Components**" as applicable to the Purchase Order:

(a) Power conversion systems ("**PCS**") a device to convert (DC to AC, or AC to DC).

(b) Battery unit ("**Battery Unit**") an outdoor energy storage system engineered to work with the PCS.

(c) A "**Bank**" consisting of a single or multiple series-parallel battery strings (including battery modules ("**Battery Modules**") composed of multiple battery cells ("**Battery Cells**"), tied to string level Battery Control Units ("**BCU**"), and a Battery Management System ("**BMS**").

(d) Enclosure, including battery rack, thermal management system, and Fire Suppression System ("**FSS**") as applicable

(e) Local controller ("**Local Controller**") a controller to receive and distribute commands appropriately to Battery Units connected to a PCS.

1.10. "**Service**" shall mean a site visit, or remote services performed by Sungrow technicians in response to a claim.

1.11. "**Service Cancellation**" Please refer to Exhibit A for detailed information regarding Service Cancellation.

1.12. "**Serial Defect**" Please refer to Exhibit B for detailed information regarding Serial Defects.

1.13. "**Site**" shall mean the location of End-user's Product that is covered under this Warranty.

1.14. "**VPC**" shall mean volts per cell.

1.15. The "**Warranty**" shall mean this limited warranty contract for Sungrow Product, as may be extended by any Extended Warranty purchased by the End-user.

1.16. The "Initial Warranty Commencement Date" shall mean the earlier date between i) The commissioning completion date, or ii) Two (2) months after the date the last Product was delivered to End-user)

1.17. "**Extended Warranty**" means the extended warranty can be purchased from Sungrow at the time of the initial purchase or no later than 12 months before the end of the Product's warranty period (prices may vary). If the warranty has already expired, Sungrow will decide on a case-by-case basis whether to offer extended warranty services.

1.18. "**Warranty Period**" shall mean the Initial Warranty Period or the Extended Warranty Period, as applicable.

1.19. **"Spare Parts Warranty"** Please refer to Exhibit C for detailed information about Spare Parts Warranty.

1.20. **"Out-of-Warranty"** refers to any service or repair required after the Warranty Period or for issues not covered by Sungrow under the warranty terms.

2. OVERVIEW

2.1. The Warranty may be performed by Sungrow's own personnel, or Sungrow may, in its sole discretion, engage third party subcontractors to conduct any of the remedial work outlined hereunder, provided that Sungrow is solely responsible for the actions, omissions and costs of such third-party subcontractors.

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2.2. The terms of this Warranty will apply to the extent permitted by Applicable Law.

2.3. This Warranty is offered by Sungrow a standard warranty. Sungrow reserves the right to offer special warranty conditions. In that case, these special conditions will be stated in a separate document in relation to the specific products.

3. LIMITED WARRANTY

3.1. Sungrow warrants that the Products are free from defects in design, material, and workmanship for the Warranty Period.

3.2. If Sungrow accepts a warranty claim submitted by End-user, Sungrow shall, in its sole and absolute discretion, either send replacement Product to the End-user or shall dispatch technicians to the Site to perform on-site repair.

3.3. Sungrow will have sole and absolute discretion for determining whether it will pursue the repair or replacement remedy, but in either case, the costs of performing the remedial work (including, but not limited to, the costs of transporting replacement Products) shall be at Sungrow's expense, subject to a right of recuperation of those costs under the circumstances described in Section 13.3below. In addition, Sungrow may, in its sole and absolute discretion, engage third-party service providers to perform any of the remedial work hereunder, provided that Sungrow shall be solely responsible for the actions, omissions and costs of such third-party service providers.

3.4. If Sungrow sends replacement parts, the defective Products that have been replaced shall become the sole property of Sungrow, and the End-user shall collect and store those defective Products for Sungrow until such time as Sungrow can collect said Products or arrange for shipment back to Sungrow. End-user's obligation to collect and store defective Products shall last for:

(i) Up to one (1) month in, Canada, Contiguous United States;
(ii) Up to one (1) year in the rest of the world.

3.5. Warranty rights could be transferred to subsequent owners during the Warranty Period, including any subsequent authorized operators or lessees at the same location. The new End-User, namely non-purchasers, must sign and submit a warranty transfer agreement to Sungrow. If the installed Product is relocated to another site, the continuation of warranty services will depend on an on-site inspection by Sungrow at the new location before installation, with the final cost borne by the End-User.

3.6. Sungrow and the End-user shall mutually agree upon the conduct of any tests required to determine whether a Product is defective in advance of conducting such tests. Sungrow reserves the right, in its sole and absolute discretion, to supply different Product Components to settle a warranty claim, provided that such Product Components are functionally equivalent to the original Product Components and do not affect the performance of the system to which the Product Components will be installed. Any parts that are replaced may be new or reconditioned.

3.7. In the event of a Serial Defect, Sungrow shall preventively replace, or repair components related to the serial defect in all same Equipment at the Site.

4. Warranty Term Exceptions

4.1. C3 coatings for environments with moderate corrosivity, such as outdoor environments with moderate humidity and low pollution levels have a two (2) year limited warranty when installed within five (5) kilometers of the coast and a one (1) year limited warranty when installed within two (2) kilometers of the coast.

4.2. C4 coatings for environments with high corrosivity, such as coastal environments with high humidity and high pollution levels have a two (2) year limited warranty when installed within two (2) kilometers of the coast and a one (1) year limited warranty when installed within one (1) kilometer of the coast.

4.3. C5 coatings for environments with very high corrosivity, such as coastal or industrial environments with very high humidity, and high pollution levels have a two (2) year limited warranty when installed within five hundred (500) meters of the coast.

4.4. The End User is responsible for ordering an appropriate level of corrosion resistance in accordance with the site location and lifespan requirements.

4.5. The standard warranty for the painting, coating and container will be void in cases: 1) highly corrosive environment (≥250 µg/), 2) highly hot and humid environment (A 67°F/19.5°C or higher wet bulb temperature for 3,000 or more hours during the warmest 6 consecutive months of the year and RH>85%), unless there are special protection measures taken and clearly stated in the agreement between Sungrow and End-User.

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5. WARRANTY CLAIM PROCESS

5.1. If the End-user identifies any non-conformity or defect in the Product during the Warranty Period, the End-user will provide notice by email to BESStechsupport@sungrowamericas.com or other established Sungrow contact method within one (1) business days of the date that the End-user identified the non-conformity or defect.

5.2. Upon request by Sungrow, End-user shall provide (i) proof of ownership, including valid assignment of ownership, the Warranty Claimed serial number and/or (ii) evidence of executed regular or corrective maintenance reports on the Products in reference to the Warranty Claim.

5.3. Sungrow will make all commercially reasonable efforts to notify End-user by email within two (2) business day of receiving End-user's Warranty Claim of a Defect under this Warranty, whether Sungrow accepts the Warranty Claim or if more information is required to evaluate the Warranty Claim. If the Warranty Claim is approved, Sungrow will assign the warranty work a service ticket number. If Sungrow denies the Warranty Claim due to one of the exclusions or limitations listed in this Warranty, Sungrow will offer a thorough written justification.

5.4. Sungrow's decision to accept or reject a Warranty Claim is final, although the End-user may dispute it under the applicable dispute terms of a relevant purchase order or purchase agreement for the Products.

5.5. Sungrow shall produce (or ask its service providers to produce) a field service report in respect of any on-Site remediation work performed under the Warranty.

6. PRODUCT DATA REQUIREMENTS FOR WARRANTY CLAIM

(a) **T**hroughout the Warranty Period, End-User shall, when necessary, monitor, collect, and store the Product data as instructed by Sungrow every five (5) seconds as described in the Logging and Archiving Exhibit of the Master Supply Agreement. Upon request from Sungrow, the operating data shall be made available to Supplier for twenty-four (24) hours before and twenty-four (24) hours after the fault that requires investigation.

7. ORIGINAL WARRANTY PERIOD

7.1. The Original Warranty Period is five (5) years for a Product installed in the United States or Canada.

7.2. All spare parts repaired or replaced are covered under this Warranty for the longer of either (i) the Warranty Period for the defective Product or (ii) one (1) year from the date of completion of the repair or replacement.

7.3. All Service work performed by Sungrow is warranted for one (1) year from the day the service was completed.

8. EXTENDED WARRANTY PERIOD

8.1. The Extended Warranty option is sold separately for Products that are currently within warranty.

8.2. An Extended Warranty shall commence provided Sungrow has received payment in full for the initial warranty and extension, or a periodic instalment plan has been memorialized via an executed contract document. Periodic instalment plans will incur additional financing fees.

8.3. It is recommended that the Extended Warranty be purchased together with the Preventative Maintenance Plan to comply with Sungrow standards.

8.4. If purchasing an Extended Warranty, it must be purchased for every Product Component on site.

9. WARRANTY EXCLUSIONS

9.1. The Warranty does not cover defects or damages caused by factors outside Sungrow's control including:

(a) Force Majeure events as defined further herein;
(b) Improper transportation and/or delivery in the event End-user assumes transportation responsibility;
(c) Improper transportation, installation, storage, and handling;
(d) Failure of the End-user to properly store the Product;
  (i) If for any reason the Battery Units are stored prior to installation of the Product for a period longer than four (4) months following the later of
    1. the initial Battery Unit delivery date specified in the BOL and/or
    2. the date the initial Battery Unit was delivered to the designated Project Site or End-user's designated Staging Warehouse.
  (ii) End-user shall inspect and re-charge inventory material, if required, as directed by Supplier.
  (iii) End-user shall share relevant data related to any top-off charge of stored battery to assure compliance with Warranty terms.
  (iv) The cost related to the inspection and recharging process shall be borne by End-user, unless the Supplier is directly responsible for the extended storage of the Battery Units, in which case the Supplier shall bear the cost of one top-off charge.

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(v) Failure by End-user to comply with the Product Manual, guidelines, warnings, or instructions provided;

(e) Improper use or misuse of the Products, including accidents and external influences, e.g., third-party EMS or controllers, extended period of shutdown/idle resulting in deep discharge of the battery below its minimal cell voltage level;

(f) Improper maintenance or lack of maintenance, as set forth in the Manual;

(g) Repair, disassembly, or replacement of the Product Components, unless permitted in writing by Sungrow;

(h) External factors include but are not limited to: Extended power failure, surges, storm, lightning, flood, fire, vehicle collision, telecommunication, grid outage or voltage spike.

(i) Conditions exceeding the electrical, wind, snow load specifications, and any other operational specification.

(j) Chemical exposure.

(k) Damage caused by vandalism or animals.

(l) Neglect, abuse, misuse, improper or lack of maintenance and maintenance performed by unqualified personnel.

(m) Flaws that do not adversely affect the proper functioning of the Product. (e.g., cosmetic defects, wear and tear)

(n) Salt, mist, or corrosion levels above design specifications.

9.2. The Warranty does not cover:

(a) Fuses, surge suppressors, filters, cosmetic defects or normal wear and tear;

(b) Costs for End-user's employees and/or any third parties, unless stipulated otherwise in the Warranty;

(c) Regulatory changes or recertifications;

(d) Indirect, incidental, consequential, or special damages of the failure of the Product in Quality Warranty, including but not limited to, loss of use, loss of profits, loss of production, or loss of revenues.

9.3. The Warranty shall be void, if:

(a) Serial number has been tampered with;

(e) Inadequate Site access is provided and Sungrow repeatedly cannot perform service;

(b) Inadequate proof in cases where End User or its agents are responsible for required maintenance.

9.4. Additional Warranty Voiding Conditions – Battery Unit

(a) Low voltage. Allowing any Battery Unit to hold a 0% SOC condition on for more than one hundred and twenty (120) consecutive hours; allowing any cell voltage to be held at or below the minimum cell voltage 2.7VPC ("Minimum Cell Voltage") for more than one hundred and twenty (120) consecutive hours; Allowing cell voltages to reach 2.0VPC ("Cell Protection Voltage") or below; or exceeding battery alarm levels and triggering battery protection mechanisms.

(b) Abnormal Environment. During any power shutdown or maintenance work or consequence of negligence affecting the thermal management system or integrity of the internal environment within the BESS where:

- Humidity causes condensation within the BESS.
- Water enters the BESS.
- Excessive dust or pollutants enter the BESS.
- Temperature(n) <5℃ based on direct physical cell temperature (during cell charging or discharging) or Humidity <5% or Temperature(n) > 60℃ for more than 15 minutes. Temperature(n) below-30℃ for more than 2 hours.

10. DISCONTINUED AND COMPATIBLE PRODUCTS

10.1. If the Product or Product Component that is the subject of a Warranty Claim has required a non-repairable part to be replaced and no such part is available, Sungrow shall affect a repair path for such Warranty Claim using a part of comparable quality, specification, and certification.

10.2. If replacement of the defective part is not possible in connection with any such Warranty Claim, Sungrow must refund End-User in accordance with the calculation:

$$f2: Payment = D \times S \times R_V$$

$$S \text{ is added to the SOH adjustment account}$$

$$f4: R_v = \min\left[(SOH - 65\%) \times \frac{100}{35}, \frac{P_L - Project_{year}}{P_L}\%\right]$$

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Where	Description	Units
S	Percentage of lost product, measured in battery racks, taken offline versus on the number of racks in the original contract. Where a PCS is removed from service leaving the racks unusable, the racks behind that PCS shall be counted as offline.	
D	Dollar amount paid	$
SOH_A	SOH adjustment account. SOH_A is an account that keeps track of any additional in accessible SOH that's due to any abnormal activity such as capacity removal from the project.	
R_V	Residual value of the system. A system at 65% SOH is deemed to have 0% R_V	
P_L	The Warranty Period (or shorter if the warranty is no longer in good standing prior to the end of the Warranty Period)	
SOH	State of health as reported by the system BMS	

11. END-USER'S OBLIGATIONS

11.1. End-user is only entitled to the benefits of this warranty if:

(a) The Product is used as intended in compliance with the Manual's specifications and environmental standards;

(b) Best efforts are taken to protect the Product Components against further damage after discovering an issue which is likely to result in further damage;

(c) End User must grant, without delay, access, and all relevant permits to the Site;

(d) End-User must ensure the Site is free from hazards or obstructions;

(e) End-User must ensure site safety rules are in place, communicated and followed.

11.2. End-user is responsible for notifying SUNGROW of any hazards at the Site and ensuring that the site is free of hazards or other conditions that could impede the provision of warranty services.

11.3. End-user must provide SUNGROW service personnel with access to the Site or any special instructions for Site access. SUNGROW will not be held liable if access to the Site is not granted. If a second visit to the Site is required due to lack of access, the warranty holder will bear any costs.

12. OTHER LIMITATIONS

12.1. Sungrow's obligations under this Warranty are valid only if the End-user complies with its payment obligations under the applicable purchase order. If the End-user is in breach of its payment obligations for the applicable Product, in accordance with the contract terms under which the Product is sold, Sungrow shall have no Warranty obligations with respect to such Product until the payment has been made in full to Sungrow. The Warranty Period will not be extended because of late payments.

12.2. The termination of this Warranty does not release either Party from the obligation to make outstanding payments due at termination of the Warranty to the other Party.

13. COSTS NOT RELATED TO WARRANTY

13.1. The End-user shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Warranty, including without limitation, Site calls involving an inspection that determines no corrective maintenance is required.

13.2. The End-user shall be invoiced for, and shall pay, any costs for replacement equipment, installation, materials, freight charges, travel expenses or labor of Sungrow representatives to the extent such costs and expenses are outside the terms of this Warranty.

13.3. If, after performing Warranty work, Sungrow determines that the cause of the defect was not covered under this Warranty, Sungrow reserves the right, in its sole and absolute discretion, to charge the End-user for all reasonable costs incurred by Sungrow in performing the work.

13.4. Any request from the End-user for accompaniment by their own maintenance team during repair services, whether under warranty or out-of-warranty, will be at the End-user's expense.

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14. WARRANTY CONTRACT EFFECTIVE DATE, APPLICATION AND VALIDITY

14.1. This Warranty is valid as of the date of the applicable Purchase Order or purchase agreement between the parties and shall be applicable to all those Products purchased under such Purchase Order or purchase agreement. Sungrow reserves the right, in its sole and absolute discretion, to make any changes and modifications to this Warranty, without prior notice, for future, unsigned purchase orders or contracts, in addition to the right to decide whether to accept new contracts or annual contract renewals. Sungrow will notify the Buyer within 30 days of any changes and modifications to this Warranty if the Buyer and Sungrow still have an active Master Supply Agreement in place.

15. Out-of-Warranty Service

15.1. If the Product is defective but not covered under warranty, Sungrow will, at its discretion, offer a paid repair. The End-user may contact Sungrow to organize the paid repair service. Sungrow will provide a quotation covering inspection, labor, freight, materials, waste disposal, and management costs for the repair. Sungrow warrants the workmanship of the repair for six (6) months.

16. WARRANTY TRANSFER

16.1. The Warranty is transferable when the Product remains installed in its original location. This means, when the ownership of the Products has changed, the new owner shall continue to benefit under this Warranty if the new owner maintains the Product at its original location. Further, a lessee or assignee may obtain consent from the owner of the Products and make a claim under this Warranty. If the Products are relocated to another site, whether the warranty is transferable to the new site will be subject to a site inspection by Sungrow at the new site prior to installation with the written consent. For the avoidance of doubt, Sungrow shall not bear any costs associated with the re-installation of the Products such as installation, commissioning, site inspection by Sungrow, etc.

16.2. When Sungrow replaces a defective Product, the remaining Warranty Period of the original Product will be transferred to the replaced Product. There are no extensions applied on repair or replaced Products.

16.3. Notwithstanding the requirements of this article, this Warranty is not transferable to:

(a) More than one (1) Entity at a time.

(b) Any battery manufacturers or system integrators regardless of size, type or applications including, without limitation, ones used for electric vehicles, automotive applications and/or stationary storage applications.

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Web: www.sungrowpower.com

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17. CONDITIONAL TERMS

The following terms and conditions will apply to the extent that the parties have not executed a purchase order or other applicable agreement containing similar terms. In the event of any conflict between the term of this Section 17, and the term of the parties' executed purchase order or purchase agreement, the purchase order or purchase agreement shall prevail.

18. LIMITATIONS ON LIABILITY.

To the fullest extent allowed under the law, this Warranty constitutes End-user's sole and exclusive remedy for claims against Sungrow in respect of defective or non- conforming Products hereunder and is in lieu of all other warranties, conditions, guarantees or representations from Sungrow relating to the Products hereunder, whether oral or written, express or implied, statutory or otherwise, in contract, tort or otherwise, including without restriction, any warranties of merchantability or of fitness for a particular purpose, and any such Warranty, condition, guarantee or representation is hereby excluded. In no event shall any claim, failure of any Product hereunder, or breach of this Warranty, render either party, its affiliates, subcontractors or suppliers liable to the other party or its affiliates for indirect or consequential damages or loss of use associated with warranty claims for lost profits or loss of revenues, or any associated equipment, cost of capital, cost of substitute equipment, facilities, services or replacement power, downtime costs, claims of End-user's customers for such damages, or for any other special, consequential, incidental, indirect or exemplary damages. Each party's total liability for any and all warranty claims and costs under this Warranty shall not exceed the total purchase price for the Product that is the subject of the claim.

19. FORCE MAJEURE.

19.1 Sungrow shall not be liable hereunder for any failure or delay in the performance of its obligations hereunder due to an event of Force Majeure. "**Force Majeure**" means an act of god or other cause which is beyond the reasonable control of the party whose performance is affected by such event and could not have been avoided by the exercise of reasonable prudence, including but not limited to: extreme natural disasters (e.g. earthquakes, floods, landslides); explosions; fire; pandemics or epidemics; destruction of machines; equipment, factories and of any kind of installation to the extent caused by an event of Force Majeure; terroristic attacks; nuclear accidents; war, civil war or similar uprising; general strike (or lock-out) of a regional or national nature that is not targeted at Sungrow.

19.2. In the event of the occurrence of any Force Majeure event, Sungrow shall notify the End-user immediately in writing of the invocation of this section, and Sungrow's obligations hereunder shall be suspended for the duration of such Force Majeure event; provided that Sungrow shall be obligated to use its commercially reasonable efforts to restore performance hereunder as soon as reasonably practicable, and provided, further, that if such event continues for more than ninety (90) days in the aggregate in any six (6) month period, the End-user shall have the right to terminate this Warranty at any time upon written notice to Sungrow. Sungrow shall exercise commercially reasonable efforts in accordance with prudent industry practices to alleviate and mitigate the cause and effect of such Force Majeure event. Reasonable actions must be taken to avoid and/or limit damages to the End-user. Any portion of payments for Extended Warranty that is for time periods that follow termination date of this Warranty by the End-user under this provision shall be refunded to the End-user by Supplier.

20. DISPUTE RESOLUTION.

20.1. Any dispute under this Warranty which cannot be resolved by the good faith negotiation of the parties shall be finally settled by binding arbitration before a panel of three arbitrators selected and appointed in accordance with the Commercial Arbitration Rules of the American Arbitration Association ("**AAA**") then in effect on the date the dispute is submitted to the AAA (the "**Rules**"). The venue of the arbitration proceedings shall be San Francisco, California, and the language to be used in the arbitration proceedings shall be English. Unless prohibited by applicable laws, the arbitrator(s) shall have the power to issue interim measures, including but without limitation measures for preservation of property, attachment, preliminary injunction, replevin, preservation of evidence, etc. to avoid irreparable harm, maintain the status quo, or preserve the subject matter of the dispute. All the arbitration costs - including but not limited to the costs of the arbitrators (whether local or foreign arbitrators), all fees charged by the arbitration institution, experts' fees, and reasonable attorneys' fees -- shall be borne by the losing party. This Warranty shall remain in full force and effect pending the resolution of any dispute hereunder, and each party shall continue to perform its obligations not relating to the pending dispute during the pendency of any dispute. This Warranty is governed by and shall be interpreted in accordance with the laws of the State of California, without reference to conflicts of law.

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SUNGROW USA CORPORATION
Tel: 1-833-SGPOWER (747-6937)
Sales: info@sungrowamericas.com
Service: BESStechsupport@sungrowamericas.com
Web: www.sungrowpower.com

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EXHIBIT A
SERVICE CANCELLATION

1. Overview
This policy applies to both under-warranty and out-of-warranty service requests. It outlines terms and conditions for cancellations, rescheduling, and associated fees. This structure ensures fair compensation for time and resources allocated by Sungrow and any third-party vendors.

2. Prepayment Requirement for Out-of-Warranty Services
For any service or repair classified as not covered under warranty, a deposit of 20% of the total service fee is required before the service appointment. This deposit may be non-refundable if cancellation policies are applied.

3. Cancellation Notice Period

a) Under Warranty:
If a scheduled warranty service is cancelled less than 24 hours in advance, a cancellation fee of 20% of the equivalent service cost will be charged.
b) Cancellations made less than 12 hours before the service will incur a 40% fee of the equivalent service cost. This compensates for short-notice cancellations.

Out-of-Warranty:
If an out-of-warranty service is cancelled within 24 hours, a cancellation fee of 20% of the pre-agreed service fee will apply.
For cancellations made less than 12 hours before the scheduled visit, a 40% cancellation fee of the total service fee applies.

4. No-Show Policy

a) Under Warranty:
If the customer is unavailable for a warranty service visit without prior notice, a 40% fee based on the equivalent service cost will be charged. This covers time and preparations already undertaken.

b) Out-of-Warranty:
If the customer is unavailable for an out-of-warranty service without notice, a 40% no-show fee based on the total service fee will apply.

5. Rescheduling Policy

a) Under Warranty:
For rescheduling warranty services within 24 hours, a 20% rescheduling fee of the equivalent service cost may apply.
Rescheduling less than 12 hours in advance will incur a 40% fee of the equivalent service cost.

b) Out-of-Warranty:
Rescheduling requests for out-of-warranty services within 24 hours of the appointment will incur a 20% rescheduling fee.
For rescheduling less than 12 hours in advance, a 40% rescheduling fee of the total service fee applies.

6. Refunds for Prepaid Out-of-Warranty Services
For prepaid out-of-warranty services canceled more than 24 hours in advance, Sungrow will make its best efforts to reschedule. Refunds are not guaranteed unless specifically agreed upon.

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EXHIBIT B
SERIAL DEFECT

Term	Definition
Defect	Any material defect in design, manufacturing, materials or workmanship or damage (where the damage is caused by Sungrow or by any defect for which Sungrow or any of its Subcontractors is responsible) in or to the Equipment or any Part thereof, or any failure of the Equipment or any Part thereof to comply with the Technical Specifications, excluding in all cases (a) any of the foregoing attributable to or caused by ordinary wear and tear of the Equipment or any Part thereof and (b) any defects caused by auxiliary parts provided for in the Project.
Serial Defect	A Defect in a Major Component resulting from a similar failure mode or which otherwise could reasonably be expected to result from the same root cause is discovered prior to the expiration of the Serial Warranty Period for the Equipment in an aggregate number of such Major Components at the Project equal to or greater than the Serial Defect Threshold Number (Otherwise, for defects considered by the customer as serial defect, customer has the responsibility to prove failures having the similar mode).
Serial Warranty Period	Follow the duration of standard product warranty
Serial Defect Threshold	With respect to a Major Component, ten percent (10%) of the aggregate number of such Major Component originally installed at the Project within a rolling 12-month period or fifteen percent (15%) within a 24-month period, rounded up to the nearest whole number. This applies to projects with a capacity of 50MW or more.
Corrective action	(1) Root cause analysis: Conduct thorough root cause analysis of the serial defects to identify the underlying issues. (2) Design or manufacturing adjustments: Implement necessary design or manufacturing adjustments to ensure that future production does not result in the same defects. (3) Product recall/retrieval or on-site rectification: If there are serious safety concerns or if the serial defects cannot be resolved through repairs, product recall or rectification may be necessary. (4) Update maintenance manuals or training: Update maintenance manuals or provide training to ensure that maintenance personnel can promptly identify and address any serial defects. (5) Customer communication and response: Communicate promptly with customers regarding the status of serial defects and provide appropriate solutions to protect customer interests and trust. (6) Continuous monitoring and improvement: Establish continuous monitoring mechanisms to periodically assess product quality and performance and take necessary improvement measures to prevent similar serial defects from recurring.

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EXHIBIT C
SPARE PARTS WARRANTY

1. Warranty Period

- **Standard Warranty**: All spare parts are provided with a standard 12-month warranty, contingent upon adherence to the specified storage conditions outlined in this agreement. This warranty covers defects in materials and workmanship.

2. Storage Conditions and Compliance

- **Partitioned Storage**: Spare parts must be stored in designated areas based on their attributes, categories, specifications, and models. High-value and hazardous materials, such as PCBA components, modules, storage battery components, and chemicals, must be stored separately from other spare parts and marked accordingly.

3. Temperature and Humidity Requirements for Specific Spare Parts

- Different spare parts require specific storage environments to maintain warranty eligibility. Temperature and humidity requirements for each category are as follows:

Category	Temperature and humidity requirements for storage	Storage period	Remarks
Aluminum heat sink	Temperature: -20℃ ~ 60℃, humidity: 20% ~ 80%	24 months	The storage can be extended after reinspection at expiration
Wire and cable, breakers, switches, fuses	Temperature: -20-60℃, humidity: 20% ~ 80%	24 months	The storage can be extended after reinspection at expiration
Connectors	Temperature: -20℃ ~ 60℃, humidity: 20% ~ 80%	24 months	The storage can be extended after reinspection at expiration
PCBA	Temperature: -20℃ ~ 60℃, humidity: 30% ~ 60%	24 months	The storage can be extended after reinspection at expiration
Capacitors	Temperature: -20℃ ~ 60℃, humidity: 20% ~ 75%	24 months	The storage can be extended after reinspection at expiration
IGBT	Temperature: -20℃ ~ 60℃, humidity: 30% ~ 60%	24 months	The storage can be extended after reinspection at expiration
Transformers, reactors	Temperature: -20℃ ~ 60℃, humidity: 20% ~ 75%	24 months	The storage can be extended after reinspection at expiration
The whole machine finished product	Temperature: -20℃ ~ 60℃, humidity: ≤ 90%	24 months	The storage can be extended after reinspection at expiration
Screws, nuts, and gaskets	Temperature: -20℃ ~ 60℃, humidity: ≤ 90%	12 months	The storage can be extended after reinspection at expiration

4. Inspection and Evaluation Clause

- Sungrow shall conduct visual and basic electrical inspections of the stored spare parts upon expiration of the initial storage period to assess their condition. The results of this evaluation will be provided to the customer. The customer shall be responsible for covering the labor costs associated with this inspection.

5. Storage Condition Records

- End-users must maintain records of temperature and humidity in the storage environment to ensure compliance. Sungrow reserves the right to request these records as a condition for warranty eligibility.

6. Non-Compliance with Storage Conditions

- Failure to maintain and document storage conditions as specified may void the warranty. Specifically, if (1) the spare parts are still available and functional, the warranty remains valid; (2) if the spare parts are rendered unusable due to non-compliance with storage conditions, the warranty will be void. This applies to both standard and extended warranty terms, and any deviations from these conditions require prior written consent from Sungrow to avoid forfeiture of warranty coverage.

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SALES CONTRACT

ORIGINAL

Contact No. GY-KA-HGIS20250627003

The Seller: Chint Electric Co., Ltd.
Add: No. 1255 Wenhe Road, Songjiang District, Shanghai, 201614 PRChina
Tel: 021-67777777-89978 Email: xubaoj@chint.com

The Buyer: Red River Clean Energy, LLC on behalf of Blue Heron Solar, LLC
Add: 107 Spring Street, Seattle, WA 98104, United States of America Tel: (+l) 312-883-4846
Email: operations@concordnewenergy.com

The Sales Contract (the "Contract") is made between the Seller and the Buyer concerned on the basis of equality and mutual benefits. The terms and conditions are fully agreed by both parties as below:

I. Scope of Supply (the "Products"):

Item 序号	Description 产品名称	Type 型号	Qty. 数量	Unit 单位	Unit Price 单价	Total Amount 总价	Remark 备注
1	Circuit Breaker	362kV 2200A	3	set			
2	Freight		1	set			DAP Texas site. It shall be subject to the freight at the time of actual shipment.
3	Destination service fee	/	30	set			Including 1 person 30 days technical service, exceed part will cost USD 1500/person/day
4	5 years warranty	/	1	set			5 years warranty
4.1	Spare parts supply service		1	set			Replacement of spare parts due to quality issues within the warranty period

4.2	Guidance of installation and commissioning	/	1	set			On-site service caused by quality issues within the warranty period
5	**Total Amont&Total Amount** **产品总数量和总价**		**37**	**Set**			

10. Guarantee & Warranty

I 0.1 The Seller guarantees that the Products are brand new, unused, good quality with good workmanship and comply with the technical specifications. The Seller warrants the Products be free from defects of design, material, quality and workmanship for a period of 24 months after issuing the Arrival Acceptance Certificate. After the warranty period, the Seller shall still provide after-sales service and technical support and the Buyer shall bear the cost arising

therefrom.

The Seller guarantees that the delivered products will have normal performance within their service life under normal use and maintenance conditions, and that the products will not be scrapped due to design defects, production processes, material defects, quality control, etc.

10.2 Throughout the warranty period, the Buyer shall notify the Seller of defect within 5 days after discovery of the defect. The Seller shall provide a response to the Buyer within four (4) hours of receiving any such notification. If required, the Seller shall send service personnel to the Project Site within twelve (12) hours of receiving any such notification (the "Guaranteed Response Times"). The Seller shall, within reasonable period, repair the defect or replace the defect part with new part at its discretion. The Buyer shall give the Seller sufficient opportunity and full assistance to carry out such remedial work. Replaced parts shall become Seller's property.

10.3 The Seller shall have no responsibility for any defect, failure or non-compliance of the Products or any part thereof if there is any of the following events: (a) failure of the Buyer to comply with any of the Seller's operational or maintenance written guidelines, instructions or requirements; (b) improper use or installation; (c) physical abuse of the Products or any component or acts of vandalism by any persons other than Seller, its employees, agents or subcontractors; (d) alterations, modifications, additions, replacement or repairs made during the warranty period by anyone other than Seller, its employees, agents, subcontractors or personnel certified by the Seller; (e) accidents or damage resulting from fire, water, wind, hail, lightning, electrical surge or failure, earthquake, theft or similar causes not caused by or attributed to the negligence of Seller or its employees, agents, or subcontractors or (t) fair wear and tear. Seller shall provide and maintain a Warranty support contact capable of providing the Guaranteed Response Times that is located in the United States of America for the duration of the Warranty Period.

10.4 For all service and remedial work on the Products provided by Seller where such work shall require the Products to be de-energized, when such Products are connected to a photovoltaic generation Project, all service and work shall be performed during non-daylight hours, and when such Products are connected to a battery energy storage Project, all service and work shall be performed in scheduled coordination with the Buyer to minimize downtime for the Project during operational hours. Buyer shall not be responsible for any costs associated with this requirement. The forgoing requirement applies to non-emergency service and warranty work.

10.5 During the service life of the products, the Seller shall be liable for product liability issues including personal injuries and damages to other property except the product itself caused by the design defects, production workmanship, material defects, quality control of the Seller's products.

1. Introduction

The purpose of this document is to offer guidance on the scope of work and construction progress that **must be completed before the arrival of the Sungrow service engineer to commence the inverter commissioning.** This document is not a replacement for the installation manual or the operation manual. Detailed installation and operation procedures as well as the safety precautions as prescribed in the manuals shall be followed. Customers are encouraged to establish early contact with the Sungrow Service department at https://en.sungrowpower.com/service to coordinate the project schedule and facilitate the project commissioning process.

NOTE: Make sure you sign this sheet before submitting the commission request form.

2. Commissioning Phases

The commissioning process is divided into two parts. The cold commissioning and hot commissioning. During the cold commissioning, mechanical checks (Phase 1) and voltage checks (Phase 2). After cold commissioning, it's hot commissioning (Phase 3). The checklist document comprises the following checklists.

A. Phase 1: Cold Commissioning (mechanical checks) checklist
B. Phase 2: Cold Commissioning (DC/voltage checks) checklist
C. Phase 3: Hot commissioning checklist

Phase 1: Cold Commissioning (mechanical checks) Checklist

☐ All trenches around each inverter are backfilled.

☐ All aprons around each inverter are in place.

☐ Packaging removed (e.g., silica gel bags, dust seal tape on the outside, MVT packaging materials).

☐ Gland plate(s) installed, and conduits sealed.

☐ All load-bearing cushions meet the ground interface.

☐ All designated points for mounting are either welded or bolted per Suppliers drawings.

☐ Situation is not unsafe (e.g., standing water, open trenches).

☐ Shipping dust covers removed o Provided accessories installed.

☐ Sufficient and safe clearance access service areas.

☐ Exterior temporary safety labels removed.

☐ Check that there is no sign of leakage.

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☐ Grounding cables installed correctly. Check whether the grounding connection is done properly, and if the grounding resistance is less than 4Ω. **EPC or customer needs to provide the document.**

☐ Check the protective device for the Pressure Relief Valve is removed.

☐ Make sure the pressure is released as shown in the pressure requirement of the user manual.

Phase 2: Cold Commissioning (DC/voltage checks) Checklist

☐ All string-level VOC & polarity checks are completed.

☐ A team of at least two is needed from the EPC to turn combiner boxes on & off during DC checks performed by Sungrow.

☐ All string-level fuses are engaged up to the combiner or disconnect box.

☐ All DC feeders are landed at the inverter.

☐ All DC fuses are installed in the correct location based on the DC feeder directly in line with each fuse.

☐ Must have a complete list of protection parameters.

☐ Must have a complete list of IP addresses, subnet, & gateway.

☐ If any or all inverters are going to be derated. If yes, list them: _____

On behalf of the customer (to be filled on or thereabout the date pre-commissioning is complete and transmitted to Sungrow)

Name:

Customer's representative:

Customer's representative is EPC/Self

Signature:

Date:

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Phase 3: Hot Commissioning Checklist

☐ Must have AC back feed with AC present at each MVT that is connected to each inverter.

☐ Must have permission from the utility company to push power.

☐ All personnel must be removed from the array in active commissioning areas for safety reasons.

☐ All string fuses installed in all combiners.

☐ If trackers are not commissioned, they must be in the 12 o'clock position to allow for as much irradiance as possible.

☐ MVT, if provided by Sungrow, is recommended to be soaked for 24hrs via back feed from the sub-station.

☐ All MV cabling needs to be torqued.

☐ Phase sequence and line-to-line voltage of the AC terminals correct.

☐ PCS auxiliary power connections ready (torqued, phase rotation correct, etc.) up until the terminal blocks of the product electrical interface.

☐ PCS communications connections ready (connected, correct terminals or pinouts, communications tested from outside device to electrical interface).

☐ Terminal connections to busbars/terminals torqued and marked

☐ Surge protection devices, cartridges, and fuses are not tripped o Transformer indicators are visible and easily accessible (not occluded by site installation materials or incorrectly mounting of the Local Controller) o

☐ Tap-changer position has been set by the EPC and matches the position shown on the load flow study7.

☐ MV transformer bushings clean

On behalf of the customer (to be filled on or thereabout the date pre-commissioning is complete and transmitted to Sungrow)

Name:

Customer's representative:

Customer's representative is EPC/Self

Signature:

Date:

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Project Name:	Customer:
PM contact info: Name: Email: Cell:	
Project Address	

Serial Number/Manufacturer info:

SG4400UD Skid SN: Click or tap here to enter text.

SG1100UD SN: Click or tap here to enter text.

Transformer SN: Click or tap here to enter text.

The purpose of this document is to offer guidance to the scope of work and construction progress that needs to be completed prior to the arrival of Sungrow service engineer to commence the inverter commissioning. This document is not a replacement of the installation manual or the operation manual. Detailed installation and operation procedures as well as the safety precautions as prescribed in the manuals shall be followed.

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1. Introduction

This manual gives a brief introduction of the SG4400UD-MV commissioning procedure, and the commissioning personnel shall be qualified and have relevant skills.

1.1. Symbol Explanations

This manual contains important safety and operational instructions that must be accurately understood and respected during the installation and maintenance of the equipment.

> ⚠ WARNING
> **WARNING** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

> **NOTICE**
> NOTICE indicates a situation which, if not avoided, could result in equipment or property damage.

> NOTE indicates additional information, emphasized contents or tips to help you solve problems or save time.

The symbols below may be present on the electrical parts of the station. Make sure to read the following symbols and fully understand them before installing the equipment.

Symbol	Explanation
	Lethal voltage inside! Do not touch!
	Hot surface! Do not touch the hot surface of the device.
	Protective earth. Grounding securely to ensure personal safety.

1.2. Requirements for Commissioning Personnel

- The personnel engaged in site commissioning shall have no physical or visual impairments. They shall be trained, tested, and qualified and deemed electrically competent.
- All commissioning personnel shall obey the unified arrangement and unified management of the person in overall charge. During commissioning, at least two persons should be arranged for commissioning operation: one is responsible for commissioning operation and the other for supervision.
- The commissioning engineer shall be fully aware of all emergency procedures and must confirm these with site manager prior to start.
- During commissioning, the commissioning personnel shall operate in strict accordance with the commissioning steps for each process and shall not proceed to the next process before the previous commissioning process is accepted. Operation against rules is strictly forbidden. The site commissioning

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personnel shall always focus on their own tasks. All components are treated to be "live" before they are confirmed to be "not live".

- Before commissioning, the commissioning personnel shall carefully check all tools have been appropriately tested and calibrated. Serial numbers and calibration dates must be recorded. All appropriate PPE shall always be worn.

1.3 Requirements for Commissioning Tools

Tool Name	Specification	Quantity
Digital multimeter	1500V or plus	1
Walkie talkie		Several
Tool box	All necessary tools	Several
Insulated Torque wrench	0.7-70 Nm	1
FR clothing, insulated shoes and protective gloves (PPE)	Accord to local regulation	Several
PC with Ethernet cable		1 set

Note: To ensure the commissioning work goes smoothly, the quantity of the tools and appliances can be increased or reduced in time according to the site requirements.

Tightening Torques

Screw size is based on thread diameter. Example M3 equals to 3mm thread diameter.		
Screw size	**Torque (N.m)**	**Torque (lbf.inch)**
M3	0.7~1	6.195~8.85
M4	1.8~2.4	15.93~21.24
M5	4~4.8	35.4~42.48
M6	7~8	61.95~70.8
M8	18~23	159.3~203.55
M10	34~40	300.9~354
M12	60~70	531~619.5
M16	119~140	1053.15~1239

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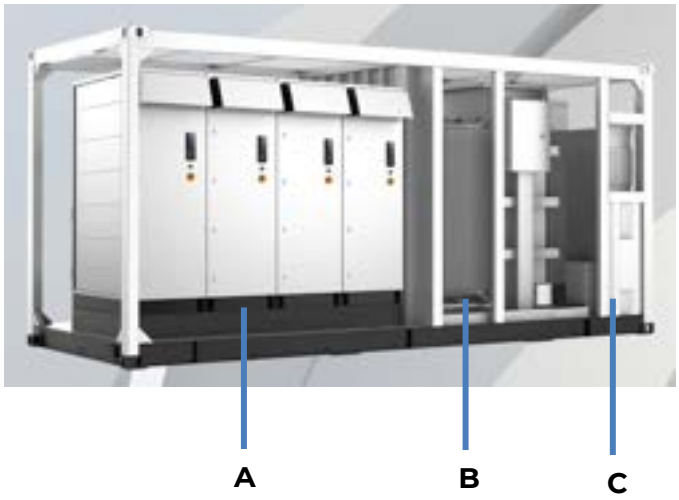
SG4400UD-MV Station



A	**Inverters (All four SG1100UD)**
B	Medium Voltage Transformer (MVT)
C	Auxiliary Cabinet

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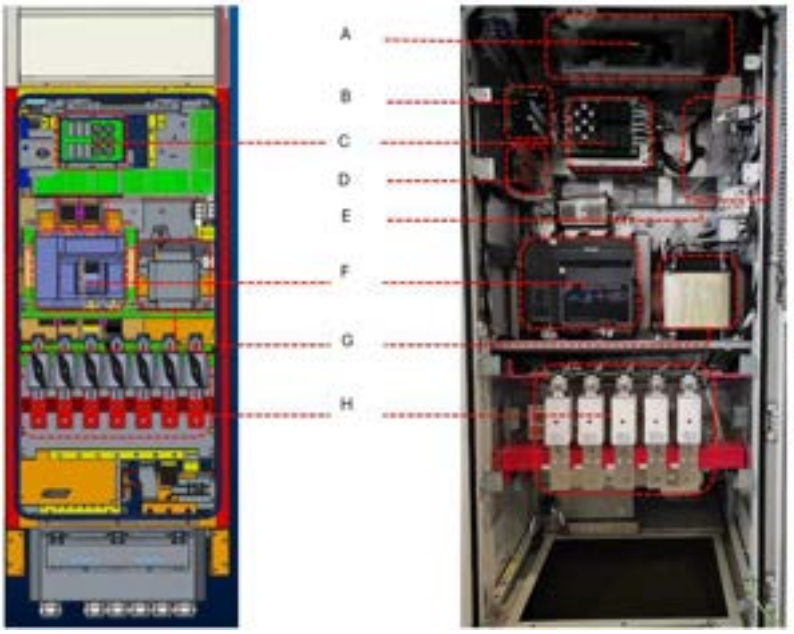
SG1100UD Inverter Units:

Cold Commissioning checks must be done on all 4 SG1100UD units individually. (Showing 1 SG1100UD Unit).

Everything downstream and upstream from the Medium Voltage Transformer has been deenergized, the LOTO shall be on according to site LOTO Procedures and is in accordance with the Sungrow PV LOTO customer guidance document ASD-1852.



No	Name	Description
A	DC fan	DC cabinet Air Circulation
B	PQ Cap Board	Temp Power Supply for PE board
C	PE and PE1	Power Supply for PCBs, Fans, and Load Switches
D	PZ Discharge Board	Drains DC caps when unit is powered off.
E	GFDI Circuit	Ground fault Detector Circuit
F	DC Switch (QS1)	Opens and Closes DC branch circuits to Inverter internals.
G	Power supply transformer	Steps down 645VAC power to lower voltages for inverter auxiliary use.
H	DC Bus Bar and Fuse	Where DC PV Branch Circuits Terminate

Figure 1: SG1100UD DC Side

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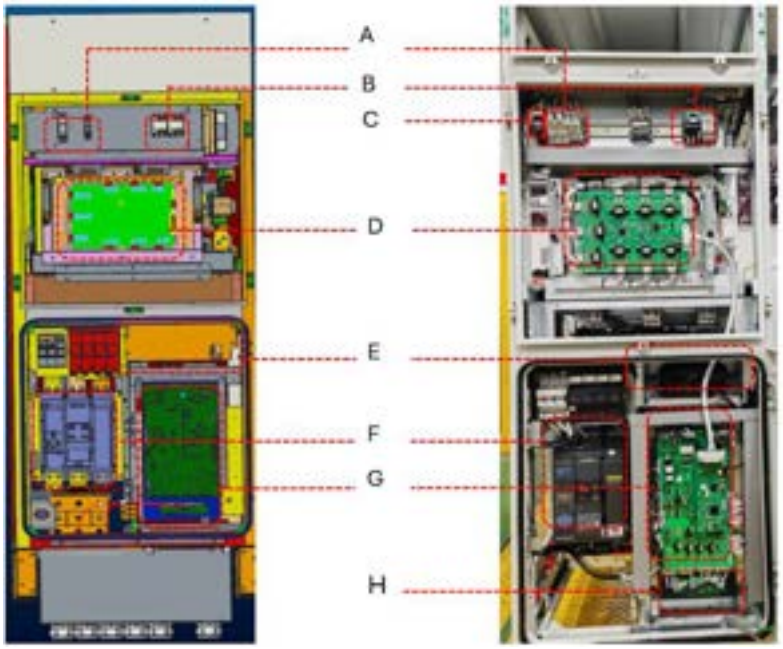

No	Name	Description
A	FU#	Fuse Terminal Blocks
B	SVG circuit contactor	Controls SVG Circuit (Optional)
C	KA1	Emergency Stop Relay
D	Driver board	Drives IGBT in Powerstack
E	AC side fan	Circulates Air In AC Cabinet
F	AC circuit breaker (QF1)	Control the on/off for the AC side circuits of the inverter.
G	PA and PD	Sensing, Controls, Communications etc.
H	PW	Unit to Unit Communications

Figure 2: SG1100UD AC Side

Each SG1100UD inverter must go through its own cold commissioning check which includes all of the points below. Record concerns and dictate which specific units may have issues as they are found. Check the boxes below to confirm that Each unit has undergone the full commissioning check:

Unit 1	Unit 2	Unit 3	Unit 4
☒	☐	☐	☐

Sr.no.	Technical Item	Requirements	Done	Comments
1	General visual check	Check that all external surfaces of enclosures are clean and neat, free from paint peeling, rust, abnormal dents (diameter larger than 50mm), deformation. **Ensure the Desiccant bags are removed.**	Click or tap to enter a date.	
2	DC Cabling	Check DC branch circuits and the presence of torque marks, flat and spring washers.	Click or tap to enter a date.	

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3	Pressure Relief Gate	Make sure to take out the screws of the pressure relief panel located at the bottom of each unit. Take out the two black panels at the bottom from the DC side to see the pressure relief gate. After removing the two screws, push the pressure relief panel to make it fixed firmly in those three metal clips. 	Click or tap to enter a date.	
4	Fan Inlet Screw	Remove the screw in the middle of the fan inlet screen. 	Click or tap to enter a date.	
5	Door Functionality	Ensure all exterior door locks are working and the seals for the doors are in good condition.	Click or tap to enter a date.	
6	AC/DC Switch	Ensure the AC circuit breaker QF1 and the DC Load Switch QS1 are in the open position.	Click or tap to enter a date.	
7	Conduit Entrances	Verify the DC feeder conduit is filled with sealing foam into the gap of DC conduit/pipes to prevent rodents.	Click or tap to enter a date.	

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<table>
<tr>
<td>8</td>
<td>Internal Connections</td>
<td>Remove all the panels and confirm the following boards are present and without damages. The following boards and components are listed as follows: (Refer to Figure 1 and 2 above for component identification)
<table>
<tr><td>PA Board</td><td>☐</td></tr>
<tr><td>PD Board</td><td>☐</td></tr>
<tr><td>PW Board</td><td>☐</td></tr>
<tr><td>PQ Board</td><td>☐</td></tr>
<tr><td>PZ Board</td><td>☐</td></tr>
<tr><td>PE Board</td><td>☐</td></tr>
<tr><td>PE 1 Board</td><td>☐</td></tr>
<tr><td>PH Board (behind front door)</td><td>☐</td></tr>
<tr><td>GFDI Circuit</td><td>☐</td></tr>
<tr><td>PN1 -DC SPD</td><td>☐</td></tr>
<tr><td>PN2 – AC SPD (Inverter unit 1 only)</td><td>☐</td></tr>
<tr><td>SW1 Smoke Detector</td><td>☐</td></tr>
<tr><td>SQ1 Door Switch</td><td>☐</td></tr>
</table>
</td>
<td>Click or tap to enter a date.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>QF2 Breaker</td>
<td>Make sure that QF2 is in the on position. QF2 is in the DC access cabinet of the SG1100UD directly above the T1 transformer.
 </td>
<td>Click or tap to enter a date.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>T1 Transformer</td>
<td>Check all cable connections coming in and out of the T1 transformer in the DC access cabinet.</td>
<td>Click or tap to enter a date.</td>
<td></td>
</tr>
</table>

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11	DIP Switches	Confirm correct DIP switches for PA, PD, and PW boards are all correct based on UNIT designation. SG1100UD Unit 1 is closest to the MVT transformer. From there it is consecutive moving outward to Unit 2, 3, and 4. PA board DIP setting Model / Unit / Inverter unit address setting (DIP 1, DIP 2) / Master-slave number setting (DIP 3, DIP 4) SG4400UD: Unit 1 OFF OFF OFF ON; Unit 2 ON OFF OFF OFF; Unit 3 OFF ON OFF OFF; Unit 4 ON ON OFF OFF PD board DIP setting Model / Unit / SW1 (CANB) / SW2 (CANA) SG4400UD: Unit 1 ON OFF; Unit 2 OFF OFF; Unit 3 OFF OFF; Unit 4 ON ON PW1 board DIP setting Model / Unit / SW1 / SW2 SG4400UD: Unit 1 ON ON; Unit 2 OFF OFF; Unit 3 OFF OFF; Unit 4 ON OFF	Click or tap to enter a date.	
12	Emergency Stop Button	Confirm that the E-Stop button key fits into the E-Stop keyhole and that the button can be closed and re-opened correctly.	Click or tap to enter a date.	
13	DC Branch Fuse Check	Check all DC input cables/fuses and verify torque marks (cables should not have awkward bends or pinches). DO NOT RETORQUE input cables, report any issues (Actual pictures may differ). 	Click or tap to enter a date.	

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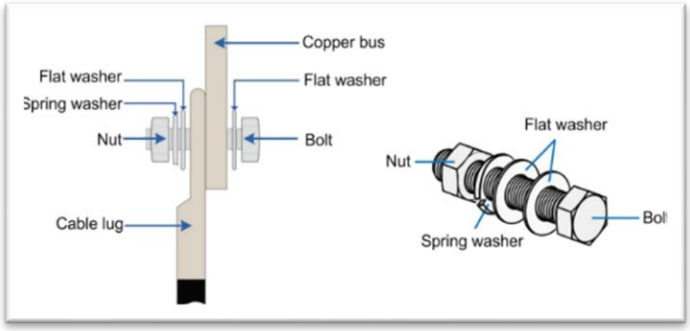
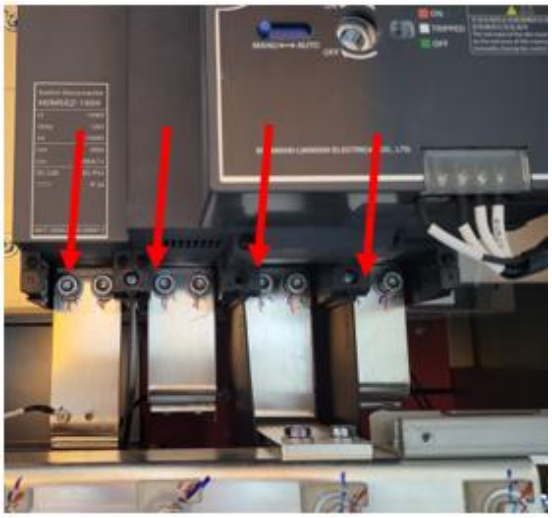
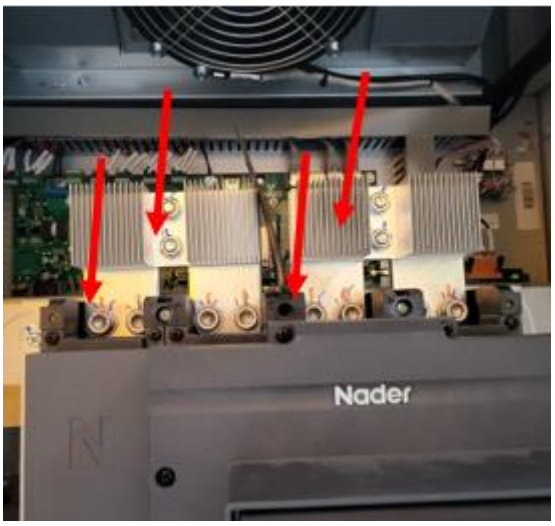
14	DC Branch Circuit Cables	Verify all hardware is present and all DC PV branch circuits are torqued appropriately. 	Click or tap to enter a date.	
15	Desiccant Packs	Verify site installer has removed desiccant packs and protective tape from vents.	Click or tap to enter a date.	
15	DC Switch	Visually check torque marks aligned on DC breakers and busbars. (Actual Pictures may differ)  	Click or tap to enter a date.	

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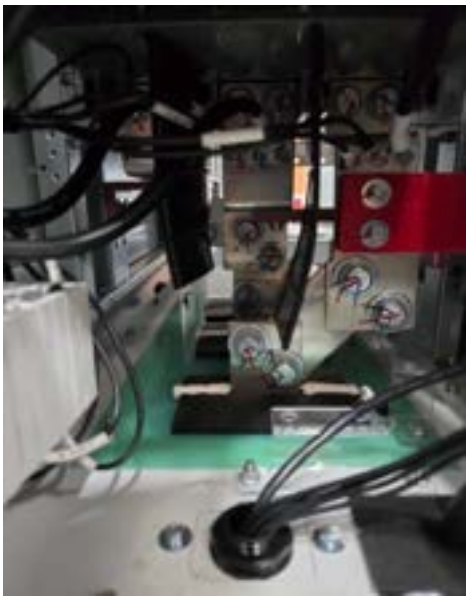
16	AC Circuit Breaker	Verify the bottom bus bars on the AC Circuit Breakers are secured and aligned with torque marks. Fix the 2 rubber insulators as needed. 	Click or tap to enter a date.	
17	Power Stack	Verify all 18 power stack bolts in the DC cabinet are torqued down and present. 	Click or tap to enter a date.	
18	Grounding Cable	Ensure ground cable exist from inverter doors to inverter frame, and from inverter frame to skid		

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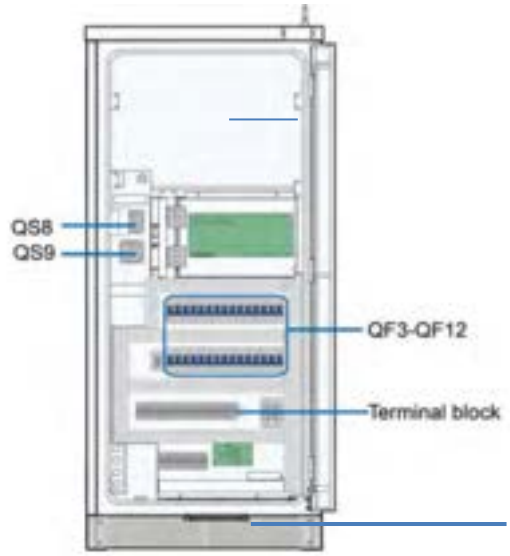
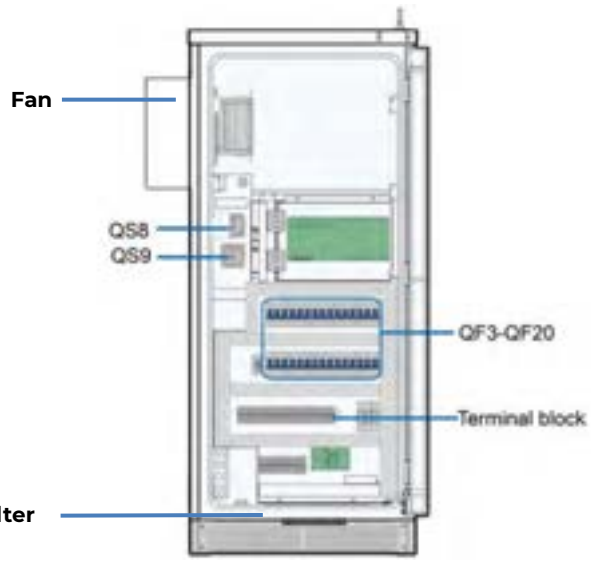
Auxiliary Cabinet: Cabinet difference (Fan and extra QF breakers present)

Everything downstream and upstream from the Medium Voltage Transformer has been deenergized, the LOTO shall be on according to site LOTO Procedures and is in accordance with the Sungrow PV LOTO customer guidance document ASD-1852.



Note: 5KVA Aux Cabinet



Note: 40KVA Aux Cabinet

To access the PT board you must remove the middle dead stop. To access the PT board and the PE3 board you must remove the middle Aux cabinet dead stop, remove the 2 PT gate screws, and open the PT gate on its hinges.

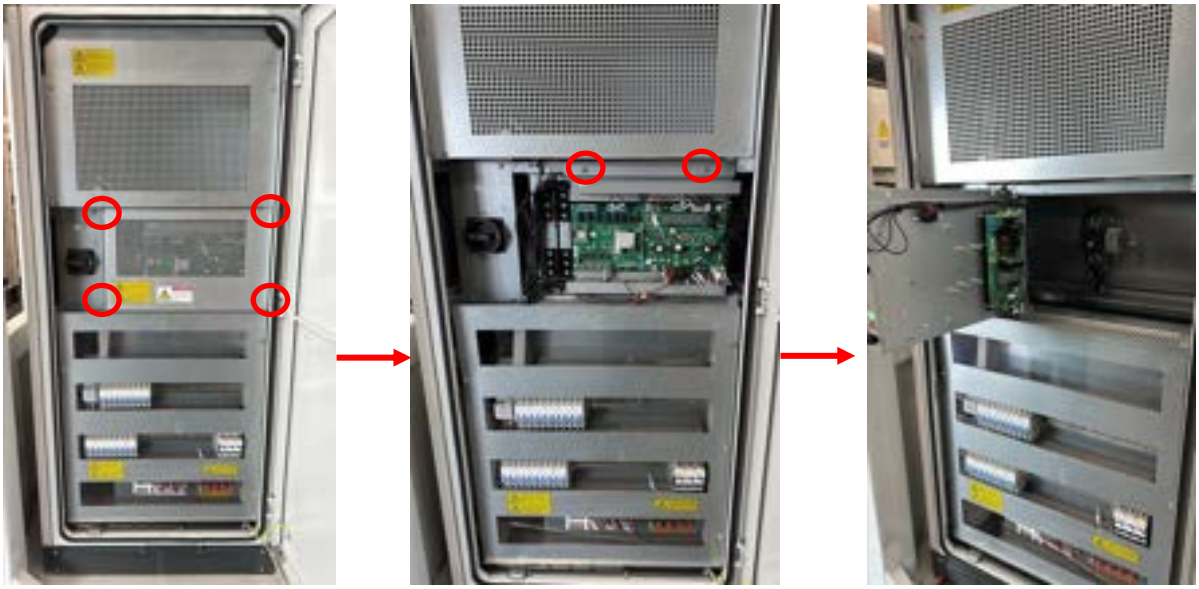


Figure 3: PT Board Dead Stop and Opening PT Gate

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Sr.no.	Technical Item	Requirements	Done	Comments
1	General Visual check	No obvious appearance defect or scratches and if it has been installed well.	Click or tap to enter a date.	
2	Cabling	Check SCADA communication cable to net port #1 is connected well.	Click or tap to enter a date.	
3	Internal Connections	Verify all the following boards and components are present and without damage. The following boards and components must have all their connections. check: **PT Board** ☐ **PE3 Board** ☐ **120V Outlet** ☐ **PN3 AC SPD** ☐ **All AC Circuit Breakers** ☐ The PE3 Board is located directly behind the PT board. The gate screws must be removed to access it.	Click or tap to enter a date.	
4	Air Filter	Remove the air filter at the bottom of the Aux cabinet	Click or tap to enter a date.	
5	Conduit Sealing	Verify the conduit is sealed with foam/sealing.	Click or tap to enter a date.	

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Medium Voltage Transformer (MVT)

Everything downstream and upstream from the Medium Voltage Transformer has been deenergized, the LOTO shall be on according to site LOTO Procedures and is in accordance with the Sungrow PV LOTO customer guidance document ASD-1852.

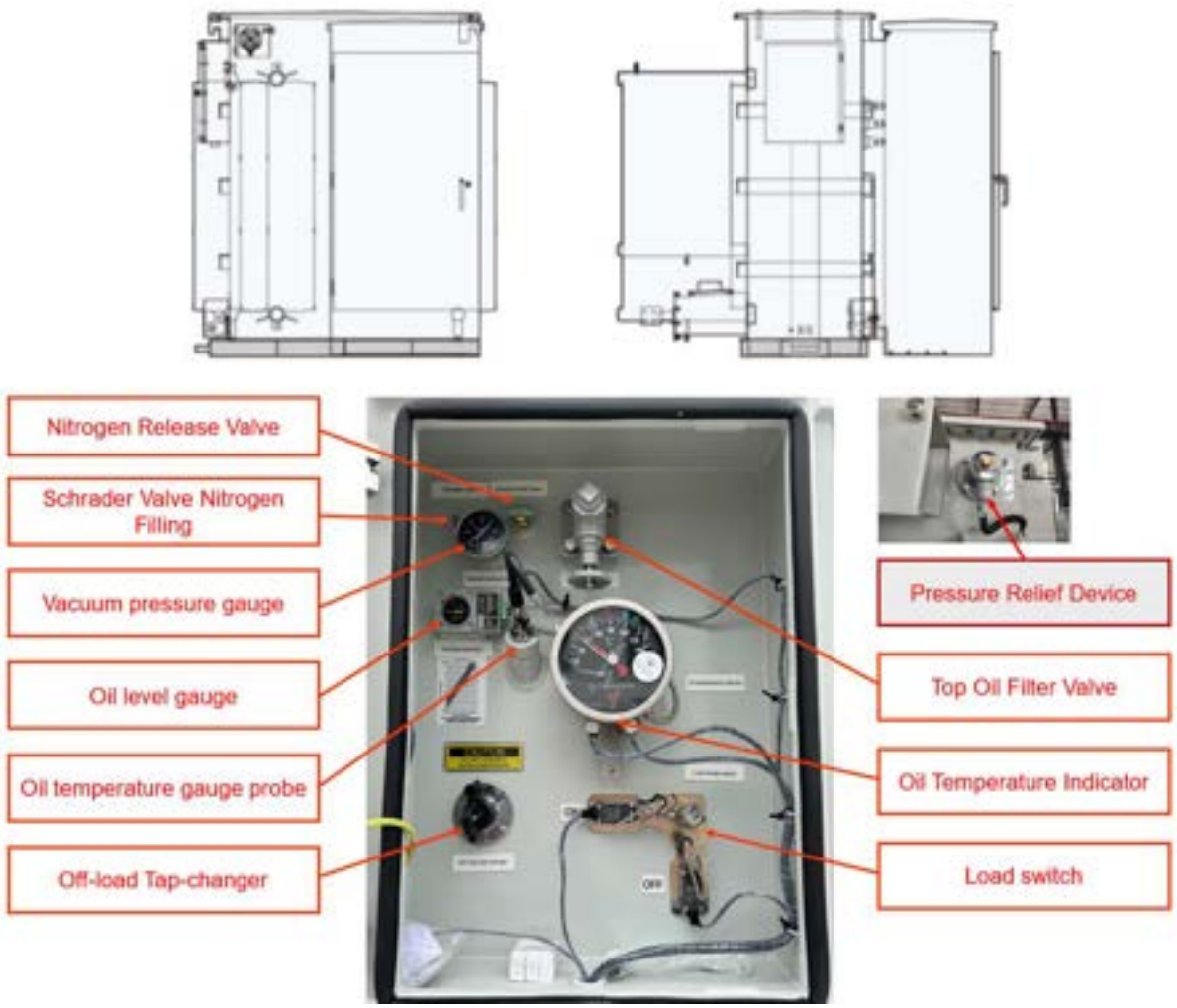

Figure 4: Transformer Component Reference (Eagle Rise)

Sr.no.	Technical Item	Requirements	Done	Comments
1	General Visual check	No appearance defects or scratches and check if it has been installed well.	Click or tap to enter a date.	

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<table>
<tr>
<td>3</td>
<td>Leakage Check</td>
<td>Confirm all the components below are free of any current oil leaks or signs of previous oil leaks: (Refer to Figure 3 for component identification)
<table>
<tr><td>Load Switch</td><td>☐</td></tr>
<tr><td>Off-Load Tap Changer</td><td>☐</td></tr>
<tr><td>Pressure Gauge</td><td>☐</td></tr>
<tr><td>Oil Temperature Probe</td><td>☐</td></tr>
<tr><td>Emergency Pressure Relief Devices</td><td>☐</td></tr>
<tr><td>Nitrogen Relief Valve</td><td>☐</td></tr>
<tr><td>HV Bushing</td><td>☐</td></tr>
<tr><td>LV Bushing Drip Pan</td><td>☐</td></tr>
<tr><td>Nitrogen Schrader Valve</td><td>☐</td></tr>
<tr><td>Oil Level Gauge</td><td>☐</td></tr>
<tr><td>Bottom Oil Drain Valve</td><td>☐</td></tr>
<tr><td>Top Oil Filter Valve</td><td>☐</td></tr>
<tr><td>Welding Seams</td><td>☐</td></tr>
<tr><td>Radiator Fins</td><td>☐</td></tr>
</table>
</td>
<td>Click or tap to enter a date.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Emergency Pressure Release Device</td>
<td>Remove the safety lock that ships on the emergency pressure relief device. This is

essential for functionality.
The emergency pressure relief device may be in the transformer access cabinet, or in its own access box on the side of the transformer.</td>
<td>Click or tap to enter a date.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>HV Cables</td>
<td>Confirm all HV cables are supported by the cable support clamps and that the conduits are sealed with foam or sealant.</td>
<td>Click or tap to enter a date.</td>
<td></td>
</tr>
</table>

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4	Oil Level Gauge	Verify oil is at a normal level	Click or tap to enter a date.	
5.	Oil Thermometer	Verify the oil temperature is close to ambient temperature. Remove the shipping styrofoam that is placed inside the temperature gauge during transportation.	Click or tap to enter a date.	
6	Nitrogen Release Process	Use the manual pressure relief device and the pressure gauge in the access cabinet to adjust the internal transformer pressure. The internal pressure will be based on the ambient oil temperature. | #	When the oil temperature is	the pressure shall be adjusted to
---	---	---
1.	20 ℃ or less	zero
2.	25 ℃	0 ~ 0.5 psig (PRESS)
3.	30 ℃	0.5 ~ 1.0 psig (PRESS)
4.	35 ℃	1.0 ~ 1.5 psig (PRESS)
5.	40 ℃	1.5 ~ 2. 0 psig (PRESS)
6.	45 ℃	2.0 ~ 2. 5 psig (PRESS)
7.	50 ℃	2.5 ~ 3.0 psig (PRESS) | 	Click or tap to enter a date.	
7	Radiator Fins	Inspect for any obstructions that may block air flow between the fins.	Click or tap to enter a date.	

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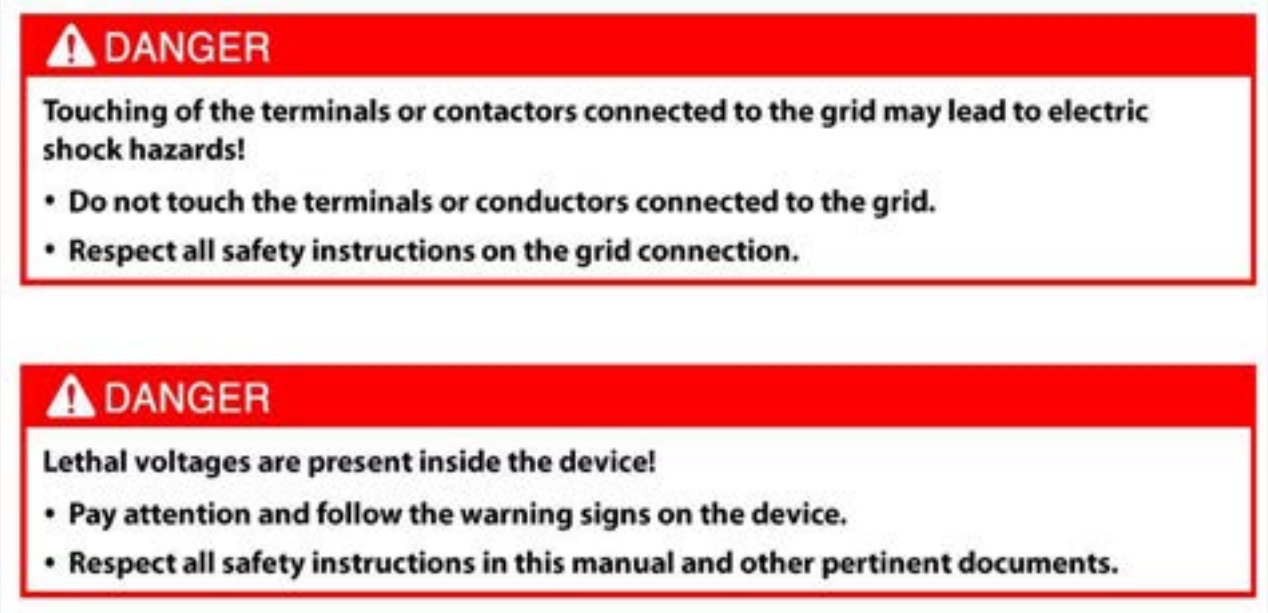
Hot Commissioning



STEPS	Operating Instructions	DONE	COMMENTS
	Precondition for Hot Commissioning.		

Before powering on the equipment, check the following items carefully.

- The EPC or site owner shall make sure everyone shall be outside the PV site when MVT is being energized
- 24 hours Medium Voltage transformer soak has been completed.
- Check whether the protective covers inside the equipment are installed correctly.
- Check whether the emergency stop button is released.
- Check and ensure that no tools or components are left inside the equipment.
- Inform the people in the area when the equipment is about to be energized.
- Everything downstream from the Medium Voltage Transformer has been deenergized, the LOTO shall be on according to site LOTO Procedures and is in accordance with the Sungrow PV LOTO customer guidance document ASD-1852.
- Ensure EPC doesn't have reversed DC polarity and ensure DC input voltages do not exceed 1500Vdc when installing the inverter onsite.

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DC Voltage Checks and Open Loop Test – Must be performed on each individual SG1100UD

ALL PROPER PPE SHALL BE WORN DURING THE ENTIRETY OF THE HOT COMMISSIONING PROCESS

Before energizing any circuits:
Confirm that all DC, AC, and AUX switches on the inverters are disconnected and in the off position, namely SA1, QS1, QF1, QS2.

Confirm that CATIV PPE is in accordance with the required incident energy rating sticker on the unit undergoing commissioning.

⚠ WARNING

- DC side voltage should be no more than the inverter 1500 VDC input DC voltage. Too high DC voltage may damage the inverter and cause a safety issue.
- If more than one DC input is turned on at once a short circuit potential is possible. Only test one DC input at a time and verify 0Vdc before proceeding to the next box.

1. Remove the LOTO devices on the QF1 AC circuit breaker. Close the DC Load switch QS1, the AC maintenance switch QS2, and the DC Knob Switch SA1, and the QS9 auxiliary switch in the auxiliary cabinet of the SG4400UD. Close all the doors.
2. Connect PC to net port #1 through Ethernet cable and close the Auxiliary Cabinet door.
3. Remove the LOTO device to close all DC combiner boxes for each SG1100UD unit in the field to bring voltage into the SG1100UD units.
4. Connect the UMCG Web Portal and go to "**Device Monitoring**". Perform firmware upgrades based on request. Contact site field supervisor to confirm the operation.
5. Ensure that the "Access Protection Enabling" parameter value is set to disabled or "close" on the Web page. **Device Monitoring → Protection Parameters**
6. Click on the drop-down option next to "SG4400UD" to reveal SG1100UD Units 1-4. Select unit 1 and go to "**Real Time Values**". Observe and record the incoming DC voltage. Do the same for inverter unit 2-4. Check for the reverse polarity/GFDI faults.
7. Perform Open Loop test according to **SG4400UD Open Loop MOP. Refer to the SG4400UD-MV Open Loop MOP** Document ID: **ASD-1644.** After the Open Loop test, key-stop the inverter.
8. If site has automatic DC load switch, put on PPE according to the site's DC incident energy and switch from manual to automatic.
9. If you move on directly to the AC voltage checking, leave combiner boxes, QS2 switches, and QS1 switches closed from the Open Loop Test. Reset all parameters to normal grid tied mode as document (SG4400UD-MV Open Loop MOP ASD-1644) instructs and leave the unit in a key stopped state.

    a. If AC voltage testing is not being performed next be sure to open and LOTO the DC combiners that were closed. **Use PPE** to confirm de-energized state of the SG1100UD DC bus bars and Caps using FU23 and 24 and the bus bars above

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the DC load switch. Open the DC switch QS1 and open all QS2 switches so the unit can sit in a completely de-energized state and is fully LOTO'd according to site procedures.

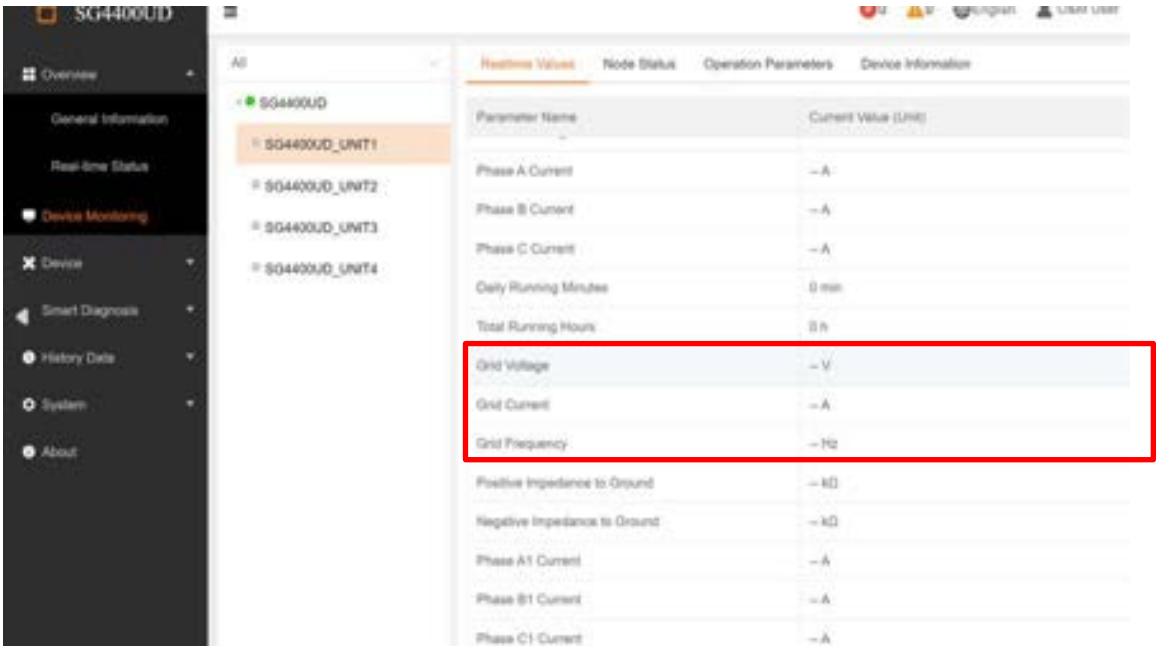
AC Voltage Checks and Gradual Power Limits Testing.

ALL PROPER PPE SHALL BE WORN DURING THE ENTIRETY OF THE HOT COMMISSIONING PROCESS

If performing AC voltage check straight from a de-energized state, follow the below instructions first:

1. Close QS2 maintenance switches in all SG1100UD inverters and close the QS9 Auxiliary switch in the auxiliary cabinet.
2. Manually Close the QS1 DC load switch in all SG1100UD inverters
3. Turn the SA1 DC controls switch on the front of all SG1100UD inverters to the "ON" Position,
4. Close all DC combiners to the SG4400UD inverter

1. If coming straight from the Open Loop Testing: Confirm the SG4400UD is in a key stopped state. Then, have the site operators remove the LOTO devices and close the MVT transformer load switch to energize the LV bus.
2. Confirm the Grid Voltage is at 645VAC (± 10%).



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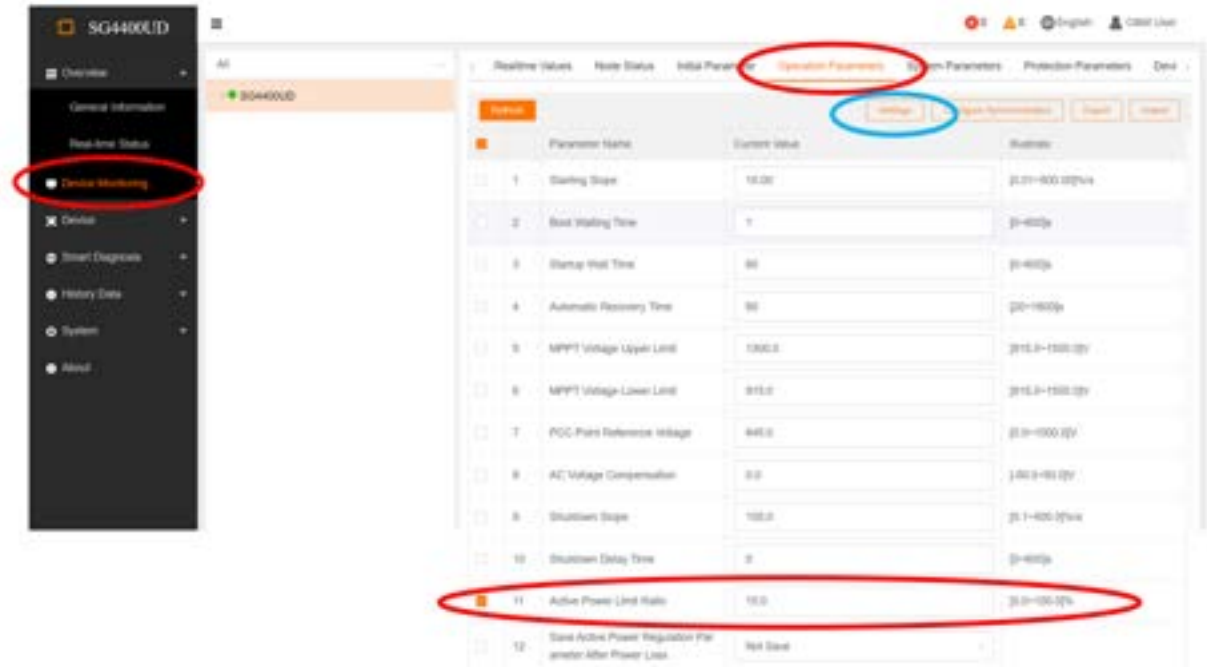
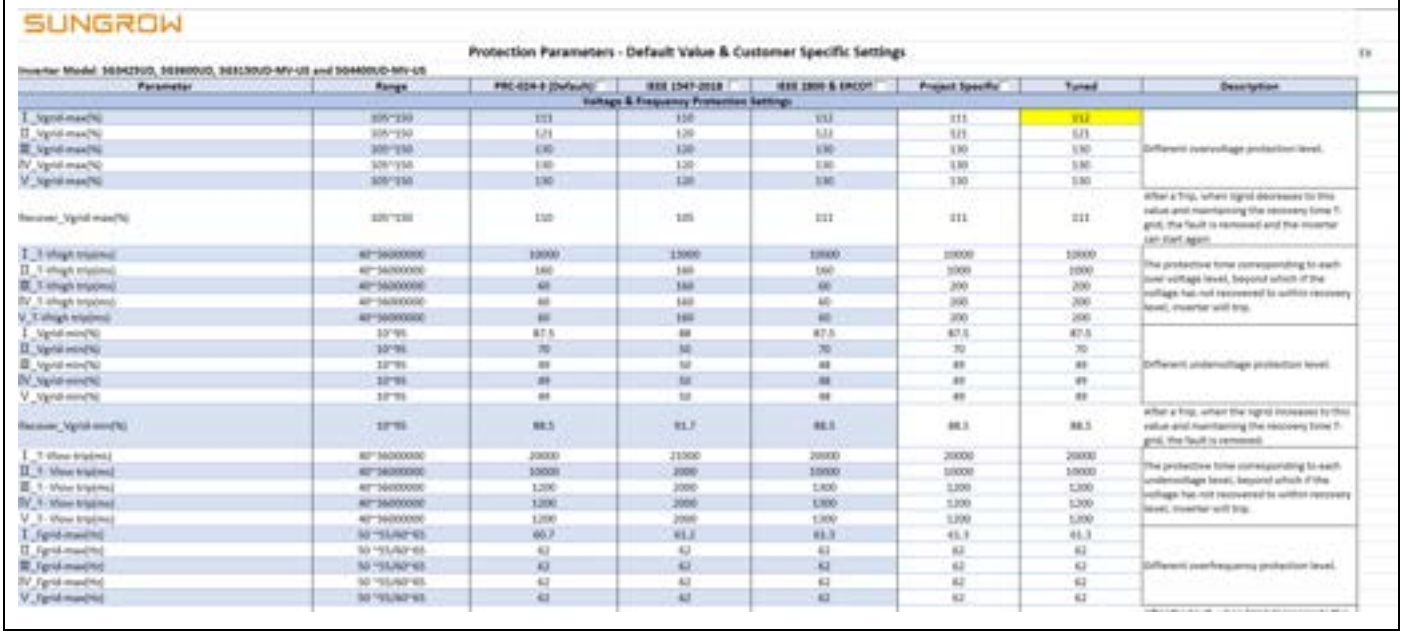
3. Lower the output power to 10% by going to operation parameters, going to the UMCG web portal, selecting the "**Device Monitoring**" tab, selecting "**Operation Parameters**", and scrolling to entry 11 "**Active Power Limit Ratio"** and changing the value to 10%**.** To implement the change you must click on the check box by entry 11 and click on the "**Setting**" box highlighted in blue.



4. Verify the date and time are correctly displayed in the UMCG web Portal.

5. Ensure that the Protection parameters shared by the Sungrow project management team and field service team are all set as required by the site requirements. **Note**: If the protection parameters are not provided, please reach out to Sungrow field service supervisor for further clarification.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Protection Parameters - Default Value & Customer Specific Settings

Parameter	Range	PRC-024-3 (Default)	IEEE 1547-2018	IEEE 1699 & IEC/TS	Project Specific	Tuned	Description
Voltage & Frequency Protection Settings							
I_Vgrid-max(%)	105~150	121	120	121	121	112	Different overvoltage protection level.
II_Vgrid-max(%)	105~150	121	120	121	121	121	
III_Vgrid-max(%)	105~150	130	120	130	130	130	
IV_Vgrid-max(%)	105~150	130	120	130	130	130	
V_Vgrid-max(%)	105~150	130	120	130	130	130	
Recover_Vgrid-max(%)	105~150	110	105	111	111	111	After a Trip, when Vgrid decreases to this value and maintaining the recovery time T-grid, the fault is removed and the inverter can start again.
I_T-Vhigh trip(ms)	40~36000000	10000	13000	10000	10000	10000	The protective time corresponding to each over voltage level, beyond which if the voltage has not recovered to within recovery level, inverter will trip.
II_T-Vhigh trip(ms)	40~36000000	160	160	160	1000	1000	
III_T-Vhigh trip(ms)	40~36000000	60	160	60	200	200	
IV_T-Vhigh trip(ms)	40~36000000	60	160	60	200	200	
V_T-Vhigh trip(ms)	40~36000000	60	160	60	200	200	
I_Vgrid-min(%)	10~95	87.5	88	87.5	87.5	87.5	Different undervoltage protection level.
II_Vgrid-min(%)	10~95	70	50	70	70	70	
III_Vgrid-min(%)	10~95	88	50	88	88	88	
IV_Vgrid-min(%)	10~95	88	50	88	88	88	
V_Vgrid-min(%)	10~95	88	50	88	88	88	
Recover_Vgrid-min(%)	10~95	88.5	91.7	88.5	88.5	88.5	After a trip, when the Vgrid increases to this value and maintaining the recovery time T-grid, the fault is removed.
I_T-Vlow trip(ms)	40~36000000	20000	21000	20000	20000	20000	The protective time corresponding to each undervoltage level, beyond which if the voltage has not recovered to within recovery level, inverter will trip.
II_T-Vlow trip(ms)	40~36000000	10000	2000	10000	10000	10000	
III_T-Vlow trip(ms)	40~36000000	1200	2000	1400	1200	1200	
IV_T-Vlow trip(ms)	40~36000000	1200	2000	1300	1200	1200	
V_T-Vlow trip(ms)	40~36000000	1200	2000	1300	1200	1200	
I_Fgrid-max(Hz)	50~55/60~65	60.7	61.2	61.3	61.3	61.3	Different overfrequency protection level.
II_Fgrid-max(Hz)	50~55/60~65	62	62	62	62	62	
III_Fgrid-max(Hz)	50~55/60~65	62	62	62	62	62	
IV_Fgrid-max(Hz)	50~55/60~65	62	62	62	62	62	
V_Fgrid-max(Hz)	50~55/60~65	62	62	62	62	62	

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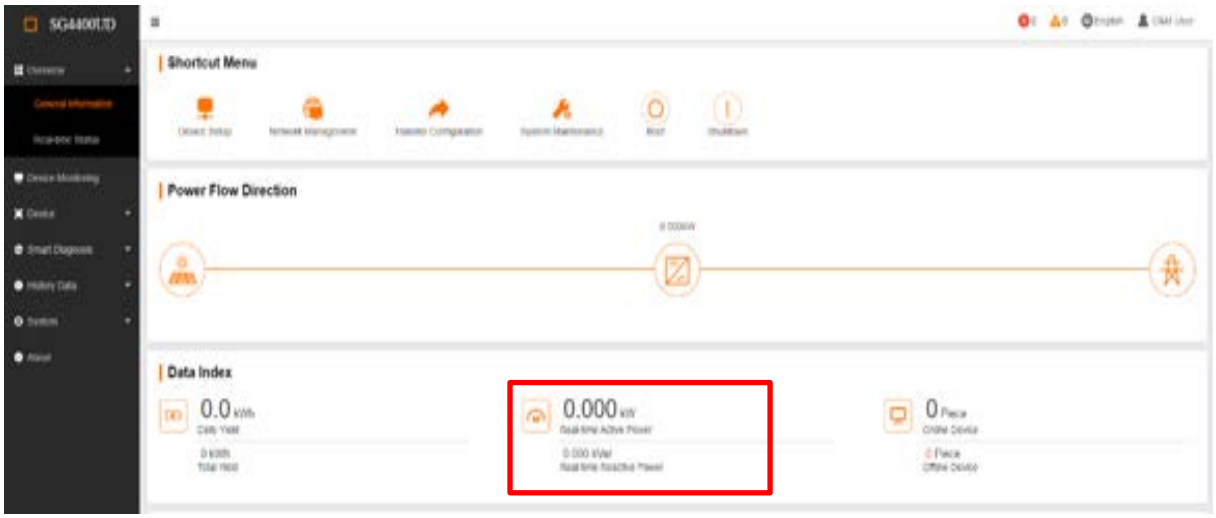
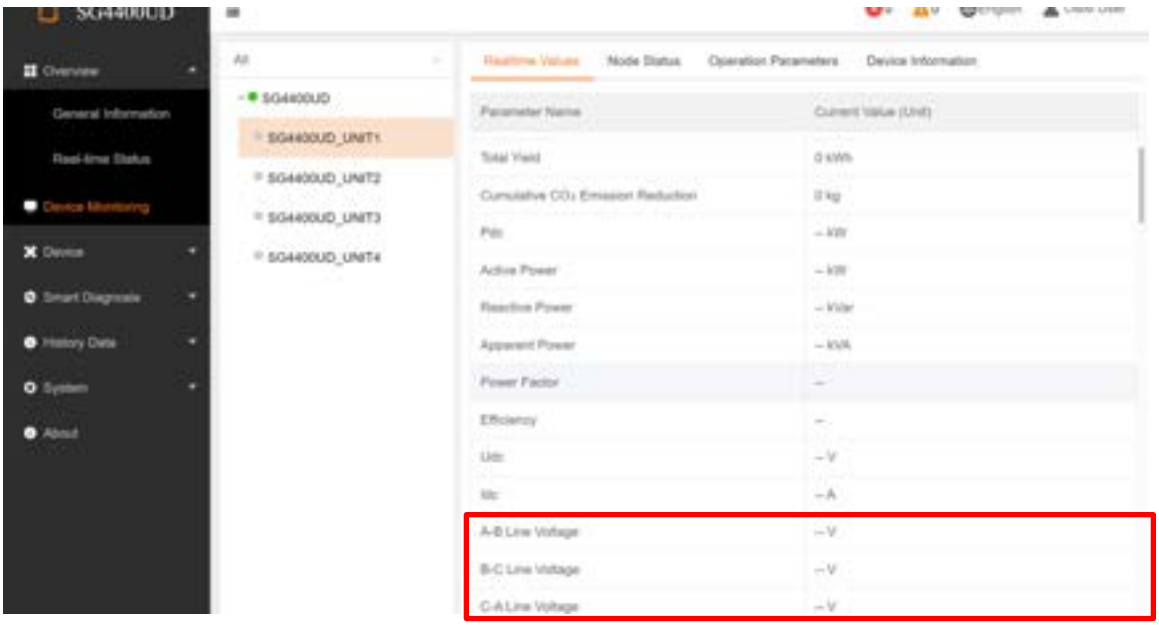
6. Set the inverter into local mode so that SCADA cannot interfere with any of the commissioning processes.

7. Key Start the inverter by going to the overview page and selecting the Boot option. Confirm that you are receiving approximately 10% of SG4400UD rated output on the general information page.



8. Go back to the Device Monitoring page and click on the drop-down icon next to the SG4400UD. This will let you observe Realtime Values for each individual SG1100UD inverter.

9. Confirm that the A-B, B-C, and C-A line voltage for all 4 SG1100UD inverters are at 645VAC (± 10%). Also confirm that the phase A, B, and C current have no large deviations from each other in value.



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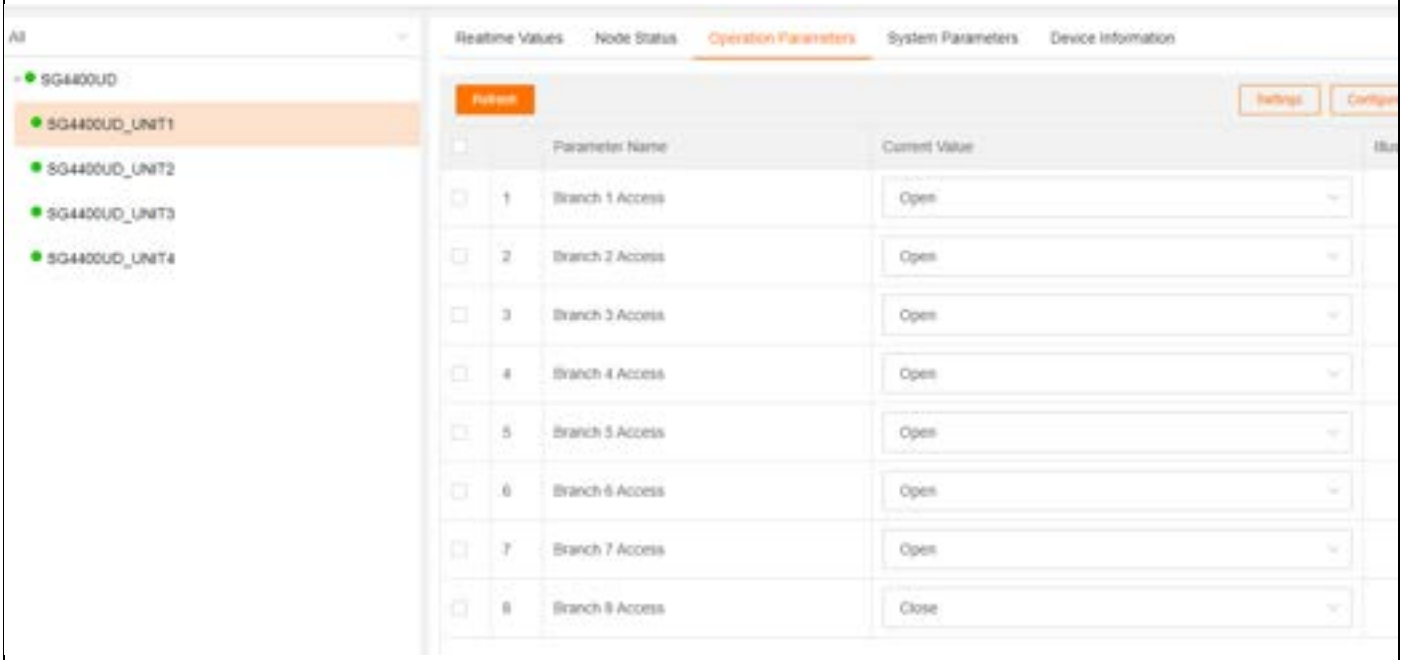
10. Let the inverter operate for 1 minute and check if any faults or alarms populate on the webpage.

11. After 1 minute increase the Active Power Limit Ratio to 50%. Check DC and AC voltage and currents for any anomalies. After operating for a minute verify there are no faults or alarms and that the power output in the general information page reflects 50% of inverter's rating.

12. After 1 minute increase the Active Power Limit Ratio to 100%. Check DC and AC voltage and currents for any anomalies. After operating for a minute verify there are no faults or alarms and that the power output in the general information page reflects 100% of inverter's rating.

13. Leave the inverter running at 100%, and go to the inverter unit1-4 options, and set the branch access for 1-7 to "open/enable" to enable them as shown in the figure below. Check the inverter real time values as shown in the figure, and note which branch current numbers report 0A, which will need the branch access set to "close/disable".



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14. Export the parameter settings as well as checking the firmware versions. If you are un aware on where to find these versions follow our **MV-Software Upgrade MOP (ASD-1939)** which outlines how to check current firmware versions.

Firmware Versions

SG1100UD: MDSP Firmware Version: Click or tap here to enter text.

SG1100UD: SDSP Firmware Version: Click or tap here to enter text.

SG4400UD SCU Firmware Version: Click or tap here to enter text.

SG1100UD: CPLD Firmware Version: Click or tap here to enter text.

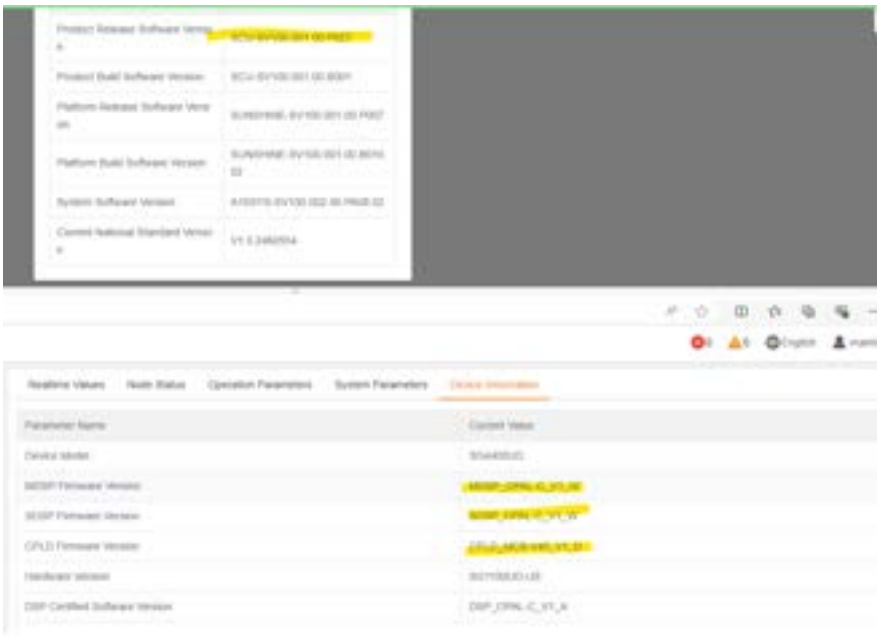

Figure 5: Highlighted Portions of Needed Firmware

15. Set the inverter back into Local/Remote mode to allow on-site SCADA to reconnect to the SG4400UD's PT board.

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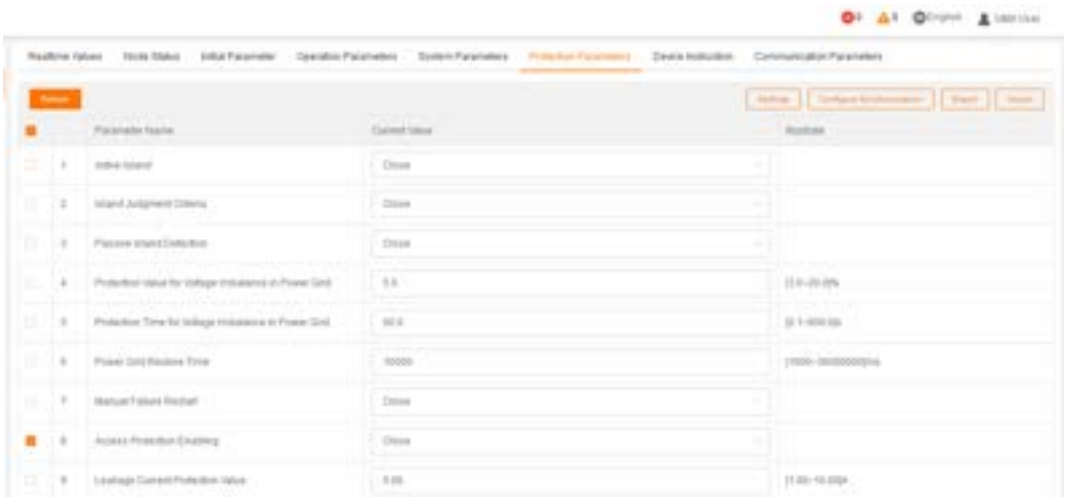
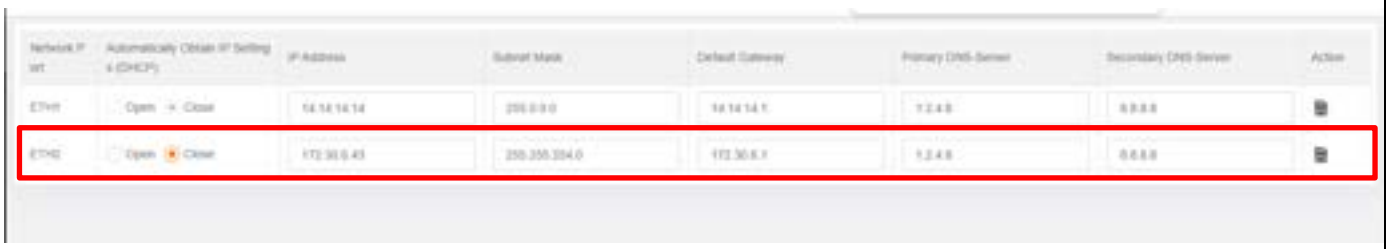
16. Ensure that the "Access Protection Enabling" parameter value is set to enabled or "open" on the UMCG Web page. **Device Monitoring → Protection Parameters**



17. Leave the Inverter running, or key stop and de-energize the entire station as required by site at the time.

18. Setup IP address for SCADA by going to System -> Port Parameters -> Ethernet (details provided by PM/customer)



19. After the IP address setup, you will be automatically logged out by the unit. Relogging back to the unit using the IP address that was newly configured to check if the IP address was set up successfully.

Note: Once done, disconnect the PC from the auxiliary cabinet. Ensure appropriate PPE is always worn based on the incident energy.

Commissioning is now complete! ✅

END

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INVERTER LISTING

Inverter Location	Inverter Serial Number	MVT Serial Number

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Evaluation of customer:	Evaluation of Sungrow:
Click or tap here to enter text.	Click or tap here to enter text.

SUNGROW	**Service Partner**	**Customer**
Performed by:	Performed by:	Performed by:
Click or tap to enter a date.	Click or tap to enter a date.	Click or tap to enter a date.
Signature: _____	Signature: _____	Signature: _____

NOTE :

1) Commissioning should be verified by the site Engineer/Supervisor.
2) Sign with date and initials when the test item passes; complete the comments section, when the test item fails.
3) This table is designed for 3-phase SUNGROW SG4400UD.
4) This report is valid after an affixed seal or signature.
5) Tools: multi-meter, power quality and energy analyzer, multifunction insulation tester

Revision History

Revision	DCO Number	Originators Name	Description
2.0	DCO-23-0048	Richard Wang	Initial Release from Drop box
3.0	DCO-23-0332	Bowen He	Entire revision
4.0	ASD-1392	Carlos Zapata	Restructure of formatting. Change in procedures for hot commissioning.
5.0	ASD-1392	Carlos Zapata	Major revision to sequence and format

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Web: www.sungrowpower.com

North America Standard Warranty

Extended Warranty

1. DEFINITIONS

1.1. The warrantor for the limited warranties set forth herein is Sungrow USA Corporation, as well as Sungrow Power Supply Co., Ltd. (collectively referred to as "Sungrow").

1.2. The "Product" means the Inverters, transformers and peripheral devices manufactured by Sungrow and purchased from Sungrow by End-user.

1.3. The "Warranty" means this limited warranty contract for the Product.

1.4. "End-user" means the party who purchases the Products from Sungrow, or any subsequent owner of the Product with valid assignment of ownership, for which Service, as defined herein, will be performed under the Warranty.

1.5. "'Manual' means all manuals, guides, or similar documents which are provided in writing by Sungrow to End-user and which relate to the installation, operation, maintenance, or storage of the Products; provided, however, that any changes or additions to such documents shall not be retroactively applied."

1.6. "Service" means a site visit or remote services by Sungrow technicians, including its subcontractors, in response to a Warranty Claim, whether covered under this Warranty or excluded.

1.7. "Site" means the location the End-user has installed the Product covered under this Warranty.

1.8. "Warranty Period" means the period the Product is covered under this Warranty as set forth in Section 3 below titled *Warranty Period*.

1.9. "Warranty Commencement Date" has the meaning set forth in Table A.

1.10. "Warranty Claim" means notifying Sungrow of a Product non-conformity or defect during the Warranty Period within five (5) business days via phone, email, or the Global Service Platform. "Product Delivery Date" means the earlier of: (i) the day the product is delivered to the location designated by the End-user; or (ii) sixty (60) days from the date Sungrow stores the Products in the United States or Canada (as applicable) at the direction of, and on the behalf of, End-user.

1.11. "Defect" means a design, engineering, materials, manufacturing, production, workmanship or assembly of the Product or Product Components that does not conform to the Product Specifications and/or adversely affects the Product's operation or functioning.

1.12. "Extended Warranty" means the option for the End-user to purchase additional years of warranty services by Sungrow for the Products, prior to the last twelve (12) months of the Warrant Period and provided that the Warranty has not been voided.

2. LIMITED WARRANTY

2.1. Sungrow warrants that the Products are free from defects in design and manufacturing by Sungrow, and from defects in material and workmanship.

2.2. If the End-user identifies any non-conformity or defect in the Product during the Warranty Period, the End-user will provide notice by phone, email or via the Global Service Platform (https://gsp.sungrow.cn/) within five (5) business day of the date that the End-user identified the non-conformity or defect. To issue a Warranty Claim for Defect under this Warranty the End-user shall provide the following information:

(a) Product and serial number
(b) A brief description of the non-conformity or Defect, including any failure code and what investigation has been done so far.

2.3. Upon request by Sungrow, End-user shall provide (i) proof of ownership, including valid assignment of ownership, the Warranty Claimed serial number and/or (ii) evidence of executed regular or corrective maintenance reports on the Products in reference to the Warranty Claim.

2.4. Sungrow will make all commercially reasonable efforts to notify End-user by email within one (1) business day of receiving End-user's Warranty Claim of a Defect under this Warranty, whether Sungrow accepts the Warranty Claim or if more information is required to evaluate the Warranty Claim. If the Warranty Claim is approved, Sungrow will assign the warranty work a service ticket number. In the event that Sungrow denies the Warranty Claim due to one of the exclusions or limitations listed in this Warranty, Sungrow will offer a thorough written justification to End-user.

2.5. Sungrow's decision to accept or reject a Warranty Claim is final, although the End-user may dispute it under the applicable dispute terms of a relevant purchase order or purchase agreement for the Products.

2.6. If Sungrow accepts a Warranty Claim submitted by End-user, Sungrow shall, in its sole and absolute discretion, either send a replacement Product(s) to the End-user or shall dispatch technicians to the Site to perform any needed on-Site

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repairs.

2.7. Sungrow will have sole and absolute discretion for determining whether it will pursue the repair or replacement remedy, but in either case, the costs of performing the remedial work (including, but not limited to, the costs of transporting replacement Products) shall be at Sungrow's expense, subject to a right of recuperation of those costs under the circumstances described in Section 2.11.

2.8. Sungrow may, in its sole and absolute discretion, engage third-party service providers to perform any of the remedial work hereunder, provided that Sungrow shall be solely responsible for the actions, omissions and costs of such third-party service providers.

2.9. Sungrow shall produce (or ask its service providers to produce) a field service report in respect of any on-Site remediation work performed under Warranty.

2.10. If Sungrow sends replacement parts, the defective Products that have been replaced shall become the sole property of Sungrow, and the End-user shall collect and store those defective Products for Sungrow until such time as Sungrow can collect said Products or arrange for shipment back to Sungrow. End-user's obligation to collect and store defective Products shall last for: (i) up to one (1) month in, Canada, United States (excluding Alaska).

2.11. If, after performing Warranty work, Sungrow determines that the cause of the defect was not covered under this Warranty, Sungrow reserves the right to charge the End-user for all reasonable costs directly incurred by Sungrow in performing work for the Warranty Claim.

2.12. Installed Product relocated to another site requires the unit be re-commissioned by Sungrow.

2.13. Sungrow and the End-user shall mutually agree upon the conduct of any tests required to determine whether a Product is defective in advance of conducting such tests. Sungrow reserves the right to supply a different inverter model to settle a Warranty Claim, provided that such inverter model is functionally equivalent to the original inverter and does not negatively affect the performance of the system to which the inverter will be installed. Any parts that are replaced may be new or reconditioned to be like new.

2.14. All parts repaired or replaced pursuant to this Warranty will also be subject to the provisions of Section 2 Warranty, to the same extent as original Products. The Warranty Period with respect to repaired or replaced parts by Sungrow will run for the longer of the: (i) the original Warranty Period for the defective Product; or (ii) twelve (12) months from the date of completion of the repair or replacement.

2.15. End-users authorized by Sungrow to perform repair or replacement of Products with the use of Spare Parts are covered by this Warranty for the longer of: (i) the original Warranty Period for the defective Product; or (ii) twelve (12) months from the date the repair or replacement was completed.

2.16. All Service work performed by Sungrow is warranted for one (1) year from the day the service was completed.

3. WARRANTY PERIOD

The Warranty Period for a Product installed in the United States, or Canada are indicated in Table A below.

TABLE A

Products	**Standard Warranty Period**	**Warranty Commencement Date**
String Inverters (SG36CX, SG60CX, SG125HV)	10 Years	The earlier date between: i) First-time commissioning date; or ii) Six (6) months after the Product delivery date. In case no evidence of the two above the warranty commencement will be 12 months from production according to the serial number.
All other String Inverters	5 Years	
All Central Inverters	5 Years	
Inverter Station Products (MV transformer, switchgear)	5 Years	
Inverter Station Products (all other equipment)	3 Years	
Re-combiners and Combiners	2 Years	
Communication, Monitoring, and Control Equipment	2 Years	

4. EXTENDED WARRANTY PERIOD

4.1. Prior to the last twelve (12) months of the Warranty Period and if the Warranty has not be voided, End-user may

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purchase additional years of warranty services by Sungrow for the Products (the "Extended Warranty"), if the conditions outlined herein have been met.

4.2. An Extended Warranty shall start only if Sungrow has received payment in full for the extension, or annual installments may be accepted with an additional fee.

4.3. Should Sungrow agree to provide an Extended Warranty beyond the five (5) years specified in Table B of these Warranty terms, the End-user must additionally, in accordance with the Manual conduct regular & proper maintenance which can be provided to Sungrow upon request for review. All maintenance on the Products may be performed by any of the following:

(a) by Sungrow through a written agreement for Sungrow to provide the required maintenance in accordance with the Manual.
(b) by a qualified third-party through a written agreement for the qualified third-party to provide the required maintenance in accordance with the Manual
(c) or by self-performance with qualified personnel.

4.4. The period covered by the Extended Warranty for Product installed in the United States, or Canada is indicated in Table B below.

TABLE B

Products	Offered Extended Warranty Options
String Inverters (SG36CX, SG60CX, SG125HV)	5,10 Years
All other String Inverters	5, 10, 15 Years
All Central Inverters	5,10,15 Years
Inverter Station Products (MV transformer, switchgear)	5 Years
Inverter Station Products (all other equipment)	Not available
Re-combiners and Combiners	Not available
Communication, Monitoring, and Control Equipment	Not available

4.5. It is recommended that the Extended Warranty be purchased together with the Sungrow preventive maintenance plan to comply with Sungrow standards.

4.6. If purchasing an Extended Warranty, it must be purchased for every inverter on the Site.

4.7. Sungrow will, upon request and for a reasonable fee, perform additional Services not covered by this Warranty, such as repairs or replacements with the most recent version of the Product.

5. WARRANTY EXCLUSIONS

5.1. The Warranty does not cover defects or damages caused by:

(a) Normal wear and tear, oxidation, deterioration or damage due to misuse or neglect by End-user, or superficial imperfections, dents or marks, in each case that do not impact Product performance or integrity.
(b) Improper transportation and/or delivery in the event Customer assumes transportation responsibility.
(c) Failure to properly store the Product before installation by Customer.
(d) Improper installation unless caused by Sungrow or its agents.
(e) Use and application of the Product beyond the definition in the Manual.
(f) Repair, adjustment, or alteration, not authorized in writing by Sungrow.
(g) Force Majeure events
(h) The customer's non-compliance with applicable regulations and standards
(i) Voltage surge coming from DC side, grid AC side or externally caused harmonics.

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(j) Neglect, abuse, misuse, improper maintenance, or lack of maintenance, as set forth in the Manual. This includes the case that maintenance is not executed by qualified personnel.
(k) Acts of nature such fire, flood, earthquake, and lightning
(l) Damage or accidents due to third parties' actions, vandalism, a surge, or improper use of the Product
(m) Any other non-conformity, defect, damage or failures not: (x) caused by Sungrow or a Sungrow agent; or (y) arising out of the manufacture of the Product or component by Sungrow or a Sungrow agent resulting from: (i) the operation, maintenance or repair of the Product by the End-user or any third party other than a Sungrow or a Sungrow agent and (ii) a failure to perform (or cause to be performed) maintenance of the Product required under the Manual; provided that operation of the Product consistently with the Sungrow Manual and other guidelines shall not, on its own, invalidate a claim or be reason for Sungrow's rejection of a claim for Defect under this Warranty

5.2. The Warranty does not cover:
(a) fuses, surge suppressors, filters, cosmetic damages optical damages or normal wear and tear.
(b) costs for End-user's employees and/or any third parties, unless stipulated otherwise in the Warranty.
(c) Regulatory changes or recertifications
(d) Downtimes or other business interruption of the Product and/or the installation, including but not limited to loss of profit, loss of availability, or loss of production.

5.3. The Warranty shall be void, if any of the below occurs.
(a) Serial number of the Product has been altered, manipulated, or cannot be clearly identified.
(b) The End-user does not provide sufficient access to the property/building on or in which the Product concerned is stored or installed, to the PV array itself, of which the Product concerned has become an integral part in the event the Product has already been installed, or to the Product itself, which is subject to inspection, testing, and correction, including Firmware/Software upgrades. This is applicable to both on-Site and remote access.
(c) The End-user fails to make any Product subject of a Warranty Claim available for inspection, testing and correction.
(d) The End-user does not provide maintenance records or other similar evidence consistent with Sungrow's Manual that the required maintenance was performed during the relevant Warranty Period as detailed in the Sungrow's Manual.

6. END-USER'S OBLIGATIONS

6.1. In order to receive the benefits of this Warranty, the End-user must install, maintain and operate the Product according to the Manual; reasonably protecting against further damage to the Product if a defect is discovered.

6.2. End-user shall provide Sungrow service personnel with reasonable access to the Site and any special instructions needed to access the Site. Provided that Sungrow gives reasonable advance notice to the End-user of its intent to access the Site for Service, Sungrow shall have no liability if Site access is not provided, and End-user will be invoiced for any costs incurred by Sungrow if an additional visit is required due to lack of access.

6.3. It is the End-user's responsibility to notify Sungrow of any hazards at the Site and to guarantee the Site is free from hazards or obstructions, and that all applicable Site safety precautions have been communicated to Sungrow in a timely manner. Sungrow shall ensure that its own personnel follow the safety precautions at the Site as provided by the End-user.

7. OTHER LIMITATIONS

7.1. Sungrow's obligations under this Warranty are valid only if the End-user complies with its payment obligations under the applicable purchase order or other purchase agreement for the Products. If the End-user is in breach of its undisputed payment obligations for the applicable Product, in accordance with the contract terms under which the Product is sold, Sungrow shall have no Warranty obligations with respect to such Product until the undisputed payment has been made in full to Sungrow. Also, during such time, the Warranty Period for the Product shall continue to run and the expiration of this Warranty shall not be extended upon payment of any overdue or unpaid amounts.

8. COSTS NOT RELATED TO WARRANTY

8.1. The End-user shall be invoiced for, and shall pay for, all Services not expressly provided for by the terms of this Warranty, including without limitation, Site calls involving an inspection that determine no corrective maintenance is required. The End-user shall also be invoiced for, and shall pay, any costs for replacement equipment, installation, materials, freight charges, travel expenses or labor of Sungrow representatives to the extent such costs and expenses are not included in the terms of this Warranty.

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9. WARRANTY APPLICATION AND VALIDITY

9.1. Sungrow, in its sole and absolute discretion, reserves the right to make any changes and modifications to this Warranty, at no prior notice, for future, unsigned purchase orders or contracts, in addition to the right to decide whether to accept new contracts or annual contract renewals.

10. PRICE

10.1. For Services not covered under this Warranty, Sungrow will charge based on its standard service price schedule. Sungrow, in its sole and absolute discretion, reserves the right to revise prices with respect to the excluded Services at any time.

11. CONDITIONAL TERMS

The following terms and conditions shall apply solely to the extent that the parties have not executed a purchase order or purchase agreement containing similar terms. In the event of any conflict between and term of this Section 11 and a term of the parties' executed purchase order or purchase agreement, the purchase order or purchase agreement shall prevail.

11.1. LIMITATIONS ON LIABILITY.

11.1.1. To the fullest extent allowed under the law, this Warranty constitutes End-user's sole and exclusive remedy for Warranty Claims against Sungrow in respect of defective or non-conforming Products hereunder and is in lieu of all other warranties, conditions, guarantees or representations from Sungrow relating to the Products hereunder, whether oral or written, express or implied, statutory or otherwise, in contract, tort or otherwise, including without restriction, any warranties of merchantability or of fitness for a particular purpose, and any such warranty, condition, guarantee or representation is hereby excluded. In no event shall any Warranty Claim, failure of any Product hereunder, or breach of this Warranty, render either party, its affiliates, subcontractors or suppliers liable to the other party or its affiliates for indirect or consequential damages or loss of use associated with Warranty Claims for lost profits or loss of revenues, or any associated equipment, cost of capital, cost of substitute equipment, facilities, services or replacement power, downtime costs, Warranty Claims of End-user's customers for such damages, or for any other special, consequential, incidental, indirect or exemplary damages. Each party's total liability for any and all Warranty Claims and costs under this Warranty shall not exceed the total purchase price for the Product that is the subject of a Warranty Claim.

11.2. FORCE MAJEURE.

11.2.1. Sungrow shall not be liable hereunder by reason of any failure or delay in the performance of its obligations hereunder due to an event of Force Majeure. "Force Majeure" means an act of god or other cause which is beyond the reasonable control of the party whose performance is affected by such event and could not have been avoided by the exercise of reasonable prudence, including but not limited to: extreme natural disasters (e.g. earthquakes, floods, landslides); explosions; fire; pandemics or epidemics; destruction of machines; equipment, factories and of any kind of installation to the extent caused by an event of Force Majeure; terroristic attacks; nuclear accidents; war, civil war or similar uprising; general strike (or lock-out) of a regional or national nature that is not targeted at Sungrow.

11.2.2. In the event of the occurrence of any Force Majeure event, Sungrow shall notify the End-user immediately in writing of the invocation of this section, and Sungrow's obligations hereunder shall be suspended for the duration of such Force Majeure event; provided that Sungrow shall be obligated to use its commercially reasonable efforts to restore performance hereunder as soon as reasonably practicable, and provided, further, that if such event continues for more than ninety (90) days in the aggregate in any six (6) month period, the End-user shall have the right to terminate this Warranty at any time upon written notice to Sungrow. Sungrow shall exercise commercially reasonable efforts in accordance with prudent industry practices to alleviate and mitigate the cause and effect of such Force Majeure event. Reasonable actions must be taken to avoid and/or limit damages to the End-user.

11.3. DISPUTE RESOLUTION.

11.3.1. Any dispute under this Warranty which cannot be resolved by the good faith negotiation of the parties shall be finally settled by binding arbitration before a panel of three arbitrators selected and appointed in accordance with the Commercial Arbitration Rules of the American Arbitration Association ("AAA") then in effect on the date the dispute is submitted to the AAA (the "Rules"). The venue of the arbitration proceedings shall be San Francisco, California, and the language to be used in the arbitration proceedings shall be English. Unless prohibited by applicable laws, the arbitrator(s) shall have the power to issue interim measures, including but without limitation measures for preservation of property, attachment, preliminary injunction, replevin,

preservation of evidence, etc. to avoid irreparable harm, maintain the status quo, or preserve the subject matter of the dispute. All the arbitration costs - including but not limited to the costs of the arbitrators (whether local or foreign arbitrators), all fees charged by the arbitration institution, experts' fees, and reasonable attorneys' fees -- shall be borne by the losing party. This Warranty shall remain in full force and effect pending the resolution of any dispute hereunder, and each party shall continue to perform its obligations not relating to the pending dispute during the pendency of any dispute. This Warranty is governed by and shall be interpreted in accordance with the laws of the State of California, without reference to conflicts of law.

NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN OR IN THE PURCAHSE AGREEMENT FOR THE PRODUCTS, SUNGROW DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Docusign Envelope ID: 040D1157-5A89-4288-B102-93AC90480AB5

Hi-MO 5 Ice-Shield

(For US market)

LR5-72HBD

540~560M

- Extraordinary reliability against hailstorms
- Advanced module technology delivers superior module efficiency
  - M10 Gallium-doped Wafer
  - 18-busbar Half-cut Cell
- Globally validated bifacial energy yield
- High module quality ensures long-term reliability

12 12-year Warranty for Materials and Processing

30 30-year Warranty for Extra Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO9001:2015: ISO Quality Management System

ISO14001: 2015: ISO Environment Management System

ISO45001: 2018: Occupational Health and Safety

IEC62941: Guideline for module design qualification and type approval

LONGi

Docusign Envelope ID: 040D1157-5A89-4288-B102-93AC90480AB5

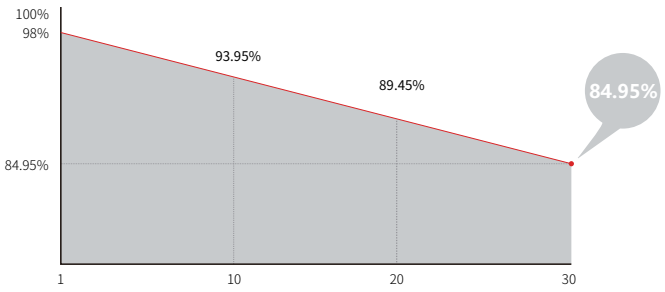
Hi-MO 5 Ice-Shield

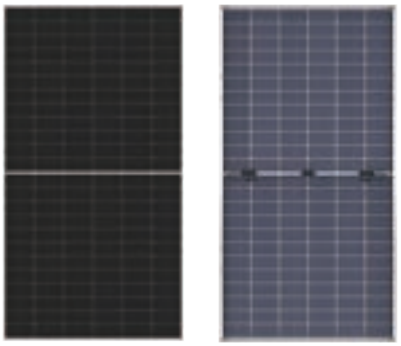
LR5-72HBD 540~560M

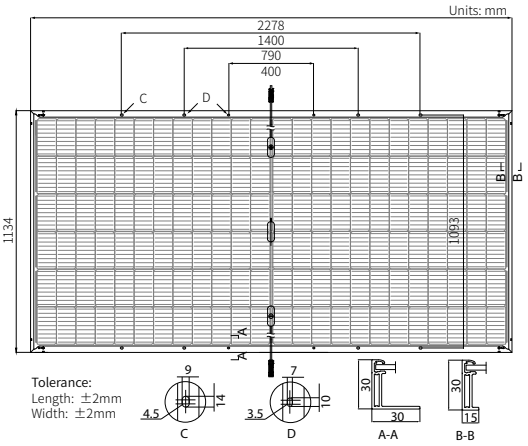
21.7%	0~3%	<2%	0.45%	HALF-CELL
MAX MODULE EFFICIENCY	POWER TOLERANCE	FIRST YEAR POWER DEGRADATION	YEAR 2-30 POWER DEGRADATION	Lower operating temperature

Additional Value

30-Year Power Warranty







Mechanical Parameters

Cell Orientation	144 (6×24)
Junction Box	IP68, three diodes
Output Cable	4mm², +400, -200mm/±1400mm length can be customized
Glass	Dual-glass, 3.2mm coated tempered glass + 2.0mm heat strengthened glass
Frame	Anodized aluminum alloy frame
Weight	39.5kg
Dimension	2278×1134×30mm
Packaging	36pcs per pallet / 180pcs per 20' GP / 468pcs per 40' HC

Electrical Characteristics

STC : AM1.5 1000W/m² 25°C NOCT : AM1.5 800W/m² 20°C 1m/s Test uncertainty for Pmax: ±3%

Module Type	LR5-72HBD-540M		LR5-72HBD-545M		LR5-72HBD-550M		LR5-72HBD-555M		LR5-72HBD-560M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	540	403.6	545	407.4	550	411.1	555	414.8	560	418.6
Open Circuit Voltage (Voc/V)	49.50	46.54	49.65	46.68	49.80	46.82	49.95	46.97	50.10	47.11
Short Circuit Current (Isc/A)	13.85	11.17	13.92	11.23	13.99	11.29	14.05	11.34	14.10	11.38
Voltage at Maximum Power (Vmp/V)	41.65	38.86	41.80	39.00	41.95	39.14	42.10	39.28	42.25	39.42
Current at Maximum Power (Imp/A)	12.97	10.39	13.04	10.45	13.12	10.51	13.19	10.56	13.26	10.62
Module Efficiency(%)	20.9		21.1		21.3		21.5		21.7	

Electrical characteristics with different rear side power gain (reference to 550W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp /A	Pmax gain
578	49.80	14.68	41.95	13.77	5%
605	49.80	15.38	41.95	14.43	10%
633	49.90	16.08	42.05	15.08	15%
660	49.90	16.78	42.05	15.74	20%
688	49.90	17.48	42.05	16.39	25%

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Bifaciality	70±5%
Fire Rating	UL type 29 IEC Class C

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	50mm hailstone at the speed of 32.4m/s*

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.265%/°C
Temperature Coefficient of Pmax	-0.340%/°C

*The product can withstand larger hailstones impacting at higher speeds when integrated with tracker hail stow technology.

Specifications included in this datasheet are subject to change without notice. LONGi reserves the right of final interpretation. (20241206V1.0 Draft) For US market

LONGi

Web: www.longi.com

Docusign Envelope ID: 040D1157-5A89-4288-B102-93AC90480AB5

LONGi

Limited Warranty for Solar Modules

Utility Generation Market

20230810

Docusign Envelope ID: 040D1157-5A89-4288-B102-93AC90480AB5

This Limited Warranty applies to the following modules		
Series	60&66 cells	72&78 cells
Hi-MO 5	LR5-66HBD-xxxM	LR5-72HBD-xxxM
	/	LR5-72HIBD-xxxM
Hi-MO 7	/	LR5-72HGD-xxxM
	/	LR7-72HGD-xxxM

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1. Limited Warranty

The warranty start date of the Solar Modules stipulated under this Limited Warranty for Solar Modules (hereinafter referred to as “Limited Warranty”) is the date of delivery to the Customer or 6 months after the modules are shipped out of the production plant, whichever is earlier (hereinafter referred to “Warranty Start Date”). For the avoidance of doubt, the aforesaid Customer means the Buyer as agreed in the Sales Contract for sale of the Solar Modules.

1.1. 12-Year Limited Product Warranty

The Supplier warrants that for a period of 12 years since the Warranty Start Date that the Solar Modules (including the DC connectors and cables) will be free of defects in material or workmanship which affects the normal installation or utilization of the modules, provided that the Solar Modules are installed, utilized and maintained according to the stipulations of the Installation Manual provided by the Supplier, which may be updated from time to time. Defects do not include changes in appearance or normal wear and tear of the Solar Modules after the modules is installed. Performance warranty for the power output is not included here but it shall be specifically elaborated in the "30 Year Limited Performance Warranty" section below.

1.2. 30-Year Limited Performance Warranty

The Supplier warrants for a period of 30-year performance warranty (“Performance Warranty Period”) in details as below. For the avoidance of doubt, this limited performance warranty only applies to the actual power output of the front-side of the modules.

As for the Hi-MO 5 series, during the first year of the Performance Warranty Period, the actual power output (performance) of the modules will reach at least 98% of the nominal power output; and from the second year, the actual power output will decline annually by no more than 0.45% for a period of 29 years; by the end of the 30th year, an actual output of at least 85% of the nominal power output is guaranteed.
Actual Power Output (Year=1) ≥ Nominal Power * (1 - 2%)
Actual Power Output(Year=N, 2≤N≤30）≥ Nominal Power *(1 −(2% + 0.45% *(N-1)))

As for the Hi-MO 7 series, during the first year of the Performance Warranty Period, the actual power output (performance) of the modules will reach at least 99% of the nominal power output; and from the second year, the actual power output will decline annually by no more than 0.4% for a period of 29 years; by the end of the 30th year, an actual output of at least 87.4% of the nominal power output is guaranteed.
Actual Power Output (Year=1) ≥ Nominal Power * (1 − 1%)
Actual Power Output(Year=N, 2≤N≤30）≥ Nominal Power *(1 −(1% + 0.4% *(N-1)))

The actual power output is to be measured under standard testing condition (“STC” or “Standard Test Conditions”) in an independent testing lab accepted by the Supplier or previously designated by the Supplier, and when measuring the actual power output, measurement equipment tolerance is to be taken into consideration, as per IEC60904.

Standard Test Conditions are: Air mass 1.5, wind speed 0m/s, irradiance 1000W/㎡, cell temperature 25℃

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2. Warranty Claim Procedure

In any case, any and all warranty claims shall be submitted to the Supplier or its authorized distributor in writing or by mail within the corresponding warranty period. The customer shall provide necessary evidence documents for its claim. If the customer believes that the Solar Module does not meet the requirements of the “Limited Warranty”, the customer should notify the sales team or global technical service department of the Supplier in writing or submit the notice via email through "Contact LONGi" button on the Supplier's global official website page (the website is www.longi.com) within 30 days after the claim is identified. The notice should include the following information: (a) the claimant; (b) a detailed description of the claim; (c) supporting materials, including photos or data; (d) serial number of affected module; (e) evidence for purchase of the affected module; (f) model of the affected module; (g) project location; (h) other supplementary information required by the Supplier. The Supplier will review and evaluate alleged claims after receipt of the claim and full information as stipulated herein. If the Supplier at its sole discretion considers it necessary, the Supplier can request the module be shipped back to the Supplier’s factory or 3rd-partyfor testing, in which case, the Supplier will provide the customer with a Return Merchandise Authorization (“RMA”).

In the event the Customer fails to notify the Supplier and provide the relevant information of (a)-(h) as described above within the time required by the Supplier, or fail to coordinate the Supplier arrange the defected modules transfer under necessary circumstances, the Supplier is entitled to refuse to process the relevant claim demand without any liability until the Customer has provided the relevant information as required by the Supplier.

In the absence of such RMA, any returned module will not be accepted by the Supplier. In the event the Customer returns the Solar Modules without written agreement of the Supplier, the risks (including but not limited to damage and loss of the Solar Modules) and expenses related to the Solar Modules shall be borne by the Customer. Subject to the approval of the Supplier’s technical service department, the necessary and documented shipping costs related to the Limited Product Warranty or the Limited Performance Warranty will be compensated by the Supplier to the customer.

The Supplier is entitled to decide whether to send a representative to investigate the alleged claims on site and related cost and expenses shall be borne by the Supplier. In the event that the Supplier decides to send a representative to the product installation site for verification, the customer shall actively cooperate for such investigation. If the customer refuses the Supplier to enter the site for investigation without a proper and appropriate reason, the Supplier has the right to extend the claim process until necessary evidence is provided. In case a consensus regarding the cause of any module defect cannot be reached between the Supplier and the customer, the supplier have rights to assign authoritative testing facilities, such as PI, TÜV SUD, TÜV Rheinland, Intertek, UL, CQC, CGC, etc., which should be accepted by both parties to participate in the final settlement. The Supplier will pay for the reasonable costs incurred by such test in advance. All costs shall be borne by the losing party finally, including shipping freight, transportation insurance, and laboratory testing costs etc., except for the lawsuit which should be judged by written judgment. The Supplier reserves the right of final interpretation.

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3. Remedies for Claims

In the event that the customer claims that the module(s) fails to meet the "Limited Warranty" as described in Sections 1.1 and 1.2 above and the Supplier confirms the cause for such defect lies on the product material or workmanship; or at the request of the client, a mutually-agreed third-party testing was done to reveal that the cause of such defect lies on the material or workmanship, then the Supplier shall, at its sole discretion, either

1. Repair the defective solar modules. In such case, the Supplier shall prepare the repair project plan and carry out the repair project for the affected modules; or

2. Replace the defective modules or provide additional module(s) to make up for the output gap between the guaranteed output and the actual power output of the defective module(s) ; or

3. Refund the residual value of the defective modules or refund the value equivalent of the output gap between the guaranteed power output and the actual power output of the defective module(s).

*Residual value = current market price (price-per-watt) * nominal power * left-over service life/ 30*
*Value Equivalent of Output Gap = current market price (price-per-watt) * (guaranteed power output – actual power output) * left-over service life/ 30*

SPECIAL NOTE:

1. Unless otherwise agreed by the Parties in written, the repaired module(s) or replacement module(s) will be delivered by the Supplier in accordance with the same Incoterms and destination as the relevant module supply contract. The insurance, freight, customs clearance fees and other reasonable expenses shall be borne in accordance with the Incoterms in the original module supply contract. In the case that the Customer pays for such costs in advance, and expects to contact the Supplier for compensation for such aforesaid costs, the Customer shall provide the invoices to evidence that such costs are incurred from related service providers. Costs incurred due to dismantling, repacking, installation or reinstallation the module(s) and other related expenses shall be borne by the Customer.

2. Any repair or replacement of the affected module(s) shall not renew the applicable warranty period. The warranty period for replaced or repaired module(s) is the remainder of the warranty for the affected modules. The Supplier is entitled to deliver similar module(s) at its sole discretion in replacement of the affected module(s) if the affected module(s) is no longer available. The nominal power of the module(s) used to replace the concerned module(s) shall at least equal or over the power wattage of the affected module(s).

3. Unless instructed by Supplier or required by law, the Customer shall dispose of out-of-use module (s) in accordance with applicable regulations on electronic waste treatment and disposal at its own cost. If the Supplier decides or is required by law to retrieve these defective modules, the ownership of the relevant module(s) belong to the Supplier. In the event the Customer returns the Solar Modules to the Supplier without the prior written consent of the Supplier, the risks (including but not limited to damage or loss of the Solar Modules) and expenses related to the Solar Modules shall be borne by the Customer, and the Supplier is entitled to refuse to deal with the related claims and demands without any liability therefrom. Unless with written authorization from the Supplier, any replaced module(s) shall not be resold, reworked or reused in any way.

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4. Product limited warranty will terminate after refunding the residual value. If the output gap keeps growing after compensating the value equivalent had been compensated, the Customer could apply claim based on the growing value equivalent as well, which means it should exclude the value equivalent of last claim.

5. The buyer is obliged to cooperate with the Supplier to sign a "Settlement Agreement" so that the remedy plan for any alleged claim can be implemented. The Parties agree that the Supplier is entitled to use this as a precondition for fulfilling the obligations under this "Limited Warranty".

4. Liability Exemptions

The Supplier shall be free of any liability in the event that any defect of the Solar Modules is caused by or in connection to the Force Majeure. The Supplier and the Customer understands and agree that the Supplier shall free of liability in the event any obligations under this “Limited Warranty” is delayed or could not be provided because of the occurrence of the Force Majeure as defined under Clause 9 of this “Limited Warranty”.

Save the stipulations under Clause 9, the Supplier and the Customer understand and agree that this "Limited Warranty" does not apply to any one of the following situations:

- Module(s) have been installed, used and maintained in a manner that fails to strictly comply with the relevant provisions of the supplier's installation manual, module technical specification and maintenance manual; or

- Module(s) which have been subject to misuse, abuse, negligence, vandalism or accident; or

- Module(s) which have been subject to power supply failure, power surge, lightning, flood, fire, accidental damage or other events beyond the control of the Supplier directly or indirectly; or

- Module(s) which have been installed on mobile equipment (except for photovoltaic tracking systems) such as vehicles, ships, etc., or offshore facilities (except for pre-authorized floating systems or fishery-solar hybrid project); or

- Module(s) which have been subject to system voltage over the rated maximum system voltage or surge; or

- Module(s) which have been installed on unqualified buildings; or

- Module(s) which have been installed near extreme heat or in extreme or volatile environmental conditions, causing the module(s) to corrode, oxidize, or to suffer from chemical materials in the environment; or

- Failure to pay the purchase price to the Supplier or its affiliated company that sells the module(s) to the customer; or

- Module(s) which have been used in a way that infringes on the intellectual property rights of the Supplier or any other third party (including but not limited to patent rights, trademark rights, etc.);

In addition, when the nameplate and serial number of the module(s) are tampered with, removed or unrecognizable without the written authorization of the Supplier, the claim will be rejected.

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5. Limitation of Liability

The Supplier assumes no warranties, express or implied, other than the warranties made herein and specifically disclaims all other warranties, including but not limited to, merchantability or fitness for a particular purpose, usage or application, or other obligations and responsibilities assumed by the Supplier, unless the Supplier expressly recognizes other obligations and responsibilities in a dully signed written document. The customer understands and agrees that the Supplier shall not be liable for personal injury or property damage, and shall not be liable for other losses or injuries caused by or related to the module(s) (including but not limited to any module defect, or any defect arising from improper use and installation of the module(s)). The Supplier excludes all liabilities for any collateral, consequential or special damages. Losses caused by module defect, including but not limited to, loss of profit, loss of power, loss of business opportunity, loss of goodwill, increase of the operating cost or loss of income are clearly excluded here. If the Supplier is liable for compensation to the customer, the total amount of compensation shall not exceed the invoice price of the defective module(s) paid by the customer.

6. Assignment

The Customer can transfer the rights and obligations under this "Limited Warranty" to the subsequent project owner by informing the Supplier in writing of this transfer of rights, provided that:

1. The module(s) remain at the initial installation site without being tempered with; and

2. The purchase price of the module(s) are fully paid to the Supplier or other payable amounts (such as liquidated damages); and

3. This transfer of rights covers all provisions of this “Limited Warranty”; and

4. The transferee agrees to be bound by all terms of this "Limited Warranty".

If required by the Supplier, the Customer shall, within 15 days upon receipt of the notice from the Supplier, provide reasonable evidence to prove the inheritance of ownership. Otherwise, the Supplier shall have the right to refuse to process the relevant claim and shall not be liable for it.

The rights of this "Limited Warranty" shall only be transferred if above mentioned requirements are fully met, otherwise such transfer shall not be binding upon on the Supplier, and the Supplier has the right to refuse to process the relevant demand for claims without any liability.

7. Severability

If a certain section or clause of this "Limited Warranty" itself or its applicability to certain people or certain situation is deemed invalid, ineffective or unable to be implemented, this does not affect the validity of any other sections or clauses of this warranty. In such case, the applicability of other sections or clauses of this shall be regarded as independent and effective.

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8. Applicable Law and Dispute Resolution

Any dispute relating to this “Limited Warranty”, including but not limited to, disputes relating to the survival, validity, breach or termination of the “Limited Warranty”, shall be resolved in accordance with the governing law and jurisdiction written in the Solar Module supply contract. The Supplier reserves the right of final interpretation.

9. Force Majeure

Force Majeure refers to unforeseeable, unavoidable and insurmountable objective conditions in practice, including but not limited to war, riot, strike, epidemic, quarantine, traffic control and other social events; and earthquake, fire, flood, blizzard, hurricane, lightning, natural disaster and other natural disaster; or due to lack of adequate or adequate labor force, shortage of raw materials or inability to produce capacity, technology or output, or delay not caused by either Party due to delay of construction period due to approval delay of non-municipal supporting facilities; or the delay caused by national laws, regulations, administrative rules or orders and any unforeseeable events beyond the control of the Supplier.

Upon occurrence of Force Majeure or its continuing, in sales or defective product warranty claim, the Supplier cannot fulfill or delay in performance of its obligations under this “Limited Warranty”, the Supplier shall be free of any liability to the loss or damages incurred therefrom, but the Supplier shall promptly notify the Customer regard to the Force Majeure, and shall negotiate with the Customer in time to take necessary measurements to minimize the impact of the Force Majeure.

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隆基组件产品质量标准

LONGi Module Quality Criteria

1. 基本定义和要求 General Definition and Requirement

1.1 目的 Purpose

定义隆基主要原辅材料及组件生产过程控制及隆基组件出厂验货的检验项目、检验方法、抽样基准等，确保进厂原辅材料质量及组件生产过程及组件出厂质量得到有效控制，且满足规定的要求。

Define the inspection items, inspection methods and sampling standards, etc. for LONGi main raw materials incoming and module process control and output inspection module, in order to ensure the quality of raw materials and production process and pre-shipment inspection has been controlled and can meet related requirements.

1.2 适用范围 Scope of Application

本文件适用于隆基所有组件工厂生产所需的主要原辅材料进厂检验，组件生产过程控制及出厂检验工作。

These inspection criteria are applicable to raw materials incoming inspection, production process control and pre-shipment inspection for all LONGi modules.

1.3 不良等级 Defect Level

从可能造成影响的程度对条款类别进行区分，分为关键不良、严重不良、轻微不良。

Defect level: Categorized based on potential impacts to 3 levels, Critical defect, Major defect, Minor defect.

关键不良：对人体会造成伤害或违反法律法规的缺点。

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Critical Defect：Defects may cause injury on the human body, or cause violation of laws and regulations.

严重不良：对产品的基本性能、实用性与操作会构成障碍。

Major Defect: Defects may have effect on the basic performance, practicality and operating of the product.

轻微不良：外观性质量不良，或对产品的基本性，实用性与操作性不会构成障碍。

Minor Defect: Quality defects only on the appearance, or defects which have no effect on the basic performance, practicality and operating of the product.

1.4 抽样及 AQL 标准 Sampling and AQL standards

抽样水平：参照 ISO2859-1:1999 标准，并按具体条款中列明的参数执行。

Sampling Level: Referring to ISO2859-1:1999, and detailed parameters in related listed item.

AQL 标准：按照具体条款中列明的参数执行。

AQL Standard: Referring to detailed parameters in related listed item.

2. 原辅材料进料检验要求 Raw Material Incoming Inspection Requirement

2.1 检验要求 Inspection Condition

电池片，玻璃，背板，EVA/POE，线盒，焊带，硅胶，边框材料进料检验要求如下：

The incoming inspection requirements for Cell, Glass, Baksheet, EVA/POE, J-box, Ribbon, Silicon, Frame are as below.

材料 Material	序号 No.	测试项目 Test Item	规范/公差 Standard/Tolerance	测试设备 Test Equipment	取样频率 Frequency
电池片检验 Cell Inspection	1	尺寸 Size	参考电池片进货检验指导书 Refer to cell incoming inspection instructions	游标卡尺、千分尺 Caliper\Microcalliper	每批 Each batch
	2	外观 Appearance	参考电池片进货检验指导书 Refer to cell incoming inspection	点线规、钢尺 Steel Ruler	每批 Each batch

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			instructions		
	3	EL	参考电池片进货检验指导书 Refer to cell incoming inspection instructions	单片 EL 测试仪 Single EL test	每批 Each batch
	4	电性能 Electrical	参考电池片进货检验指导书 Refer to cell incoming inspection instructions	单片功率测试仪 Single I-V test	每批 Each batch
玻璃检验 Glass inspection	1	尺寸 Size	参考《光伏玻璃进货检验指导书》 Refer to glass incoming inspection instructions	卷尺，千分尺 Flexible Rule\Microcalliper	每批 Each batch
	2	外观 Appearance	参考《光伏玻璃进货检验指导书》 Refer to glass incoming inspection instructions		每批 Each batch
	3	弯曲度 Curvature	参考《光伏玻璃进货检验指导书》 Refer to glass incoming inspection instructions	钢球、放大镜、点线规 steel ball、magnifier	每批 Each batch
	4	膜厚 Thickness	100~140μm	膜厚测试仪 Thickness test	每批 Each batch
	5	硬度（镀膜） Hardness	参考《光伏玻璃进货检验指导书》 Refer to glass incoming inspection instructions	硬度测试仪 Hardness test	每批 Each batch
	6	附着力测试 (镀膜) Coating Adhesion Test	镀膜玻璃：标准≤0 级 Standard of Reflective glass：≤0 镀釉玻璃：标准≤1 级 Standard of Glazed glass：≤1	漆膜划格器 Grid knife	每月初/次 Beginning of each month
	7	抗冲击强度 Impact Strength	参考《光伏玻璃进货检验指导书》 Refer to glass incoming inspection instructions	1040g 钢球 1040g steel ball	每月初/次 Beginning of each month
	8	高透镀膜玻璃透光率 Glass transmittance	参考《光伏玻璃进货检验指导书》 Refer to《glass incoming inspection instructions》	透光率测试仪 transmittance test	每批 Each batch

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检验背板 Backsheet inspection	1	背板厚度 Thickness		尺寸±10% size±10%	千分尺 Microcalliper	每批/5 卷 Each batch/5 roll
	2	剥离强度 Peel Strength		≥40N/cm (涂层 Coating) ; ≥60N/cm（氟膜 Fluorine Film）	拉力计 tension meter	每批 Each batch
	3	层间剥离强度 Inter-layer slipping strength		≥4N/cm	拉力计/百格刀 tension meter/Grid knife	每批 Each batch
	4	收缩率 Shrinkage		横向≤1.0%，纵向≤1.0% broadwise≤1.0%，direction≤1.0%	烘箱 bake oven	每批 Each batch
检验 EVA/POE EVA/POE inspection	1	尺寸 Size	宽度 Width	规格尺寸，公差 0~+5mm，每卷测试 3 个点，边缘锯齿状的以外沿为基准；白色 EVA 公差 0~+7 Spec： tolerance 0 ~ +5mm(white EVA 0～+7mm) Test 3 points on each roll, the outer edge of the serrated edge is the datum	卷尺 Flexible Rule	每批 Each batch
	2		克重 Weight	抽 5 卷用圆盘取样器在每卷上取一个 100cm2 EVA，电子天平上称重记录数值，标准参照《EVA POE 技术协议》 Draw 5 rolls and take a 100cm2 EVA on each roll with a disc sampler,Record the weighing value on the electronic balance,standard refer to 《EVA/POE technology agreement》	圆盘取样器、电子天平 Electronic balance	每批 Each batch
	3		厚度 Thickness	EVA 厚度：规格尺寸，公差 -0.03/+0.08mm	千分尺、测厚规 Microcalliper	每批 Each batch

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				每卷测试 6 个点，每边 3 个值，记录平均值。 EVA thickness spec：tolerance -0.03/+0.08mm Test 6 points on each roll, 3 values on each side, and record the average value		
	4	外观 Appearance	外观 Appearance	参考《EVA 进货检验指导书》《POE 进货检验指导书》 Refer to 《EVA incoming inspection instructions》 《 POE incoming inspection instructions》	/	每批 Each batch
	5	剥离强度 Peeling strength	EVA 与背板 EVA and backsheet	≥40N/cm	拉力测试仪 Tensile strength tester	每批 Each batch
	6		EVA 与玻璃 EVA and glass	EVA 与玻璃 ≥70N/cm；POE 与玻璃≥60N/cm EVA and glass≥70N/cm，POE and glass≥60N/cm，	拉力测试仪 Tensile strength tester;	每批 Each batch
	7	体积电阻率 Volume resistivity		EVA > 1.0*〖10〗^15Ω*cm，白色 EVA > 1.0* 〖 10 〗 ^14 Ω *cm；POE>1.0*〖10〗^15Ω*cm	体积电阻测试仪 Volume resistance tester	每批 Each batch
	8	收缩率：温度 130℃，时间 3min Shrinkage： Tem 130 ° Time3min		横向 < 2%，纵向 < 4% Broadwise≤ 2%，direction≤4% POE：(130℃，3min)：横向<1.5%、纵向<3% POE：(130℃，3min) Broadwise <	烘箱 Bake oven	每批 Each batch

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				1.5%，Direction≤3%		
	9	交联度 Cross linking	POE	75-95%	电子天平、烘箱、萃取装置 Electronic balance 、bake oven	每批 Each batch
	10		EVA	75%-95%		每批 Each batch
检验接线盒 J-Box inspection	1	外观 Appearance 尺寸 Size	尺寸 size	依照《接线盒设计图纸》 refer to《 j-box design drawing》	卷尺、卡尺 Flexible Rule	每批 Each batch
	2		外观 Appearance	依照《接线盒进货检验指导书》 refer to《 J-box incoming inspection instructions》	/	每批 Each batch
	3	二极管性能 Diode performance		依照《接线盒设计图纸》 refer to《 j-box design drawing》	万用表 Multimeter	每批 Each batch
	4	连接线与线缆的抗拉力 Tensile resistance of connecting wire and cable		依照《接线盒进货检验指导书》 Refer to《 j-box incoming inspection instructions》	拉力测试仪 tensile strength tester	每月 every month
	5	焊锡高度 Solder height		依照《接线盒进货检验指导书》 Refer to《 j-box incoming inspection instructions》	卡尺 Caliper	每批 Each batch
	6	正向压降 Forward voltage		依照《接线盒进货检验指导书》 Refer to《 j-box incoming inspection instructions》	万用表 Multimeter	每批 Each batch
	7	绝缘电阻 Insulation resistance		依照《接线盒进货检验指导书》 Refer to《 j-box incoming inspection instructions》	直流低电阻测试仪 DC low resistance tester	每批 Each batch
	8	线缆绝缘电阻 Cable insulation resistance		依照《接线盒进货检验指导书》 Refer to《 j-box incoming inspection	直流低电阻测试仪 DC low resistance tester	每批 Each batch

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				instructions》		
	9	背板粘结强度 Bonding strength of backsheet		依照《接线盒进货检验指导书》 Refer to《 j-box incoming inspection instructions》	拉力计 Tension meter	每月 Every month
检验焊带 Ribbon inspection	1	外观 Appearance 尺寸 size	尺寸 Size	依照《光伏异形焊带进货检验指导书》和《光伏焊带进货检验指导书》 refer to 《 Photovoltaic special-shaped ribbon incoming inspection instructions》and 《PV Ribbon incoming inspection instruction》	显微镜、千分尺、钢直尺或 COA Microcalliper, Steel ruler、COA	每批 Each batch
	2		外观 Appearance		目视/10 倍放大镜、点线规、卡尺、千分尺 Visual/10x magnifying glass, caliber rule, Microcalliper	每批 Each batch
	3	称重 Weighing	称重 Weighing		电子天平 Electronic balance	每批 Each batch
	4	可焊性 Solderability	可焊性 Solderability		电烙铁、拉力机 Electric iron 、 Tensile Tester	每批 Each batch
	5	弯曲度 Curvature	弯曲度 Curvature		直尺、塞尺 Ruler\Feeler	每批 Each batch
	6	电阻率 Electrical resistivity	圆形焊带 Circular welding strip	≤0.022Ω.mm²/m	电阻测试仪 Resistance meter	每批 Each batch
	7		常规焊带电阻率 Normal strip resistivity	≤0.0225Ω.mm²/m	电阻测试仪 Resistance meter	每批 Each batch
	8		低电阻焊带	≤0.0195Ω.mm²/m	电阻测试仪	每批

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			电阻率 Low resistance strip resistivity		Resistance meter	Each batch
	9	屈服强度 Yield strength	屈服强度 Yield strength	依照《光伏异形焊带进货检验指导书》和《光伏焊带进货检验指导书》 Refer to 《 Photovoltaic special-shaped ribbon incoming inspection instructions》and 《PV Ribbon incoming inspection instruction》	万能拉力机 Universal tension machine	每批 Each batch
	10	抗拉强度 Tensile strength	厚 度 ≤ 0.25mm Thickness ≤ 0.25mm	互联条≥150 Mpa、汇流条 > 200 Mpa Interconnection bar ≥ 150 Mpa , Busbar > 200 Mpa	万能拉力机 Universal tension machine	每批 Each batch
	11		厚 度 > 0.25mm Thickness ≤ 0.25mm	互联条/汇流条: > 180mpa Interconnection bar/Busba: > 180 Mpa	万能拉力机 Universal tension machine	每批 Each batch
	12	延伸率 Elongation		互联条>25%，汇流条>30%，不区分厚度 Interconnection bar>25%, Busbar>30%, Regardless of thickness	万能拉力机 Universal tension machine	每批 Each batch
检验硅胶 Sealant Inspection	1	密封胶 Sealant	外 观 Appearance	膏状、无杂质、颗粒、结块、凝胶、气泡 Cream 、 no impurities, particles, caking, gels, bubbles,	/	每月/2 次 Twice per month
	2		固 化 深 度 Cure depth	参照《密封胶进货检验指导书》	卡尺、四氟乙烯板 Caliber rule,	每月/2 次 Twice per month

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				Refer to 《 sealant incoming inspection instructions》	Tetrafluoroethylene plate	
	3		硬 度 Hardness	40-60（Shore-A)	邵氏硬度计 Shore durometer	每月/2 次 Twice per month
	4		表干时间 Surface drying time	参照《密封胶进货检验指导书》 Refer to 《 sealant incoming inspection instructions》	/	每月/2 次 Twice per month
	5		与接线盒粘接性 Adhesion to J-box	48 小时后≥500N 48 Hour Later≥500N	万能拉力机 Universal tension machine	每月/2 次 Twice per month
	6	灌封胶 Potting	外 观 Appearance	无杂质、颗粒、结块、凝胶、气泡等 No impurities, particles, caking, gels, bubbles, etc.	烧杯 Beaker	每月/2 次 Twice per month
	7		固化时间 Curing Time	标准≤24H Standard：≤24H	电子秤 Electronic balance	每月/2 次 Twice per month
	8		粘 度 viscosity	A 组分：3500-8000mpa.s，B 组分：15-80mpa.s （回天 B 组分：170-270mpa.s) A component：3500-8000mpa.s，B component： 15-80mpa.s (Huitian component：170-270mpa.s)	粘度计/COA viscometer/COA	每月/2 次 Twice per month
	9		凝 胶 时 间 Gelation time	标准≤60min standard：≤60min	烧杯 Beaker	每月/2 次 Twice per month
	10		硬 度 Hardness	将样品静置 24H 后进行测试，25Shore-A≤硬度≤35Shore A Test the sample after standing for 24h	邵氏硬度计 Shore durometer	每月/2 次 Twice per month

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检验边框 Aluminous frame inspection	1	尺寸 Size 外观 Appearance	参考《铝型材进货检验指导书》 Refer to 《 Aluminous frame incoming inspection instructions》	卷尺、卡尺、千分尺、角度尺、韦氏硬度仪、塞尺 Flexible Rule、caliber rule、Microcalliper	每批 Each batch
	2	边框氧化膜厚度 Frame oxide film thickness	AA10≥8μm，AVE≥10；	涡流测厚仪 I-MPOD	每批 Each batch
	3	硬度 Hardness	6005 T6 HW≥14，测试 3 个点取平均值为测试硬度 6005 T6 HW≥14，The average value of 3 points is taken as the test hardness	硬度计 Hardometer	每批 Each batch

3. 组件生产过程控制质量检验要求 Module Production Process Control Inspection Requirement

3.1 检验要求 Inspection Requirement

组件生产过程质量检验要求如下：

The requirements for module production process control are as below.

过程名称 Process Name	**步骤名称 Step Name**	**序号 NO.**	**CTQ 产品 CTQ Product**	**CTP 过程 CTP Process**	**规范/公差 Standard/Tolerance**	**测量设备/工具 Measure equipment/tool**	**频率 Frequency**
物料周转 Material turnover	玻璃上料 Glass loading	1	在线玻璃上料环境温度湿度 Ambient temperature and humidity		温度 10～30℃，湿度 10%≤RH≤70% Tem10 ～ 30 ℃ ，	温湿度计 Hygrothermograph	4h

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				humidity10% ≤ RH ≤ 70%		
		2	上料玻璃信息 Glass information	符合订单 BOM 要求 Meet the BOM requirements of the order	目视 Visual	12h
	EVA/POE 裁切 EVA\POE cutting	1	长度尺寸 Length size	符合订单 版图要求 Meet the requirements of order layout	卷尺 Flexible Rule	首件 First article
		2	平整度 Planeness	无褶皱 No fold	目视 Visual	首件 First article
		3	外观 Appearance	干净整洁、无异物、无脏污 Clean and tidy, free of foreign matters and dirt	目视 Visual	首件 First article
		4	材料失效性 Material failure	拆包到使用时间控制≤12h Time control from unpacking to use ≤ 12h	目视 Visual	4h
	背板裁切 Backsheet cutting	1	背板裁切长度 Backsheet cutting length	符合订单 版图要求 Meet the requirements of order layout	卷尺 Flexible Rule	首件 First article
		2	背板开口长度 Backsheet opening length	符合订单 版图要求 Meet the requirements of order layout	卷尺 Flexible Rule	首件 First article
		3	背板开口距离 Backsheet opening distance	符合订单 版图要求 Meet the requirements of	卷尺 Flexible Rule	首件 First article

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				order layout		
		4	开孔效果 Opening effect	穿透、无毛刺 Penetration and no burr	目视 Visual	首件 First article
		5	背板外观 Backsheet appearance	干净整洁、无异物、无脏污 Clean and tidy, free of foreign matters and dirt	目视 Visual	首件 First article
		6	铺设精度 Laying accuracy	居中铺设，不得超出玻璃边缘且EVA与玻璃两边边缘距离之差≤5mm Laying in the middle and not exceed the edge of the glass，Difference between EVA and edges on both sides of glass ≤ 5mm	卷尺 Flexible Rule	首件 First article
		7	材料失效性 Material failure	拆包到使用时间控制≤12h Time control from unpacking to use ≤ 12h	目视 Visual	4h
	焊带准备 Ribbon preparation	1	来料信息 Incoming material information	来料信息与工单信息、符合订单BOM要求 Incoming and order information meet the BOM requirements of the order	目视 Visual	全部 All

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	电池片准备 cell preparation	1	来料信息 Incoming material information	来料信息与工单信息、符合订单 BOM 要求 Incoming and order information meet the BOM requirements of the order	目视 Visual	全部 All
划片 Scribing	电池片上料 Cell charging	1	信息核对 Information check	电池片信息与工单信息一致性：开班及工单切换时核对电池片厂家，规格，颜色，转换效率 Consistency between cell information and order information	目视 Visual	全部 All
	激光划片 Laser Scribing	1	激光划片参数点检 Scribing parameters check list	参数正确符合作业指导书要求 Parameters correct and meet the requirements of operation instructions	目视 Visual	12h
		2	功率 Power	M6: 0-100% ； M10: 80±20%	目视 Visual	12h
		3	切割深度 Cutting depth	M6: 50% ± 15% ； M10: 50%±10%	显微镜 Microscope	首件 First article
		4	切割后外观 Appearance after cutting	无崩边、无脱晶 No edge collapse and no crystallization	目视 Visual	1 次/每片 Once / piece
焊接	焊接	1	正面焊接拉力	参数正确符合作业指	拉力计	12h

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Soldering	Soldering		Front soldering tension		导书要求 Parameters correct and meet the requirements of operation instructions	Tension meter	
		2	背面焊接拉力 Back soldering tension		参数正确符合作业指导书要求 Parameters correct and meet the requirements of operation instructions	拉力计 Tension meter	12h
		3	焊带偏移 Ribbon offset		参考附件 1《组件外观检验标准》 Referring to Annex 1《 Module Appearance Inspection Criteria》	菲林尺 Microrule	首件 First article
		4	电池串长度 Cell string length		参考版型图纸要求 refer to drawing requirements	卷尺 Flexible Rule	首件 First article
		5	电池片片间距 Cell spacing		参考版型图纸要求 refer to drawing requirements	菲林尺 Microrule	首件 First article
串检 Serial inspection	外观检查 Appearance inspection	1	焊接后电池片外观 Appearance of cell after soldering	露白、片间距、破片、虚印等不良 Exposed white, film spacing, fragments, false printing and other defects	参考附件 1《组件外观检验标准》 Referring to Annex 1《 Module Appearance Inspection Criteria》	目视/菲林尺 Visual/microrule	首件 First article
	EL 检查	2	EL	隐裂、明暗、破片、短路、	参考附件 2《组件外观	EL 测试仪	24h

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	EL inspection			黑心、同心圆、虚焊 Mic-crack、Scrack、short circuit、black center、poor soldering	检验标准》 Referring to Annex 2 《 Module EL Inspection Criteria》	EL Tester	
排版 Composing	电池片进料 Cell feed	1	电池串位置 Cell string position		符合图纸、外观标准要求（串间距/错位/方正偏移） Meet the requirements of drawings and appearance standards	目视 Visual	首件 First article
		2	电池串极性 Cell string polarity		玻璃面从左往右依次为正负性交替 The glass surface is alternately positive and negative from left to right	目视 Visual	首件 First article
叠层 Lay up	间距 Pacing	1	电池串间距定位 Cell string spacing positioning		符合订单版图实际要求 Meet the requirements of order layout	菲林尺 钢尺 Microrule、steel rule	12h
		2	电池片距离玻璃长边 Distance between the cell and the long side of the glass		符合订单版图实际要求 Meet the requirements of order layout	菲林尺 钢尺 Microrule、steel rule	12h
		3	电池片距离玻璃短边 Distance between the cell and the short side of the glass		符合订单版图实际要求 Meet the requirements of	菲林尺 钢尺 Microrule、steel rule	12h

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				order layout		
	设备焊接 Equipment soldering	1	汇流条裁切尺寸 Busbar cutting size	参考图纸标准 referance drawing standard	卷尺 Flexible Rule	12h
		2	电池片到玻璃长边距离 Distance between the cell and the long side of the glass	符合制作手册版图要求 Meet the requirements of order layout	直尺 菲林尺 ruler/microrule	24h
		3	外观性能 Performance	无堆锡、无崩边、缺角、碎片 No crack and unfilled corner	目视 Visual	24h
	EVA POE 铺设 EVA/POE laying	1	开孔位置 效果 Effect of opening position	符合制作手册版图要求 Meet the requirements of order layout	卷尺/菲林尺 Flexible Rule/microrule	首件 First article
		2	EVA 长边长度（2 个长边） EVA long side length(2 long sides)	符合制作手册版图要求 Meet the requirements of order layout	卷尺/菲林尺 Flexible Rule/microrule	首件 First article
		3	EVA 外观 EVA Appearance	干净整洁、无异物、无脏污、无褶皱 Clean and tidy, no dirty and wrinkles	目视 Visual	首件 First article
	铺背板（适用于单玻） Lay back sheet (For single glass	1	"背板条码粘贴位置 Pasting position of backsheete bar code"	参考制作手册和版图要求 Meet the requirements of order layout	目视 visual	首件 First article
		2	"引出线超出背板长度 outgoing line exceeds the length of the	参考制作手册和版图要求	目视 visual	首件 First article

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	product)		backsheet"	Meet the requirements of order layout		
		3	"背板长边长度（2 个长边）backsheet long side length(2 long sides)"	参考制作手册和版图要求 Meet the requirements of order layout	"卷尺/菲林尺/工装 Flexible Rule/microrule"	首件 First article
		4	材料失效性 material failure	"拆包到使用时间控制≤12h Time control from unpacking to use ≤ 12h"	目视 visual	首件 First article
	背玻铺设（适用于双玻）Back glass laying (For Dual glass product)	1	玻璃铺设精度 Glass laying accuracy	玻璃铺设后上下偏差≤2mm Upper and lower deviation after glass laying≤2mm	目视 visual	首件 First article
镜检& EL 测试 Appearance & EL inspection	外观检查 Inspection	1	外观检测 Appearance test	参考附件 1《组件外观检验标准》Referring to Annex 1《Module Appearance Inspection Criteria》	目视/菲林尺/钢直尺 Visual/microrule	100%
	EL 检测 EL testing	1	相机曝光时间 Camera exposure time	参考《镜检&EL 测试作业指导书》reference《Operation instruction for mirror inspection &el test 》	目视 Visual	12h
		2	EL 检测 EL	隐裂、虚焊、破片、短路	参考附件 2《组件 EL	目视 Visual	24h

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			test	等 Micro-crack, faulty soldering, crack, short circuit, etc.	检验标准》 Referring to Annex 2《 Module EL Inspection Criteria》		
组件层压 Laminating	组件层压 Laminating	1	一段层压 Primary lamination	温度、真空度、层压时间等 Temperature, vacuum degree, lamination time, etc	参考层压参数表 Refer to lamination parameter table	目视 Visual	12h
		2		层压压力 Pressure	参考层压参数表 Refer to lamination parameter table	目视 Visual	12h
		3		极限真空 Kpa Extreme vacuo Kpa	羿珩：120s 内小于 70Pa 金辰：120s 内小于 110Pa Yixing： Less than 70pa within 120s Jincheng：Less than 110pa within 120s	目视 Visual	12h
		4	二段层压 Two stage lamination	温度、真空度、层压时间等 Temperature, vacuum degree, lamination time, etc.	参考层压参数表 Refer to lamination parameter table	目视 Visual	12h
		5		层压压力 Pressure	参考层压参数表 Refer to lamination parameter table	目视 Visual	12h
		6		极限真空 kpa Extreme vacuo Kpa	羿珩：120s 内小于 70Pa 金辰：120s 内小于 110Pa	目视 Visual	12h

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					Yixing： Less than 70pa within 120s Jinchen： Less than 110pa within 120s		
		7	可靠性 Reliability	交联度：POE\EVA 标准值： Cross-linking： POE\EVA standard value	75%-95%	二甲苯 Dimethylbenzene	24h
		8		玻璃与 POE/EVA 剥离强度 Peel Strength between glass and POE/EVA	POE ≥60N/cm EVA ≥70Ncm	拉力计 Tension meter	每月 Every month
		9		背板与 EVA\POE 剥离强度 Peel Strength between backsheet and POE/EVA	≥40N/cm	拉力计 Tension meter	每月 Every month
层压检 Laminator inspection	层压检 Laminator inspection	1	组件外观 Appearance	如脏污、露白、裂片等 Dirt, whiteness, crack, etc.	参考附件 1《组件外观检验标准》 Referring to Annex 1《Module Appearance Inspection Criteria》	菲林尺 microrule	2h
		2		如脏污、露白、裂片等 Dirt, whiteness, crack, etc.		菲林尺 microrule	2h
		3		组件安全距离 Safe distance	符合版型图纸要求 Meet the requirements of order layout	钢直尺、菲林尺、工装 microrule 、 steel ruler	2h
装框 Framing	边框打胶 Frame gluing	1	长边框打胶克重 Gluing gram weight of long frame		参考作业指导书&制作手册要求 Refer to operation instruction	电子天平 Electronic balance	4h

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					& production manual requirements		
		2	短边框打胶克重 Gluing gram weight of short frame		参考作业指导书&制作手册要求 Refer to operation instruction & production manual requirements	电子天平 Electronic balance	4h
	装框 Framing	1	装框外观 Appearance after framing	组框后边框间隙 Border gap	参考附件 1《组件外观检验标准》 Referring to Annex 1 《 Module Appearance Inspection Criteria》	目视 Visual	24
		2		边框错位 Frame dislocation	参考附件 1《组件外观检验标准》 Referring to Annex 1 《 Module Appearance Inspection Criteria》	目视 Visual	24
		3		组件尺寸长、短边公差 Tolerance of long and short sides	±2mm	卷尺 Flexible Rule	12h
		4		边框安装孔尺寸 Mounting hole size	符合图纸要求，安装孔之差≤1mm，漏水孔之差≤1.5mm Comply with drawing requirements , Mounting hole difference ≤ 1mm , Leakage hole difference≤1.5mm	卷尺 Flexible Rule	12h

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安装接线盒 J-Box placement	接线盒打胶 Gluing of junction box	1	接线盒打胶胶量 Gluing amount of junction box	参考接线盒打胶用量标准/参考订单手册 Refer to the standard for gluing amount of junction box/Order manual	电子天平 Electronic balance	12h
		2	接线盒型号 J-Box model	参考订单 BOM reference BOM	目视 Visual	24
	安装接线盒 J-box placement	1	接线盒区域温湿度 Temperature and humidity in j-box area	10-30℃，20%≤RH≤70%	温湿度计 Hygrothermograph	4h
		2	接线盒胶线 Junction box glue wire	参考附件 1《组件外观检验标准》 Referring to Annex 1《Module Appearance Inspection Criteria》	卷尺、目视 Tape, Visual	24H
	接线盒焊接 01503J-Box soldering	1	焊接温度 Soldering Temperature	Resistance welding: 300±40℃ Magnetic discharge welding: 15±5A	目视 Visual	12h
		2	焊接时间 Soldering time	Resistance welding: M6：1～4s, M10：1～4.5s Magnetic discharge welding: M6：0.5～2.5s, M10：0.5～2.5s	目视 Visual	12h
		3	焊接效果 soldering effect — 引出线焊接面积 Welding area of outgoing line	焊接面积≥80% Welding area≥80%	钢直尺 Steel ruler	24h
		4	焊接外观 Welding appearance	无虚焊，漏焊、有效焊接长度满足要求 No poor soldering	目视 Visual	24h

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					and missing soldering, effective welding length meets the requirements		
接线盒灌胶 J-box gluing	灌封胶 Gluing	1	AB 胶配比 AB glue ratio		参考灌胶用量标准/订单手册 Refer to glue filling dosage standard /Order manual	电子天平 Electronic balance	3h
		2	AB 胶小样表干时间 Surface drying time of AB glue sample		30min	电子天平 Electronic balance	3h
		3	接线盒灌胶胶量 Glue filling amount of junction box		参考灌胶用量标准/订单手册 Refer to glue filling dosage standard /Order manual	电子天平 Electronic balance	12h
		4	灌胶后外观 Potting appearance	溢胶 Excessive glue	参考附件 1《组件外观检验标准》 Referring to Annex 1《 Module Appearance Inspection Criteria》	目视 Visual	12h
		5		缺胶 Starved		目视 Visual	12h
固化 Curing	固化 Curing	1	固化房温湿度 Temperature and humidity		RH≥70% 25℃±2℃	温湿度计 Hygrothermograph	2h
		2	组件固化时间 Curing time		≥3h	目视 Visual	12h
锉角 File angle	锉角 File angle	1	自动锉角边框外观 Border appearance		无毛刺 No burr	目视 Visual	12h
		2	边框无间隙 Frame without gap		参考附件 1《组件外观检验标准》 Referring to Annex 1《 Module	塞尺 Feeler gauge	12h

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				Appearance Inspection Criteria》		
背面清洗 Back cleaning	背面清洗 Back cleaning	1	接线盖盒盖效果 J-Box cover effect	无松动，不允许有脱落 No falling off is allowed	目视 Visual	24h
		2	清洗后的组件背面不允许有明显脏污 No obvious dirt is allowed	干净，无可视脏污 Clean and no visible dirt	目视 Visual	24h
		3	上电工装连接 Upper electrical installation connection	连接牢固 Firm connection	目视 Visual	24h
绝缘耐压测试 Hi-Pot Test	测试 Hi-Pot Test	1	耐压测试 Hi-Pot	1500V 组件直流耐压测试:电压 4800VDC,漏电流≤50μA,升压时间 10s,测试时间 1s,电压升速≤500V/s ； DC withstand voltage test of 1500V module : DC Voltage4800V , Leakage current≤50μA，rising time 10s，test time 1s，rate of voltage rise≤500V/s	耐压设备 Voltage equipment	24h
		2	绝缘测试 Insulation test	直流电压 1500V 绝缘电阻≥40MΩ*m²，测试 1s DC Voltage1500V，insulation resistance	绝缘设备 Insulation equipment	24h

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				≥40MΩ*m² and test 1s.		
		3	接地连续性测试 Ground continuity test	M6：以 62.5A 的恒定电流（组件最大允许通过安全电流的 2.5 倍）测试，测试电阻要＜0.1Ω，测试时间 1s； M10：以 75A 的恒定电流（组件最大允许通过安全电流的 2.5 倍）进行测试，测试电阻＜0.1Ω，测试时间 1s； M6: Taking 62.5A constant current(2.5 times maximum safety current of module), resistance ＜0.1Ω, test duration time 1s. M10: Taking 75A constant current(2.5 times maximum safety current of module), resistance ＜0.1Ω, test duration time 1s.	测试设备 Testing equipment	24h
正面清洗 Front cleaning	正面清洗 Front cleaning	1	玻璃面 Glass surface	无 EVA、硅胶脏污，边框溢胶 No EVA, silica gel	目视 Visual	24H

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					dirt, frame glue overflow		
功率测试 Power test	标准 Calibration	1	组件温湿度 Temperature and humidity	温度 Temperature	组件：25±2℃ module：25±2℃ 标片：25±1℃（2级标板的校准温度） Reference module：25±1℃（Calibration temperature of level 2 standard plate）	温湿度计 Hygrothermograph	4h
		2		湿度 Humidity	10%<RH<70%		4h
		3	校准光强控制 Calibration intensity control		1000±20W/m²	目视 Visual	24
		4	标板EL隐裂检测 El crack detection of reference module		参考附件2《组件EL检验标准》 Referring to Annex 2《Module EL Inspection Criteria》	EL测试 EL test	12h
		5	标板洁净度 Cleanliness of reference module		表面洁净无脏污 Surface is clean and no dirt	目视 Visual	4h
		6	灯管更换周期 Lamp tube replacement cycle		众森：≤8万次，更换后达到3A要求 Pasan：≤10万次，更换后达到3A要求 ≤100000 times, meeting 3A requirements after replacement	IV测试仪 IV test	24h

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		7	测试曲线 Test curve	平滑无台阶 Smooth without steps	IV 测试仪 IV test	24h
		8	监控电池的洁净度 The cleanliness of monitor cell	表面洁净无脏污 Surface is clean and no dirt	IV 测试仪 IV test	4h
		9	校准波动 Calibration fluctuation	不同时间段：（-0.4%）≤ΔPmax≤0.4% Different time periods：（-0.4%）≤ΔPmax≤0.4%	IV 测试仪 IV test	4h
双面组件功率测试 Bifacial Module Power test	标准 Standard	1	双面率测试 Bifaciality test	根据产品规格书参数 According to Datasheet	IV 测试仪 IV test	10pcs/月
EL 测试 EL Test	EL 测试 EL Test	1	分辨率 Resolution	0.4~0.6(B 级) 0.4~0.6(B Grade)	分辨率纸 Resolution paper	每月 every month
		2	EL 图片确认 EL picture confirmation：虚焊、隐裂、短路、破片等不良 Poor soldering, micro crack, short circuit, fragment, etc	参考附件 2《组件外观检验标准》 Referring to Annex 2《Module EL Inspection Criteria》	EL 测试仪 EL Tester	24h
粘贴铭牌 Pasting nameplate	粘贴铭牌 Pasting nameplate	1	条码是否正确 Barcode correct or not	三码一致 Three codes are consistent	目视 Visual	24h
		2	铭牌粘贴 Nameplate pasting	无歪斜气泡 No skew and no bubble	目视 Visual	12h
		3	打印字迹 Print handwriting	无可视断针,字迹清	目视 Visual	12h

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					晰，可辨识，符合图纸要求 Handwriting is clear and No visible broken needle , Comply with drawing requirements		
		4	打印信息正确 Print information		信 息 正 确 Information correct	目视 Visual	12h
		5	黏贴位置 Adhesive position		符 合 图 纸 要 求 Comply with drawing requirements	目视 Visual	12h
终检 FQC	检验 Inspection	1	玻璃面外观检查 Visual inspection of glass surface	电池片破片、间距、偏移、划伤、气泡等 Check the cell for fragments, spacing, offset, scratch, bubbles, etc.	参考附件 1《组件外观检验标准》 Referring to Annex 1《 Module Appearance Inspection Criteria》	目视/卷尺/直尺 Visual/ flexible rule	24h
		2	背板面外观检查 Appearance inspection of backplane surface	背板划伤 脏污 溢胶 边框 线盒 线缆等 Check the backsheet for scratches, dirt, glue overflow, frame, junction box, etc.	参考附件 1《组件外观检验标准》 Referring to Annex 1《 Module Appearance Inspection Criteria》	目视/卷尺/直尺 Visual/ flexible rule	24h
		3	条码检查 Barcode inspection	字迹 内容 外观 Handwriting, content, appearance	符合工单 图纸要求，打印字迹清晰， 内容正确 Meet the requirements of work order drawings，The printing handwriting	目视/卷尺/直尺 Visual/ flexible rule	24h

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					is clear		
		4	铭牌检查 Label inspection	字迹 内容 外观 Handwriting, content, appearance	无气泡 褶皱 字迹清晰 内容正确 No bubbles and folds, clear handwriting and correct content	目视/卷尺/直尺 Visual/ flexible rule	24h
包装 Packing	包装 Packing	1	唛头 标签 Shipping and label		字迹清晰、位置、内容信息符合制作手册及订单要求 The handwriting is clear , location&content information meet the requirements of the production manual and order	目视 Visual	每拖 Per drag
		2	纸箱 托盘 Carton and pallet		无破损，符合制作手册机订单要求 、缠绕方式正确、放 PE 膜 No damage and meeting the order requirements of the production manual，	目视 Visual	每拖 Per drag
		3	包装方式 Packaging		符合制作手册 图纸要求，包装无破损 Meet the requirements of production manual and drawings, and the package is free of damage	目视 Visual	每拖 Per drag

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4. 组件出厂检验标准 Module Pre-shipment Inspection Requirement

4.1 出厂检验基本条件 Pre-shipment Inspection Basic Conditions

4.1.1 抽样及 AQL 标准 Sampling and AQL standards

抽样水平：参照 ISO2859-1:1999 标准，一般检验水平 I 适用于外观、EL 和功率检验，特殊检验水平 S-3 适用于绝缘耐压和接地检验。

Sampling Level: General Inspection Level I according to ISO2859-1:1999 is applicable for Visual, EL and Power Inspections, Special Inpsection Level S-3 is applicable for Hi-Pot and Grounding Inspection.

AQL 标准：关键性不良 Cr: AQL 0，主要不良 Ma: AQL 1.5，次要不良 Mi: AQL 4.0。适用于所有检验项目，但不同的检验项目按照对应的不良类型需单独统计 AQL。

AQL Standard: Critical defect AQL 0, Major defect AQL 1.5, Minor defect AQL 4.0. This AQL is applicable for all inspections, but AQL shall be calculated separately for each different inspection and defect level.

4.1.2 隆基标准验货次数 LONGi standard inspection times

第一次验货不通过，剔除不符合隆基标准产品后，对第一次不通过的检验项目进行第二次验货，第二次不通过进行全部返工后，对第二次仍不通过的检验项目进行第三次验货，第三次验货不通过拒货。

If the first inspection is fail, carry out the second inspection for the failed inspection item in first time after removing the products that do not meet the LONGi standard. If the second inspection is fail, all product rework and carry out the third inspection for the failed inspection item in second time. If the third inspection fail, reject.

4.1.3 隆基标准验货批次 LONGi standard inspection batch

标准验货可以按照 15~20MW/批次进行。

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Standard inspection batch volume can be 15MW~20MW.

4.1.4 隆基标准验货测试项目 LONGi standard test items

指在厂内验货线进行的基本项目，包括外观，EL，功率，绝缘耐压，接地。

Refers to the basic items carried out in the factory inspection line, including appearance, EL, power, Hi-pot, Grounding inspections.

4.2 组件外观检验 Module Appearance Inspection

4.2.1 检验条件 Inspection Condition

4.2.1.1 检验员：矫正视力>0.8，无色盲；Inspector：Naked or corrected acuity of human eyes above 0.8，No color-blind.

4.2.1.2 室内检验：光照强度 700-1000LUX，外观目视检验距离 80cm-100cm。正视查看不良角度 0~90°，检验方式:翻转检查；检验频次：100%全检；检验时间：不少于 5s.

Indoor inspection: Module inspection condition: Luminance within 700-1000 lux, Overall appearance viewed at a distance of 80cm-100cm；An approximate angle of 0~ 90°（perpendicular) to the surface， Inspection method: flip inspection; Inspection frequency: 100% full inspection; Inspection time: no less than 5s:

室外检验：光照强度 1000LUX 以上，外观目视检验距离 80cm-100cm；检验角度:顺光 0~180°；检验方式：目视移动检查；检验频次：同版型 3pcs，检验时间不少于 5s.

Outdoor inspection: Light intensity above 1000LUX, visual inspection distance of appearance 80cm-100cm; Inspection Angle: smooth 0~180°;

4.2.1.3 工具：直尺、游标卡尺、菲林尺、检验工装等；Tools: Ruler/Vernier caliper/Film size/Inspection tooling.

4.2.1.4 不良面积界定：规则图形（如圆形、矩形、三角形）的面积按不良实际面积计算，不规则图形以外切矩形的近似面积计算。

Defect area judgment: Regular graphics (such as circle/ rectangle/ triangle): Calculate the actual area. Irregular graphics: Calculate the area of enclosing rectangle.

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4.2.1.5 数量定义：电池数量均为半片电池数量概念，涉及标准为百分比的不能整除的，四舍五入取整数（如 1.6 片取整后为 2 片），但结果＜1 片的按 1 片计算。quantity: the number of batteries is the concept of the number of half cells, Refers to the standard percentage is not divisible, rounded to an integer (such as 1.6 pieces rounded to 2 pieces), but the result < 1 piece is calculated as 1 piece

4.2.1.6 长度定义：长度数值是整片电池边长或者半片电池长边 Length: the length value is the length of the whole battery or the long side of half a cell

4.2.1.7 面积定义：面积大小是整片电池概念 Area: Area size is the whole cell concept

4.2.1.8 缺陷判定： 组件正背面单独判定；有特殊注明背面要求的，按照要求判定。Module front and back separately determined; Where there is a special indication of the requirements on the reverse side, it shall be judged according to the requirements.

4.2.2 术语定义 Terms and definitions

外观标准：按照材料类型，分为 1.电池片相关（单双面区分）、2、焊带相关、3.玻璃相关（含单双玻区分）、4.背板相关（含单双玻区分）、5.边框相关、6.铭牌相关、7、接线盒相关。

Appearance standard: According to the type of material, it is divided into 1、cell related（Single and double sided）,2、Ribbon related 、3、glass related(including single/double glass module), 4、back plate related(including single/double glass module),5、frame related, 6、Label related、7、junction box related.

边框 A 面：组件玻璃面侧，默认为装饰面，组件安装后，能被客户能看到或长时间使用到的一面。

Side A: the glass side of the component, which is the decorative surface by default. After the component is installed, it can be seen or used by customers for a long time.

边框 B 面：组件侧面，默认为非装饰面，组件安装后，不能被客户看到或长时间不使用的一面。

Side B: the side of the component, which is non decorative by default. After the component is installed, it cannot be seen by the customer or will not be used for a long time.

边框 C 面：组件背板面侧，默认为非装饰面，组件安装后，不能被客户看到或长时间不使用的一面。

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Side C: the side of the back panel of the module, which is not decorative by default. After the component is installed, it cannot be seen by the customer or will not be used for a long time.

4.2.1 检验标准 Inspection criteria

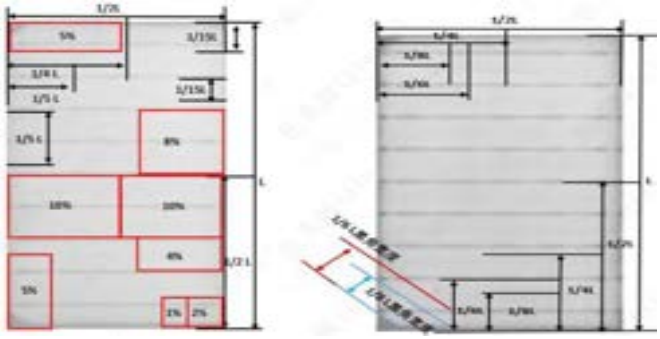
参考附件 1 组件外观检验标准，按照每个项目列出的不良类型和相应的 AQL 判定。

Refer to Annex 1 Module Appearance Inspection Criteria, judged according to listed defect level and related AQL for each item.

4.3 组件 EL 检验 Module EL Inspection

4.3.1 面积判定示意图 Area determination diagram

Hi-MO5 半片电池面积图示 Area determination diagram for half cell of Hi-MO5



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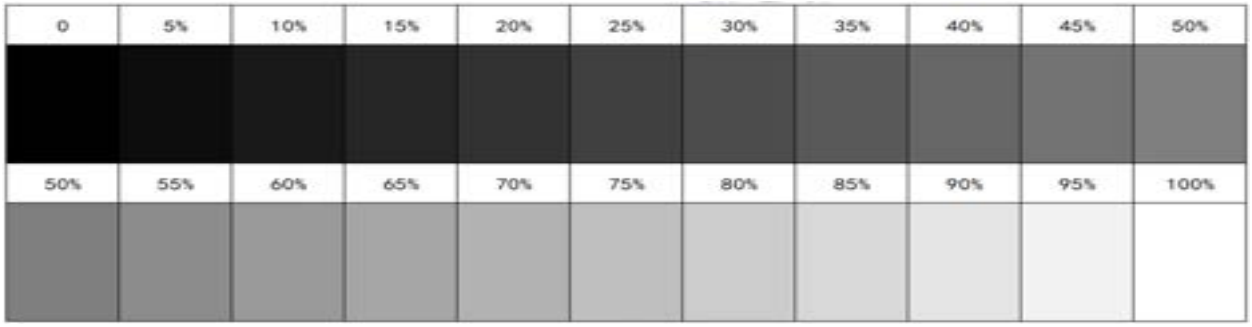
4.3.2 光伏组件灰度尺标准 Module Gray scale Standard



灰度：灰度量化概念请按照以上灰度尺为准。

Gray scale: the concept of grayscale quantization should be based on the above gray scale.

灰度对比说明：电池单片上缺陷灰度与单片整体灰度进行对比；电池整片灰度与组件其他电池片灰度对比.

The grayscale of defects on a single cell was compared with that of the whole cell. The grayscale of the whole cell is compared with that of other cells in the module

数量：电池数量均为半片电池数量概念。

Quantity: the number of batteries is the cOncept of the number of half cells.

长度：长度数值是整片电池边长或者半片电池长边。

Length: the length value is the length of the whole battery or the long side of half a cell.

面积：面积大小参考半片电池图例。

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Area: refer to the legend of half cell.

4.3.3 组件 EL 判定及标准图示 EL inspection criteria and limit/sample picture

参考附件 2 组件 EL 检验标准，按照每个项目列出的不良类型和相应的 AQL 判定。

Refer to Annex 2 Module EL Inspection Criteria, judged according to listed defect level and related AQL for each item.

4.4 功率检验 Power Inspection

检验标准 Inspection criteria

1. 复测平均功率≥平均铭牌功率，合格

Average retest power ≥ Average nameplated power，OK.

2. 复测单块功率 < 铭牌功率*99.5%，不允许。

Individual retest power < Nameplated power * 99.5%, Not allowed.

3. 铭牌功率*99.5% ≤ 复测单块功率 < 铭牌功率，按照次要不良 AQL 2.5 判定。

Nameplated power * 99.5% ≤ Individual retest power < Nameplated power, judged according to Minor defect AQL 4.0.

4.5 绝缘耐压检验 Hi-pot Inspection

检验标准 Inspection criteria

漏电流小于 0.05mA，按照关键不良 AQL 0 判定。

Current leakage < 0.05mA, judged according to Critical defect AQL 0.

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4.6 接地检验 Grounding Inspection

检验标准 Inspection criteria

测试电阻 < 1Ω，按照关键不良 AQL 0 判定。

Resistance < 1Ω, judged according to Critical defect AQL 0.

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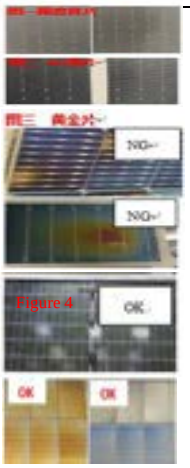
附件 1 组件外观检验标准

Annex 1 Module Appearance Inspection Criteria

检验项目 Inspection Item	缺陷 Defect name	缺陷等级 Defect grade	图片 Reference pictures	QA级 Grade QA
1、电池片 Cell	1.1色差 Color contrast	轻微缺陷 Minor		1) 组件整体颜色呈中蓝、深蓝、深深蓝、不允许混色（不同颜色出现在同一块组件中），图一为限度样片，超出不允许，图二为OK图片 ，具体以实物封样为准 2）单片中镀膜导致的黄金片、彩虹片不允许，左图三 3）整体背面颜色不管控包含氮氧化硅镀膜工艺,左图四 1)The overall color of each module should be uniform （(medium/dark blue/dark dark blue blue） ；colour mixture; (different color in one module not allowed) Figure 1 is the limit sample, which is beyond the allowable limit, and Figure 2 is the OK picture 2) single film coating caused by gold film，rainbow film is not allowed 3）the overall back color is not controlled including the silicon oxide coating process

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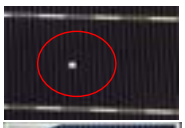
	1.2 电池片污痕（正、背面） Stain(Front/ back side)	轻微缺陷 Minor	 	1）手指印：不允许； 2）脏污：单个≤20mm²，单片电池片≤1 个，同一组件脏污电池片≤ 5%组件电池片总数 3）助焊剂印迹：单片电池片总面积≤10mm²，同一组件助焊剂电池片≤4%组件电池片总数 Front and back side count and judge separate 1) Finger prints not allowed. 2) Stain: area≤20㎜², amount per cell ≤ 1 Affected cell qty./module ≤ 5% total module cells 3）Scaling powder Imprint:Sigle Cell Area ≤10㎜², Affected cell qty./module≤ 4% total module cells
	1.3.电池片划痕（正面） Scratch of cell（front side）	轻微缺陷 Minor	 	1）可见划痕长度≤20㎜， 2）单片电池片划痕≤2处， 同一组件划痕电池片≤5%组件电池片总数 1) Visible scratch length ≤ 20mm 2) Scratch qty./cell ≤ 2 Affected cell qty./module ≤5% total module cells
	1.4.电池片白斑（正背面） White spot(front /blackside)	轻微缺陷 Minor	 	正面 1）面积≤0.05㎜²，不计片数和个数； 2）0.05㎜2＜单个面积≤3㎜² 单片电池片白斑数量≤2 个，同一组件白斑电池片数量≤5%组件电池片总数 背面 1)直径≤3㎜，不计个数和片数 2)3㎜＜直径≤10㎜，单片＜8 个；单块组件白斑电池片数量≤15%组件电池片总数； 3)直径＞10㎜，不允许

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				Front Side: 1) Area≤0.05mm², no counting amount of cell and white spot. 2) 0.05mm2<Area of each white spot≤3mm² Amount in each cell≤2; Amount of cell in each module≤5% total module cells Black Side: 1) Diameter≤3mm, no counting amount of cell and white spot. 2) 3mm<Diameter of white spot≤10mm, Amount in each cell≤8;Amount of cell in each module≤15% total module cells 3)Diameter>10mm,not allowed
	1.5 断栅（正面） Broken finger(Front side)	轻微缺陷 Minor		1）长度≤1mm：单片电池数量不计，同一组件断栅电池片数量不限 2）1mm<断栅长度≤2mm （非连续断栅）：单片电池片断栅数量≤2处，同一组件断栅电池片数量≤5%组件电池片总数 3）长度>2mm，不允许 1)length of broken finger≤1mm: no counting amount of cell and white spot 2) 1mm<length of broken finger ≤ 2mm: Amount of broken finger ≤2per cell; Amount of cell with broken finger≤5% total module cells 3) length of broken finger Broken finger>2mm,not allowed.
	1.6 脱晶（正、背面单独判定） Silicone peel off(front side and back side judged separately)	轻微缺陷 Minor		正背面单独判定 1)面积≤1mm²，单片≤2个，片数不计； 2)1mm²<面积≤5mm²，单片电池片≤2处，单块组件≤3%组件电池片总数 1) Affected area ≤ 1mm²,amount ≤2per cell，cell amount

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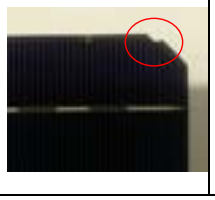
				no need to count; 2) 1mm² ＜Affected area≤5mm²，≤2per cell; cell amount ≤3% total module cells
	1.7崩边 Edge Chip	轻微缺陷 Minor		边沿缺失，厚度方向没有贯穿整片电池片厚度 1)长度≤3mm，宽度≤0.5mm， 2)单片电池片≤2处，单块组件≤3%组件电池片总数 The edge is missing and the thickness direction does not run through the whole thickness of the cell 1)Length≤3mm;Width0.5mm; 2)Amount of edge chip ≤2per cell; Amount of cell with edge chip ≤3% total module cells
	1.8 缺角 Corner chipped	重要缺陷 Major		边沿缺失，贯穿整个电池片厚度 V形、锯齿不允许； 其他参考崩边标准 The edge is missing, and the thickness direction runs through the thickness of the whole cell "V" chip or zigzag notch Not allowed，Other reference Edge Chip standards

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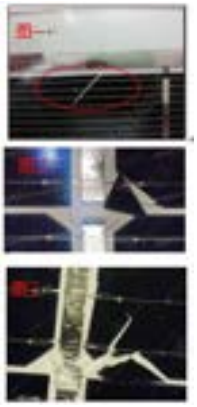
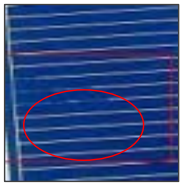
	1.9 碎片/穿孔 Breakage/ pinhole	重要缺陷 Major		不允许 Not allowed
	1.10 虚印（正背面） Poor printing	轻微缺陷 Minor		轻微非断开的虚印 1）正面单块电池片虚印面积≤12cm^2，单块组件≤5%组件电池片总数 2）背面： 不管控 Slight no breaking virtual print 1）Front：Area of poor printing per cell≤12cm^2 ,Amount of cell with poor printing ≤5% total module cells 2）Back：No requirement

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	1.11 栅线氧化 Finger Oxidation	轻微缺陷 Minor		1）单块电池片氧化面积≤20cm^2，单块组件≤5%组件电池片总数 2）背面： 不管控 1）Slight non breaking virtual print Front：Area of poor printing per cell≤20cm^2 ,Amount of cell with poor printing ≤5% total module cells 2）Back：No requirement
	1.12边缘白印 Edge white print	轻微缺陷 Minor		1）月牙形、长条形目视可见的彩虹印不允许; 2）宽度≤1mm线状边缘白印，长度≤20mm，单片电池片划痕≤3处；同一组件电池片≤3%组件电池片总数 1. the crescent shaped and long strip-shaped rainbow print visible by visual inspection is not allowed; 2. White mark on linear edge with width ≤ 1mm, determined according to scratch standard: length ≤ 20mm, single cell scratch ≤3; Scratch cells of the same component ≤ 3% total module cells

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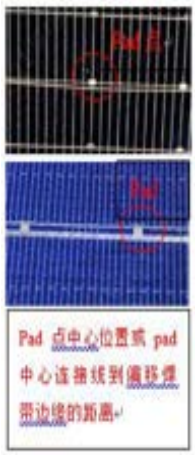
2 焊带 Busribbon	2.1.焊带偏移 Ribbon Shifted	轻微缺陷 Minor		9BB: 1） 焊带偏离主栅线≤2mm，偏移数量不超过组件总焊带数量的 5% 2）每根焊带允许空焊点≤2(不包括头尾焊点) 1)ribbon shifted Bus-bar ≤2mm, Total number shall not exceed 5% of the total number of weld belts 2)Empty solder joints of Each Ribbon ≤ 2（head and tail solder joints are not included） 18BB: 1）鱼叉位置：焊带偏离主栅线在鱼叉内，数量不计，超出鱼叉位置按照主栅线要求管控； 2）正面主栅线位置：焊带偏离主栅线＜3mm，每根焊带允许空焊点≤3（不包括头尾焊点），每片≤2 根，总数不超过总焊带数量的 3%； 背面主栅线位置：焊带偏离主栅线＜3mm，每根焊带允许空焊点≤4（不包括头尾焊点），每片≤2 根，总数不超过总焊带数量的 3%； 3）焊带偏离主栅线≥3mm，不允许 1) Harpoon position: The welding strip deviates from the main grid line within the harpoon (not exceeding the edge lines on both sides of the harpoon), and the quantity is not allowed. The position beyond the harpoon is controlled according to the requirements of the main grid line 2) Main grid line position ： ribbon shifted Bus-bar ≤3mm ； Empty solder joints of Each Ribbon ≤ 3（head and tail solder joints are not inluded），Single cell≤2,，Total number shall not exceed 3% of the total number of weld belts

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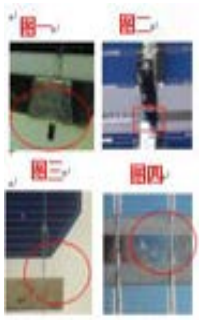
				3）Welding strip deviation from the main grid line ≥ 3mm, not allowed
	2.2.焊带与汇流条搭接 Junction of ribbon and connector	轻微缺陷 Minor		1) 未剪焊带超出汇流条≤2mm,焊带与汇流条 2) 完全接触 左图一，涉及汇流与汇流条焊接的,超出部分≤2mm，汇流条与汇流条完全接触 如图一 图二 2) 汇流条超出焊带0-6mm 如图三 3) 汇流带与焊带焊接长度≥1.5mm，如图四 1) Uncut ribbon length ≤ 2mm Ribbon should contact completely with bus-bar. 2) Ribbon to bus-bar Distance0-6mm 3) Ribbon of Junction and weld length≥1.5mm
2 焊带 Bus-bar	2.3.汇流条位置偏移 Bus-bar shifted	轻微缺陷 Minor		1、汇流条与电池片之间≥1mm 2、汇流条与铝边框之间≥1mm 1、 Gap between bus-bar and cell≥1mm 2、 Gap between bus-bar and frame≥1mm

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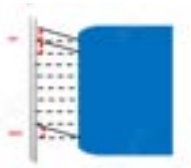
	2.4.汇流条位置偏移 Bus-bar shifted	轻微缺陷 Minor		头尾部焊带与汇流条之间保持垂直状态，头尾部焊带偏移≤3mm 1）Maintain a vertical position between the head/tail welding strip and the bus-bar 2）Shift between the head/tail welding strip and the bus-bar ≤3mmD
3 黑色EPE放置(适用于全黑组件) EPE position(suitable to all black module)	3.1 EPE遮盖 Bus-bar uncovered by EPE	轻微缺陷 Minor		EPE全部遮盖住汇流条 Bus-bar fully covered by EPE
	3.2 EPE遮盖电池片 Cell covered by EPE	轻微缺陷 Minor		1、常规组件EPE遮挡电池片不超过第二根栅线 The EPE shield battery does not exceed the second cell line 2、1102组件：EPE直线形均匀遮盖电池片边缘且宽≤2mm不管制，非均匀性遮盖电池片时，极差≤3mm。 EPE covers the edge of the cell uniformly in a straight line with a width ≤ 2mm, which is not controlled. When the cell is covered by non-uniformit ，the range ≤ 3mm

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3 黑色汇流条 Black Bus-bar	3.3汇流条弯折处泛白（全黑组件） White at bus bar bend (all black modules)	轻微缺陷 Minor		1，泛白面积 S≤60mm2 2，数量不计 1,White area≤60mm2 2, The quantity is not counted
	3.4 汇流条旁边溢锡	轻微缺陷 Minor		1） 溢锡面积≤5mm2 2） 数量不计 1） in o erflow area ≤ mm2 2）The quantity is not counted
	3.5 焊带与汇流条搭接	轻微缺陷 Minor		1)未剪焊带超出汇流条≤1.5mm 2)汇流条超出焊带0-6mm 3)黑色汇流条面焊疤无可视面积要求 1 ncut welding strip e ceeding us ar ≤ 1.5mm 2) The bus bar exceeds the welding strip by 0-6mm 3) There is no visual area requirement for welding scar on black bus bar surface

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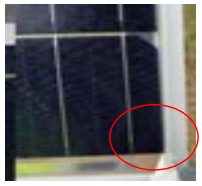
	3.6 黑色汇流条划伤（掉漆）			1)划伤面积小于5mm² 或者长度小于5mm，数量≤3个； 2)面积≤1mm²，忽略不计 1) The scratch area≤5mm² or the length ≤ 5mm, Qty≤3 2）area≤1mm²，The quantity is not counted
	3.7隔离方块色差	/		隔离方块与背板颜色、汇流条颜色允许有颜色差异 Color difference is allowed between isolation block and backplane and bus bar
	3.8 引线孔溢胶	/		引出线孔溢AB胶不做管控 The overflow of AB glue in the outlet hole is not controlled
4 玻璃面 Glass	4.1.安全距离Safety distance	重要缺陷 Major		安全距离：电池片到玻璃边缘距离 以层压图纸为准。 测量方式：电池片到边框内侧的距离 1)双玻安全距离 1mm 2)单玻安全距离 0. mm 防积灰组件：短边框安全距离满足IEC标准要求，长边框参考以上常规标准； 测量方式：汇流条外侧边缘到玻璃边缘距离

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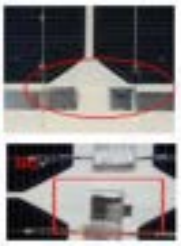
				Prevent dust Product：short frame Safety distance，Meet the design requirements of the drawings，Long frame refers to the above conventional standards Safety distance: The distance from the cell to the glass edge should refer to the designation drawing of lamination.The distance from the cell to the inside of the frame 1)Double glass safety distance ≥ 1mm， 2)Safety distance of single glass ≥ 0.85 mm Prevent dust Product：short frame Safety distance，Meet the requirements of IEC standards，Long frame refers to the above conventional standards Measurement method：Distance from outside edge of bus bar to glass edge
	4.2.EPE放置位置 EPE Position	重要缺陷 Major		1、层压件：EPE开口处距离汇流条内测边缘≤2mm Laminated module: Distance of EPE opening cut to inner edge of bus- ar ≤2mm 2、EPE开口处超出电池片边缘≥0.5mm，同时不能覆盖汇流条 Laminated module: Distance of EPE opening cut to Beyond the edge of the battery ≥0.5mm，Bus bars cannot be covered at the same time
4 玻璃面 Glass	4.3片间距 Cell gap	重要缺陷 Major		常规： M6: 1.8±1mm M10: 0.6±0.5mm（背面打光，整体漏光即可） 大间距： M10: 1.5±0.5mm 其他过程变更参考层压件图纸 Other changes Refer to the designation drawing of lamination

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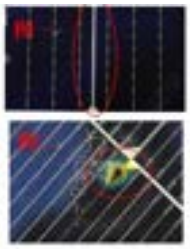
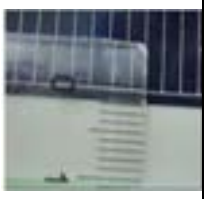
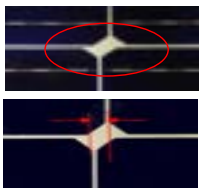
4 玻璃面 Glass	4.4.串间距 Cell string gap	重要缺陷 Major		常规： M6: 2.1 +3/-1.5mm M10: 1.7 +3/-1.5mm 其他过程变更参考层压件图纸 Other changes Refer to the designation drawing of laminatio
	4.5 方阵偏移 Array shifted	重要缺陷 Major		长边框侧 组件两端电池片与边框距离之差≤8mm Distance difference between the battery and the frame at both ends of the module≤8mm
	4.6 错位 Misalignment	轻微缺陷 Minor		1、常规组件 电池串相邻错位≤1.5mm Conventional module Misalignment ≤ 1.5mm 2、1102组件电池串相邻错位≤2.5mm 1102 module Misalignment ≤ 2.5mm

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	5.1 异物（正反面单独判定） Foreign material (Front and back side count and judge separate	轻微缺陷 Mino	 	1）不允许有机杂物（如昆虫、油渍等） 2）异物不得引起内部短路 3）正面电池片上：异物面积≤5 mm² 或异物长度≤10mm，单玻组件数量≤2个；双玻组件数量≤3个 背面电池片上：异物面积≤20 mm² 或异物长度≤20mm，单双玻数量≤20个； 4) 正面电池片外： 异物面积≤10 mm² 或异物长度≤15mm;单玻组件数量≤3个；双玻组件数量≤4个 背面电池片外：异物面积≤20mm² 或长度≤20mm，单双玻组件数量≤20个 5）异物面积≤0.5mm²，忽略不计； 6）异物距离玻璃边缘尺寸≥10mm Separate judgment of glass front and back 1) Organic foreign material is not allowed, e.g. insects, grease, etc. 2) Foreign material should not lead to short circuit. 3) On cell surface: Area ≤ 5mm² or Length ≤ 10mm, Foreign material qty./ single glass module ≤ 2, double glass ≤3 Back cell：Area ≤ 20mm² or Length ≤ 20mm, Foreign material qty./ single glass module & double glass≤20 4) Outside cell surface: Area ≤ 10mm² or Length ≤ 15mm, Foreign material qty./ single glass module ≤ 3,double glass

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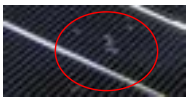
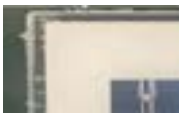
				≤4 Back cell：Area ≤ 20mm² or Length ≤ 20mm, Foreign material qty./ single glass module & double glass≤20 5) Ignore if Area ≤ 0.5mm² 6) Distance of foreign material to glass edge ≥ 10mm
	6.1 气泡（正反面单独判定） Bubble (Front and back side count and judge separate)	重要缺陷 Major	  	1)气泡不得引起内部短路 2)电池片上： 气泡直径＜1mm，数量不计 气泡直径1-3mm，数量≤6个； 气泡直径＞3mm，不允许 3)电池片外： 单玻：气泡面积≤4mm2，且气泡与电池片间距≥0.3mm；面积≤0.5mm²，忽略不计，气泡直径1.5-3mm，数量≤10个；气泡直径＞3mm，不允许 双玻：气泡直径≤2mm，数量不计；气泡直径2-4mm，数量≤15个；气泡直径＞4mm，不允许 4)任何区域不允许有密集气泡，密集气泡定义：400mm² 范围内φ＜2mm的气泡个数≥15个 1)Bubble should not lead to short circuit (except connecting to cell finger). 2）On the cell：

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				Ignore if Bubble diameter ≤ 1mm，The quantity is not counted Ignore if Bubble diameter1-3mm，Qty≤6 Ignore if Bubble diameter＞3mm，not allow 3)Outside cell area: Total amount ≤3 per Module Single Glass： The bubble area is ≤ 4 mm^2, and the distance between the bubble and the cell is ≥ 0.3mm; the area is ≤ 0.5 mm^2, The quantity is not counted Ignore if Bubble diameter1.5-3mm，Qty≤10 Double Glass： Ignore if Bubble diameter ≤ 2mm The quantity is not counted Ignore if Bubble diameter2-4mm，Qty≤15 Bubble diameter > 4mm, not allowed 4) Dense bubbles are not allowed in any area. Definition of dense u les: 00 mm , ＜ The number of 2mm bubbles is more than 15

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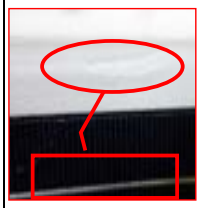
<table>
<tr>
<td rowspan="2"></td>
<td>7.1.封装胶膜未溶或缺失(正背面单独判定)Eva/poe un-melted of missing(Front and back side count and judge separate)</td>
<td>重要缺陷
Major</td>
<td> </td>
<td>不允许
Not allowed</td>
</tr>
<tr>
<td>7.2.白色EVA
White EVA</td>
<td>轻微缺陷
Minor</td>
<td> 
 </td>
<td>1）EVA褶皱（针对白色EVA）
局部区域允许最多褶皱数量≤4 条，电池片区域和空白区域可以共存
EVA wrinkle; (for white EVA)
he maximum number of wrinkle in local area is less than 4, and the cell area and blank area can coexist
电池片区域，宽度≤4mm
Cell area, width ≤ 4mm
<table>
<tr><td>长度</td><td>≤ 10mm</td><td>≤ 20mm</td><td>≤ 30mm</td><td>≤ 60mm</td></tr>
<tr><td>数量</td><td>忽略不计</td><td>≤ 5片</td><td>≤3片</td><td>≤ 1片</td></tr>
</table>
组件边沿区域，宽度≤4mm
Module edge area, width ≤ 4mm</td>
</tr>
</table>

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LONGi

长度	≤ 10mm	≤ 100mm	≤ 150mm
数量	忽略不计	≤5片	≤3片

Cell area, width ≤ 4mm

Length	≤ 10mm	≤ 20mm	≤ 30mm	≤ 60mm
number	Ignore	≤5	≤3	≤1

Component edge area, width ≤ 4mm

Width	≤ 10mm	≤ 100mm	≤ 150mm
number	Ignore	≤5	≤3

2）EVA溢白（针对白色EVA）

电池片区域要求不能达到细栅线边缘，溢白总数量≤5 个

EVA white overflow (for white EVA)

It is required that the area of cells cannot reach the edge of fine grid lines, and the total number of white spill≤ 5

电池片区域 Cell area,

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<table>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>
<table>
<tr><td>长度</td><td>≤3mm</td><td>≤ 10mm</td><td>≤ 15mm</td></tr>
<tr><td>数量</td><td>不计</td><td>≤5</td><td>≤3</td></tr>
</table>
汇流条区域 Bus-bar area
<table>
<tr><td>宽度</td><td>≤1mm</td><td>≤2mm</td><td>≤ 4mm</td></tr>
<tr><td>数量</td><td>不计</td><td>≤6</td><td>≤4</td></tr>
</table>
</td>
</tr>
<tr>
<td></td>
<td>8.1.条码一
Barcode 1#</td>
<td>轻微缺陷
Minor</td>
<td> </td>
<td>1）不允许条码反，条码歪斜,偏移≤2mm
2）条码可以读取（扫描枪）、ID号可以辨识
3）黑色条码标签横向、纵向露白区域≤1mm.
1) Inverted barcode not allowed. Offset ≤ 2mm
2) Barcode can be read (by barcode scanner)/ID can be identified.
3）Horizongtal and vertical exposed white areas of black barcode lable ≤1mm</td>
</tr>
<tr>
<td></td>
<td>8.2.条码二
Barcode 2#</td>
<td>轻微缺陷
Minor</td>
<td> </td>
<td>1）印刷正确清晰
2）条码不遮盖电池片,偏移≤2mm
3）不允许重码
1) Barcode clearly printed, correct format,
2) Do not cover cell, ffset ≤ 2mm
3) Duplicate barcode not allowed,</td>
</tr>
</table>

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	9.1 玻璃划痕（正面） Glass scratch (front side)	轻微缺陷 Minor		1)10mm≤长度≤20mm，宽度≤1mm的划痕，同一组件允许数量≤10 条； 2)20 mm＜长度≤40 mm，宽度≤1mm的划痕，同一组件允许数量≤6 条; 3)不允许长度＞40 mm 的划痕。 Single Glass / Double Glass front side： 1) 10mm ≤Length≤20mm, width ≤1mm, scratch qty. allowed ≤10 2) 20mm <Length≤40mm, width ≤1mm, scratch qty. allowed ≤6 3) Length >40mm not allowed
	9.2 玻璃划痕（背面，非镀釉玻璃） Glass bubble(back side, unglazed glass)	轻微缺陷 Minor	 	双玻背面 镀釉区域： 1)5 mm≤长度≤10 mm，宽度≤0.5mm 的划痕，同一组件允许数量≤6 条 2)10 mm＜长度≤15 mm，宽度≤0.5mm 的划痕，同一组件允许数量≤4 条 3)不允许长度＞15 mm 的划痕 非镀釉区域： 宽度＜0.5mm 1)划伤长度＜10mm，数量≤6， 2)划伤长度 10-20mm，数量≤4； 3)划伤长度 20-50mm，数量≤1 4)宽度>0.5mm，不允许 Double Glass black side： Non-glazed module: 1)5 mm≤length≤10 mm，width≤0.5 mm, Amount in 1 module≤6 2)10 mm＜length≤15 mm, width≤0.5 mm , Amount in 1 module≤4

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				3)Length＞15 mm, not allowed Unglazed area of glazed glass: Width＜0.5mm 1)Length ＜10mm ,Qty.. ≤6 per module; 2)Length within 10-20mm, Qty≤4per module. 3)Length within 20-50mm,Qty≤1per module. 4)Width≥0.5mm, not allowed.
	9.3.玻璃放反 Glass reverse	重要缺陷 Major		不允许 Not allowed
	9.4.玻璃气泡（正面） Glass bubble (front side)	轻微缺陷 Minor		1)圆形气泡：直径≤2mm，数量≤8处 2)椭圆气泡：长度≤5mm，宽度≤1mm，数量≤8处 3）开口气泡，气线不允许 1) Round bubble: Diameter ≤2mm, bubble qty./module ≤8 2) Oval bubble: Length≤5mm, width≤1mm, bubble qty./module ≤8 3）Opening bubble, line-shaped bubble not allowed
	9.5.玻璃面脏污（正面） Glass Stain (front side)	轻微缺陷 Minor		正面视角1m处 任何角度不可有可见EVA残胶，硅胶等脏污 Positive perspective on glass surface from 1m ,EVA residue, sealant residue, mark cannot be seen from any angle

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	9.6 玻璃叠差 Glass misalignment	轻微缺陷 Minor		1.长度或宽度 L＜500mm，最大允许误差≤0.5mm 2.长度或宽度 500mm≤L＜1000mm，最大允许误差≤1mm 3.长度或宽度 1000mm≤L＜2000mm，最大允许误差≤2mm 4.长度或者宽度 2000mm≤L＜4000 mm，最大允许误差≤3mm 1) Length/width: L ＜ 500mm, allowable difference ≤ 0.5mm 2) Length/width: 500mm ≤ L＜ 1000mm, allowable difference ≤ 1mm 3) Length/width: 1000mm ≤ L＜ 2000mm, allowable difference ≤ 2mm 4) Length/width: 2000mm ≤ L＜ 4000mm, allowable difference ≤ 3mm
	9.7 玻璃面印痕（正面） Glass Mark (front side)	轻微缺陷 Minor		1)1m处直视可见明显印痕 圆形直径≤15mm， 椭圆长度≤100mm，宽度≤10mm 2)单片组件≤8处 1) Allowable visible mark on glass surface from 1m: i) Round shape: Diameter ≤15mmii) Oval-shaped: Length ≤100mm, Width ≤10mm 2) Mark qty./module ≤8
	9.8 玻璃面压痕 Glass indentation	轻微缺陷 Minor		1、常规组件：长条、圆形及不规则正常 90 度 1mm 直视不允许 Strip, circle and irregularity Normal 90 °1mm direct vision is not allowed 2、1102组件:1m处直视可见明显印痕圆形直径≤20mm,椭圆长度≤1 0mm,宽度≤1 mm 单片组件≤ %组件电池片总数 Allowable visible mark on glass surface from 1m:Round shape: Diameter ≤ 20mm Oval-shaped: Length ≤1 0mm, Width ≤1 mm, ark t . module ≤ %

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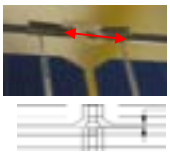
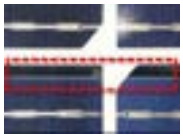
	9.9 引出线长度 Length of lead-out wire	轻微缺陷 Minor		1） 按照图纸尺寸偏差±1mm，适于安装接线盒 2） 层压后引出线间距≥1mm 1）According to technical drawing, Lead-out bus-bar length: 20 ±1mm 2）Lead out spacing after lamination≥1mm
漏光 Light leakage	9.10 网格与电池片间漏光 Light leakage between grid and cell	轻微缺陷 Minor		宽度≤3mm,数量不计 Width ≤ 3mm, quantity not counted
锯齿波 Sawtooth wave	9.11 镀釉面锯齿波 Saw tooth wave on glazed surface	轻微缺陷 Minor		高度≤2mm Height ≤ 2mm
镀釉面斑点 Enamel spots	9.12 镀釉面斑点 Enamel spots	轻微缺陷 Minor		直径<2.0mm，≤10.0 个/m2; 2.0mm≤直径≤4mm，≤5.0 个/m2; 4mm＜直径≤6.0mm，≤2.0 个/m2; Diameter < 2.0 mm, ≤ 10.0 pieces / m²; 2.mm ≤ diameter ≤ 4 mm, ≤ 5.pieces / m² 4 mm ≤ diameter ≤ 6 mm, ≤ 2pieces / m²

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镀釉面针孔 Pinhole on glazed surface	9.13 镀釉面针孔 Pinhole on glazed surface	轻微缺陷 Minor		直径≤0.5mm 允许; 0.5mm＜直径≤1mm ，≤10 个/m2， 1mm＜直径≤2mm ，≤6.0 个/m2 Diameter ≤ 0.5mm is allowed 0.5mm ＜ diameter ≤ 1mm, ≤ 10 pieces / m², 1mm ＜ diameter ≤ 2mm, ≤ 6 pieces / m²
镀釉层间距 Glazing layer spacing	9.14 镀釉层到边框间距 Glazing layer to frame spacing	轻微缺陷 Minor		玻璃镀釉层边缘到长短边框 A 面内侧距离≤2.5mm The distance between the edge of the glazing layer and the inside of side A of the long and short frame is less ≤2.5mm
削边工艺（BIPV 组件） Edge cutting process （BIPV module）	9.15 削边后外观要求 Appearance requirements after edge cutting	轻微缺陷 Minor		削边后组件四边平整、无明显残胶、毛边及毛刺： 1）直角边残胶长度及宽度≤3mm（从玻璃边缘到胶的外围），四角各允许 1 处(缺陷位置如图一)； 2）边缘毛刺、拉丝长度≤3mm 以内，宽度≤1mm 以内，忽略不计；大于 3mm 不允许（缺陷位置如图二、图三）； After trimming, the four edges of the module are flat and free of obvious adhesive residue, burrs, and burrs: 1）The length and width of the residual adhesive on the right angle edge should be ≤ 3mm (from the glass edge to the outer edge of the adhesive), and one defect is allowed on each corner (as shown in Figure 1); 2）Edge burrs, wire drawing length ≤ 3mm, width ≤ 1mm, ignored; Greater than 3mm is not allowed (as shown in Figure 2 and Figure 3 for defect location)

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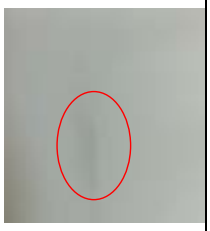
防积灰组件玻璃面 Prevent dust Product	9.16 玻璃与短边框间隙 Glass and Short frame gap	轻微缺陷 Minor		玻璃与短边框间隙≤1.5mm Glass and Short frame Gap≤1.5mm
10 背板面 Back sheet	10.1 背板划伤 Damage on back sheet	重要缺陷 Minor		背板表层第一层背膜划破 不允许 The first dorsal membrane on the surface of the back sheet was cut Not allowed
	10.2.背板划痕 Scratch on back sheet	轻微缺陷 Minor		无手感的划痕 长度≤100mm，≤2处 Scratch without feel Length≤100mm，amount≤2
10 背板面 Back sheet	10.3 背板偏移 Back sheet shifted	重要缺陷 Major		层压件不允许 Laminations are not allowed

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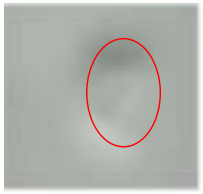
	10.4.背板鼓包 Blister	轻微缺陷 Minor		形成面积的鼓包（例如：自然鼓起，因气泡、胶带方面的鼓起）不允许 Bulge forming area (e.g. natural bulge due to bubble and tape bulge) is not allowed
	10.5.背板凸点 Bump	轻微缺陷 Minor		高度≤0.5mm，数量不计 高度＞0.5mm，单片组件≤3处 Height ≤0.5mm，The quantity is not counted Height ＞0.5mm，≤3per module.
	10.6.背板凹坑/褶皱 Dented/ Wrinkle	轻边微缺陷 Minor		1)凹坑深度≤0.5mm：直径≤5mm个数不计；5mm＜直径≤10mm，数量≤3处；直径＞10mm或深度＞0.3mm不允许 2)褶皱深度≤0.5mm，长度≤50mm,数量≤3处 1) Depth of dent ≤ 0.5mm: i) Diameter of dent ≤5mm, ignore dent quantity. ii) 5mm < Diameter of dent ≤ 10mm, dent qty. ≤3. iii) Diameter of dent >10mm or depth of dent >0.3mm. Not allowed. 2) Depth of wrinkle ≤0.5mm: i) Length ≤50mm ii) Wrinkle qty./module ≤3

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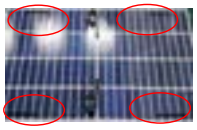
	10.7.背板脱层 Delamination	重要缺陷 Major		不允许 Not allowed
	10.8.背板色差 Color contrast of back sheet	轻微缺陷 Minor		背板颜色、外观、透明度整体一致，无拼接痕迹 Back sheet overall color, appearance, transparency shall consistent. No splitting marks.
	10.9.背板脏污 Stain on back sheet	轻微缺陷 Minor		1m外观察无明显脏污，不允许有不可擦拭的脏污 No stain, Un-removable stain not allowed.
10 背板面 Back sheet	10.10泡棉胶带 foam tape	重要缺陷 Major		符合图纸安装要求，不允许泡棉胶带缺失， Meets the installation requirements of the drawing, and it is not allowed to lose foam tape
	10.11 线卡 Line Card	轻微缺陷 Minor		符合图纸安装要求，线卡不允许缺失及与组件分离 Comply with the installation requirements of the drawings, and the line card is not allowed to be missing or separated from the module
	10.12 跨接汇流条折叠 Jumper Busbar fold	轻微缺陷 Minor		折叠高度≤0.5mm，折叠长度≤0.4mm，单根跨接汇流条折叠≤1 处，单片组件≤3 处 Folded height≤0.5mm，folded length≤0.4mm，single jumper Busbar folding≤1，Qty≤3 per module

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LONGi

<table>
<tr>
<td>11 边框
Frame</td>
<td>11.1划痕/撞伤（白边框）
Scratch/ Dented （White frame）</td>
<td>轻微缺陷
Minor</td>
<td>
 </td>
<td>1）无金属外漏 No metal leakage
A 面（长条形）Side A (strip) 宽度（width）≤0.5mm，深度（Depth）≤0.1mm；
<table>
<tr><th>L(mm)</th><th>≤10</th><th>10~30</th><th>30~50</th><th>TQ(长)</th><th>TQ(短)</th></tr>
<tr><td>Q(黑)</td><td>4</td><td>2</td><td>0</td><td>3</td><td>2</td></tr>
<tr><td>Q(银)</td><td>5</td><td>3</td><td>1</td><td>4</td><td>3</td></tr>
</table>
B C 面（长条形）Side B C (strip) 宽度≤0.5mm
深度（Depth）≤0.1mm； 60-200mm 1 条
<table>
<tr><th>L(mm)</th><th>≤15</th><th>15~30</th><th>30~60</th><th>TQ(长)</th><th>TQ(短)</th></tr>
<tr><td>Q(黑)</td><td>6</td><td>4</td><td>2</td><td>6</td><td>4</td></tr>
<tr><td>Q(银)</td><td>8</td><td>6</td><td>4</td><td>8</td><td>6</td></tr>
</table>
面积型：Area type

2）金属外漏（黑色/银色）
metal leakage(Black / Silver)
长条形(strip) 宽度（width）≤0.5mm，深度（Depth）≤0.1mm

面积型：Area type</td>
</tr>
</table>

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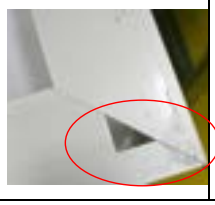
	11.2.边框色差 Color contrast of frame	轻微缺陷 Minor		颜色、外观、透明度整体一致， The overall color, appearance, transparency shall be consistent. No splitting marks.
	11.3 间隙/错位 Frame Deviation/ gap	轻微缺陷 Minor		错位：正面上下错位≤0.5mm，侧面上下错位≤0.5mm，反面上下错位≤0.8mm。 间隙：正面缝隙≤0.8mm，反面缝隙≤0.8mm Deviation: Front side displacement: ≤0.5mm ,B side displacement≤0.5mm，Back side displacement≤0.8mm Gap: Front side≤0.8mm ,Back side≤0.8mm

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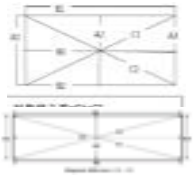
	11.4 边框毛刺 Burr	轻微缺陷 Minor		不允许（超过即返工） Not allowed. Rework if found.
	11.5 边框变形Deformed	重要缺陷 Major		1、 C 面轻微弓形≤5mm 2、变形不允许（超过即返工） 1、 bow ≤5mm 2、deformation Not allowed Rework if found.
	11.6 边框清洁度 Stain	轻微缺陷 Minor		边框上脏污、硅胶等残留，不可擦拭污渍距离 1m 处不可视放行。 There is no dirt and silicon residue on the frame；cannot be cleaned but not visible from 1m，acceptable
	11.7 组件尺寸 Module dimension	重要缺陷 Major		1） 长短边框公差±2mm； 2） 两对角线之差绝对值≤3mm 1) Long/short frame difference: ± 2mm； 2) Both side diagonal difference absolute value: ≤ 3mm

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	12.1硅胶 Sealant	轻微缺陷 Minor	 	1)闭口气泡背膜与边框间隙不接受，未破气泡直径≤5mm，每边≤5 个 2)开口气泡导致缺胶的不允许，开口气泡直径≤5mm，每边≤15 个，背板与边框间隙不允许， 3）边框溢胶：可见溢胶，0mm＜胶线宽度≤7mm，胶线均匀美观，允许组件四角堆胶 4）补胶后胶线均匀美观，补胶接头无毛刺、堆胶、缝隙 5）预打胶工艺，与正常溢胶无缝隙，无毛刺，节点高度≤4mm 6）每边卷边长度≤30cm，单块组件卷边总长度≤60cm，单边数量不超过 2 处，总数量不超过 8 处 7）防积灰组件产品： 正面：A 面长短边框接缝处的溢胶，0mm<胶线宽度≤2mm 胶线均匀美观；正面无溢胶污染， 背面： 一次溢胶：可见溢胶，1mm＜胶线宽度≤7mm,胶线宽度极差≤5mm，允许组件四角堆胶 1) Closed bubble and Gap between back sheet and frame are not allowed. The diameter of the unbroken bubble is iess than 5mm and Qty≤5 2）The gap between the back plate and the frame is not allowed，Opening bubble diameter﹤5mm ，≤15 on each side Gap between back sheet and frame are not allowed 3) Frame Overflowing of sealant：1mm＜the width of overflow ≤7mm，allowing four comers of the componends to pile glue 4) After the normal process, the glue line is uniform and beautiful, and the glue joint has no burr, glue pile and gap 5）Pre-gluing process, no gap with normal glue overflow, no burr, node height ≤4mm

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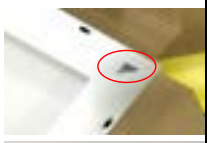
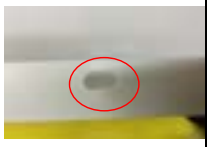
				6)Each crimping dege≤30cm，total crimping length of single block component≤60mm，The number of single side shall not exceed 2, and the total number shall not exceed 8 7）Prevent dust Product： On the front： Glue overflow at the seams of long and short frames on side A, 0mm<glue line width≤2mm.； No overflow glue pollution on the front； The back： Overflowing of sealant：1mm＜the width of overflow ≤7mm，Width difference of adhesive line ≤ 5mm ，allowing four comers of the module to pile glue.
	13.1安装孔/漏水孔 Installation/ drainage hole	重要缺陷 Major	 	边框安装孔、漏水孔、接地孔位置尺寸正确，符合图纸要求，不允许缺失 Frame mounting hole，grounding hole and drainage hole position are correct and conform to the drawing requirements,Missing is not allowed 1）安装孔之差≤1mm 2）漏水孔之差≤1.5mm 1) Installation hole dimension difference: ≤ 1mm 2) Drainage hole dimension difference: ≤ 1.5mm
	13.2.边框地标缺失Earth symbol missing	轻微缺陷 Minor		不允许 Not allowed

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	13.2 边框爆膜 Frame burst film	轻微缺陷 Minor		单个面积≤150㎜²，数量不计 Single Area≤150㎜², Quantity is not counted
14 铭牌 Label	14.1铭牌偏移 Label shifted	轻微缺陷 Minor		1)条码，铭牌无明显褶皱气泡 2)铭牌偏移≤3mm （超过返工） 1)No obvious bubble or drape on label and barcode 2)Label shifted ≤3mm,Barcode (Rework if exceed the criteria)
铭牌 Label 条码 Barcode	14.2 激光打码	轻微缺陷 Minor	 	条码： 1)条码打印内容、格式、位置 符合图纸要求，内容清晰可辨，条码无断码，且易于扫描 2)以边框 B 面和 C 面交界位基准，条码偏移≤2㎜（L1-L2） 铭牌 1、铭牌打印内容、格式、位置置 符合图纸要求，内容清晰可辨 2、以边框 C 面为基准，铭牌偏移≤3㎜（L1-L2） Barcode: 1) The content, format and position of barcode printing shall meet the requirements of the drawing, the content shall be clear and legible, the barcode shall not be broken, and it is easy to scan 2)Base on border B and C, Barcode offset≤2㎜（L1-L2） Nameplate 1)The printed content, format and position of the nameplate shall meet the requirements of the drawing, and the content shall be clear and legible 2) Base on border C, Barcode offset≤3㎜（L1-L2）

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15 接线盒 J-box	15.1 接线盒偏移 J-box shifted	轻微缺陷 Minor		分体式组件：接线盒左右端与边框之差≤5mm（超过返工） Split J-box: Difference between left and right end of J-box to glass edge (A-B): ≤5mm，Rework if found.
	15.2接线盒焊接 J-box soldering	重要缺陷 Major		1.引出线安装/焊接必须牢固（汇流条与接线柱无明显偏移，引出线与焊接柱有效焊接长度大于焊接柱长度的 1/2） 1.The lead-out wire must be firmly installed/welded (There is no obvious deviation between the bus bar and the terminal post, the effective welding length between the outgoing line and the welding column is more than 1/2 of the length of the welding column)
	15.3接线盒线胶J-box sealant	轻微缺陷 Minor		胶线光滑饱满，不得有毛刺、缺胶、堆胶现象，溢胶范围 2-7mm（超过返工） 1) Excessive sealant should be smooth surface and no burr, no lack of sealant and no accumulated sealant. 2) Sealant overflow should within 2-7mm.
	15.4接线盒灌胶 J-box sealant	重要缺陷 Major		1)接线盒内密封胶固化后必须盖过引出线，引出线不能可见，– 2）灌封胶必须完全覆盖二级管，引出线、焊盘金属件，整体灌胶外观不可见； 1)AB sealant shall fully cover lead-out busbar 2) The sealing adhesive must completely cover the secondary pipe, lead wire, and solder pad metal parts, and the overall appearance of the sealing adhesive must not be visible;

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	15.5 接线盒线圈 J-box seal ring	重要 缺陷 Major		密封圈无断裂、破损且密封圈未脱（超过返工） No breakage/damage in seal ring, and not falling off.
	15.6接线盒外观 Appearance of J-box	重要 缺陷 Major		1) 各种标识清晰、无缺失 2) 接线盒盒盖应盖紧； 1)Each identification/symbol is clear and no missing 2) J-box cover shall be tightly closed,
		致命 缺陷 Critical		1）接线盒（包括盒体、盒盖、导线、连接器、二极管等）规格正确，金属不得外漏； 2）零件齐全，安装到位、牢固， 3）连接线极性标志正确，长度符合订单要求 1) J-box (Include J-box body, cover, cable, connector, bypass diode) specification shall correct no crack, no damage and other defect. 2) Parts complete, properly installed, firm, 3) Cable correctly labelled with terminal, length of cable fulfill WO requirement
	15.7接线盒线尺寸 J-box dimension	重要 缺陷 Major		参照图纸要求 Refer to the designation drawing
16.包装 Packing	16.1.包装 托盘外观 Appearance of packing tray	轻微缺陷 Minor	/	1)托盘无发霉、开裂、破损、不得露尖钉； 2) 箱体与托盘不可错位，箱体必须平均放在托盘内，纸箱四边距离托盘边位置相等； 3)纸箱无破损、脚印、脏污； 4)胶合板舌片锁紧，箱体无破损、脚印、脏污、开裂，钢边无破损，不允许EVA槽脱落

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				5)PE膜缠绕符合要求，破损不能超过1层、不可露出组件 6)打包带符合要求， 无翻转、歪斜、开裂 7)外箱标识应与内箱实物对应一致，条码清晰； 8)不同色系的组件不允许混箱、混柜 9）尾拖组件可混包 1) No mold, crack, damage, or nail exposure on the tray 2)The box body and the tray shall not be misplaced. The box body shall be placed in the tray on an average basis. The four sides of the carton shall be equal to the distance between the sides of the tray 3) .No damage, footprints or smudges in the carton 4)Plywood tongue lock, box body no damage,footprints, dirt, cracking, steel edge no damage, EVA groove is not allowed to fall off 5)PE film winding meets the requirements, the damage shall not exceed 1 layer, and the components shall not be exposed 6)Packing belt meets the requirements, no turning, skew, cracking; 7）The label of the outer box should be consistent with that of the inner box, and the barcode should be clear 8）Mixing boxes and cabinets are not allowed for components of different colors 9）The trailing modules can be mixed package

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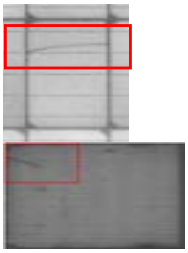
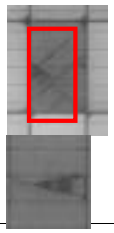
附件 2 组件 EL 检验标准

Annex 2 Module EL Inspection Criteria

序 号 No.	项目 Type of defect	不良程度 Severity	EL 照片 EL image	Grade QA
1	线状隐裂 Line micro crack	重要不良 Major		1）隐裂长度≤1/2 电池长度；单片电池线状隐裂≤1 处；单块组件线状隐裂电池片数量 M6≤4 片，M10≤8 片 2）不允许贯穿（两边连接）； 1)Micro-crack length ≤ 1/2 of full cell length; Line micro crack qty/cell ≤ 1;Qty. of cell with line micro crack M6≤4 PCS M10≤8 2) Micro-crack cannot run through entire cell area
2	网状隐裂 Path micro crack	重要不良 Major		不允许 Not allowed.

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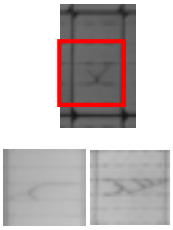
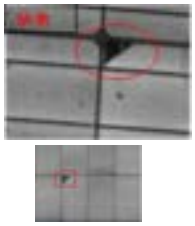
3	叉状隐裂 Cross crack	重要不良 Major		较长的隐裂长度≤1 / 10 电池片长度，单片电池片叉状隐裂数量≤2 处， 叉状隐裂电池片数量≤4%电池片数量（适用所有版型，数值采用四舍五入）；如图一 1) The longer cross micro-crack length ≤ 1/10 full cell length Cross crack cells≤4% total cells（Applicable to all module versions，Values are rounded ）
4	砸伤隐裂	重要不良 Major		1)较长的隐裂长度≤1 / 10 电池片长度，单片电池片叉状隐裂数量≤2 处，叉状隐裂电池片数量≤4%电池片数量（适用所有版型，数值采用四舍五入），如图一 1) The longer cross micro-crack length ≤ 1/10 full cell length Cross micro-crack qty/cell ≤2; Cross crack cells≤4% total cells（Applicable to all module versions，Values are rounded ）
5	缺角 Corner chipped	重要不良 Major		1)单片电池片缺角面积≤单片电池片面积的 3% 2)单片电池片缺角数量≤1 处；缺角电池片数量≤3.5%电池数量（适用所有版型，数值采用四舍五入） 1） Area of corner chipped/cell A ≤ 3% 2) Corner chipped qty/cell ≤ 1, Corner chipped cells≤3.5% total cells

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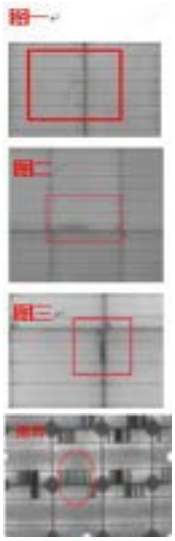
6	断栅 Broken finger	重要不良 Major		1）单片断栅面积≤4%，允许，电池数量不计；(图一) 2）4%＜单片面积≤8%，电池数量≤10%电池总数量；（图二 三 ） 3）单片面积＞8%，不允许（图四） 1）Single cell area ≤ 4%, allowed，No control over the number of cells（Fig 一） 2）4%＜single cell area≤8% Quantity≤10% of total cells（Fig 二 三 四） 3）Single cell area ＞8%，not allowed（Fig 四）

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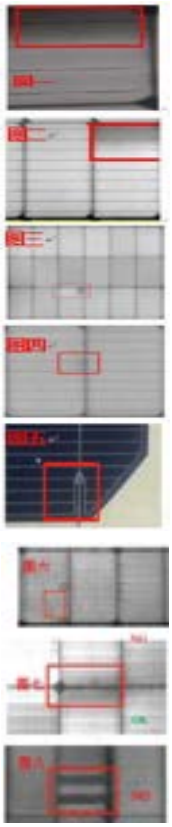
7	虚焊 Weak soldering	重要不良 Major		平行主栅且贯穿整片电池片的阴影定义为整条阴影， 1）不允许整条阴影；（如图一 图二）1102 电池，整条较浅明暗差异为正常，如图七 2）累计虚焊面积≤5%半片电池片面积，虚焊电池数量≤电池数量的 10%； 累计虚焊面积≤10%半片电池片面积，虚焊电池数量≤电池数量的 5%； 累计虚焊面积＞10%半片电池片面积不允许（如图三） 3）仅 U 型槽区域出现阴影，数量不计。（如图四 图五） 4） LR6 组件 电池整条明暗较浅，差异为正常，如图 7，其他参考常规组件虚焊标准 The shadow parallel to the main grid and running through the whole cell is defined as the whole shadow 1）Not allowed. Whole shadow；1102 module，The light and dark difference of the cell isnormal, as shown in Fig 7 2）Grand total Weak soldering area ≤5% half cell area ，Weak soldering amount ≤10 of Cell amount； Grand total Weak soldering area ≤10% half cell area ，Weak soldering amount ≤ of Cell amount； Grand total Weak soldering area ＞10% half cell area，not allowed 3）The number of shadows in U-groove area is not counted. 4） The whole battery strip of LR6 component is light and dark, and the difference is normal, as shown in Figure 7. For others, refer to the conventional component virtual welding standard

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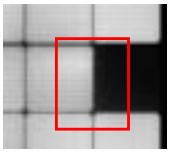
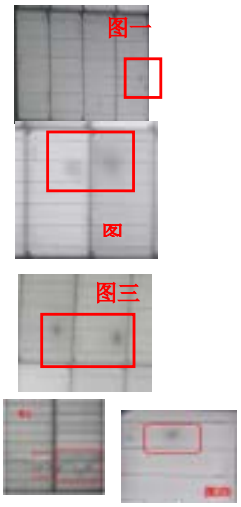
8	短路 Short circuit	关键不良 Critical		不允许 Not allowed.
9	黑斑（包含边缘黑点） Black spot(Edge black spot not included)	轻微不良 Minor		Hi-MO5/Hi-MO7 1） 单处面积≤3%电池片面积，允许，单片数量不计，电池数量不计；图一 2）3%电池片面积＜单处面积≤10%电池片面积，单片数量不计，电池数量≤4%电池总数，图二 图三 图四 3） 单处面积＞10%电池片面积，不允许 1）Single area≤3%电池片，allowed，The quantity in a single cell is not counted，total cells quantity is not counted Figure 1 2）3%＜Single area≤10%，The quantity in a single cell is not counted，Total cell ≤4% Figure 2 Figure 3 Figure 4 3）Single area＞10%，not allowed

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	黑斑（包含边缘黑点） Black spot(Edge black spot not included)	轻微缺陷 Minor		HI-MO6 1） 单处面积≤3%电池片面积，允许，单片数量不计，电池数量不计；图一 2）3%电池片面积＜单处面积≤10%电池片面积，单片数量不计，电池数量≤4%电池总数，图二 图三 图四 图五 3） 单处面积＞10%电池片面积，不允许 1）Single area≤3%电池片，allowed，The quantity in a single cell is not counted，total cells quantity is not counted；Figure 1 2） 3%＜Single area≤10%，The quantity in a single cell is not counted，Total cell ≤4%；Figure 2 Figure 3 Figure 4 Figure 5 3）Single area＞10%，not allowed

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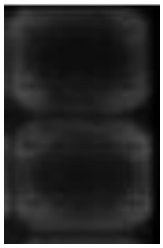
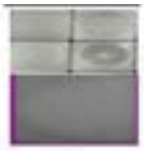
10	黑心 Black core	重要不良 Major		不允许 Not allowed
11	同心圆 Striation ring	重要不良 Major		不允许 Not allowed
	同心圆 Striation ring	重要不良 Major		Hi-MO7: 1）灰度值差异≤ 35%，数量不计; 2）灰度值差异＞35%，允许同一块光伏组件电池数量的 10% 3）氧环导致黑心，按黑心标准判定 Hi-MO7: 1）Gray scale≤35% the number is not counted; 2）Gray scale＞35%，oxygen ring allows 10% of the number of cells in the same photovoltaic module 3) Oxygen ring causes black heart, judged according to black heart standard
12	黑边/角 Black edge/corner	轻微不良 Minor		Hi-MO5/ Hi-MO7 1）如左图一，黑边/角宽度≤1/8 电池片长度，数量不计； 2）如左图一，1/8 电池片长度＜黑边/角 宽度≤1/6 电池片长度，电池片数≤

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			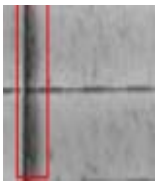 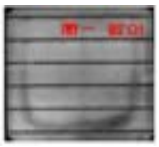	10%电池总数 （适用所有版型，数值采用四舍五入） 3）如左图一，黑边/角 宽度 > 1/6 电池片长度不允许； 4）如左图二，框印按照黑边判定 1) black edge/horn width≤1/8 of cell length, no counting; 2) 1/8 of cell length ≤black edge/horn width≤1/6 of cell length Qty≤10% total cells（Applicable to all module versions，Values are rounded） 3) black edge/horn width > 1/6 of cell length Not allowed； 4) As shown in the second picture on the left, the frame print is judged by the black edge 度，电池片数≤3.5%电池总数 （适用所有版型，数值采用四舍五入） 4）如左图二，框印按照黑边判定 1) as shown on the left the gray level difference is within 40% of black edge/horn width≤1/8 of cell length, no counting; 2) as shown on the left the gray level difference is within 40% of black edge/horn width > 1/6 of cell length Not allowed 3）as shown on the left the gray level difference is within 40% ,1/8 of cell length ≤black edge/horn width≤1/6 of cell length Qty≤3.5% total cells （Applicable to all module versions，Values are rounded）； 4） As shown in the second picture on the left, the frame print is judged by the black edge

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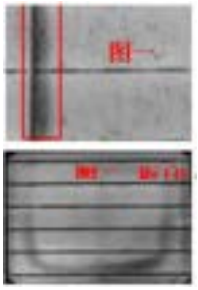
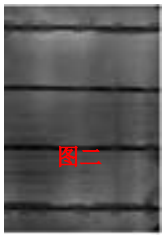
	黑边/角 Black edge/corner	轻微缺陷 Minor		Hi-MO6: 1) 电池片黑边角宽度≤ 1/6 电池片长，整个组件电池片数量不计 2) 电池片黑边角宽度 > 1/6 不允许 3) 如左图三，框印按照黑边判定 1) black edge/horn width≤1/6 of cell length, The number of cells in the module is not included 2) black edge/horn width > 1/6 of cell length, not allowed 3) As shown in the second picture on the left, the frame print is judged by the black edge
13	亮斑 Bright spot	重要不良 Major		不允许 Not allowed.

Docusign Envelope ID: 040D1157-5A89-4288-B102-93AC90480AB5

14	划痕 Scratch	轻微不良 Minor	 	非密集划痕（黑线等同）： 1）划痕程度为低于图一，不计 2）划痕长度< 1/5 电池片长度，允许≤3 条/片 3）划痕长度> 1/5 电池片长度，不允许 密集划痕：（划痕胶集中，形成面积） 如图二，密集划痕，区域面积< 1/2 电池片面积。 Single scratch 1) The severity lower than fiure1, allowed; 2）The severity is the same to fiure1,Length< 1/5length of cell，≤3/cell 3)Length > 1/5 length of cell, not allowed. Dense scratch as shown in figure2 Area of scratch<1/2area of cell
15	吸盘印 Suction mark	轻微不良 Minor		1)达到或超过左图严重程度的吸盘印，灰度差异 40%以上，不允许 2)未达到左图严重标准的吸盘印，数量不计，灰度差异 40%以下 1) sucker printing that reaches or exceeds the seve rity of the figure on the left is not allowed; The gray level difference is within 40% 2) the number of sucker prints that do not meet the severe standard in the figure on the right shall not be counted. The gray difference is less than 40%

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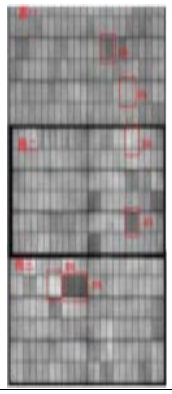
16	皮带印记 Belt imprint	轻微不良 Minor		1.灰度差异≤35%，允许，不限长度及片数 2.灰度差异＞35%，不允许 1.GV≤30%，allowed，Unlimited length and number of pieces 2.GV＞30%，not allowed
17	明暗片 Mismatched cell	轻微不良 Minor		差异说明：单个组件中电池片最暗与最亮的明暗差异 1）灰度值相差 15%以下的明暗片不计；图一 2）灰度值相差 15%～30%的明暗片≤电池数量的 10%；图二 3）灰度值相差 30%～50%的明暗片≤电池数量的 5%；图三 4）不允许灰度值相差 50%以上的明暗片。 Difference Description: the difference between the darkest and brightest cells in a single module 1） ra alue difference ≤1 , ignore 2）15% < ra alue difference≤30 , Qty≤10% of Cell amount; 3）30% < ra alue difference≤ 0 , Qty≤5% of Cell amount; 4）Not allowed 50% < Gray value difference
18	明暗片 Mismatched cell	轻微缺陷 Minor		Hi-MO7： 差异：每个组件电池片间、单个半片电池片内存在明暗差异不一致的现象； 1）整体（片内明暗、片间明暗）：灰度极极差≤20% 以下的明暗片不计； 2）整体（片内明暗、片间明暗）：20%＜灰度值极差≤30% 的明暗片（片内明暗+片间明暗）≤电池数量的 10%； 3）片内明暗：灰度值极差>30%，不允许； 4）片间明暗：30%＜灰度值极差≤50% 的明暗片≤电池数量的 5%；

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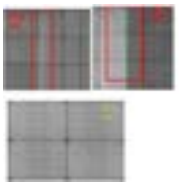
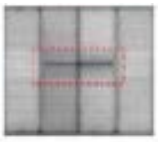
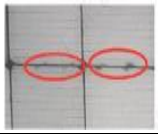
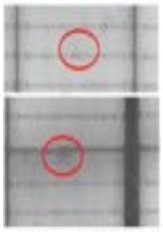
				5）片间明暗：灰度值极差＞50%，不允许 Inconsistent light and dark differences exist between cells of each module and within a single half cell 1）Whole (intra-slice light and dark, inter-slice light and dark)：Gray scale≤20%，Not counting quantity； 2）Whole (intra-slice light and dark, inter-slice light and dark)：20%＜Gray scale≤30%，Qty≤10% of Cell amount； 3）intra-slice light and dark：Gray scale＞30%，not allowed； 4）inter-slice light and dark：30＜Gray scale≤50%，Qty≤5% of Cell amount 5）inter-slice light and dark：Gray scale＞50%，not allowed。
19	拼接不良	重要不良 Major		1、拼接重合在电池片上，导致拼接处电池片影像缺失不允许； 图一 2、拼接镜头亮度颜色差异大不允许 图 二 3、无拼接不良 图 三 1)coincident splicing is on cell area，resulting in missing image of coincident cells，which is not allowed（picture1） 2)Large camera difference in brightness and color is not allowed（picture2） 3）o poor splicing（picture3）
20	黑线 Black line	重要缺陷 Major		不允许 Not allowed

Docusign Envelope ID: 040D1157-5A89-4288-B102-93AC90480AB5

21	卡槽印	重要缺陷 Major		Hi-MO7 电池 不允许触及主栅线 Do not touch the main grid line
22	叉状阴影	重要缺陷 Major	 **叉状阴影长度计算方法**：以叉型两边最长边的长度为准	Hi-MO7 电池 单点型： 1）单个缺陷长度≤5mm忽略不计； 2） 5mm<单个缺陷长度≤ 电池长度的 1/6L， 电池片内单个缺陷数量≤5，组件内缺陷电池片的数量≤6%电池片总数； 3）单个缺陷长度>电池长度的 1/6L 不允许 密集型: 1)灰度差异＜30%，组件内缺陷电池片的数量≤7%电池片总数 2）30≤灰度差异≤35%，组件内缺陷电池片的数量≤5%电池片总数 3）灰度差异＞35%,不允许 Single point type 1） Single defect length ≤ 5mm ignored 2） 5mm< The length of a single defect is less than or equal to 1/6L of the cell length. The number of single defects in a cell is less than or equal to 5. The number of defective cells in a module is less than or equal to 6% of the total number of cells

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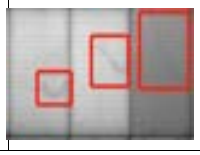
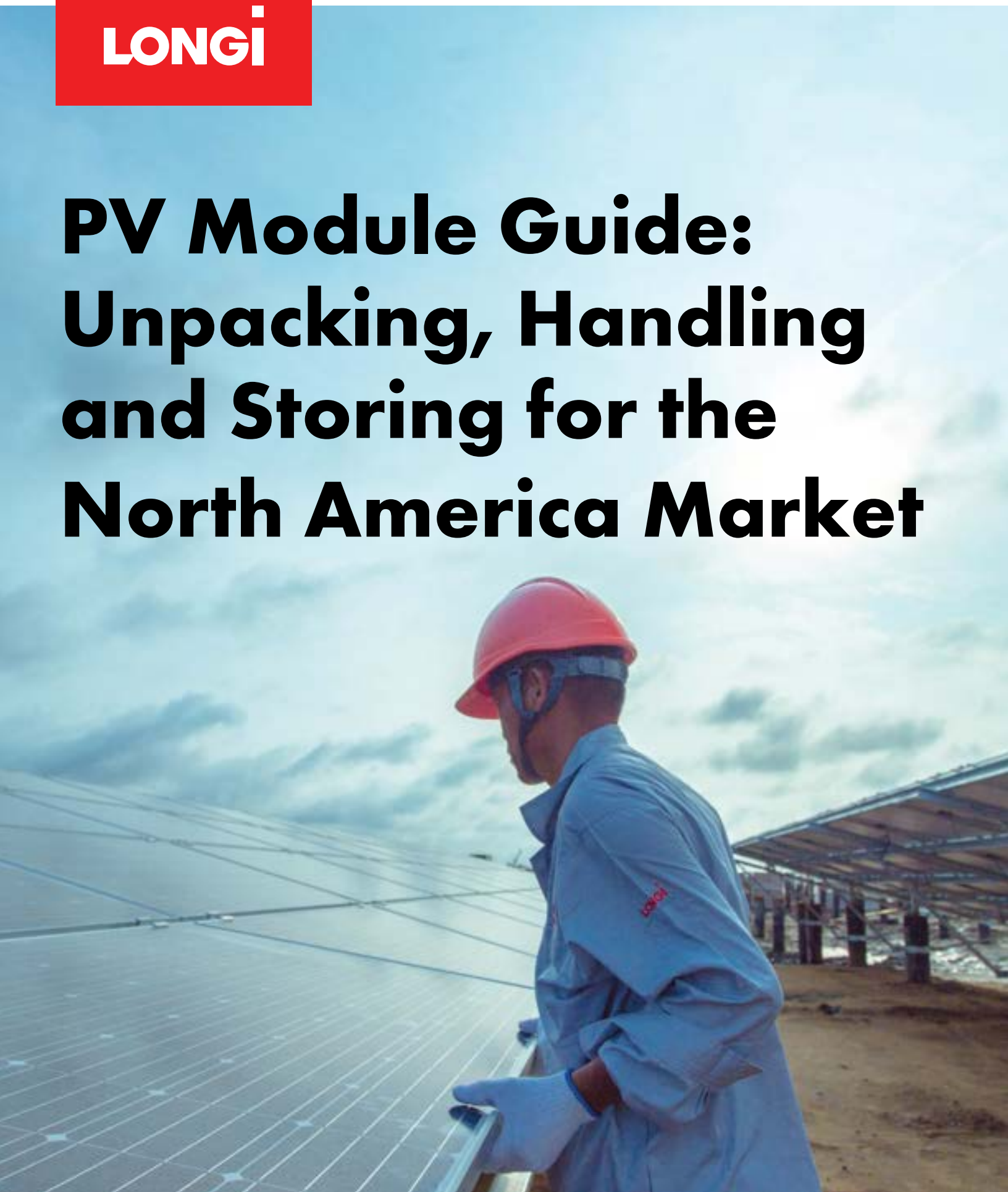
				3) Single defect length > 1/6L of cell length is not allowed intensive 1) Gray difference < 30%, the number of defective cells in the module is less than 7% of the total number of cells 2) 30%≤ gray difference ≤35%, the number of defective cells in the module ≤5% total number of cells 3) Gray difference > 35%, not allowed
23	水纹印 Watermark	轻微缺陷 Minor		Hi-MO7: 单片电池片内灰度差异≤30%，组件电池片数量不计；单片电池片内灰度差异＞30%，不允许 Hi-MO7: Single cell Gd≤30%，the quantity is not counted；Single cell Gd＞30%，not allowed

LONGi

PV Module Guide: Unpacking, Handling and Storing for the North America Market



Top Tips for Unpacking, Handling and Storing LONGi Modules

If modules are damaged upon arrival, notify the driver immediately. Notify the carrier and LONGi staff within 24 hours of delivery, and provide a record with detailed information within 48 hours of delivery. See **claims and warranties** for full details.

Store pallets in a flat, covered, dry and ventilated location. Always inspect your safety PPE items for proper wear and tear and replace those items no longer suitable.

When moving modules with a forklift:

- Place all module pallets on a flat and even surface in a dry, open location.
- Always insert the fork from the short side of the pallet, as long as it is safe to do so.
- Use the right-size forklift forks based on the pallet size. Do NOT use oversized forks.
- Use forklifts with a backrest greater than 48 inches.
- DO NOT press the forklift backrest into the cardboard
- Lift the forks high enough so the pallet wooden supports do not hit the ground and break

When unpacking, position pallets next to a solid, self-standing support structure. Do NOT support the pallet with sharp objects, modules, or loose materials.

Review the Installation Manual for LONGi Solar PV Modules before you begin installation.

Do not carry a module alone – two people are recommended to lift and carry modules.

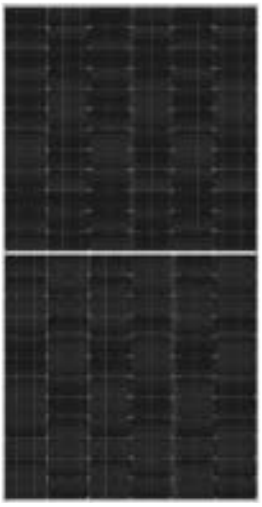
Introduction

This guide serves as a reference for inspecting, transporting, unpacking, handling and storing LONGi PV solar modules to ensure safety for you and your modules. No matter where you are in the delivery and installation process, LONGi is here to help, and our team of industry experts is proud to partner with you for a successful project.

These unpacking, handling and storing best practices pertain to all LONGi modules, including 54, 66, 72, and 78-cell products:

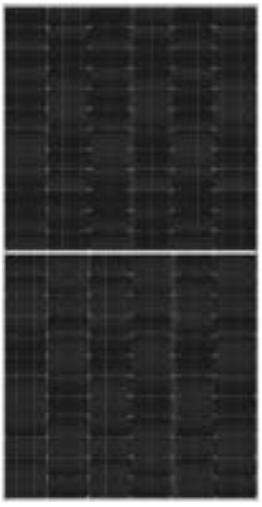
Hi-MO 5 54-cell

54-cell/ 108 half-cell, single glass monofacial (LR5-54HPH/HPB-xxxM)
(For U.S. market)



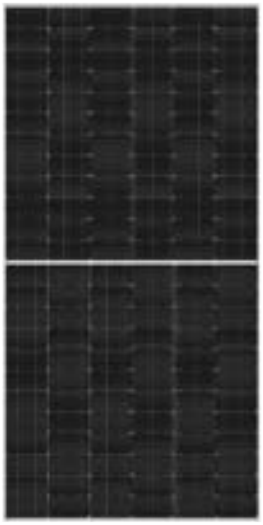
Hi-MO 5 72-cell

72-cell/ 144 half-cell, dual glass, bifacial (LR5-72HBD-xxxM)
(For U.S. market)



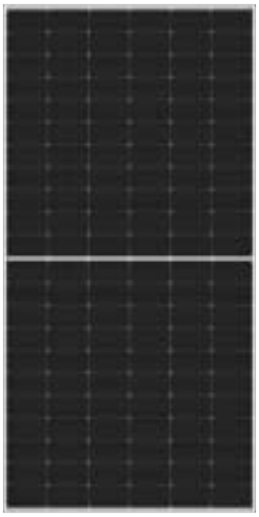
Hi-MO 5 72-cell Ice-Shield

72-cell/ 144 half-cell, dual glass, bifacial (LR5-72HBD-xxxM)
(For U.S. market)



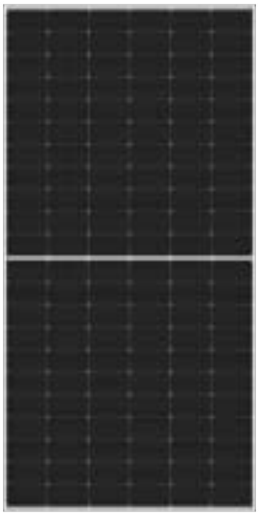
Hi-MO 5 78-cell

78-cell/ 156 half-cell, dual glass, bifacial (LR5-78HBD-xxxM)
(For U.S. market)



Hi-MO 7 66-cell

66-cell/ 132 half-cell, dual glass, bifacial (LR8-66HGD-xxxM)
(For Canadian market)



Hi-MO 7 66-cell Ice-Shield

66-cell/ 132 half-cell, dual glass, bifacial (LR8-66HGD-xxxM)
(For Canadian market)

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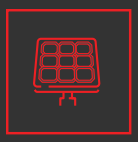

Pallet specifications and packing details

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Module packaging

LONGi ships modules in pallets with the following dimensions, depending on module type:

Family	Module Type	Module Dimensions (mm)	Pcs/ Pallet	Pallet Dimensions LxWxH (mm)	Pallet Weight (kg)	Pallets per 20'GP Container	Pallets per 40'HC Container
Hi-MO 5	LR5-54HPH/HPB	1722 x 1134 x 30	36	1767 × 1130 × 1244	798.8	6	24
Hi-MO 5	LR5-72HBD	2278 x 1134 x 30	36	2322 x 1120 x 1243	1195	5	16
Hi-MO 5 Ice-Shield	LR5-72HBD	2278 x 1134 x 30	36	2340 x 1150 x 2504	1477	5	13
Hi-MO 5	LR5-78HBD	2465 x 1134 x 30	36	2500 x 1120 x 1252	1329	4	14 (for 53' DV)
Hi-MO 7	LR8-66HGD	2382 x 1134 x 30	36	2396 x 1120 x 1254	1230	4	20
Hi-MO 7 Ice-Shield	LR8-66HGD	2382 x 1134 x 30	36	2396 x 1120 x 1252	1553	4	16

Note: Pallet dimensions and weight are for reference only.

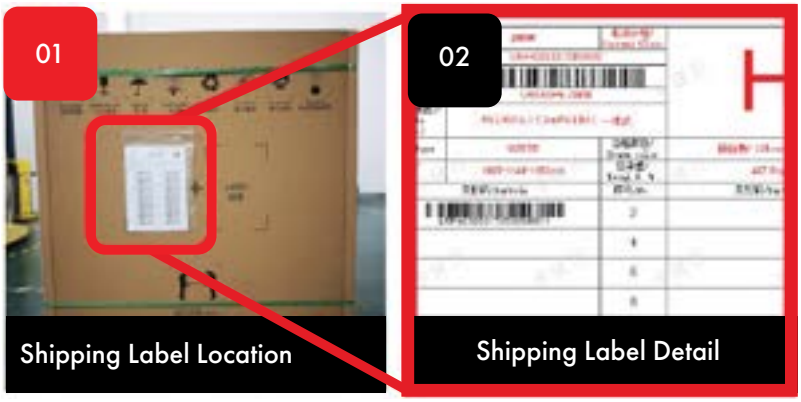
Modules are packaged using industry best practices to ensure safe transport, sustainable packaging, and ease of unpacking. LONGi packages each pallet as follows:

Components

1. Stack interconnecting straps
2. Shipping label. Use this label to identify modules.
3. External strapping
4. External corner protectors
5. Cardboard sleeve. DO NOT cut into the cardboard with a sharp object – the glass side of the module is directly on the other side.
6. Plywood divider
7. Internal strapping. When you remove the strapping, be sure to store your modules safely, and always secure unattended modules from falling over.
8. Module corner protector
9. Vertically strapped panels

Module verification

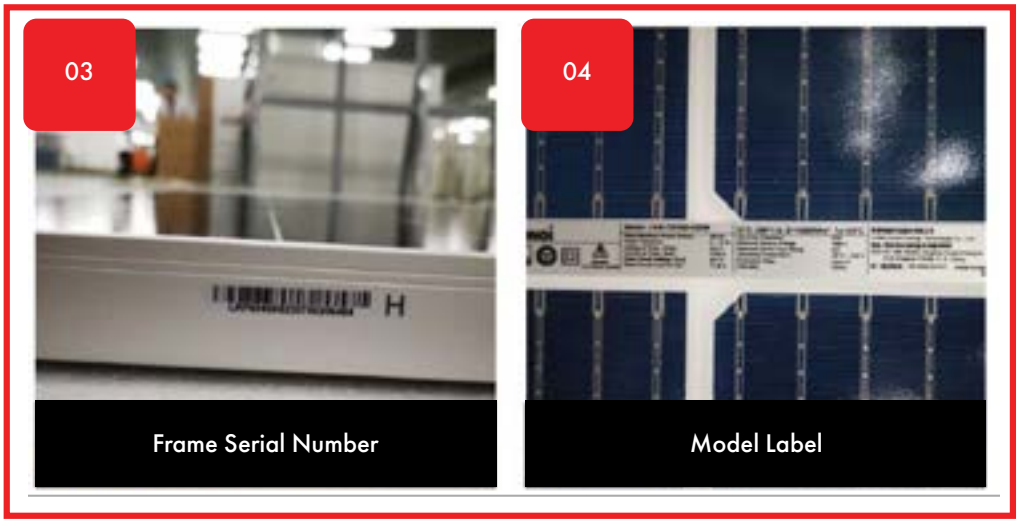
Before unpacking, review the shipping label to confirm that delivered modules match your order.



Pallet shipping label is located on the short side of the box, and includes:

- Power bin (wattage)
- Pallet ID
- Model number
- Module barcodes and serial numbers

After unpacking, check the module frame serial number and model label against the shipping label.



The serial number is the unique identifier of each PV module. A protected copy of the barcode is located on the front top-left corner, under the glass, and it cannot be removed or damaged. The matching serial number is located on the frame and on the rear of the module.

The model label includes:

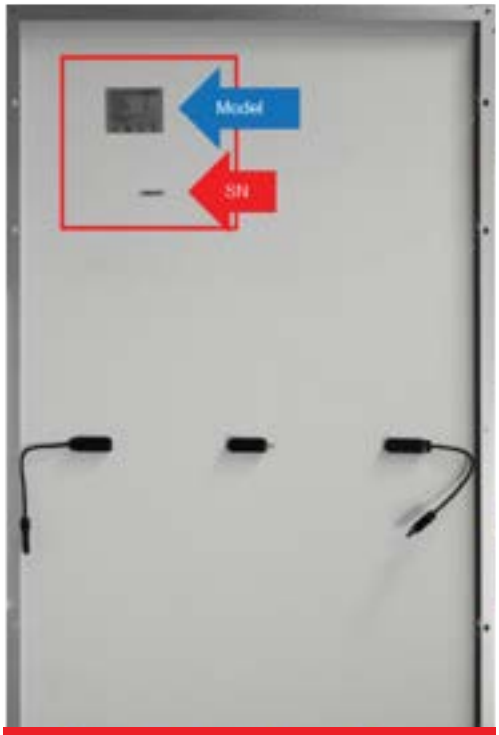
- Model number
- Nominal power rating
- Voc, Isc, Vmp, Imp
- Maximum system voltage + certifications

Unique identifier for each individual PV panel, located in three places per standard panel:

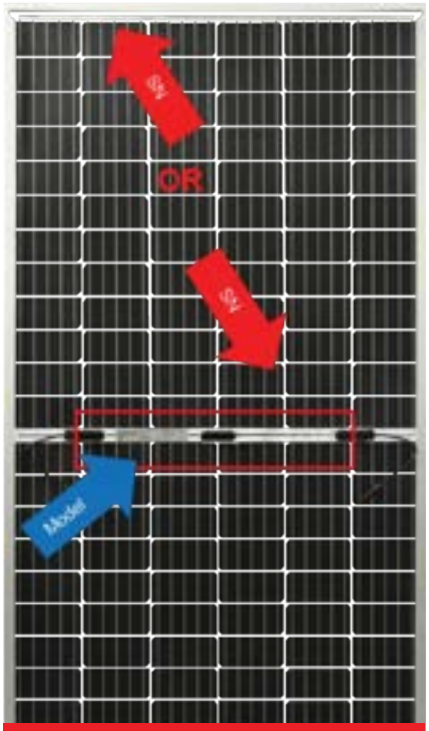
- Front (under glass)
- Side (on frame)
- Rear (top corner)

Front Barcode

Side Frame Barcode



Rear (Monofacial)

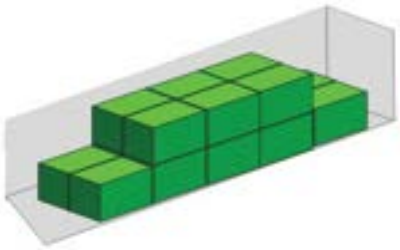


Rear (Bifacial)

Module loading for transit

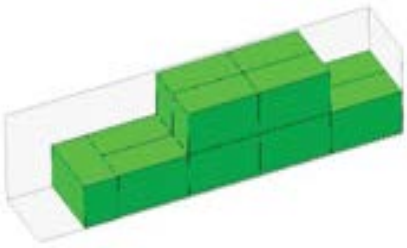
LONGi uses industry best practices to load modules for transit in standard-sized shipping containers.

We use a standard loading pattern for all LONGi modules. For example:



Hi-MO 5 LR5-72HBD:
16 pallets per 40′ HC container (U.S.).

Hi-MO 7 LR8-66HGD:
20 pallets per 40′ HC container (Canada).



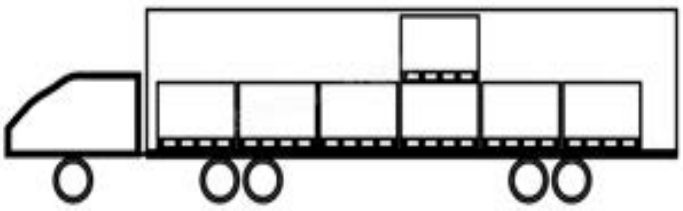
Hi-MO 5 LR5-72HBD Ice-Shield:
13 pallets per 40′ HC container (U.S.).

We recommend a transloaded arrangement for 53-foot dry moving van with:

- No unsupported, free-standing pallet stacks.
- Pallets parallel to the vessel, with any spaces greater than 4″ filled with airbags.

LR5-78HBD
(Example)

Head	1PLT	1PLT	Airbag
	Airbag	1PLT	1PLT
	1PLT	1PLT	Airbag
	Airbag	**2PLT**	**2PLT**
	1PLT	1PLT	Airbag
	Airbag	1PLT	1PLT
Back	Strap		



53′DV 14-pallet cabinet (U.S.)

Packaging inspection upon arrival

After arrival, **verify your modules**, then inspect the packaging for any visible damage.

Common issues may include:

Pallet wear and tear
or damaged modules

Unusual dents or scratches
on cardboard

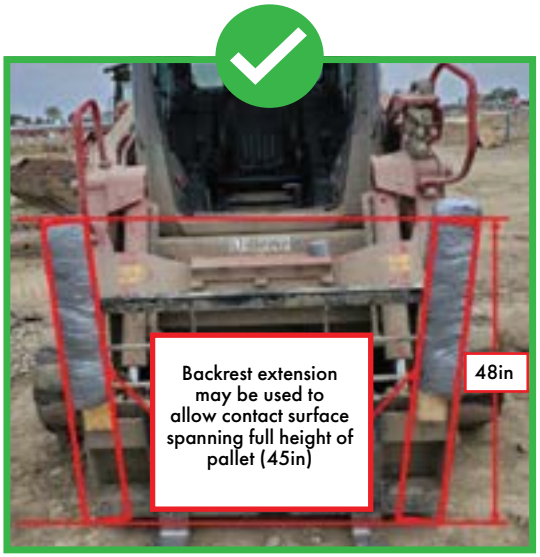
Unusual loading method,
with shifted or titled pallets

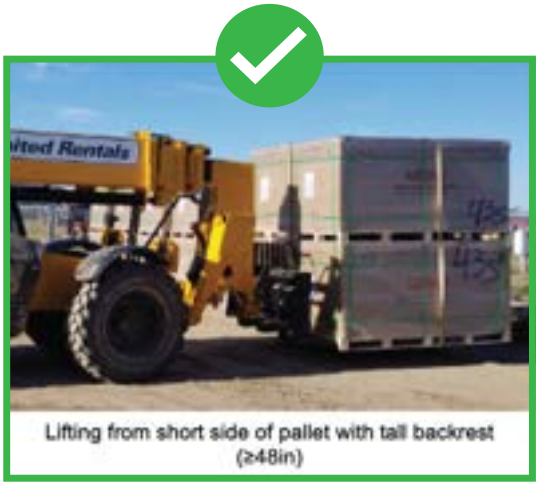
Forklift damage on pallet
that exposes modules

If modules are damaged:

- Immediately notify driver
- Within 24 hours of delivery: Notify carrier and LONGi staff
- Within 48 hours of delivery: Provide record with detailed delivery information, photos, and description of damage

See **claims and warranties** for complete details.




Lifting from short side of pallet with tall backrest (≥48in)

Maneuvering pallets with a forklift

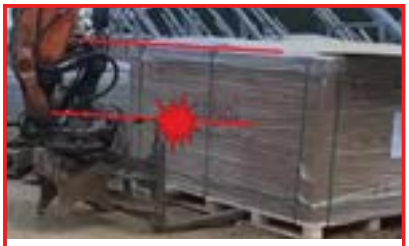
Adhere to forklift best practices to ensure safety and avoid module damage.

- Allow space between the backrest and pallet when safe to do so.
- ALWAYS insert the fork from the short side of the pallet if it is safe to do so. Backrest impacts are the leading cause of module damage, and moving modules from the short side avoids contact with this area.
- ALWAYS use the right-sized forklift forks based on the pallet size. DO NOT use oversized forks.
    - For loading from the short side, use a 72-inch fork for 72 and 78-cell modules. Use a fork between 60 inches and 70 inches for 54 and 66-cell modules.
    - When loading from the long side (only if required for safety reasons), use a 42-inch fork.
- Use forklifts with a backrest greater than 48 inches whenever possible.
    - The backrest may be extended using padded lumber to achieve 48 inches above the forks.
    - Side contact areas to backrest should be against the wooden parts of the pallet.

Maneuvering pallets with a forklift (continued)

Using oversized forks and damaging adjecent pallets

DO NOT ram or force pallets.



Lifting from long side of pallet with low backrest (<48 in)

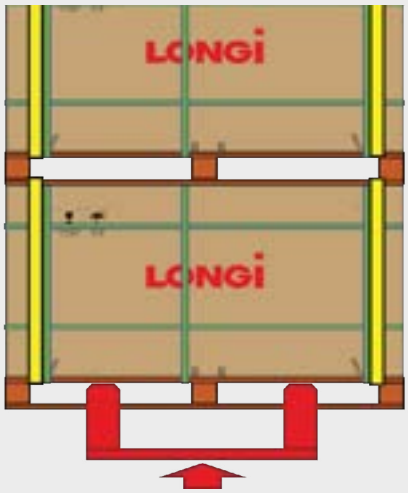
DO NOT press the backrest into cardboard, particularly against areas marked in red (see image).

DO NOT extend forks past the pallet, as it may damage adjacent pallets. Check the surrounding area before loading/unloading.

Avoid leaning or tilting pallets while in transit.

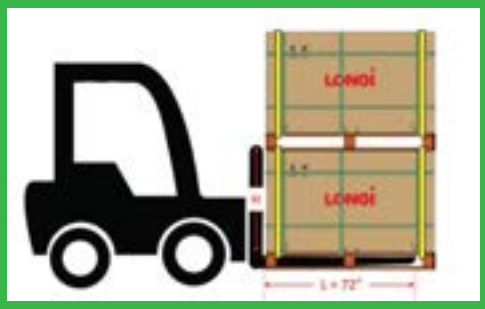
Use proper forklift length based on module model and loading side

Short side: size appropriately based on model



Long side: use 42″ forks

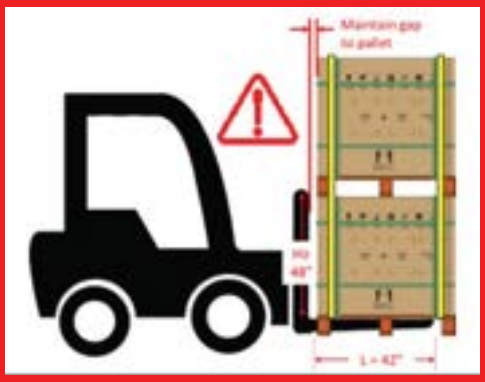
Pressure Sensitive Areas for Palletized PV Modules (Shown in red)



How to load a pallet from the short side (RECOMMENDED METHOD)

Short side forklift specifications:

- Length: Minimum 60 inches. 72 inches for 72 and 78-cell formats, up to 70 inches for 54 and 66-cell formats
- Height: 48 inches recommended
- Allow gap between pallet and backrest where safe to do so
- When lifting stacked pallets, minimize cargo recline
- Inspect connecting strap integrity (marked in yellow)



How to load a pallet from the long size (NOT RECOMMENDED)

Long side forklift specifications:

- Length: 42 inches
- Height: 52 inches for Hi-MO 5 (LR5 models)
- Backrest height MUST be equal to or higher than single pallet height
- Gap MUST be maintained between pallet and back-rest. DO NOT press backrest into cardboard
- Avoid reclining stacked pallets
- Inspect connecting strap integrity (marked in yellow), employ additional strapping where needed

Module unpacking

Recommended forklift specifications:

1. Stage pallets on a flat, open and dry location.
2. Position pallets next to a solid, self-standing support structure (e.g., tracker post, wall, another pallet) to prevent loose modules from falling. Do not use sharp or unstable structures to support modules, which may harm the installer or cause damage to the modules.
3. Cut and remove the external straps and shrink wrap.
4. Remove the cardboard top.
5. Inspect the cardboard for dents or tears. Then slide the cardboard panel up to remove and inspect the outermost modules. In case of damage, take a photo of the following areas and see **claims and warranties** for next steps.
6. Cut internal straps.
7. Lean modules against support structure (See **module storage**).
8. Remove modules one at a time.

Module unpacking

- **DO** unstack the pallets immediately if the pallet or packaging is compromised, wet, or damaged.
- **DO** use stable, self-standing structures or devices, or other pallets for support.

- **DO NOT** unpack the module pallets from a wet, soft, or inclined area.
- **DO NOT** use sharp, unstable structures for support.
- **DO NOT** stand or walk on PV modules.

Module storage

- **DO** store unused pallets in a covered, dry and ventilated area.

- **DO NOT** remove cardboard packaging if not installing modules immediately.
- **DO NOT** leave panels loose and unsupported.
- **DO NOT** exceed the indicated maximum stacking layer limit as shown on the pallet.
- **DO NOT** place sharp or heavy objects on your modules, as they may cause glass damage.

Moving and preparing modules for installation

- Prior to the start of module install, review the **Installation Manual for LONGi Solar PV Modules**.
- Two people are recommended for lifting and carrying modules.
- Never carry modules above your head.
- Do not drill holes on the module frame. This invalidates LONGi product warranty and may lead to reduced frame load capacity and corrosion.
- Be careful not to scratch the anodized frame coating, except for the grounding connection.
- Never carry a module by its cables, connectors, or junction box.
- Keep connectors dry and free of dust and foreign debris.
- Prevent module connectors from resting on the ground.
- Never mate connectors that are damaged or dirty.
- Always make sure each connector's locking mechanism is properly engaged and locked.

Transportation damage

Warranty claims can be filed for individual or full pallets.

In the event of transportation damage:

- Immediately notify the driver.
- Indicate damage on the Bill of Lading, and take pictures for your records.
- Within 24 hours of delivery, notify carrier dispatch and LONGi staff to enable an effective investigation.
- Within 48 hours, record the following and share with carrier dispatch and LONGi staff:
  - Truck container ID
  - Arrival and unload time and date
  - Pallet ID
  - Photo showing damaged pallet in position on truck (if available)
  - Detailed photo and description of damage, including pallet overview and damage area closeup

Information for warranty claim verification and processing:

- Complete warranty claim information form with a detailed claim issue description.
- Model number and corresponding quantities of claimed modules.
- Pallet ID for whole-pallet issues and/or module ID for individual module issues.
- Photos of claimed module/pallet:
  - Module label showing model number and serial number, or pallet label (**see module verification**)
  - Front side of whole module and rear side of whole module
  - Damage location detail, and multiple angles highlighting point of collision/impact
  - Corresponding external cardboard indicating collision/impact
- Additional supporting evidence, which may include:
  - Bill of Lading with driver verification of on-arrival fault
  - Container number for on-arrival fault
  - Any additional supporting information indicating quality or transportation issue

Contact us

If modules were damaged in transport, see **claims and warranties**.

Questions about safe handling practices? Visit the **Service Consultation webpage** and complete the form, select the phone headset on the right side of the webpage, and select the appropriate contact method or contact us directly at **us-info@longi.com** .

Resources

Module data sheets, certificates, and the Installation Manual for LONGi Solar PV Modules are all located at **longi.com/en/download/**.

For more information about LONGi, visit **longi.com**.

Disclaimer

No warranties, promises, and/or representations of any kind, expressed or implied, are given as a result of following this guide. Warranty claims shall only be considered for processing when presented in writing by a direct LONGi customer, and acceptance specifically presented in writing by LONGi personnel upon review of supporting information as outlined in this document.

The information contained within this document is solely advisory, and should not be substituted for legal, technical, financial or other professional advice. Any and all decisions and actions must be executed by qualified personnel.

This reference guide is subject to changes by LONGi from time to time with the sole discretion of LONGi without prior or subsequent notice to customers. Customers are recommended to check with LONGi from time to time for periodical updates and changes.

Version 20250917

ORIGINAL

SALES CONTRACT

Contact No. GY-KA-2024121488

The Seller: CHINT Electric Co., Ltd
Add: No.3555 Si Xian Road , Songjiang District 201614 Shanghai China
Tel: (+86) 21 6777 7777 Fax: (+86) 21 6777 7999

The Buyer: Red River Clean Energy, LLC on behalf of Blue Heron Solar, LLC,

Add: 107 Spring Street, Seattle, WA 98104, United States of America
Tel: (+1) 312-883-4846 Email: operations@concordnewenergy.com

The Sales Contract (the "Contract") is made between the Seller and the Buyer concerned on the basis of equality and mutual benefits. The terms and conditions are fully agreed by both parties as below:

1. Scope of Supply (the "Products"):

Item	Description	Type	Qty.	Unit			Remark
1	Transformer	SFZ-200000/345	1	set			
2	Spare Parts	Gasket, HV bushing, HVN bushing, LV bushing	1	set			
3	special tool's list	Torque spanner, Valves handle, Socket spanner	1	set			
4	Special accessories list	AVR, RTCC, DGA, Intelligent temperature, HV lightning arrester, LV lightning arrester, vacuum gauge	1	set	Included	Included	
5	Customs duties	/	1	set			
6	Freight		1	set			Including sea transportation and inland transportation in USA
7	Destination service fee	/	1	set			Including 1 person 60 days technical service,
8	**Chisme Solar and Storage Total Amount.**		**7**	**Set**			**Blue Heron Solar, LLC**

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10. Guarantee & Warranty

10.1 The Seller guarantees that the Products are brand new, unused, good quality with good workmanship and comply with the technical specifications. The Seller warrants the Products be free from defects of design, material, quality and workmanship for a period of 60 months after issuing the Arrival Acceptance Certificate. After the warranty period, the Seller shall still provide after-sales service and technical support and the Buyer shall bear the cost arising therefrom.

The seller guarantees that the delivered products will have normal performance within their service life under normal use and maintenance conditions, and that the products will not be scrapped due to design defects, production processes, material defects, quality control, etc.

10.2 Throughout the warranty period, the Buyer shall notify the Seller of defect within 5 days after discovery of the defect. The Seller shall provide a response to the Buyer within four (4) hours of receiving any such notification. If required, the Seller shall send service personnel to the Project Site within twelve (12) hours of receiving any such notification (the "Guaranteed Response Times"). The Seller shall, within reasonable period, repair the defect or replace the defect part with new part at its discretion. The Buyer shall give the Seller sufficient opportunity and full assistance to carry out such remedial work. Replaced parts shall become Seller's property.

10.3 The Seller shall have no responsibility for any defect, failure or non-compliance of the Products or any part thereof if there is any of the following events: (a) failure of the Buyer to comply with any of the Seller's operational or maintenance written guidelines, instructions or requirements; (b) improper use or installation; (c) physical abuse of the Products or any component or acts of vandalism by any persons other than Seller, its employees, agents or subcontractors; (d) alterations, modifications, additions, replacement or repairs made during the warranty period by anyone other than Seller, its employees, agents, subcontractors or personnel certified by the Seller; (e) accidents or damage resulting from fire, water, wind, hail, lightning, electrical surge or failure, earthquake, theft or similar causes not caused by or attributed to the negligence of Seller or its employees, agents, or subcontractors or (f) fair wear and tear. Seller shall provide and maintain a Warranty support contact capable of providing the Guaranteed Response Times that is located in the United States of America for the duration of the Warranty Period.

10.4 For all service and remedial work on main power transformers where such work shall require the transformer to be de-energized, when such transformer is connected to a photovoltaic generation Project, all service and work shall be performed during non-daylight hours, and when such transformer is connected to a battery energy storage Project, all service and work shall be performed in scheduled coordination with the Buyer to minimize downtime for the Project during operational hours. Buyer shall not be responsible for any costs associated with this requirement. The forgoing requirement applies to non-emergency service and warranty work.

10.5 During the service life of the products, the Seller shall be liable for product liability issues including personal injuries and damages to other property except the product itself caused by the design defects, production workmanship, material defects, quality control of the Seller's products.

MAIN POWER PURCHASE AGREEMENT

This Main Power Purchase Agreement (this "Agreement") is entered into August 1, 2025 (the "Main Agreement Effective Date"), between Tesla and Seller (each as defined below, together the "Parties" and each individually as a "Party").

The terms and conditions of this Agreement will apply and are intended to be incorporated by reference into one or more Power Purchase Agreement Confirmations (each, a "Confirmation") that may be entered into between Tesla and Seller or between any of their respective Affiliates, except to the extent otherwise provided in such Confirmation. Except to the extent Tesla and Seller (or an Affiliate of either) execute and deliver such a Confirmation, this Agreement shall have no binding effect upon Tesla, Seller or any Affiliate thereof, and no Party shall have any obligation to enter into any such Confirmation solely as the result of entering into this Agreement.

Key Terms	
These Key Terms set out the scope of this Agreement and certain key terms.	
Parties:	
Tesla:	Tesla, Inc., a corporation organized under the laws of Texas, whose registered office is at 1 Tesla Road, Austin, TX 78725.
Seller:	Red River Clean Energy, LLC, a limited liability company organized under the laws of Delaware, whose registered office is at 11515 Burnet Road, Suite 825, Austin, TX 78758
Notices:	
Tesla Notice Address:	1 Tesla Road, Austin, TX 78725 Attn: General Counsel / Legal Phone: +1. 512.516.8177 Email: energynotices@tesla.com, Tesla-Renewable-Notices@tesla.com
Seller Notice Address:	11515 Burnet Road, Suite 825, Austin, TX 78758 Attn: Legal Phone: +1 (312) 883-4898 Email: info@redrivercleanenergy.com
NDA:	
NDA:	The mutual non-disclosure agreement dated April 15, 2028, between Tesla (or its Affiliate) and Seller (or its Affiliate).

EXECUTED by the Parties on the Main Agreement Effective Date.

TESLA, INC.	Red River Clean Energy, LLC
Ana Stewart	Mike Luo Mike Luo (Aug 1, 2025 10:59:49 CDT)
Senior Director, Corporate Development	Mike Luo
	Manager

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1. **Defined Terms; Confirmations.**

(a) Definitions. The capitalized terms used in this Agreement and not otherwise defined in Annex I of this Agreement have the meaning given to them in Annex I of the applicable Confirmation.

(b) Confirmations. This Agreement does not obligate Tesla to engage Seller with respect to any proposed Project, or Seller to engage in any activities with respect to any proposed Project, until the Parties have executed a Confirmation and then only with respect to any Project specified in such Confirmation. To the extent that the Parties execute one or more Confirmations, then this Agreement shall govern each such Confirmation, except to the extent that a given Confirmation expressly states that it is intended to modify conflicting terms of this Agreement or expressly states that a term of this Agreement is not incorporated into the Confirmation by reference. The provisions of each Confirmation are intended to be complementary rather than conflicting and should be interpreted as a single agreement with this Agreement.

2. **Term.**

The term of this Agreement shall commence on the Main Agreement Effective Date and shall remain in effect during the Confirmation Term of any Confirmation entered into pursuant to this Agreement (the "Term"). The term of each Confirmation shall commence on the Effective Date and shall continue in full force and effect until the end of the Settlement Term (the "Confirmation Term").

3. **Financial Delivery.**

(a) Settlement Amount. For each Settlement Interval under any Confirmation, Seller shall calculate an amount (the "Settlement Amount") equal to the difference resulting from (i) the Fixed Price Payment, less (ii) the Floating Price Payment. If the Settlement Amount is greater than zero, the Settlement Amount shall be payable by Tesla to Seller according to Section 5. If the Settlement Amount is less than zero, the absolute value of the Settlement Amount shall be payable by Seller to Tesla according to Section 5. If the Settlement Amount equals zero, no amount shall be payable by either Party.

(b) Floating Price Payment. For each Settlement Interval under any Confirmation, Seller shall be responsible for an amount equal to the sum, over all Calculation Intervals in such Settlement Interval, of the product of (i) the Floating Price for such Calculation Interval, and (ii) the Interval Quantity for such Calculation Interval (the "Floating Price Payment"); provided that, when the Floating Price is equal to or less than the Minimum Floating Price, (X) if the Confirmation indicates Non-Settlement as "Not Applicable", Seller shall not be obligated to produce Energy or Environmental Attributes, but if Seller does produce Energy and Environmental Attributes, the Floating Price shall be equal to the Minimum Floating Price, and (Y) if the Confirmation indicates Non-Settlement as "Applicable", Tesla shall not be obligated to purchase Energy or Environmental Attributes.

(c) Fixed Price Payment. In consideration for Seller's payment of the Floating Price Payment pursuant to Section 3(b) and delivery of Environmental Attributes under any Confirmation, for each Settlement Interval under any Confirmation, Tesla shall be responsible for an amount equal to the sum, over all Calculation Intervals in such Settlement Interval, of the product of (i) the Fixed Price and (ii) the Interval Quantity during such Calculation Interval (the "Fixed Price Payment"). For the avoidance of doubt, Tesla shall not be responsible for a Fixed Price Payment when Tesla does not purchase Energy or Environmental Attributes pursuant to Section 3(a).

4. **Environmental Attributes.**

(a) Transfer of Environmental Attributes. Each calendar quarter during the Settlement Term of any Confirmation, Seller shall transfer to Tesla (or, upon Tesla's written request, its designee) by the Transfer Deadline, and Tesla shall accept (or shall cause its designee to accept) from Seller, in each case, in accordance with the rules of the Renewable Energy Tracking System, all of Seller's right and title to, and interest in, Environmental Attributes, including

RECs, in an aggregate quantity equal to the Interval Quantity; provided, if Tesla is unable to receive any Environmental Attributes, upon Tesla's written request, Seller will (i) transfer such Environmental Attributes to Tesla or Tesla's designee via attestation, (ii) retire such Environmental Attributes on behalf of Tesla, or (iii) monetize such Environmental Attributes and pay to Tesla the net revenues received for the Environmental Attributes; provided further that Tesla shall be responsible for any costs reasonably incurred by Seller directly arising from Seller's retirement and/or monetization of Environmental Attributes pursuant to limbs (ii) and (iii) of this Section 4(a).

(b) Clean Title. Seller represents and warrants that, at the time of transfer to Tesla of any Environmental Attributes under any Confirmation, (i) Seller has good and marketable title to such Environmental Attributes; (ii) such Environmental Attributes have not been sold to any other Person or used to meet compliance requirements of any other regulatory or voluntary renewable Energy program or standard, including any greenhouse gas reduction requirements; and (iii) Seller shall transfer to Tesla all right, title to and interest in such Environmental Attributes, free and clear of any liens or other encumbrances by, through or under Seller.

(c) Acceptance of Environmental Attributes. Tesla shall be responsible for all arrangements and other actions required to receive, at the applicable place of delivery, if any (or, for any Environmental Attributes that, by their nature, do not have a place of delivery, upon transfer within the applicable Environmental Attribute program(s) and associated monitoring, tracking, certification and/or trading system(s)), any Environmental Attributes to be transferred to Tesla under this Agreement. Risk of loss of any such Environmental Attributes shall transfer from Seller to Tesla at the time as the same are made available at the applicable place of delivery, if any (or, for any Environmental Attributes that, by their nature, do not have a place of delivery, upon transfer within the applicable Environmental Attribute program(s) and associated monitoring, tracking, certification and/or trading system(s)).

(d) Failure to Transfer Environmental Attributes. If, with respect to any Settlement Interval under any Confirmation, Environmental Attributes are required to be obtained by Seller and transferred to Tesla according to this Section 4, but Seller fails to obtain and transfer to Tesla all or part of such Environmental Attributes solely as a result of a failure by Seller to comply with this Section 4 by the Transfer Deadline, then, within fifteen (15) days of the Transfer Deadline, Seller shall pay Tesla's EA Cost to Cover, which shall be Tesla's sole and exclusive remedy, and Seller's sole and exclusive liability, for Seller's failure to comply with this Section 4. The Parties acknowledge and agree that the terms, conditions and amounts determined according to this Section 4(d) for such payment are reasonable considering the Damages that Tesla would sustain if any failure described in the immediately preceding sentence occurs. The Parties have agreed upon and established such terms, conditions and amounts because of the difficulty of ascertaining the exact amount of Damages that Tesla would sustain in such event and because otherwise obtaining an adequate remedy would be difficult or inconvenient.

(e) Future Environmental Attributes. Tesla shall be entitled to all Future Environmental Attributes at no additional cost. If Future Environmental Attributes become available during the Confirmation Term, Tesla may request that Seller transfers to it such Future Environmental Attributes, and upon such request, Seller shall take commercially reasonable efforts to effectuate such transfer. Tesla shall be responsible for any costs reasonably incurred by Seller directly associated with the transfer of such Future Environmental Attributes.

5. **Payments.**

(a) Invoicing. With respect to each Settlement Interval under any Confirmation, Seller shall deliver an invoice to Tesla in substantially the form of Annex VII of the Confirmation within ten (10) Business Days after the end of each Settlement Interval reflecting the Settlement Amount and any other amounts due under such Confirmation. Seller shall include in each such invoice a statement of the Interval Quantity, any Delay Damages, any Capacity Shortfall Damages, the Floating Price for each Calculation Interval, and any other information used by Seller in the determination of the Settlement Amount for such Settlement Interval, and with the first invoice of each Contract Year, Seller shall provide Tesla with a statement of any Availability Damages incurred during the prior Contract Year and represented on the invoice, the calculation performed to calculate any such Availability Damages, and any other information used by Seller in the determination of any such Availability Damages (and Seller will provide additional detail and supporting data

within five (5) Business Days of Tesla's request). Invoices shall be sent to Tesla at the addresses as provided in the Key Terms or as otherwise specified according to the Confirmation.

(b) Payment. Payments due by Tesla, or Seller as the case may be, shall be made by electronic funds transfer, or by wire transfer, as designated by the owed Party to the account of the owed Party as provided in the invoice on or before the Due Date, without deduction or set-off except as specifically set forth in the immediately following sentence. If Seller and Tesla each owes an amount to the other on the same invoice for obligations incurred under the applicable Confirmation, the undisputed portion(s) of such amounts shall be aggregated, and the Parties shall satisfy their payment obligations through netting, in which case the Party owing the greater aggregate undisputed amount shall pay to the other Party the difference between the undisputed amounts owed.

(c) No Set-off. Tesla and Seller may not offset or set off against any amounts that may be due and owed to the other Party under any Confirmation any amounts that are owed by such other Party to Tesla or Seller, as applicable, pursuant to such Confirmation or otherwise, including Damages and other payments, except as set forth in Section 5(b) and in Section 26(g).

(d) Adjustments to Invoices. In the event that either Party to a Confirmation discovers an error in billings or payments under such Confirmation due to metering, billing or other errors, each Party shall be entitled to an adjustment of the amount payable hereunder to reflect such revised price, error discovery, or the availability of actual (as opposed to estimated) invoicing information. A Party that seeks an adjustment to invoices as described in this Section 5(d) must provide the other Party with notice and a description of the desired adjustment within twelve (12) months of the date the invoice that is to be adjusted was received by Tesla. Such notice shall include a calculation of the payment necessary to correct the prior invoice. Any invoice that has not been challenged pursuant to this Section 5(d) within twelve (12) months of the date it was received by Tesla shall be deemed final and not subject to adjustment under this Section 5(d).

(e) Disputed Amounts. Either Party may, in good faith, dispute the correctness of any invoice. In the event an invoice or portion thereof, or any other claim or adjustment arising hereunder, is disputed, payment of the undisputed portion of such invoice shall be required to be made when due, with notice of the objection given to the other Party in writing and stating the basis for the dispute (including all supporting calculations). Payment of the disputed amount shall not be required until the dispute is resolved. Upon resolution of the dispute, any required payment shall be made (and any overpayment shall be refunded) within thirty (30) days after such resolution.

6. **Financial Close Date; Commercial Operation Date; Obligation to Complete.**

(a) Project Financing. Seller shall use commercially reasonable efforts to achieve Financial Close for any Project on or before the applicable Financial Close Date. Seller shall notify Tesla of progress toward Financial Close on a monthly basis until the Financial Close Date and shall formally notify Tesla once Seller achieves Financial Close by issuing the Notice of Financial Close. If the Project does not achieve Financial Close by the Financial Close Date, then Tesla may elect, in its sole discretion and upon three (3) days' prior written notice to Seller, to terminate the Confirmation. In the event that Tesla exercises its termination right pursuant to this Section 6(a) Seller shall pay to Tesla liquidated damages in the amount of the Financing Termination Payment. Tesla may draw on Seller's Pre-COD Credit Support in an amount equal to the Financing Termination Payment.

(b) Commercial Operation Date. Seller shall use commercially reasonable efforts to achieve Commercial Operation for any Project on or before the applicable Expected Commercial Operation Date. Seller shall provide Tesla with quarterly progress reports describing its progress toward completion of each milestone described on Annex III of the Confirmation. Such reports shall describe any anticipated delays to the milestone dates set forth in Annex III of the Confirmation, the reasons for such delays, and any updates with respect to any anticipated changes to the Commercial Operation Date, along with reasonable supporting information or documentation regarding the milestone status. Seller shall formally notify Tesla once the Project achieves Commercial Operation by issuing the Notice of Commercial Operation.

(c) Delay Damages. If the Project has not achieved Commercial Operation for any Project by the applicable Expected Commercial Operation Date, Seller shall use commercially reasonable efforts to ensure that such Project achieves Commercial Operation as soon as possible thereafter, and Seller shall pay to Tesla liquidated damages ("Delay Damages") for each day after the Expected Commercial Operation Date until the earlier of the Commercial Operation Date and the Guaranteed Commercial Operation Date, in an amount equal to the product of (x) the Expected Project Capacity, *multiplied by* (y) Tesla's Capacity Percentage, *multiplied by* (z) the Delay Damages Amount. If Seller has not paid any accrued Delay Damages within 30 days after the end of each month that such Delay Damages accrued, Tesla may draw on Seller's Pre-COD Credit Support in an amount equal to such Delay Damages.

(d) Capacity Shortfall Damages. If the Project achieves Commercial Operation, but the Installed Quantity for such Project is less than the Expected Project Capacity on the Guaranteed Commercial Operation Date, Seller shall pay to Tesla liquidated damages ("Capacity Shortfall Damages") in an amount equal to the product of (x) the difference between the Expected Project Capacity and the Installed Quantity as of such date, *multiplied by* (y) Tesla's Capacity Percentage, *multiplied by* (z) the Capacity Shortfall Damages Liquidated Value. If Seller has not paid any Capacity Shortfall Damages within 30 days of the Guaranteed Commercial Operation Date, Tesla may draw on Seller's Pre-COD Credit Support in an amount equal to the Capacity Shortfall Damages.

(e) Early Termination for Failure to Complete. If the Project does not achieve Commercial Operation by the Guaranteed Commercial Operation Date, then (i) for a period beginning the day after the Guaranteed Commercial Operation Date and ending on the Commercial Operation Date, Tesla may elect, in its sole discretion and upon three (3) days' prior written notice to Seller, to terminate the Confirmation. In the event that Tesla exercises its termination right pursuant to this Section 6(e), Seller shall pay to Tesla liquidated damages in the amount of (x) Seller's Pre-COD Credit Support Amount less (y) aggregate Delay Damages paid by Seller prior to the date that Tesla provides notice of its termination ("Early Termination Payment"). The payment of Financing Termination Payment, Delay Damages, Capacity Shortfall Damages, Early Termination Payment and Tesla's termination rights set forth this Section 6 shall be Tesla's sole and exclusive remedy, and Seller's sole and exclusive liability, for any failure to achieve, or delay in achieving, the Commercial Operation Date. The Parties acknowledge and agree that the terms, conditions and amounts determined according to this Section 6 for Delay Damages are reasonable considering the Damages that Tesla would sustain if any failure described in the immediately preceding sentence occurs. The Parties have agreed upon and established the amounts of the Financing Termination Payment, Early Termination Payment, Delay Damages and Capacity Shortfall Damages because of the difficulty of ascertaining the exact amount of Damages that Tesla would sustain in such event and because otherwise obtaining an adequate remedy would be difficult or inconvenient. The Financing Termination Payment, Early Termination Payment, Delay Damages and Capacity Shortfall Damages are not penalties and shall be paid regardless of the amount of Damages that Tesla actually sustains.

(f) Right of First Offer. If a Confirmation is terminated for any reason other than as a result of a Tesla Event of Default and Seller seeks to enter into an agreement to sell Tesla's Capacity Percentage of the output of the Project and any related Environmental Attributes at any time within twenty-four (24) months following such termination, Seller shall notify Tesla of the same and provide Tesla with a written offer price equal to the lesser of (i) the price Seller seeks to offer to the third party and (ii) the Fixed Price. Tesla shall have thirty (30) days after receipt of such notice from Seller to accept such offer by delivery of written notice to Seller, and thereafter the Parties will use diligent good faith efforts to consummate the transaction on or before the forty-fifth (45th) Business Day after Tesla's acceptance of Seller's offer on substantially the same terms and conditions as set forth in this Agreement. If Tesla rejects such purchase offer or the Parties are unable to consummate the transaction within such forty-five (45) Business Day period, Seller may sell the output of the Project and any related Environmental Attributes to any third party so long as the price for such output and related Environmental Attributes is not less than the price proposed by Tesla and the terms and conditions of any such sale taken as a whole are no more favorable to the purchaser thereof than those set forth in this Agreement. This Section 6(f) shall survive the expiration or termination of this Agreement.

7. **Construction; Operation and Maintenance.**

(a) Construction. Seller shall design and construct the Project in accordance with Prudent Electrical Practices and Applicable Laws. Seller shall design and construct the Project to meet, and shall not alter or modify (or permit to be altered or modified) the Project in any material respect from, the characteristics set forth in Annex II of the Confirmation pertaining to the Project's power capacity and energy production; provided, however, that Seller may deviate from such characteristics (prior to, on or after the Commercial Operation Date) with Tesla's written consent.

(b) Operations and Maintenance. Seller shall operate the Project at all times in accordance with Prudent Electrical Practices and Applicable Laws. Failure to do so shall be considered a material breach of this Agreement. In addition, during the months of [June through September] inclusive, Seller shall not schedule any maintenance that reduces the Energy generation capability of the Project, unless (i) such outage is required to avoid damage to the Project, (ii) such outage is required as a result of or to avoid a System Emergency, (iii) such outage is required to preserve equipment warranties and cannot be scheduled outside the months of [June through September], (iv) such outage is required in accordance with Prudent Electrical Practices, or (v) the Parties agree otherwise in writing.

(c) Production and Operational Information. Seller shall provide Tesla with reasonable access to data from the Project, either directly or through a third-party software program, in a format mutually agreeable to the Parties. Seller shall provide, on a near real-time basis in formats reasonably acceptable to Tesla, the following: supervisory control and data acquisition system data in read-only format relating to the Project's performance and maintenance outages; meteorological conditions including wind speed, wind direction or plane-of-array irradiance, global horizontal irradiance, as applicable, and temperature; energy output (EMO revenue meter output); Project nodal pricing; and availability information including explanatory details. Tesla may request, on a monthly or other regular basis, a report on any scheduled and unscheduled maintenance outages and curtailment events. From time to time, Tesla may request other reasonable and appropriate operational information from Seller, which information shall not to be unreasonably withheld. Subject to Section 21, Tesla may disclose the information provided in this Section 7(c) to potential providers for the purposes of managing this Agreement, any Confirmation, and/or entering into certain hedging and risk management products.

(d) Project Site Visits. Tesla may request of Seller permission to visit or for its representatives to visit a Project site during normal business hours. Seller shall accommodate reasonable requests of Tesla with respect to such visits; provided that Tesla and its representatives shall comply with all Seller health and safety policies and procedures and instructions that are communicated to Tesla and its representatives while present at the Project site and shall conduct themselves in a manner that will not unreasonably interfere with or disrupt the operation of the Project or other activities of Seller and its subcontractors.

(e) Shared Facilities. Except as set forth in Annex II to the Confirmation, the Project shares no interconnection facilities with any Other Project. If any Other Project is reflected on Annex II to the Confirmation, Seller represents to Tesla that: (i) Seller will have sufficient interconnection capacity and rights under the Interconnection Agreement and any agreement by which Seller shares capacity of interconnection facilities ("Shared Facilities Agreement") to interconnect the Project to the Transmission System at the Installed Quantity and fulfill its obligations to Tesla under this Agreement; and (ii) any instruction from the EMO of the Transmission System to curtail Energy deliveries that does not specify the generating facility to be curtailed will be allocated first to the Other Projects and all other resources subject to any Shared Facilities Agreement.

8. **Availability Guarantee.**

Seller guarantees to Tesla that the Project will be available to produce Energy in accordance with, and will otherwise comply with, the provisions of Annex IV of the Confirmation.

9. **Metering.**

Seller shall cause to be provided, at no cost to Tesla, any and all meters required by the EMO, and shall utilize metering data provided by the EMO to measure the total electric Energy generation from the Project delivered at the Interconnection Point. The total electric Energy generation from the Project delivered at the Interconnection Point (expressed in MWh) shall be measured in accordance with the metering methodology recognized by the EMO for settlement purposes; and the amount of total electric Energy generation from the Project delivered at the Interconnection Point recognized by the EMO for settlement purposes (for the avoidance of doubt, meaning the amount recognized by the EMO at the Interconnection Point without deduction for transmission losses from and after the Interconnection Point for any reason) shall be deemed the amount of total electric Energy generation from the Project delivered at the Interconnection Point for all purposes of this Agreement. Without limiting the foregoing, any adjustment to prior meter readings shall be made and settled in accordance with the methodologies recognized by the EMO for settlement purposes, and only any such adjustment recognized by the EMO for settlement purposes shall be made to the amount of total electric Energy generation from the Project delivered at the Interconnection Point for purposes of this Agreement.

10. **Indemnity; Third Party Charges.**

(a) Indemnification. Seller shall indemnify, defend and hold Tesla harmless from and against any and all Damages for (i) personal injury, death or property damage to Tesla's property or facilities, (ii) personal injury, death or property damage to third parties, (iii) infringement, misappropriation or other violation by Seller of any third party's intellectual property rights, or (iv) other third-party claims (whether arising under contract or tort), in each case that arise out of or are connected with development, construction, operation, ownership or leasing of, or other acts or omissions of Seller with respect to, the Project, except to the extent such injury, death or damage or other third-party claims are attributable to the willful misconduct or breach of this Agreement or any Confirmation by Tesla or any of its Affiliates. Seller shall also indemnify, defend and hold Tesla harmless from and against any and all Damages resulting from a breach of its obligations set forth in Section 26(j).

(b) Third-Party Charges. Seller shall be responsible for the payment of all Third-Party Charges during the Confirmation Term.

11. **Seller's Credit Support.**

(a) No later than ten (10) days after the Effective Date, Seller shall deliver to Tesla security (the "Seller's Pre-COD Credit Support") in the form of a Letter of Credit in an amount (subject to Section 13) equal to Seller's Pre-COD Credit Support Amount, which such Seller's Pre-COD Credit Support shall be promptly returned by Tesla upon Tesla's receipt of the Seller's Operation Credit Support (as defined below). Seller shall not be required to replenish any amounts drawn under the Seller's Pre-COD Credit Support.

(b) Seller shall, upon the Commercial Operation Date, deliver to Tesla security (the "Seller's Operation Credit Support", and together with Seller's Pre-COD Credit Support, the "Seller's Credit Support"), in the form of (i) a Guaranty (from an entity that directly or indirectly controls Seller, which is a Creditworthy Entity and is acceptable to Tesla in its commercially reasonable discretion), (ii) a Letter of Credit, (iii) cash, (iv) any other form acceptable to Tesla in its commercially reasonable discretion, or (v) any combination thereof, in an aggregate amount (subject to Section 13) equal to Seller's Operation Credit Support Amount. Seller shall replenish any amounts drawn under the Seller's Operation Credit Support.

(c) The Seller's Credit Support shall not be deemed a limitation of damages.

12. **Tesla's Credit Support.**

If at any time during the Confirmation Term, (i) Tesla is not a Creditworthy Entity and (ii) Tesla does not have a Consolidated Liquidity of at least [redacted] then Tesla shall, within ten (10) Business Days of such occurrence, deliver to Seller security (the "Tesla's Credit Support") in the form of (i) a Guaranty (from an entity that directly or indirectly controls Tesla, which is a Creditworthy Entity), (ii) a Letter of Credit, (iii) cash, (iv) any other form acceptable to Seller in its commercially reasonable discretion, or (v) any combination thereof in an aggregate amount (subject to Section 13) equal to Tesla's Credit Support Amount. If Tesla delivers Tesla's Credit Support before the Commercial Operation Date (and the Installed Quantity is less than the Expected Project Capacity), the Tesla's Credit Support Amount shall be reduced accordingly at the Commercial Operation Date, and Seller shall promptly execute any documents reasonably requested by Tesla or the issuing bank who issued any Letter of Credit (if applicable) in order to memorialize any such reduction. If Tesla delivers Tesla's Credit Support and subsequently (i) becomes a Creditworthy Entity or (ii) has a Consolidated Liquidity of at least [redacted] then Seller shall return Tesla's Credit Support to Tesla on the date on which Tesla (i) has remained a Creditworthy Entity or (ii) has a Consolidated Liquidity of at least [redacted] for six (6) consecutive months. Tesla shall not be required to replenish any amounts drawn under Tesla's Credit Support.

13. **Posting, Maintenance and Drawing of Credit Support.**

(a) Security Interest. To secure its obligations under a Confirmation, Credit Support Provider hereby grants to Credit Support Beneficiary, as the secured party, a first priority, present and continuing security interest in, and lien on (and right of setoff against), and assignment of, all security posted in the form of cash and all cash obtained by Credit Support Beneficiary resulting from a draw on the Credit Support, and any and all proceeds resulting therefrom or the liquidation thereof, whether now or hereafter held by, on behalf of, or for the benefit of the Credit Support Beneficiary, and Credit Support Provider agrees to take such action as Credit Support Beneficiary reasonably requires in order to protect the Credit Support Beneficiary's first-priority security interest in, and lien on (and right of setoff against), such collateral and any and all proceeds resulting therefrom or from the liquidation thereof; provided, however, that the Credit Support Beneficiary may exercise its rights as a secured party (including the right of setoff granted pursuant to this sentence) against such cash collateral only upon the terms and conditions of Section 13(b). If Credit Support Beneficiary receives cash proceeds from a Letter of Credit pursuant to a drawing made according to the last sentence of Section 13(b), then the Credit Support Beneficiary shall deposit such proceeds in a depository account with a Qualified Issuer under terms and conditions that allow the proceeds to be disbursed to Credit Support Beneficiary only upon the terms and conditions of Section 13(b) and provide for disbursement to Credit Support Provider according to Section 13(d).

(b) Drawing of Credit Support. If an Event of Default has occurred and is continuing, Credit Support Beneficiary shall be entitled to draw upon Credit Support for any amounts due and owing from the Credit Support Provider to the Credit Support Beneficiary with respect to this Agreement and any Damages arising from (i) such Event of Default and/or (ii) any prior Event of Default to the extent that Damages arising therefrom have not yet been timely paid in full to the Credit Support Beneficiary. In addition, in the case of Credit Support in the form of a Letter of Credit, Credit Support Beneficiary may draw the full amount of such Letter of Credit within thirty (30) days before the expiration of such Letter of Credit if, as of the date of such drawing, Credit Support Beneficiary does not receive replacement Credit Support meeting the requirements of this Agreement.

(c) Replacement. If, at any time during which Credit Support is required to remain in place, a Credit Event occurs with respect to said Credit Support, then the Credit Support Provider shall not be deemed to be in breach of this Section 13; provided that, within ten (10) Business Days after a request from Credit Support Beneficiary, the Credit Support Provider replaces the affected Credit Support with other Credit Support in order to have Credit Support with undrawn capacity in the amount required by the definition thereof at such time. In addition to the replacement of the Credit Support that may be required pursuant to the preceding sentence, the Credit Support Provider shall, at any time and from time to time, have the right to replace the Credit Support in effect at such time with other

Credit Support, so long as Credit Support Provider maintains the Credit Support with undrawn capacity in the amount required by the definition thereof at such time.

(d) Release Upon Replacement. If any Credit Support is replaced in accordance with Section 13(c), then, subject to Section 13(e), if the Credit Support being replaced is (i) a Guaranty, the corresponding Credit Support Guarantor(s) shall be deemed released from all obligations under such replaced Credit Support, and Credit Support Beneficiary shall execute any documents reasonably requested by Credit Support Provider or any such Person to confirm such release, or (ii) a Letter of Credit, the Credit Support Beneficiary shall return such Letter of Credit to the bank that issued such Letter of Credit and shall execute any documents reasonably requested by Credit Support Provider or such issuing bank in order to release such Letter of Credit. Further, at six (6) months after the end of the Term (subject to Section 13(e)), if any part of the Credit Support being released is (i) a Guaranty, the corresponding Credit Support Guarantor(s) shall be deemed released from all obligations under the Credit Support, and Credit Support Beneficiary shall execute any documents reasonably requested by Credit Support Provider or any such Person to confirm such release or (iii) a Letter of Credit, the Credit Support Beneficiary shall return such Letter of Credit to the bank that issued such Letter of Credit and shall execute any documents reasonably requested by the Credit Support Provider or such issuing bank in order to release such Letter of Credit.

(e) Release Upon Termination. If, on any scheduled security release date set forth in Section 13(d), there are outstanding any claims that (i) were validly made prior to such date against Credit Support then being released and (ii) in the case of any Credit Support being released because it is being replaced, are not fully secured by the replacement Credit Support, then, on such scheduled release date, (a) the amount of the applicable Credit Support shall be deemed reduced to the amount of such outstanding claims, (b) such release date shall be extended until the final resolution and (if applicable) full payment of such outstanding claims and (c) at the election of Credit Support Provider, the scope of such security may be reduced to secure only such outstanding claims. In the event of a reduction in the amount and/or scope of any Credit Support in accordance with clause (a) or clause (c) of the immediately preceding sentence, Credit Support Beneficiary shall promptly execute any documents and take any other actions reasonably requested by the Credit Support Provider or any applicable Credit Support Guarantor to effect and/or confirm such reduction in amount and/or scope, including by executing and delivering an amendment to such Credit Support, by exchanging such Credit Support or by other reasonable means.

14. **Taxes.**

Unless otherwise agreed to in writing by the Parties or specifically expressed in this Agreement, neither Party is liable for any of the taxes of the other Party that the other Party is legally obligated to pay and that are incurred or arise in connection with or are related to income generated by the transactions contemplated under this Agreement and any Confirmation or arise from ownership of property subject to the transactions contemplated by this Agreement and any Confirmation, and all such taxes (including net income taxes, franchise taxes, and property taxes) shall be the financial responsibility of the Party who is obligated by operation of law to pay such tax. In the instance that sales, gross receipts, transfer, use or similar taxes are incurred or arise in connection with or are related to a transaction between the Parties contemplated by this Agreement or any Confirmation, a purchasing Party may provide to the other Party a valid exemption certificate executed by the purchasing Party, in which case such other Party shall not collect the taxes covered by such certificate.

15. **Representations and Warranties; Covenants.**

(a) On the Effective Date, each Party hereby represents and warrants (or shall be deemed to represent and warrant, as applicable) to the other Party as follows:

(i) Good Standing. It is duly organized, validly existing and in good standing under the laws of the jurisdiction of its organization or incorporation and is in good standing and qualified to do business in each jurisdiction where the failure to so qualify could reasonably be expected to have a material adverse effect on such Party's ability to perform its obligations under this Agreement or on the business, operations or financial condition of such Party.

(ii) Authority. It has all necessary company power and authority to execute and deliver this Agreement and perform its obligations hereunder.

(iii) No Conflict. Its execution, delivery and performance of this Agreement (i) has been duly authorized by all necessary company action, (ii) does not violate any of the terms or conditions of (A) its governing documents, (B) any contract to which it is a Party (or result in acceleration of any amounts owed or otherwise adversely affect its rights or obligations under such a contract) including any sharing and common ownership, use and financing arrangements between Seller and the owners of the Other Project(s), or (C) any Applicable Laws currently in effect having applicability to such Party or its assets (subject, in the case of Seller as the representing Party, obtaining any permits that are not yet required) and (iii) does not result in, or require, the creation or imposition of any mortgage, deed of trust, pledge, lien, security interest or other charge or encumbrance of any nature (other than as may be contemplated by this Agreement) upon or with respect to any of the properties of such Party now owned or hereafter acquired, in the case of each clauses (ii)(B), (ii)(C) and (iii), to the extent such violation or creation or imposition could reasonably be expected to have a material adverse effect on such Party's ability to perform its obligations under this Agreement or on the business, operations or financial condition of such Party.

(iv) Binding Agreement. This Agreement has been validly executed and delivered on behalf of such Party and constitutes the legal, valid and binding obligation of such Party enforceable against such Party according to its terms, except as the enforceability of this Agreement may be limited by (i) bankruptcy, insolvency, reorganization or other similar laws affecting the enforcement of creditors' rights generally and (ii) general principles of equity whether considered in a proceeding in equity or at law.

(v) Licenses and Permits. All governmental and other third-party consents that are required to have been obtained by it with respect to its execution, delivery or performance of this Agreement have been obtained and are in full force and effect and all conditions of any such consents have been complied with, except, in the case of Seller as the representing Party, any permits that are not yet required.

(vi) Ability to Perform. There is no pending or (to its knowledge) threatened litigation, arbitration or administrative proceeding that could reasonably be expected to have a material adverse effect on such Party's ability to perform its obligations under this Agreement or on the business, operations or financial condition of such Party.

(vii) Eligible Participant. As of the Commercial Operation Date, each Party is an "eligible contract participant" within the meaning of Section 1a(18)(A)(v) of the Commodity Exchange Act or an "eligible commercial entity" within the meaning of Section 1(a)(17) of the Commodity Exchange Act. The Parties acknowledge and agree that all transactions under this Agreement, except for the transfer of Environmental Attributes, shall be deemed to be "swaps" as defined in Section 1a(47)(A) of the Commodity Exchange Act and the CFTC's rules and regulations promulgated under the Commodity Exchange Act.

(b) Seller covenants that it will perform its obligations under this Agreement in compliance with all Applicable Laws.

16. **Limitation of Liability.**

(a) Waiver of Consequential Damages. EXCEPT FOR INDEMNIFICATION UNDER SECTION 10(a), IN NO EVENT SHALL EITHER PARTY OR ANY OF ITS RELATED PERSONS BE LIABLE TO THE OTHER PARTY OR ANY OF ITS RELATED PERSONS FOR SPECIAL, PUNITIVE, INCIDENTAL, INDIRECT, EXEMPLARY, OR CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER, INCLUDING LOSS OF PROFITS, ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT; PROVIDED, HOWEVER, THAT THIS LIMITATION SHALL NOT BE CONSTRUED TO LIMIT A PARTY'S RIGHT TO RECEIVE LIQUIDATED DAMAGES AND REPLACEMENT CONTRACT LOSSES AS PROVIDED IN THIS AGREEMENT OR, SUBJECT TO THE OTHER LIABILITY LIMITATIONS, TO RECEIVE "COVER" DAMAGES. THE PARTIES INTEND THAT, EXCEPT AS OTHERWISE EXPRESSLY PROVIDED IN THIS AGREEMENT, THE LIABILITY LIMITATIONS SHALL APPLY EVEN IN THE EVENT OF THE FAULT,

NEGLIGENCE (INCLUDING GROSS NEGLIGENCE) (IN WHOLE OR IN PART), STRICT LIABILITY, OR BREACH OF CONTRACT OF THE BENEFICIARY THEREOF AND WHETHER ASSERTED IN CONTRACT, IN WARRANTY, IN TORT, BY STATUTE OR OTHERWISE.

(b) Non-Recourse. NO RELATED PERSON OF EITHER PARTY SHALL HAVE ANY LIABILITY OR RESPONSIBILITY FOR, RELATING TO OR IN CONNECTION WITH SUCH PARTY'S FAILURE TO PERFORM OR FAULTY PERFORMANCE OF ANY TERM, COVENANT, CONDITION OR PROVISION OF THIS AGREEMENT OR ANY OTHER FAILURE, BREACH (INCLUDING BREACH OF ANY DUTY OR STANDARD OF CONDUCT) OR OTHER ACT OR OMISSION OF SUCH PARTY ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT, INCLUDING (WITHOUT LIMITING SECTION 17(A)) AS A RESULT OF THE FAULT, NEGLIGENCE (INCLUDING GROSS NEGLIGENCE) (IN WHOLE OR IN PART), STRICT LIABILITY OR BREACH OF CONTRACT OF THE RELATED PERSON THAT IS THE BENEFICIARY OF THIS PROVISION. IN PURSUING ANY REMEDY FOR ANY SUCH FAILURE TO PERFORM, FAULTY PERFORMANCE OR OTHER FAILURE, BREACH OR OTHER ACT OR OMISSION OF A PARTY, NEITHER THE OTHER PARTY NOR ANY OF ITS RELATED PERSONS SHALL HAVE ANY RECOURSE AGAINST ANY PERSON OTHER THAN THE DEFAULTING OR BREACHING PARTY ITSELF, NOR AGAINST ANY ASSETS OTHER THAN THE ASSETS OF THE DEFAULTING OR BREACHING PARTY ITSELF. NOTWITHSTANDING THE FOREGOING, NOTHING IN THIS SECTION 16(B) SHALL LIMIT OR AFFECT THE OBLIGATIONS OF ANY GUARANTOR OF EITHER PARTY'S CREDIT SUPPORT UNDER THE TERMS OF SUCH PARTY'S CREDIT SUPPORT.

(c) No Warranty. TESLA ACKNOWLEDGES AND AGREES THAT IT HAS ENTERED INTO THIS AGREEMENT TO RECEIVE PAYMENTS AND ENVIRONMENTAL ATTRIBUTES BASED SOLELY UPON THE EXPRESS REPRESENTATIONS AND WARRANTIES IN THIS AGREEMENT, AND NO IMPLIED WARRANTIES FROM SELLER OR ANY OTHER PERSON SHALL BE DEEMED TO APPLY TO THE SAME. THE PARTIES NEGATE ANY REPRESENTATION OR WARRANTY WITH RESPECT TO THE INTERVAL QUANTITY AND ENVIRONMENTAL ATTRIBUTES NOT EXPRESSLY SET FORTH IN THIS AGREEMENT, INCLUDING ANY REPRESENTATION OR WARRANTY WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

(d) Survival. This Section 16 shall survive the expiration or termination of this Agreement.

17. **Events of Default.**

If any of the following events occur:

(a) Failure to Pay. A Party fails to make, when due, any payment required pursuant to this Agreement (other than amounts disputed in good faith), and such failure is not remedied within fifteen (15) Business Days after written notice of such failure from the other Party;

(b) Material Breach. A Party is in material breach of its obligations under this Agreement (other than an obligation to make payment, an obligation that is otherwise specifically set forth in this Section 17 as a separate Event of Default or an obligation in respect of which this Agreement provides a remedy that is stated to be an exclusive remedy), and such breach is not remedied within thirty (30) days after written notice of such breach from the other Party (or, to the extent such Party has commenced and is continuing reasonable efforts to remedy such breach, within ninety (90) days after written notice of such breach from the other Party);

(c) Misrepresentation. A Party's representation or warranty made in this Agreement proves to have been false in any material respect when made and (i) the underlying facts are not corrected or cured so as to make such representation and warranty correct within thirty (30) days after written notice of such misleading or false representation or warranty from the other Party (provided that, to the extent such inaccuracy is not reasonably capable of being remedied within the thirty (30)-day remedy period specified above but is reasonably capable of being remedied, such Party shall have such additional time as is reasonably necessary to remedy such inaccuracy, so long as such Party promptly commences and diligently pursues such remedy) or (ii) if such inaccuracy is not capable of a remedy but the other Party's Damages can be ascertained, the payment of such Damages (subject to the Liability Limitations) is not made

within ten (10) Business Days after the amount of such Damages is agreed upon by the Parties or is determined by a final and non-appealable judgment or order;

(d) Failure to Maintain Credit Support. A Credit Support Provider fails to deliver or maintain Credit Support when and as required pursuant to Section 11 or Section 12 or Section 13, as applicable, and such breach is not cured within the applicable period specified therein;

(e) Bankruptcy. A Party (i) files a petition or otherwise commences, or authorizes the commencement of, a proceeding or cause under any bankruptcy, insolvency, receivership or similar law for the protection of creditors, (ii) has such a petition filed or proceeding commenced against it, which remains un-dismissed for ninety (90) days, (iii) files an answer or pleading admitting or failing to contest the material allegations of any such petition, (iv) takes any action for its winding up, liquidation or dissolution, (v) is otherwise adjudged bankrupt or insolvent under any bankruptcy, insolvency, receivership or similar law for the protection of creditors, or (vi) consents to any of the actions described in the preceding clauses (i) through (v);

(f) Unauthorized Assignment. A Party assigns or transfers this Agreement or any portion thereof in violation of Section 23 of this Agreement; or

(g) Availability. The Project does not achieve an Actual Availability Percentage equal to or greater than eighty percent (80)% in each of two (2) consecutive Contract Years;

then an "Event of Default" shall exist as to such Party (the "Defaulting Party") and the other Party (the "Non-Defaulting Party") shall be entitled to exercise the remedies set forth in Section 18.

18. **Remedies.**

(a) Termination. If an Event of Default occurs and is continuing, the Non-Defaulting Party shall have the right to exercise one or more of the following remedies: (i) send written notice of its intent to terminate this Agreement for such Event of Default, and if the Defaulting Party fails to cure such Event of Default within thirty (30) days of receiving the Non-Defaulting Party's notice of intent to terminate this Agreement, terminate this Agreement early by providing notice to the Defaulting Party designating an early termination date that shall be no earlier than the date such notice is effective and not later than twenty (20) days after the date such notice is effective and (ii) to exercise such remedies as otherwise provided in this Agreement or (subject to the Liability Limitations) available at law or in equity, including the right to specific performance in the event of Seller's default for failure to deliver the Environmental Attributes as required hereunder and the right (subject to the Liability Limitations) to Damages arising out of the Event of Default, including, in the case of termination of this Agreement as a result of an Event of Default, Damages suffered by the Non-Defaulting Party as a result of the termination, which shall be determined as equal to the Replacement Contract Losses (if any) incurred by the Non-Defaulting Party as a result of such termination. Further, whether or not this Agreement is terminated, either Party may assert any claims available to it under this Agreement or (subject to the Liability Limitations) at law or in equity, so as to recover any other Damages against the other Party resulting from any breach of or default under this Agreement by such other Party. Each Party shall use commercially reasonable efforts to mitigate its Damages resulting from the other Party's breach of or default under this Agreement, including upon any termination hereof as a result of an Event of Default of the other Party.

(b) Suspension. In addition to (and without limiting) the remedies for Event of Default set forth in Section 18(a) or (subject to the Liability Limitations) otherwise available at law or in equity, during the existence of an Event of Default, the Non-Defaulting Party may suspend (in whole or in part) its performance under this Agreement, but without relieving the Defaulting Party of its obligations to pay (subject to the Liability Limitations) Damages arising out of such Event of Default.

(c) Payment of Damages. Promptly upon any termination of this Agreement pursuant to Section 18(a), the Non-Defaulting Party shall determine in a commercially reasonable manner its Damages, including the

Replacement Contract Losses (if any) and any payments then due to the Non-Defaulting Party for prior performance (net of payments owed to the Defaulting Party for prior performance). The Non-Defaulting Party shall provide by notice to the Defaulting Party, its determination of Damages, together with reasonable supporting material. The Defaulting Party shall pay such Damages within thirty (30) days of such notice.

(d) Remedies Cumulative. Except as expressly provided in this Agreement, all remedies are cumulative and not exclusive of any rights, privileges and remedies provided by Applicable Laws.

19. **Survival.**

Neither the termination nor expiration of this Agreement shall relieve either Party of (i) any undischarged liability of such Party in respect of the period prior to such termination or expiration (including for unpaid amounts owing under this Agreement in respect of the period prior to such termination or expiration) or any liability for breach by such Party of this Agreement prior to such termination or expiration or (ii) any obligations or liabilities arising out of any such termination. All obligations and liabilities described in the preceding sentence, the Liability Limitations, and Sections, 6(f), 16, 21, and 26(i), together with applicable provisions of this Agreement to the extent relating to any of the foregoing (including for final billings and other provisions relating to the discharge and enforcement of any of the foregoing), shall survive termination or expiration of this Agreement.

20. **Notices.**

All invoices, notices, demands or other communications that either Party may give to the other under or in connection with this Agreement shall be in writing and shall be delivered either by hand or express courier mail addressed to the relevant Party at the address stated in the Key Terms or at any other address notified by that Party to the other Party as its address for notice. A Party may change its addresses or other notice information by providing notice of same in accordance with this Section 20.

21. **Confidentiality.**

(a) Confidentiality. The NDA sets out the Parties' confidentiality obligations under this Agreement and any Confirmation. It is incorporated by reference into this Agreement, mutatis mutandis, and the terms and conditions of the NDA will continue in force throughout the term of this Agreement and for three (3) years following its expiration or earlier termination. The terms and conditions of this Agreement and any Confirmation shall be Tesla's Confidential Information for purposes of the NDA.

(b) Goodwill and Publicity. Neither Party shall use any name, trade name, service mark or trademark of the other Party in any promotional or advertising material without the prior written consent of such other Party. The Parties shall coordinate and cooperate with each other when making public announcements related to the Project or the execution and existence of this Agreement, and each Party shall have the right to promptly review, comment upon and approve any publicity materials, press releases or other public statements (to include via social media) by the other Party that refer to, or that describe any aspect of, the Project or this Agreement. Neither Party shall make any press release or public announcement of the specific terms of this Agreement (except for filings or other statements or releases as may be required by Applicable Laws or pursuant to Section 26(i)) without the specific prior written consent of the other Party.

(c) Naming Rights. Tesla shall have the exclusive right to name any Project during the applicable Confirmation Term; provided that Seller shall not be obligated to change its legal entity name. Seller agrees that Tesla may also include graphics, trade dress, logos, or other marks ("Tesla Marks") wherever the name of such Project will appear. Upon Tesla's request, Seller will use such Tesla Marks on signs, billboards and posters, websites, advertisements in any medium, presentations or descriptive materials and anywhere else the Project's proper name would typically be displayed. Tesla grants Seller a non-exclusive, non-transferable, non-assignable, revocable right and license for the

during the Confirmation Term to use the Tesla Marks. Upon the termination or expiration of the Confirmation, Seller will immediately cease and discontinue all further use of the Tesla Marks.

22. **Records and Audits.**

Seller shall create and keep (i) meter records and other records substantiating amounts due from Tesla to Seller under this Agreement and (ii) all other records required to be kept by Seller according to Applicable Laws. Seller shall maintain the records that it is required to create and keep under this Section 22 according to Prudent Electrical Practices and, if applicable, generally accepted accounting practices, consistently applied. Seller shall keep and maintain those records for a period of at least four (4) years after the respective records are created, and Tesla may inspect and audit those records during normal business hours upon reasonable advance notice (but not more frequently than once every calendar year unless Tesla has a commercially reasonable reason for auditing more frequently) and with as little impact to Seller's business as possible. Each Party's costs of audits will be borne by such Party.

23. **Assignment.**

Neither Party shall be entitled to assign or transfer all or any portion of its interest in this Agreement or any Confirmation, except as provided herein, without the prior written consent of the non-assigning Party, which consent shall not be unreasonably withheld, delayed or conditioned. Any Change in Control of Seller will be deemed an assignment. Any assignment without the prior written consent of the non-assigning Party is void. Notwithstanding the foregoing, a Party may make the following assignments without the prior written consent of the other Party:

(i) Seller may collaterally assign this Agreement or any Confirmation to a Financing Party relating to Seller's construction or long-term financing for the Project, and, in connection with any such financing, Tesla shall execute and deliver an estoppel certificate and/or Tesla's standard form direct agreement, each containing customary terms and conditions; and

(ii) Tesla may transfer or assign all of its rights and obligations under this Agreement or any Confirmation to an Affiliate; provided that, if Tesla assigns any Confirmation to an Affiliate and such Affiliate is not a Creditworthy Entity, Tesla's Credit Support is provided or remains in place, as applicable.

24. **Force Majeure.**

(a) Effect of Force Majeure. To the extent a Party is prevented by Force Majeure from carrying out, in whole or in part, its obligations under this Agreement, then the affected Party shall be excused from performing such obligations.

(b) Notice of Force Majeure. The Party claiming Force Majeure will promptly (but no later than ten (10) Business Days after becoming aware, or after such Party reasonably should have been aware, of events that constitute such Force Majeure event) notify the other Party in writing of such event, giving details of the Force Majeure event, its anticipated effect on the affected Party's performance under this Agreement, and the steps that the affected Party is taking to remedy the delay.

(c) Termination Due to Force Majeure event. If any Force Majeure event prevents a Party from carrying out its material obligations under this Agreement before or after the Commercial Operation Date for a period of one hundred eighty (180) days or longer, and Force Majeure event is not subject to dispute resolution pursuant to Section 24(e) of this Agreement, the Party not claiming Force Majeure may (so long as the consecutive days of excused performance are continuing) terminate this Agreement, without liability of either Party arising out of such termination, upon at least thirty (30) days written notice and such termination shall not be considered a termination due to an Event of Default; provided that such termination right shall expire (and shall no longer apply) if, prior to the end of such thirty (30) day period, the Force Majeure is remedied. If the Party not claiming Force Majeure does not exercise its right to terminate this Agreement pursuant to this Section 24(c) within thirty (30) days, the Party claiming Force Majeure shall

have the right to terminate this Agreement without liability of either Party arising out of such termination, upon written notice to the other Party.

25. **Insurance Requirements.**

Seller shall, at its sole cost, maintain insurance as set forth in Annex II of this Agreement with responsible insurance carriers.

26. **Miscellaneous.**

(a) Entire Agreement. This Agreement, the Confirmations, including all Annexes hereto, contains the entire understanding of the Parties with respect to the subject matter hereof and shall completely and fully supersede all prior understandings or agreements, both written and oral, including any term sheet, between the Parties relating to the subject matter hereof and thereof. No representations, inducements, promises, or agreements, oral or otherwise, have been relied upon or made by any Party, or anyone on behalf of a Party, that are not fully expressed in this Agreement. The section titles in this Agreement are only for purposes of convenience and do not form a part of this Agreement and will not be taken to qualify, explain or affect any provision thereof.

(b) Severability. If any article, section, phrase or portion of this Agreement is held to be invalid, illegal or unenforceable for any reason, such article, section, phrase, or portion so adjudged will be deemed separate, severable and independent and replaced automatically by a legal, valid and enforceable provision which most nearly accomplishes and reflects the original intention of the Parties. This Agreement, as so modified, shall remain in full force and effect and shall not be invalidated or rendered illegal or unenforceable or otherwise affected thereby. If the application of any provision of this Agreement to any Person or circumstance is determined to be void, unlawful, or unenforceable, then that provision shall remain valid, lawful, and enforceable as applied to other Persons and circumstances.

(c) Amendment/Binding Effect. This Agreement shall become effective and binding upon the Parties as of the Main Agreement Effective Date upon the execution and delivery of this Agreement by each of the Parties. This Agreement may not be amended, changed, modified, or altered unless such amendment, change, modification, or alteration is in writing and signed by both of the Parties. This Agreement shall inure to the benefit of and shall be binding upon the Parties and their respective successors and permitted assigns.

(d) Waiver. No delay or omission by a Party in the exercise of any right under this Agreement shall be taken, construed or considered as a waiver or relinquishment thereof, and any such right may be exercised from time to time and as often as may be deemed expedient. If any term and condition hereof is breached and thereafter waived by a Party, such waiver shall be limited to the particular breach so waived and is not deemed to waive any other breach hereunder.

(e) Governing Law; Dispute Resolution; Venue. This Agreement and all claims arising out of or relating to this Agreement and the transactions contemplated hereby shall be governed by the laws of the State of Texas, without regard to the conflicts of law principles that would result in the application of any law other than the law of such state. Any dispute arising from or relating to this Agreement shall first be promptly referred to the Parties' senior level management for resolution. If the Parties' senior level management are unable to resolve any such dispute within twenty (20) days after referral, then either Party may take a dispute to binding arbitration in accordance with the then-current Streamlined Arbitration Rules of the Judicial Arbitration and Mediation Services ("JAMS"). The existence, content and result of the arbitration shall be held in confidence by the Parties, their representatives, any other participants and the arbitrator. The arbitration will be conducted by a single arbitrator selected by agreement of the Parties or, failing such agreement, appointed in accordance with JAMS, in either case in English in Austin, Texas. The arbitration award shall be final and binding on the Parties and the Parties shall not have the right to appeal any such award. Each Party will bear its own expenses in the arbitration and will share equally the costs of the arbitration; provided, however, that the arbitrator may, in their discretion, award reasonable costs and fees to the prevailing Party. Each Party hereby excludes

and waives irrevocably any rights or application or appeal to the courts of any country otherwise having jurisdiction to the fullest extent permitted by law in connection with any questions of law arising in the course of arbitration or arising out of any award made, except for actions to obtain a judgment recognizing or enforcing an arbitral award or actions to take (or request any judicial or other authority to order) any provisional measure prior to the commencement of or during the arbitration proceedings for the preservation of its rights and interests.

(f) Waiver of Jury Trial. EACH OF THE PARTIES HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY RIGHT TO HAVE A JURY PARTICIPATE IN RESOLVING ANY DISPUTE ARISING OUT OF, IN CONNECTION WITH, RELATED TO, OR INCIDENTAL TO THE RELATIONSHIP BETWEEN THEM BY THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY.

(g) Bankruptcy Treatment. The Parties acknowledge and agree that (i) this Agreement constitutes a "commodity contract" and/or a "forward contract" and that Seller and Tesla are "forward contract merchants" and all payments under this Agreement are "transfers" or "settlement payments" in each case within the meaning of the United States Bankruptcy Code; (ii) the Parties are entitled to the rights under, and the protections afforded by, Sections 362, 546, 548, 556, 560 and 561 of the United States Bankruptcy Code. In addition, Seller and Tesla each represent that it is an "eligible commercial entity" and an "eligible contract participant" within the meaning of United States Commodity Exchange Act §§1a(17) and 1a(18), respectively. To secure its obligations under this Agreement, each Party hereby grants the other Party a present and continuing security interest in, lien on, and right (without limiting Section 5(c)) to set off against, its respective payment obligations to the other Party under this Agreement. Each Party acknowledges and agrees that the pledge of its payment obligations to the other Party under this Agreement shall serve to "guaranty" or "secure" such obligations within the meaning of the United States Bankruptcy Code.

(h) Equitable Relief. Nothing in Section 26(e) shall prevent either Party from applying to a court of competent jurisdiction (subject to Section 26(e)) for interim measures, specific performance, or other similar relief prior to completion of the procedures in Section 26(e).

(i) Disclosures to Governmental Authorities. Tesla and Seller hereby acknowledge and agree that the Parties shall be entitled, each at its own expense, to report and disclose information concerning any or all of the transactions hereunder (including information regarding the economic terms and valuations of such transactions) to any applicable Governmental Authority (or a third-party swap data repository as required by a Governmental Authority), from time to time, as may be required by Applicable Laws or as such Party may determine, in its reasonable discretion, to be necessary or advisable for it to comply with Applicable Laws. Additionally, to the extent either Party needs additional information or details from the other Party in order to comply with any such Applicable Laws (including information concerning such other Party's organization, corporate status, status under the CFTC's regulations and/or unique entity identifier), such other Party shall promptly provide such additional information or details to the first Party upon request therefor.

(j) Dodd-Frank. Each Party represents and warrants to the other Party that the information provided with respect to such Party in Annex VI of the Confirmation is true and correct as of the Effective Date and as of the Commercial Operation Date. From and following the Effective Date, each Party shall update the information provided in Annex VI of the Confirmation by notice to the other Party promptly after any material change to such information or after any such information ceases to be true and correct at any time during the balance of the Term. Seller covenants that it shall keep full, complete and systematic records of all transactions under this Agreement and maintain such records until the date that is the five (5) year anniversary of the termination or expiration of this Agreement. For purposes of Parts 43.3 and 45.8 of the regulations of the CFTC promulgated under the Commodity Exchange Act, the Parties hereby agree that, Seller shall be the reporting counterparty (the "Reporting Party") with respect to such transaction, provided that Seller shall be responsible for all costs incurred by Seller as the Reporting Party. Tesla hereby agrees that, upon the occurrence of any "life cycle event" (as defined in Part 45.1 of the regulations of the CFTC) relating to a corporate event in respect of Tesla and any swap, it will, as soon as practicable, but in no event later than 10:00 a.m. PT on the second

(2nd) Business Day following the day on which such life cycle event occurs, notify Seller of the occurrence of such life cycle event, with sufficient detail regarding such life cycle event to allow Seller to comply with any reporting requirement.

(k) Further Assurances. Each Party shall deliver or cause to be delivered to the other Party such instruments, documents, statements, certificates of its officers, accountants, engineers or agents as to matters as may be reasonably requested, and shall make available, upon reasonable request, personnel and records relating to the Project to the extent required for the requesting Party to carry out the purposes of this Agreement or fulfill any legal obligation or regulatory reporting requirements.

(l) No Rights of Third Parties. This Agreement is intended only for the Parties' benefit, and nothing in this Agreement may be construed to create any duty to, any standard of care concerning, or any liability to, any person not a Party to this Agreement, other than the rights of Persons expressly included in the Liability Limitations to the protection of such Liability Limitations.

(m) Relationship of the Parties. This Agreement shall not be interpreted or construed to (a) create an association, joint venture or partnership between the Parties or impose any partnership obligation or liability on either Party, or (b) create any agency relationship between the Parties or impose any fiduciary duty of any kind on either Party, or (c) create a trust or impose any trust obligations of any kind on either Party, or (d) constitute a lease of any properties of any kind. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or act as or be an agent or representative of, or otherwise bind, the other Party. Each Party waives any and all rights that it may otherwise have under Applicable Laws or legal precedents to make any claim or take any action against the other Party or any of its Related Persons in respect of this Agreement based on any theory of agency, fiduciary duty or other special standard of care.

(n) Counterparts; Electronic Format. This Agreement may be executed in several counterparts, each of which is an original and all of which constitute one and the same instrument. This Agreement may be duly executed and delivered by a Party by electronic format (including portable document format (.pdf)) delivery of the signature page of a counterpart to the other Party.

ANNEX I – DEFINITIONS

"Affiliate" shall mean, when used with reference to a specified Person, any other Person that directly, or indirectly through one or more intermediaries, controls, is controlled by or is under common control with the specified Person; provided, however, that the term "Affiliate," when used with respect to Seller, shall not include any direct or indirect tax equity investor in Seller. For purposes of this definition, "control" shall mean the power or authority, through ownership of voting securities, by contract or otherwise, to direct the management of the specified Person.

"Agreement" shall have the meaning set forth in the introductory paragraph.

"Applicable Laws" shall mean all (i) constitutions, treaties, statutes, laws, ordinances, rules, regulations, judgments, decrees, injunctions, writs and orders of any Governmental Authority; (ii) rules or listing requirements of any stock exchange or trading market on which securities issued by either of the Parties or any of their respective Affiliates are listed or quoted; (iii) decisions of and determinations by, and interpretations of, any of the foregoing set forth in clauses (i) and (ii) by any Governmental Authority or stock exchange or trading market or arbitrator; and (iv) requirements of permits, in the case of each of the items described in clauses (i)-(iv), that apply to either or both of the Parties or their Affiliates, the Project, the terms of this Agreement or otherwise to the Person or matter in question. Applicable Laws includes the EMO Protocols and the requirements of NERC and any applicable regional reliability entity.

"Business Day" shall mean a day on which Federal Reserve member banks in New York City are open or required to be open for business.

"Capacity Shortfall Damages" shall have the meaning set forth in Section 6(d).

"CFTC" shall mean the Commodity Futures Trading Commission.

"Change in Control" shall mean the occurrence of any one of the following events or actions with respect to Seller: (i) a direct or indirect transfer of a majority of the ownership or equity interests of such Party; or (ii) a sale or conveyance of any direct or indirect voting rights such that the Party is no longer in control of its interests under this Agreement, provided, that, for the avoidance of doubt, (x) the sale or issuance of equity interests by Seller to a Financing Party pursuant to any tax equity investment transaction or (y) the foreclosure on or similar acquisition of any equity or ownership interests in Seller by a lender or secured party; or (z) transfer by a lender or secured party pursuant to a collateral pledge or assignment agreement to a Qualified Operator that (A) is not a Competitor or Competitor Related Party, (B) is not a party to a dispute with Tesla or an Affiliate of Tesla, and (C) is primarily engaged in the business of owning or operating renewable generation projects, shall not constitute a Change in Control.

"Code" shall mean the U.S. Internal Revenue Code of 1986, as amended.

"Commercial Operation" shall mean when the following conditions have been satisfied or waived by the Parties: (a) the Generation Equipment with an aggregate nameplate capacity equal to or greater than the Minimum Installed Capacity have been installed and have been Commissioned, (b) the Project systems (other than the Generation Equipment) have been completed in all material respects and are capable of delivering Energy to the Interconnection Point in accordance with Prudent Electrical Practices, and (c) Seller has issued the Notice of Commercial Operation.

"Commercial Operation Date" shall mean the date on which Commercial Operation occurs.

"Commissioned" or "Commissioning" shall mean, as to the Generation Equipment, the performance of the start-up and commissioning activities identified in the applicable equipment manufacturer's commissioning completion checklist.

"Competitor" shall mean a Person who is a competitor of Tesla with respect to the manufacture, design, integration or supply of battery energy storage equipment or systems; provided, that Competitor does not include a

Person who performs such functions solely for itself or its wholly-owned Affiliates and not for revenue generation purposes; provided, further, that transfer pricing arrangements between Affiliates shall not be deemed revenue generation for purposes of the foregoing (including monies transferred between Affiliates primarily for tax and accounting reasons on a transfer pricing basis).

"Competitor Related Party" shall mean, with respect to any Competitor, any other Person (x) that is a controlling direct or indirect beneficial owner of such Competitor, or (y) for whom such Competitor is a controlling direct or indirect beneficial owner. For purposes of this definition, the term "control" shall mean the right and power, directly or indirectly through one or more intermediaries, to direct or cause the direction of substantially all of the management and policies of a Person through ownership of voting securities or by contract.

"Confidential Information" shall mean all oral and written information relating to the business, strategy, policies, prospects, assets or plans of the other Party or any of the other Party's Related Persons (including, in the case of Tesla as the receiving Party, Project capabilities and availability) and, to the extent marked "Confidential" or otherwise identified with specificity in writing as confidential at the time of disclosure, all other information provided by the Parties to one another pursuant to this Agreement. The following information does not constitute Confidential Information for purposes of this Agreement: (i) information that is or becomes generally available to the public other than as a result of a disclosure by the receiving Party in violation of this Agreement; (ii) information that was already known by the receiving Party on a non-confidential basis prior to this Agreement; (iii) information that becomes available to the receiving Party on a non-confidential basis from a source other than the disclosing Party if such source was not subject to any prohibition against disclosing the information to the receiving Party; (iv) information that the receiving Party develops independently without using the Confidential Information, and (v) information that the disclosing Party approves for release in writing.

"Confirmation" shall have the meaning set forth in the introductory paragraph.

"Confirmation Term" shall have the meaning set forth in Section 2.

"Consolidated Liquidity" shall have the meaning set forth in the RCF Credit Agreement.

"Contract Year" shall mean each one-year period during the Settlement Term commencing at the Commercial Operation Date or on one of the anniversaries of the Commercial Operation Date; provided that, if this Agreement is terminated prior to its expiration, the Contract Year in which such termination occurs will begin on the anniversary of the Commercial Operation Date immediately preceding the termination date (or, if such termination occurs during the first Contract Year, at start of the Settlement Term) and will end on the termination date.

"Credit Event" shall mean, at the applicable time, with respect to any Credit Support, (a) if such Credit Support is in the form of a Guaranty, the Guarantor fails to meet the standards required in the definition of "Guaranty," (b) if such Credit Support is in the form of a Letter of Credit, the bank issuing such Letter of Credit ceases to have the Credit Rating required in the definition of "Qualified Issuer," or (c) in the case of any Credit Support, such Credit Support ceases to be in full force and effect at such time.

"Credit Rating" shall mean, for any Person, the senior unsecured and uncredit-enhanced long term debt rating of such Person by Moody's or S&P or, if such Person does not have such a senior unsecured and uncredit-enhanced long term debt rating, the issuer rating of such Person by Moody's or S&P.

"Credit Support" shall mean either Seller's Credit Support or Tesla's Credit Support, as applicable.

"Credit Support Beneficiary" shall mean either Seller or Tesla, which is the beneficiary of a Credit Support, as applicable.

"Credit Support Guarantor" shall mean (a) in respect of any Credit Support in the form of a Guaranty, the Guarantor issuing such Guaranty and (b) in respect of any Credit Support in the form of a Letter of Credit, the bank issuing such Letter of Credit.

"Credit Support Provider" shall mean either Seller or Tesla, which is the provider of a Credit Support, as applicable.

"Creditworthy Entity" shall mean an entity that maintains at least one of the following Credit Ratings: (i) "Baa3" or higher by Moody's, (ii) "BBB-" or higher by S&P, or (iii) "BBB-" or higher by Fitch.

"Damages" shall mean any and all claims, liabilities, losses, damages, causes of action, fines interest, awards, penalties, litigation, lawsuits, administrative proceedings, administrative investigations, costs and expenses (including reasonable attorneys' fees, court costs and other costs of suit, arbitration, dispute resolution or other similar proceedings), including for injury, illness or death and including those owed to third parties (whether asserted in contract, in warranty, in tort, by statute or otherwise), but (for the avoidance of doubt) in all events subject to the Liability Limitations.

"Defaulting Party" shall have the meaning set forth in Section 17.

"Delay Damages" shall have the meaning set forth in Section 6(c).

"Dollars" or "$" shall mean the lawful currency of the United States of America.

"Due Date" shall mean, for any amount on an invoice issued by Seller pursuant to Section 5(a), (i) if Seller is required to pay such amount, the Seller Due Date or (ii) if Tesla is required to pay such amount, Tesla Due Date.

"EA Cost to Cover" shall mean the reasonable costs incurred (or that would be incurred) by Tesla to purchase Environmental Attributes necessary to replace any shortfall between the Environmental Attributes required to be obtained by Seller and transferred to Tesla and the Environmental Attributes actually transferred to Tesla.

"Early Termination Payment" shall have the meaning set forth in Section 6(e).

"EMO Protocols" shall mean the documents adopted by the EMO, including any exhibits or attachments referenced therein, that contain the scheduling, operating, planning, reliability and settlement policies, rules, guidelines (including the guidelines approved by the EMO describing the reliability standards for the EMO), procedures, standards and criteria of the EMO.

"Energy" shall mean three-phase, 60-cycle alternating current electric energy, expressed in units of kilowatt-hours or megawatt-hours.

"Environmental Attribute" shall mean (i) any emissions, air quality or other environmental attribute, aspect, characteristic, claim, credit, benefit, reduction, offset or allowance, howsoever entitled or designated, resulting from, attributable to or associated with the Interval Quantity and/or Tesla's Capacity Percentage of the Project that is related to the Project's benefits to the environment and capable of being measured, verified or calculated and (ii) the reporting rights related to any such attributes, aspects, characteristics, claims, credits, benefits, reductions, offsets or allowances, including the right of a Person to report the ownership thereof in compliance with federal or state law, if applicable, or otherwise to a federal or state agency or any other Person, including under any present or future federal, state or local law, regulation or bill or any international or foreign emissions trading program. Environmental Attributes include RECs, carbon credits, portfolio credits, emissions allowances, environmental air quality credits and emissions reduction credits, offsets and allowances, howsoever entitled, resulting from the avoidance of the emission of any gas, chemical or other substance attributable to the generation of the Energy by a renewable Energy facility, including any of the same arising out of legislation or regulation concerned with oxides of nitrogen, sulfur, carbon, particulate matter, soot or mercury or

implementing the United Nations Framework Convention on Climate Change (the "UNFCCC") or the Kyoto Protocol to the UNFCCC or crediting "early actions" with a view thereto, or laws or regulations involving or administered by the Environmental Protection Agency or successor administrator. Notwithstanding the foregoing or anything to the contrary, Environmental Attributes do not include federal, state and local tax credits, grants or other tax incentives.

"Event of Default" shall have the meaning set forth in Section 17.

"FERC" shall mean the Federal Energy Regulatory Commission, or its success in function.

"Financing Parties" shall mean lenders and/or equity investors (including any trustee or agent on behalf of such lenders and/or equity investors) providing equity and/or debt financing or refinancing to Seller or any of its Affiliates, whether that financing or refinancing takes the form of private debt or equity, public debt or equity or any other form.

"Financial Close" shall mean full and complete construction financing of the Project.

"Fitch" shall mean Fitch Ratings or its successor.

"Fixed Price Payment" shall have the meaning set forth in Section 3(c).

"Floating Price" shall mean, for any Calculation Interval, the Settlement Point Price for electricity at the Settlement Point, as defined and published by the EMO, expressed in $/MWh.

"Floating Price Payment" shall have the meaning set forth in Section 3(b).

"Force Majeure" means any act or circumstance beyond the reasonable control and not attributable to the fault or negligence of, the Party seeking relief, including acts of God, epidemic, pandemic, flood, fire, earthquake, climatic conditions at the Project site that are unusual for the time of year, explosion, action or inaction of a public authority (including delays caused by permitting authorities) for reasons other than the claiming Party's fault, war, terrorist threats or acts or other civil unrest, piracy, lock-outs, strikes or other labor disputes other than those limited to the Project site, restraints or delays affecting carriers to the extent caused by a Force Majeure event, the inability or delay in obtaining supplies of adequate or suitable materials to the extent caused by a Force Majeure event, any emergencies declarations by any Governmental Authority, the applicable utility or EMO requiring shutdown or forced curtailment of the Project or Project site, or imposing delays or other impacts on a Party's performance (including those arising from shut-in, social distancing or other orders by Governmental Authorities or enhanced safety or monitoring requirements, or due to any epidemic or pandemic), and delays or non-availability of labor or materials to the extend caused by a Force Majeure event. Under no circumstances shall the following constitute a Force Majeure event: (i) a Party's ability to enter into a contract for sale or purchase of Energy or Environmental Attributes at a more favorable price or under more favorable conditions or other economic reasons; (ii) outages to the extent such are not caused by a Force Majeure event; (iii) changes in import tariff rates and/or the imposition of new import tariffs (including anti-dumping and/or countervailing duties or other trade measures); (iv) any event relating to charging of or discharging from the BESS; or (v) any other economic hardship (including lack of funds), financial cost, or changes in market conditions affecting the economics of either Party.

"Future Environmental Attributes" shall mean Environmental Attributes, generated by, attributable to or associated with the Interval Quantity and/or Tesla's Capacity Percentage of the Project that are not recognized as of the Effective Date and become recognized and marketable during the Term.

"Governmental Authority" shall mean (a) any federal, state, local, municipal or other government or (b) any other governmental, quasi-governmental, regulatory or administrative agency, commission or other authority (including CFTC, the EMO, FERC, NERC and any applicable regional reliability entity) lawfully exercising or entitled to exercise any administrative, executive, judicial, legislative, police, policy, regulatory or taxing authority or power.

"Guarantor" shall mean any Person issuing a Guaranty pursuant to this Agreement in connection with a Confirmation.

"Guaranty" shall mean a guaranty issued by a Person that is a Creditworthy Entity in form and substance reasonably satisfactory to the relevant Credit Support Beneficiary.

"HE" shall mean "hour ending."

"Installed Quantity" shall mean the nameplate capacity of the Generation Equipment that has been installed and Commissioned and for which the Project systems (other than the Generation Equipment) have been completed in all material respects and are capable of delivering Energy to the Interconnection Point in accordance with Prudent Electrical Practices.

"Interconnection Facilities" shall mean all the facilities installed for the purpose of interconnecting the Project to the Interconnection Point, including, but not limited to, all transformers and associated equipment, relay and switching equipment, and safety equipment.

"Interval Quantity" shall mean, for each Calculation Interval during the Settlement Term, an amount (expressed in MWh) equal to Tesla's Capacity Percentage of the net electric Energy generation from the Project delivered at the Interconnection Point during such Calculation Interval.

"Letter of Credit" shall mean an irrevocable standby letter of credit substantially in the form of Annex V of the Confirmation issued by a Qualified Issuer.

"Liability Limitations" shall mean the indemnities and other releases, waivers, allocations and disclaimers of, and limitations on, liabilities or remedies set forth in this Agreement.

"Main Agreement Effective Date" shall have the meaning set forth in the introductory paragraph.

"Moody's" shall mean Moody's Investors Service, Inc.

"MW" shall mean megawatt AC.

"MWh" shall mean megawatt-hour.

"NERC" shall mean the North American Electric Reliability Corporation.

"Non-Defaulting Party" shall have the meaning set forth in Section 17.

"Notice of Commercial Operation" shall mean written notice provided by Seller to Tesla stating that the conditions in clauses (a) and (b) of the definition of "Commercial Operation" have been satisfied or waived by the Parties and the Installed Quantity as of the Commercial Operation Date along with substantiating documentation.

"Notice of Financial Close" shall mean written notice provided by Seller to Tesla stating that Financial Close has been satisfied along with substantiating documentation.

"Other Project" shall mean any other r electricity-generating facility or energy storage facility that proposes to interconnect with the Transmission System through all or any portion of the Interconnection Facilities, including Shared Facilities.

"Party" and "Parties" shall have the respective meanings set forth in the introductory paragraph.

"Person" shall mean an individual, corporation, limited liability company, voluntary association, joint stock company, business trust, partnership, Governmental Authority or other entity.

"Prudent Electrical Practices" shall mean those practices, methods and acts that would be implemented and followed by prudent operators of wind or solar, as applicable, electric energy generating facilities, similar to the Project, during the relevant time period, which practices, methods and acts, in the exercise of prudent and responsible professional judgment in the light of the facts known or that shall reasonably have been known at the time the decision was made, would reasonably have been expected to accomplish the desired result consistent with manufacturers' warranties and recommendations, contractual obligations, the requirements or guidance of the Connecting Utility, the state Public Utility Commission or equivalent regulatory entity, the EMO and each other applicable Governmental Authority, Applicable Laws, the requirements of insurers, good business practices, reliability and safety. Prudent Electrical Practices shall not be limited to the optimum practice, method, technique or standard to the exclusion of all others, but rather shall be a range of possible practices, methods, techniques or standards. Seller acknowledges that the use of Prudent Electrical Practices by Seller does not exempt Seller from any obligations set forth in this Agreement or any Confirmation.

"PT" shall mean the prevailing time at the Project as observed by the EMO.

"Qualified Issuer" shall mean a major U.S. commercial bank, or a U.S. branch of a foreign commercial bank, which U.S. bank, or foreign bank, has and maintains (i) at least [redacted] in total assets and (ii) a Credit Rating of "A-" or better from S&P, or "A3" or better from Moody's.

"Qualified Operator" shall mean (a) a Person that has at least five (5) years' experience with operating at least seven hundred fifty (750) MW of renewable energy generation (excluding the Project) or (b) any other Person reasonably acceptable to Tesla.

"RCF Credit Agreement" shall mean the Credit Agreement, dated as of January 20, 2023, among Tesla, Inc., the Lenders and Issuing Banks from time to time party thereto, Citibank, N.A., as Administrative Agent and Deutsche Bank Securities, Inc., as Syndication Agent, as may be amended from time to time.

"Related Persons" shall mean, in respect of a referenced Person, (i) its owners (direct and indirect) and Affiliates, (ii) its subcontractors and (iii) the respective directors, officers, employees and agents of the referenced Person and the Persons described in clauses (i) and (ii) of this definition.

"Renewable Energy Tracking System" shall mean the REC tracking and trading system administered by the EMO in accordance with the EMO Protocols.

"Replacement Contract Losses" shall mean, with respect to a termination by a Non-Defaulting Party, an amount equal to (a) the difference (positive or negative) to such Non-Defaulting Party between the present value of the payments to be made and received under this Agreement (less the costs and expenses to be incurred in performing this Agreement) during the remaining term of this Agreement and the present value of the payments to be made and received (less the costs and expenses to be incurred) under transaction(s) replacing this Agreement, plus (b) attorneys' fees and expenses, brokerage fees and commissions and other third-party transaction costs and expenses to be reasonably incurred by the Non-Defaulting Party in entering into transaction(s) replacing this Agreement, attorneys' fees and expenses to be reasonably incurred by the Non-Defaulting Party in connection with the termination of this Agreement and any other reasonable incremental costs and expenses to be reasonably incurred by such Non-Defaulting Party in connection with the termination of this Agreement and/or in entering into transaction(s) replacing this Agreement; provided, however, that, if the foregoing amount is negative, the Replacement Contract Losses shall be deemed to be zero. For the avoidance of doubt, the Non-Defaulting Party shall not be required to enter into a replacement transaction in order to establish the Replacement Contract Losses owed.

"Reporting Party" shall have the meaning set forth in Section 26(j).

"S&P" shall mean Standard & Poor's Credit Ratings, Inc.

"Seller" shall have the meaning set forth in the Key Terms.

"Seller Due Date" shall mean, with respect to any invoice issued by Seller pursuant to Section 5(a), the forty-fifth (45th) day after the end of the applicable Settlement Interval.

"Seller's Credit Support" shall have the meaning set forth in Section 11(b).

"Seller's Operation Credit Support" shall have the meaning set forth in Section 11(b).

"Seller's Pre-COD Credit Support" shall have the meaning set forth in Section 11(a).

"Settlement Amount" shall have the meaning set forth in Section 3(a).

"Settlement Interval" shall mean each calendar month during the Settlement Term, commencing HE 0100 PT on the first calendar day of such calendar month and ending HE 2400 PT on the last calendar day of such calendar month; provided that, if this Agreement is terminated prior to its expiration, the Settlement Interval in which such termination occurs will be HE 0100 PT on the first calendar day of the calendar month in which such termination occurs and will end on the termination date.

"Shared Facilities" means the equipment, assets, and property (real or personal) that are used in common with Other Projects, as applicable, and all as necessary to enable delivery of energy from the Project (which is excluded from Shared Facilities) to the Interconnection Point.

"Shared Facilities Agreement" shall have the meaning set forth in Section 7(e).

"System Emergency" shall mean any circumstance or combination of circumstances or any condition of the Project, the Interconnection Facilities, the Transmission System, or the transmission system of other electric utilities, in which continued operation of the Project (a) is reasonably likely to endanger life or property and necessitates immediate action to avert injury to persons or serious damage to property, or (b) is reasonably likely to adversely affect, degrade or impair Transmission System reliability or transmission system reliability of the transmission system of other electric utilities.

"Term" shall have the meaning set forth in Section 2.

"Tesla" shall have the meaning set forth in the Key Terms.

"Tesla Due Date" shall mean, with respect to any invoice issued by Seller pursuant to Section 5(a), the forty-fifth (45th) day after the later of the end of the applicable Settlement Interval and the date of such invoice.

"Tesla's Credit Support" shall have the meaning set forth in Section 12.

"Third-Party Charges" shall mean all fees, costs, charges and penalties of every kind assessed by the EMO or other third-party charges arising from Seller's development, construction, operation, ownership or leasing of, or other acts or omissions of Seller with respect to, the Project, including, but not limited to, maintaining the Project's account with the EMO (if applicable), costs associated with registering, issuing and transferring Environmental Attributes (subject to Section 4(a)), and charges arising from the Project's operator failure to follow dispatch instructions or follow the EMO Protocols.

"Transfer Deadline" shall mean, with respect to any Environmental Attribute required to be obtained by Seller and transferred to Tesla according to Section 4(a), the fifteenth (15th) Business Day of the financial quarter following the

date that the applicable monitoring, tracking, certification and/or trading system(s) posts (or would have posted, had Seller complied with its obligations in Section 4), such Environmental Attribute in Seller's account (as extended for any delays due to the act or omission of Tesla or a Force Majeure event).

"Transmission System" shall mean the electric transmission system to which the Project is connected.

"UNFCCC" shall have the meaning set forth in the definition of Environmental Attribute.

ANNEX II – INSURANCE

1. Insurance Requirements.

1.1. **Commercial General Liability Insurance.**

1.1.1. $2,000,000 each occurrence or per claim, combined single limit for third party bodily injury or property damage and $2,000,000 general aggregate.

1.1.2. Include Tesla as additional insured in connection to this Agreement and the applicable Confirmation.

1.2. **Business Automobile Liability or similar Motor Liability Insurance.**

1.2.1. Seller's vehicles utilized in scope of this Agreement and the applicable Confirmation insured in accordance with local statutory requirements.

1.2.2. Include Tesla as additional insured in connection to this Agreement and the applicable Confirmation.

1.3. **Worker's Compensation Insurance and Employer Liability Insurances.**

1.3.1. Workers Compensation as required by state or federal laws.

1.3.2. Employer Liability with limits of $1,000,000 bodily injury for each accident, $1,000,000 bodily injury by disease for each employee and $1,000,000 bodily injury by disease policy limit.

1.4. **"All Risk" Property Insurance.**

1.4.1. Seller may elect to procure or maintain "All Risk" Property insurance for Seller-owned property, which shall include, but not limited to, building, structures, equipment and/or other property owned and all non-owned property in Seller's care, custody or control for which the Seller is legally liable or for which the Seller has agreed to insure or be responsible for at the Site.

2. Other Requirements for Seller's Insurances.

2.1. **Waiver of Subrogation.** Where permitted by law, all applicable insurance in this Annex II shall include waivers of subrogation.

2.2. **Notice of Cancellation.** Seller shall give Tesla prior written notice in the event of cancellation of insurance required to be obtained under this Annex II.

2.3. **Evidence of Insurance**. Seller shall provide certificate(s) of insurance or equivalent evidencing the required coverages under this Annex II to Tesla upon execution of the applicable Confirmation and upon each insurance renewal through the duration of the applicable Confirmation.

Tesla - Concord - Main PPA Form - Execution Version - 250725

Final Audit Report 2025-08-01

Created:	2025-08-01
By:	Jean Chou (jchou@concordnewenergy.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAOLL9rygTy66m3lkoRu30JnPUCrMdvzfk

"Tesla - Concord - Main PPA Form - Execution Version - 250725 " History

Document created by Jean Chou (jchou@concordnewenergy.com)
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Email viewed by Mike Luo (mluo@concordnewenergy.com)
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Document e-signed by Mike Luo (mluo@concordnewenergy.com)
Signature Date: 2025-08-01 - 3:59:49 PM GMT - Time Source: server

Agreement completed.
2025-08-01 - 3:59:49 PM GMT

Adobe Acrobat Sign

POWER PURCHASE AGREEMENT CONFIRMATION

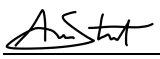
(Chisme Solar/8987 CR268, Early, TX 76802)

This Power Purchase Agreement Confirmation (this "Confirmation") is entered into August 1, 2025 (the "Execution Date"), by and between Tesla and Seller (each as defined below, together the "Parties" and each individually as a "Party"). This Confirmation shall take effect on August 1, 2025 ("Effective Date").

Key Terms	
These Key Terms set out the scope of this Confirmation and certain key terms.	
Parties:	
Tesla:	Tesla, Inc., a corporation organized under the laws of Texas, whose registered office is at 1 Tesla Road, Austin, TX 78725.
Seller:	Blue Heron Solar, LLC, a limited liability company organized under the laws of Delaware, whose registered office is at 107 Spring St, Seattle, WA 98104
Notices:	
Tesla Notice Address:	1 Tesla Road, Austin, TX 78725 Attn: General Counsel / Legal Phone: +1. 512.516.8177 Email: energynotices@tesla.com; Tesla-Renewable-Notices@tesla.com
Seller Notice Address:	11515 Burnet Road, Suite 825, Austin, TX, 78758 Attn: Legal Phone: +1 (312) 883-4898 Email: info@redrivercleanenergy.com
NDA:	
NDA:	The Mutual Non-disclosure Agreement dated May 24, 2024, between Tesla (or its Affiliate) and Seller (or its Affiliate).
Project Terms:	
Project:	A solar energy generation facility located in Mills County, Texas as further described in Annex II.
Expected Project Capacity:	147 MWac.
Energy Market Operator:	Electric Reliability Council of Texas (ERCOT), or successor organization, or successor organization.
Financial Close Date:	Not Applicable.
Expected Commercial Operation Date:	[redacted]

Guaranteed Commercial Operation Date:	The date that is one hundred eighty (180) days after the Expected Commercial Operation Date.
Project RECs:	RECs generated by the Project.
Capital Expenditure Estimate	[redacted] Seller's expected capital expenditure to construct the Project.
Commercial Terms:	
Fixed Price:	[redacted]/MWh.
Minimum Floating Price:	[redacted]/ MWh.
Non-Settlement:	Applicable
Settlement Term:	15 years.
Settlement Point:	ERCOT North Hub.
Tesla's Capacity Share:	147 MW.
Tesla's Capacity Percentage:	100%.
Capacity Shortfall Damages Liquidated Value:	[redacted]
Expected Annual Production (as generated)	384,015 (associated with Tesla's Capacity Share).
Delay Damages Amount:	[redacted]/MW/day.
Seller's Pre-COD Credit Support Amount:	[redacted]/MW of Tesla' Capacity Percentage of the Expected Project Capacity.
Seller's Operation Credit Support Amount:	[redacted]/MW of Tesla's Capacity Percentage of the Installed Quantity.
Tesla's Credit Support Amount:	(i) Prior to the Commercial Operation Date, [redacted]/ of Tesla's Capacity Percentage of the Expected Project Capacity, and (ii) on and after the Commercial Operation Date, [redacted] of Tesla's Capacity Percentage of the Installed Quantity.
Financing Termination Payment:	Not Applicable.
Guaranteed Availability Percentage:	90% in the first Contract Year, and 92% in each Contract Year thereafter

EXECUTED by the Parties on the Execution Date, to take effect on and from the Effective Date.

TESLA, INC.	**Blue Heron Solar, LLC**
	Mike Luo Mike Luo (Aug 1, 2025 11:00:01 CDT)
Ana Stewart	**Mike Luo**
Senior Director, Corporate Development	**Manager**

POWER PURCHASE AGREEMENT CONFIRMATION

TERMS AND CONDITIONS

1. Incorporation of Terms of Main Power Purchase Agreement. Tesla and Seller agree that the terms of the Main Power Purchase Agreement, entered into August 1, 2025, between Tesla and Red River Clean Energy, LLC (the "Main Agreement") are hereby incorporated into this Confirmation as if set forth in their entirety. With respect to the transaction described in this Confirmation, to the extent that any term of this Confirmation conflicts with a term of the Main Agreement, this Confirmation shall govern.

2. Definitions. The capitalized terms used in this Confirmation and not otherwise defined in Annex I of this Confirmation have the meaning given to them in the Main Agreement.

3. Annexes. The following Annexes attached to this Confirmation are the respective Annexes to the Confirmation referenced in the Main Agreement:

Annex I	Definitions
Annex II	Project Description
Annex III	Project Milestones
Annex IV	Availability Guarantee
Annex V	Form of Letter of Credit
Annex VI	Dodd Frank Information
Annex VII	Form of Invoice and Settlement Interval Data

4. Amendments to Main Agreement. [Insert any Project-specific amendments to Main Agreement].

a. Change in Law.

i. If a Change in Law occurs which (i) renders it impossible or unlawful to give effect to this Agreement; (ii) renders any material matter required to be ascertained under this Agreement impossible to ascertain; or (iii) causes the provisions of this Agreement to become inconsistent with Applicable Law (each, a "Relevant Change in Law"), then a Party may give notice to the other Party of the Relevant Change in Law occurring. The Parties shall meet within fifteen (15) Business Days of such notice to negotiate in good faith such amendments to this Agreement as are necessary to achieve (so far as is possible) the same overall balance of rights, obligations, liabilities, risks, costs and rewards under this Agreement as applied immediately prior to the Relevant Change in Law and to ensure that performance of this Agreement remains legal and enforceable. If sixty (60) days have elapsed since such meeting and there exists an unresolved dispute between the Parties as to whether there has been a Relevant Change in Law and/or consequently whether any amendments to this Agreement are necessary, then either Party will have a right to terminate this Agreement without further liability hereunder.

ii. If, prior to the earlier of the Commercial Operation Date and the Guaranteed Commercial Operation Date, a Change in Law occurs which (i) in the case of Seller, causes a Minor Federal Tax Credit Impact or a Major Federal Tax Credit Impact in respect of the Project (a "Seller Economic Change in Law"), or (ii) in the case of Tesla, materially and adversely affects the value or benefits of the Environmental Attributes (or Tesla's ability to realize the value or benefits of the Environmental Attributes) (a "Tesla Economic Change in Law"), then the impacted Party may give notice to the other Party of the Seller Economic Change in Law or Tesla Economic Change in Law, as applicable (each, an "Economic Change in Law") occurring, including details of the Economic Change in Law (and, in the case of a Seller Economic Change in Law, Seller's increased actual costs associated with such Seller Economic Change in Law and the calculation of how such costs resulted in the proposed increase to the Fixed Price) and supporting documents as reasonably requested by the other Party to validate such claim (the "Economic Change in Law Notice").

iii. If Seller provides an Economic Change in Law Notice to Tesla relating to a Minor Federal Tax Credit Impact, Tesla shall have thirty (30) days from receipt of such Economic Change in Law Notice to provide Seller with Notice that it has rejected such Economic Change in Law Notice if Tesla determines in good faith that Seller's documentation fails to substantiate the Seller Economic Change in Law and/or the related calculation of the impact to the Fixed Price. Tesla's notice to Seller of such determination shall include a reasonable explanation for why Tesla made its good faith determination that Seller's Economic Change in Law Notice fails to substantiate the Seller Economic Change in Law and/or the related calculation of the impact to the Fixed Price. Following receipt of such notice, Seller may (a) within fifteen (15) days, resubmit the Seller Economic Change in Law Notice, or (b) dispute Tesla's determination pursuant to the dispute resolution procedures set forth in Section 26(e) of this Agreement. If Tesla does not reject the Economic Change in Law Notice within such thirty (30) day period, the Fixed Price will automatically be increased by fifty percent (50%) of the impact to the Fixed Price set forth in such Economic Change in Law Notice. For the avoidance of doubt, in no event will Tesla be required to increase the Fixed Price due to one or more Seller Economic Change in Law events by more than five percent (5%) of the original Fixed Price in the aggregate.

iv. If Seller provides an Economic Change in Law Notice to Tesla relating to a Major Federal Tax Credit Impact, the Parties shall meet within fifteen (15) Business Days of such Economic Change in Law Notice to negotiate in good faith amendments to this Agreement that reflect a mutually agreeable sharing of costs directly attributable to the Seller Economic Change in Law. If thirty (30) days have elapsed since such meeting and there exists an unresolved dispute between the Parties as to such Seller Economic Change in Law, then either Party will have a right to terminate this Agreement without further liability hereunder.

v. If Tesla provides an Economic Change in Law Notice to Seller, the Parties shall meet within fifteen (15) Business Days of such Economic Change in Law Notice to negotiate in good faith such amendments to this Agreement as are necessary to achieve (so far as is possible) the same overall balance of rights, obligations, liabilities, risks, costs and rewards under this Agreement as applied immediately prior to the Economic Change in Law. If sixty (60) days have elapsed since such meeting, and there exists an unresolved dispute between the Parties as to whether there has been an Economic Change in Law and/or consequently whether any amendments to this Agreement are necessary, either Party may refer such dispute for resolution in accordance with Section 26(e) of the Main Agreement.

ANNEX I – DEFINITIONS

"Actual Availability Percentage" shall mean, for any Contract Year, a percentage calculated as (i) 100 multiplied by (ii) the result of (a) the sum of all Available Intervals for all inverters during Contract Year, divided by (b) the sum of all Period Intervals for all inverters during such Contract Year.

"Availability Damages" shall mean, for any Contract Year, the amount equal to the product of (i) the Guarantee Differential Price, multiplied by (ii) the Availability Shortfall, multiplied by (C) the sum of Deemed Generated Energy plus the Interval Quantity for such Contract Year.

"Calculation Interval" shall mean each hour period (or such other period as required by the EMO Protocols) during a Settlement Interval.

"Capacity Shortfall Damages Liquidated Value" shall have the meaning set forth in the Key Terms.

"Change in Law" shall mean the occurrence, after the Effective Date, of any of the following: (i) the adoption or taking effect of any law, rule, regulation or treaty; (ii) any change in any law, rule, regulation or treaty or in the administration, interpretation or application thereof by any Governmental Authority; or (iii) the making or issuance of any request, guideline or directive (whether or not having the force of law) by any Governmental Authority.

"Connecting Utility" shall mean Oncor Electric Delivery TSP LLC, or the successor organization that owns the portion of the electric transmission system at the Interconnection Point.

"Day-Ahead Market" shall have the meaning ascribed to it by the EMO.

"Delay Damages Amount" shall have the meaning set forth in the Key Terms.

"Expected Project Capacity" shall have the meaning set forth in the Key Terms.

"Federal Investment Tax Credit" means the investment tax credit determined using the energy percentage determined under Section 48(a)(2) or (a)(9)(A)(i) of the Code (or any successor) or the applicable percentage determined under Section 48E(a)(2) of the Code (or any successor) as in effect on the Effective Date providing for a federal tax credit for which Seller, as the owner of the Project, is eligible. For the avoidance of doubt, Federal Investment Tax Credit shall not include any "bonus" or "adder" such as those for domestic content, energy communities or low-income communities.

"Financial Close Date" shall have the meaning set forth in the Key Terms.

"Financing Termination Payment" shall have the meaning set forth in the Key Terms.

"Fixed Price" shall have the meaning set forth in the Key Terms.

"Generation Equipment" shall mean those electric energy generating devices powered by solar irradiance that are included in the Project and transform the solar irradiance into Energy.

"Guaranteed Commercial Operation Date" shall have the meaning set forth in the Key Terms.

"Expected Commercial Operation Date" shall have the meaning set forth in the Key Terms.

"Energy Market Operator" or "EMO" shall have the meaning set forth in the Key Terms.

"Interconnection Point" shall mean the point where the Project is interconnected with the transmission system at the Gobbers Knob Switch bus to the Connecting Utility's transmission line to which the Project will interconnect to the electrical transmission system owned by the Connecting Utility, and as further specified in the ERCOT Standard Generation Interconnection Agreement between the EMO, the Connecting Utility and Seller.

"Minimum Floating Price" shall have the meaning set forth in the Key Terms.

"Minimum Installed Capacity" shall mean ninety percent (90%) of the Expected Project Capacity.

"Major Federal Tax Credit Impact" means a material and adverse impact on Seller's actual costs to construct the Project directly due to (i) a Change in Law that reduces Seller's reasonably expected Federal Investment Tax Credit available for the Project as of the Effective Date, and which would require the Fixed Price to increase by more than ten percent (10%) for Seller to recoup such actual costs, or (ii) multiple Changes in Law, which, in the aggregate, have the cumulative impact of reducing Seller's reasonably expected Federal Investment Tax Credit available for the Project as of the Effective Date, and which would require the Fixed Price to increase by more than ten percent (10%) for Seller to recoup such actual costs..

"Minor Federal Tax Credit Impact" means a material and adverse impact on Seller's actual costs to construct the Project directly due to a Change in Law that reduces Seller's reasonably expected Federal Investment Tax Credit available for the Project as of the Effective Date, and which would require the Fixed Price to increase by more than five percent (5%) and less than ten percent (10%) for Seller to recoup such actual costs.

"Project" shall have the meaning set forth in the Key Terms.

"Project RECs" shall have the meaning set forth in the Key Terms.

"RECs" shall mean certificates, green tags, or other transferable indicia indicating generation of a particular quantity of energy from a solar energy facility attributed to all of the energy output during a specified term created under a renewable energy, emission reduction or other reporting program adopted by a governmental authority, which are certified, certifiable or "CRS Listed" under the Renewable Energy Standard. RECs include Project RECs and Replacement RECs.

"Renewable Energy Standard" shall mean Green-e National Standard Version [4.2], or successor version.

"Replacement REC" shall mean RECs generated by any solar energy facility located in Texas that is not the Project and are similar to Project RECs in all material respects.

"Seller's Operation Credit Support Amount" shall have the meaning set forth in the Key Terms.

"Seller's Pre-COD Credit Support Amount" shall have the meaning set forth in the Key Terms.

"Settlement Point" shall have the meaning set forth in the Key Terms.

"Settlement Point Price" shall mean the price established through the EMO locational marginal pricing system at the pricing node or aggregated pricing node associated with the Settlement Point in the Day-Ahead Market.

"Settlement Term" shall mean the period from HE 0100 PT on the Commercial Operation Date until the earlier of (a) HE 2400 PT on the day prior to the anniversary set forth in the Key Terms of the day on which the Settlement Term commences or (b) termination of this Confirmation in accordance with its terms.

"Tesla" shall have the meaning set forth in the Key Terms.

"Tesla's Capacity Share" shall have the meaning set forth in the Key Terms.

"Tesla's Capacity Percentage" shall have the meaning set forth in the Key Terms.

"Tesla's Credit Support Amount" shall have the meaning set forth in the Key Terms.

ANNEX II – PROJECT DESCRIPTION

Project: Chisme Solar and Storage Project

Owner: Blue Heron Solar, LLC

Operator: Operations & Maintenance Operator TBD

Location: Brown and Mills Counties, Texas

Solar Capacity: 147 MWac (approx. 215 MWdc)

Technology: Solar PV

Key Equipment:

- Longi Solar Technology PV Modules
- Sungrow SG4400UD PV Inverters and MV Transformer Skids
- Array Technologies Omnitrack PV Tracker System
- Chint Electronics Main Power Transformer
- Merit SI Power Plant Controller/SCADA System
- Medium Voltage collection system

Storage Capacity: 146 MWac – 2hr Duration

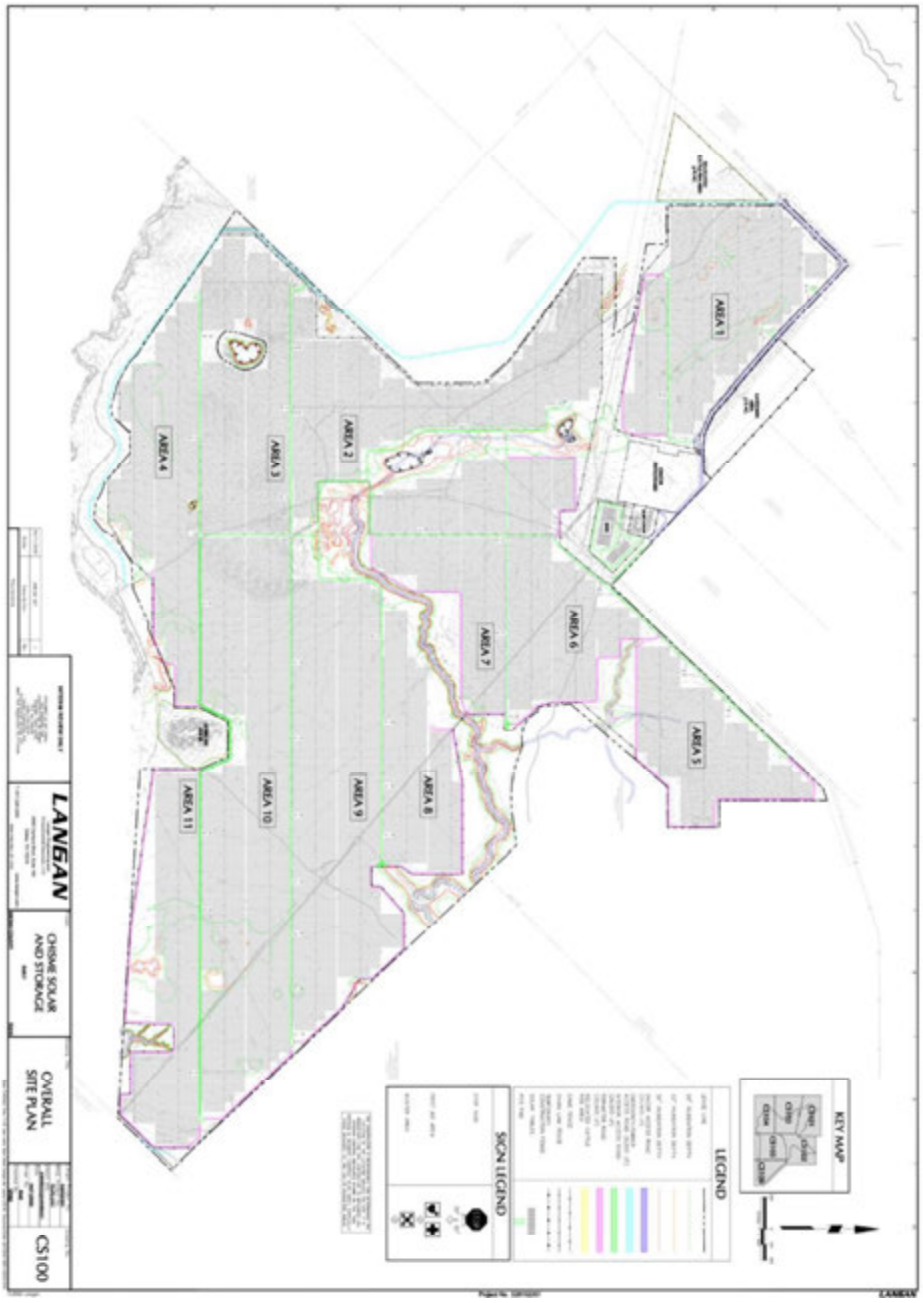
Technology: Lithium Ion Battery System

Key Equipment:

- Storage Vendor: TBD
- Chint Electronics Main Power Transformer
- Merit SI Power Plant Controller/SCADA System
- Medium Voltage collection system

Point of Interconnection: Gobbers Knob Switch to be built on existing 345 kV line between Brown Switch and Buckhorn Switch

Diagram of facility and Site map/layout: See below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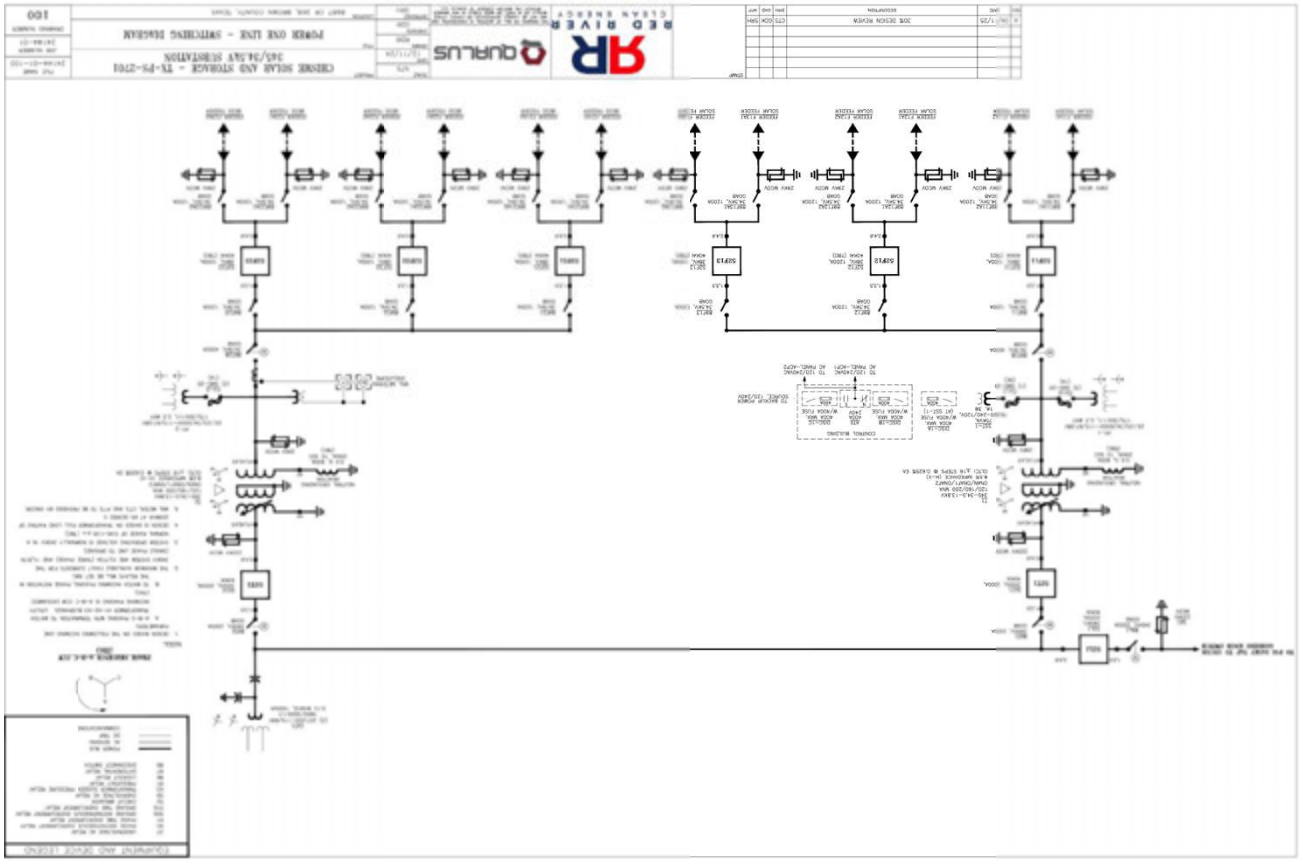


ANNEX III – PROJECT MILESTONES

	Milestones	*Date*
1	Obtains control of all lands and rights-of-way comprising the Project site.	[redacted]
2	Executes interconnection agreement.	[redacted]
3	Receives construction permit.	[redacted]
4	Receives other material permits.	[redacted]
5	Executes an engineering, procurement and construction agreement.	[redacted]
6	Procures the material equipment for the Project.	[redacted]
7	Completes financing, including construction financing.	[redacted]
8	Begins construction of the Project.	[redacted]
9	Begins startup activities.	[redacted]
10	Initial synchronization date.	[redacted]
11	Commercial Operation Date.	[redacted]

ANNEX IV – AVAILABILITY GUARANTEE

1. Availability Guarantee. Seller guarantees to Tesla that in each Contract Year, the Project shall achieve an Actual Availability Percentage equal to or greater than the Guaranteed Availability Percentage.

2. Availability Damages. In any Contract Year, if the Actual Availability Percentage falls below the Guaranteed Availability Percentage, Seller shall (i) pay to Tesla the Availability Damages and (ii) provide Replacement RECs corresponding to the Availability Shortfall. Upon determination by the Parties of any Availability Damages owed for any Contract Year, the Availability Damages shall be included on the next invoice; provided, however, that under no circumstances shall Tesla be liable to Seller for Availability Damages. The Parties acknowledge and agree that the terms, conditions and amounts determined according to this Annex IV for Availability Damages are reasonable considering the Damages that Tesla would sustain if any event or circumstance described in the immediately preceding sentence occurs. The Parties have agreed upon and established the amounts of the Availability Damages because of the difficulty of ascertaining the exact amount of Damages that Tesla would sustain in such event or circumstance and because otherwise obtaining an adequate remedy would be difficult or inconvenient. The Availability Damages are not penalties and shall be paid regardless of the amount of Damages that Tesla actually sustains.

3. Reporting. Seller shall, within fifteen (15) days after the end of each month, provide to Tesla a report showing which (if any) Calculation Intervals during such month were deemed Period Intervals, Available Intervals, Excused Intervals, and Unexcused Intervals for each inverter, and the reason for any such determination. In addition, Seller shall, within forty-five (45) days after the end of each Contract Year, provide to Tesla a report showing Seller's computation of the Actual Availability Percentage for such Contract Year and the Availability Damages due to Tesla (if any). The report shall provide sufficient detail and supporting data to allow Tesla to audit and verify any matters set forth in the report.

4. Definitions. The capitalized terms in this Annex IV shall have the meanings set forth herein, whether singular or plural or in the present or past tense.

"Actual Availability Percentage" shall mean, for any Contract Year, a percentage calculated as (i) 100 multiplied by (ii) the result of (a) the sum of all Available Intervals for all inverters during Contract Year, divided by (b) the sum of all Period Intervals for all inverters during such Contract Year.

"Availability Damages" shall mean, for any Contract Year, the amount equal to the product of (i) the Guarantee Differential Price, multiplied by (ii) the Availability Shortfall, multiplied by (C) the sum of Deemed Generated Energy plus the Interval Quantity for such Contract Year.

"Availability Shortfall" shall mean, for any Contract Year, the amount (expressed as a percentage) equal to the difference between the Guaranteed Availability Percentage and the Actual Availability Percentage.

"Available Intervals" shall mean the number of Period Intervals in which an inverter was electrically connected and capable of delivering energy to the Interconnection Facilities, as counted by an inverter's programmable logic controller, plus any Excused Intervals less any Unexcused Intervals.

"Deemed Generated Energy" shall mean, for any Contract Year, the quantity of Energy, expressed in MWh, calculated by Seller in a manner reasonably acceptable to Tesla using available Project data, Prudent Electrical Practices, Applicable Law or other established industry practices relevant to the Project's location and characteristics, that would have otherwise been delivered in such Contract Year but was not actually delivered.

"Directed Curtailment" shall mean a required curtailment of all or any part of the deliveries of Interval Quantity by the EMO or Connecting Utility not due to actions or omissions of Seller or its Affiliates. For the purpose of this Confirmation, Directed Curtailment shall not include curtailments or instructions not to dispatch issued by the EMO or Connecting

Utility as a result of the price of Energy produced by the Project that is bid by Seller or the value of that Energy relative to Energy produced by other generation facilities or bid by market participants.

"Excused Intervals" shall mean all Period Intervals during which an inverter was not electrically connected to the system due to: (i) System Emergency (excluding any System Emergency caused by Seller's breach of the Project's interconnection agreement with the Connecting Utility); (ii) a Force Majeure event; (iii) Tesla's failure to perform (unless due to a failure by Seller to meet its obligations under this Confirmation); (iv) Directed Curtailment; or (v) any Calculation Interval during which the Floating Price is equal or less than the Minimum Floating Price and the Interval Quantity is not delivered due to Seller's elective curtailment.

"Guarantee Differential Price" shall mean, for the applicable Contract Year, the positive difference, if any, of the average weighted Floating Price value for such Contract Year minus the Fixed Price.

"Guaranteed Availability Percentage" shall have the meaning set forth in the Key Terms.

"Interval Quantity" shall mean, an amount (expressed in MWh) equal to the Tesla's Capacity Percentage of the net electric Energy generation from the Project delivered at the Interconnection Point during each Calculation Interval during the Contract Year.

"Period Intervals" shall mean the sum total of all Calculation Intervals between sunrise and sunset in the applicable Contract Year as determined by the Global Monitoring Laboratory of the National Oceanic and Atmospheric Administration.

"System Emergency" shall mean any circumstance or combination of circumstances or any condition of the Project, the Interconnection Facilities, the Transmission System, or the transmission system of other electric utilities, in which continued operation of the Project (a) is reasonably likely to endanger life or property and necessitates immediate action to avert injury to persons or serious damage to property, or (b) is reasonably likely to adversely affect, degrade or impair Transmission System reliability or transmission system reliability of the transmission system of other electric utilities.

"Unexcused Intervals" shall mean the sum total of all Period Intervals where: (i) the inverters are electrically connected to the Interconnection Facilities and (ii) no Interval Quantity is produced or delivered for any reason other than those set forth in the events identified as Excused Intervals.

ANNEX V – FORM OF LETTER OF CREDIT

Irrevocable Standby Letter of Credit No
[ACCOUNT NUMBER]

[NAME AND ADDRESS OF BANK AT WHICH ACCOUNT IS MAINTAINED]

[ABA NUMBER] . [_____]

Date: [_____]

APPLICANT
[Insert Applicant name and address and e-mail]

BENEFICIARY
[Insert Beneficiary name and address and e-mail]

Amount: [_____]

Expiration Date: [_____]

Issuance

At the request and for the account of XXX ("Applicant"), we, XXX ("Issuing Bank") hereby issue this irrevocable standby letter of credit No. XXX (this "Letter of Credit"), for drawings up to but not to exceed the aggregate sum of XXX U.S. Dollars and no cents (US$XXX)(such amount, as it may be reduced in accordance with the terms hereof, the "Stated Amount"), in favor of XXX ("Beneficiary"), in connection with the XXX dated as of XXX, XXX, by and between Beneficiary and Applicant (as may be amended, amended and restated, supplemented or modified).

Drawings

Subject to the terms hereof, funds are available to you hereunder against presentation of a completed certificate (Exhibit A) on Beneficiary's letterhead, dated and purportedly signed by your representative, stating ***one*** of the following:

1. The undersigned being a duly authorized [officer][signatory] of XXX ("Beneficiary") hereby demands payment of US$XXX and certifies, in such capacity, that XXX ("Applicant") has failed to pay or perform in accordance with the terms of the XXX dated as of XXX, XXX, as may be amended, amended and restated, supplemented or modified, by and between Beneficiary and Applicant, which entitles Beneficiary to draw under the Letter of Credit No. XXX.

2. The undersigned being a duly authorized [officer][signatory] of XXX ("Beneficiary") certifies that Letter of Credit No. XXX will expire in [sixty (60)] days or less and XXX ("Applicant") has

not provided a replacement security acceptable to Beneficiary as required in accordance with the terms of the XXX dated as of XXX, XXX, as may be amended, amended and restated, supplemented, or modified, by and between Beneficiary and Applicant. Wherefore, Beneficiary does hereby demand payment of the entire undrawn amount of the Letter of Credit.

Partial and multiple drawings are allowed. The amount which may be drawn under this Letter of Credit shall be automatically reduced by the amount of any drawings previously paid by us hereunder.

Presentment

A copy of this Letter of Credit must be presented together with the sight draft in the form of Exhibit A ("Sight Draft"). Presentation of such documents may be made (a) in person at our office located at XXX or (b) by overnight courier to our office at XXX, or (c) by telecopy to facsimile number XXX or to such other facsimile number identified by us in a written notice to you, or (d) by electronic mail to XXX, or to such other electronic mail address identified by us in a written notice to you. Presentation by telecopy or electronic mail should be confirmed by telephone to XXX or to such other telephone number identified by us in a written notice to you, but receipt of such telephone notice shall not be a condition to presentation hereunder. If presentation is made by telecopy or electronic mail, the original sight draft and accompanying documents referred to above are not required to be sent to us, except that in the event of a full or final drawing the original of the Letter of Credit must be returned to us by overnight courier, but our receipt of the original Letter of Credit following a presentation by telecopy shall not be a condition to presentation under this Letter of Credit. We hereby agree with Beneficiary that any Sight Draft drawn under and in compliance with the terms and conditions of this Letter of Credit shall be duly honored by us upon delivery, if presented to us on or before our close of business on the Expiration Date. Provided that a compliant drawing is presented by 12:00 noon (XXX time), on any Business Day (as hereinafter defined), payment shall be made to Beneficiary of the amount specified in the applicable Sight Draft, not to exceed the Stated Amount, in immediately available funds, not later than 11:00 a.m. (XXX time), on the second following Business Day. A compliant drawing presented after 12:00 noon (XXX time) on any Business Day, will be paid on the third following Business Day.

As used herein, "Business Day" means a day other than a Saturday, Sunday or other day on which commercial banks in New York City are authorized or required by law to close.

If any drawing presented under this Letter of Credit does not comply with the terms and conditions hereof, we will advise Beneficiary of same by facsimile transmission to XXX or email at XXX within one (1) Business Day and give the reasons for such non-compliance. Upon being notified that Beneficiary's drawing was not honored by us, Beneficiary may attempt to correct any such noncompliant drawing if, and to the extent that, Beneficiary is entitled and able to do so on or before the Expiration Date.

Expiration

This Letter of Credit shall be deemed automatically extended without an amendment for a one year period beginning on the present Expiration Date hereof, and upon each future Expiration Date, unless at least [sixty (60)] days prior to any such Expiration Date we have sent you written notice via email and confirmed by courier service or overnight mail at the above address that we elect not to permit this Letter of Credit to be so extended beyond, and will expire at 5 p.m. (XXX time) on its then current Expiration Date. Upon receipt of such notice, Beneficiary may draw hereunder up to the full amount then available by presentation of Beneficiary's Sight Draft drawn on us accompanied by the original Letter of Credit and all amendments thereto. No presentation made under this Letter of Credit after such Expiration Date will be honored except for any demand validly presented under this Letter of Credit and received prior to the then current Expiration Date that remains unpaid after such Expiration Date.

Notices

All communications to you in respect of this Letter of Credit shall be in writing and shall be delivered to your address first shown above or such other address as may from time to time be designated by you in a written notice to us. All documents to be presented to us hereunder and all other communications to us in respect of this Letter of Credit, which other communications shall be in writing, shall be delivered to the address for us indicated above, or such other address as may from time to time be designated by us in a written notice to you.

Charges

All charges associated with this Letter of Credit (including any transfer of this Letter of Credit) are for the account of Applicant.

Transferability

This Letter of Credit is transferable in its entirety (but not in part) one or more times without notice to Applicant and without first obtaining Applicant's consent. Only Issuing Bank or its successors is authorized to act as the transferring bank. Any such transfer shall be subject to the completion of a transfer form (which we shall provide to you promptly upon your request therefor) executed by Beneficiary.

Governing Practices

This Letter of Credit shall be governed by and construed in accordance with the laws of state of New York and applicable US Federal law. Except to the extent it is inconsistent with the express terms of this Letter of Credit, this Letter of Credit is subject to the International Standby Practices ISP 98, ICC Publication No. 590.

[ISSUING BANK]

_____

Authorized Signatory

EXHIBIT A

FORM OF SIGHT DRAFT

(INSERT DATE OF SIGHT DRAFT)

To: (INSERT NAME OF ISSUER)

On sight, pay to the order of [INSERT NAME OF BENEFICIARY] ("Beneficiary") by wire transfer of immediately available funds to the following account:

[NAME OF ACCOUNT]

[REFERENCE]

The following amount:

[INSERT NUMBER OF CURRENCY IN WRITING] UNITED STATES DOLLARS

(US$ [INSERT NUMBER OF CURRENCY IN FIGURES])

Drawn upon your irrevocable Standby Letter of Credit No. XXX dated XXX.

[The undersigned being a duly authorized [officer][signatory] of XXX ("Beneficiary") hereby demands payment of US$XXX and certifies, in such capacity, that XXX ("Applicant") has failed to pay or perform in accordance with the terms of the XXX dated as of XXX, XXX, as may be amended, amended and restated, supplemented or modified, by and between Beneficiary and Applicant, which entitles Beneficiary to draw under the Letter of Credit No. XXX.]

[The undersigned being a duly authorized [officer][signatory] of XXX ("Beneficiary") certifies that Letter of Credit No. XXX will expire in [sixty (60)] days or less and XXX ("Applicant") has not provided a replacement security acceptable to Beneficiary as required in accordance with the terms of the XXX dated as of XXX, XXX,

as may be amended, amended and restated, supplemented, or modified, by and between Beneficiary and Applicant. Wherefore, Beneficiary does hereby demand payment of the entire undrawn amount of the Letter of Credit.]

{INSERT NAME OF BENEFICIARY}

BY: _____

TITLE: _____

[INSERT NAME AND ADDRESS OF BENEFICIARY]

ANNEX VI – DODD FRANK INFORMATION

Party A's Full Legal Entity Name:			Party B's Full Legal Entity Name:		
[_____]			[_____]		
CFTC Legal Entity Identifier:			CFTC Legal Entity Identifier:		
[_____]			[_____]		
Party A's Guarantor:			Party B's Guarantor:		
[__]			[__]		
Party A is the following Dodd-Frank Entity Type:			Party B is the following Dodd-Frank Entity Type:		
Swap Dealer [1]:	____NO	____YES	Swap Dealer [1]:	____NO	____YES
Major Swap Participant [2]:	____NO	____YES	Major Swap Participant [2]:	____NO	____YES
Financial Entity [3]:	____NO	____YES	Financial Entity [3]:	____NO	____YES
Special Entity [4]:	____NO	____YES	Special Entity [4]:	____NO	____YES
U.S. Person [5]:	____NO	____YES	U.S. Person [5]:	____NO	____YES
Primary SDR (if Reporting Party):			Primary SDR (if Reporting Party):		
To be determined by Seller			N/A		

1. As defined in Section 1a(49) of the Commodity Exchange Act ("CEA") and Part 1.3(ggg) of the Commodity Futures Trading Commission ("CFTC") regulations.
2. As defined in Section 1a(33) of the CEA and Part 1.3(hhh) of the CFTC regulations.
3. As defined in Section 2(h)(7)(C)(i) of the CEA.
4. As defined in Section 4s(h)(2)(C) of the CEA and Part 23.401(c) of the CFTC Regulations.
5. As defined in the CFTC's Interpretive Guidance and Policy Statement Regarding Compliance with Certain Swap regulations, published at 78 FR 45292.

ANNEX VIII – FORM OF INVOICE AND SETTLEMENT INTERVAL DATA

Settlement Interval Data (Sample)

	Calculation Interval #1	**Calculation Interval #2**	**…**
Settlement Interval Year			
Settlement Interval Month			
Settlement Interval Day			
Settlement Interval Hour Ending			
[15min] Settlement Interval Ending			
Site Generation			
Tesla's Capacity Share			
Tesla's Capacity Percentage			
Settlement Point - (Floating Price)			
Interconnection Point LMP			
Fixed Price ($/MWh)			
Fixed Price Payment ($)			
Floating Price Payment ($)			

Tesla - Concord - PPA Confirmation - Chisme Solar - Execution Version 250801

Final Audit Report 2025-08-01

Created:	2025-08-01
By:	Jean Chou (jchou@concordnewenergy.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA2y8VMMe7QUHD_EkEeAIeNVsg0N9Wtxd0

"Tesla - Concord - PPA Confirmation - Chisme Solar - Execution Version 250801" History

Document created by Jean Chou (jchou@concordnewenergy.com)
2025-08-01 - 3:43:11 PM GMT

Document emailed to Mike Luo (mluo@concordnewenergy.com) for signature
2025-08-01 - 3:43:17 PM GMT

Email viewed by Mike Luo (mluo@concordnewenergy.com)
2025-08-01 - 3:59:30 PM GMT

Document e-signed by Mike Luo (mluo@concordnewenergy.com)
Signature Date: 2025-08-01 - 4:00:01 PM GMT - Time Source: server

Agreement completed.
2025-08-01 - 4:00:01 PM GMT

Adobe Acrobat Sign

Exhibit V
Owner Provided Information

The following Exhibits contain information provided by the Owner as Owner Provided Information in accordance with the EPC Agreement:

Exhibit A-1 – Design Plans
Exhibit C – Applicable Permits
Exhibit E – Site Layout
Exhibit N – Site Description and Documents
Exhibit FF – RRCE Hail Stow Protocol

The following documents are included in this Exhibit V:

2025-07-03 Chisme Solar and Storage – Langan Geotechnical Engineering Report
3 Chisme Solar Wetland Delineation Report
Chisme 520102301-V-AB101-0101 (Orthomosaic & Topographic Survey)
Chisme Solar – Phase 1 Final
Chisme Solar Project CIA

GEOTECHNICAL ENGINEERING REPORT

for

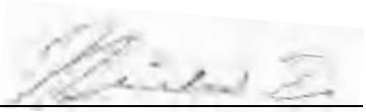
Chisme Solar and Storage
Brown and Mills County, Texas

Prepared For:

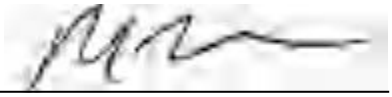
Red River Clean Energy
11801 Domain Boulevard, Floor 3
Austin, TX 78758

Prepared By:

Langan Engineering and Environmental Services, LLC
2999 Olympus Boulevard, Suite 165
Dallas, TX 75019



Richard Lo, P.E.
Senior Project Manager



Robert S. Johnston, P.E.
Managing Principal/ Executive Vice President

Revised 3 July 2025
520102301

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Figure 1B Site Location Map - Roadway
Figure 2A Regional Geology Map
Figure 2B Regional Geology Map - Roadway
Figure 3A Subsurface Investigation Plan
Figure 3B Subsurface Investigation Plan - Roadway

ATTACHMENTS

Attachment A-1 Site Boring Logs
Attachment A-2 Roadway Boring Logs
Attachment B Test Pit Logs
Attachment C ERT Test Results
Attachment D Lateral Pile Load Test Results
Attachment E Tension Pile Load Test Results
Attachment F-1 Site Laboratory Test Results
Attachment F-2 Roadway Laboratory Test Results

1.0 EXECUTIVE SUMMARY

In accordance with your request, Langan Engineering and Environmental Services, LLC (Langan) has prepared this report to summarize the results of the geotechnical investigation and to present geotechnical engineering recommendations for the proposed Photovoltaic (PV) array and Battery Energy Storage System (BESS) (the "Project") in Brown and Mills Counties, Texas (site). The approximately 820-acre site is located about 12 miles southeast of Brownwood, Texas, and is primarily undeveloped land used for agricultural purposes.

A summary of the findings and recommendations are as follows:

Subsurface Conditions

- The subsurface conditions at the site generally consist of 2 to 8 feet of stiff lean to fat clay overlying clayey loam residuum originating from weathered shale and claystone and terrace deposits. Weathered rock was encountered at depths ranging from 2 to 43 feet below grade but was generally encountered at depths ranging from about 8 to 18 feet below grade in the northwestern, northeastern, and southwestern portions of the site. The depth to weathered rock within the proposed substation footprint ranged from about 13 to 18 feet below grade.

- Silty sand pockets in the upper clays were generally encountered in the northwestern portion of site and along the dirt roads in the southern portion of site. Pockets of gravelly clay with sand were encountered in Borrow Pit #2, Borrow Pit #4, and Additional Parcel #2.

- Groundwater was not encountered during the subsurface investigation.

- The site was previously part of Camp Bowie and used as a U.S. Army training base in the 1940s, and there is a risk of encountering unexploded ordnances (UXOs) across the site. Due to the risk of encountering UXOs, it is assumed that a comprehensive UXO site survey will be conducted prior to any earthwork activities being performed, and that all earthwork activities will be performed under the full-time monitoring of a UXO specialist.

County Road Conditions

- Langan performed hand auger borings and visual observations along County Roads 265, 264, and 268 between FM 45 and the northern gate of the site, as part of a high-level assessment of the condition of the designated site access path for construction equipment to the project site.

- Generally, the county roads consist of of gravelly sand overlying a sandy clay/clayey sand subbase. The total road thicknesses were observed to be 2 to 12 inches thick. Noted deficiencies included some minor potholes along CR 268, and the areas along the intersections of each county road were slightly looser than the rest of the roadways.

- Gravel or gravelly sand was not encountered in hand auger locations RW-14, RW-15,

and RW-18 along CR 264, and in hand auger locations RW-1 through RW-7 along CR 268. The portion of CR 268 south of the northernmost site entrance gate generally consists of no gravel materials and 12 to 24 inches of silty sand overlying native sandy clay. Vegetation was noted to be growing along the centerline of the road.

Borrow Pit Locations

- Four locations surrounding the site were identified as potential detention areas or as areas to use for potential borrow fill material, referred to as Borrow Pit 1 to Borrow Pit 4. All borrow pit locations appear to be viable for use as detention ponds based on the materials encountered at design excavation depths. Soils encountered within Borrow Pit 2 and Borrow Pit 4 include material that may be used as select fill.

Foundation and Earthwork Recommendations

- The surficial clays have a high expansion potential, and the underlying calcareous clays have a moderate to high expansion potential. The estimated Potential Vertical Rise (PVR) ranges from about 1 to 5 inches across the site and from about 4.5 to 5 inches within the proposed substation location, for native soil conditions.

- Site soils may be stabilized using lime to reduce their expansion potential and to increase their workability after rainfall events. Sulfate contents of site soils in the upper 4 feet ranged from 146 to 375 ppm based on laboratory testing, indicating that lime treatment may be suitable. Based on preliminary lime series testing, Langan recommends an initial dosage of 14% lime be used for stabilization estimates.

- Rainfall events may cause the surficial clays across the site to become soft and unworkable, particularly in areas with thicker layers of Stratum 1 clays. This may warrant stabilized access roads for construction.

- The PV arrays and BESS foundations are expected to be supported on driven pile foundations. Pile load testing was performed at a total of 8 locations, with one tension load test and one lateral load test performed at each location. All piles were installed to a depth of 10 feet below grade except for the lateral test pile at location PLT-2, which encountered refusal at 9 feet below grade. The maximum tensile load applied on the piles was about 10 kips, and maximum deflection observed during the tension load tests ranged from about 0.01 to 0.07 inches. The maximum lateral load applied on the piles ranged from about 6 to 6.7 kips, and the lateral load applied at a measured deflection of ½-inch ranged from about 2.6 to 5 kips.

- Structures within the BESS and substation footprints may be supported on conventional shallow foundations bearing on undisturbed Stratum 2 soils or on moisture conditioned and recompacted Stratum 1 or 2 materials prepared as described in later sections of this report, depending on the allowable expansion potential below the foundations.

- Alternatively, structures within the substation footprint may be supported on straight shaft drilled piers bearing in Stratum 4 weathered rock.

- The Stratum 1a and Stratum 2a clays are generally not suitable for use as select fill and should only be used in areas where structures are not sensitive to moisture-induced heave. The Stratum 1b and 2b silty, clayey sands and the Stratum 3 gravelly clay may be used as select fill.

Seismicity

- A seismic site class of "C" per the International Building Code (IBC) should be used for project.

Additional discussion of the encountered subsurface conditions and geotechnical recommendations are provided in the following report. The report is one complete document and should be read in its entirety to understand the basis of the geotechnical recommendations. Recommendations provided are dependent upon one another and no recommendation should be followed independent of the others.

2.0 INTRODUCTION

This report presents the results of our initial and supplemental geotechnical investigations and associated recommendations for the proposed PV Array, BESS, and substation development in Brown and Mills Counties, Texas.

Langan performed an initial subsurface investigation and prepared a report for the project titled "Geotechnical Engineering Report for Chisme Solar and Storage – Brown and Mills County, Texas", dated 10 April 2025. Following submission of the initial report, Red River Clean Energy, LLC requested Langan perform a supplemental investigation for 3 additional parcels totaling about 95 acres, the revised proposed substation location, and about 8.7 miles of existing county road designated for primary site access. The purposes of the supplemental geotechnical investigation were to explore subsurface conditions at the site within the additional development footprints and along the existing county roads, analyze and evaluate the encountered subsurface conditions with respect to the proposed construction, and develop recommendations related to earthwork, foundation, and pavement design for the proposed development.

The geotechnical investigations were performed following the scope of services in the Change Order Request, authorized 21 April 2025, the Master Engineering Services Agreement for Grid Connected Solar and Storage Projects, authorized 2 August 2024, and Task Order – Chisme Solar and Storage, authorized 7 October 2024.

Elevations (el) in this report reference the North American Vertical Datum of 1988 (NAVD 88).

3.0 PROJECT DESCRIPTION

3.1 Existing Conditions

3.1.1 Project Site

The site is located about 12 miles southeast of Brownwood, Texas and spans across Brown County and Mills County. The northernmost 40 acres of the 820-acre site lies within Brown County, while the remaining portion of the site lies within Mills County. The approximate GPS coordinates of the northern site entrance are 31°34'58.9"N, 98°50'20.8"W along County Road 268. The site is generally bordered by Fisk Creek to the south and undeveloped land to the east, north, and west. Pecan Bayou runs northwest-southeast about one-half mile northeast of the site. A Site Location Map is included as Figure 1A.

The site is generally undeveloped and has historically been used primarily for farming and cattle ranching but was formerly part of Camp Bowie and was used as a U.S. Army training area from 1940 to 1946. The area is listed as a Formerly Used Defense Site (FUDS) and has a risk of containing unexploded ordnances (UXOs).

In the northern portion of the site, about 61 acres are open field with sparse vegetation followed by about 102 acres of dense tree cover. The remainder of the site is lightly to moderately vegetated with cactus, mesquite, and other scrub vegetation. An overhead transmission line runs northwest-southeast and turns northeast-southwest along the site boundary.

Several streams and wetland areas are present on the property; the main water features include a stream running west-east across the central portion of the site, a stream running north-south at the southeastern site boundary, and an about 0.6-acre pond in the southwestern portion of the site. Additionally, the site is sectioned off by multiple fences and accessible through dirt roads.

Site grades vary from about el 1250 to 1326[1], with isolated high and low points throughout. The site generally ranges in elevation from el 1260 to 1305, sloping down from the northwest to the southeast. Additionally, grades in the southwestern part of the site range from el 1270 to 1307, sloping down from the southwest to the northeast and southeast. Notable topographic features include:

- The southwestern corner of the site has a cluster of four hills in a line with peaks at about el 1326, el 1302, el 1294, and el 1300, from west to east.
- The southern central area of site has one hill with a peak at el 1323 and a base elevation of el 1270.

[1] Based on draft drawing AB101, "Orthomosaic and Topographic Survey" by Langan, dated 20 March 2025.

3.1.2 County Roads

The nearest major thoroughfare to site is Farm to Market Road 45 South (FM 45 S), which is connected to the project site through a series of county roads. Four county roads comprising about 8.7 miles of roadway have been identified as the primary site access path for equipment and other vehicles to access the site during construction. The site access path begins at the intersection of FM 45 S and County Road (CR) 265 and continues southeast on CR 265 for about 0.9 miles to its intersection with CR 264, then continues northeast along CR 264 for about 3.7 miles to its intersection with Elkins Road (CR 267). The path continues south along CR 267 for about 0.9 miles and turns northeast onto CR 268, following CR 268 to the northern site entrance. A Site Location Map is included as Figure 1B.

The county roads along the primary site access path are generally unpaved gravel or caliche roads, with intermittent areas of rutted asphalt on CR 265 and CR 264. An about-0.4-mile-long section of CR 268 at the northern site entrance is primarily a dirt road with short grass along the centerline.

3.2 Proposed Construction

The proposed construction includes a 207 MW DC/147 MWac AC photovoltaic (PV) array[2], a 152 MWac battery energy storage system (BESS) with an approximate storage capacity of 304 MWh[3], a 345/34.5 kV substation, and associated site features such as roadways and security. The proposed work also includes the construction of the 345 kV Gobblers Knob Switching Station which will connect to the site substation and existing transmission lines. The Gobblers Knob Switching Station design is outside of the Langan project scope and will be designed by others. Four borrow pit areas on site are proposed for use in generating fill materials for site mass grading and being developed as detention ponds.

Structural loads for the PV arrays, BESS support structures, and substation support structures have not been evaluated at this time. From past experience, BESS and support equipment loads are anticipated to range between 10 and 50 kips, and PV array pile loads are anticipated to range between about 1 and 10 kips.

4.0 REVIEW OF AVAILABLE INFORMATION

4.1 Soil Survey Data

Langan reviewed the United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) web soil survey. The map indicates that the project site is underlain by ten soil types, but the majority of the site is underlain by soils characterized as Deleon silty

[2] Based on Chisme Solar & Storage Project Description provided by Red River Clean Energy, dated 9 August 2024.
[3] Based on preliminary design drawing E1.000, "Overall Electrical Plan" by Pure Power Engineering, dated 7 March 2025.

clay (0 to 1 percent slopes, rarely flooded) and Frio silty clay loam (0 to 1 percent slopes, occasionally flooded). The reported soils are summarized in Table 1.

Table 1 – USDA Soils Survey Summary

Soil Unit Name	Map Unit	Percent of Site Area	Parent Material Description	Depth to Restrictive Feature	Drainage Class	Runoff Class	Hydro-logic Soil Group
Abilene Clay Loam, 1 to 3% slopes	2	1.6%	Calcareous alluvium	More than 80 inches	Well drained	Medium	C
Bonti-Callahan Association, 1 to 8% slopes	10	0.3%	Loamy and/or clayey residuum weathered from sandstone and/or claystone	20 to 40 inches to paralithic bedrock	Well drained	High	C
Bonti-Owens Complex, 8 to 30% slopes	11	1.1%	Loamy residuum weathered from sandstone	20 to 40 inches to paralithic bedrock	Well drained	High	C
Callahan Loam, 1 to 3% slopes	15	6.6%	Clayey residuum weathered from claystone	20 to 40 inches to densic bedrock	Well drained	High	D
Callahan-Throck Complex, 1 to 8% slopes	18	11.4%	Clayey residuum weathered from claystone	20 to 40 inches to densic bedrock	Well drained	High	D
Deleon Silty Clay, 0 to 1% slopes	25	33.5%	Clayey and/or loamy alluvium	More than 80 inches	Moderately well drained	Medium	C
Pedernales Fine Sandy Loam, 1 to 3% slopes	58	11.8%	Loamy residuum weathered from sandstone and siltstone	More than 80 inches	Well drained	Medium	C
Sagerton Clay Loam, warm, 1 to 3% slopes	67	9.2%	Calcareous loamy alluvium	More than 80 inches	Well drained	Medium	C
Winters Fine Sandy Loam, 1 to 3% slopes	79	9.6%	Mixed loamy alluvium	More than 80 inches	Well drained	Medium	C
Frio Silty Clay Loam, 0 to 1% slopes	FsoA	14.9%	Loamy alluvium derived from limestone and shale	More than 80 inches	Well drained	Low	C

4.2 Regional Geology

Soils underlying the site are mapped predominantly as the Strawn Group of Middle Pennsylvanian age in the northwestern area of the site and as fluviatile terrace deposits of Quarternary age[4] in the southeastern area of the site. The Strawn Group consists of silty greenish-gray to red shale and mudstone with thin limestone beds and plant and marine megafossils. The fluvial terrace

[4] Geologic Atlas of Texas, Brownwood Sheet (1976) published by the University of Texas at Austin, Bureau of Economic Geology.

deposits consist of sand, silt, clay, and gravel locally indurated with caliche. A Regional Geology Map of the site is included as Figure 2A.

Soils underlying the county road access path are mapped as the Strawn Group of Middle Pennsylvanian age along CR 268 and the eastern portion of CR 264, and as the Travis Peak Formation[4] along CR 265 and the western portion of CR 264. The Travis Peak Formation consists of conglomerates, sandstone, and limestone. A Regional Geology Map of the roadway is included as Figure 2B.

4.3 Federal Emergency Management Agency Flood Map

Langan reviewed the Flood Insurance Rate Maps (FIRM) for Brown County published by the Federal Emergency Management Agency (FEMA), Map No. 48049C0550E effective 28 August 2018. The portion of the site within Brown County is in Zone X, "areas determined to be outside the 0.2% annual chance floodplain." FEMA has not published a FIRM Panel for Mills County, therefore floodplain information is not available for the remainder of the site.

5.0 SUBSURFACE EXPLORATION

Subsurface conditions at the site were assessed by performing 38 geotechnical borings, 43 test pits, 8 pairs of pile load tests, and 10 electrical resistivity tests (ERTs) during the initial investigation. An additional 4 geotechnical borings, 4 test pits, and 3 ERTs were performed for the supplemental investigation. Roadway conditions along the county road access paths were assessed by performing 22 hand auger borings. The subsurface investigation program is summarized in Table 2. The Subsurface Investigation Plan showing the locations of the borings, test pits, pile load test locations, and ERTs performed across the site is included as Figure 3A; locations of proposed site features including borrow pit areas are also included. The Subsurface Investigation Plan showing the locations of the roadway hand auger borings performed is included as Figure 3B.

Table 2 – Subsurface Investigation Program

Investigation Series	Method	Site Area	ID	Completion Depth (feet bgs)
Initial	Soil Boring	PV Array Area[5]	LB-1 to LB-4	37.5 to 50[6]
		PV Array Area[7]	LB-5 to LB-8	20
		PV Array Area	LB-9 to LB-30	
		Borrow Pit Areas	LB-31 to LB-38	
	Test Pit	PV Array Area[5]	TP-1 to TP-4	8[10]
		PV Array Area	TP-5 to TP-6	
		PV Array Area	TP-7 to TP-21	
		Borrow Pit Area	TP-22	
	Pile Load Test – Lateral and Tension	PV Array Area[8]	PLT-1 to PLT-8	9 to 10[9]
	ERT	PV Array Area[5]	ERT-1	N/A
		PV Array Area[7]	ERT-2	
		PV Array Area	ERT-3 to ERT-10	
Supplemental	Soil Boring	Substation/BESS Area	LB-39 to LB-40	50
		PV Array Area	LB-41 to LB-42	20
	Test Pit	Substation/BESS Area	TP-23	7.25[10]
		PV Array Area	TP-24 to TP-25	3 to 4[10]
		Laydown Area	TP-26	2.75[10]
	ERT	Substation/BESS Area	ERT-11	N/A
		PV Array Area	ERT-12 to ERT-13	
	Hand Auger Probes	CR 268	RW-1 to RW-11, PH-1 to PH-2	0.5 to 2.75**Error! Bookmark not defined.**
		CR 264	RW-12 to RW-18	
		CR 265	RW-19 to RW-20	

The drilling, test pit, soil sampling, and pile load test activities were completed under the full-time observation of a Langan field professional and under the direct supervision of a Langan project professional engineer. The field professional laid out the boring, test pit, and pile load test locations, maintained logs of the borings and test pits, examined and classified soil samples, and packaged soil samples for transportation to the Langan office.

5.1 Borings

The borings for the initial subsurface investigation were drilled between 11 and 21 November 2024 and between 10 and 14 February 2025 by a specialty drilling contractor using Mayhew 200

[5] Borings, test pits and ERTs within this PV Array area were performed prior to relocation of the proposed substation footprint.
[6] Borings were performed to a target depth of 50 feet below grade or until auger refusal, whichever is shallower.
[7] Borings, test pits, and ERTs within this PV Array area were performed prior to relocation of the proposed BESS footprint.
[8] Pile load tests were performed adjacent to selected test pit locations across the site.
[9] Piles were installed to a target depth of 10 feet below grade or pile refusal, whichever is shallower.
[10] Test pits were performed to a target depth of 8 feet below grade or until excavator refusal, whichever is shallower.

and Mobile B58 truck-mounted drill rigs with auger drilling methods. The borings for the supplemental subsurface investigation were drilled on 8 May 2025 by a specialty drilling contractor using a CME55 truck-mounted drill rig with auger drilling methods. Soil samples were obtained semi-continuously from ground surface to a depth of 10 feet below the ground surface (bgs)[11] and at 5-foot intervals thereafter until the target depths were achieved or until auger refusal was encountered. The boring logs for the initial and supplemental subsurface investigations are included as Attachment A-1.

A 2-inch-outer-diameter split-spoon sampler was generally used to obtain disturbed samples of the underlying granular soils. The Standard Penetration Test (SPT)[12] was completed consistent with ASTM D1586 as part of the split-spoon sampling procedure, using an automatic trip hammer to evaluate the density of the soils. The SPT results were recorded by the Langan field professional observing the boring conditions and documenting the observations.

A 3-inch-diameter Shelby tube sampler was used to obtain relatively undisturbed samples of the underlying cohesive soils. Samples obtained using a Shelby tube sampler were extruded in the field and tested by the Langan field professional using a pocket soil penetrometer to obtain estimates of the unconfined compressive strength of the cohesive soils as well as to evaluate their consistency.

A Texas Cone Penetrometer (TCP)13 test was performed in stiff cohesive materials to obtain soundings in materials that were too stiff to be sampled using a split-spoon or Shelby tube sampler. The TCP test was conducted in general accordance with TxDOT standard TEX-132-E. The TCP results were recorded by the Langan field professional observing the boring conditions and documenting the observations.

Groundwater was not encountered during the subsurface investigation. Borings were backfilled with soil cuttings upon completion.

5.2 Roadway Hand Auger Probes

Hand auger probes were performed at 20 locations along the three unpaved county roads (RW-1 to RW-20) and in 2 locations with observed potholes or similar roadway defects (PH-1 and PH-2). The hand auger borings for the roadway investigation were performed between 13 and 14 May 2025 by a Langan field professional using a 3-inch-outer-diameter hand auger and a tamping bar. Soil samples were obtained continuously from ground surface to a depth of about 2 feet bgs or

[11] Below the ground surface and below the existing grade are interchangeable in this report.
[12] The Standard Penetration Test is a measure of the soil density and consistency. The SPT N-value is defined as the number of hammer blows required to drive a 2-inch-outer-diameter split-spoon sampler 12 inches, after an initial seating penetration of 6 inches, using a 140-pound hammer free falling 30 inches.
[13] The TCP blow count provides a measure of material hardness and penetration resistance. The recorded values help assess the bearing capacity of the subsurface materials and inform foundation design recommendations. The TCP blow count is defined as the number of hammer blows required to drive a 3-inch-diameter cone 12 inches into the ground, using a 170-pound hammer free falling 24 inches.

until hand auger refusal was encountered. Hand auger borings were backfilled with soil cuttings and pea gravel and tamped down after completion. The roadway boring logs are included as Attachment A-2.

5.3 Test Pits

The test pits for the initial investigation were performed between 5 and 7 February 2025 by a specialty drilling contractor using a John Deere 135G excavator. The test pits for the supplemental subsurface investigation were performed on 7 May 2025 by a specialty drilling contractor using a John Deere 35P excavator. Bulk soil samples were obtained at 2-foot intervals in each test pit until excavator refusal was encountered or the target depths were achieved. The test pits were backfilled with soil cuttings upon completion. The test pit logs are included as Attachment B.

5.4 Electrical Resistivity Testing (ERT)

Soil resistivity testing was performed consistent with ASTM G57 using the Wenner Array 4-point method by a Langan field professional between 4 and 6 March 2025 for the initial investigation and between 6 and 8 May 2025 for the supplemental investigation. Resistivity testing was run in two orthogonal lines at each location summarized in Table 2. For each line, readings were taken with spacings of 2, 5, 10, 20, 30, 50, and 100 feet. Electrode penetration ranged from 2 to 6 inches bgs. The ERT test results are included as Attachment C.

5.5 Pile Load Testing

The test piles were installed between 28 February and 1 March 2025 by a specialty contractor using a Vermeer PD5 vibratory pile driver. At each pile load test location, two 14-foot-long W6x9 piles were installed about 9 feet apart and driven to the target depth of 10 feet below grade or to pile refusal. The pile driving times were recorded by the Langan field professional.

One tension load test and one lateral load test were performed on separate piles at each test location. Piles were installed a minimum of three days before testing to allow for pile setup in the soils. The piles were tested between 10 March and 12 March 2025 by the specialty drilling contractor using a KOBELCO SK210 excavator, an ENERPAC P80 hydraulic hand pump jack, and a Dillon Edjr 10T Dynamometer load cell.

The tension tests were performed by applying an axial load using a hydraulic jack attached to the boom of an excavator, and a load cell was used to measure the applied loads. The lateral tests were performed by applying a lateral load with a hydraulic pull cylinder, and a load cell was used to measure the applied loads. The test pile was fastened using a chain system to the excavator bucket, which served as the reaction force. Displacements for each load test were measured using a pair of dial gauges fastened to a reference beam. The lateral loads were applied to the test piles at a height of 42 inches above grade, and displacements were measured at a height of

6 inches above grade. The Langan field professional recorded pile loads and deflections for each test. The piles were extracted by the contractor after termination of each load test.

The pile load test locations are shown in Figure 3A. A summary of the lateral pile load test results is included as Attachment D, and a summary of the tension pile load test results is included as Attachment E.

5.6 Laboratory Testing

Representative soil samples were subjected to testing by a specialty geotechnical laboratory to aid in the analyses and evaluations. The testing was aimed at evaluating index, strength, and chemical characteristics of the underlying soils. The laboratory testing program is summarized in Tables 3A and 3B for the site and roadway investigations, respectively.

Table 3A – Site Laboratory Testing Program

Test	Quantity		Test Method
	Initial	Supplemental	
Natural Water Content	40	16	ASTM D2216
Percent Passing No. 200 Sieve	22	-	ASTM D1140
Particle Size Analysis	27	5	ASTM D6913
Atterberg Limits	38	8	ASTM D4318
1-D Swell Test, Method B	5	-	ASTM D4546
1-D Swell Test, Method C	5	3	ASTM D4546
Unconfined Compression (UC) Strength Test	13	4	ASTM D2166
Standard Proctor Test	3	1	ASTM D698
CBR	2	1	ASTM D1883
Sulfate Content, Water-Soluble	13	1	ASTM C1580
Sulfide Content	13	1	EPA 376.1
Chloride Content	13	1	ASTM D512
Redox Potential	9	1	SM 2580B
Soil pH	9	1	ASTM D4972
Thermal Resistivity	8	3	ASTM D5334
Soil-Lime to Reduce pH	-	1	TEX-121-E Pt III

Table 3B – Roadway Laboratory Testing Program

Test	Quantity	Test Method
Natural Water Content	31	ASTM D2216
Particle Size Analysis	31	ASTM D6913
Atterberg Limits	18	ASTM D4318

The laboratory test results are discussed in Section 6 and are included as Attachment F-1 and F-2 for the site and roadway investigations, respectively.

6.0 SUBSURFACE CONDITIONS

The encountered soil stratigraphy within the project site generally consisted of a surficial layer of clay and silty sand, overlying calcareous and sandy lean clay, with pockets of gravelly clay with sand, overlying weathered rock. The soil stratigraphy encountered is summarized in Table 4.

Table 4 – Generalized Soil Stratigraphy

Stratum Number	Soil Type	Depth to Top of Stratum (feet bgs)(1)	Thickness of Stratum (feet)(1,2)
1a	Upper Clay	0 to 4	2 to 8
1b	Upper Silty Sand	0	0.75 to 4
2a	Calcareous Lean Clay	0 to 8	2 to 36+
2b	Sandy Clay/Clayey or Silty Sand	0 to 18	2 to 20+
3	Gravelly Clay with Sand	2 to 13	2 to 13+
4	Weathered Rock	2 to 43	2 to 16+

Notes:
(1) Depths and thicknesses are approximate values. Subsurface conditions have been generalized.
(2) Substation borings terminated within Stratum 4. PV area borings terminated within Stratum 2 through Stratum 4. Test pits terminated within Stratum 2 through Stratum 4. Maximum thicknesses provided represent encountered thicknesses to boring or test pit termination depth.

6.1 Stratum 1 – Surficial Materials

A surficial layer of clay and silty sand was encountered at existing grade and extending to depths ranging from about 2 to 8 feet bgs. Stratum 1 is split into two substrata based on plasticity characteristics and fines contents as discussed below.

6.1.1 Stratum 1a – Upper Clay

Dark brown to black clay with varying amounts of sand and trace amounts of gravel, calcareous nodules, and rootlets was encountered at existing grade in 27 of the 42 borings[14] and in 16 of the 26 test pits[15]. Stratum 1a was also encountered below Stratum in Borings LB-11 and LB-22. Stratum 1a was generally encountered in the northwest section of site, in the southeastern area of the site, and in Borrow Pit Areas 1 and 3. The thickness of Stratum 1a ranged from about 2 to 8 feet, and rootlets were generally encountered in the upper 2 to 4 feet.

SPTs were performed within Stratum 1a resulted in N-ranging from 17 to 38 blows per foot (bpf). Field estimates of unconfined compressive strength using a pocket penetrometer resulted in values of at least 4.5 tons per square foot (tsf), with one outlying value of 1 tsf in Boring LB-3. The SPT N-values and field estimates of unconfined compressive strength indicate that the consistency of Stratum 1a is generally hard.

[14] LB-1 to LB-7, LB-9 to LB-15, LB-18, LB-20, LB-22, LB-24, LB-26, LB-28, LB-29, LB-31 to LB-34, and LB-39 to LB-42.
[15] TP-1 to TP-5, TP-8, TP-10, TP-15, TP-16, and TP-18 to TP-21, and TP-23 to TP-25.

Laboratory testing of samples within Stratum 1a resulted in natural water contents ranging from 10.4% to 16.3%, liquid limits ranging from 39 to 52, plasticity indices (PIs) ranging from 24 to 35, and fines contents ranging from 66.7% to 92.3%. One Standard Proctor compaction test was performed within Stratum 1a, resulting in a maximum dry unit weight of 97.4 pcf and an optimum moisture content of 22.8%. Swell tests performed within Stratum 1a resulted in vertical strains ranging from 3.2% to 6.1% for overburden pressures ranging from 350 to 750 psf, with estimated swell pressures ranging from 7,250 to 10,750 psf, indicating that the Stratum 1a soils are highly expansive. Unconfined compression (UC) tests performed within Stratum 1a resulted in undrained shear strengths ranging from 1.6 to 10.2 tsf.

The Stratum 1a soils are generally classified using the USCS[16] as lean clay [CL] with some occurrences of fat clay [CH].

6.1.2 Stratum 1b – Upper Silty Sand

Brown to dark brown silty fine sand with trace amounts of sand and gravel and varying amounts of rootlets was encountered at grade in 7 of the 42 borings[17] and in Test Pits TP-7, TP-25 and TP-26. Stratum 1b was generally encountered in part of the northwest section of the site, including within Additional Parcel 3, and along the dirt roads in the southern portion of the site. The thickness of Stratum 1b was about 4 feet in Boring LB-11 and Test Pit TP-7 and ranged from about 0.75 to 2 feet thick where otherwise encountered.

One SPT was performed within Stratum 1b, resulting in an N-value of 22 bpf. The SPT N-value and observations made during hand augering indicate that Stratum 1b is generally medium dense.

Laboratory testing of samples within Stratum 1b resulted in moisture contents ranging from 2.1% to 10.7%, a liquid limit of 17, a PI of 1, and fines contents ranging from 26.4% to 38.9%. One Standard Proctor compaction test was performed within Stratum 1b, resulting in a maximum dry unit weight of 111.3 pcf and an optimum moisture content of 12.8%. One California Bearing Ratio (CBR) test was performed within Stratum 1b, which resulted in a CBR value of 15.8 when compacted at 95% maximum dry density and optimum moisture content based on the Standard Proctor compaction test.

The Stratum 1b soils are generally classified using the USCS as silty sand [SM].

6.2 Stratum 2 – Calcareous Clay with Silt and Sand

Clayey residuum and fluviatile deposits of varying constituency was encountered in all borings and test pits. Stratum 2 was encountered at grade or below Stratum 1 where present, at depths

[16] Unified Soil Classification System.
[17] Borings LB-8, LB-11, LB-16, LB-17, LB-19, LB-22, and LB-25.

ranging from existing grade to 8 feet below grade. Stratum 2 is split into two substrata based on plasticity characteristics and fines contents as discussed below.

6.2.1 Stratum 2a – Calcareous Lean Clay

Stratum 2a consists of light brown to reddish brown to grayish brown lean clay with varying amounts of sand and calcareous nodules, and was encountered in 33 of the 42 borings[18] and 20 of the 26 test pits[19]. The thickness of Stratum 2a generally ranged from 4 to 36 feet in the PV array area and from 7 to 12 feet in the substation area. 9 of the borings and 19 of the test pits were terminated within Stratum 2a.

SPT values within Stratum 2a ranged from 16 bpf to refusal[20] but were generally between 20 and 30 bpf. Field estimates of unconfined compressive strength using a pocket penetrometer resulted in values ranging from 3.5 to 4.5 tsf but were generally at least 4.5 tsf. The SPT N-values and field estimates of unconfined compressive strength indicate that the consistency of Stratum 2a is generally very stiff to hard.

Laboratory testing of samples within Stratum 2a resulted in natural water contents ranging from 6.2% to 19.2%, liquid limits ranging from 35 to 48, PIs ranging from 20 to 32, and fines contents ranging from 61.8% to 97.7%. Swell tests performed within Stratum 2a resulted in vertical strains ranging from 1.2% to 3.5% for overburden pressures ranging from 400 to 1,100 psf, with corresponding swell pressures ranging from 3,750 to 4,250 psf, indicating that the Stratum 2a soils are moderately to highly expansive. UC tests performed within Stratum 2a resulted in undrained shear strengths ranging from 3.62 to 8.76 tsf.

The Stratum 2a soils are generally classified using the USCS as lean clay [CL].

6.2.2 Stratum 2b – Sandy Clay/Clayey or Silty Sand

Reddish brown to light tan clayey sand to sandy clay with pockets of silty sand and varying amounts of gravel and calcareous nodules was encountered in 19 of the 42 borings[21] and in 7 of the 26 test pits[22]. Stratum 2b was encountered below Stratum 2a at depths ranging from 13 to 28 feet below grade in Borings LB-3, LB-5, LB-6, LB-12, LB-18, and LB-19. 13 of the borings and 3 of the test pits were terminated within Stratum 2b.

SPT N-values within Stratum 2b ranged from 9 bpf to refusal but were generally between 21 and 57 bpf. Field estimates of unconfined compressive strength using a pocket penetrometer

[18] Borings LB-1 to LB-7, LB-12 to LB-14, LB-16 to LB-22, LB-24, LB-25, and LB-28 to LB-42.
[19] Test Pits TP-1 to TP-5, TP-8 to TP-11, TP-13, TP-15 to TP-23, and TP-25.
[20] Less than 6 inches penetration over 50 blows of the SPT hammer.
[21] Borings LB-3, LB-5, LB-6, LB-8 to LB-12, LB-18, LB-19, LB-23, LB-25 to LB-27, LB-30, LB-36 to LB-38, and LB-41.
[22] Test Pits TP-6, TP-7, TP-11 to TP-14, TP-17, and TP-22.

resulted in values of at least 4.5 tsf. The SPT N-values and field estimates of unconfined compressive strength indicate that the consistency of Stratum 2b is generally stiff to hard.

Laboratory testing of samples within Stratum 2b resulted in natural water contents ranging from 1.8% to 14.4%, liquid limits ranging from 18 to 33, PIs ranging from 3 to 20, gravel contents ranging from 0% to 6.7%, and fines contents ranging from 40.1% to 76.1%. Two Standard Proctor compaction tests were performed within Stratum 2b, resulting in maximum dry unit weights ranging from 112.4 to 112.9 pcf and optimum moisture contents ranging from 13.6% to 14.2%. UC tests performed within Stratum 2b resulted in undrained shear strengths ranging from 1.7 to 6.7 tsf.

The Stratum 2b soils are generally classified using the USCS as lean clay [CL], clayey sand [SC], and silty sand [SM].

6.3 Stratum 3 – Gravelly Clay with Sand

Pockets of grayish brown to white gravelly sand and clay were encountered in 6 of the 42 borings[23] and 2 of the 26 test pits[24] at depths ranging from 2 to 13 feet below grade. Stratum 3 was encountered below Stratum 2 within the PV footprint, and was encountered between Stratum 2 in 2 of the 4 borrow pit areas. The thickness of the Stratum 3 pockets generally ranged from 2 to 7 feet. Borings LB-8 and LB-35 and Test Pit TP-14 were terminated within Stratum 3.

SPT values within Stratum 3 ranged from 22 to 55 bpf. Field estimates of unconfined compressive strength using a pocket penetrometer resulted in values ranging from 3.5 to 4.5 tsf but were generally at least 4.5 tsf. The SPT N-values and field estimates of unconfined compressive strength indicate that Stratum 4 is dense.

Laboratory testing of samples within Stratum 3 resulted in natural water contents ranging from 2.4% to 13.5%, liquid limits ranging from 26 to 24, PIs ranging from 13 to 18, gravel contents ranging from 17.4% to 29.4%, and fines contents ranging from 15.7% to 65.2%.

The Stratum 3 soils are generally classified using the USCS as lean clay with gravel [CL] or gravelly, clayey sand [SC].

6.4 Stratum 4 – Weathered Rock

Severely weathered shale, limestone, and sandstone that generally presents as a lean clay was encountered below Stratum 2a and Stratum 3 in 19 of the 42 borings[25] and Test Pit TP-26. Stratum 4 was encountered at depths ranging from 13 to 18 feet below grade in the substation

[23] Borings LB-8, LB-15, LB-22, and LB-35 to LB-37.
[24] Test Pits TP-14 and TP-22.
[25] Borings LB-1 to LB-4, LB-13 to LB-17, LB-21, LB-22, LB-31, LB-32,LB-36 to LB-40, and LB-42.

area and at depths ranging from 2 to 18 feet below grade along the northeastern, western, and southwestern areas of the site. Where encountered, the borings terminated within Stratum 4.

SPT values within Stratum 4 ranged from 26 bpf to refusal but were generally at refusal. TCP values within Stratum 4 ranged from 64 bpf to refusal but were generally at refusal, with penetration depths ranging from about 3 to 6 inches over 100 blows of the TCP hammer. The SPT N-values and TCP values indicate that the consistency of Stratum 4 is generally hard to very hard.

Laboratory testing of samples within Stratum 4 resulted in natural water contents ranging from 8.7% to 14.7%, liquid limits ranging from 39 to 49, PIs ranging from 21 to 31, and fines contents ranging from 86.2% to 97.6%.

6.5 Groundwater

Groundwater was not encountered during the subsurface investigation. These observations represent the absence of groundwater at the time of exploration only, and shallow groundwater may be present due to various influences such as seasons, weather/storms, prolonged periods of precipitation, construction activity, and other hydrologic factors.

7.0 GEOTECHNICAL RECOMMENDATIONS

7.1 General

The encountered soil stratigraphy generally consisted of a surficial layer of stiff lean clay with silty sand pockets overlying clayey loam residuum from weathered shale and claystone and terrace deposits. The Stratum 1a clays encountered have a high expansion potential, and the Stratum 2a clays have a moderate to high expansion potential, based on the laboratory tested PIs,[29] in situ moisture contents, and swell test results. The expansion potential of the surficial soils is discussed in further detail below.

The PV arrays and BESS equipment are anticipated to be lightly loaded and can be supported on driven piles; other equipment pads may be supported on conventional shallow foundations. Substation equipment may be supported on conventional shallow foundations bearing on site soils that have undergone remedial grading, or on drilled shaft foundations. Lightly loaded shallow foundations may be susceptible to moisture-induced ground movement and should be designed to accommodate potential total and differential movement, or subgrades should be treated accordingly to reduce the potential for moisture-induced ground movement.

[29] Soils with a PI of greater than 15 are generally considered expansive per International Building Code 2021.

7.2 Expansive Soils

The amount of vertical deformation that expansive soils can generate is termed the "potential vertical rise" (PVR). Langan evaluated the PVR of the soils at the site using the following methods:

1) The Texas Department of Transportation (TxDOT) Tex-124-E Method,
2) The method developed by Nelson and others (2015)[30], and

A brief description of each method used is provided in Table 5. Calculations were performed to estimate the PVR for existing conditions, which is generally indicative of dry in-situ moisture conditions. Calculations assumed a 10-foot-deep zone of seasonal moisture fluctuation. The estimated PVR of the soils within in the substation and BESS area range from about 4.5 to 5 inches. The estimated PVR of the soils across the entire site range from about 1 to 5 inches and generally decreases towards the southern portion of the site.

Table 5 - Summary of PVR Analysis Methods

Analysis Method	Method Description
TDOT Tex-124E	Estimates PVR using studied correlations with the measured plasticity characteristics and moisture contents of the subsurface soils.
Nelson et al. (2015)	Uses measured volume and pressure changes from consolidation-swell tests performed on the subsurface soils to estimate PVR.

7.2.1 PV Array Racking Support

PV racking systems should be selected considering potential heave and differential uplift movements on the racking supports. Methods for built-in components to re-level after installation can be implemented to correct movements as part of regular maintenance.

7.2.2 Substation and Equipment Pads

The estimated PVR exceeds typical allowable ground movements for shallow foundations and equipment pads. For movement sensitive equipment and structures such as transformers, PCS Units, and other equipment within the substation, measures should be implemented to account for potential ground movement such as flexible connections and re-leveling mechanisms. Remedial grading can also be performed to reduce expansion potential locally, or equipment can be supported on deep foundations. Light equipment such as BESS containers or ancillary equipment for PV arrays can be elevated above the free-swelling ground. Substation foundation structures are expected to be thicker and extend below grade, which may require the use of void boxes when pile-supported.

[30] Nelson, John & Chao, Kuo Chieh & Overton, D.D. & Nelson, E.J. (2015). Foundation Engineering for Expansive Soils. 10.1002/9781118996096.

For the remedial grading option, to reduce PVR to a level of about 2 inches, it is recommended to over-excavate to a minimum depth of 5 feet below the bottom of slab or footing elevation, or to the bottom of Stratum 1a, and replace with moisture-conditioned soils from Stratum 1b or Stratum 2.

This remedial grading should be performed to at least 5 feet beyond the limits of the foundation footprint at the bottom of the foundation excavation, and within a 1H:1V zone from bottom of excavation to finished grade. Specific structures across the site may be evaluated on a case-by-case basis to determine if other subgrade preparation should be performed to meet maximum potential heave requirements.

7.3 Soil Corrosivity and Resistivity

7.3.1 ERT Test Results

Field electrical resistivity test values generally ranged from about 1,150 to 11,650 Ω-cm, except for ERT-5, which exhibited resistivity test values ranging from about 5,500 to 34,500 Ω-cm. Resistivity values generally decreased as probe spacing increased to about 30 feet, and resistivity values generally increased with probe spacing past 30 feet. Based on guidelines presented in *Corrosion Basics: An Introduction, 2nd Ed.* (2006), the results of these field resistivity tests generally indicate a moderately corrosive to extremely corrosive potential. ERT results are provided in Attachment C.

7.3.2 Laboratory Chemical Test Results

Laboratory testing for soil sulfate content, sulfide content, chloride content, oxidation-reduction potential, and pH was performed on samples in the upper 2 to 6 feet across the site to estimate corrosion potential for buried structures. The laboratory test results are summarized in Table 6.

Table 6 – Soil Chemistry Test Results

Laboratory Test	ASTM	Range of Values					Units
		Stratum 1a	Stratum 1b	Stratum 2a	Stratum 2b	Stratum 3	
pH in Water	D4972	7.14 – 8.94	6.94	7.27 – 8.54	8.07	NR	-
pH in $CaCl_2$	D4972	6.54 – 7.93	6.23	6.4 – 7.79	7.42	NR	-
Redox Potential	SM 250B	118 – 187	150	144 – 176	135	NR	mV
Soluble Sulfate Content	C1580	0.015 – 0.038	0.027	0.021 – 0.042	0.035	0.021	% mass
Sulfide Content	EPA 376.1	< 6.7	<6.7	<6.7	<6.7	<6.7	ppm
Chloride Content	D512	20 – 230	105	15 – 238	270	33	ppm

7.3.3 Thermal Resistivity Test Results

Laboratory thermal resistivity testing was performed on samples in the upper 2 to 4 feet across the site. Samples were recompacted to 90% of the maximum dry density and 2% dry of optimum water content based on the Standard Proctor for the corresponding soil type and were tested in accordance with ASTM D5334. The thermal resistivity test results are summarized in Table 7 for the initial and supplemental investigations.

Table 7 – Laboratory Thermal Resistivity Test Results

Test Pit ID	Depth (ft)	Stratum #	Water Content (%)	Dry Unit Weight (pcf)	Thermal Resistivity Wet (°C-cm/W)	Thermal Resistivity Dry (°C-cm/W)
TP-3	0 – 2	1a	20.6	82.6	91.3	240.2
TP-18	2 – 4	1a	20.7	80.8	111.3	249.4
TP-20	0 – 2	1a	12.1	95.3	113.2	222.5
TP-23	2 -- 4	1a	20.9	82.8	103.4	272.1
TP-7	0 – 2	1b	11.6	96.5	86.2	215.0
TP-26	0 -- 2	1b	11.0	94.6	91.4	278.3
TP-11	0 – 2	2a	12.3	95.6	74.9	199.5
TP-13	0 – 2	2a	12.1	95.3	92.7	219.2
TP-25	2 -- 4	2a	11.7	95.9	97.3	255.8
TP-6	0 – 2	2b	11.7	96.1	78.5	206.3
TP-14	0 – 2	2b	12.1	95.2	83.4	235.2

7.3.4 Buried Metals

According to the American Water Works Association C105-72(R77): American National Standard For Polyethylene Encasement For Gray and Ductile Cast Iron Piping For Water and Other Liquids and based on soil resistivity, pH, redox potential, sulfides content, and moisture content laboratory test results conducted during Langan's subsurface investigation, the site soils near the BESS area and in the southeastern corner of the site may be corrosive to ferrous metals. Langan recommends subsurface ferrous metal structures and utilities not embedded in concrete in these areas be protected against corrosion. A qualified corrosion engineer or specialist should provide recommendations for protection.

7.3.5 Concrete

American Concrete Institute (ACI) concrete exposure classes for sulfate (S), water (W), freeze-thaw (F), and corrosion protection of reinforcement (C) were evaluated for proposed buried and at-grade concrete placed at the site.

Laboratory tests indicate that the site soils have low (S0) sulfate exposure. All buried and at-grade concrete is expected to be placed above the water table and can absorb moisture from

surrounding soil. Therefore, the concrete should have moderate (W1) exposure to water and moderate (C1) corrosion exposure. Based on typical weather patterns at the site area, the concrete is expected to experience freeze-thaw cycles with limited exposure to water (F1).

The owner's structural engineer should design buried and at-grade concrete in accordance with the requirements provided in the latest edition of ACI 318 based on exposure class.

7.4 County Road Assessment

Langan performed a series of shallow hand auger probes along the about 8.7-mile designated site access path, which is from FM 45 to the northern gate of the site and includes unpaved county roads CR 265, CR 264, and CR 268. Additionally, Langan drove the extent of the path to visually observe the roadway conditions and note areas of concern.

Generally, the county roads along the designated site access path are intact and consist of a surficial layer of about 2 to 12 inches of gravelly or silty sand overlying a clayey sand or lean clay subbase. A summary of roadway conditions along each county road are provided below. Roadway hand auger logs are included as Attachment A-2, and laboratory test results for the roadway samples are included as Attachment F-2.

- Along CR 265, the roadway generally consisted of 3 to 7 inches of gravel overlying clayey sand. The roadway near the intersection of CR 265 and CR 264 was observed to be looser than the rest of the roadway. No significant rutting was observed.
- Along CR 264, gravel or gravelly sand was encountered in 4 of the 7 hand auger locations[32] and was generally 6 to 12 inches thick. In the remaining 3 hand auger locations[33], the roadway consisted of 6 to 16 inches of silty/clayey sand over sandy clay. The portion of roadway near the intersection of CR 264 and CR 267 was observed to be softer than the other observed areas of the roadway.
- The portion of CR 267 between auger locations RW-11 and RW-12 is a paved asphalt road.
- Along CR 268 outside the site entrance gate, the roadway generally consisted of 2 to 3 inches of gravel over sandy clay, except at location RW-7 where the roadway consisted of 12 inches of silty sand over sandy clay. CR 268 is generally intact, but the road surface appears looser and less maintained than the other roads. Two small potholes were observed along CR 268.
- The portion of CR 268 inside the first site entrance gate generally consists of 12 to 24 inches of silty sand overlying sandy clay or clayey sand. The road appears uneven may rut under heavy loads or after rainfall events.

[32] RW-12, RW-13, RW-16 to RW-18
[33] RW-14, RW-15, and RW-18

7.5 Site Preparation

Due to the risk of encountering UXOs across the site, it is assumed that a comprehensive UXO site survey will be conducted prior to any earthwork activities being performed, and that all earthwork activities will be performed under the full-time monitoring of a UXO specialist. Any suspected UXOs or other munitions discovered or UXOs encountered during site work must be reported immediately to the UXO specialist to coordinate removal and disposal.

All vegetation within construction areas, including trees and associated root structures, should be stripped. Excavations made for removals (i.e., large root structures) should be backfilled with approved backfill material. Debris and vegetation should be properly disposed of off-site. Organic material within backfill soils will adversely impact the ampacity of power cables and affect the electrical design. Excavation of soils for direct bury of cables should be monitored closely to prevent stripped vegetation from being backfilled in the excavation.

All construction work should be performed so as not to adversely impact off-site structures or utilities, including any existing utilities and trees that are to remain. Protection of these elements should be provided as necessary.

7.6 Subgrade Preparation Procedures

After performing the aforementioned site preparation work, including overexcavation for remedial grading, and prior to placing and compacting backfill, soil subgrade within the construction areas should be proofrolled/compacted with six overlapping coverages of a sheepsfoot roller having a minimum static drum weight of 5 tons, or two passes using a fully loaded dump truck or pneumatic-tired roller weighing at least 25 tons. Additional proofrolling coverages should be performed in areas deemed necessary based on observations made by an experienced geotechnical engineer. Soft areas identified during proofrolling should be excavated and replaced with approved compacted fill.

7.6.1 Soil Stabilization

The surficial clays are sensitive to moisture exposure and may be potentially unworkable when saturated, particularly the Stratum 1a clays. The soils are expected to require several days to dry out and may be unworkable in extended wet periods. Site soils may be stabilized using lime, Portland Cement, or fly ash to attempt to dry and stiffen the surficial soils and increase their workability. Sulfate contents of site soils in the upper 4 feet ranged from 146 to 375 ppm based on laboratory testing. The results indicate that lime treatment is anticipated to be suitable for the surficial soils per TxDOT guidelines[34]. Based on preliminary lime series testing performed on

[34] Lime stabilization is not recommended for soils with a sulfate concentration of above 3,000 ppm, per the Texas Department of Transportation (TxDOT) Treatment Guidelines for Soils and Base in Pavement Structures.

surficial soil samples, Langan recommends an initial value of 14% lime be used for stabilization estimates.

If lime stabilization is to be performed, Langan recommends that additional lime series and sulfate testing be performed for a minimum of every 500 linear feet of pavement/roadway or 5,000 cubic yards of material. The testing should be performed on soils at subgrade elevation after rough grading has been performed, and the results of the lime testing should be reviewed by Langan to determine recommended lime treatment measures.

7.7 Site Grading and Landscaping Considerations

Earthwork in general should be placed to include a moderate slope (recommended 2% minimum) to promote drainage away from concrete pad footprints and roadway areas during construction and should not contain low areas where ponding would occur. At areas adjacent to pad foundations, grade should be at a slope of not less than 5% sloped for a minimum of 10 feet away from the pad, or at 2% minimum if the surface is impervious, as required by Building Code. Final subgrades, including those below flexible base, which may be used for concrete pads and roadways, should have positive drainage away from pad or roadway footprint.

7.8 Engineered Fill

7.8.1 Fill Materials

Characteristics of fill materials for raising site grades, backfilling excavations, and stabilizing subgrade areas are provided in Table 8 and Table 9 for existing site soils and imported soils, respectively. Suitable fill materials should be free of organics and other deleterious materials and should have a maximum particle size no greater than 4 inches. Sieve analyses, fines content determinations, Atterberg limits tests, and compaction tests should be performed on representative samples of the fill materials proposed by the Contractor and reviewed by the geotechnical engineer for approval.

Table 8 – Existing Site Soil Reuse and Index Parameters

Stratum #	USCS Soil Type	LL Range	PI Range	% Gravel Range	% Fines Range	Application				
						General Backfill[1]	Fill Under Roadways	Fill Under PV Arrays	Fill Under Foundations	Base[2]
1a	CL	40 – 52	24 – 34	+/- 0	67 – 92	X	X			
1b	SM	+/- 17	+/- 1	+/- 0	34 – 39	X	X	X	X	
2a	CL	35 – 48	20 – 32	+/- 0	49 – 97	X	X			
2b	CL/SC/SM	18 – 33	3 – 20	0 – 7	40 – 76	X	X	X	X	
3	CL/SC	26 – 34	13 – 18	17 – 31	16 – 65	X	X	X	X	

Notes:

(1) General backfill should only be used in landscape areas or areas not sensitive to moisture-induced heave.

(2) Subbase should be used as building foundation or pavement base material.

(3) Soil properties indicated in this table are based on laboratory tested results.

Table 9 – Imported Fill Usage and Index Parameters

Imported Soil Type	USCS Soil Type	LL Range	PI Range	% Gravel Range	% Fines Range	Application				
						General Backfill[1]	Fill Under Roadways	Fill Under PV Arrays	Fill Under Foundations	Base[2]
Select Fill	CL/SC	<40	10 – 20	<15	30 – 75	X	X	X	X	
Flexible Base[3]	GP/GW	<40	<10	45 – 75	<20					X

Notes:

(1) General backfill should only be used in landscape areas or areas not sensitive to moisture-induced heave.

(2) Base should be used as building foundation or pavement subbase material.

(3) Flexible base should consist of Type A, Grade 1-2 granular material in accordance with TxDOT Item 247, Flexible Base.

7.8.2 Borrow Pit Fill Material

Four locations surrounding the site were identified as potential detention areas or as areas to use for potential borrow fill material. The locations are labeled as Borrow Pits 1, 2, 3, and 4 and identified on the Subsurface Investigation Plan included as Figure 3. A generalized summary of the soil stratigraphy for each of the borrow pit areas is provided in Table 10, which can be reused as discussed in Section 7.8.1.

Table 10 – Generalized Soil Stratigraphy for Borrow Pits

Stratum Number	Soil Type	Depth to Top of Stratum (feet bgs)			
		Borrow Pit 1	Borrow Pit 2	Borrow Pit 3	Borrow Pit 4
1a	Upper Clay	0	--	0	--
2a	Calcareous Lean Clay	1 to 2	0 to 6	4 to 8	4 to 5.5
2b	Sandy Clay/Clayey Sand	--	0	--	0
3	Gravelly Clay with Sand	--	2 to 8	--	2+
4	Weathered Rock	+/- 13.5	13.5+	18.5+	13.5+

All borrow pit locations appear to be viable for use as detention ponds based on the materials encountered at the design excavation depths. Confirmation and testing of the soils comprising the pond subgrade should be performed during grading activities to verify soil properties used in design.

7.8.3 Fill Placement and Compaction

Compaction recommendations for site soils and imported fill materials are provided in Table 11. The Contractor should make provisions to dry or wet the existing site soils, as necessary, during placement and prior to compaction. Fill placement should be subject to observation and testing by an experienced geotechnical engineer. No fill material should be placed on surfaces which have not been approved and documented by an experienced geotechnical engineer. Langan recommends performing field moisture and density testing at a frequency of at least 1 test per 5,000 square feet per lift, or no less than 3 tests per lift.

Table 11 – Site Soil and Imported Fill Compaction Specifications

Soil Type	Proctor Compaction Test[2]	Compaction Moisture Content Range[3]	Minimum Compaction Dry Density[4]				
			General Backfill	Fill Under Roadways	Fill Under PV Arrays	Fill Under Foundations	Base
Site Soils – Stratum 1a	Standard	-1% to +3%	90%	95%			
Site Soils – Stratum 1b	Standard	-2% to +2%	90%	95%	95%	95%	
Site Soils – Stratum 2a	Standard	-1% to +3%	90%	95%			
Site Soils – Stratum 2b	Standard	-2% to +2%	90%	95%	95%	95%	
Site Soils – Stratum 3	Standard	-2% to +2%	90%	95%	95%	95%	
Select Fill	Standard	-1% to +3%	90%	95%	95%	95%	
Flexible Base	Standard	-2% to +2%					98%

Notes:

(1) Fill should be placed in uniform maximum 8-inch-thick loose lifts.

(2) The Standard Proctor compaction test corresponds to ASTM D698. The Modified Proctor compaction test corresponds to ASTM D1557.

(3) The compaction moisture content ranges listed are relative to the optimum moisture content as determined by the corresponding Proctor compaction test.

(4) The compaction dry density percentages listed are relative to the maximum dry density for each soil type and application, as determined by the corresponding Proctor compaction test.

7.9 Solar Array Foundations

7.9.1 Pile Load Tests

Index piles were installed and load tested to develop an understanding of production pile installation process and behavior under loading. Eight pairs of pile load tests were performed across the site, adjacent to selected test pit locations. Each pile load test was performed on a 14-foot-long W6x9 pile driven using a vibratory PD5 pile driver to a depth of 10 feet below grade or to pile refusal.

A summary of the pile load test results is provided in Table 12. The lateral and tension load test data are provided as Attachments E and F.

Table 12 – Pile Load Test Summary

Pile Load Test Location	Test Pit	Tension Load Test		Lateral Load Test		
		Max Deflection (in)	Load at Max Deflection[1] (lb)	Max Deflection (in)	Load at Max Deflection[2] (lb)	Load at 0.5" Deflection (lb)
PLT-1	TP-7	0.05	10,000	0.68	5,000	4,000
PLT-2[3]	TP-9	0.02	10,000	0.67	5,250	4,000
PLT-3	TP-10	0.05	10,000	1.05	6,000	4,500
PLT-4	TP-17	0.03	10,000	1.05	5,900	4,800
PLT-5	TP-16	0.05	10,000	1.07	6,600	4,000
PLT-6	TP-15	0.06	10,000	1.00	5,000	2,600
PLT-7	TP-19	0.07	10,000	0.79	6,100	5,000
PLT-8	TP-21	0.01	10,000	1.07	6,000	3,200

Notes:
(1) Tension load tests were performed to maximum load of load cell at 10,000 lbs.
(2) Lateral load tests were performed to maximum load of about 6,000 to 6,700 lbs.
(3) Pile PLT-2(L) was installed to pile refusal at a depth of 9 feet below grade.

7.9.2 Driven Pile Design Parameters

The solar array and BESS container structures are expected to be supported on driven steel piles. The piles will derive capacity from side friction and cohesion largely from the Stratum 2 lean clays and sandy clays, with end-bearing in either the Stratum 2 clays, Stratum 3 gravelly clays, or Stratum 4 weathered rock. Pile foundations are expected to resist uplift and lateral loads due to wind and uplift loads due to soil heave, in addition to normal service dead loads from self-weight. Recommended end-bearing and skin friction design values for H-pile analysis are summarized in Table 13.

Side friction in the upper 4 feet of the piles should be neglected to account for the expansive soils. Additionally, the piles should be designed for an additional uplift pressure and negative side friction of 750 psf along the perimeter of the pile within the upper 4 feet to account for potential movement of the surficial expansive soils. These measures will not fully address the risk of expansive soils (which includes soils for the full length that piles are embedded) but are practical measures to reduce expansive soil action for the PV array foundations.

Table 13 – Driven H-Pile Geotechnical Axial Capacity for PV Arrays

Stratum #	Depth (feet)	Allowable End-Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 4	-	-	-
Stratum 2	4 – 20	20,000	750	625
	4 – 13[2]			
Stratum 3[3]	8 – 20	22,000	350	300
Stratum 4	13 – 20[2]	25,000	1,000	800

Notes:
(1) Capacities shown are geotechnical capacities only. A factor of safety of 2.5 was used for side friction in compression, and a factor of safety of 3 was used for end-bearing and side friction in tension. Structural capacities should be evaluated by the structural engineer.
(2) In the southwestern area of the site where shallow rock was encountered, we recommend using the generalized depths for Stratum 2 and Stratum 4 for pile design if required to penetrate deeper than 13 feet below grade.
(3) Pile load tests were not performed in areas where Stratum 3 was encountered. Recommended design values are based on soil properties alone. Stratum 3 should only be included in pile design for areas where Stratum 3 is anticipated.

The recommended design parameters provided in Table 13 are interpreted based on soil parameters and corroborated against the pile load test data results.

7.9.3 L-Pile Design Parameters

Langan recommends that lateral resistance of the driven piles be evaluated using the p-y method, where the soil is modeled as a series of lateral non-linear springs. Commercial software programs such as LPILE can be used for lateral pile analysis. Recommended soil parameters for use in LPILE are provided in Table 14, which have been corroborated with the lateral load test data.

Table 14 – LPILE Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor e50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2a	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 2b	133	Stiff Clay w/o Free Water	4,500	0.02

The final pile size, length, and details will be designed once the loads are finalized; the design and details will need to be signed and sealed by a Professional Engineer licensed in the state of Texas. During construction, Langan recommends tension and lateral load testing about 2% to 5% of the piles to verify the design parameters and contractor installation methods.

7.10 Equipment Pad/Energy Storage Shallow Foundations

7.10.1 Shallow Foundation Parameters

Shallow foundations are feasible to support lightly loaded equipment pads, assuming that the anticipated expansion potential is acceptable. Equipment within the proposed substation and BESS areas can be supported on shallow foundations bearing on a minimum of 12 inches of imported select fill, on moisture conditioned and recompacted Stratum 1a clays, or native Stratum 2 materials. Recommended design parameters for shallow foundations are provided in Table 15.

Table 15 – Shallow Foundation Design Parameters

Description	Recommended Value
Allowable Bearing Pressure – Moisture Conditioned and Recompacted Stratum 1 or Stratum 2 Soils	2,500 psf
Allowable Bearing Pressure – Undisturbed Stratum 2 Soils	4,000 psf
Allowable Bearing Pressure – Select Fill (Recompacted)	2,500 psf
Subgrade Modulus (k)	125 pci

Footings should be at least 18 inches wide and bear a minimum of 18 inches below finished grade. Footings should not be unreinforced, and minimum steel requirements should be met, as determined by the project structural engineer.

7.11 Substation Deep Foundations

7.11.1 Drilled Pier Foundations

If the estimated expansion potential or remedial grading recommendations are unacceptable for constructing the substation equipment on conventional shallow foundations, the proposed substation equipment may also be supported on a deep foundation system comprised of drilled straight shaft piers bearing in the Stratum 4 weathered rock. Drilled piers are constructed as auger-excavated, straight shaft reinforced concrete piers that will resist loads primarily via end-bearing, with additional skin friction resistance in overburden soils. Skin friction resistance for design should start below the depth of seasonal moisture change, assumed to be about 10 feet.

The piers should be founded a minimum of 4 feet or 3 shaft diameters (whichever is greater) into the selected bearing stratum. Piers should be spaced a minimum of 3 pile diameters apart to avoid negative axial group effects. If close spacings of piers cannot be avoided, then group effects should be evaluated on a case-by-case basis in coordination with Langan. Piers spaced closer than 6 pile diameters will experience group effects in lateral loading depending on the pile group orientation. Foundation plans should be reviewed by Langan to develop appropriate p-multipliers for pile lateral group effects.

An experienced geotechnical engineer should observe and document the construction of each pier to confirm that construction procedures are in accordance with the specifications, the bearing requirements are satisfied, and concrete is placed properly.

7.11.2 Drilled Pier Axial Capacity

Recommended design values for drilled pier and ACIP design are provided in Table 16 for end-bearing and skin friction values. The allowable design values provided are based on a factor of safety of 2.5 for skin friction in compression, 3.0 for skin friction in tension, and 3.0 for end-bearing. Piles in tension will derive capacity from skin friction only. These design values are for geotechnical capacity only, and foundations should be designed structurally to resist all compression, tension, and lateral loads in accordance with structural demands and Building Code requirements.

Table 16 – Substation Drilled Pier Geotechnical Axial Capacity

Stratum #	Depth (feet)	Allowable End-Bearing (psf)	Allowable Unit Skin Friction (psf)	
			Compression	Tension
Stratum 1	0 – 6	--	--	--
Stratum 2	6 – 20	20,000	875	725
Stratum 4	20 – 50	25,000	3,000	2,500

Drilled piers should also be designed to resist an uplift force of 750 psf along the upper 10 feet to account for expansion potential. Piers should be structurally designed to resist axial compression, tension, and lateral forces in accordance with Building Code and relevant design standards for concrete members (i.e., ACI 318).

7.11.3 L-Pile Design Parameters

Langan recommends that lateral resistance of the drilled shafts be evaluated using the p-y method, where the soil is modeled as a series of lateral non-linear springs. Commercial software programs such as LPILE can be used for lateral pile analysis. Recommended soil parameters for use in LPILE are provided in Table 17.

Table 17 – LPILE Drilled Pier Recommended Soil Parameters

Stratum #	Unit Weight (pcf)	LPILE Soil Model	Undrained Shear Strength (psf)	Strain Factor e50
Stratum 1	125	Stiff Clay w/o Free Water	4,000	0.03
Stratum 2	127	Stiff Clay w/o Free Water	5,500	0.02
Stratum 4	135	Stiff Clay w/o Free Water	9,000	--

The final pile size, length, and details will be designed once the loads are finalized; the design and details will need to be signed and sealed by a Professional Engineer licensed in the state of Texas.

7.11.4 Pile Load Test

A load test program is recommended to verify ultimate load capacities for the drilled piers, as the drilled piers will be designed for different bearing depths and design loads than the driven piles. Pile load tests where piles are loaded to failure can be used to optimize the foundation design if the tested ultimate failure load exceed the estimated ultimate capacities. It is recommended to perform the following load tests for each size of pile used for each structure:

- Two compression load tests for each pile size (ASTM D1143)[35]
- Two tension load tests for each pile size (ASTM D3689)[36]
- Two lateral load tests for each pile size (ASTM D3966)[37]

It is recommended that the load tests be performed as a pre-production load-test program before beginning the installation of production piles to allow for re-design of foundation systems as needed. Test piles may be instrumented with strain gauges as a tool to evaluate skin friction versus depth. The additional data allows for re-design of pile geotechnical capacities in variable soil conditions, and for optimization of structural pile design. Test piles for the lateral load test can also be instrumented with inclinometers to measure curvature and deflection with depth, which can also be used to refine modeling parameters and optimize structural reinforcement design.

Bi-directional axial load testing can also be performed in lieu of separate compression and tension load tests. These tests require the use of sacrificial load cells installed within the pile, but do not require the installation of a reaction frame to resist test loads.

7.12 Seismic Design

This section presents our site seismic evaluation in accordance with ASCE 7-16 as referenced in the 2021 International Building Code.

The Building Code assigns a seismic Site Class based on the type, thickness, and engineering properties of soil and rock in the top 100 feet below the ground surface. Based on the encountered subsurface conditions and the regional geology, the site is classified as Site Class C (Very Dense Soil and Soft Rock) for seismic design purposes in accordance with the Building Code. Based on the design spectral accelerations and an assumed Structural

[35] Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load
[36] Standard Test Methods for Deep Foundation Elements Under Static Axial Tensile Load
[37] Standard Test Methods for Deep Foundations Under Lateral Load

Occupancy/Risk Category II for the PV array structures, the Seismic Design Category (SDC) is A in accordance with Building Code. Based on the design spectral accelerations and an assumed Structural Occupancy/Risk Category III for the BESS and substation structures, the Seismic Design Category (SDC) is A in accordance with Building Code. Table 18 provides a detailed summary of seismic design parameter recommendations.

Table 18 – Recommended Seismic Design Parameters

Description	Symbol	Recommended Value
Mapped Spectral Acceleration for 0.2 Second Period	S_s	0.056 g
Mapped Spectral Acceleration for 1 Second Period	S_1	0.035 g
Site Class	Very Dense Soil and Soft Rock	C
Site Coefficient	F_a	1.3
Site Coefficient	F_v	1.5
5 Percent Damped Design Spectral Response Acceleration at 0.2 Second Period	S_{DS}	0.047 g
5 Percent Damped Design Spectral Response Acceleration at 1 Second Period	S_{D1}	0.039 g
Seismic Design Category – PV Arrays (Based on Structural Occupancy/Risk Category II)	SDC	A
Seismic Design Category – BESS and Substation (Based on Structural Occupancy/Risk Category III)	SDC	A

7.13 Temporary Excavation

Excavations should be conducted in accordance with OSHA requirements including, but not limited to, sloping and/or benching the sides and using a trench box or shield. The sides of open-cut excavations should generally be no steeper than 1H:1V. Where mass excavation may occur near the property line, such as for remedial grading under the substation, the excavations may encroach on neighboring properties, roadways, or pipeline easements. To protect these sites, retaining walls or temporary excavation support systems may be needed to facilitate excavation activities.

7.14 Utilities

Prior to starting construction, existing utilities to remain should be field-located and maintained during construction. Excavations for utility installation should be conducted in accordance with OSHA requirements and as described in the previous section of this report, excavated to sufficient width to allow for proper compaction around utilities. Prior to the installation of utilities, the soil at the bottom of the trenches should be proofrolled/compacted with six overlapping

coverages of a double-drum walk-behind sheepsfoot roller. Soft areas identified during proofrolling should be excavated and replaced with approved compacted fill. Utilities should be backfilled with approved compacted fill.

Utility design should consider potential vertical movements due to heave from expansive soils. If utilities are sensitive to vertical movements, flexible connections or isolation measures should be considered within their vicinity. If utility trenches are backfilled with free-draining material, trenches should be capped with an impermeable liner to prevent migration of free water to the underlying expansive soils.

In addition, because of the potential for utility settlement and heave from changes in the moisture content of soils, we recommend the following:

- Provide flexible connections capable of sustaining differential movements for utilities where they transition from building areas to adjacent site areas.
- Construct site utilities using flexible pipe (i.e., HDPE).

Power cables may be installed as direct bury by trenching the site soils and replacing excavated materials after installation. The presence of organic material such as vegetation or rootlets in the backfill will negatively impact the ampacity of the cables and electrical design. Backfill of direct bury cables should be carefully monitored to verify that organics are not mixed in with the backfill materials, and the trench area should be thoroughly stripped and grubbed before earthwork.

7.15 Access Road Design

Access roads within the PV array, substation, and BESS areas are expected to be designed as aggregate-surfaced roadways. Pavement sections have been analyzed following the FHWA Gravel Roads Maintenance and Design Manual (2000). The CBR used in the pavement design is assumed based on laboratory test results on compacted Stratum 1a or 2a soils. Table 19 below summarizes the design parameters used for pavement design.

Table 19 – Pavement Design Parameters

Parameters	Design Values
Standard Duty ESALs	15,000
Heavy Duty ESALs	50,000
Design Life	20 years
Initial Serviceability	4.5
Terminal Serviceability	2.0
Climatic Region	IV (Dry, hard freeze, spring thaw)
California Bearing Ratio (CBR)	5

Access roads should be constructed using flexible base material, with a crushed stone (i.e., 3/4" stone or AASHTO #57) wearing surface to protect from erosion and rutting. The following roadway sections provided in Table 20 are recommended for this project.

Table 20 – Recommended Minimum Pavement Sections

Pavement Section Type	Flexible Base Thickness (inches)	Crushed Stone Wearing Thickness (inches)
Standard Duty	7	2
Heavy Duty	12	2

Aggregate base should consist of flexible base as outlined in Section 7.8.1. The subgrade soils below the roadway aggregate are expected to be existing site soils from Stratum 1 or Stratum 2, prepared and proofrolled per the recommendations described in Section 7.8. Langan recommends a non-woven filter fabric or geogrid be placed below the flexible base to separate the flexible base from the subgrade soils.

A maintenance plan should be implemented for the roadway to maintain roadway conditions over time.

8.0 SERVICES DURING DESIGN, CONSTRUCTION DOCUMENTS AND CONSTRUCTION QUALITY ASSURANCE

During final design, Langan should be retained to consult with the design team as geotechnical questions arise. Technical specifications and design drawings should incorporate Langan's recommendations. When authorized, Langan will assist the design team in preparing specification sections related to geotechnical issues such as earthwork, deep foundations, backfill, and excavation support. Langan should also, when authorized, review the project plans, as well as Contractor submittals relating to materials and construction procedures for geotechnical work, to confirm the designs incorporate the intent of our recommendations.

Langan has investigated and interpreted the site subsurface conditions and developed the design recommendations contained herein, and is therefore experienced with site conditions, and suited to perform quality assurance observation and testing of geotechnical-related work during construction. The work requiring quality assurance confirmation and/or special inspections per the Building Code includes, but is not limited to, earthwork, backfill, ground improvement, shallow and deep foundations, and excavation support.

Recognizing that construction observation is the final stage of geotechnical design, quality assurance observation during construction by Langan is necessary to confirm the geotechnical design assumptions and the conditions encountered during construction are consistent with those anticipated. The foundation system and general geotechnical construction methods recommended herein are predicated upon Langan assisting with the final design and providing

construction observation services, including confirmation and documentation of the removal and recompaction/moisture conditioning efforts, for the Owner. Should Langan not be retained for these services, Langan cannot assume the role of geotechnical engineer of record, and the entity providing the final design and construction observation services must serve as the geotechnical engineer of record and accept/be responsible for all previous investigation results and geotechnical recommendations developed for the project.

9.0 OWNER AND CONTRACTOR RESPONSIBILITIES

The Contractor is responsible for construction quality control, which includes satisfactorily constructing the foundation system and any associated temporary works to achieve the design intent while not adversely impacting or causing loss of support to neighboring property, structures, utilities, roadways, etc. Construction activities that can alter the existing ground conditions such as excavation, fill placement, foundation construction, ground improvement, pile driving/drilling, dewatering, etc. can also induce stresses, vibrations, and movements in nearby structures and utilities, and disturb occupants. Contractors are solely responsible to ensure that their activities will not adversely affect the structures and utilities and will not disturb occupants. Contractors must also take all necessary measures to protect the existing structures, utilities, etc. during construction. By using this report, the Owner agrees that Langan will not be held responsible for any damage to adjacent structures, utilities, etc.

The preparation and use of this report is based on the condition that the project construction contract between the Owner and their Contractor(s) will include: 1) Langan being added to the Project Wrap and/or Contractor's General Liability insurance as an additional insured, and 2) language specifically stating the Foundation Contractor will defend, indemnify, and hold harmless the Owner and Langan against all claims related to disturbance or damage to adjacent structures, utilities, etc. or properties.

10.0 LIMITATIONS

The conclusions and recommendations provided in this report result from Langan's interpretation of the geotechnical conditions existing at the site inferred from a limited number of borings and test pits at the indicated locations, as well as information provided by the Client. Actual subsurface conditions encountered during construction may vary. Recommendations provided are dependent upon one another and no recommendation should be followed independent of the others.

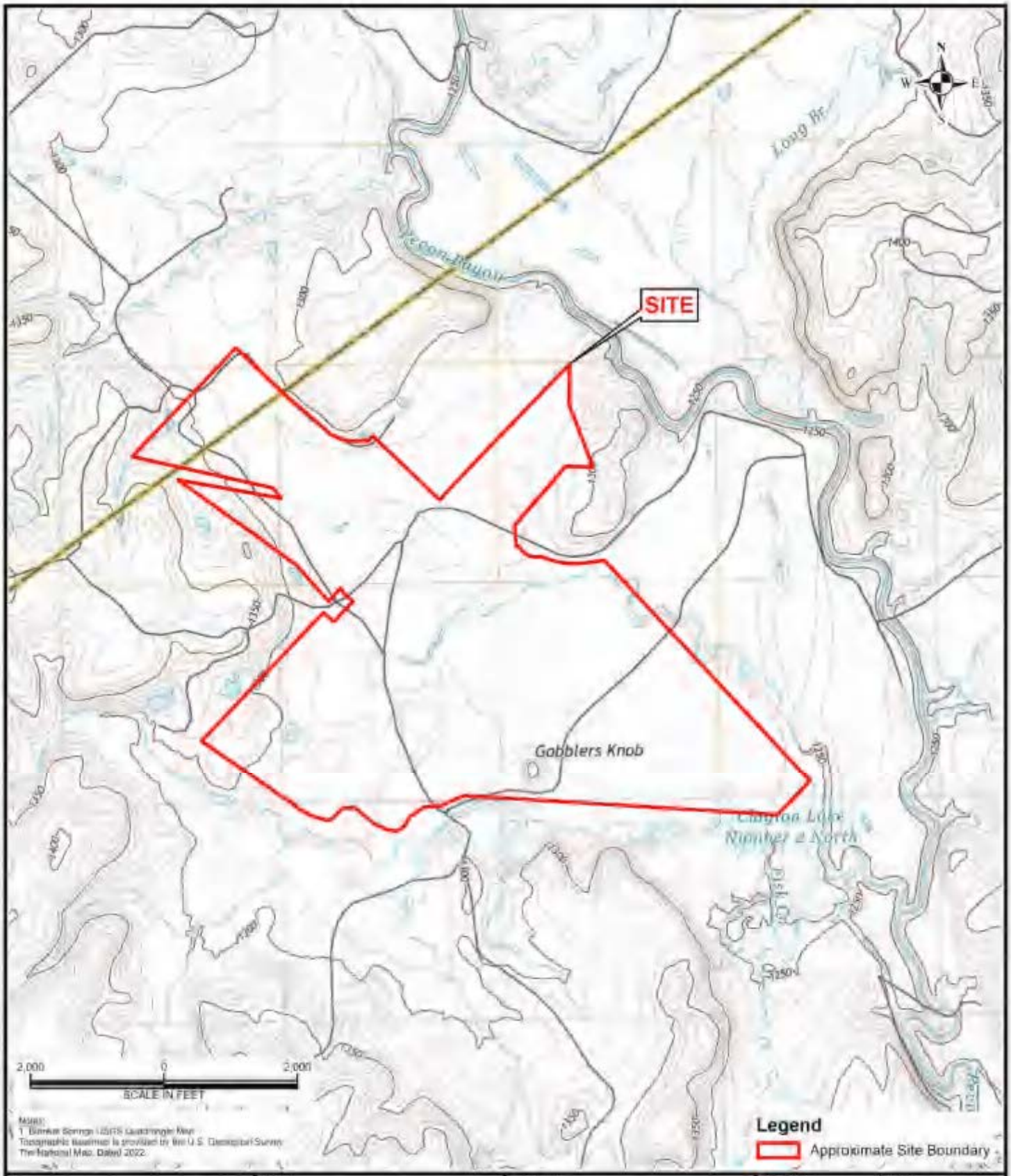
Any proposed changes in structures, structural loads, or the structure locations should be brought to Langan's attention immediately so that Langan can determine whether such changes affect the recommendations. Information on subsurface strata and groundwater levels shown on the boring and test pit logs represent conditions encountered only at the locations indicated and at the time of investigation. If different conditions are encountered during construction, they should

immediately be brought to Langan's attention for evaluation, as they may affect the recommendations presented herein.

This report has been prepared solely to assist the Owner, architect, and structural engineer in the design process and is only applicable to the design of the specific project identified. The information in this report cannot be utilized or relied on by engineers or contractors who are involved in evaluations or designs of facilities (including underpinning, grouting, ground stabilization, etc.) without prior written authorization from Langan, or on adjacent properties which are beyond the limits of that which is the specific subject of this report.

Environmental issues (such as permitting or potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate evaluation.

FIGURES



Notes:
1. Bunker Springs USGS Quadrangle Map
Topographic basemap is provided by the U.S. Geological Survey
The National Map, Dated 2022.

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Project

CHISME SOLAR STORAGE

ZEPHYR

MILLS COUNTY TEXAS

Figure Title

SITE LOCATION MAP

Project No. 520102301	Figure 1A
Date 7/2/2025	
Scale 1"=2,000'	
Drawn By GS	

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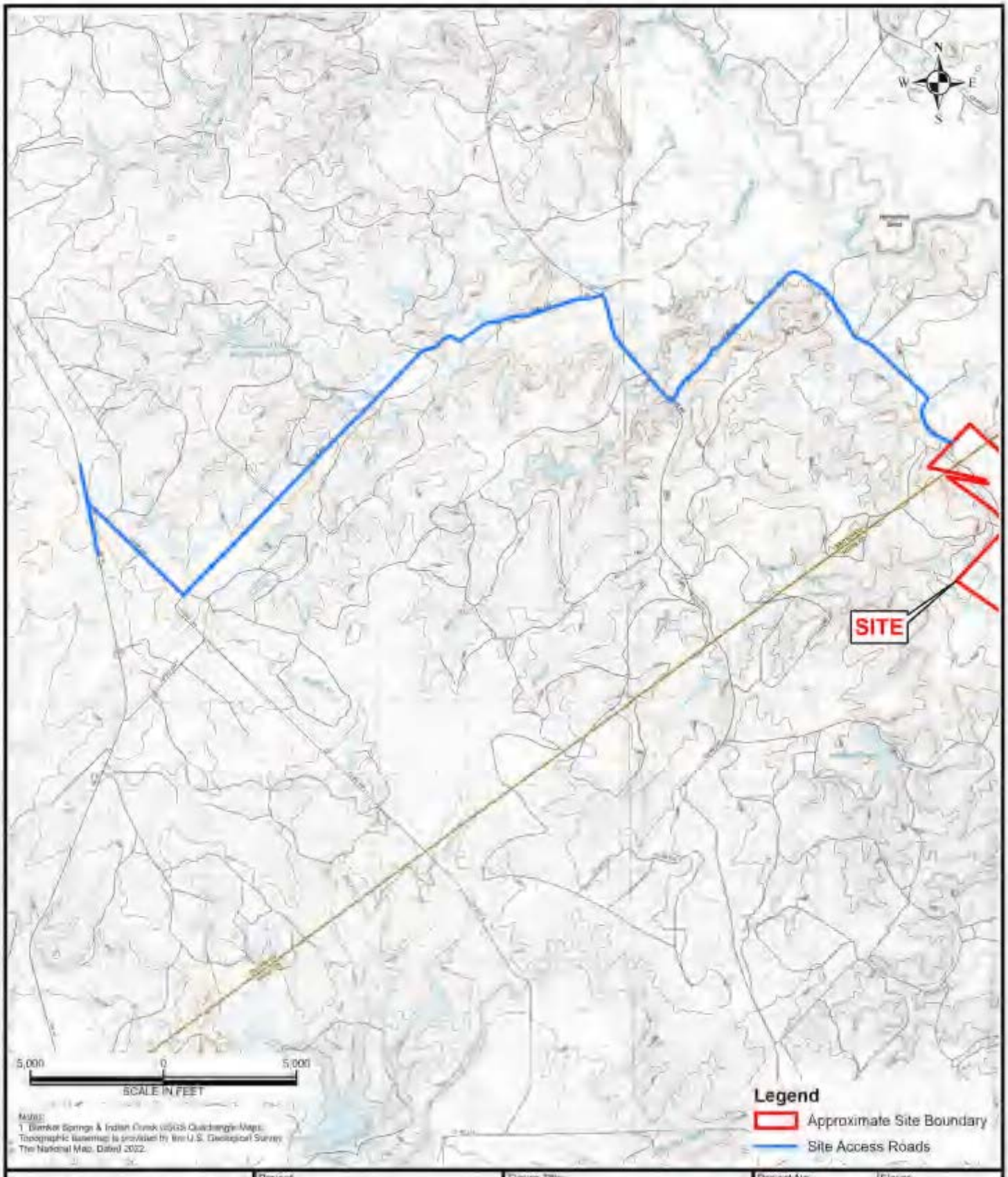
Path: N:\langan.com\data\DAL\data3\520102301\Project Data\ArcGIS\APRX\520102301\520102301.aprx



Notes:
1. Bunker Springs & Indian Creek USGS Quadrangle Maps.
Topographic basemap is provided by the U.S. Geological Survey
The National Map, Dated 2022.

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Project:

CHISME SOLAR STORAGE

BROWN & MILLS COUNTY TEXAS

Figure Title:

SITE LOCATION MAP- ACCESS ROADS

Project No. 520102301	Figure 1B
Date 7/2/2025	
Scale 1"=5,000'	
Drawn By GS	

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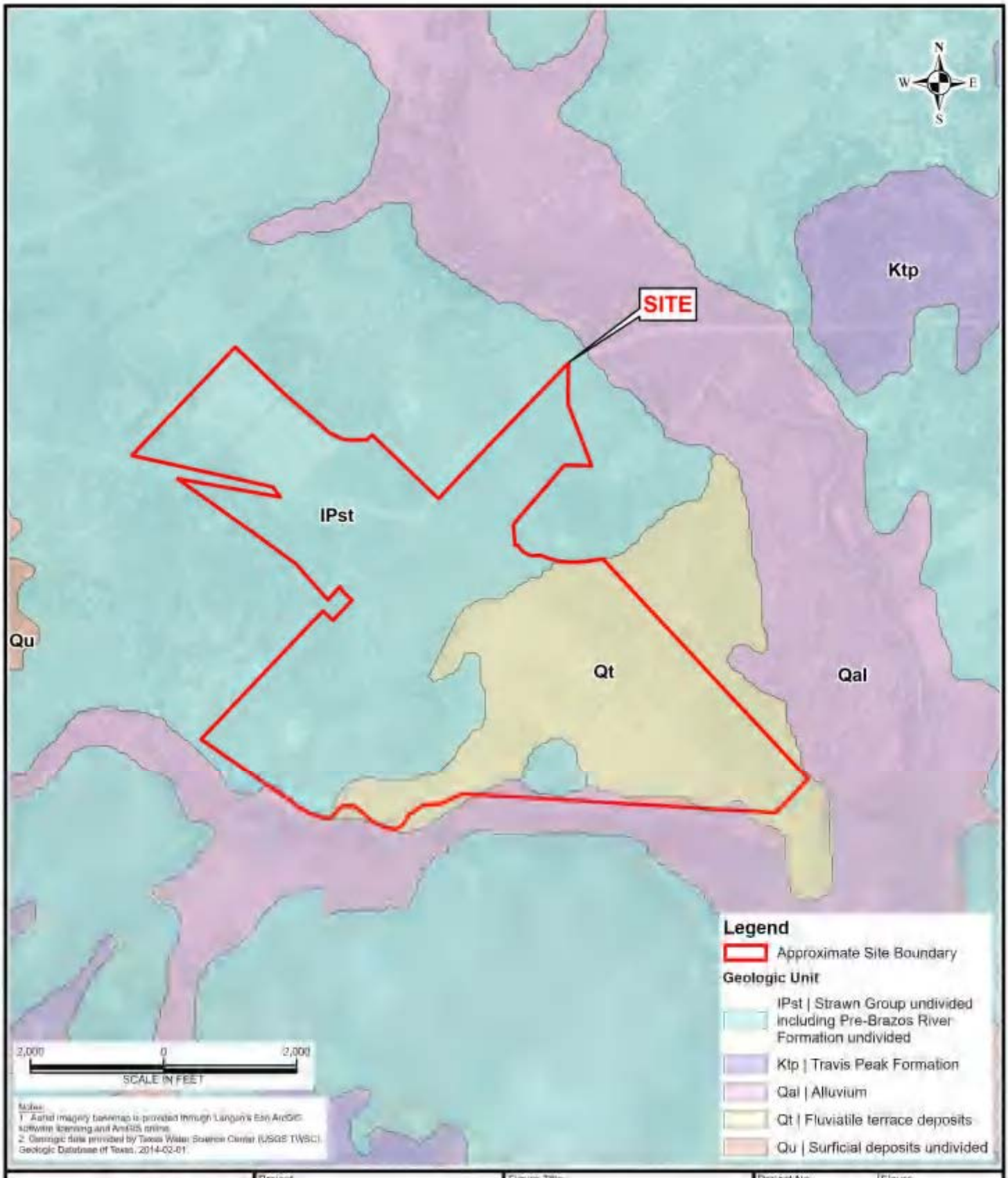

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Project

CHISME SOLAR STORAGE

BROWN & MILLS COUNTY TEXAS

Figure Title

REGIONAL GEOLOGY MAP

Project No. 520102301	Figure 2A
Date 7/2/2025	
Scale 1"=2,000'	
Drawn By GS	

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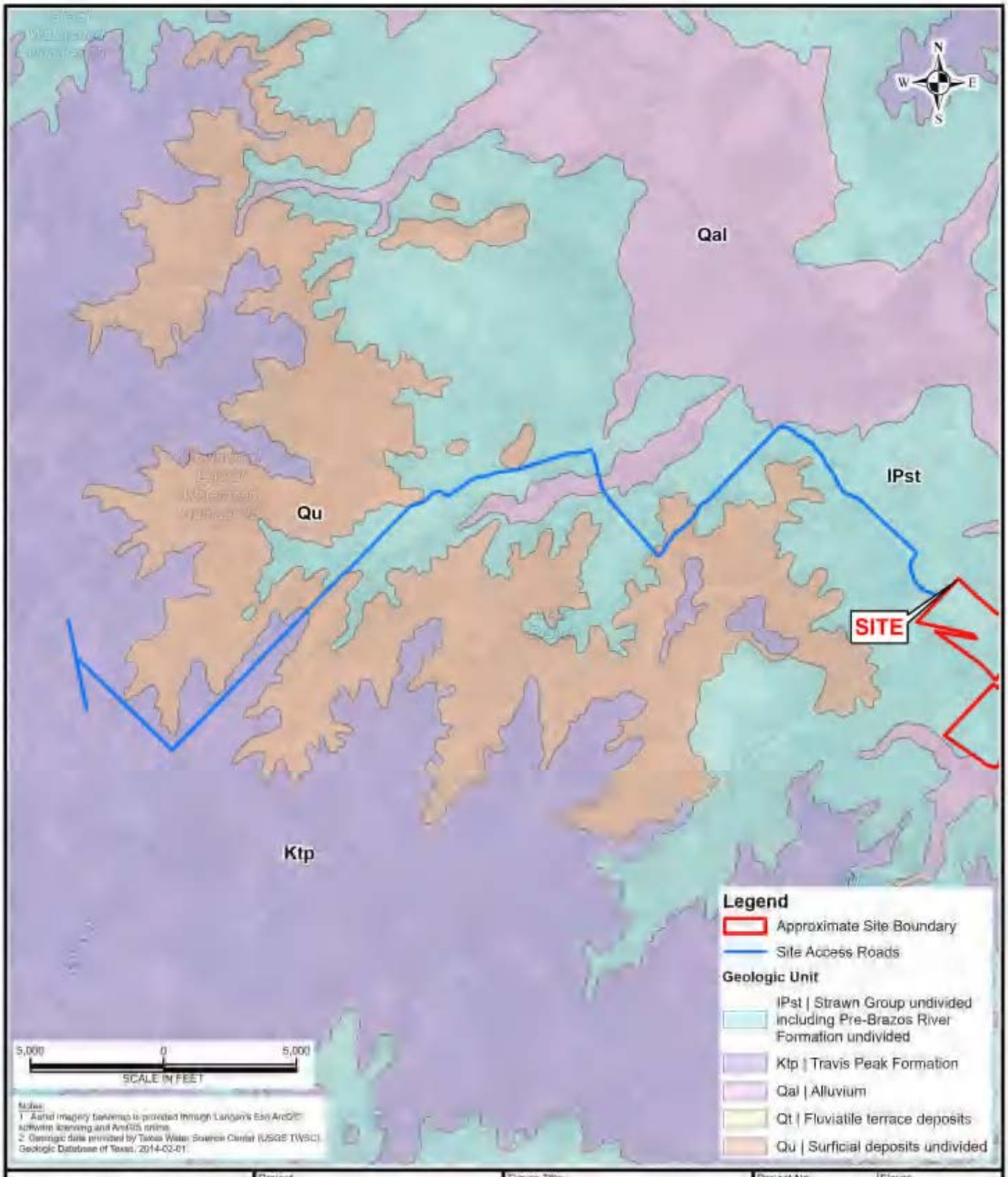
Path: \\langan.com\data\DAL\data3\520102301\Project Data\ArcGIS\APRX\520102301\520102301.aprx



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Project
CHISME SOLAR STORAGE
BROWN & MILLS COUNTY TEXAS

Figure Title
REGIONAL GEOLOGY MAP- ACCESS ROADS

Project No.	520102301
Date	7/2/2025
Scale	1"=5,000'
Drawn By	GS
Figure	2B

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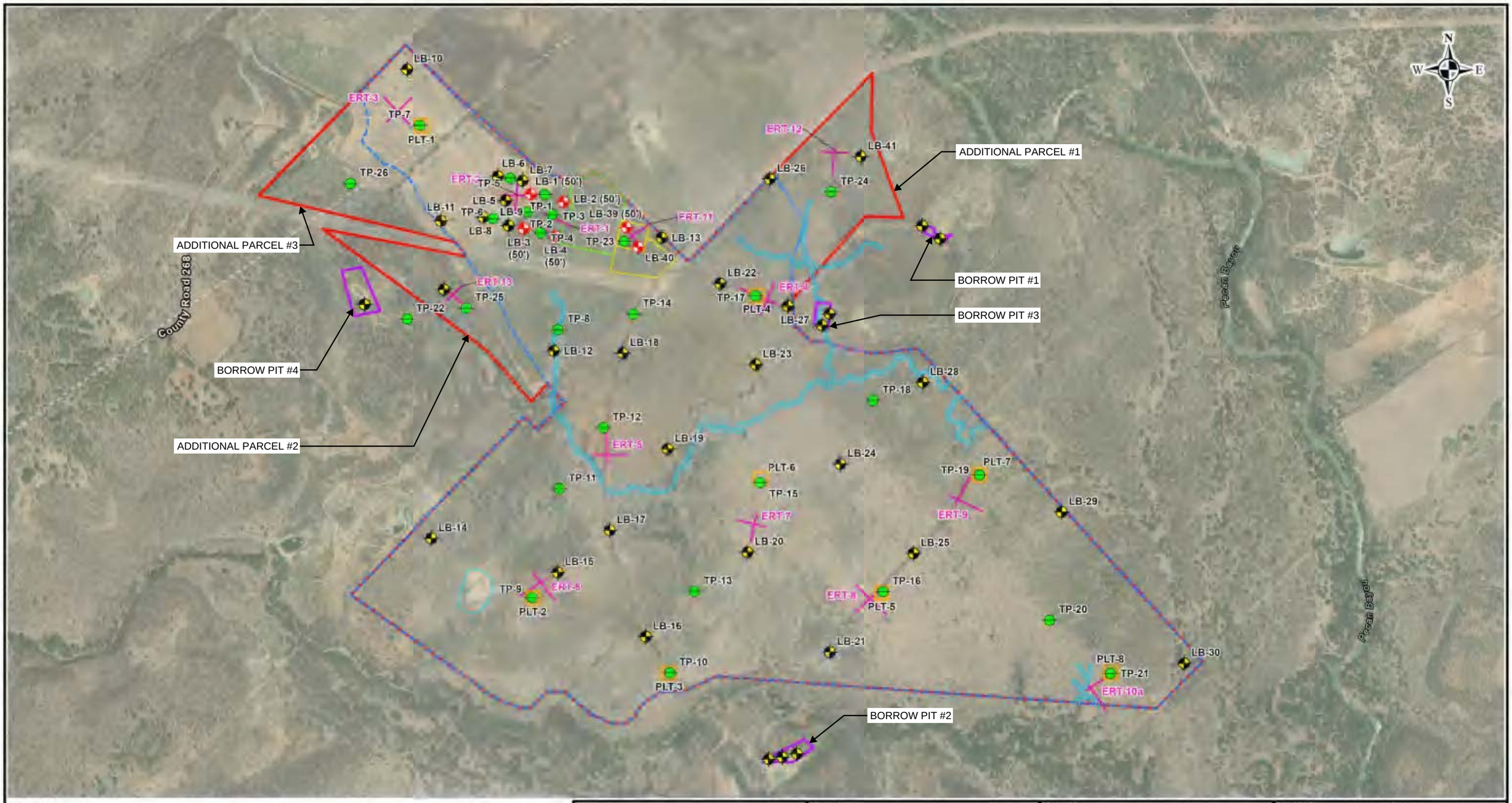

Legend

- Site Boundary
- Initial Lease Boundary
- Oncor Substation Footprint
- Proposed Substation and BESS Footprint
- Wetland Boundary
- ERT Line
- Boring Location - 20'
- Boring Location - 50'
- Pile Load Test
- Test Pit

Notes:
1. Aerial imagery provided through Langan's Esri ArcGIS software subscription and ArcGIS Online.
2. All features shown are approximate.

1,000 0 1,000
SCALE IN FEET

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Project: CHISME SOLAR STORAGE
BROWN & MILLS COUNTY TEXAS

Figure Title: SUBSURFACE INVESTIGATION PLAN

Project No.	Figure
520102301	3A
Date: 7/2/2025	
Scale: 1"=1,000'	
Drawn By: GS	

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Path: \\langan.com\data\DAL\data3\520102301\Project Data\ArcGIS\APRX\520102301\520102301.aprx

Legend

- Site Boundary
- Wetland Boundary
- ERT Line
- Boring Location - 20'
- Roadway Boring Location
- Pile Load Test
- Test Pit

Notes:
1. Aerial imagery provided through Langan's Esri ArcGIS software subscription and ArcGIS Online.
2. All features shown are approximate.

2,250 0 2,250
SCALE IN FEET

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Project
CHISME SOLAR STORAGE
BROWN & MILLS COUNTY, TEXAS

Figure Title
ROADWAY INVESTIGATION PLAN

Project No.	520102301
Date	6/2/2025
Scale	1"=2,250'
Drawn By	GS
Figure	3B

Path: \\langan.com\data\DAL\data3\520102301\Project Data\ArcGIS\APRX\520102301\520102301.aprx

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ATTACHMENT A-1

Site Boring Logs

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Log of Boring **LB-1** Sheet 1 of 2

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.5 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/11/2025 / Date Finished: 2/11/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 43.6 ft / Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 4, Undisturbed 9, Core 0
Casing Diameter (in): N/A / Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A, Completion ▼ N/A, 24 HR. ▼ N/A
Casing Hammer: N/A / Weight (lbs): N/A / Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1278.5	Dark brown CLAY, trace rootlets, trace fine gravel, some fine sand (moist) [CL]	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace rootlets, trace fine gravel, trace fine sand (moist) [CL]	UD-1	U	8			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace rootlets, trace fine gravel, trace calcareous nodules, trace fine sand (moist) [CL]	UD-2	U	12			qu = 4.50 tsf (PP)
	+1274.5	Reddish brown CLAY, some fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	UD-3	U	15			qu = 4.50 tsf (PP)
		Reddish brown CLAY, some fine sand, trace fine gravel, some calcareous nodules (moist) [CL]	UD-4	U	14			qu = 4.50 tsf (PP)
		Reddish brown CLAY, some fine sand, trace fine gravel, some calcareous nodules (moist) [CL]	UD-5	U	19			qu = 4.50 tsf (PP)
								Augered to 13.5 ft
		Reddish brown Sandy CLAY, trace calcareous nodules, trace fine to coarse gravel (moist) [CL]	S-1	SS	18	6 7 12	19	
								Augered to 18 ft
		Reddish brown CLAY, trace fine to coarse gravel, some fine sand (moist) [CL]	UD-6	U	14			qu = 4.50 tsf (PP)

Depth Scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

N-Value (Blows/ft) scale: 10 20 30 40

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Log of Boring **LB-1** Sheet 2 of 2

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1278.5 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1258.5		20						Augered to 23 ft
			21						
			22						
		Reddish brown CLAY, trace fine to coarse gravel, some fine sand, trace silt (moist) [CL]	23						qu = 4.50 tsf (PP)
			24	UD-7	U	6			
			25						Augered to 28.5 ft
			26						
			27						
			28						
		Reddish brown CLAY, some fine sand, trace fine gravel (moist) [CL]	29	S-2	SS	18	9 14 17	31	
			30						Augered to 33 ft
			31						
			32						
		Reddish brown CLAY, some fine sand, trace silt (moist) [CL]	33						qu = 4.50 tsf (PP)
			34	UD-8	U	20			
			35						Augered to 38 ft
			36						
			37						
		Reddish brown Sandy CLAY, trace silt, trace calcareous nodules (moist) [CL]	38						qu = 4.50 tsf (PP)
			39	UD-9	U	19			
			40						Augered to 43.5 ft
			41						
			42						
			43						
	+1235.0								
	+1234.9	Light tan WEATHERED SANDSTONE [WEATHERED ROCK]	44	S-3	SS	1	50/1"	50/1"	SPT refusal at 43.6ft. Boring backfilled with soil cuttings.
		End of Boring at 43.6ft.	45						

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Log of Boring **LB-2** Sheet 1 of 2

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/12/2025 — Date Finished: 2/12/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 42.9 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5, Undisturbed 8, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1278.0	Dark brown CLAY, trace rootlets, some fine sand (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace rootlets, trace fine sand (moist) [CL]	1	UD-1	U	9			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace rootlets, trace fine sand, trace calcareous nodules (moist) [CL]	2						
			3	UD-2	U	14			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace calcareous nodules (moist) [CL]	4						
			5	UD-3	U	12			qu = 4.50 tsf (PP)
	+1271.2	Dark brown CLAY, trace fine sand, trace calcareous nodules (moist) [CL]	6	UD-4A					
		Reddish brown CLAY, some fine sand, some calcareous nodules (moist) [CL]	7	UD-4B	U	19			qu = 4.50 tsf (PP)
		Reddish brown CLAY, some fine sand, some calcareous nodules (moist) [CL]	8						
			9	UD-5	U	10			
			10						Augered to 13 ft
			11						
			12						
		Reddish brown CLAY, some fine sand, trace calcareous nodules (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	14			
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	19	S-1	SS	15	10 14 15	29	
			20						

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Log of Boring **LB-2** Sheet 2 of 2

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1278.0 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1258.0		20						Augered to 23 ft
			21						
			22						
		Reddish brown CLAY, trace fine sand, trace fine gravel (moist) [CL]	23						qu = 4.50 tsf (PP)
			24	UD-7	U	17			
			25						Augered to 28 ft
			26						
			27						
		Reddish brown CLAY, trace fine sand, trace fine gravel (moist) [CL]	28						qu = 3.50 tsf (PP)
			29	UD-8	U	12			
			30						Augered to 33.5 ft
			31						
			32						
			33						
	+1244.5	Gray to orangish brown SHALE, trace fine sand (moist) [WEATHERED ROCK]	34	S-2	SS	9	25 50/5"	50/5"	Augered to 38.5 ft
			35						
			36						
			37						
			38						
		Gray to brown SHALE, trace fine sand (moist) [WEATHERED ROCK]	39	S-3	SS	9	46 50/3"	50/3"	Augered to 42.5 ft
			40						
			41						
			42						
	+1235.1	Gray to orangish brown SHALE, trace fine sand (moist) [WEATHERED ROCK]	43	S-4	SS	5	50/5"	50/5"	Encountered auger refusal. Boring backfilled with soil cuttings.
		End of Boring at 42.9ft.	44						
			45						

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Log of Boring **LB-3** Sheet 1 of 3

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1276.5 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/11/2025 — Date Finished: 2/11/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 48.9 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 8, Undisturbed 6, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1276.5	Grayish brown CLAY, some rootlets (moist) [CL]	0	G-1	HA	18			Precleared using 3-in OD hand auger to 18 inches.
		Brown CLAY, trace fine sand, trace rootlets (moist) [CL]	1	UD-1	U	4			qu = 1.00 tsf (PP)
		Dark brown CLAY, trace fine sand, trace fine to coarse gravel (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	16			
		Dark brown to light brown CLAY, trace fine sand, trace fine to coarse gravel (moist) [CL]	4						qu = 4.50 tsf (PP)
	+1270.5		5	UD-3	U	11			
		Orangish brown CLAY, trace fine sand, trace fine to coarse gravel, trace calcareous nodules (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	21			
		Orangish brown CLAY, trace fine sand, trace fine to coarse gravel, trace calcareous nodules (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	16			
			10						Augered to 13 ft
			11						
			12						
		Reddish brown CLAY, some fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	10			
			15						Augered to 18.5 ft
			16						
			17						
			18						
	+1258.0		19	S-1	SS	18	8 11 10	21	
		Reddish brown to light reddish brown Silty SAND (moist) [SM]	20						

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Log of Boring **LB-3** Sheet 2 of 3

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1276.5 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1256.5		20						Augered to 23.5 ft
			21						
			22						
			23						
		Reddish brown to light reddish brown Silty SAND (moist) [SM]	24	S-2	SS	18	18 23 30	53	
			25						Augered to 28.5 ft
			26						
			27						
			28						Encountered rock seam
	+1248.0	Dark reddish brown Clayey SAND, some fine gravel, trace calcareous nodules (moist) [SC]	29	S-3	SS	12	13 18 36	54	
			30						Augered to 33.5 ft
			31						
			32						
			33						
		Reddish brown to tan Clayey SAND, trace silt (moist) [SC]	34	S-4	SS	13	12 14 18	32	Pockets of clay found in spoon
			35						Augered to 38.5 ft
			36						
			37						
			38						
		Brown to light tan Clayey fine to coarse SAND, some fine angular gravel (moist) [SC]	39	S-5	SS	12	19 25 18	43	
			40						Augered to 43.5 ft
			41						
			42						
			43						
	+1233.0	Dark gray SHALE, trace silt, trace sand (moist) [WEATHERED ROCK]	44	S-6	SS	8	36 50/3"	50/3"	
			45						Augered to 48.5 ft

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Log of Boring **LB-3** Sheet 3 of 3

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1276.5 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1231.5		45 46 47 48						
	+1227.6	Gray to tan SHALE, silt lenses (moist) [WEATHERED ROCK]	49	S-7	SS	5	50/5"	50/5"	Boring backfilled with soil cuttings.
		End of Boring at 48.9ft.	50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70						

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Log of Boring **LB-4** Sheet 1 of 2

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1276.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/12/2025 — Date Finished: 2/12/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 37.5 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5 — Undisturbed 6 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1276.0	Grayish brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	1	UD-1	U	10			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	13			
		Dark brown CLAY, trace fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	4						qu = 4.50 tsf (PP)
	+1270.0		5	UD-3	U	16			
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	16			
		Reddish brown CLAY, some fine sand, some calcareous nodules, trace fine gravel (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	12			
			10						Augered to 13 ft
			11						
			12						
	+1263.0		13						qu = 4.50 tsf (PP)
		Reddish brown CLAY, trace fine sand, some calcareous nodules, trace fine gravel (moist) [CL]	14	UD-6	U	14			
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace fine gravel, trace silt (moist) [CL]	19	S-1	SS	18	8 10 14	24	
			20						

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-4** Sheet 2 of 2

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1276.0 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1256.0		20					10 20 30 40	Augered to 23.5 ft
		Reddish brown CLAY, some fine sand, trace silt (moist) [CL]	21						
			22						
			23						
			24	S-2	SS	18	7 14 16	30	
			25						Augered to 28.5 ft
			26						
			27						
			28						
		Reddish brown CLAY, some fine sand, some calcareous nodules, trace fine gravel, trace silt (moist) [CL]	29	S-3	SS	15	10 16 28	44	
			30						Augered to 33.5 ft
			31						
			32						
			33						
	+1242.5								
		Reddish brown WEATHRED SANDSTONE, some fine to coarse gravel, trace silt, trace calcareous nodules (moist) [WEATHERED ROCK]	34	S-4	SS	9	45 50/3"	50/3"	
			35						Augered to 37.5 ft
			36						
			37						
	+1238.5								
		End of Boring at 37.5ft.	38						Auger refusal and borehole collapse at 37.5 ft. Boring terminated and backfilled with soil cuttings.
			39						
			40						
			41						
			42						
			43						
			44						
			45						

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Log of Boring **LB-5** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/11/2025 — Date Finished: 2/11/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1278.0	Brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace calcareous nodules, trace fine gravel (moist) [CL]	1	UD-1	U	14			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace calcareous nodules, trace fine gravel (moist) [CL]	2	UD-2	U	15			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace calcareous nodules, trace fine gravel, trace fine sand (moist) [CL]	4	UD-3	U	17			qu = 4.50 tsf (PP)
	+1272.0	Light brown CLAY, trace calcareous nodules, trace fine gravel, trace fine sand (moist) [CL]	6	UD-5	U	7			qu = 4.50 tsf (PP)
		Light brown CLAY, trace calcareous nodules, trace fine sand, trace fine to coarse gravel (moist) [CL]	8	UD-4	U	12			qu = 4.50 tsf (PP)
	+1264.5		10						Augered to 13.5 ft
		Reddish brown Silty SAND, some clay (moist) [SM]	14	S-1	SS	12	7 10 12	22	
			15						Augered to 18.5 ft
		Reddish brown Silty SAND, some clay (moist) [SM]	19	S-2	SS	12	9 12 15	27	
	+1258.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-6** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1280.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/11/2025 — Date Finished: 2/11/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ⧩ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1280.0	Dark brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace root, trace fine sand (moist) [CL]	1	UD-1	U	12			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace root, trace fine sand (moist) [CL]	2	UD-2	U	9			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace fine to coarse gravel, trace calcareous nodules (moist) [CL]	3	UD-3	U	16			qu = 4.50 tsf (PP)
		Brown CLAY, trace fine sand, trace fine to coarse gravel, trace calcareous nodules (moist) [CL]	4	UD-4	U	15			qu = 4.50 tsf (PP)
	+1272.0	Brown to reddish brown CLAY, some fine sand, trace fine to coarse gravel, trace calcareous nodules (moist) [CL]	5	UD-5	U	16			qu = 4.50 tsf (PP)
			6						Augered to 13.5 ft
	+1266.5	Reddish brown to light brown Clayey SAND, trace fine to coarse gravel, trace silt (moist) [SC]	7	S-1	SS	18	10 17 18	35	
			8						Augered to 18.5 ft
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19	S-2	SS	18	7 12 16	28	
	+1260.0	Reddish brown to light brown Clayey SAND, trace fine to coarse gravel, trace silt (moist) [SC]	20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-7** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1281.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/11/2025 — Date Finished: 2/11/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ⧩ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1281.0	Dark brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace fine sand, trace root (moist) [CL]	1	UD-1	U	8			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace fine gravel (moist) [CL]	2	UD-2	U	13			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	3	UD-3	U	18			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace fine gravel, some calcareous nodules (moist) [CL]	4	UD-4	U	17			qu = 4.50 tsf (PP)
	+1273.0	Reddish brown CLAY, some fine sand, trace calcareous nodules, trace silt (moist) [CL]	5	UD-5	U	14			qu = 4.50 tsf (PP)
			6						Augered to 13.5 ft
			7						
			8						
			9						
			10						
			11						
			12						
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace silt (moist) [CL]	13	S-1	SS	18	8 12 16	28	Augered to 18.5 ft
			14						
			15						
			16						
			17						
			18						
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace silt (moist) [CL]	19	S-2	SS	18	7 17 14	31	Boring backfilled with soil cuttings.
	+1261.0		20						

End of Boring at 20.0ft.

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Log of Boring **LB-8** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.5 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/18/2024 — Date Finished: 11/18/2024
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 19.5 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 7 — Undisturbed 0 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks
	+1278.5	Brown Silty fine SAND, trace fine gravel (moist) [SM]	0	G-1	GRAB				Precleared using 3 in OD hand auger to 24 inches.
	+1276.5	Reddish brown Sandy CLAY (moist) [CL]	1						
			2	S-1	SS	9	15 16 19	35	
		Reddish brown Sandy CLAY (moist) [CL]	3						Augered to 4 ft
			4	S-2	SS	7	19 23 24	47	
		Reddish brown SAND and CLAY (moist) [CL]	5						Augered to 6 ft
			6	S-3	SS	10	14 15 15	30	
		Reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	7						Augered to 8.5 ft
			8	S-4	SS	8	15 18 18	36	
	+1265.0		9						Augered to 13.5 ft
		Brown to white Gravelly fine to coarse SAND, some clay (dry) [SC]	10						
			11						
			12						
			13						
			14	S-5	SS	6	16 19 24	43	
			15						Augered to 18.5 ft
			16						Encountered rig chattering.
			17						
		Brown Clayey SAND, trace fine gravel (moist) [SC]	18						Encountered rig chattering and auger refusal.
	+1259.0		19	S-6	SS	15	6 8 14	22	Boring backfilled with soil cuttings.
		End of Boring at 19.5ft.	20						

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-9** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1277.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/11/2025 — Date Finished: 2/11/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1277.0	Brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	HA	6			Precleared using 3-in OD hand auger to 6 inches.
		Dark brown CLAY, some fine sand, trace rootlets (moist) [CL]	1	UD-1	U	14			qu = 4.50 tsf (PP)
		Dark brown CLAY, some fine sand, trace rootlets, trace calcareous nodules (moist) [CL]	2						
	+1273.0		3	UD-2	U	15			qu = 4.50 tsf (PP)
		Dark brown to reddish brown CLAY, some fine sand, trace calcareous nodules (moist) [CL]	4						
			5	UD-3	U	15			qu = 4.50 tsf (PP)
		Reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	6						
			7	UD-4	U	13			qu = 4.50 tsf (PP)
		Reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	8						
			9	UD-5	U	12			Augered to 13.5 ft
	+1263.5		10						
			11						
			12						
			13						
		Reddish brown Clayey SAND, trace fine to coarse gravel (moist) [SC]	14	S-1	SS	16	11 10 9	19	
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Light reddish brown Clayey SAND, trace silt, trace fine to coarse gravel (moist) [SC]	19	S-2	SS	18	9 12 15	27	
	+1257.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-10** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1284.5 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/18/2024 — Date Finished: 11/18/2024
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 2 — Undisturbed 5 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1284.5	Dark brown to black Sandy CLAY, with rootlets (moist) [CL]	0	G-1	GRAB				Precleared using 2 in OD hand auger to 26 inches.
		Black Sandy CLAY (moist) [CL]	1–3	UD-1	U	12			qu = 4.50 tsf (PP)
	+1280.4	Dark brown Sandy CLAY, calcareous nodules (moist) [CL]	4–5	UD-2	U	16			qu = 4.50 tsf (PP)
		Dark grayish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	6–7	UD-3	U	9			qu = 4.50 tsf (PP)
		Grayish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	8–9	UD-4	U	16			qu = 4.50 tsf (PP)
			10						Augered to 13 ft
		Reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	11–13	UD-5	U	14			qu = 4.50 tsf (PP)
			14–15						Augered to 18.5 ft
	+1266.0		16–18						
		Light reddish brown Clayey SAND (moist) [SC]	19	S-1	SS	11	25 28 29	57	Boring backfilled with soil cuttings.
	+1264.5		20						

End of Boring at 20.0ft.

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Log of Boring **LB-11** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1289.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/21/2024 — Date Finished: 11/21/2024
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 6 — Undisturbed 1 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1289.0	Dark brown Silty fine SAND (moist) [SM]	0						Precleared using 3 in OD hand auger to 48 inches.
			1	G-1	GRAB				
		Light brown Silty fine SAND, trace clay, trace fine gravel (moist) [SM]	2						
			3	G-2	GRAB				
	+1285.0	Dark brown to brown Sandy CLAY (moist) [CL]	4						Augered to 4.5 ft
			5	S-1	SS	8	11 18 20	38	
		Dark brown to brown Sandy CLAY (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-1	U	5			
	+1280.5	Dark brown to orangish brown Sandy CLAY (moist) [CL]	8						Augered to 8.5 ft
			9	S-2	SS	10	15 21 23	44	
			10						Augered to 13.5 ft
	+1275.5	Orangish brown Clayey SAND (moist) [SC]	11						
			12						
			13						
			14	S-3	SS	13	18 21 25	46	
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Orangish brown Clayey SAND, trace fine gravel (moist) [SC]	19	S-4	SS	13	11 13 14	27	
	+1269.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-12** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1272.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/18/2024 — Date Finished: 11/18/2024
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 1, Undisturbed 6, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A, Completion ▼ N/A, 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1272.0	Dark brown Sandy CLAY, with rootlets (moist) [CL]	0						Precleared using 3 in OD hand auger to 24 inches.
			1	G-1	GRAB				
		Dark grayish brown CLAY, some sand (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-1	U	13			
	+1268.0	Dark grayish brown CLAY, some sand (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-2	U	6			
		Orangish brown CLAY, some sand (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-3	U	7			
		Grayish brown to orangish brown CLAY, some sand (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-4	U	10			
			10						Augered to 13 ft
			11						
			12						
	+1259.0		13						qu = 4.50 tsf (PP)
		Brown Sandy CLAY (moist) [CL]	14	UD-5	U	15			
			15						Augered to 18 ft
			16						
			17						
		Brown Sandy CLAY, trace calcareous nodules (moist) [CL]	18						qu = 4.50 tsf (PP)
			19	UD-6	U	9			Boring backfilled with soil cuttings.
	+1252.0		20						

End of Boring at 20.0ft.

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Log of Boring **LB-13** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/12/2025 — Date Finished: 2/12/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 19.4 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 2 — Undisturbed 6 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ⧩ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1278.0	Dark brown CLAY, some fine sand, trace root (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace fine sand, trace root, trace fine gravel (moist) [CL]	1	UD-1	U	10			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace fine gravel (moist) [CL]	2						qu = 4.50 tsf (PP)
	+1274.0		3	UD-2	U	14			
		Reddish brown CLAY, some fine sand, trace fine gravel (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-3	U	12			
		Reddish brown CLAY, some fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	21			
		Reddish brown CLAY, some fine sand, trace fine gravel, trace calcareous nodules, trace silt (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	11			
			10						Augered to 13 ft
			11						
			12						
		Reddish brown CLAY, some fine sand, trace fine gravel (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	12			
			15						Augered to 18.5 ft
			16						
			17						
	+1260.0		18						
		Grayish brown to tan SHALE, trace sand, trace silt (moist) [CL]	18	S-1	SS	14	13 / 32 / 50/5"	50/5"	
	+1258.6		19						
		End of Boring at 19.4ft.	20						Boring backfilled with soil cuttings.

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Log of Boring **LB-14** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1308.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/10/2025 — Date Finished: 2/10/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 18.9 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 4, Undisturbed 3, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1308.0	Brown CLAY, some fine to coarse gravel, trace fine sand (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Brown to tan CLAY, some fine sand, trace rootlets (moist) [CL]	1	UD-1	U	11			
		Brown to tan CLAY, some fine sand, trace calcareous nodules, trace rootlets (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	15			
			4						Augered to 4 ft
			5						
	+1302.0	Grayish brown CLAY, some calcareous nodules, trace fine sand [CL]	6						qu = 4.50 tsf (PP)
			7	UD-3	U	11			
			8						Augered to 8.5 ft
	+1299.0	Gray to tan CLAY, trace fine sand, trace silt (moist) [CL]	9	S-4	SS	9	19 50/3"	50/3"	Augered to 13.5 ft
		.	10						
			11						
			12						Introduced water at 12 ft
		Gray to tan SHALE (moist) [WEATHERED ROCK]	13						
			14	S-5	SS	4	43 50/3"	50/3"	Augered to 18.5 ft
			15						
			16						
			17						
			18						
	+1289.1	Tan to reddish brown WEATHERED CLAYSTONE (moist) [WEATHERED ROCK]	19	S-3	SS	4	50/5"	50/5"	Boring backfilled with soil cuttings.
		End of Boring at 18.9ft.	20						

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Log of Boring **LB-15** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1279.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/14/2025 — Date Finished: 2/14/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 2 — Undisturbed 6 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1279.0								
		Brown CLAY, some fine sand, trace rootlets, trace fine to coarse gravel (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Brown CLAY, trace fine sand, some fine to coarse gravel (moist) [CL]	1	UD-1	U	9			qu = 4.50 tsf (PP)
	+1277.0	Grayish brown CLAY, some fine sand, some fine to coarse gravel (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	11			
		Grayish brown to reddish brown CLAY, some fine sand, some fine to coarse gravel (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-3	U	11			
		Grayish brown to reddish brown CLAY, some fine sand, some fine to coarse gravel (moist) [CL]	6						qu = 4.50 tsf (PP)
	+1271.0		7	UD-4	U	6			
		Grayish brown to reddish brown Gravelly CLAY, some fine sand (moist) [GC]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	5			
	+1265.5		10						Augered to 13.5 ft
			11						
			12						
			13						
		Grayish brown to tan SHALE, trace silt, trace fine sand (moist) [SHALE]	14	S-1	SS	8	7 10 16	26 •	
			15						Augered to 18 ft
			16						
			17						
		Gray to tan SHALE, some fine sand, trace silt (moist) [SHALE]	18						qu = 3.00 tsf (PP)
			19	UD-6	U	11			
	+1259.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-16** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1279.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/15/2024 — Date Finished: 11/15/2024
Drilling Equipment: Meyhew 200 Truck-Mounted Rig	Completion Depth: 19.4 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 8 — Undisturbed 0 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Santiago Arriaga
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1279.0	Brown to dark brown Silty fine SAND, trace fine gravel, with rootlets (moist) [SM]	0	G-1	GRAB				Precleared using 3 in OD hand auger to refusal at 9 inches.
	+1277.3	Brown to tan Silty fine SAND (moist) [SM]	1	S-1A	SS	14	13 11	22	Augered to 1 ft
		Light gray to tan Sandy CLAY (moist) [CL]	2	S-1B			11		
	+1275.0	Light grayish tan to brown CLAY and SAND (moist) [CL]	3	S-2	SS	9	7 9 15	24	Introduced water at 2.5 ft.
		Light grayish tan to brown WEATHERED SHALE (moist) [WEATHERED ROCK]	4	S-3	SS	15	24 19 27	46	
		Light grayish tan to brown WEATHERED SHALE (moist) [WEATHERED ROCK]	5						Augered to 6 ft
			6	S-4	SS	6	10 50/3"	50/3"	Encountered spoon bouncing refusal. Augered to 8.5 ft
		Light grayish tan to brown WEATHERED SHALE (moist) [WEATHERED ROCK]	7						
			8						Introduced water at 8.5 ft.
			9	S-5	SS	13	12 20 26	46	
			10						Augered to 13.5 ft
			11						
			12						
			13						
		Light grayish tan to brown WEATHERED SHALE (moist) [WEATHERED ROCK]	14	S-6	SS	13	27 38 36	74	
			15						
			16						
			17						
			18						
		Light grayish tan to brown WEATHERED SHALE (moist) [WEATHERED ROCK]	19	S-7	SS	7	15 50/4"	50/4"	
	+1259.6	End of Boring at 19.4ft.	20						Boring backfilled with soil cuttings.

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Log of Boring **LB-17** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1270.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/21/2024 — Date Finished: 11/21/2024
Drilling Equipment: Meyhew 200 Truck-Mounted Rig	Completion Depth: 13.6 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5 — Undisturbed 2 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Santiago Arriaga
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks
	+1270.0							(Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
		Dark brown to tan Fine SAND, some silt, trace fine gravel, trace clay (moist) [SM]	G-1	GRAB				Precleared using 3 in OD hand auger to refusal at 18 inches.
	+1268.5	Dark brown Sandy CLAY (moist) [CL]	S-1	SS	8	5 10 12	22	
		Dark brown Sandy CLAY (moist) [CL]	UD-1	U	7			qu = 4.50 tsf (PP)
		Dark brown Sandy CLAY (moist) [CL]	S-2	SS	8	9 12 18	30	
		Dark brown Sandy CLAY, calcareous nodules (moist) [CL]	UD-2	U	9			qu = 4.50 tsf (PP)
		Dark grayish brown Sandy CLAY, trace fine gravel, calcareous nodules (moist) [CL]	S-3	SS	11	13 19 23	42	
								Augered to 13.5 ft
								Encountered rig chattering. Introduced water.
	+1256.5		S-4	SS	5	41 50/1"	50/1"	
	+1256.4	Light brownish gray to light orangish brown SHALE (moist) [WEATHERED ROCK]						Encountered bouncing refusal at 13.6 ft. Boring terminated due to auger and SPT refusal. Boring backfilled with soil cuttings.
		End of Boring at 13.6ft.						

Depth Scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

N-Value (Blows/ft): 10 20 30 40

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Log of Boring **LB-18** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1277.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/15/2024 — Date Finished: 11/15/2024
Drilling Equipment: Meyhew 200 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Santiago Arriaga
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1277.0	Brown to dark brown Sandy CLAY, trace fine gravel (moist) [CL]	0	G-1	GRAB				Precleared using 3 in OD hand auger to refusal at 12 inches.
		Dark brown Sandy CLAY (moist) [CL]	1	S-1	SS	9	7 10 16	26	
		Dark brown Sandy CLAY, trace gravel (moist) [CL]	2						qu = 4.50 tsf (PP)
	+1272.5		3	UD-1	U	9			
		Brown Sandy CLAY (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-2	U	14			
		Reddish brown Sandy CLAY (moist) [CL]	6						qu = 4.50 tsf (PP)
	+1268.5		7	UD-3	U	11			
		Tan to brown Clayey SAND (moist) [SC]	8						
			9	S-2	SS	9	9 14 15	29	
	+1264.0		10						Augered to 13 ft
		Dark brown Sandy CLAY, some calcareous nodules (moist) [CL]	11						
			12						
			13						qu = 4.50 tsf (PP)
			14	UD-4	U	11			
			15						Augered to 18 ft
			16						
			17						
		Dark brown Sandy CLAY, trace calcareous nodules (moist) [CL]	18						qu = 4.50 tsf (PP)
	+1257.0		19	UD-5	U	8			Boring backfilled with soil cuttings.
		End of Boring at 20.0ft.	20						

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Log of Boring **LB-19** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1275.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/13/2025 — Date Finished: 2/13/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1275.0								
	+1274.0	Brown SAND, some silt, trace clay, trace rootlets (moist) [SM]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark reddish brown CLAY, some fine sand (moist) [CL]	1	UD-1	U	10			qu = 4.50 tsf (PP)
		Reddish brown CLAY, some fine sand, trace calcareous nodules (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	10			
		Reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	4						qu = 4.50 tsf (PP)
	+1269.0		5	UD-3	U	12			
		Reddish brown Silty fine SAND (moist) [SM]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	13			
		Reddish brown Silty fine SAND (moist) [SM]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	10			
			10						Augered to 13.5 ft
			11						
			12						
			13						
		Reddish brown Silty fine SAND (moist) [SM]	14	S-1	SS	9	12 15 16	31	
			15						Augered to 18.5 ft
			16						
			17						
			18						
	+1256.5		19	S-2	SS	15	12 13 13	26	
		Reddish brown Clayey SAND, trace fine gravel, trace silt (moist) [SC]	20						Boring backfilled with soil cuttings.
	+1255.0								

End of Boring at 20.0ft.

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-20** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1270.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/14/2025 — Date Finished: 2/14/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 2 — Undisturbed 6 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1270.0	Dark brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	1	UD-1	U	8			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	2						
			3	UD-2	U	11			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	4						
			5	UD-3	U	11			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace silt (moist) [CL]	6						
	+1262.0		7	UD-4	U	8			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace silt, trace fine gravel, calcareous seams (moist) [CL]	8						
			9	UD-5	U	15			qu = 4.50 tsf (PP)
			10						Drilled to 13 ft
			11						
			12						
		Brown CLAY, some fine sand, trace silt, trace fine gravel, trace root, calcareous nodules (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	17			
			15						Drilled to 18.5 ft
			16						
			17						
			18						
		Brown Sandy CLAY, trace silt, trace fine gravel, trace root (moist) [CL]	19	S-1	SS	13	11 9 13	22 •	Boring backfilled with soil cuttings.
	+1250.0		20						

End of Boring at 20.0ft.

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Log of Boring **LB-21** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1271.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/14/2024 — Date Finished: 11/14/2024
Drilling Equipment: Meyhew 200 Truck-Mounted Rig	Completion Depth: 19.2 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 8 — Undisturbed 0 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Santiago Arriaga
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks
	+1271.0	Brown to light gray CLAY, some fine sand (moist) [CL]	0	G-1	GRAB				Precleared using 3 in OD hand auger to refusal at 16 inches.
		Light brownish gray CLAY, some sand (dry) [CL]	1						Augered to 1.5 ft
	+1268.0		2	S-1	SS	8	10 15 19	34	
		Light orangish brown to light gray WEATHERED SHALE, some sand (moist) [WEATHERED ROCK]	3	S-2	SS	10	13 24 50	74	
		Light orangish brown to light gray WEATHERED SHALE, some sand (moist) [WEATHERED ROCK]	4	S-3	SS	13	22 34 48	82	
		Light orangish brown to light gray WEATHERED SHALE, some sand (moist) [WEATHERED ROCK]	5	S-4	SS	10	36 50 50/4"	50/4"	
			6						Augered to 8.5 ft
		Light orangish brown to light gray WEATHERED SHALE, some sand (moist) [WEATHERED ROCK]	7	S-5	SS	7	29 55/5"	55/5"	
			8						Augered to 13.5 ft
		Light orangish brown to light gray WEATHERED SHALE, some sand (moist) [WEATHERED ROCK]	9	S-6	SS	7	22 50/4"	50/4"	
			10						Augered to 18.5 ft
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
		Light orangish brown to light gray WEATHERED SHALE, some sand (moist) [WEATHERED ROCK]	19	S-7	SS	6	35 50/3"	50/3"	
	+1251.8	End of Boring at 19.2ft.	20						Boring backfilled with soil cuttings.

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Log of Boring **LB-22** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1276.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/19/2024 — Date Finished: 11/19/2024
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 19.9 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 4 — Undisturbed 3 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1276.0	Dark brown Fine SAND, some silt, trace clay, trace fine gravel (moist) [SM]	0	G-1	GRAB				Precleared using 3 in OD hand auger to refusal at 15 inches.
	+1274.0	Dark brown Sandy CLAY (moist) [CL]	1						Augered to 2 ft
			2	UD-1	U	6			Introduced water. qu = 4.50 tsf (PP)
	+1272.0	Orangish brown CLAY, some sand, trace calcareous nodules (moist) [CL]	3						
			4	UD-2	U	6			qu = 4.50 tsf (PP)
		Orangish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	5						
			6	UD-3	U	5			qu = 4.50 tsf (PP)
			7						
		Orangish brown to light gray Sandy CLAY, some coarse rounded gravel (moist) [CL]	8						Augered to 8.5 ft
			9	S-1	SS	12	19 26 29	55	
			10						Augered to 13.5 ft
			11						
			12						
			13						
	+1261.9	Orangish brown to light gray Sandy CLAY, some coarse rounded gravel (moist) [CL]	14	S-2A	SS	13	23 34 35	69	
		Orangish brown to gray WEATHERED CLAYSTONE (moist) [WEATHERED ROCK]	15	S-2B					Augered to 18.5 ft
			16						
			17						
			18						
		Orangish brown to gray WEATHERED CLAYSTONE (moist) [WEATHERED ROCK]	19	S-3	SS	12	27 43 50/4"	50/4"	
	+1256.1	End of Boring at 19.9ft.	20						Boring backfilled with soil cuttings.

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Log of Boring **LB-23** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1273.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/12/2025 — Date Finished: 2/12/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 5, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1273.0	Reddish brown Sandy CLAY, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Reddish brown Sandy CLAY, trace rootlets (moist) [CL]	1	UD-1	U	8			qu = 4.50 tsf (PP)
		Reddish brown Sandy CLAY (moist) [CL]	2	UD-2	U	12			qu = 4.50 tsf (PP)
		Reddish brown Calcareous CLAY, some fine sand, trace gravel (moist) [CL]	3	UD-3	U	12			qu = 4.50 tsf (PP)
		Reddish brown Calcareous CLAY, some fine sand (moist) [CL]	4	UD-4	U	11			qu = 4.50 tsf (PP)
		Reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	5	UD-5	U	9			Drilled to 13.5 ft
		Light reddish brown to white Sandy CLAY, some silt, some calcareous nodules (moist) [CL]	6	S-1	SS	9	10 18 21	39	Drilled to 18.5 ft
	+1254.5		7	S-2	SS	13	8 15 20	35	Boring backfilled with soil cuttings.
	+1253.0	Light reddish brown Silty SAND, some clay (moist) [SM]	8						
		End of Boring at 20.0ft.	9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LB-24** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1265.5 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/12/2025 — Date Finished: 2/12/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 1 — Undisturbed 7 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ⧩ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1265.5	Dark brown CLAY, some fine sand, trace rootlets (moist) [CH]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, some fine sand, trace rootlets (moist) [CH]	1	UD-1	U	10			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace rootlets, trace fine gravel (moist) [CH]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	14			
		Dark brown CLAY, trace fine sand, trace fine gravel (moist) [CH]	4						qu = 4.50 tsf (PP)
	+1259.5		5	UD-3	U	14			
		Dark brown CLAY, some fine sand, trace fine gravel (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	19			
		Brown CLAY, some fine sand, trace fine gravel (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	20			
			10						Augered to 13 ft
			11						
			12						
		Brown CLAY, some fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	16			
			15						Augered to 18 ft
			16						
			17						
		Tan CLAY, trace calcareous nodules, trace fine sand, trace fine gravel (moist) [CL]	18						qu = 4.50 tsf (PP)
			19	UD-7	U	15			
	+1245.5		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-25** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1265.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/14/2024 — Date Finished: 11/14/2024
Drilling Equipment: Meyhew 200 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 6 — Undisturbed 1 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Santiago Arriaga
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks
	+1265.0							10 20 30 40	(Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
		Dark brown Silty fine SAND, trace clay, trace fine gravel (moist) [SM]	0	G-1	GRAB				Precleared using 3 in OD hand auger to refusal at 20 inches.
	+1263.0		1						Augered to 2 ft
		Reddish brown Sandy CLAY (dry) [CL]	2	S-1	SS	7	10 13 13	26	
		Grayish brown Sandy CLAY (dry) [CL]	3						Augered to 4 ft
	+1259.0		4	S-2	SS	14	8 10 11	21	
		Brown CLAY, some sand (dry) [CL]	5						Augered to 6 ft
			6	S-3	SS	9	7 12 10	22	
		Brown CLAY, trace fine sand, trace calcareous nodules (dry) [CL]	7						Augered to 8 ft
			8						
			9	UD-1	U	21			
			10						Augered to 13.5 ft
			11						
			12						
		Brown to light tan CLAY, trace sand (dry) [CL]	13						
			14	S-4	SS	7	7 17 12	29	
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Brown CLAY, trace sand (dry) [CL]	19	S-5	SS	10	10 22 17	39	
	+1245.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-26** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1274.5 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/19/2024 — Date Finished: 11/19/2024
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5 — Undisturbed 2 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1274.5	Brown Sandy CLAY (moist) [CL]	0	G-1	GRAB				Precleared using 3 in OD hand auger to 24 inches.
		Dark brown Sandy CLAY, with rootlets (moist) [CL]	1						
	+1270.5	Orangish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	2	UD-1	U	8			qu = 4.50 tsf (PP)
		Orangish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	3						
		Orangish brown Sandy CLAY (moist) [CL]	4	UD-2	U	7			qu = 4.50 tsf (PP)
			5						Introduced water.
		Orangish brown to tan Sandy CLAY (moist) [CL]	6	S-1	SS	9	11 18 16	34	
			7						Augered to 8 ft
			8	S-2	SS	11	20 35 26	61	
			9						Augered to 13 ft
			10						
			11						
			12						
		Orangish brown fine Sandy CLAY, trace silt (moist) [CL]	13	S-3	SS	12	14 23 20	43	
			14						Augered to 18.5 ft
			15						
			16						
			17						
			18						
		Orangish brown fine Sandy CLAY, trace silt (moist) [CL]	19	S-4	SS	12	11 19 17	36	
	+1254.5		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

LANGAN

Log of Boring **LB-27** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1277.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 1/7/2025 — Date Finished: 1/7/2025
Drilling Equipment: Simco 2800 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5 — Undisturbed 2 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: David Calgua
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1277.0	Dark reddish brown Sandy CLAY (moist) [CL]	0	G-1	GRAB				Precleared using 3-in OD hand auger to 18 inches.
		Dark brown Sandy CLAY (moist) [CL]	1	S-1	SS	8	10 14 19	33	
			2						
		Dark reddish brown Sandy CLAY (moist) [CL]	3	S-2	SS	14	10 11 16	27	Augered to 3.5 ft
			4						
			5						Augered to 6 ft
		Dark reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	6	UD-1	U	7			qu = 4.50 tsf (PP)
		Dark reddish brown Sandy CLAY, trace calcareous nodules (moist) [CL]	7						
			8	UD-2	U	10			qu = 4.50 tsf (PP)
			9						
			10						Augered to 13.5 ft
			11						
			12						
	+1263.5		13						
		Light brown Clayey SAND, trace calcareous nodules, trace fine gravel (moist) [SC]	14	S-3	SS	12	28 49 55/6"	55/6"	
			15						Augered to 18.5 ft
			16						
			17						
	+1258.5		18						
		Dark brown Sandy CLAY (moist) [CL]	19	S-4	SS	13	14 18 24	42	Boring backfilled with soil cuttings.
	+1257.0		20						

End of Boring at 20.0ft.

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Log of Boring **LB-28** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1264.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/13/2025 / Date Finished: 2/13/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft / Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 1 / Undisturbed 7 / Core 0
Casing Diameter (in): N/A / Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A / Completion ▼ N/A / 24 HR. ▼ N/A
Casing Hammer: N/A / Weight (lbs): N/A / Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1264.0	Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace fine sand (moist) [CL]	1	UD-1	U	11			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand, trace calcareous nodules (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	12			
		Dark brown CLAY, trace fine sand, trace calcareous nodules (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-3	U	14			
		Dark brown CLAY, trace fine sand, trace calcareous nodules, trace silt (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	16			
		Brown CLAY, trace fine sand (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	16			
			10						Augered to 13 ft
			11						
			12						
		Brown CLAY, trace fine gravel, trace sand (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	20			
			15						Augered to 18 ft
			16						
			17						
		Brown CLAY, trace fine gravel, trace sand, trace calcareous nodules (moist) [CL]	18						qu = 4.50 tsf (PP)
			19	UD-7	U	20			
	+1244.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

LANGAN

Log of Boring **LB-29** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1263.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/12/2025 / Date Finished: 2/12/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft / Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 1 / Undisturbed 7 / Core 0
Casing Diameter (in): N/A / Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A / Completion ▼ N/A / 24 HR. ▼ N/A
Casing Hammer: N/A / Weight (lbs): N/A / Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1263.0	Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	1	UD-1	U	8			qu = 4.50 tsf (PP)
		Dark brown CLAY, trace fine sand (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	14			
		Dark brown CLAY, trace fine sand (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-3	U	19			
	+1257.0	Dark brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-4	U	15			
		Dark brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules, trace silt (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-5	U	15			
			10						Augered to 13 ft
			11						
			12						
		Brown CLAY, trace fine sand, trace silt (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-6	U	20			
			15						Augered to 18 ft
			16						
			17						
		Brown CLAY, trace fine sand, trace silt (moist) [CL]	18						qu = 4.50 tsf (PP)
			19	UD-7	U	20			
	+1243.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

LANGAN

Log of Boring **LB-30** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1258.0 (NAVD 88)
Drilling Company: Formulated Solutions, LLC	Date Started: 11/21/2024 — Date Finished: 11/21/2024
Drilling Equipment: Meyhew 200 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 7 — Undisturbed 1 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Santiago Arriaga
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Sydney Shanahan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description
	+1258.0	
		Dark brown Clayey fine SAND, trace fine gravel (moist) [SC]
	+1256.0	
		Dark brown CLAY, trace fine sand, trace fine gravel (moist) [CL]
		Grayish brown Sandy CLAY (dry) [CL]
		Grayish brown CLAY, trace fine sand (moist) [CL]
		Grayish brown CLAY, trace fine sand (moist) [CL]
		Grayish brown CLAY, trace fine sand (moist) [CL]
	+1244.5	
		Grayish brown CLAY, trace fine sand (moist) [CL]
		Grayish brown CLAY, trace fine sand (moist) [CL]
	+1238.0	

End of Boring at 20.0ft.

Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
0						Precleared using 3 in OD hand auger to refusal at 33 inches.
1	G-1	GRAB				
2	G-2	GRAB				Augered to 3 ft
3	S-1	SS	9	11 16 20	36	
4						Introduced water at 4.5 ft.
5	S-2	SS	11	11 19 29	48	
6						qu = 4.50 tsf (PP)
7	UD-1	U	19			
8						Augered to 8.5 ft
9	S-3	SS	6	7 10 11	21	
10						Augered to 13.5 ft
11						
12						
13						
14	S-4	SS	9	9 12 15	27	
15						Augered to 18.5 ft
16						
17						
18						
19	S-5	SS	11	7 12 15	27	
20						Boring backfilled with soil cuttings.

N-Value (Blows/ft) scale: 10 20 30 40

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-31** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1310.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/10/2025 — Date Finished: 2/10/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 19.2 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5 — Undisturbed 3 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1310.0								
	+1309.0	Brown CLAY, trace fine to coarse gravel, trace fine sand, trace rootlets (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 24 inches.
		Tan CLAY, trace fine sand, trace rootlets (moist) [CL]	1	G-2	HA	12			
		Grayish brown CLAY, trace fine to coarse sand, trace fine gravel, some calcareous nodules (moist) [CL]	2						qu = 4.00 tsf (PP)
			3	UD-1	U	10			
		Grayish brown CLAY, trace fine gravel, some calcareous nodules, trace silt, trace fine sand (moist) [CL]	4						qu = 4.50 tsf (PP)
	+1304.0		5	UD-2	U	14			
		Grayish brown to reddish brown CLAY, some silt, some calcareous nodules (moist) [CH]	6						qu = 4.50 tsf (PP)
			7	UD-3	U	12			Augered to 8.5 ft
			8						
		Grayish brown to reddish brown CLAY, some silt, some calcareous nodules, trace fine sand (moist) [CH]	9	S-1	SS	8	10 10 12	22	
			10						Augered to 13.5 ft
			11						
			12						
	+1296.5		13						
		Gray WEATHERED SHALE (moist) [WEATHERED ROCK]	14	S-2	SS	7	10 50/3"	50/3"	Augered to 18.5 ft
			15						
			16						
			17						
			18						
		Gray to tan WEATHERED SHALE, silt lenses (moist) [WEATHERED ROCK]	19	S-3	SS	9	15 50/3"	50/3"	
	+1290.8	End of Boring at 19.2ft.	20						Boring backfilled with soil cuttings.

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-32** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1305.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/10/2025 — Date Finished: 2/10/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 18.7 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 4, Undisturbed 3, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1305.0	Grayish brown CLAY, some fine to coarse gravel, trace rootlets (moist) [CL]	0						Precleared using 3-in OD hand auger to 24 inches.
	+1303.0	Grayish brown to reddish brown CLAY, trace silt (moist) [CH]	1	G-1	HA	24			qu = 4.50 tsf (PP)
			2						
			3	UD-1	U	12			qu = 4.50 tsf (PP)
		Grayish brown to reddish brown CLAY, trace fine sand, trace silt (moist) [CL]	4						
			5	UD-2	U	9			qu = 4.50 tsf (PP)
		Grayish brown to reddish brown CLAY, trace silt (moist) [CL]	6						
			7	UD-3	U	9			Augered to 8.5 ft
			8						
		Grayish brown to reddish brown CLAY, trace silt, trace calcareous nodules (moist) [CL]	9	S-1	SS	9	12 20 27	47	
			10						Augered to 13.5 ft
			11						
			12						
	+1291.5		13						
		Light gray SAND, trace silt (moist) [WEATHERED ROCK]	14	S-2	SS	1	50/1"	50/1"	Augered to 18.5 ft
			15						
			16						
			17						
			18						
	+1286.3	Light gray SAND, trace silt (moist) [WEATHERED ROCK]	19	S-3	SS	1	50/2"	50/2"	Boring backfilled with soil cuttings.
		End of Boring at 18.7ft.	20						

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Log of Boring **LB-33** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1266.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/10/2025 — Date Finished: 2/10/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 18.6 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 3, Undisturbed 4, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1266.0	Brown CLAY, some fine sand, trace rootlets (moist) [CL]	0						Precleared using 3-in OD hand auger to 24 inches.
			1	G-1	HA	24			
		Dark brown CLAY, trace rootlets, trace fine sand (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-1	U	18			
		Dark brown CLAY, some fine sand, trace coarse to fine gravel (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-2	U	17			
		Dark brown CLAY, some fine sand, trace coarse to fine gravel (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-3	U	12			
	+1258.0	Reddish brown CLAY, some fine sand, trace silt (moist) [CL]	8						qu = 4.50 tsf (PP)
			9	UD-4	U	13			
			10						Augered to 13.5 ft
			11						
			12						
			13						
		Gray to reddish brown CLAY, some fine sand, trace silt, trace fine to coarse gravel (moist) [CL]	14	S-1	SS	18	20 21 20	41	
			15						Augered to 18.5 ft
			16						
			17						
			18						
	+1247.4	Reddish brown CLAY, some fine sand, some fine to coarse gravel (moist) [CL]	19	S-2	SS	1	50/1"	50/1"	Boring backfilled with soil cuttings.
		End of Boring at 18.6ft.	20						

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-34** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1266.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/10/2025 — Date Finished: 2/10/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5, Undisturbed 2, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1266.0	Brown Sandy CLAY, trace rootlets (moist) [CL]	0	G-1	HA	24			Precleared using 3-in OD hand auger to 24 inches.
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace rootlets (moist) [CL]	1						qu = 4.50 tsf (PP)
	+1262.0		2	UD-1	U	20			
		Reddish brown CLAY, trace fine sand, trace fine gravel, some calcareous nodules (moist) [CL]	3						qu = 4.50 tsf (PP)
			4	UD-2	U	15			
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	5						
			6	S-1	SS	14	5 7 9	16	
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	7						Augered to 8.5 ft
			8						
			9	S-2	SS	10	4 9 12	21	
			10						Augered to 13.5 ft
			11						
			12						
		Reddish brown to tan CLAY, trace fine to medium sand, some fine to coarse gravel, trace calcareous nodules (moist) [CL]	13						
			14	S-3	SS	12	12 18 20	38	
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Reddish brown to tan CLAY, trace fine to medium sand, trace calcareous nodules (moist) [CL]	19	S-4	SS	15	20 35 41	76	
	+1246.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-35** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1272.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/14/2025 — Date Finished: 2/14/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5, Undisturbed 3, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1272.0	Grayish brown to tan Sandy CLAY, trace fine gravel (moist) [CL]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Brown CLAY, some fine sand, trace fine gravel (moist) [CL]	1	UD-1	U	8			qu = 4.50 tsf (PP)
		Brown CLAY, some fine sand, trace fine to coarse gravel, trace calcareous nodules (moist) [CL]	2						
			3	UD-2	U	11			qu = 4.50 tsf (PP)
			4						Shelby Tube stuck in ground; Drilled to 4.5 ft
		Light brown CLAY, some fine sand, trace silt, trace calcareous nodules (moist) [CL]	5	S-1	SS	11	13 11 14	25	
			6						Augered to 6.5 ft
		Light brown CLAY, some fine to medium sand, trace silt, trace calcareous nodules (moist) [CL]	7	S-2	SS	14	16 14 15	29	
	+1263.5		8						Augered to 8.5 ft
		Orangish brown to tan Clayey fine to coarse SAND, some gravel (moist) [SC]	9	S-3	SS	8	10 14 19	33	
			10						Augered to 13 ft
	+1259.0		11						
		Tan Gravelly CLAY, some fine to medium sand (moist) [CL]	12						
			13						qu = 3.50 tsf (PP)
			14	UD-3	U	14			
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Reddish brown to gray Calcareous CLAY, some fine to medium sand, some fine to coarse gravel (moist) [CL]	19	S-4	SS	14	13 17 24	41	
	+1252.0		20						Boring backfilled with soil cuttings.

End of Boring at 20.0ft.

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Log of Boring **LB-36** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1271.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/14/2025 — Date Finished: 2/14/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 20.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 5, Undisturbed 3, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1271.0	Grayish brown Clayey SAND (moist) [SC]	0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
		Light brown Clayey SAND (moist) [SC]	1	UD-1	U	12			
	+1269.0	Light brown Sandy CLAY, trace fine to coarse gravel (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-2	U	14			
		Light brown Gravelly fine to coarse SAND, some clay (moist) [SC]	4						
			5	UD-3	U	12			
	+1264.5		6						Augered to 6.5 ft
		Light brown to reddish brown Sandy CLAY, trace fine gravel (moist) [CL]	7	S-1	SS	7	9 12 14	26	
			8						Augered to 8.5 ft
		Gray to tan CLAY, trace fine gravel, trace fine sand (moist) [CL]	9	S-2	SS	11	13 11 14	25	
			10						Augered to 13.5 ft
	+1257.5		11						
			12						
			13						
		Grayish brown WEATHERED SHALE, trace silt, trace fine sand (moist) [WEATHERED ROCK]	14	S-3	SS	14	11 20 26	46	
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Grayish brown WEATHERED SHALE, trace silt, trace fine sand (moist) [WEATHERED ROCK]	19	S-4	SS	13	22 32 41	73	Boring backfilled with soil cuttings
	+1251.0		20						

End of Boring at 20.0ft.

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Log of Boring **LB-37** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1276.0 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/14/2025 — Date Finished: 2/14/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 19.3 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 7, Undisturbed 1, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description
	+1276.0	
	+1275.0	Reddish brown Clayey SAND, trace fine gravel, trace rootlets (moist) [SC]
		Reddish brown SAND, some fine to coarse gravel (moist) [SP]
		Reddish brown to tan SAND, some fine to coarse gravel (moist) [SP]
	+1271.5	
		Grayish brown to tan CLAY, trace silt, trace fine to medium sand (moist) [CL]
		Grayish brown to tan CLAY, trace silt, trace fine sand (moist) [CL]
		Grayish brown to tan CLAY, trace silt, trace fine sand (moist) [CL]
	+1262.5	
		Tan SHALE, trace silt (moist) [WEATHERED ROCK]
		Gray SHALE, trace silt (moist) [WEATHERED ROCK]
	+1256.7	
		End of Boring at 19.3ft.

Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
0	G-1	HA	12			Precleared using 3-in OD hand auger to 12 inches.
1	UD-1	U	6			qu = 4.50 tsf (PP)
2						Augered to 2.5 ft
3	S-1	SS	10	14 16 20	36	
4						Augered to 4.5 ft
5	S-2	SS	8	7 6 15	21	
6						Augered to 6.5 ft
7	S-3	SS	10	10 12 16	28	
8						Augered to 8.5 ft
9	S-4	SS	9	12 16 21	37	
10						Augered to 13.5 ft
11						
12						
13						
14	S-5	SS	11	16 31 37	68	
15						Augered to 18.5 ft
16						
17						
18						
19	S-6	SS	10	43 50/4"	50/4"	
20						Boring backfilled with soil cuttings.

N-Value (Blows/ft) scale: 10 20 30 40

Template: Log-BH; Strip: BH-GEO; Printed on 07/01/2025

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Log of Boring **LB-38** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1315.5 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 2/10/2025 — Date Finished: 2/10/2025
Drilling Equipment: Mobile B58 Truck-Mounted Rig	Completion Depth: 18.9 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Solid Stem Auger with Rock Bit	Number of Samples: Disturbed 4 — Undisturbed 3 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, Shelby Tube	Field Engineer: Ashish Govindan
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1315.5	Grayish brown Sandy CLAY (moist) [CL]	0						Precleared using 3-in OD hand auger to 24 inches.
			1	G-1	HA	24			
		Gray to orangish tan fine Sandy CLAY, trace fine to coarse gravel (moist) [CL]	2						
			3	S-1	SS	14	3 6 3	9	
	+1311.5								Augered to 4 ft
		Gray to orangish tan Sandy CLAY, some fine sand (moist) [CL]	4						
			5	UD-1	U	18			
		Gray to orangish tan CLAY, some fine to coarse sand (moist) [CL]	6						
			7	UD-2	U	16			
		Gray to orangish tan CLAY, trace fine sand (moist) [CL]	8						
			9	UD-3	U	15			
			10						Augered to 13.5 ft; Gravelly layer encountered at 10 ft. Switched to rock bit
			11						
			12						
			13						
	+1301.6	Grayish brown to tan CLAY, trace fine sand, trace silt (moist) [CL]	14	S-2	SS	11	15 50/5"	50/5"	Drilled to 18.5 ft
		.	15						
			16						
			17						
			18						
	+1296.6	Grayish brown WEATHERED SHALE (moist) [WEATHERED ROCK]	19	S-3	SS	12	50/5"	50/5"	Weathered claystone; Boring backfilled with soil cuttings.
		End of Boring at 18.9ft.	20						

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Log of Boring **LB-39** Sheet 1 of 3

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.1 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 5/8/2025 — Date Finished: 5/8/2025
Drilling Equipment: CME 55 Truck-Mounted Rig	Completion Depth: 50.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Flight Auger	Number of Samples: Disturbed 10, Undisturbed 3, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A, Completion ▼ N/A, 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, 3" Shelby Tube, 3" OD TX CPT	Field Engineer: Sharen Wallace
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1278.1	Dark brown CLAY, some fine sand, with rootlets (moist) [CH]	0						Pre-cleared using 3" OD hand auger to 24"
			1	G-1	GRAB				
		Dark brown CLAY, some fine sand, trace fine gravel, calcareous nodules, with rootlets (moist) [CH]	2						qu = 4.50 tsf (PP)
			3	UD-1	U	8			
		Dark brown CLAY, some fine sand, trace fine gravel, calcareous nodules, rootlets (moist) [CH]	4						qu = 4.50 tsf (PP)
	+1272.1		5	UD-2	U	8			
		Light brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-3	U	6			
		Light brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	8						
			9	S-1	SS	11	12 17 25	42	Augered to 13.5 ft
	+1264.6		10						
		Olive to tan SHALE, fine sand lenses (moist) [WEATHERED ROCK]	11						
			12						
			13						
			14	S-2	SS	15	19 36 49	85	
			15						Augered to 18.5 ft
			16						
			17						
			18						
		Olive to tan SHALE, fine sand lenses (moist) [WEATHERED ROCK]	19	S-3	SS	13	48 50/4"	50/4"	Augered to 23.5 ft. Switched to TCPs
			20						

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Log of Boring **LB-39** Sheet 2 of 3

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1278.1 (NAVD 88)

Material Symbol	Elev. (ft) +1258.1	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
		Olive SHALE (moist) [WEATHERED ROCK]	24	G-2	GRAB				Collected grab sample from auger cuttings. Olive return. 11/6in-50/3in-50/2in
			25						Driller introduced water into hole. Augered to 28.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	29	G-3	GRAB				Collected grab sample from auger cuttings. Olive return. 5/6in-33/6in-50/3in Augered to 33.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	34	G-4	GRAB				Collected grab sample from auger cuttings. Olive return. 12/3in-50/2in-50/1in Augered to 38.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	39	G-5	GRAB				Collected grab sample from auger cuttings. Olive return. 5/6in-50/5.5in-50/0.5in Augered to 43.5 ft
		Gray SHALE (moist) [WEATHERED ROCK]	44	G-6	GRAB				Collected grab sample from auger cuttings. Gray return. 12/6in-50/2in-50/1in

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Log of Boring **LB-39**

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1278.1 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1233.1		45						Augered to 48.5 ft
			46						
			47						
			48						
		Gray SHALE (moist) [WEATHERED ROCK]	49	G-7	GRAB				Collected grab sample from auger cuttings. Gray return. 12/6in-14/6in-50/4in
	+1228.1		50						Boring backfilled to grade with soil cuttings.
		End of Boring at 50.0ft.	51						
			52						
			53						
			54						
			55						
			56						
			57						
			58						
			59						
			60						
			61						
			62						
			63						
			64						
			65						
			66						
			67						
			68						
			69						
			70						

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Log of Boring **LB-40** Sheet 1 of 3

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1278.5 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 5/8/2025 — Date Finished: 5/8/2025
Drilling Equipment: CME 55 Truck-Mounted Rig	Completion Depth: 50.0 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Flight Auger	Number of Samples: Disturbed 10, Undisturbed 3, Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A, Completion ▼ N/A, 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, 3" Shelby Tube, 3" OD TX CPT	Field Engineer: Sharen Wallace
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1278.5	Dark brown CLAY, some fine sand, trace fine gravel, with rootlets (moist) [CL]	0						Pre-cleared using 3" OD hand auger to 24"
			1	G-1	GRAB				
		Dark brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	2						qu = 4.50 tsf (PP)
			3	UD-1	U	7			
		Dark brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	4						qu = 4.50 tsf (PP)
			5	UD-2	U	7			
		Tan to olive CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	6						qu = 4.50 tsf (PP)
			7	UD-3	U	7			
		Tan to olive CLAY, trace fine sand, calcareous nodules (moist) [CL]	8						
			9	S-1	SS	12	11 17 24	41	Augered to 13.5 ft
			10						
			11						
			12						
			13						
		Olive CLAY, some fine sand, trace fine gravel (moist) [CL]	14	S-2	SS	12	8 22 25	47	
			15						Augered to 18.5 ft
			16						
			17						
			18						
	+1260.0	Tan to olive SHALE, some fine sand, trace fine gravel (moist) [WEATHERED ROCK]	19	S-3	SS	18	17 45 30	75	Augered to 23.5 ft. Switched to TCPs
			20						

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Log of Boring **LB-40**

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1278.5 (NAVD 88)

Material Symbol	Elev. (ft) +1258.5	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
		Olive SHALE (moist) [WEATHERED ROCK]	24	G-2	GRAB				Collected grab sample from auger cuttings. Olive return. 12/6in-50/4in-50/1in
			25						Augered to 28.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	29	G-3	GRAB				Collected grab sample from auger cuttings. Olive return. 12/5in-50/4in-50/1.5in
			30						Augered to 33.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	34	G-4	GRAB				Collected grab sample from auger cuttings. Olive return. 9/6in-50/4in-50/1in
			35						Augered to 38.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	39	G-5	GRAB				Collected grab sample from auger cuttings. Olive return. 7/6in-50/3in-50/0.5in
			40						Augered to 43.5 ft
		Olive SHALE (moist) [WEATHERED ROCK]	44	G-6	GRAB				Collected grab sample from auger cuttings. Olive return. 5/6in-50/5in-50/0.5in

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Log of Boring **LB-40**

Project	Project No.
Chisme Solar and Storage	520102301
Location	**Elevation and Datum**
8987 CR 268, Brown County, TX	Approx. el. 1278.5 (NAVD 88)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1233.5		45						Augered to 48.5 ft
			46						
			47						
			48						
		Gray SHALE (moist) [WEATHERED ROCK]	49	G-7	GRAB				Collected grab sample from auger cuttings. Gray return. 12/4in-50/2in-50/0.5in
	+1228.5		50						Boring backfilled to grade with soil cuttings.
		End of Boring at 50.0ft.	51						
			52						
			53						
			54						
			55						
			56						
			57						
			58						
			59						
			60						
			61						
			62						
			63						
			64						
			65						
			66						
			67						
			68						
			69						
			70						

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Log of Boring **LB-41** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1277.6 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 5/8/2025 / Date Finished: 5/8/2025
Drilling Equipment: CME 55 Truck-Mounted Rig	Completion Depth: 18.9 ft / Rock Depth: Not Encountered
Size and Type of Bit: 4" Flight Auger	Number of Samples: Disturbed 3, Undisturbed 4, Core 0
Casing Diameter (in): N/A / Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A, Completion ▼ N/A, 24 HR. ▼ N/A
Casing Hammer: N/A / Weight (lbs): N/A / Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon, 3" Shelby Tube	Field Engineer: Sharen Wallace
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1277.6	Dark brown Sandy CLAY, trace fine gravel, with rootlets (moist) [CL]	0	G-1	GRAB				Precleared using 3" OD hand auger to 12". Auger refusal at 12"
		Dark brown CLAY, some fine sand, trace fine gravel, calcareous nodules, with rootlets (moist) [CL]	1						qu = 4.50 tsf (PP)
			2	UD-1	U	12			
		Dark brown CLAY, some fine sand, trace fine to coarse gravel, with rootlets (moist) [CL]	3						qu = 4.50 tsf (PP)
			4	UD-2	U	10			
		Dark brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	5						qu = 4.50 tsf (PP)
			6	UD-3	U	10			
			7						
		Light brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	8						
			9	S-1	SS	12	12 / 18 / 14	32	Augered to 13 ft
			10						
			11						
			12						
		Light brown CLAY, some fine sand, trace fine gravel (moist) [CL]	13						qu = 4.50 tsf (PP)
			14	UD-4	U	9			
			15						Augered to 18.5 ft
			16						
			17						
			18						
	+1258.7	Light brown Sandy CLAY, trace fine gravel (moist) [CL]	19	S-2	SS	5	50/5"	50/5"	Boring backfilled to grade with soil cuttings.
		End of Boring at 18.9ft.	20						

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Log of Boring **LB-42** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1294.2 (NAVD 88)
Drilling Company: I Deal Drilling, LLC	Date Started: 5/8/2025 — Date Finished: 5/8/2025
Drilling Equipment: CME 55 Truck-Mounted Rig	Completion Depth: 19.9 ft — Rock Depth: Not Encountered
Size and Type of Bit: 4" Flight Auger	Number of Samples: Disturbed 8 — Undisturbed 0 — Core 0
Casing Diameter (in): N/A — Casing Depth (ft): N/A	Water Level (ft.): First ▽ N/A — Completion ▼ N/A — 24 HR. ▼ N/A
Casing Hammer: N/A — Weight (lbs): N/A — Drop (in): N/A	Drilling Foreman: Brandon Rogers
Sampler: 2" OD Split Spoon	Field Engineer: Sharen Wallace
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr-resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Casing Depth, Fluid Loss, Drilling Resistance, etc.)
	+1294.2	Dark brown Sandy CLAY, some fine gravel, rootlets (moist) [CL]	0	G-1	SS GRAB				Precleared using 3" OD hand auger to 3". Auger refusal at 3"
		Dark brown CLAY, some fine sand (moist) [CL]	1	S-1	SS	10	4 9 8	17	
		Olive CLAY, some fine sand, calcareous nodules (moist) [CL]	2	S-2	SS	6	11 17 15	32	
			3						Augered to 4 ft
		Olive to tan CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	4	S-3	SS	9	11 12 11	23	
			5						Augered to 6 ft
		Olive to tan CLAY, some fine sand, calcareous nodules (moist) [CL]	6	S-4	SS	9	11 14 12	26	
			7						Augered to 8.5 ft
		Olive to tan CLAY, some fine sand, calcareous nodules (moist) [CL]	8	S-5	SS	9	13 19 18	37	
			9						Augered to 13.5 ft
			10						
			11						
			12						
			13						
		Olive to tan CLAY, some fine sand, calcareous nodules, trace fine gravel (moist) [CL]	14	S-6	SS	16	14 30 17	47	
			15						Augered to 18.5 ft
			16						
			17						
			18						
	+1275.7								
		Olive to tan SHALE, some fine sand (moist) [WEATHERED ROCK]	19	S-7	SS	15	24 35 50/5"	50/5"	Boring backfilled to grade with soil cuttings.
	+1274.2	End of Boring at 19.9ft.	20						

ATTACHMENT A-2

Roadway Boring Logs

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Log of Test Pit **RW-01**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1293.4 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1293.4	Brown to light brown fine SAND, some silt, trace fine gravel (moist) [SP-SM]	0	G-1	GRAB	
		Tannish brown fine SAND, some silt, some fine to coarse gravel (moist) [SP-SM]	1	G-2	GRAB	
	+1291.4	End of Test Pit at 2.0ft.	2			Boring backfilled to grade with soil cuttings.
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-02**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1300.8 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1300.8	Brown Clayey fine SAND, some fine gravel (moist) [SC]	0	G-1	GRAB	
	+1299.8	End of Test Pit at 1.0ft.	1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-03**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1306.9 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1306.9	Tan Silty fine SAND, trace fine gravel (moist) [SM]	0	G-1	GRAB	
		Tan Silty fine SAND, trace fine gravel (moist) [SM]	1	G-2	GRAB	
	+1304.9	End of Test Pit at 2.0ft.	2			Boring backfilled to grade with soil cuttings.
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-04**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1300.4 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.8 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1300.4	Tan Silty fine SAND, some fine gravel (moist) [SM]	0	G-1	GRAB	
	+1299.4	Brown Clayey fine SAND, some fine gravel, with rootlets (moist) [SC]	1	G-2	GRAB	
	+1298.6	End of Test Pit at 1.8ft.	2			Auger refusal at 1.75 ft. Boring backfilled to grade with soil cuttings.
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-05**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1296.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1296.0	Brown Sandy GRAVEL, some clay, with rootlets (moist) [GW]	0	G-1	GRAB	
	+1295.5	Dark brown Silty, Clayey fine SAND, trace fine gravel (moist) [SC-SM]	1	G-2	GRAB	
	+1294.0	End of Test Pit at 2.0ft.	2			Boring backfilled to grade with soil cuttings.
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-06**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1293.3 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.8 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1293.3	Tan fine SAND, some silt, some fine to coarse gravel (moist) [SM]	0	G-1	GRAB	
	+1292.3	Brown Silty, Clayey fine SAND, some clay, some fine gravel (moist) [SC-SM]	1	G-2	GRAB	
	+1291.3	Dark brown CLAY, some fine sand (moist) [CL]	2	G-3	GRAB	
	+1290.6	End of Test Pit at 2.8ft.	3			Boring backfilled to grade with soil cuttings.
			4			
			5			
			6			

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Log of Test Pit **RW-07**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1314.2 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.5 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1314.2	Brown Silty, Clayey fine SAND, some fine to coarse gravel (moist) [SC-SM]	0	G-1	GRAB	
	+1313.2	Dark brown Sandy CLAY, some fine gravel (moist) [CL]	1	G-2	GRAB	
		Olive Sandy CLAY, trace fine gravel (moist) [CL]	2	G-3	GRAB	
	+1311.7	End of Test Pit at 2.5ft.	3			Boring backfilled to grade with soil cuttings.
			4			
			5			
			6			

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Log of Test Pit **RW-08**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1280.3 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1280.3		0			
	+1280.0	Gray fine to coarse GRAVEL, some fine sand, trace clay (moist) [GW]		G-1	GRAB	
		Pink Sandy CLAY, trace fine gravel (moist) [CL]		G-2	GRAB	
		Olive CLAY, some fine sand (moist) [CL]	1	G-3	GRAB	
	+1278.3		2			Auger refusal at 2ft. Boring backfilled to grade with soil cuttings.
		End of Test Pit at 2.0ft.				
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-09**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1312.9 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1312.9		0			
	+1312.7	Pink Clayey fine SAND, some fine to coarse gravel (moist) [SC]		G-1	GRAB	
		Olive Sandy CLAY, some fine gravel (moist) [CL]		G-2	GRAB	
	+1311.9		1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
		End of Test Pit at 1.0ft.	2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-10**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1360.1 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1360.1		0	G-1	GRAB	
	+1360.0	Gray fine to coarse GRAVEL, some fine sand, trace clay (moist) [GW]				
		Brown Clayey fine SAND, some fine gravel (moist) [SC]		G-2	GRAB	
	+1359.1		1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
		End of Test Pit at 1.0ft.				
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-11**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1412.3 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	0.8 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1412.3	Gray fine SAND, some fine to coarse gravel, some clay (moist) [SP]	0	G-1	GRAB	
		Pink Gravelly fine to coarse SAND, trace clay (moist) [SP]		G-2	GRAB	
	+1411.6	End of Test Pit at 0.8ft.	1			Auger refusal at 9in. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-12**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1326.8 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1326.8					
	+1326.7	Pink Gravelly fine SAND, some clay (moist) [SP]	0	G-1	GRAB	
		Light gray fine to coarse GRAVEL, some fine sand (moist) [GW]		G-2	GRAB	
		Light pink Sandy GRAVEL, some silt (moist) [GW]		G-3	GRAB	
	+1325.8		1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
		End of Test Pit at 1.0ft.	2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-13**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1357.4 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1357.4	Pink fine SAND, some fine to coarse gravel, some clay (moist) [SP]	0	G-1	GRAB	
	+1356.4	End of Test Pit at 1.0ft.	1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-14**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1382.7 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1382.7	Pink Silty fine SAND, some fine to coarse gravel, 1in layer of asphalt at surface (moist) [SM]	0	G-1	GRAB	
	+1382.1	Dark brown Sandy CLAY, some fine gravel (moist) [CL]		G-2	GRAB	
	+1381.7	End of Test Pit at 1.0ft.	1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-15** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1378.2 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.3 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1378.2	Dark brown Clayey fine SAND, some fine to coarse gravel, with rootlets, very thin layer of pinkish tan fine sand and gravel at surface (moist) [SC]	0	G-1	GRAB	
	+1376.9	End of Test Pit at 1.3ft.	1			Auger refusal at 1.33 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

LANGAN

Log of Test Pit **RW-16** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1485.3 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1485.3	Gray fine to coarse GRAVEL, some coarse sand, trace clay (moist) [GW]	0	G-1	GRAB	
	+1484.8	Pink Silty, Clayey fine SAND, some fine to coarse gravel (moist) [SC-SM]		G-2	GRAB	
	+1484.3	End of Test Pit at 1.0ft.	1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-17**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1515.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	0.7 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1515.0		0			
	+1514.9	Gray fine to coarse GRAVEL, some fine sand, trace clay (moist) [GW]		G-1	GRAB	
		Pink Gravelly fine SAND, some clay (moist) [SP]		G-2	GRAB	
	+1514.3	End of Test Pit at 0.7ft.	1			Encountered boulder. Auger refusal at 8in. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

LANGAN

Log of Test Pit **RW-18**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 264, Brown County, TX	Approx. el. 1516.4 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1516.4	Pink Clayey fine SAND, some fine to coarse gravel, calcareous nodules (moist) [SC]	0	G-1	GRAB	
	+1515.9	Dark brown Sandy CLAY, some fine to coarse gravel (moist) [CL]		G-2	GRAB	
	+1515.4	End of Test Pit at 1.0ft.	1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

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Log of Test Pit **RW-19** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 265, Brown County, TX	Approx. el. 1522.1 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	1.0 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1522.1		0			
	+1521.8	Gray fine to coarse GRAVEL, some fine sand (moist) [GW]		G-1	GRAB	
		Pink Silty, Clayey fine SAND, some fine to coarse gravel (moist) [SC-SM]		G-2	GRAB	
	+1521.1	End of Test Pit at 1.0ft.	1			Auger refusal at 1 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

LANGAN

Log of Test Pit **RW-20**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/14/2025

Location	Elevation and Datum
CR 265, Brown County, TX	Approx. el. 1545.7 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	0.6 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1545.7		0			
	+1545.5	Gray Gravelly SAND, some clay (moist) [SP]		G-1	GRAB	
		Tan to pink GRAVEL, some fine to coarse sand (moist) [GW]		G-2	GRAB	
	+1545.1	End of Test Pit at 0.6ft.	1			Auger refusal at 7.5in. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

LANGAN

Log of Test Pit **PH-01**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1319.4 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	0.8 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1319.4	Light brown Clayey fine SAND. some fine to coarse gravel (moist) [SC]	0	G-1	GRAB	
	+1318.6	End of Test Pit at 0.8ft.	1			Auger refusal at 0.75 ft. Boring backfilled to grade with soil cuttings.
			2			
			3			
			4			
			5			
			6			

LANGAN

Log of Test Pit **PH-02**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/13/2025

Location	Elevation and Datum
CR 268, Brown County, TX	Approx. el. 1297.6 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
N/A	2.5 ft	N/A ▽	N/A ▼

Excavation Equipment	Excavation Foreman	Field Engineer
4" OD Hand Auger, Tamping Bar	N/A	Sharen Wallace, Aaron Gonzalez G.

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1297.6	Brown GRAVEL, some clay, some fine sand (dry) [GW]	0	G-1	GRAB	
	+1297.2	Dark brown CLAY, some fine sand, some fine gravel (moist) [CL]	1	G-2	GRAB	
		Olive-brown CLAY, some fine sand, some fine gravel (moist) [CL]	2	G-3	GRAB	
	+1295.1	End of Test Pit at 2.5ft.	3			Boring backfilled to grade with soil cuttings.
			4			
			5			
			6			

ATTACHMENT B

Test Pit Logs

LANGAN

Log of Test Pit **TP-1**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/5/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1279.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1279.0	Brown CLAY, trace rootlets, some fine sand (moist) [CL]	0	G-1	GRAB	
		Brown CLAY, some fine sand, trace fine gravel (moist) [CL]	2	G-2	GRAB	
		Reddish brown Sandy CLAY, trace silt, trace fine gravel, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown Sandy CLAY, trace silt, trace fine gravel, trace calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1271.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

LANGAN

Log of Test Pit **TP-2** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/5/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1277.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1277.0	Dark brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Dark brown CLAY, some fine sand, trace fine gravel (moist) [CL]	2	G-2	GRAB	
		Reddish brown CLAY, some fine sand, trace silt, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, trace silt, trace calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1269.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

LANGAN

Log of Test Pit **TP-3**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1277.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1277.0	Brown CLAY, trace rootlets, some fine sand (moist) [CL]	0	G-1	GRAB	
		Brown CLAY, some fine sand, trace fine gravel (moist) [CL]	2	G-2	GRAB	
		Light brown CLAY, some fine sand, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, trace fine gravel (moist) [CL]	6	G-4	GRAB	
	+1269.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-4** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1276.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1276.0	Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	2	G-2	GRAB	
		Light brown CLAY, some fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, trace fine to coarse gravel (moist) [CL]	6	G-4	GRAB	
	+1268.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

LANGAN

Log of Test Pit **TP-5** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1281.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1281.0	Brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Light brown CLAY, trace fine sand, trace fine gravel (moist) [CL]	2	G-2	GRAB	
		Light brown CLAY, trace fine sand, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace silt (moist) [CL]	6	G-4	GRAB	
	+1273.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-6**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/5/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1277.5 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1277.5	Brown fine SAND and CLAY, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Light brown fine SAND and CLAY (moist) [CL]	1			
			2	G-2	GRAB	
	+1273.5	Orangish brown Sandy CLAY (moist) [CL]	3			
			4	G-3	GRAB	
		Reddish brown Sandy CLAY (moist) [CL]	5			
			6	G-4	GRAB	
	+1269.5	End of Test Pit at 8.0ft.	7			Test pit backfilled with soil cuttings
			8			
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-7**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/5/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1284.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1284.0	Brown Silty fine SAND, trace rootlets (moist) [SM]	0	G-1	GRAB	
		Light brown Silty fine SAND (moist) [SM]	2	G-2	GRAB	
	+1281.0	Orangish brown Sandy CLAY (moist) [CL]	3	G-3	GRAB	
		Orangish brown Sandy CLAY (moist) [CL]	4	G-4	GRAB	
		Reddish brown Sandy CLAY (moist) [CL]	6	G-5	GRAB	
	+1276.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

LANGAN

Log of Test Pit **TP-8**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1272.5 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1272.5	Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Dark brown CLAY, trace fine sand (moist) [CL]	2	G-2	GRAB	
		Light brown Sandy CLAY, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Reddish brown to gray Sandy CLAY, trace fine gravel (moist) [CL]	6	G-4	GRAB	
	+1264.5	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-9** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1291.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1291.0	Light brown CLAY, some fine sand (moist) [CL]	0	G-1	GRAB	Laminated clay; weathered claystone?
		Light brown CLAY, trace fine sand (moist) [CL]	2	G-2	GRAB	
		Light brown CLAY, trace fine sand (moist) [CL]	4	G-3	GRAB	
		Light brown CLAY, trace fine sand (moist) [CL]	6	G-4	GRAB	
	+1283.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-10**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1275.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1275.0	Brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Light brown CLAY, some fine sand, trace calcareous nodules (moist) [CL]	2	G-2	GRAB	
		Light brown CLAY, some fine sand, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown to light brown CLAY, some fine sand, trace calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1267.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

Langan Cloud Database, Project : 520102301, Chisme Solar and Storage. Produced at 07/01/2025 20:46:48

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Log of Test Pit **TP-11**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1274.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1274.0	Brown Sandy CLAY (moist) [CL]	0	G-1	GRAB	
		Brown Sandy CLAY (moist) [CL]	2	G-2	GRAB	
		Dark brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, trace fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	6	G-4	GRAB	
	+1266.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

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Log of Test Pit **TP-12**

Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301	Date: 2/6/2025
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1275.0 (NAVD 88)	
Excavation Company: Formulated Solutions, LLC	Depth: 8.0 ft	Water Level - First: N/A ▽ / Water Level - Completion: N/A ▼
Excavation Equipment: John Deere 135G	Excavation Foreman: Joseph Marquez	Field Engineer: Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1275.0	Brown Clayey SAND, trace rootlets (moist) [SC]	0	G-1	GRAB	
	+1273.0	Dark reddish brown Sandy CLAY (moist) [CL]	2	G-2	GRAB	
		Reddish brown Sandy CLAY (moist) [CL]	4	G-3	GRAB	
		Orangish brown Sandy CLAY, trace coarse gravel (moist) [CL]	6	G-4	GRAB	
	+1267.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-13** Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301	Date: 2/6/2025
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1274.0 (NAVD 88)	
Excavation Company: Formulated Solutions, LLC	Depth: 8.0 ft	Water Level - First: N/A ▽ / Water Level - Completion: N/A ▼
Excavation Equipment: John Deere 135G	Excavation Foreman: Joseph Marquez	Field Engineer: Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1274.0	Light brown Sandy CLAY, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Light brown Sandy CLAY (moist) [CL]	2	G-2	GRAB	
		Reddish brown CLAY, some fine sand, some calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, some calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1266.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-14**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1278.5 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1278.5	Light brown Sandy CLAY, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Reddish brown to brown Sandy CLAY, trace fine to coarse gravel (moist) [CL]	2	G-2	GRAB	
		Reddish brown to white Sandy CLAY, trace fine to coarse gravel, some calcareous nodules (moist) [CL]	4	G-3	GRAB	
	+1272.5	Reddish brown Clayey GRAVEL, some f-c sand (moist) [GC]	6	G-4	GRAB	
	+1270.5	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

LANGAN

Log of Test Pit **TP-15**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/6/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1267.5 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1267.5	Dark brown CLAY, trace rootlets, trace fine sand (moist) [CL]	0	G-1	GRAB	
		Dark brown CLAY, trace fine sand (moist) [CL]	2	G-2	GRAB	
		Reddish brown CLAY, some fine sand, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, trace fine gravel (moist) [CL]	6	G-4	GRAB	
	+1259.5	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-16**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1266.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1266.0	Brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Light brown CLAY, some fine sand (moist) [CL]	2	G-2	GRAB	
		Light brown to reddish brown CLAY, trace fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Light brown to reddish brown CLAY, trace fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	6	G-4	GRAB	
	+1258.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-17**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1275.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1275.0	Reddish brown CLAY, trace rootlets, trace fine sand (moist) [CL]	0	G-1	GRAB	
		Reddish brown CLAY, trace fine sand, trace calcareous nodules (moist) [CL]	2	G-2	GRAB	
		Reddish brown to white CLAY, some fine sand, some calcareous nodules, trace silt (moist) [CL]	4	G-3	GRAB	
		Light brown to white Sandy CLAY, some calcareous nodules, trace silt (moist) [CL]	6	G-4	GRAB	
	+1267.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-18**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1266.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1266.0	Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Dark brown CLAY, trace fine sand, trace rootlets (moist) [CL]	2	G-2	GRAB	
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1258.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-19**

Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301	Date: 2/7/2025
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1264.0 (NAVD 88)	
Excavation Company: Formulated Solutions, LLC	Depth: 8.0 ft	Water Level - First: N/A ▽ / Water Level - Completion: N/A ▼
Excavation Equipment: John Deere 135G	Excavation Foreman: Joseph Marquez	Field Engineer: Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1264.0	Brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Brown CLAY, some fine sand, trace rootlets (moist) [CL]	2	G-2	GRAB	
		Brown CLAY, some fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, some fine sand, trace calcareous nodules, trace fine gravel (moist) [CL]	6	G-4	GRAB	
	+1256.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-20**

Sheet 1 of 1

Project: Chisme Solar and Storage	Project No.: 520102301	Date: 2/7/2025
Location: 8987 CR 268, Brown County, TX	Elevation and Datum: Approx. el. 1262.0 (NAVD 88)	
Excavation Company: Formulated Solutions, LLC	Depth: 8.0 ft	Water Level - First: N/A ▽ / Water Level - Completion: N/A ▼
Excavation Equipment: John Deere 135G	Excavation Foreman: Joseph Marquez	Field Engineer: Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1262.0	Dark brown CLAY, some fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Dark brown CLAY, some fine sand (moist) [CL]	2	G-2	GRAB	
		Brown to reddish brown CLAY, trace fine sand, trace gravel, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Brown to reddish brown CLAY, trace fine sand, trace gravel, trace calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1254.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-21**

Sheet 1 of 1

Project: Chisme Solar and Storage		Project No.: 520102301	Date: 2/7/2025
Location: 8987 CR 268, Brown County, TX		Elevation and Datum: Approx. el. 1262.0 (NAVD 88)	
Excavation Company: Formulated Solutions, LLC		Depth: 8.0 ft	Water Level - First: N/A ▽ / Water Level - Completion: N/A ▼
Excavation Equipment: John Deere 135G		Excavation Foreman: Joseph Marquez	Field Engineer: Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1262.0	Brown CLAY, trace fine sand, trace rootlets (moist) [CL]	0	G-1	GRAB	
		Brown CLAY, trace fine sand (moist) [CL]	2	G-2	GRAB	
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	4	G-3	GRAB	
		Reddish brown CLAY, trace fine sand, trace fine gravel, trace calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1254.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings

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Log of Test Pit **TP-22**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	2/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1343.0 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	8.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 135G	Joseph Marquez	Ashish Govindan

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1343.0	Brown to tan Sandy CLAY, trace fine gravel (moist) [CL]	0	G-1	GRAB	
	+1341.0	Light tan CLAY, some gravel, some f-c sand, some calcareous nodules (moist) [CL]	2	G-2	GRAB	
		Light tan CLAY, some gravel, some f-c sand (moist) [CL]	4	G-3	GRAB	
	+1337.5	Tan CLAY, trace fine to coarse gravel (moist) [CL]	6	G-4	GRAB	
	+1335.0	End of Test Pit at 8.0ft.	8			Test pit backfilled with soil cuttings
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-23** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1278.4 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	7.2 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 35P	Joseph Marquez	Sharen Wallace

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1278.4	Dark brown Sandy CLAY, trace fine gravel, with rootlets (moist) [CL]	0	G-1	GRAB	
		Dark brown Sandy CLAY, trace fine gravel, with rootlets (moist) [CL]	2	G-2	GRAB	
		Dark brown to light brown Sandy CLAY, trace fine gravel (moist) [CL]	4	G-3	GRAB	
		Light brown CLAY, some fine sand, trace fine gravel, calcareous nodules (moist) [CL]	6	G-4	GRAB	
	+1271.1	End of Test Pit at 7.2ft.	7			Excavator refusal at 7.25 ft. Test pit backfilled to grade with soil cuttings.
			8			
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-24** Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1272.6 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	3.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 35P	Joseph Marquez	Sharen Wallace

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1272.6	Dark brown Sandy CLAY, some fine to coarse gravel, with rootlets (moist) [CL]	0	G-1	GRAB	
		Dark brown CLAY, some fine sand, some fine to coarse gravel, with rootlets (moist) [CL]	2	G-2	GRAB	
	+1269.6	End of Test Pit at 3.0ft.	3			Excavator refusal at 3 ft. Test pit backfilled to grade with soil cuttings.
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-25**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1286.8 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	4.0 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 35P	Joseph Marquez	Sharen Wallace

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1286.8	Dark brown Silty fine SAND, some fine to coarse gravel, with rootlets (moist) [SM]	0	G-1	GRAB	
	+1286.1	Reddish brown to brown Gravelly CLAY, some fine sand, with rootlets (moist) [CL]	1	G-2	GRAB	
		Brown to light brown Gravelly CLAY, some fine sand (moist) [CL]	2	G-3	GRAB	
	+1282.8	End of Test Pit at 4.0ft.	3			Excavator refusal at 4 ft. Test pit backfilled to grade with soil cuttings.
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			

LANGAN

Log of Test Pit **TP-26**

Sheet 1 of 1

Project	Project No.	Date
Chisme Solar and Storage	520102301	5/7/2025

Location	Elevation and Datum
8987 CR 268, Brown County, TX	Approx. el. 1302.1 (NAVD 88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Formulated Solutions, LLC	2.8 ft	N/A	N/A

Excavation Equipment	Excavation Foreman	Field Engineer
John Deere 35P	Joseph Marquez	Sharen Wallace

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+1302.1	Light brown Silty fine SAND, with rootlets (moist) [SM]	0	G-1	GRAB	Bulk sample #1 and #2 collected between 0 ft and 2 ft
	+1300.1	Orange SANDSTONE (dry) [WEATHERED ROCK]	2	G-2	GRAB	
	+1299.4	End of Test Pit at 2.8ft.	3			Excavator refusal at 2.75 ft. Test pit backfilled to grade with soil cuttings.
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			

ATTACHMENT C

ERT Test Results

FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

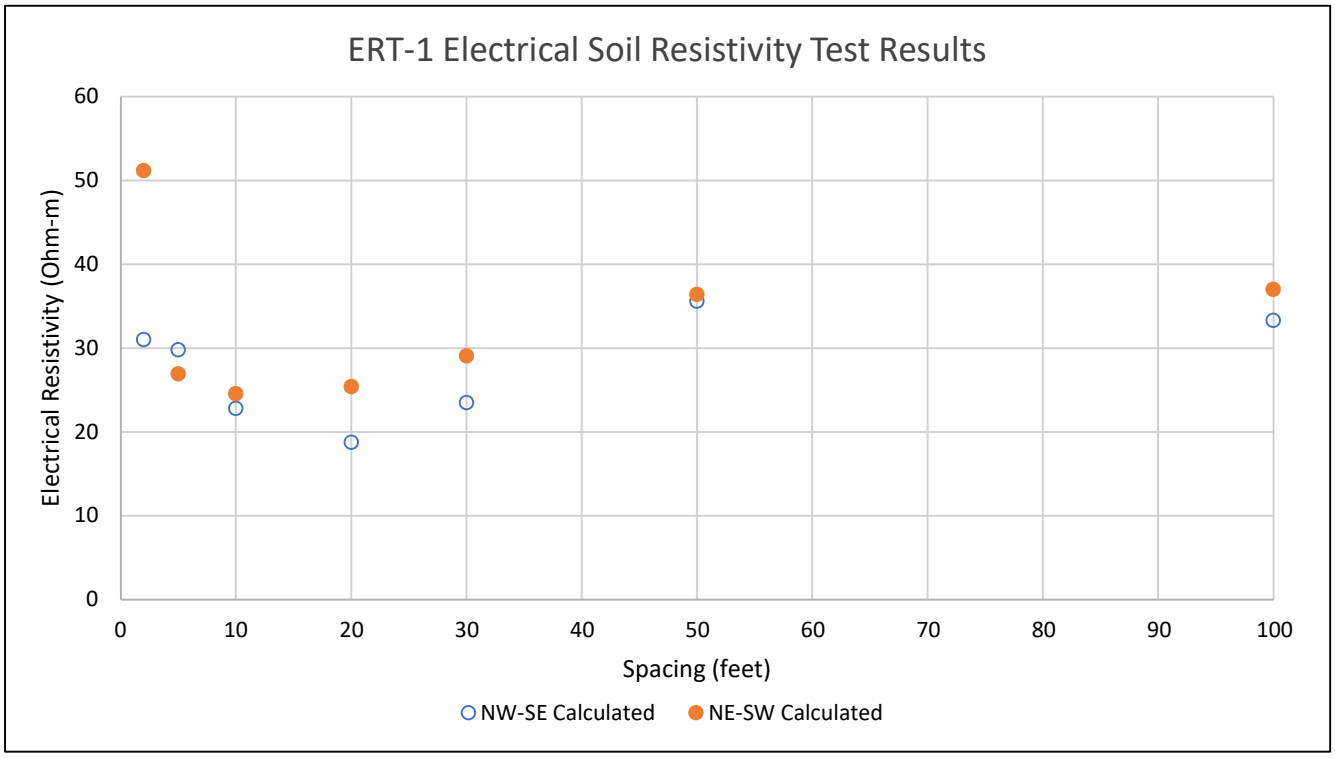
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/4/2025	**TIME:**	11:30 AM
TEST LOCATION:	ERT-1	**TEMP:**	High winds, 60s F

DIRECTION 1: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	8	31.01
5	1.52	3	3	0.0762	3.1	29.81
10	3.05	6	4	0.1016	1.1889	22.81
20	6.10	12	6	0.1524	0.4898	18.78
30	9.14	18	6	0.1524	0.4088	23.50
50	15.24	30	6	0.1524	0.3719	35.62
100	30.48	60	6	0.1524	0.1739	33.31

DIRECTION 2: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	13.2	51.17
5	1.52	3	3	0.0762	2.8	26.93
10	3.05	6	4	0.1016	1.2813	24.59
20	6.10	12	6	0.1524	0.6627	25.41
30	9.14	18	6	0.1524	0.5061	29.09
50	15.24	30	6	0.1524	0.3803	36.42
100	30.48	60	6	0.1524	0.1932	37.00



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

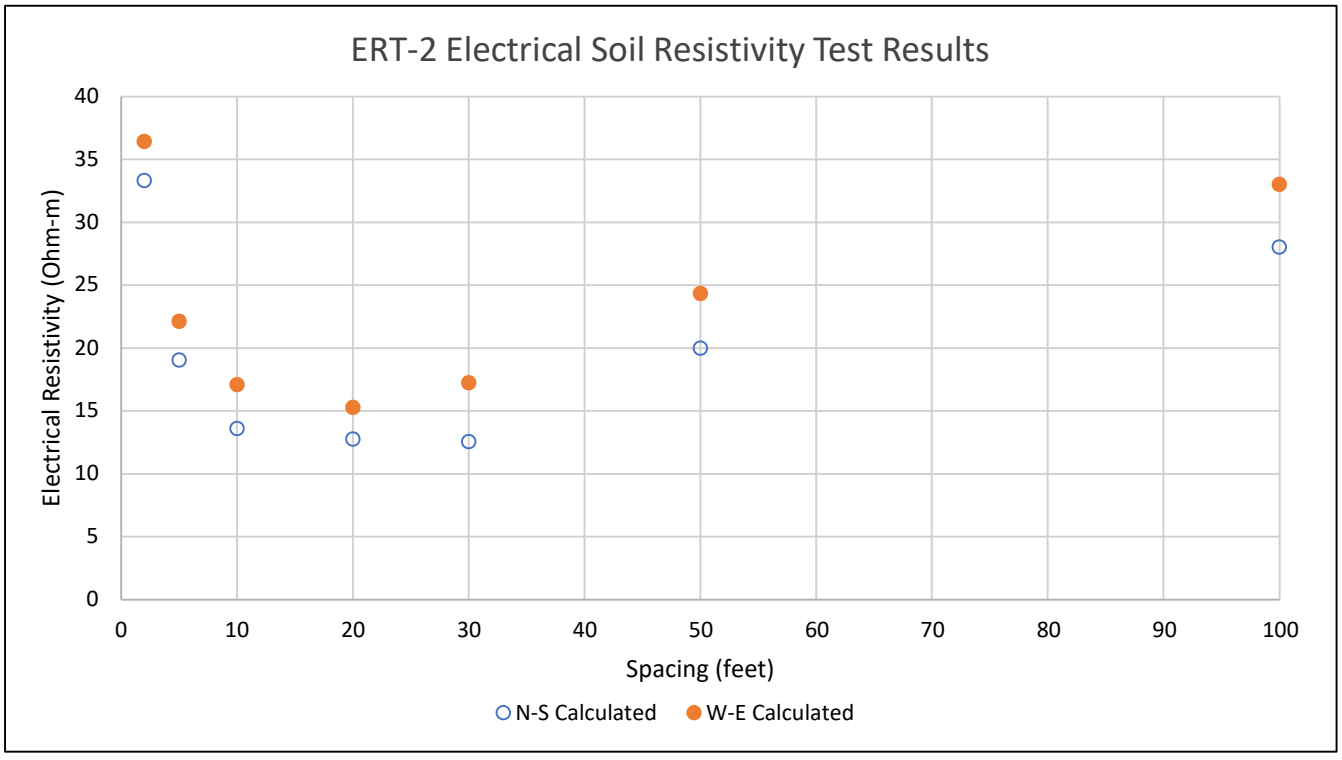
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/4/2025	**TIME:**	8:30 AM
TEST LOCATION:	ERT-2	**TEMP:**	Clear skies, Windy, 50s F

DIRECTION 1: N-S

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	8.6	33.34
5	1.52	3	3	0.0762	1.982	19.06
10	3.05	6	4	0.1016	0.7096	13.62
20	6.10	12	6	0.1524	0.3326	12.75
30	9.14	18	6	0.1524	0.2187	12.57
50	15.24	30	6	0.1524	0.2088	20.00
100	30.48	60	6	0.1524	0.1464	28.04

DIRECTION 2: W-E

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	9.4	36.44
5	1.52	3	3	0.0762	2.3	22.12
10	3.05	6	4	0.1016	0.8906	17.09
20	6.10	12	6	0.1524	0.3988	15.29
30	9.14	18	6	0.1524	0.2999	17.24
50	15.24	30	6	0.1524	0.2542	24.35
100	30.48	60	6	0.1524	0.1724	33.02



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

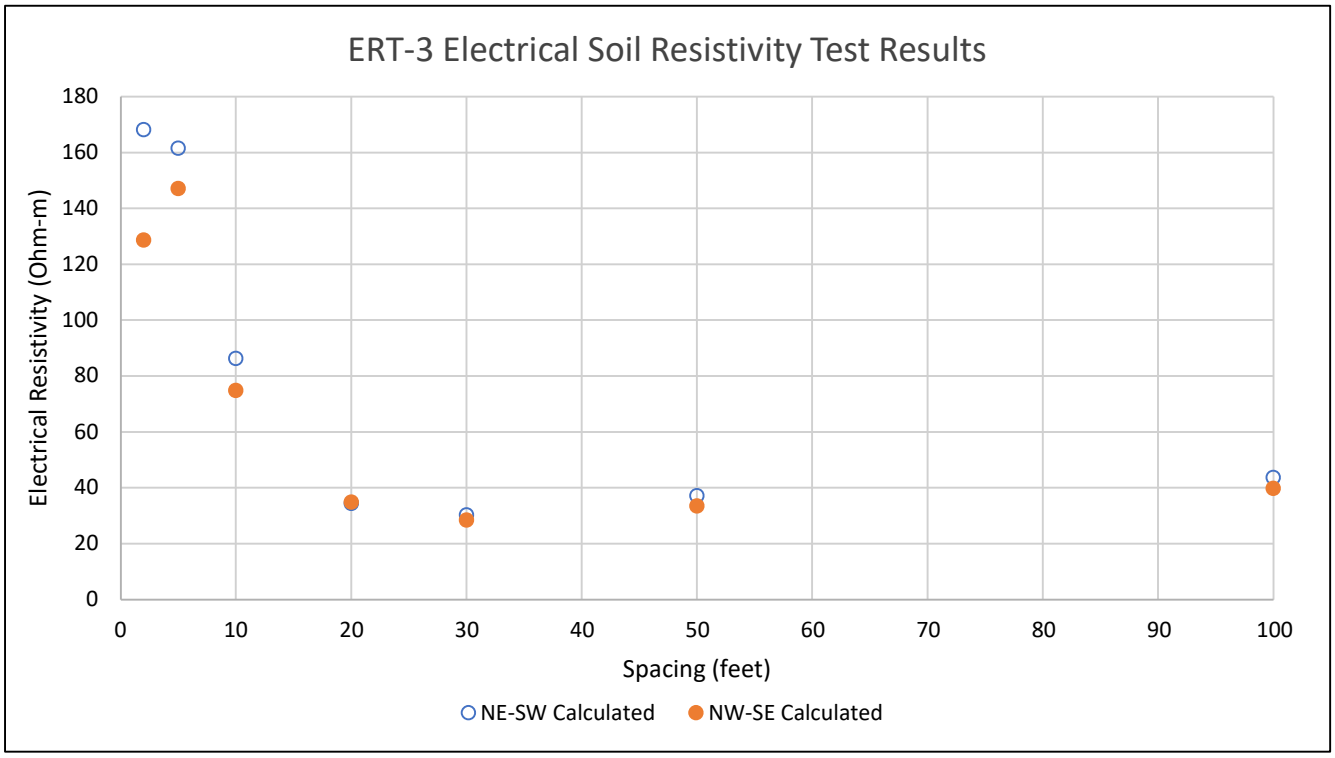
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/4/2025	**TIME:**	9:30 AM
TEST LOCATION:	ERT-3	**TEMP:**	Partly cloudy, Windy, 50s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	43.4	168.23
5	1.52	3	3	0.0762	16.8	161.57
10	3.05	6	4	0.1016	4.5	86.35
20	6.10	12	6	0.1524	0.8978	34.43
30	9.14	18	6	0.1524	0.5278	30.34
50	15.24	30	6	0.1524	0.388	37.16
100	30.48	60	6	0.1524	0.228	43.67

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	33.2	128.69
5	1.52	3	3	0.0762	15.3	147.14
10	3.05	6	4	0.1016	3.9	74.83
20	6.10	12	6	0.1524	0.9097	34.88
30	9.14	18	6	0.1524	0.4958	28.50
50	15.24	30	6	0.1524	0.3499	33.51
100	30.48	60	6	0.1524	0.208	39.84



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

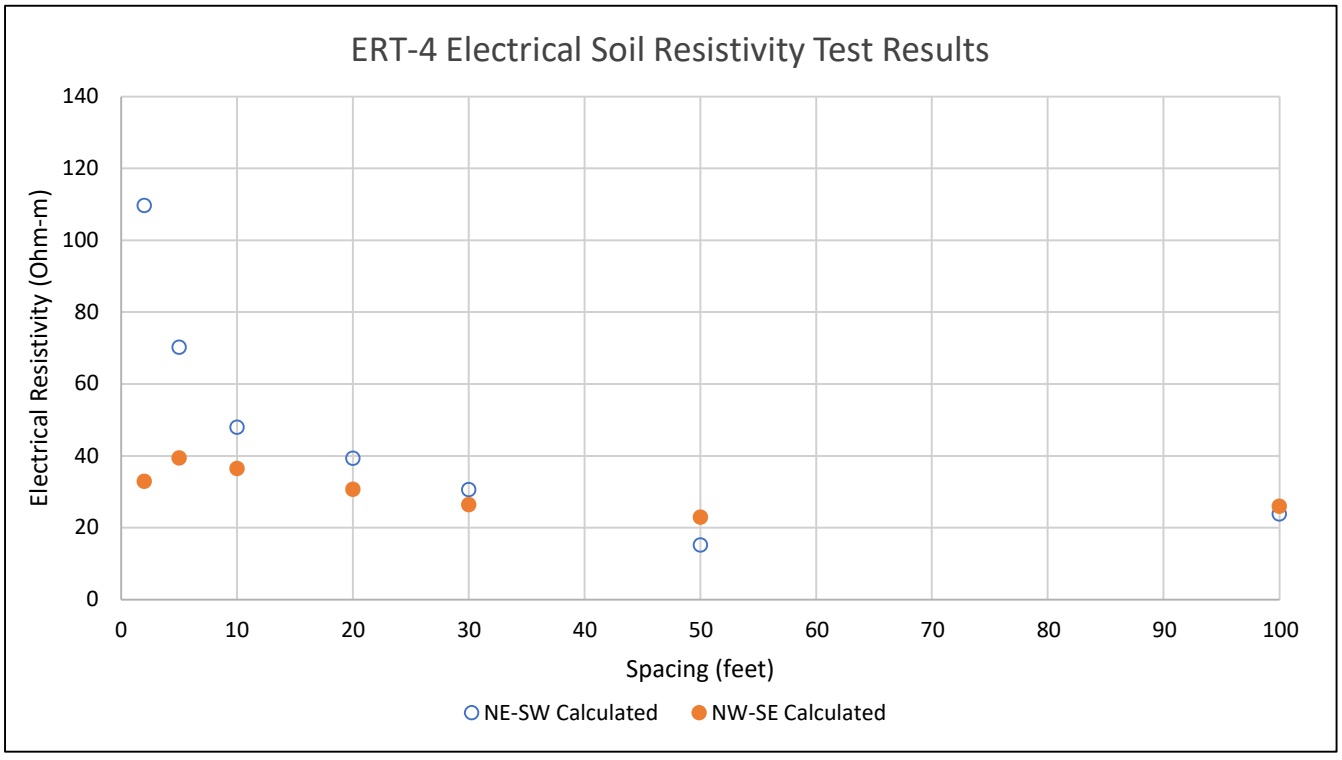
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/5/2025	**TIME:**	8:00 AM
TEST LOCATION:	ERT-4	**TEMP:**	Clear skies, 40s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	28.3	109.70
5	1.52	3	3	0.0762	7.3	70.21
10	3.05	6	4	0.1016	2.5	47.97
20	6.10	12	6	0.1524	1.0259	39.34
30	9.14	18	6	0.1524	0.5322	30.59
50	15.24	30	6	0.1524	0.159	15.23
100	30.48	60	6	0.1524	0.1243	23.81

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	8.5	32.95
5	1.52	3	3	0.0762	4.1	39.43
10	3.05	6	4	0.1016	1.9	36.46
20	6.10	12	6	0.1524	0.8013	30.73
30	9.14	18	6	0.1524	0.4602	26.45
50	15.24	30	6	0.1524	0.2399	22.98
100	30.48	60	6	0.1524	0.1356	25.97



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

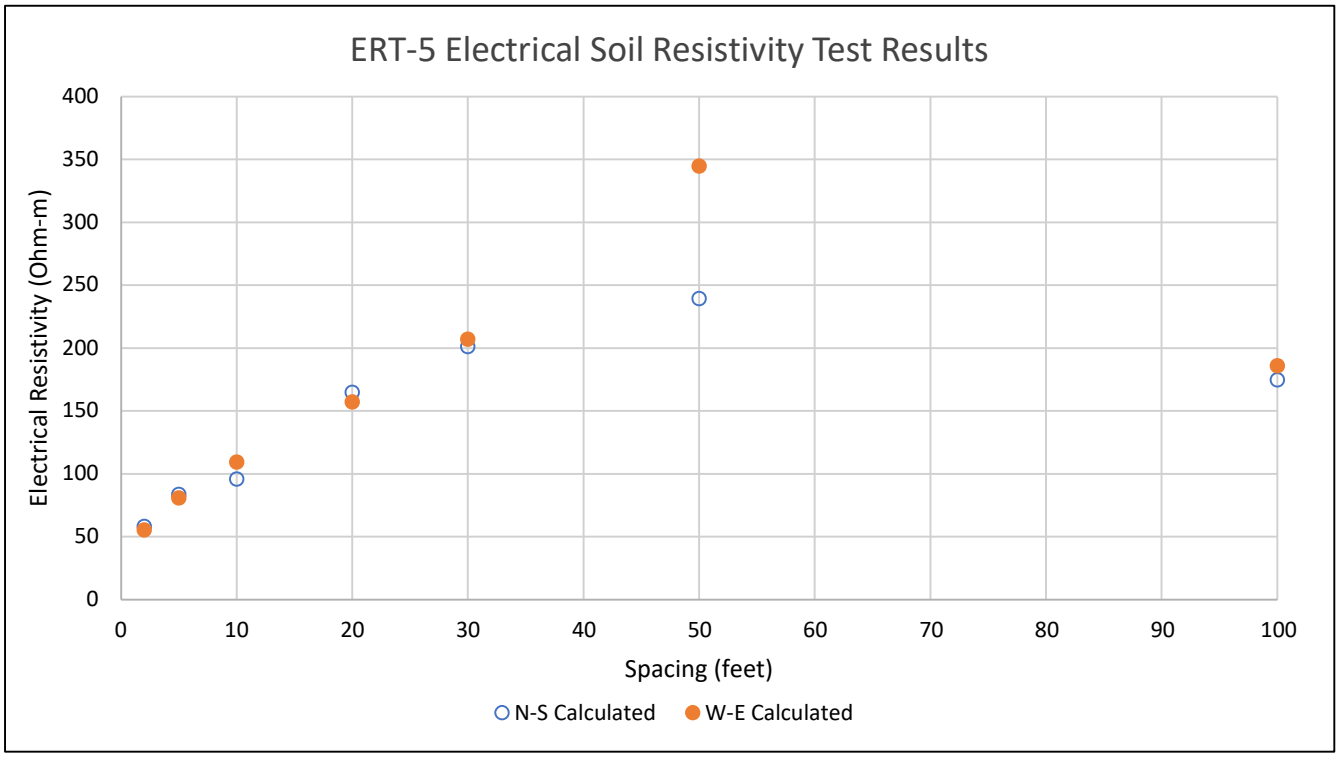
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/6/2025	**TIME:**	9:00 AM
TEST LOCATION:	ERT-5	**TEMP:**	Clear skies, 50s F

DIRECTION 1: N-S

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	15	58.14
5	1.52	3	3	0.0762	8.7	83.67
10	3.05	6	4	0.1016	5	95.94
20	6.10	12	6	0.1524	4.3	164.88
30	9.14	18	6	0.1524	3.5	201.18
50	15.24	30	6	0.1524	2.5	239.43
100	30.48	60	6	0.1524	0.9125	174.76

DIRECTION 2: W-E

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	14.3	55.43
5	1.52	3	3	0.0762	8.4	80.79
10	3.05	6	4	0.1016	5.7	109.37
20	6.10	12	6	0.1524	4.1	157.21
30	9.14	18	6	0.1524	3.6	206.93
50	15.24	30	6	0.1524	3.6	344.78
100	30.48	60	6	0.1524	0.9708	185.93



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

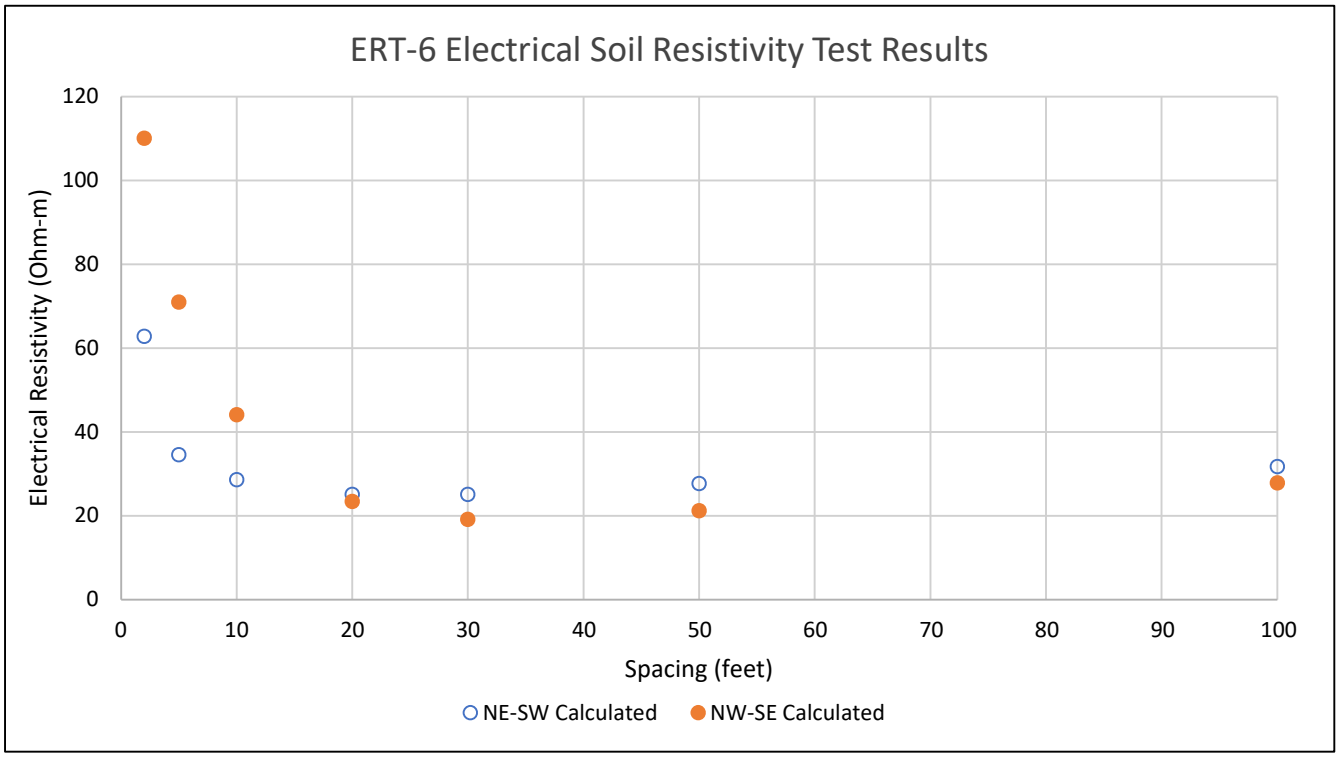
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/5/2025 & 3/6/2025	**TIME:**	3:30 PM & 8:00 AM
TEST LOCATION:	ERT-6	**TEMP:**	Clear skies, 60s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	16.2	62.80
5	1.52	3	2	0.0508	3.6	34.54
10	3.05	6	3	0.0762	1.493	28.62
20	6.10	12	4	0.1016	0.6538	25.05
30	9.14	18	6	0.1524	0.4365	25.09
50	15.24	30	6	0.1524	0.2888	27.66
100	30.48	60	6	0.1524	0.1657	31.73

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	28.4	110.09
5	1.52	3	2	0.0508	7.4	71.00
10	3.05	6	3	0.0762	2.3	44.10
20	6.10	12	4	0.1016	0.6099	23.37
30	9.14	18	6	0.1524	0.3331	19.15
50	15.24	30	6	0.1524	0.2212	21.18
100	30.48	60	6	0.1524	0.1452	27.81



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

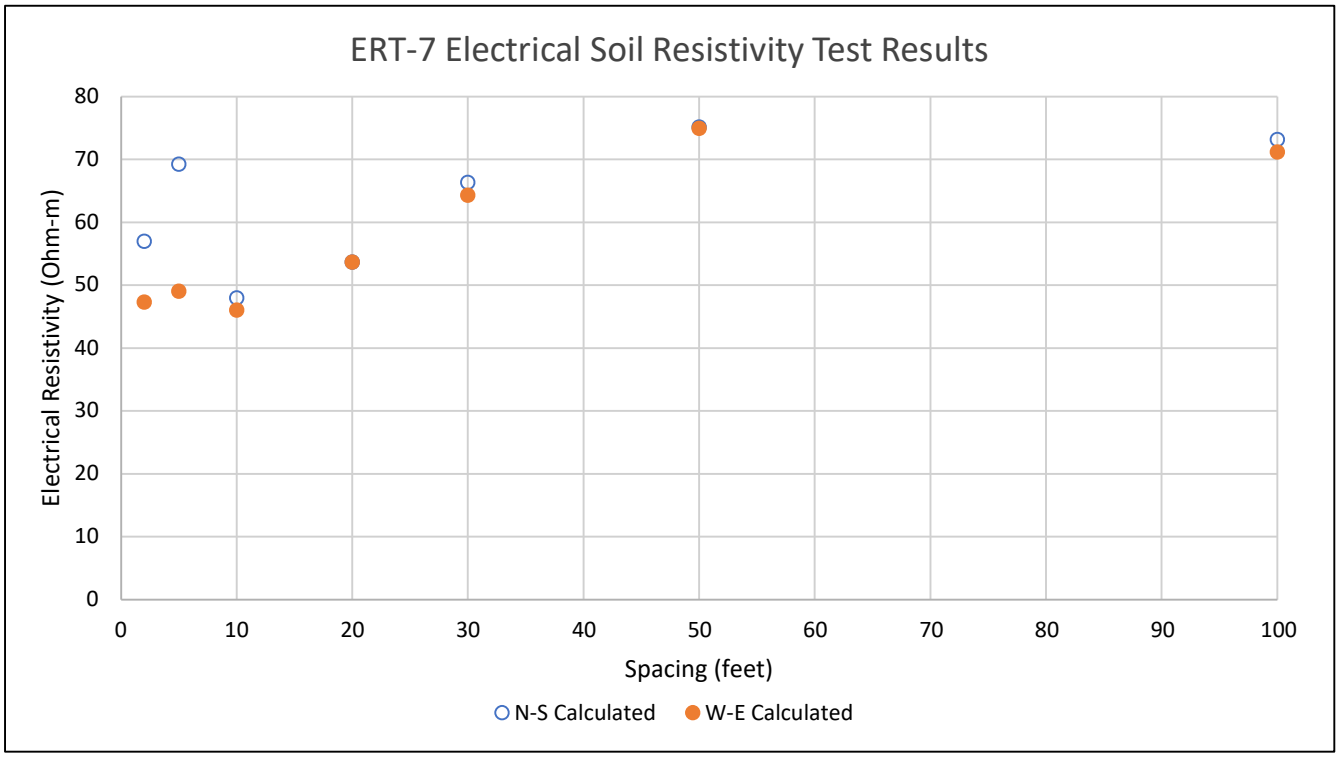
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/5/2025	**TIME:**	2:15 PM
TEST LOCATION:	ERT-7	**TEMP:**	Sunny, 60s F

DIRECTION 1: N-S

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	14.7	56.98
5	1.52	3	3	0.0762	7.2	69.24
10	3.05	6	4	0.1016	2.5	47.97
20	6.10	12	6	0.1524	1.4	53.68
30	9.14	18	6	0.1524	1.1541	66.34
50	15.24	30	6	0.1524	0.785	75.18
100	30.48	60	6	0.1524	0.382	73.16

DIRECTION 2: W-E

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	12.2	47.29
5	1.52	3	3	0.0762	5.1	49.05
10	3.05	6	4	0.1016	2.4	46.05
20	6.10	12	6	0.1524	1.4	53.68
30	9.14	18	6	0.1524	1.1193	64.34
50	15.24	30	6	0.1524	0.7826	74.95
100	30.48	60	6	0.1524	0.3718	71.21



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

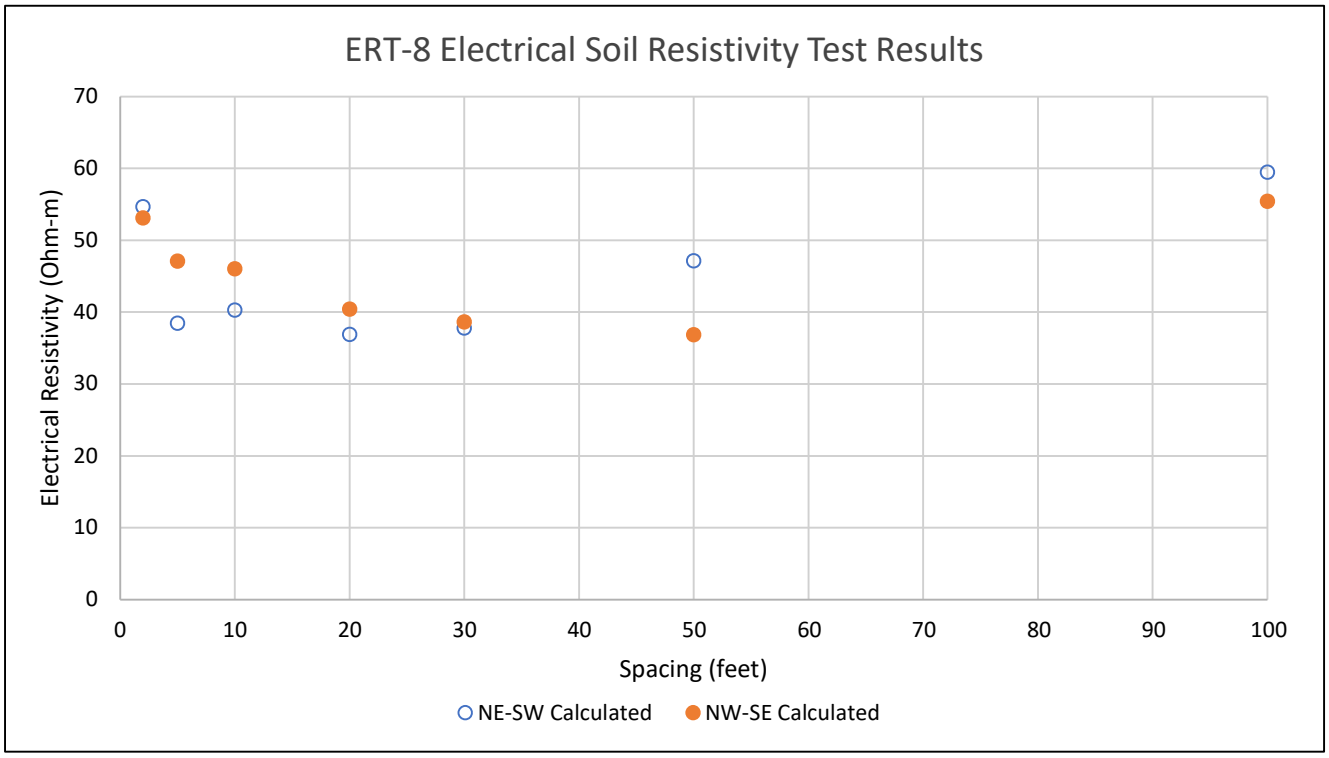
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/5/2025	**TIME:**	1:00 PM
TEST LOCATION:	ERT-8	**TEMP:**	Sunny, 60s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	14.1	54.66
5	1.52	3	3	0.0762	4	38.47
10	3.05	6	4	0.1016	2.1	40.30
20	6.10	12	6	0.1524	0.9627	36.91
30	9.14	18	6	0.1524	0.6578	37.81
50	15.24	30	6	0.1524	0.4923	47.15
100	30.48	60	6	0.1524	0.3107	59.51

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	13.7	53.10
5	1.52	3	3	0.0762	4.9	47.12
10	3.05	6	4	0.1016	2.4	46.05
20	6.10	12	6	0.1524	1.0539	40.41
30	9.14	18	6	0.1524	0.6723	38.64
50	15.24	30	6	0.1524	0.3847	36.84
100	30.48	60	6	0.1524	0.2894	55.43



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

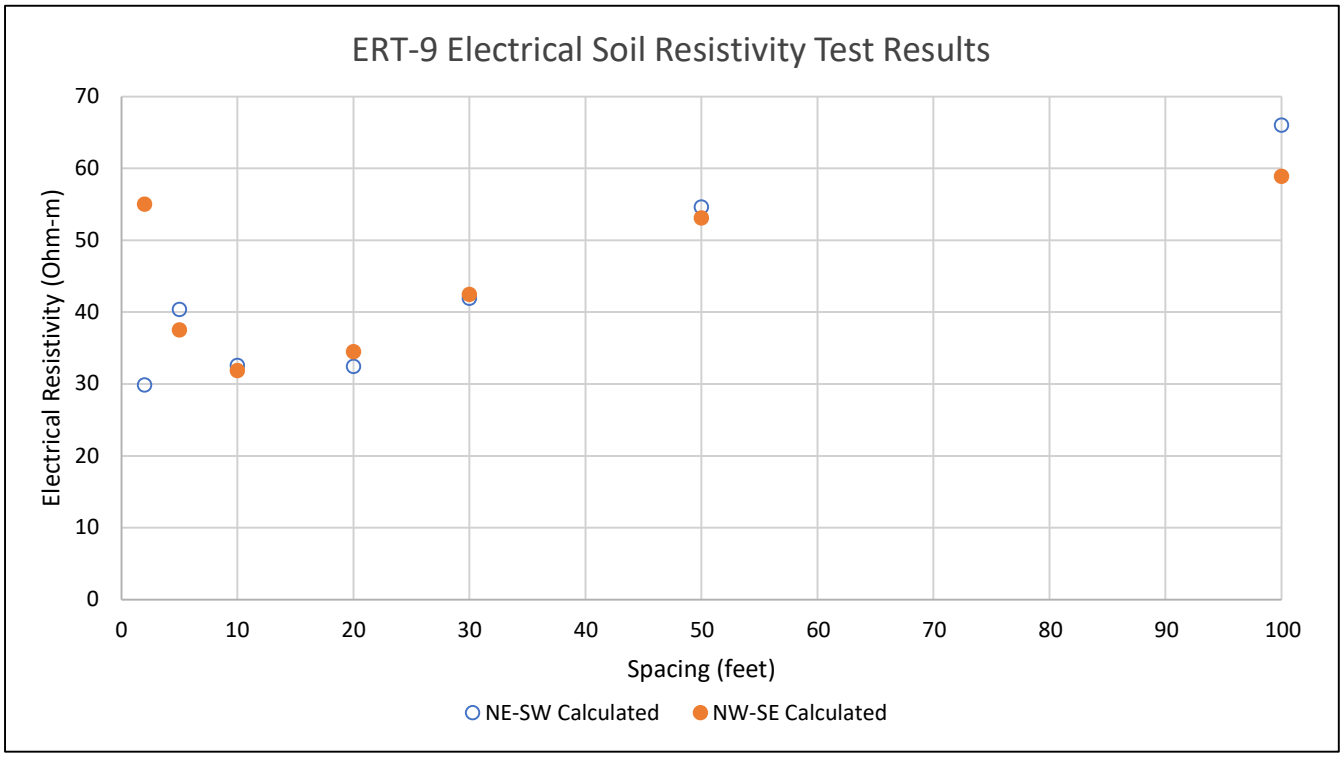
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/5/2025	**TIME:**	11:30 AM
TEST LOCATION:	ERT-9	**TEMP:**	Clear skies, 50s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	7.7	29.85
5	1.52	3	3	0.0762	4.2	40.39
10	3.05	6	4	0.1016	1.6973	32.57
20	6.10	12	6	0.1524	0.8464	32.45
30	9.14	18	6	0.1524	0.7297	41.94
50	15.24	30	6	0.1524	0.5704	54.63
100	30.48	60	6	0.1524	0.3448	66.04

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	14.2	55.04
5	1.52	3	3	0.0762	3.9	37.51
10	3.05	6	4	0.1016	1.661	31.87
20	6.10	12	6	0.1524	0.8992	34.48
30	9.14	18	6	0.1524	0.7386	42.46
50	15.24	30	6	0.1524	0.5548	53.13
100	30.48	60	6	0.1524	0.3076	58.91



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

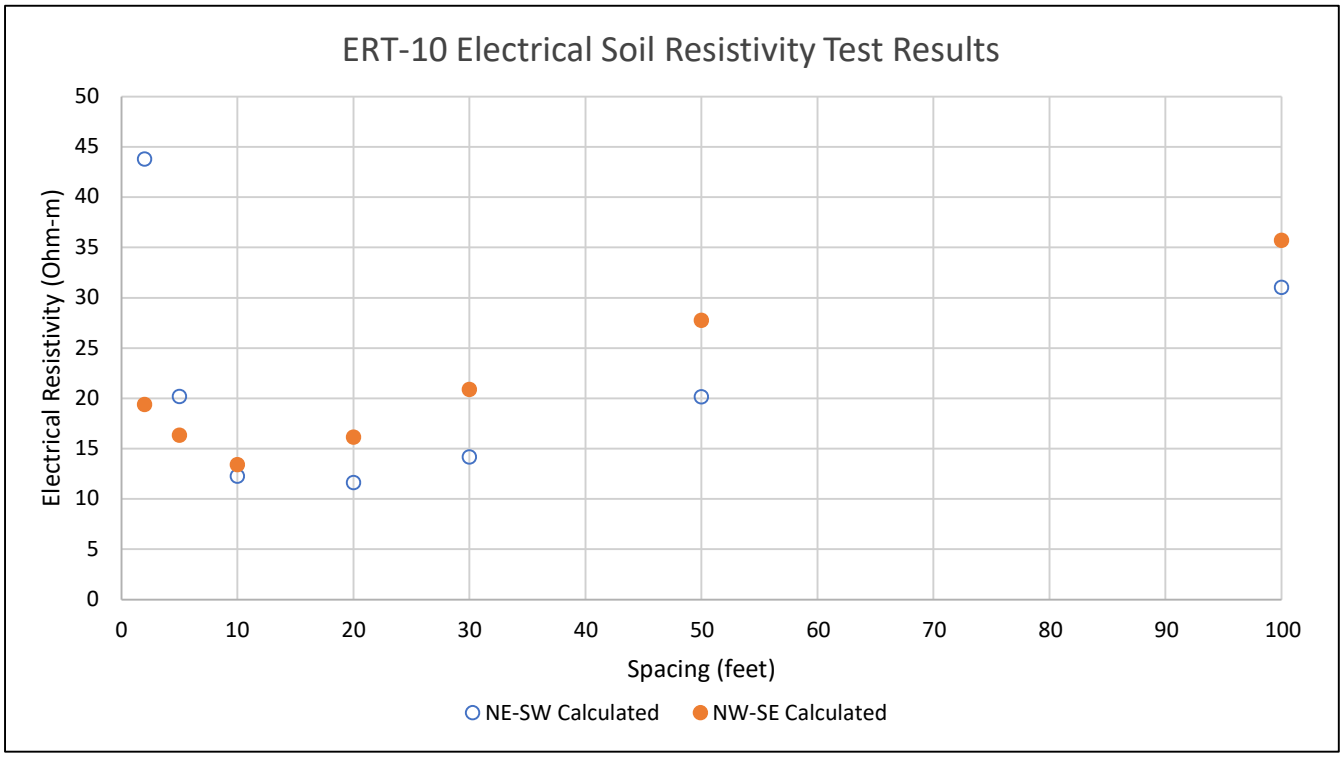
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sydney Shanahan
DATE:	3/5/2025	**TIME:**	10:00 AM
TEST LOCATION:	ERT-10	**TEMP:**	Clear skies, 50s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	11.3	43.80
5	1.52	3	3	0.0762	2.1	20.20
10	3.05	6	4	0.1016	0.6396	12.27
20	6.10	12	6	0.1524	0.3036	11.64
30	9.14	18	6	0.1524	0.2468	14.19
50	15.24	30	6	0.1524	0.2104	20.15
100	30.48	60	6	0.1524	0.162	31.03

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	5	19.38
5	1.52	3	3	0.0762	1.7	16.35
10	3.05	6	4	0.1016	0.6991	13.41
20	6.10	12	6	0.1524	0.4215	16.16
30	9.14	18	6	0.1524	0.3636	20.90
50	15.24	30	6	0.1524	0.2898	27.75
100	30.48	60	6	0.1524	0.1865	35.72



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

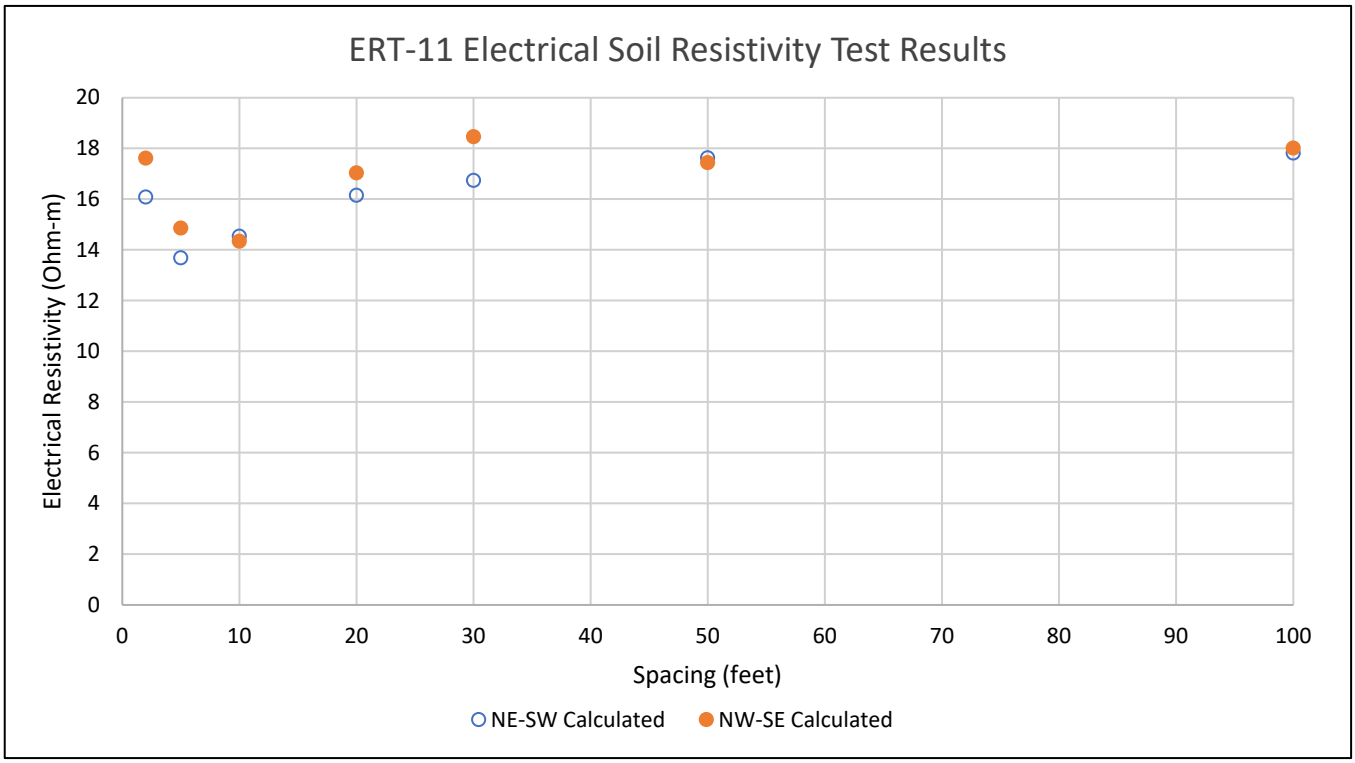
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sharen Wallace
DATE:	5/7/2025	**TIME:**	3:30 PM
TEST LOCATION:	ERT-11	**TEMP:**	Clear skies, 80s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	4.146	16.07
5	1.52	3	3	0.0762	1.422	13.68
10	3.05	6	4	0.1016	0.757	14.53
20	6.10	12	6	0.1524	0.421	16.14
30	9.14	18	6	0.1524	0.291	16.73
50	15.24	30	6	0.1524	0.184	17.62
100	30.48	60	6	0.1524	0.093	17.81

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	4.543	17.61
5	1.52	3	3	0.0762	1.544	14.85
10	3.05	6	4	0.1016	0.747	14.33
20	6.10	12	6	0.1524	0.444	17.02
30	9.14	18	6	0.1524	0.321	18.45
50	15.24	30	6	0.1524	0.182	17.43
100	30.48	60	6	0.1524	0.094	18.00



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

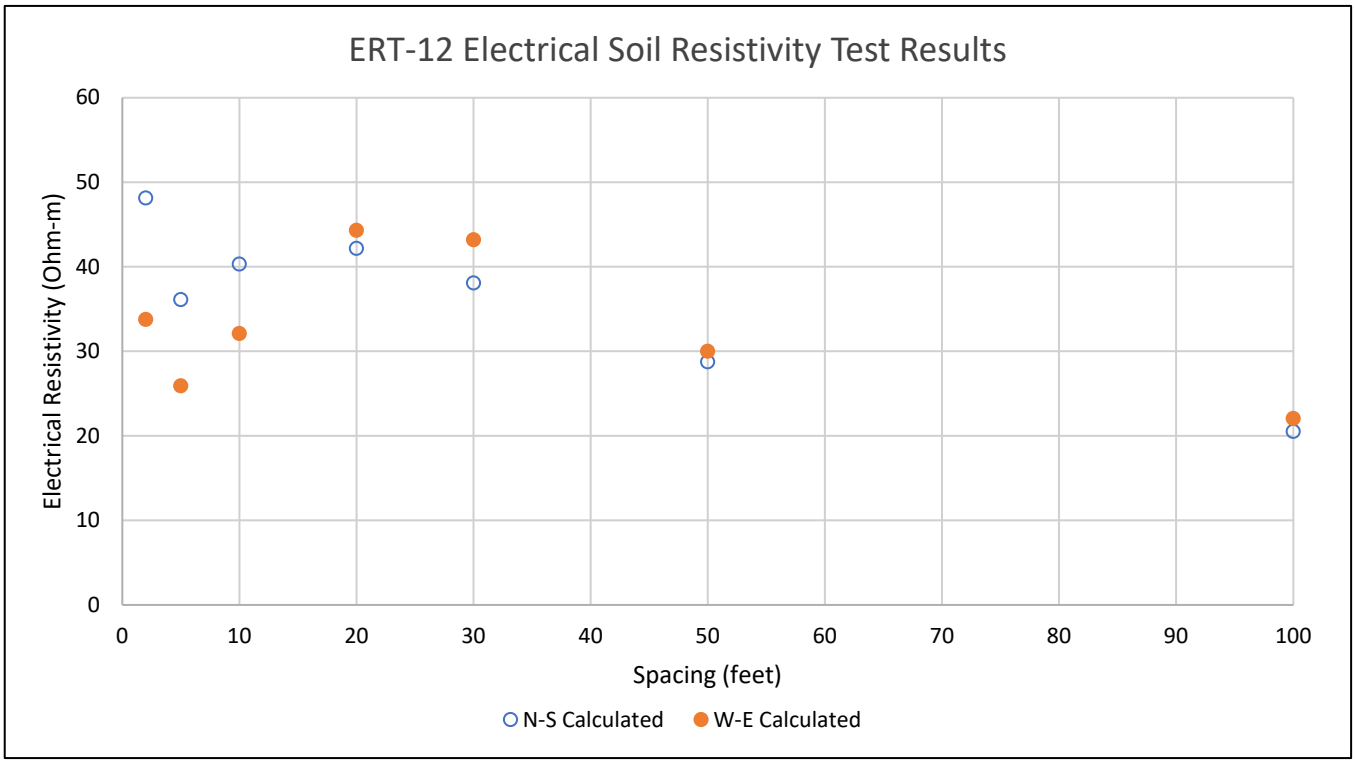
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sharen Wallace
DATE:	5/8/2025	**TIME:**	7:30 AM
TEST LOCATION:	ERT-12	**TEMP:**	Clear skies, 70s F

DIRECTION 1: N-S

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	12.411	48.11
5	1.52	3	3	0.0762	3.753	36.09
10	3.05	6	4	0.1016	2.1	40.30
20	6.10	12	6	0.1524	1.099	42.14
30	9.14	18	6	0.1524	0.662	38.05
50	15.24	30	6	0.1524	0.3	28.73
100	30.48	60	6	0.1524	0.107	20.49

DIRECTION 2: W-E

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	8.705	33.74
5	1.52	3	3	0.0762	2.691	25.88
10	3.05	6	4	0.1016	1.672	32.08
20	6.10	12	6	0.1524	1.155	44.29
30	9.14	18	6	0.1524	0.751	43.17
50	15.24	30	6	0.1524	0.313	29.98
100	30.48	60	6	0.1524	0.115	22.02



FIELD MEASUREMENT OF SOIL RESISTIVITY USING WENNER FOUR-POINT METHOD

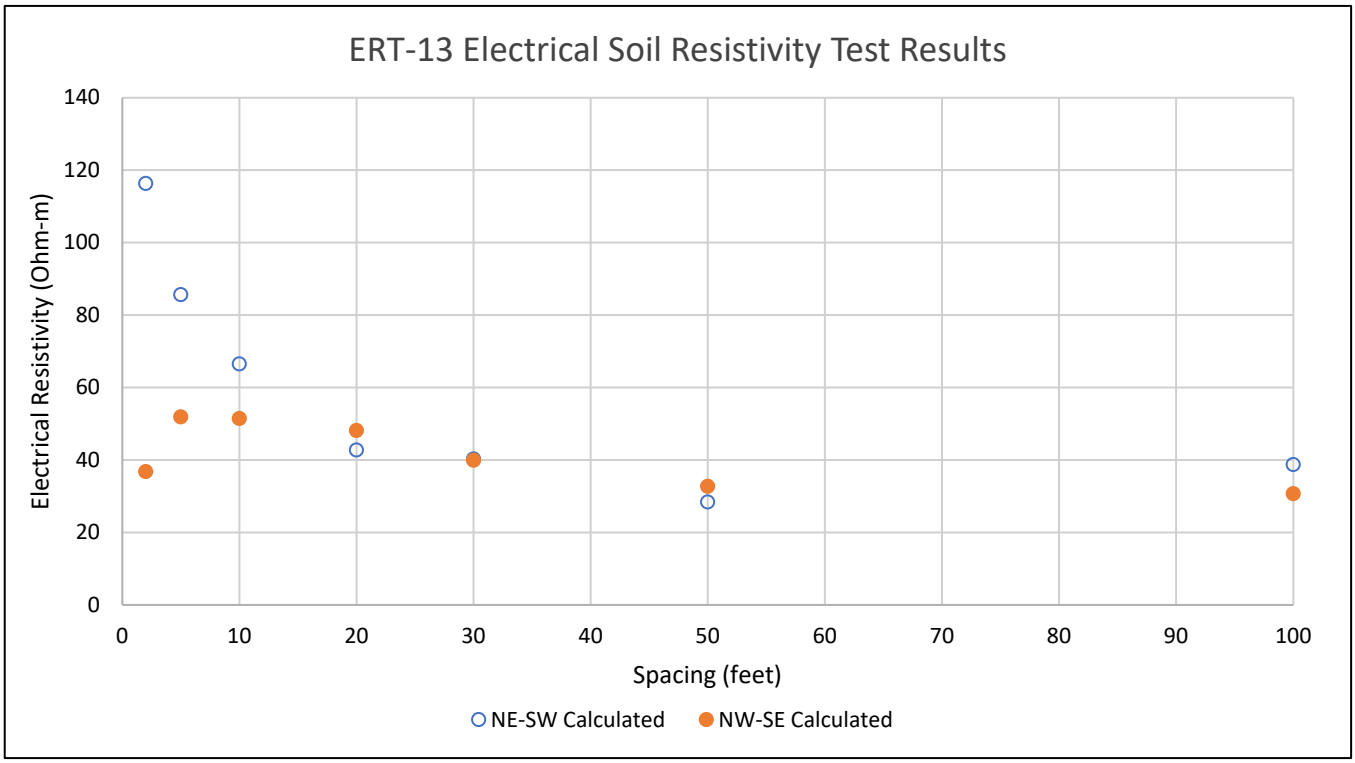
PROJECT NAME:	Chisme Solar and Storage		
PROJECT NUMBER:	520102301	**INSPECTOR:**	Sharen Wallace
DATE:	5/6/2025	**TIME:**	3:30 PM
TEST LOCATION:	ERT-13	**TEMP:**	Clear skies, 80s F

DIRECTION 1: NE-SW

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	30	116.29
5	1.52	3	3	0.0762	8.898	85.57
10	3.05	6	4	0.1016	3.463	66.45
20	6.10	12	6	0.1524	1.114	42.72
30	9.14	18	6	0.1524	0.7	40.24
50	15.24	30	6	0.1524	0.296	28.35
100	30.48	60	6	0.1524	0.202	38.69

DIRECTION 2: NW-SE

ELECTRODE SPACING "a" (ft)	(m)	MAX PENETRATION (5% a) (in)	ACTUAL PENETRATION (in)	(m)	RESISTANCE (ohm)	RESISTIVITY (CALC.) (ohm-m)
2	0.61	1.2	2	0.0508	9.482	36.75
5	1.52	3	3	0.0762	5.391	51.85
10	3.05	6	4	0.1016	2.678	51.39
20	6.10	12	6	0.1524	1.254	48.08
30	9.14	18	6	0.1524	0.694	39.89
50	15.24	30	6	0.1524	0.341	32.66
100	30.48	60	6	0.1524	0.16	30.64



ATTACHMENT D

Lateral Pile Load Test Results

LANGAN

PILE LOAD TEST

LATERAL LOAD - PILE TEST - 1A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/10/2025 (10am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	1A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 40s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.045	0.033	0.039	
		1	0.045	0.033	0.039	
1000	10%	0.5	0.075	0.067	0.071	
		1	0.075	0.065	0.070	
1500	15%	0.5	0.125	0.128	0.127	
		1	0.125	0.127	0.126	
2000	20%	0.5	0.200	0.195	0.198	
		1	0.200	0.195	0.198	
2500	25%	0.5	0.269	0.269	0.269	
		1	0.268	0.270	0.269	
3000	30%	0.5	0.335	0.348	0.342	
		1	0.335	0.347	0.341	
3500	35%	0.5	0.426	0.430	0.428	
		1	0.425	0.429	0.427	
4000	40%	0.5	0.509	0.513	0.511	
		1	0.501	0.509	0.505	
		2	0.522	0.525	0.524	
		3	0.528	0.531	0.530	
		4	0.530	0.534	0.532	
		5	0.533	0.535	0.534	
When deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load (lb) at 0.5" deflection =						4000

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
3000	30%	0.5	0.445	0.460	0.453	
		1	0.445	0.460	0.453	
2000	20%	0.5	0.361	0.375	0.368	
		1	0.369	0.374	0.372	
1000	10%	0.5	0.242	0.245	0.244	
		1	0.242	0.245	0.244	
0	0%	0.5	0.016	0.000	0.008	
		1	0.015	0.000	0.008	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.008

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Reloading						
1000	10%	0.5	0.210	0.213	0.212	
		1	0.211	0.212	0.212	
2000	20%	0.5	0.316	0.321	0.319	
		1	0.315	0.321	0.318	
3000	30%	0.5	0.420	0.427	0.424	
		1	0.420	0.426	0.423	
4000	40%	0.5	0.522	0.529	0.526	
		1	0.521	0.527	0.524	
5000	50%	0.5	0.675	0.675	0.675	Hand pump maxed out at about 5000 lbs
		1	0.672	0.673	0.673	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
10000	100%	0.5				The pile failed while trying to fix the hand pump. No Unloading data.
		1				
9000	90%	0.5				
		1				
8000	80%	0.5				
		1				
7000	70%	0.5				
		1				
6000	60%	0.5				
		1				
5000	50%	0.5				
		1				
4000	40%	0.5				
		1				
3000	30%	0.5				
		1				
2000	20%	0.5				
		1				
1000	10%	0.5				
		1				
0	0%	0.5				
		1				
NOTE PERMANENT DEFORMATION ABOVE (in)						0.000

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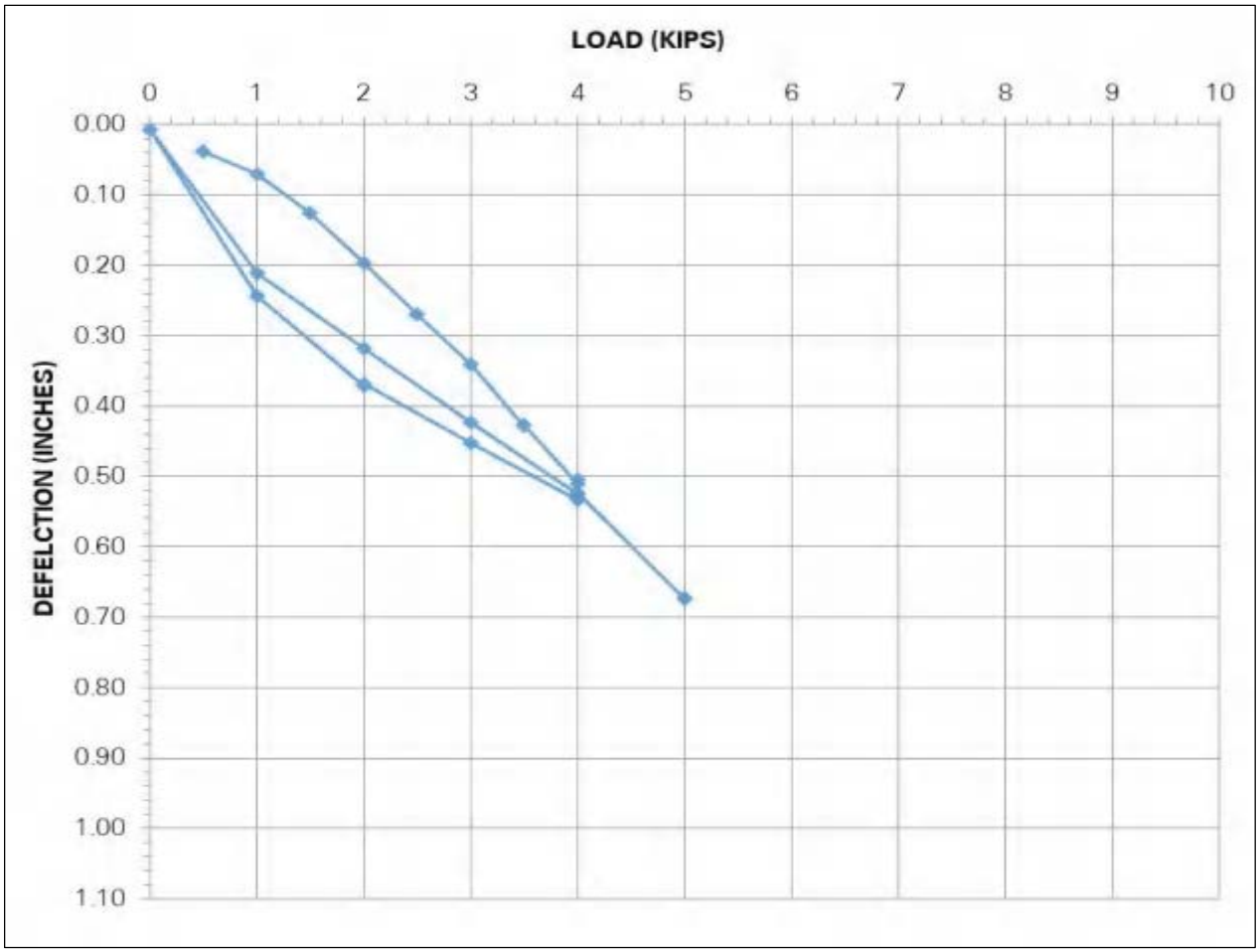
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 1A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/10/2025 (10am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	1A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 40s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 2A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (5:06pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	2A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.076	0.072	0.074	
		1	0.076	0.073	0.075	
1000	10%	0.5	0.132	0.128	0.130	
		1	0.135	0.129	0.132	
1500	15%	0.5	0.195	0.185	0.190	
		1	0.195	0.185	0.190	
2000	20%	0.5	0.254	0.240	0.247	
		1	0.257	0.242	0.250	
2500	25%	0.5	0.318	0.300	0.309	
		1	0.318	0.300	0.309	
3000	30%	0.5	0.380	0.362	0.371	
		1	0.382	0.365	0.374	
3500	35%	0.5	0.443	0.423	0.433	
		1	0.447	0.427	0.437	
4000	40%	0.5	0.504	0.488	0.496	
		1	0.507	0.49	0.500	
4500	45%	0.5	0.565	0.550	0.558	
		1	0.569	0.553	0.561	
		2	0.571	0.556	0.564	
		3	0.574	0.559	0.567	
		4	0.578	0.564	0.571	
		5	0.578	0.564	0.571	
deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb						
load (lb) at 0.5" deflection =						4500

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

Load (pounds)	% of Max Load	Time (min)	Gauge* 1	Gauge* 2	Dial Gauge	Notes
Unloading						
4000	40%	0.5	0.558	0.544	0.551	
		1	0.558	0.544	0.551	
3000	30%	0.5	0.507	0.497	0.502	
		1	0.502	0.495	0.499	
2000	20%	0.5	0.423	0.412	0.418	
		1	0.417	0.408	0.413	
1000	10%	0.5	0.3	0.29	0.3	
		1	0.3	0.29	0.3	
0	0%	0.5	0.11	0.12	0.12	
		1	0.11	0.12	0.12	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.115

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max Load	Time (min)	Gauge* 1	Gauge* 2	Dial Gauge	Notes
Reloading						
1000	10%	0.5	0.253	0.235	0.244	
		1	0.250	0.235	0.243	
2000	20%	0.5	0.363	0.347	0.355	
		1	0.37	0.349	0.357	
3000	30%	0.5	0.455	0.440	0.448	
		1	0.459	0.442	0.451	
4000	40%	0.5	0.533	0.515	0.524	
		1	0.537	0.518	0.528	
5000	50%	0.5	0.623	0.600	0.612	
		1	0.634	0.615	0.625	
5280	53%	0.5	0.680	0.66	0.67	Hand pump maxed out at about 5250 lbs
		1				
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						

Load (pounds)	% of Max	Time (min)	Dial 1	Dial 2	Dial Gaug	Notes
Unloading						
4000	40%	0.5	0.636	0.620	0.628	
		1	0.631	0.614	0.623	
3000	30%	0.5	0.572	0.558	0.565	
		1	0.565	0.551	0.558	
2000	20%	0.5	0.484	0.473	0.479	
		1	0.479	0.467	0.473	
1000	10%	0.5	0.353	0.348	0.351	
		1	0.350	0.340	0.345	
0	0%	0.5	0.150	0.152	0.151	
		1	0.149	0.149	0.149	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.149

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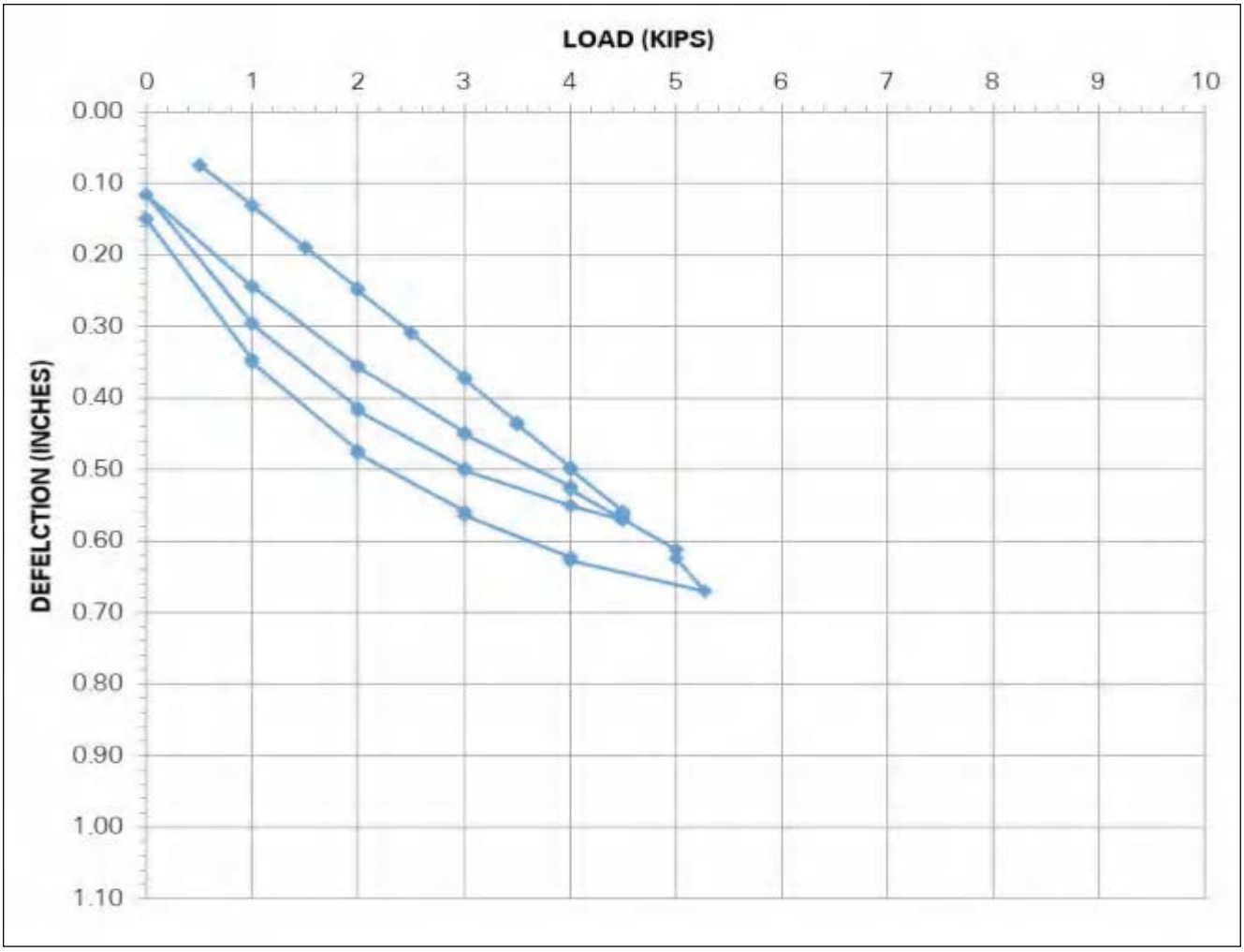
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 2A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (5:06pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	2A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 3A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (12:10pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	3A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.005	0.001	0.003	
		1	0.005	0.002	0.004	
1000	10%	0.5	0.105	0.062	0.084	
		1	0.105	0.063	0.084	
1500	15%	0.5	0.162	0.114	0.138	
		1	0.162	0.116	0.139	
2000	20%	0.5	0.220	0.175	0.198	
		1	0.250	0.180	0.215	
2500	25%	0.5	0.280	0.230	0.255	
		1	0.287	0.238	0.263	
3000	30%	0.5	0.348	0.297	0.323	
		1	0.352	0.299	0.326	
3500	35%	0.5	0.411	0.355	0.383	
		1	0.417	0.358	0.388	
4000	40%	0.5	0.478	0.417	0.448	
		1	0.483	0.419	0.451	
4500	45%	0.5	0.539	0.478	0.509	
		1	0.552	0.487	0.520	
		2	0.557	0.492	0.525	
		3	0.558	0.494	0.526	
		4	0.562	0.496	0.529	
		5	0.563	0.496	0.530	
hen deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb IN						
load (lb) at 0.5" deflection =						4500

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
4000	40%	0.5	0.537	0.474	0.506	
		1	0.537	0.474	0.506	
3000	30%	0.5	0.482	0.423	0.453	
		1	0.482	0.423	0.453	
2000	20%	0.5	0.401	0.346	0.374	
		1	0.401	0.346	0.374	
1000	10%	0.5	0.263	0.214	0.239	
		1	0.263	0.214	0.239	
0	0%	0.5	0.01	0	0.005	
		1	0.01	0	0.005	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.005

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Reloading						
1000	10%	0.5	0.209	0.160	0.185	
		1	0.209	0.160	0.185	
2000	20%	0.5	0.335	0.286	0.311	
		1	0.338	0.287	0.313	
3000	30%	0.5	0.444	0.385	0.415	
		1	0.444	0.385	0.415	
4000	40%	0.5	0.526	0.464	0.495	
		1	0.526	0.464	0.495	
5000	50%	0.5	0.628	0.560	0.594	
		1	0.633	0.564	0.599	
6000	60%	0.5	0.945	0.93	0.938	
		1	1.05	1.05	1.05	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						6000

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
6000	60%	0.5	0.945	0.930	0.938	
		1	1.050	1.050	1.050	
5000	50%	0.5	0.997	0.978	0.988	
		1	0.994	0.975	0.985	
4000	40%	0.5	0.943	0.925	0.934	
		1	0.943	0.925	0.934	
3000	30%	0.5	0.870	0.852	0.861	
		1	0.869	0.851	0.860	
2000	20%	0.5	0.767	0.748	0.758	
		1	0.767	0.748	0.758	
1000	10%	0.5	0.605	0.591	0.598	
		1	0.605	0.591	0.598	
0	0%	0.5	0.337	0.336	0.337	
		1	0.337	0.336	0.337	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.337

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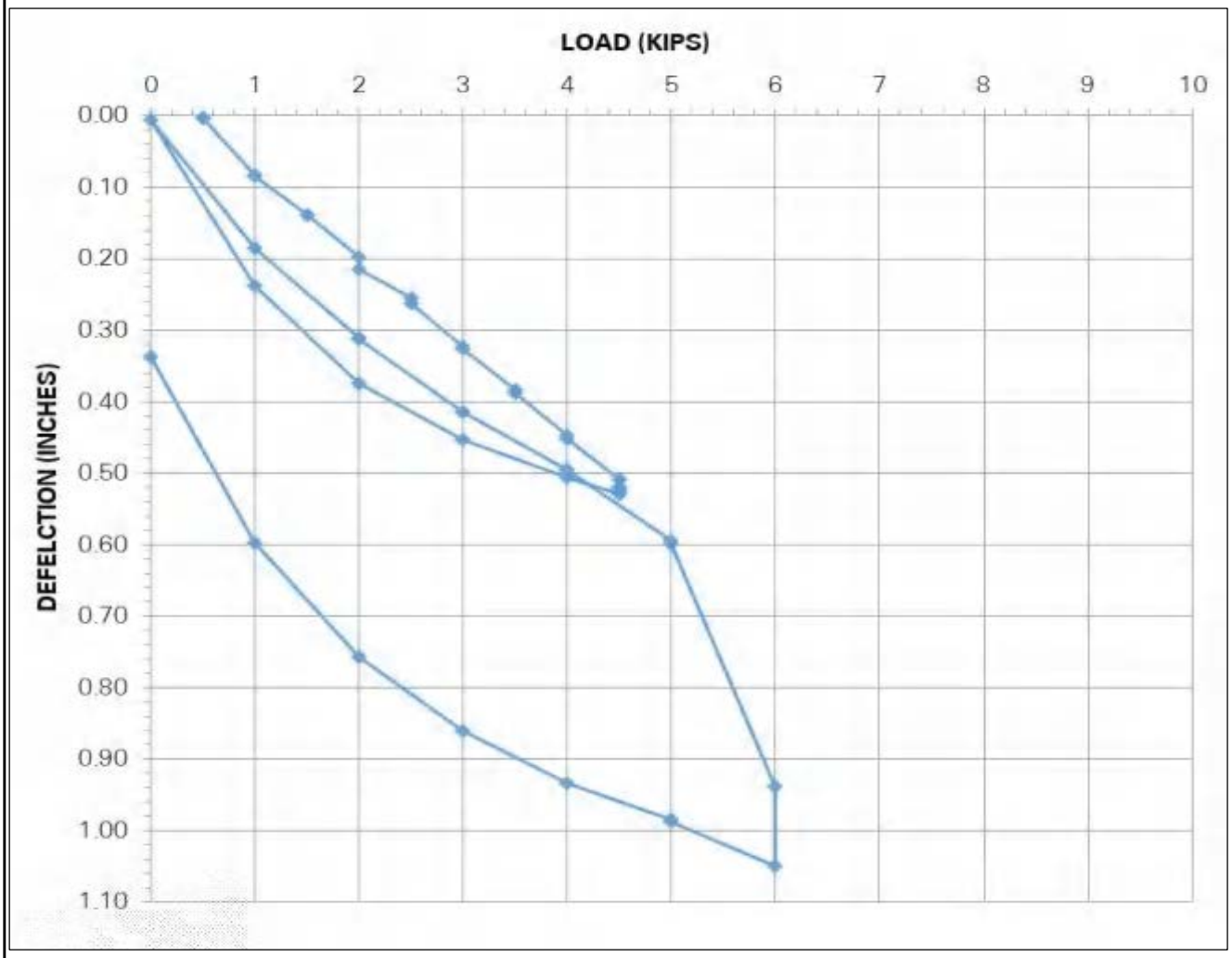
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 3A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (12:10pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	3A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 4A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (8:45am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	4A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 50s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.050	0.070	0.060	
		1	0.047	0.068	0.058	
2000	20%	0.5	0.140	0.170	0.155	
		1	0.145	0.174	0.160	
3000	30%	0.5	0.254	0.287	0.271	
		1	0.259	0.289	0.274	
4000	40%	0.5	0.375	0.410	0.393	
		1	0.385	0.418	0.402	
5000	50%	0.5	0.518	0.550	0.534	
		1	0.525	0.555	0.540	
		2	0.528	0.558	0.543	
		3	0.531	0.561	0.546	
		4	0.533	0.563	0.548	
		5	0.535	0.564	0.550	
When deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load (lb) at 0.5" deflection =						5000

Load (pounds)	% of Max Load	Time (min)	Gauge* 1	Gauge* 2	Dial Gauge AVG	Notes
Unloading						
4000	40%	0.5	0.485	0.513	0.499	
		1	0.484	0.512	0.498	
3000	30%	0.5	0.418	0.448	0.433	
		1	0.417	0.447	0.432	
2000	20%	0.5	0.312	0.343	0.328	
		1	0.311	0.342	0.327	
1000	10%	0.5	0.171	0.198	0.185	
		1	0.169	0.197	0.183	
0	0%	0.5	0.009	0.012	0.011	
		1	0.007	0.011	0.009	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.009

Load (pounds)	% of Max Load	Time (min)	Gauge* 1	Gauge* 2	Dial Gauge AVG	Notes
Reloading						
1000	10%	0.5	0.124	0.150	0.137	
		1	0.122	0.148	0.135	
2000	20%	0.5	0.246	0.278	0.262	
		1	0.245	0.277	0.261	
3000	30%	0.5	0.347	0.380	0.364	
		1	0.348	0.381	0.365	
4000	40%	0.5	0.435	0.466	0.451	
		1	0.435	0.466	0.451	
5000	50%	0.5	0.520	0.550	0.535	
		1	0.528	0.557	0.543	
5900	59%	0.5	1.070	1.03	1.05	
		1	1.07	1.03	1.05	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						5900

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max	Time (min)	Dial 1	Dial 2	Dial Gaug	Notes
Unloading						
5000	50%	0.5	1.055	1.008	1.032	
		1	1.055	1.008	1.032	
4000	40%	0.5	0.991	0.942	0.967	
		1	0.990	0.941	0.966	
3000	30%	0.5	0.920	0.875	0.898	
		1	0.920	0.875	0.898	
2000	20%	0.5	0.808	0.758	0.783	
		1	0.806	0.757	0.782	
1000	10%	0.5	0.637	0.589	0.613	
		1	0.635	0.588	0.612	
0	0%	0.5	0.442	0.401	0.422	
		1	0.438	0.399	0.419	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.419

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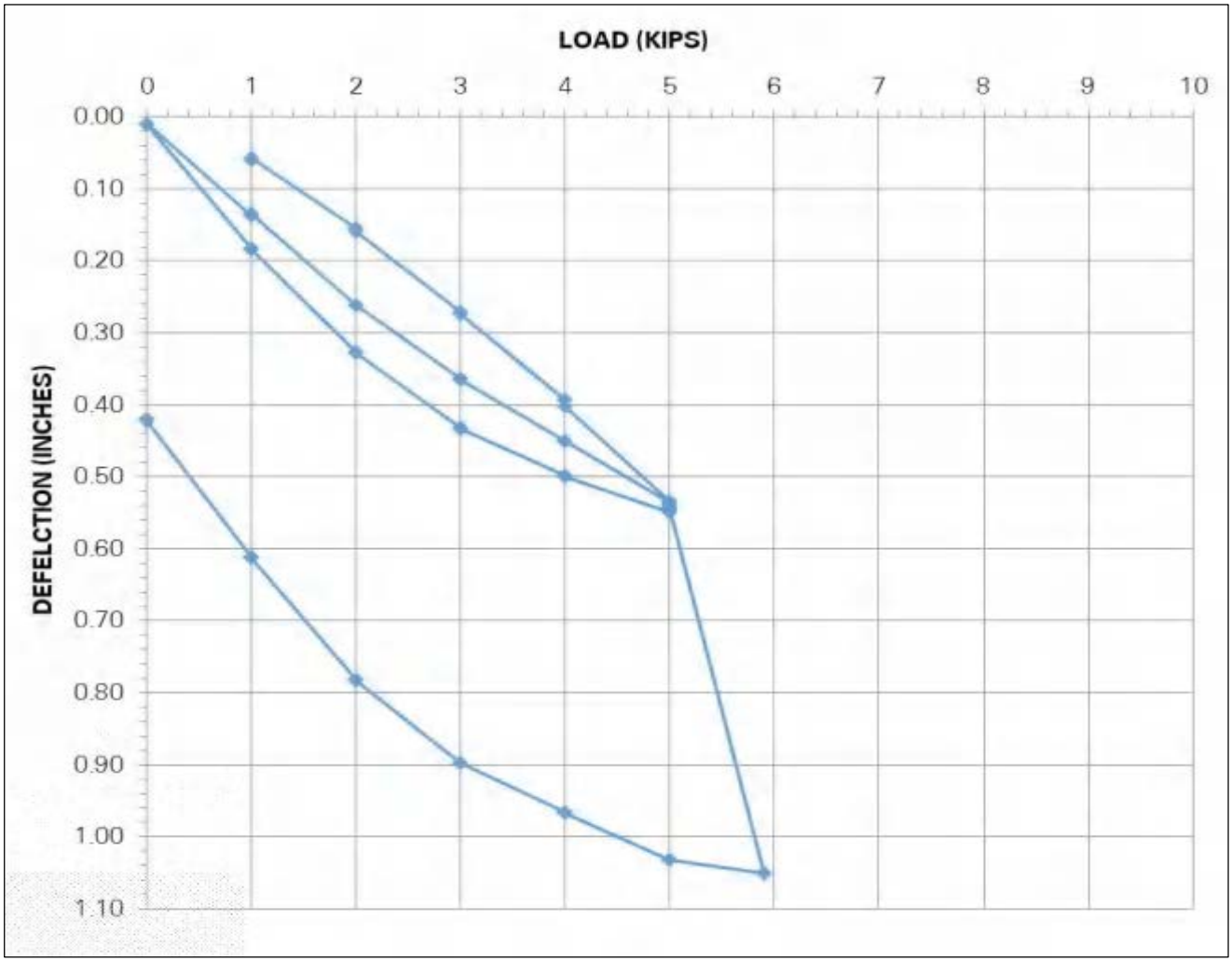
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 4A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (8:45am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	4A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 50s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 5A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (5:30pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	5A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.084	0.004	0.044	
		1	0.086	0.005	0.046	
2000	20%	0.5	0.218	0.145	0.182	
		1	0.228	0.153	0.191	
3000	30%	0.5	0.365	0.300	0.333	
		1	0.375	0.306	0.341	
4000	40%	0.5	0.515	0.440	0.478	Stopped test as there was no gap left in the pull
		1	0.522	0.448	0.485	cylinder
1000	10%	0.5	0.220	0.130	0.175	
		1	0.220	0.130	0.175	
0	0%	2	0.010	0.000	0.005	
		3	0.010	0.000	0.005	
400	4%	4	0.046	0.000	0.023	
		5	0.046	0.000	0.023	
1000	10%	0.5	0.161	0.074	0.118	
		1	0.161	0.074	0.118	
2000	20%	0.5	0.312	0.232	0.272	
		1	0.314	0.235	0.275	
3000	30%	0.5	0.44	0.37	0.405	
		1	0.445	0.37	0.408	
4000	40%	0.5	0.538	0.467	0.503	
		1	0.545	0.471	0.508	
		2	0.547	0.474	0.511	
		3	0.548	0.475	0.512	
		4	0.55	0.477	0.514	
		5	0.55	0.477	0.514	
When deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC						
load (lb) at 0.5" deflection =						5000

Load (pounds)	% of Max Load	Time (min)	Gauge* 1	Gauge* 2	Dial Gauge	Notes
Unloading						
4000	40%	0.5	0.550	0.477	0.514	
		1	0.550	0.477	0.514	
3000	30%	0.5	0.488	0.410	0.449	
		1	0.483	0.408	0.446	
2000	20%	0.5	0.380	0.296	0.338	
		1	0.379	0.295	0.337	
1000	10%	0.5	0.215	0.123	0.169	
		1	0.214	0.122	0.168	
0	0%	0.5	0.025	0.000	0.013	
		1	0.025	0.000	0.013	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.013

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max Load	Time (min)	Gauge* 1	Gauge* 2	Dial Gauge	Notes
Reloading						
1000	10%	0.5	0.164	0.075	0.120	
		1	0.165	0.079	0.122	
2000	20%	0.5	0.333	0.252	0.293	
		1	0.33	0.253	0.292	
3000	30%	0.5	0.455	0.383	0.419	
		1	0.456	0.384	0.420	
4000	40%	0.5	0.545	0.475	0.510	
		1	0.549	0.477	0.513	
5000	50%	0.5	0.660	0.590	0.625	
		1	0.672	0.600	0.636	
6000	60%	0.5	0.860	0.780	0.820	
		1	0.887	0.81	0.849	
6600	66%	0.5	1.07	1.07	1.070	
		1	1.07	1.07	1.070	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						6600

Load (pounds)	% of Max	Time (min)	Dial 1	Dial 2	Dial Gaug	Notes
Unloading						
6000	60%	0.5	1.060	1.050	1.055	
		1	1.055	1.045	1.050	
5000	50%	0.5	1.020	1.005	1.013	
		1	1.020	1.005	1.013	
4000	40%	0.5		0.930	0.930	Gauge 1 was disconnected
		1		0.926	0.926	
3000	30%	0.5		0.822	0.822	
		1		0.844	0.844	
2000	20%	0.5		0.703	0.703	
		1		0.703	0.703	
1000	10%	0.5		0.515	0.515	
		1		0.514	0.514	
0	0%	0.5		0.287	0.287	
		1		0.285	0.285	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.285

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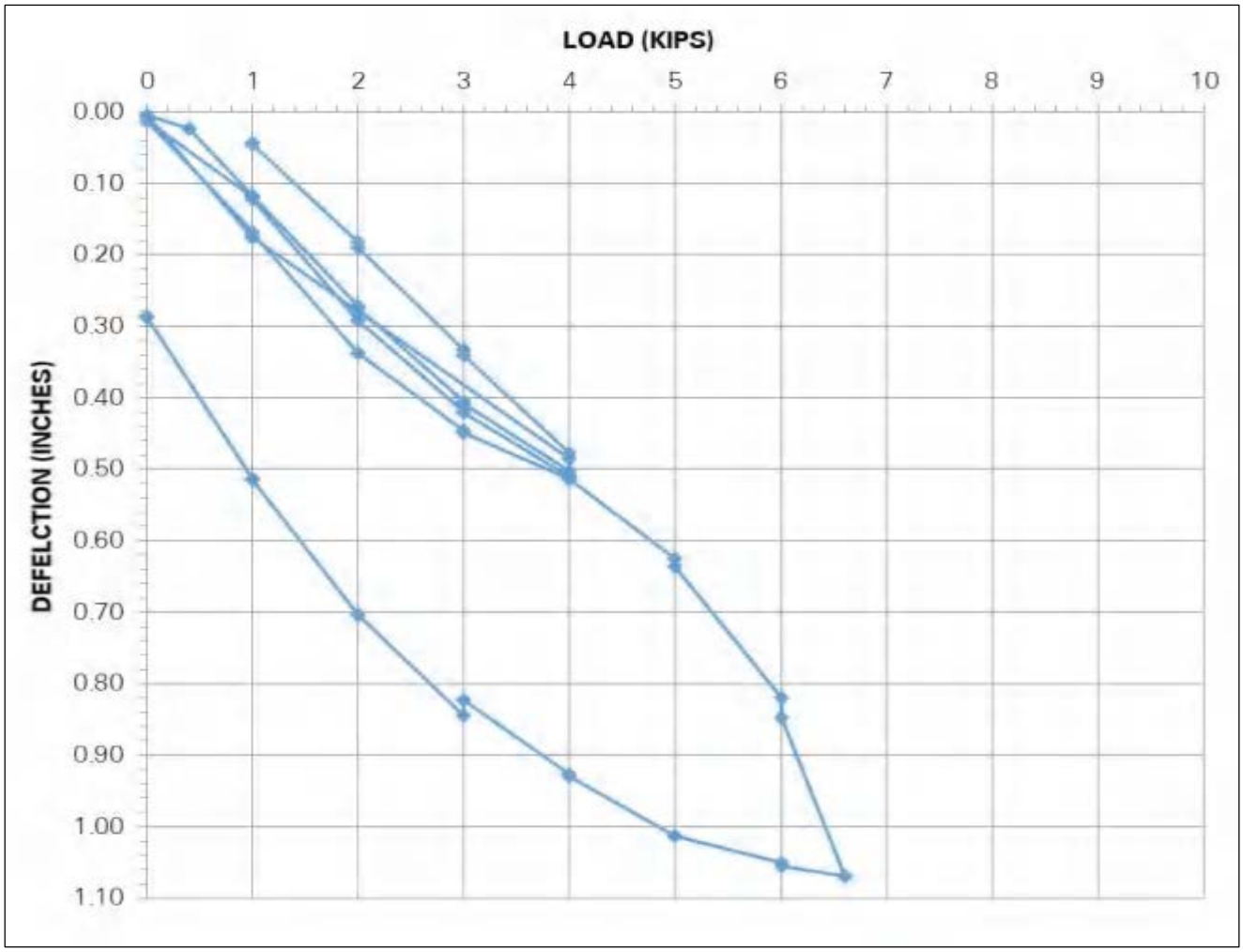
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 5A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (5:30pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	5A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 6A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (2:30pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	6A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.099	0.089	0.094	
		1	0.099	0.089	0.094	
1000	10%	0.5	0.195	0.185	0.190	
		1	0.195	0.185	0.190	
1500	15%	0.5	0.288	0.270	0.279	
		1	0.288	0.270	0.279	
2000	20%	0.5	0.374	0.360	0.367	
		1	0.383	0.368	0.376	
2500	25%	0.5	0.468	0.452	0.460	
		1	0.479	0.460	0.470	
3000	30%	0.5	0.574	0.548	0.561	
		1	0.587	0.559	0.573	
		2	0.591	0.565	0.578	
		3	0.595	0.569	0.582	
		4	0.597	0.572	0.585	
		5	0.600	0.575	0.588	
When deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load (lb) at 0.5" deflection =						3000

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
2000	20%	0.5	0.543	0.520	0.532	
		1	0.540	0.518	0.529	
1000	10%	0.5	0.414	0.404	0.409	
		1	0.413	0.403	0.408	
0	0%	0.5	0.177	0.177	0.177	
		1	0.176	0.177	0.177	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.177

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Reloading						
1000	10%	0.5	0.352	0.344	0.348	
		1	0.352	0.345	0.349	
2000	20%	0.5	0.502	0.485	0.494	
		1	0.508	0.487	0.498	
3000	30%	0.5	0.627	0.595	0.611	
		1	0.654	0.600	0.627	
4000	40%	0.5	0.812	0.765	0.789	
		1	0.825	0.775	0.800	
5000	50%	0.5	1.028	0.980	1.004	
		1	1.028	0.980	1.004	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						5000

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
4000	40%	0.5	0.960	0.938	0.949	
		1	0.960	0.938	0.949	
3000	30%	0.5	0.926	0.875	0.901	
		1	0.920	0.870	0.895	
2000	20%	0.5	0.795	0.765	0.780	
		1	0.795	0.760	0.778	
1000	10%	0.5	0.610	0.585	0.598	
		1	0.608	0.586	0.597	
0	0%	0.5	0.317	0.308	0.313	
		1	0.316	0.306	0.311	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.311

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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 6A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (2:30pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	6A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 7A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (3:15pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	7A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.037	0.062	0.050	
		1	0.040	0.064	0.052	
2000	20%	0.5	0.155	0.183	0.169	
		1	0.162	0.190	0.176	
3000	30%	0.5	0.294	0.324	0.309	
		1	0.302	0.330	0.316	
4000	40%	0.5	0.425	0.460	0.443	
		1	0.447	0.475	0.461	
5000	50%	0.5	0.480	0.515	0.498	
		1	0.498	0.533	0.516	
		2	0.507	0.542	0.525	
		3	0.512	0.548	0.530	
		4	0.514	0.548	0.531	
		5	0.514	0.553	0.534	
When deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load (lb) at 0.5" deflection =						5000

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
4000	40%	0.5	0.450	0.475	0.463	
		1	0.446	0.472	0.459	
3000	30%	0.5	0.365	0.385	0.375	
		1	0.363	0.384	0.374	
2000	20%	0.5	0.263	0.279	0.271	
		1	0.261	0.278	0.270	
1000	10%	0.5	0.100	0.103	0.102	
		1	0.099	0.103	0.101	
0	0%	0.5	0.000	0.000	0.000	
		1	0.000	0.000	0.000	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.000

Load (pounds)	% of Max Load	Time (min)	Dial Gaug 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Reloading						
1000	10%	0.5	0.165	0.166	0.166	
		1	0.165	0.166	0.166	
2000	20%	0.5	0.285	0.294	0.290	
		1	0.284	0.293	0.289	
3000	30%	0.5	0.398	0.412	0.405	
		1	0.401	0.414	0.408	
4000	40%	0.5	0.495	0.515	0.505	
		1	0.500	0.520	0.510	
5000	50%	0.5	0.585	0.616	0.601	
		1	0.595	0.620	0.608	
6000	60%	0.5	0.715	0.755	0.735	
		1	0.748	0.778	0.763	
6100	61%	0.5	0.778	0.805	0.792	
		1	0.778	0.805	0.792	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max	Time (min)	Dial 1	Dial 2	Dial Gaug	Notes
Unloading						
5000	50%	0.5	0.620	0.645	0.633	
		1	0.617	0.641	0.629	
4000	40%	0.5	0.555	0.573	0.564	
		1	0.553	0.572	0.563	
3000	30%	0.5	0.455	0.471	0.463	
		1	0.455	0.470	0.463	
2000	20%	0.5	0.341	0.345	0.343	
		1	0.338	0.351	0.345	
1000	10%	0.5	0.248	0.248	0.248	
		1	0.248	0.248	0.248	
0	0%	0.5	0.000	0.000	0.000	
		1	0.000	0.000	0.000	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.000

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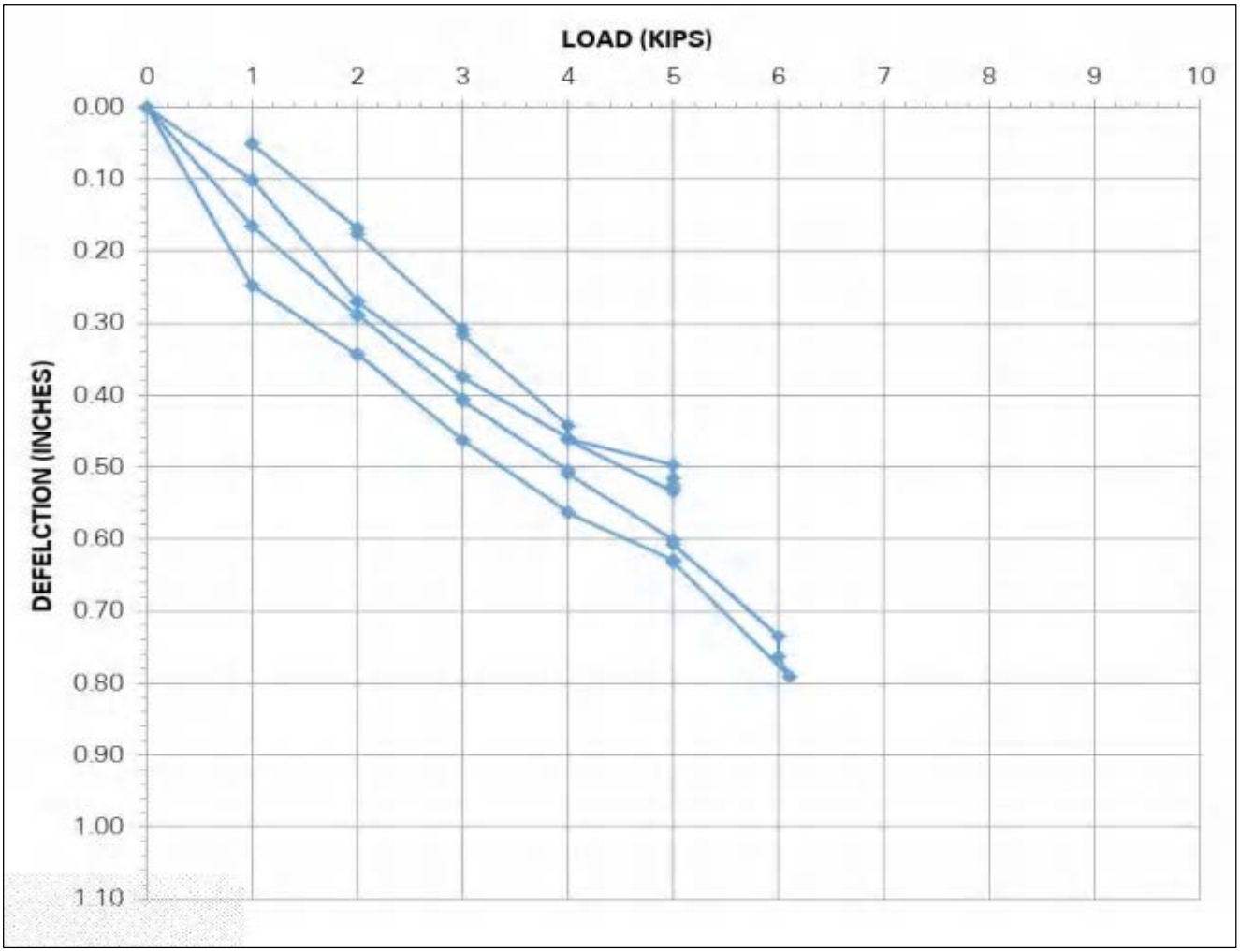
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 7A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (3:15pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	7A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

LATERAL LOAD - PILE TEST - 8A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (6:50pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	8A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny/Windy 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.110	0.113	0.112	
		1	0.110	0.113	0.112	
2000	20%	0.5	0.275	0.280	0.278	
		1	0.285	0.285	0.285	
3000	30%	0.5	0.465	0.460	0.463	
		1	0.479	0.474	0.477	
4000	40%	0.5	0.660	0.655	0.658	
		1	0.675	0.669	0.672	
		2	0.684	0.679	0.682	
		3	0.687	0.683	0.685	
		4	0.690	0.689	0.690	
		5	0.691	0.686	0.689	
When deflection reaches 0.5", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load (lb) at 0.5" deflection =						4000

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Total Pile Length (ft)	14
Pile Stick up (ft)	4

*NOTE: For lateral load testing, dial guages reading shall be taken at a distance of 6-inches above the ground surface while the lateral load is applied at a height of 42-inches (3.5 feet) above the ground surface.

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Unloading						
3000	30%	0.5	0.620	0.615	0.618	
		1	0.619	0.613	0.616	
2000	20%	0.5	0.49	0.486	0.488	
		1	0.49	0.486	0.488	
1000	10%	0.5	0.29	0.292	0.291	
		1	0.292	0.294	0.293	
0	0%	0.5	0.098	0.103	0.101	
		1	0.096	0.102	0.099	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.099

Load (pounds)	% of Max Load	Time (min)	Dial Gauge 1	Dial Gaug 2	Dial Gaug e AVG	Notes
Reloading						
1000	10%	0.5	0.258	0.264	0.261	
		1	0.258	0.264	0.261	
2000	20%	0.5	0.422	0.427	0.425	
		1	0.427	0.428	0.428	
3000	30%	0.5	0.559	0.559	0.559	
		1	0.560	0.559	0.560	
4000	40%	0.5	0.670	0.673	0.672	
		1	0.680	0.680	0.680	
5000	50%	0.5	0.820	0.830	0.825	
		1	0.850	0.850	0.850	
6000	60%	0.5	1.070	1.070	1.070	
When deflection reaches 1.0", unload to 0 in 1000lb INC.						
load (lb) at 1" deflection =						6000

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PILE LOAD TEST

LATERAL LOAD - PILE TEST

Load (pounds)	% of Max	Time (min)	Dial 1	Dial 2	Dial Gaug	Notes
Unloading						
5000	50%	0.5	1.036	1.034	1.035	
		1	1.036	1.034	1.035	
4000	40%	0.5	0.961	0.957	0.959	Gauge 1 was disconnected
		1	0.960	0.956	0.958	
3000	30%	0.5	0.854	0.850	0.852	
		1	0.853	0.849	0.851	
2000	20%	0.5	0.692	0.688	0.690	
		1	0.692	0.688	0.690	
1000	10%	0.5	0.450	0.445	0.448	
		1	0.452	0.447	0.450	
0	0%	0.5	0.196	0.200	0.198	
		1	0.196	0.200	0.198	
NOTE PERMANENT DEFORMATION ABOVE (in)						0.198

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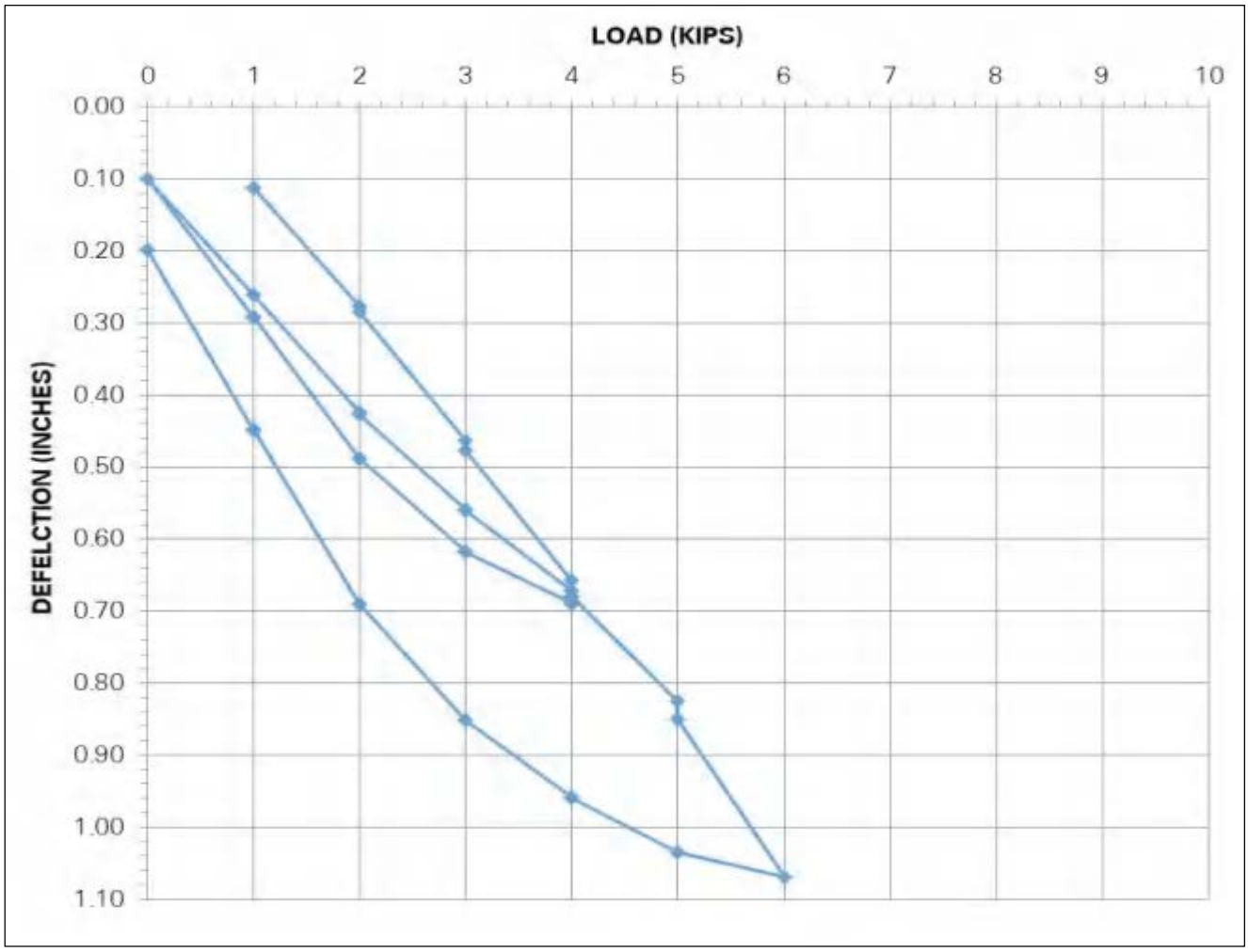
PILE LOAD TEST

LATERAL LOAD - PILE TEST - 8A

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (6:50pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	8A	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny/Windy 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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ATTACHMENT E

Tension Pile Load Test Results

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PILE LOAD TEST

TENSION LOAD - PILE TEST - 1B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (9am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	1B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 40s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.001	0.004	0.0025	
		1	0.001	0.004	0.0025	
1000	10%	0.5	0.001	0.01	0.0055	
		1	0.001	0.01	0.0055	
1500	15%	0.5	0.001	0.013	0.007	
		1	0.001	0.013	0.007	
2000	20%	0.5	0.001	0.017	0.009	
		1	0.001	0.017	0.009	
2500	25%	0.5	0.002	0.021	0.0115	
		1	0.002	0.021	0.0115	
3000	30%	0.5	0.003	0.023	0.013	
		1	0.003	0.023	0.013	
3500	35%	0.5	0.004	0.027	0.0155	
		1	0.004	0.027	0.0155	
4000	40%	0.5	0.005	0.032	0.0185	
		1	0.005	0.032	0.0185	
4500	45%	0.5	0.007	0.034	0.0205	
		1	0.007	0.034	0.0205	
5000	50%	0.5	0.009	0.037	0.023	
		1	0.009	0.037	0.023	
5500	55%	0.5	0.011	0.04	0.0255	
		1	0.011	0.04	0.0255	
6000	60%	0.5	0.013	0.044	0.0285	
		1	0.013	0.044	0.0285	
6500	65%	0.5	0.014	0.048	0.031	
		1	0.014	0.048	0.031	
7000	70%	0.5	0.016	0.049	0.0325	
		1	0.016	0.049	0.0325	
7500	75%	0.5	0.018	0.052	0.035	
		1	0.018	0.052	0.035	
8000	80%	0.5	0.02	0.054	0.037	
		1	0.02	0.054	0.037	
8500	85%	0.5	0.021	0.056	0.0385	
		1	0.021	0.056	0.0385	
9000	90%	0.5	0.024	0.06	0.042	
		1	0.024	0.06	0.042	
9500	95%	0.5	0.026	0.061	0.0435	
		1	0.026	0.061	0.0435	
10000	100%	0.5	0.029	0.065	0.047	
		1	0.029	0.065	0.047	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values	
Automatic Calculated value in this spreadsheet	

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PILE LOAD TEST

TENSION LOAD - PILE TEST

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.029	0.065	0.047	
		1	0.029	0.065	0.047	
9000	90%	0.5	0.026	0.06	0.043	
		1	0.026	0.06	0.043	
8000	80%	0.5	0.024	0.056	0.04	
		1	0.024	0.056	0.04	
7000	70%	0.5	0.02	0.05	0.035	
		1	0.02	0.05	0.035	
6000	60%	0.5	0.017	0.045	0.031	
		1	0.017	0.045	0.031	
5000	50%	0.5	0.014	0.04	0.027	
		1	0.014	0.04	0.027	
4000	40%	0.5	0.01	0.034	0.022	
		1	0.01	0.034	0.022	
3000	30%	0.5	0.008	0.028	0.018	
		1	0.008	0.028	0.018	
2000	20%	0.5	0.004	0.021	0.0125	
		1	0.004	0.021	0.0125	
1000	10%	0.5	0.003	0.014	0.0085	
		1	0.003	0.014	0.0085	
0	0%	0.5	0.002	0.001	0.0015	
		1	0.002	0.001	0.0015	
NOTE PERMANENT DEFORMATION ABOVE						0.001

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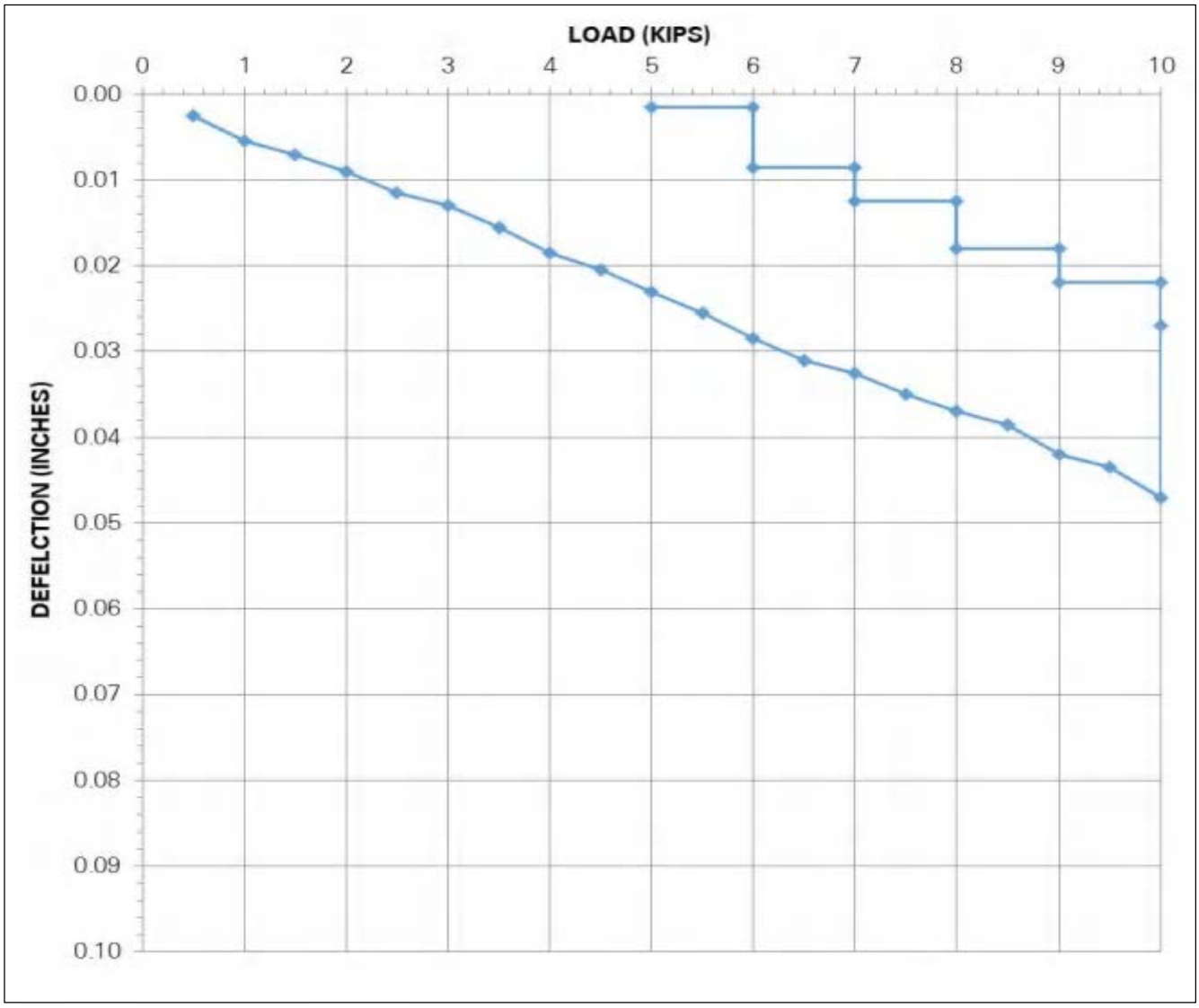
PILE LOAD TEST

TENSION LOAD - PILE TEST - 1B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (9am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	1B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 40s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST - 2B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (5:55pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	2B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.002	0	0.001	
		1	0.002	0	0.001	
1000	10%	0.5	0.004	0	0.002	
		1	0.004	0	0.002	
1500	15%	0.5	0.006	0	0.003	
		1	0.006	0	0.003	
2000	20%	0.5	0.008	0	0.004	
		1	0.008	0	0.004	
2500	25%	0.5	0.011	0	0.0055	
		1	0.011	0	0.0055	
3000	30%	0.5	0.013	-0.001	0.006	
		1	0.013	-0.001	0.006	
3500	35%	0.5	0.015	-0.001	0.007	
		1	0.015	-0.001	0.007	
4000	40%	0.5	0.017	-0.001	0.008	
		1	0.017	-0.001	0.008	
4500	45%	0.5	0.019	-0.001	0.009	
		1	0.019	-0.001	0.009	
5000	50%	0.5	0.02	-0.001	0.0095	
		1	0.02	-0.001	0.0095	
5500	55%	0.5	0.021	0.001	0.011	
		1	0.021	0.001	0.011	
6000	60%	0.5	0.023	0.001	0.012	
		1	0.023	0.001	0.012	
6500	65%	0.5	0.025	0.002	0.0135	
		1	0.025	0.002	0.0135	
7000	70%	0.5	0.027	0.003	0.015	
		1	0.027	0.003	0.015	
7500	75%	0.5	0.029	0.003	0.016	
		1	0.029	0.003	0.016	
8000	80%	0.5	0.03	0.003	0.0165	
		1	0.03	0.003	0.0165	
8500	85%	0.5	0.031	0.005	0.018	
		1	0.031	0.005	0.018	
9000	90%	0.5	0.033	0.006	0.0195	
		1	0.033	0.006	0.0195	
9500	95%	0.5	0.034	0.007	0.0205	
		1	0.034	0.007	0.0205	
10000	100%	0.5	0.035	0.008	0.0215	
		1	0.035	0.008	0.0215	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values	
Automatic Calculated value in this spreadsheet	

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PILE LOAD TEST

TENSION LOAD - PILE TEST

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.035	0.008	0.0215	
		1	0.035	0.008	0.0215	
9000	90%	0.5	0.034	0.007	0.0205	
		1	0.034	0.007	0.0205	
8000	80%	0.5	0.031	0.007	0.019	
		1	0.031	0.007	0.019	
7000	70%	0.5	0.028	0.005	0.0165	
		1	0.028	0.005	0.0165	
6000	60%	0.5	0.026	0.005	0.0155	
		1	0.026	0.005	0.0155	
5000	50%	0.5	0.024	0.005	0.0145	
		1	0.024	0.005	0.0145	
4000	40%	0.5	0.021	0.004	0.0125	
		1	0.021	0.004	0.0125	
3000	30%	0.5	0.017	0.004	0.0105	
		1	0.017	0.004	0.0105	
2000	20%	0.5	0.013	0.003	0.008	
		1	0.013	0.003	0.008	
1000	10%	0.5	0.01	0.003	0.0065	
		1	0.01	0.003	0.0065	
0	0%	0.5	0.006	0.002	0.004	
		1	0.006	0.002	0.004	
NOTE PERMANENT DEFORMATION ABOVE						0.004

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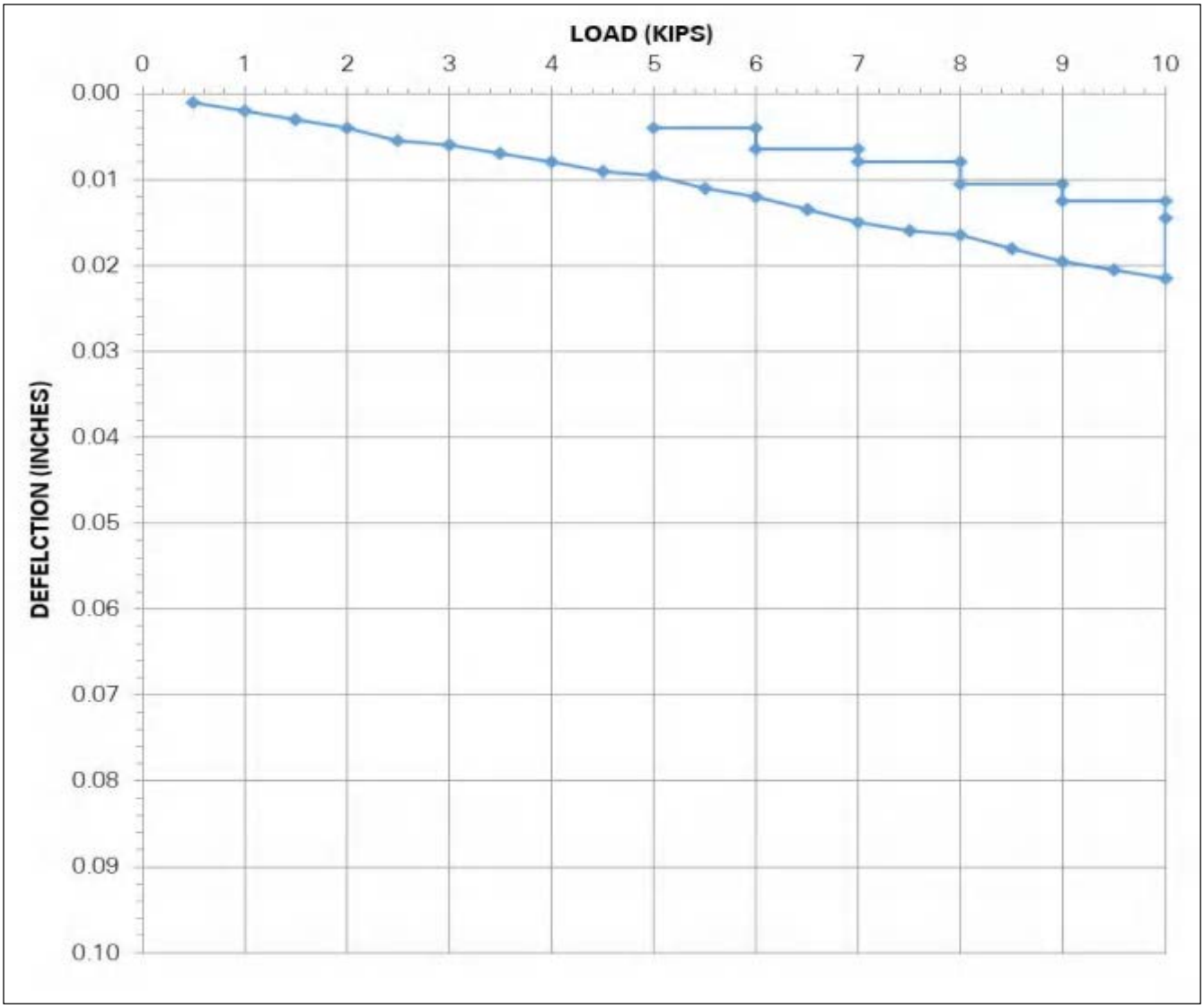
PILE LOAD TEST

TENSION LOAD - PILE TEST - 2B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (5:55pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	2B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST - 3B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (1:35pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	3B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0.001	0.003	0.002	
		1	0.001	0.003	0.002	
1000	10%	0.5	0.001	0.007	0.004	
		1	0.001	0.007	0.004	
1500	15%	0.5	0.001	0.008	0.0045	
		1	0.001	0.008	0.0045	
2000	20%	0.5	0.002	0.011	0.0065	
		1	0.002	0.011	0.0065	
2500	25%	0.5	0.002	0.014	0.008	
		1	0.002	0.014	0.008	
3000	30%	0.5	0.003	0.017	0.01	
		1	0.003	0.017	0.01	
3500	35%	0.5	0.004	0.021	0.0125	
		1	0.004	0.021	0.0125	
4000	40%	0.5	0.005	0.024	0.0145	
		1	0.005	0.025	0.015	
4500	45%	0.5	0.006	0.027	0.0165	
		1	0.006	0.028	0.017	
5000	50%	0.5	0.006	0.032	0.019	
		1	0.006	0.032	0.019	
5500	55%	0.5	0.006	0.036	0.021	
		1	0.006	0.036	0.021	
6000	60%	0.5	0.006	0.038	0.022	
		1	0.006	0.038	0.022	
6500	65%	0.5	0.017	0.042	0.0295	
		1	0.017	0.042	0.0295	
7000	70%	0.5	0.017	0.045	0.031	
		1	0.017	0.046	0.0315	
7500	75%	0.5	0.017	0.048	0.0325	
		1	0.017	0.048	0.0325	
8000	80%	0.5	0.017	0.053	0.035	
		1	0.017	0.053	0.035	
8500	85%	0.5	0.017	0.055	0.036	
		1	0.017	0.056	0.0365	
9000	90%	0.5	0.017	0.06	0.0385	
		1	0.017	0.06	0.0385	
9500	95%	0.5	0.017	0.064	0.0405	
		1	0.017	0.065	0.041	
10000	100%	0.5	0.017	0.069	0.043	
		1	0.017	0.072	0.0445	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values	
Automatic Calculated value in this spreadsheet	

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PILE LOAD TEST

TENSION LOAD - PILE TEST

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.017	0.069	0.043	
		1	0.017	0.072	0.0445	
9000	90%	0.5	0	0.071	0.0355	
		1	0	0.069	0.0345	
8000	80%	0.5	0	0.065	0.0325	
		1	0	0.064	0.032	
7000	70%	0.5	0	0.062	0.031	
		1	0	0.062	0.031	
6000	60%	0.5	0	0.058	0.029	
		1	0	0.058	0.029	
5000	50%	0.5	0	0.052	0.026	
		1	0	0.052	0.026	
4000	40%	0.5	0	0.046	0.023	
		1	0	0.046	0.023	
3000	30%	0.5	0	0.041	0.0205	
		1	0	0.041	0.0205	
2000	20%	0.5	0	0.034	0.017	
		1	0	0.034	0.017	
1000	10%	0.5	0	0.026	0.013	
		1	0	0.026	0.013	
0	0%	0.5	0	0.02	0.01	
		1	0	0.02	0.01	
NOTE PERMANENT DEFORMATION ABOVE						0.001

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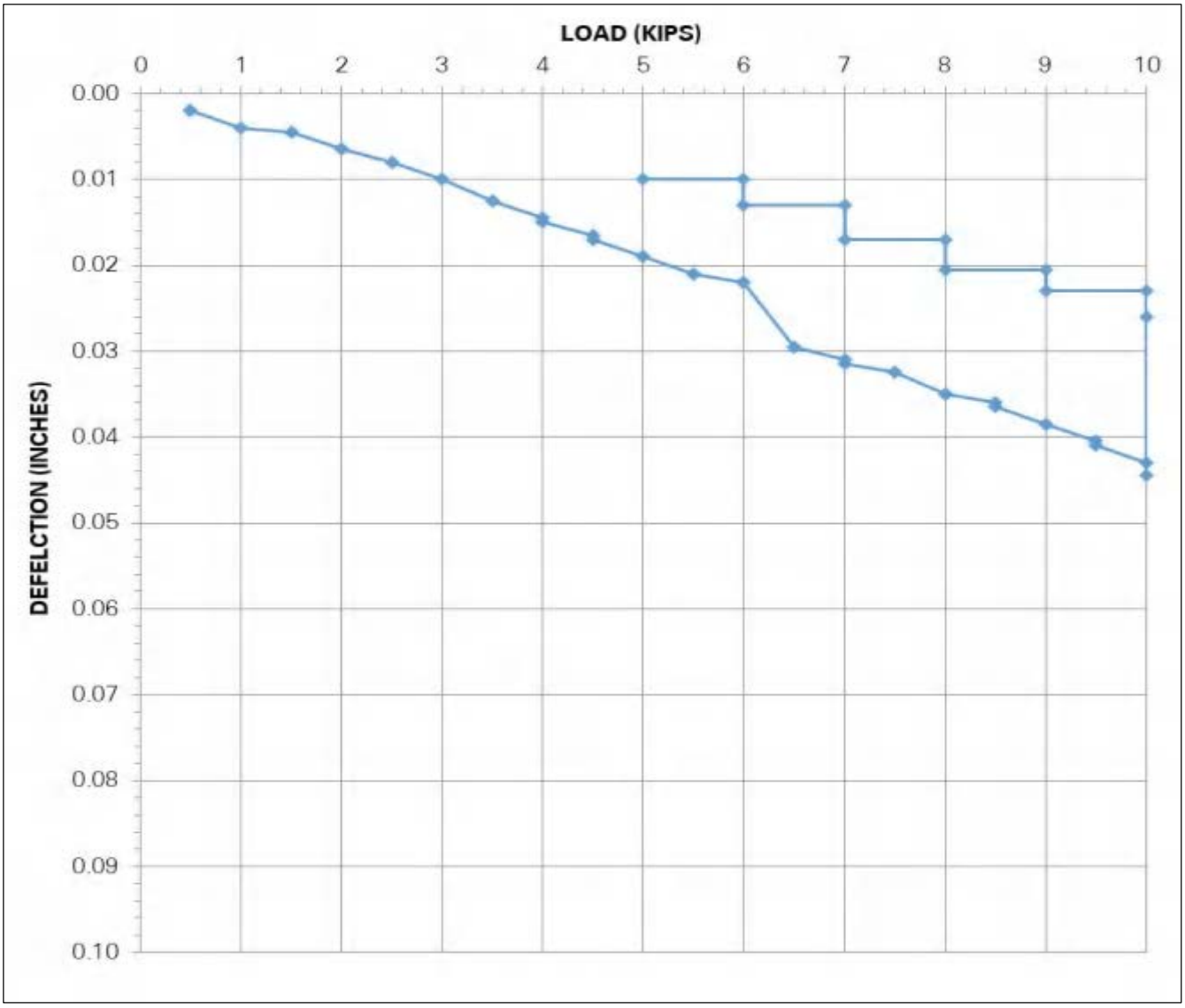
PILE LOAD TEST

TENSION LOAD - PILE TEST - 3B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (1:35pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	3B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST - 4B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (9:45Am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	4B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 60s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.002	0	0.001	
		1	0.002	0	0.001	
2000	20%	0.5	0.006	-0.001	0.0025	
		1	0.006	-0.001	0.0025	
3000	30%	0.5	0.009	-0.004	0.0025	
		1	0.009	-0.004	0.0025	
4000	40%	0.5	0.014	-0.006	0.004	
		1	0.014	-0.006	0.004	
5000	50%	0.5	0.018	-0.009	0.0045	
		1	0.018	-0.009	0.0045	
6000	60%	0.5	0.024	-0.011	0.0065	
		1	0.024	-0.011	0.0065	
7000	70%	0.5	0.027	-0.014	0.0065	
		1	0.027	-0.014	0.0065	
8000	80%	0.5	0.031	-0.015	0.008	
		1	0.031	-0.015	0.008	
9000	90%	0.5	0.034	-0.017	0.0085	
		1	0.034	-0.017	0.0085	
10000	100%	0.5	0.037	-0.018	0.0095	
		1	0.037	-0.018	0.0095	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.037	-0.018	0.0095	
		1	0.037	-0.018	0.0095	
9000	90%	0.5	0.036	-0.017	0.0095	
		1	0.036	-0.017	0.0095	
8000	80%	0.5	0.033	-0.016	0.0085	
		1	0.033	-0.016	0.0085	
7000	70%	0.5	0.03	-0.015	0.0075	
		1	0.03	-0.015	0.0075	
6000	60%	0.5	0.027	-0.013	0.007	
		1	0.027	-0.013	0.007	
5000	50%	0.5	0.023	-0.011	0.006	
		1	0.023	-0.011	0.006	
4000	40%	0.5	0.018	-0.008	0.005	
		1	0.018	-0.008	0.005	
3000	30%	0.5	0.014	-0.006	0.004	
		1	0.014	-0.006	0.004	
2000	20%	0.5	0.01	-0.002	0.004	
		1	0.01	-0.002	0.004	
1000	10%	0.5	0.005	-0.001	0.002	
		1	0.005	-0.001	0.002	
0	0%	0.5	0	0	0	
		1	0	0	0	
NOTE PERMANENT DEFORMATION ABOVE						0

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values

Automatic Calculated value in this spreadsheet

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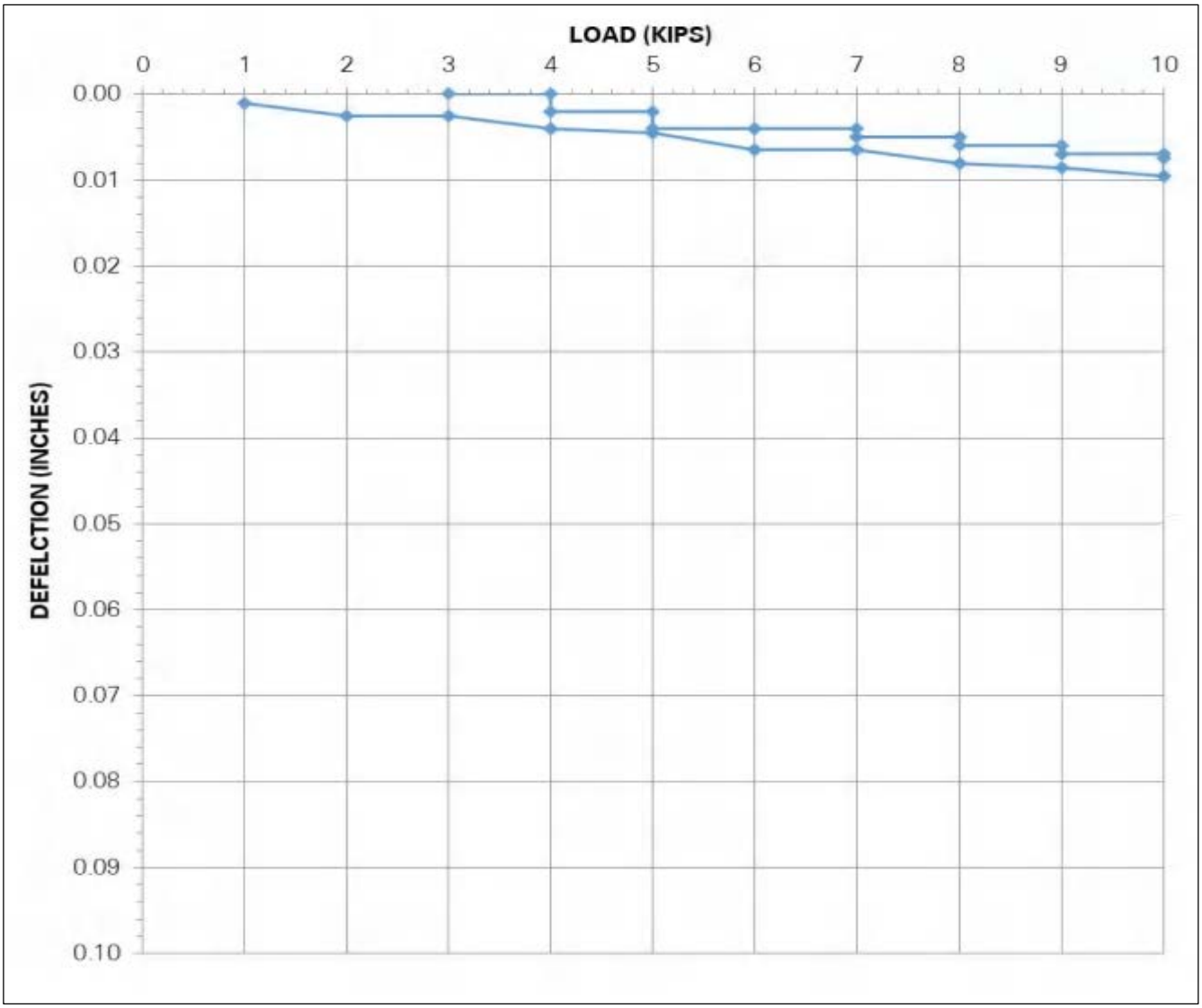
PILE LOAD TEST

TENSION LOAD - PILE TEST - 4B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (9:45Am)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	4B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 60s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST - 5B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (6Pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	5B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.01	-0.01	0	The excavator arm was positioned approximately 1 ft to the right of the pile, explaining the positive and negative dial gauge readings.
		1	0.01	-0.01	0	
2000	20%	0.5	0.019	-0.021	-0.001	
		1	0.019	-0.021	-0.001	
3000	30%	0.5	0.029	-0.033	-0.002	
		1	0.029	-0.033	-0.002	
4000	40%	0.5	0.037	-0.040	-0.002	
		1	0.037	-0.040	-0.002	
5000	50%	0.5	0.045	-0.048	-0.002	
		1	0.045	-0.048	-0.002	
6000	60%	0.5	0.052	-0.054	-0.001	
		1	0.052	-0.054	-0.001	
7000	70%	0.5	0.058	-0.06	-1E-03	
		1	0.058	-0.06	-1E-03	
8000	80%	0.5	0.063	-0.064	-5E-04	
		1	0.063	-0.064	-5E-04	
9000	90%	0.5	0.07	-0.068	0.001	
		1	0.07	-0.068	0.001	
10000	100%	0.5	0.073	-0.07	0.0015	
		1	0.073	-0.07	0.0015	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values

Automatic Calculated value in this spreadsheet

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Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.073	-0.07	0.0015	
		1	0.073	-0.07	0.0015	
9000	90%	0.5	0.07	-0.068	0.001	
		1	0.07	-0.068	0.001	
8000	80%	0.5	0.066	-0.065	0.0005	
		1	0.066	-0.065	0.0005	
7000	70%	0.5	0.061	-0.061	0	
		1	0.061	-0.061	0	
6000	60%	0.5	0.052	-0.054	-0.001	
		1	0.052	-0.054	-0.001	
5000	50%	0.5	0.052	-0.053	-5E-04	
		1	0.052	-0.053	-5E-04	
4000	40%	0.5	0.045	-0.047	-0.001	
		1	0.045	-0.047	-0.001	
3000	30%	0.5	0.036	-0.039	-0.002	
		1	0.036	-0.039	-0.002	
2000	20%	0.5	0.028	-0.03	-1E-03	
		1	0.028	-0.03	-1E-03	
1000	10%	0.5	0.018	-0.018	0	
		1	0.018	-0.018	0	
0	0%	0.5	0.004	-0.002	0.001	
		1	0.004	-0.002	0.001	
NOTE PERMANENT DEFORMATION ABOVE						0.001

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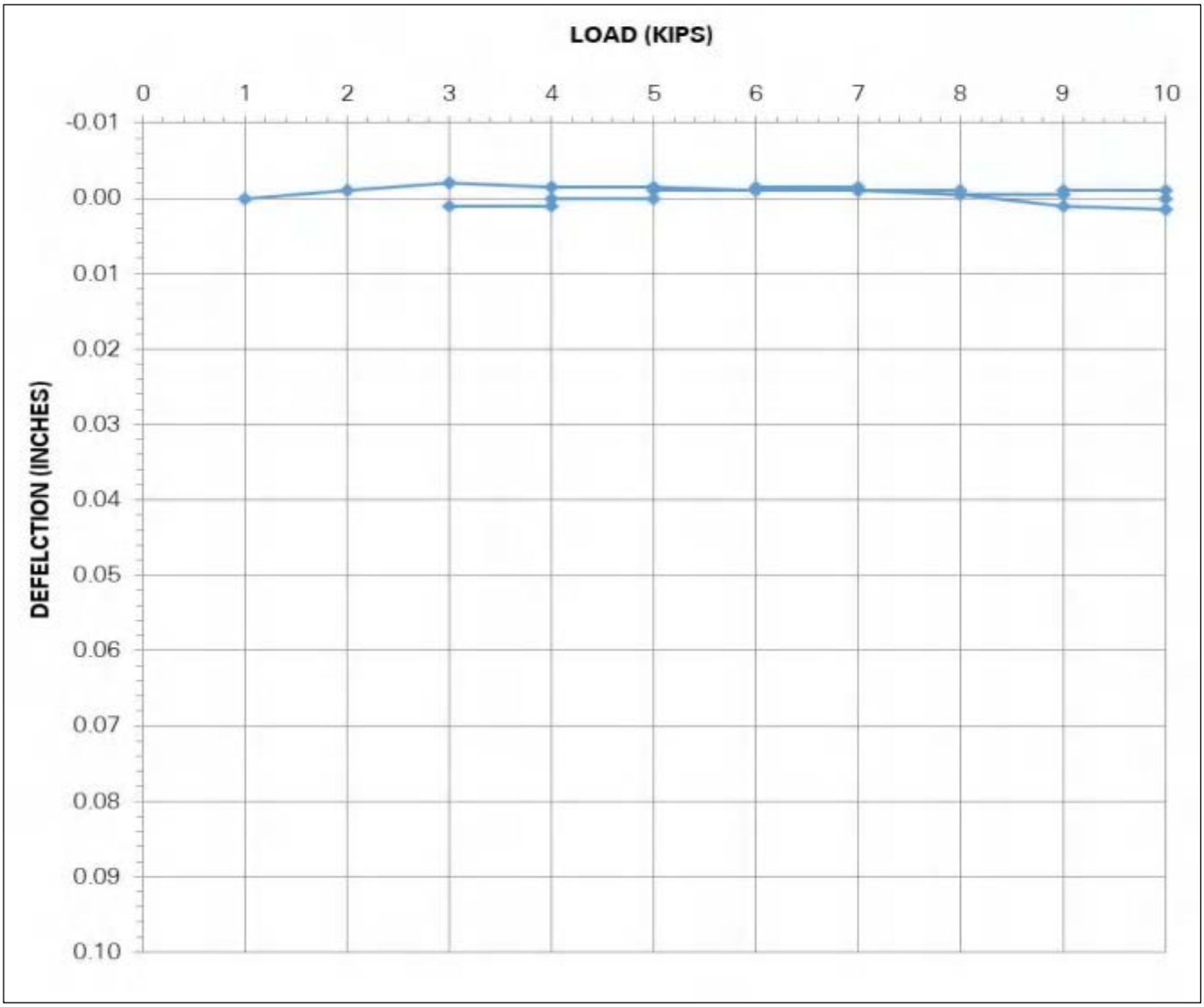
PILE LOAD TEST

TENSION LOAD - PILE TEST - 5B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (6Pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	5B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST -6B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (4pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	3B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
500	5%	0.5	0	0.008	0.004	Before testing, while the excavator was setting up, it exerted a tension load on the pile and broke a metal piece of the steel pile web. As a result, the pile was subjected to a load exceeding 10 kips before the actual test began.
		1	0	0.009	0.0045	
1000	10%	0.5	0.001	0.014	0.0075	
		1	0.001	0.014	0.0075	
1500	15%	0.5	0.001	0.018	0.0095	
		1	0.001	0.018	0.0095	
2000	20%	0.5	0.001	0.022	0.0115	
		1	0.001	0.022	0.0115	
2500	25%	0.5	0.001	0.027	0.014	
		1	0.001	0.027	0.014	
3000	30%	0.5	0.001	0.031	0.016	
		1	0.001	0.031	0.016	
3500	35%	0.5	0.001	0.034	0.0175	
		1	0.003	0.034	0.0185	
4000	40%	0.5	0.007	0.036	0.0215	
		1	0.007	0.036	0.0215	
4500	45%	0.5	0.014	0.038	0.026	
		1	0.014	0.038	0.026	
5000	50%	0.5	0.019	0.04	0.0295	
		1	0.019	0.04	0.0295	
5500	55%	0.5	0.019	0.043	0.031	
		1	0.019	0.043	0.031	
6000	60%	0.5	0.019	0.046	0.0325	
		1	0.019	0.046	0.0325	
6500	65%	0.5	0.034	0.048	0.041	
		1	0.034	0.048	0.041	
7000	70%	0.5	0.034	0.05	0.042	
		1	0.034	0.05	0.042	
7500	75%	0.5	0.034	0.051	0.0425	
		1	0.034	0.051	0.0425	
8000	80%	0.5	0.036	0.053	0.0445	
		1	0.036	0.053	0.0445	
8500	85%	0.5	0.036	0.085	0.0605	
		1	0.036	0.085	0.0605	
9000	90%	0.5	0.036	0.085	0.0605	
		1	0.036	0.085	0.0605	
9500	95%	0.5	0.036	0.087	0.0615	
		1	0.036	0.087	0.0615	
10000	100%	0.5	0.036	0.088	0.062	
		1	0.036	0.088	0.062	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values	
Automatic Calculated value in this spreadsheet	

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PILE LOAD TEST

TENSION LOAD - PILE TEST

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.036	0.088	0.062	
		1	0.036	0.086	0.061	
9000	90%	0.5	0.036	0.086	0.061	
		1	0.036	0.086	0.061	
8000	80%	0.5	0.036	0.085	0.0605	
		1	0.036	0.085	0.0605	
7000	70%	0.5	0.036	0.082	0.059	
		1	0.036	0.082	0.059	
6000	60%	0.5	0.036	0.08	0.058	
		1	0.036	0.08	0.058	
5000	50%	0.5	0.036	0.077	0.0565	
		1	0.036	0.077	0.0565	
4000	40%	0.5	0.038	0.072	0.055	
		1	0.038	0.072	0.055	
3000	30%	0.5	0.04	0.067	0.0535	
		1	0.04	0.067	0.0535	
2000	20%	0.5	0.041	0.06	0.0505	
		1	0.041	0.06	0.0505	
1000	10%	0.5	0.044	0.054	0.049	
		1	0.044	0.054	0.049	
0	0%	0.5	0.048	0.044	0.046	
		1	0.048	0.044	0.046	
NOTE PERMANENT DEFORMATION ABOVE						0.046

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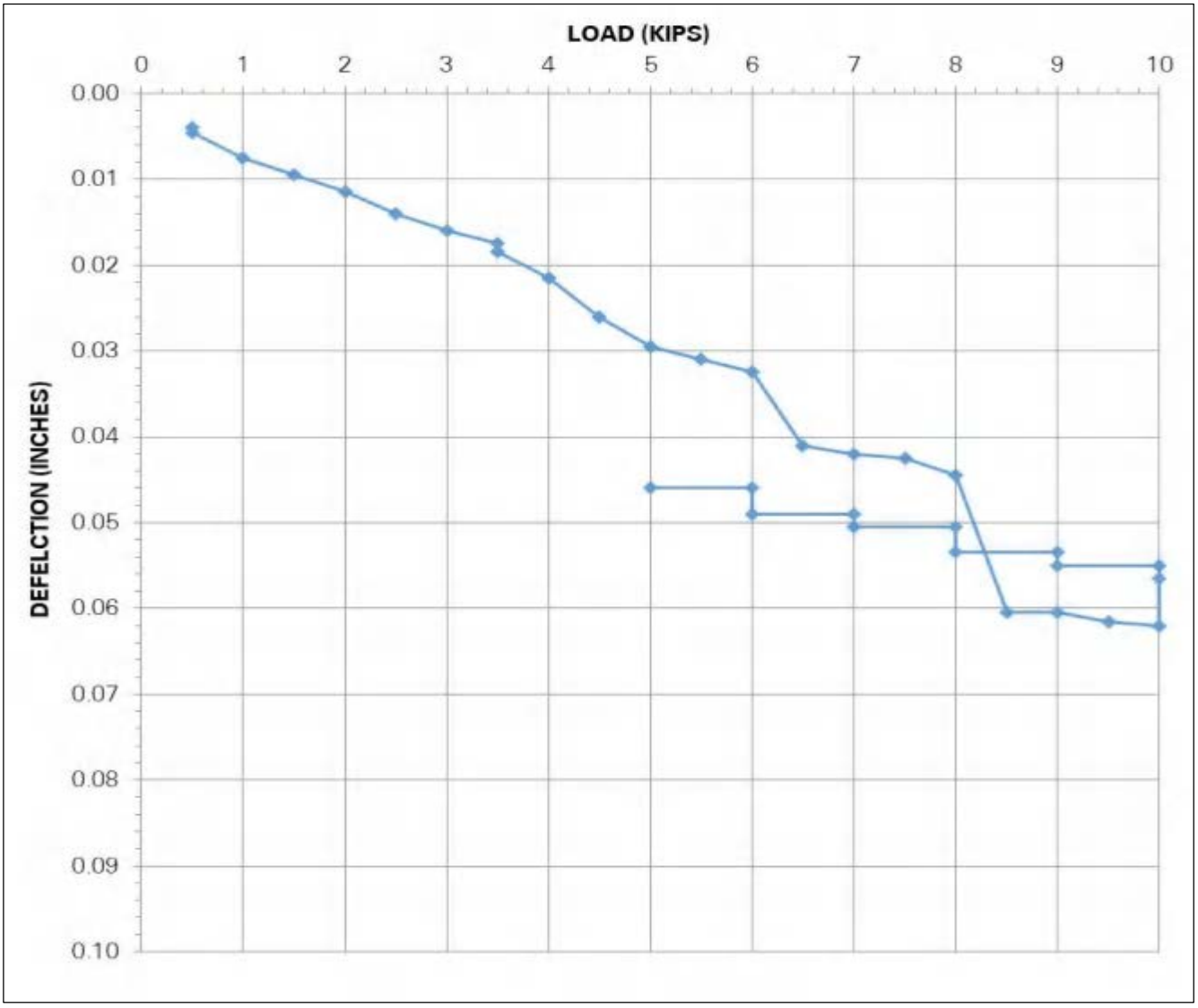
PILE LOAD TEST

TENSION LOAD - PILE TEST -6B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/11/2025 (4pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	3B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Sunny 70s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST - 7B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (2:40Pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	7B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Windy 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.01	-0.004	0.003	
		1	0.01	-0.004	0.003	
2000	20%	0.5	0.019	-0.008	0.0055	
		1	0.019	-0.008	0.0055	
3000	30%	0.5	0.027	-0.010	0.0085	
		1	0.027	-0.010	0.0085	
4000	40%	0.5	0.032	-0.011	0.0105	
		1	0.032	-0.011	0.0105	
5000	50%	0.5	0.035	-0.011	0.012	
		1	0.035	-0.011	0.012	
6000	60%	0.5	0.037	-0.009	0.014	
		1	0.037	-0.009	0.014	
7000	70%	0.5	0.04	-0.005	0.0175	
		1	0.04	-0.005	0.0175	
8000	80%	0.5	0.043	-0.004	0.0195	
		1	0.043	-0.004	0.0195	
9000	90%	0.5	0.046	-0.003	0.0215	
		1	0.046	-0.003	0.0215	
10000	100%	0.5	0.049	0	0.0245	
		1	0.049	0	0.0245	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.049	0	0.0245	
		1	0.049	0	0.0245	
9000	90%	0.5	0.046	0	0.023	
		1	0.046	0	0.023	
8000	80%	0.5	0.044	0	0.022	
		1	0.044	0	0.022	
7000	70%	0.5	0.04	-0.001	0.0195	
		1	0.04	-0.001	0.0195	
6000	60%	0.5	0.036	-0.001	0.0175	
		1	0.036	-0.001	0.0175	
5000	50%	0.5	0.032	-0.001	0.0155	
		1	0.032	-0.001	0.0155	
4000	40%	0.5	0.027	-0.001	0.013	
		1	0.027	-0.001	0.013	
3000	30%	0.5	0.024	-0.001	0.0115	
		1	0.024	-0.001	0.0115	
2000	20%	0.5	0.019	-0.001	0.009	
		1	0.019	-0.001	0.009	
1000	10%	0.5	0.013	0	0.0065	
		1	0.013	0	0.0065	
0	0%	0.5	0.005	0.001	0.003	
		1	0.005	0.001	0.003	
NOTE PERMANENT DEFORMATION ABOVE						0.003

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values	
Automatic Calculated value in this spreadsheet	

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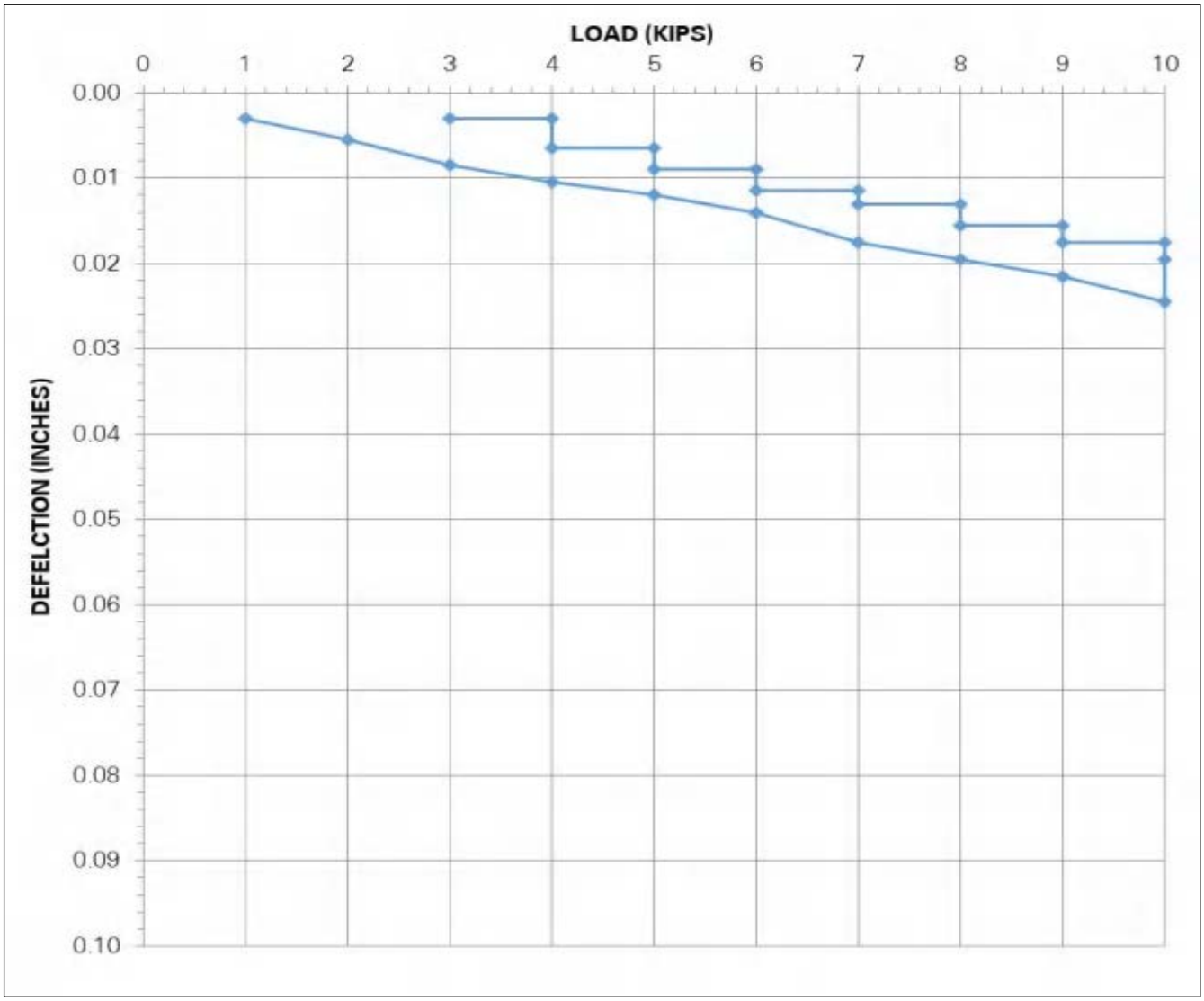
PILE LOAD TEST

TENSION LOAD - PILE TEST - 7B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (2:40Pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	7B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	Windy 80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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PILE LOAD TEST

TENSION LOAD - PILE TEST - 8B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (7:40Pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	8B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N

Load (pounds)	%Max Design Load	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
LOADING						
1000	10%	0.5	0.001	-0.001	0	
		1	0.001	-0.001	0	
2000	20%	0.5	0.002	-0.002	0	
		1	0.002	-0.002	0	
3000	30%	0.5	0.003	-0.002	0.0005	
		1	0.003	-0.002	0.0005	
4000	40%	0.5	0.004	-0.002	0.001	
		1	0.004	-0.002	0.001	
5000	50%	0.5	0.005	-0.001	0.002	
		1	0.005	-0.001	0.002	
6000	60%	0.5	0.005	0.000	0.0025	
		1	0.005	0	0.0025	
7000	70%	0.5	0.005	0.002	0.0035	
		1	0.005	0.002	0.0035	
8000	80%	0.5	0.005	0.003	0.004	
		1	0.005	0.003	0.004	
9000	90%	0.5	0.005	0.006	0.0055	
		1	0.005	0.006	0.0055	
10000	100%	0.5	0.004	0.008	0.006	
		1	0.004	0.008	0.006	
When deflection reaches 0.25", hold the load for 5 min, record at 1 min INC., then unload to 0 in 1000lb INC.						
load at 0.25" deflection =			N/A			

Load (pounds)	%Ultimate Design	Time (min)	Dial Gauge 1	Dial Gauge 2	Dial Gauge AVG	Notes
UNLOADING						
10000	100%	0.5	0.004	0.008	0.006	
		1	0.004	0.008	0.006	
9000	90%	0.5	0.004	0.007	0.0055	
		1	0.004	0.007	0.0055	
8000	80%	0.5	0.004	0.006	0.005	
		1	0.004	0.006	0.005	
7000	70%	0.5	0.003	0.005	0.004	
		1	0.003	0.005	0.004	
6000	60%	0.5	0.003	0.004	0.0035	
		1	0.003	0.004	0.0035	
5000	50%	0.5	0.003	0.003	0.003	
		1	0.003	0.003	0.003	
4000	40%	0.5	0.003	0.002	0.0025	
		1	0.003	0.002	0.0025	
3000	30%	0.5	0.002	0.001	0.0015	
		1	0.002	0.001	0.0015	
2000	20%	0.5	0.001	0.001	0.001	
		1	0.001	0.001	0.001	
1000	10%	0.5	0.001	0	0.0005	
		1	0.001	0	0.0005	
0	0%	0.5	0.001	0	0.0005	
		1	0.001	0	0.0005	
NOTE PERMANENT DEFORMATION ABOVE						0.0005

Pile	W6x9
Pile Area (in^2)	2.68
Plugged Pile Perimeter (in)	19.68
Pile Yield Strength (ksi)	60
Pile Yield Load (kips)	96.48
Total Pile Length (ft)	14
Pile Stick up (ft)	4
Soil Avg Su (psf)	2000
Alpha α	0.48
Estimated Ultimate Pull-Up Load (kips)	15.74
Max Load Test (lb)	15000

Input Values

Automatic Calculated value in this spreadsheet

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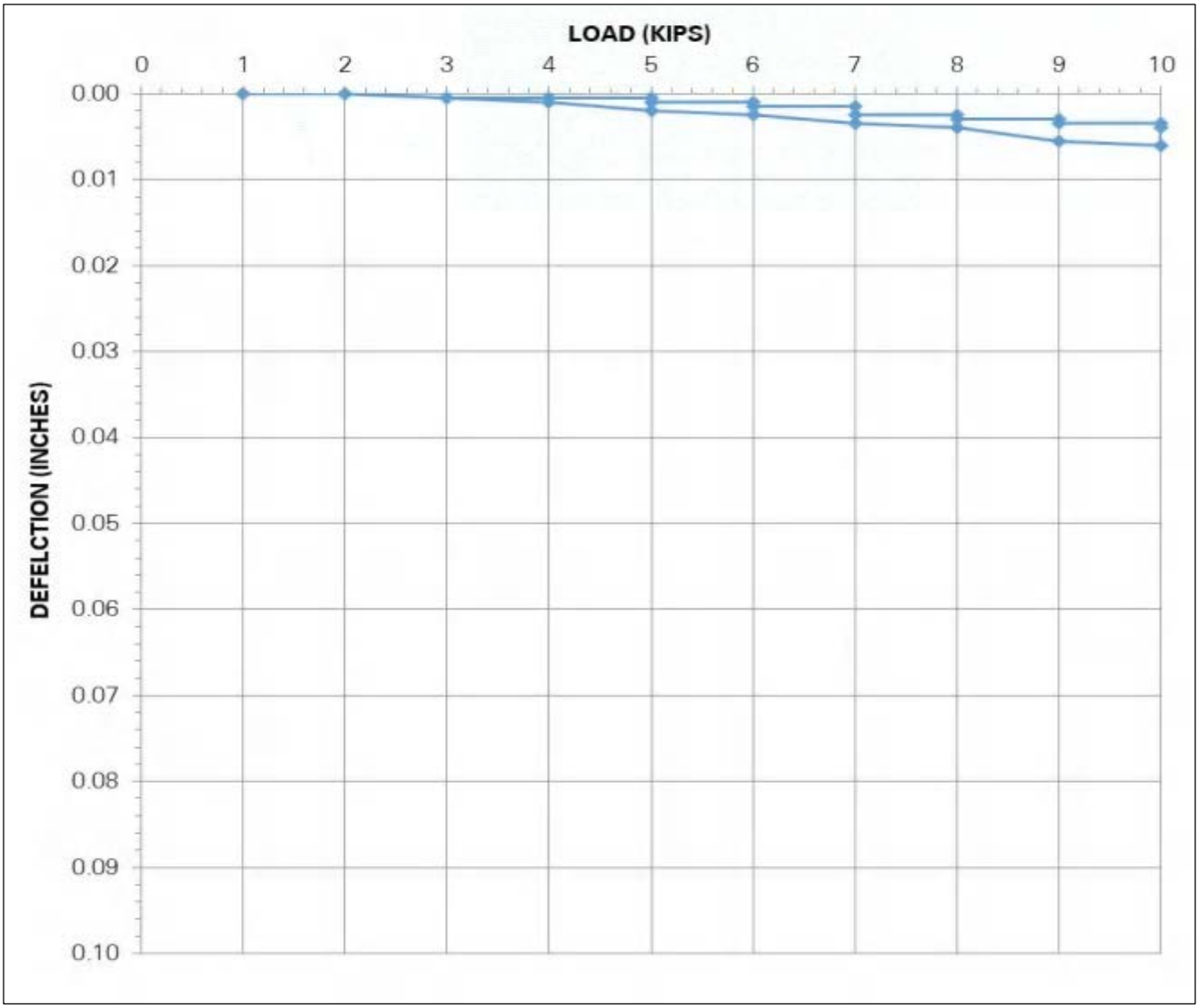
PILE LOAD TEST

TENSION LOAD - PILE TEST - 8B

PROJECT	Chisme - RRCE	**Testing Equipment**	SK210 Excavator (KOBELCO)	**Predrilling (Y/N)**	N
PROJECT NO.	520102301	**Time After Installation (hr)**	>3 days	**Predrilling Diameter (in)**	N
LOCATION	Chisme	**Jack Type**	Hydraulic Hand Pump	**Predrilling Depth in Soil (ft)**	N
DATE AND TIME	3/12/2025 (7:40Pm)	**Jack Model/Name**	P80 (ENERPAC)	**Predrilling Depth in Rock' (ft)**	N
PILE#	8B	**Load Cell Model/Name**	Dillon Edjr - 10T Dynamometer	**Predrilling Total Depth (ft)**	N
INSPECTOR	A. Idries	**WEATHER**	80s	**Predrilling Equipment**	N
CONTRACTOR	Formulated Solutions	**CONTRACTOR PERSONNEL**	Joseph Marquez	**Size and Type of Bit**	N
				Bckfilling Material	N



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ATTACHMENT F-1

Site Laboratory Test Results

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 01/31/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
1	LB-8 (S-1)	2-4	9.9	- -	61.8	39	15	24	- -
2	LB-8 (S-3)	6-8	5.4	- -	51.0	22	12	10	- -
3	LB-8 (S-5)	13.5-15	2.4	68.6	15.8	- -	- -	- -	- -
4	LB-10 (G-1)	0-2	11.6	- -	70.4	- -	- -	- -	- -
5	LB-10 (UD-1)	2-4	14.6	- -	- -	49	17	32	- -
6	LB-10 (UD-3)	6-8	15.3	- -	- -	- -	- -	- -	- -
7	LB-12 (G-1)	0-2	16.0	- -	- -	39	15	24	- -
8	LB-12 (UD-1)	2-4	13.7	- -	75.9	- -	- -	- -	- -
9	LB-12 (UD-2)	4-6	12.3	- -	- -	41	15	26	- -
10	LB-12 (UD-3)	6-8	10.5	- -	- -	- -	- -	- -	- -
11	LB-12 (UD-5)	13-15	13.7	- -	- -	- -	- -	- -	- -
12	LB-16 (S-2)	2.5-4	11.8	- -	49.2	40	15	25	- -
13	LB-16 (S-5)	8.5-10	14.7	- -	- -	44	18	26	- -
14	LB-17 (UD-2)	6.5-8.5	10.2	- -	- -	40	15	25	- -
15	LB-18 (S-1)	1-2.5	12.1	- -	66.7	- -	- -	- -	- -
16	LB-18 (UD-1)	2.5-4.5	13.5	- -	- -	40	15	25	- -
17	LB-21 (G-1)	0-1.5	6.5	99.8	81.6	- -	- -	- -	- -
18	LB-21 (S-2)	3-4.5	7.5	- -	88.0	- -	- -	- -	- -
19	LB-21 (S-6)	13.5-15	8.7	- -	86.2	39	18	21	Lean clay
20	LB-22 (UD-2)	4-6	14.3	- -	75.6	39	15	24	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 02/06/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 01/31/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
21	LB-22 (S-1)	8.5-10	4.2	78.2	41.6	- -	- -	- -	- -
22	LB-25 (S-1)	2-4	7.4	- -	62.7	- -	- -	- -	- -
23	LB-25 (UD-1)	8-10	14.5	- -	96.3	- -	- -	- -	- -
24	LB-26 (UD-1)	2-4	12.2	- -	- -	44	15	29	- -
25	LB-26 (S-3)	13-15	2.7	94.0	53.9	- -	- -	- -	- -
26	LB-30 (G-2)	2-3	11.0	- -	93.6	42	15	27	Lean clay (CL)
27	LB-30 (UD-1)	6-8	13.7	- -	- -	- -	- -	- -	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 02/06/25

Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE - Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
1	Bulk-1	0-4	- -	100.0	92.3	44	19	25	Lean clay (CL)
2	Bulk-2	0-4	- -	99.9	63.9	27	13	14	Sandy lean clay (CL)
3	Bulk-3	0-4	- -	100.0	34.1	17	16	1	Silty sand (SM)
4	Bulk-4	0-4	- -	100.0	87.1	43	17	26	Lean clay (CL)
5	Bulk-5	0-4	- -	99.5	62.5	25	13	12	Sandy lean clay (CL)
6	TP-3 (G-1)	0-2	- -	- -	- -	- -	- -	- -	- -
7	TP-3 (G-2)	2-4	- -	99.7	79.1	- -	- -	- -	- -
8	TP-6 (G-1)	0-2	- -	100.0	50.4	- -	- -	- -	- -
9	TP-6 (G-2)	2-4	- -	- -	- -	- -	- -	- -	- -
10	TP-7 (G-1)	0-2	- -	99.9	38.9	- -	- -	- -	- -
11	TP-7 (G-3)	3-4	- -	- -	- -	- -	- -	- -	- -
12	TP-11 (G-1)	0-2	- -	- -	- -	- -	- -	- -	- -
13	TP-11 (G-2)	2-4	- -	- -	- -	- -	- -	- -	- -
14	TP-13 (G-1)	0-2	- -	- -	- -	- -	- -	- -	- -
15	TP-13 (G-2)	2-4	- -	- -	- -	- -	- -	- -	- -
16	TP-14 (G-1)	0-2	- -	- -	- -	- -	- -	- -	- -
17	TP-14 (G-2)	2-4	- -	96.3	69.3	- -	- -	- -	- -
18	TP-16 (G-1)	0-2	- -	- -	- -	- -	- -	- -	- -
19	TP-18 (G-1)	0-2	- -	- -	- -	- -	- -	- -	- -
20	TP-18 (G-2)	2-4	- -	- -	- -	- -	- -	- -	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 03/08/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering

Project Name: RRCE - Chisme (PN: 520102301)

Alpine Project No.: 2501017

Test Date: 02/26/25

Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[(1)]	Fines (%)[(2)]	LL	PL	PI	USCS Classification
21	TP-20 (G-1)	0-4	- -	- -	- -	- -	- -	- -	- -
22	TP-20 (G-2)	0-4	- -	- -	- -	- -	- -	- -	- -

(1) Percent passing No. 4 sieve per ASTM D6913.

(2) Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 03/08/25

Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
1	LB-1 (U-3)	4-6	- -	- -	78.4	48	16	32	- -
2	LB-1 (U-7)	23-25	- -	- -	- -	- -	- -	- -	- -
3	LB-2 (S-1)	18-20	12.8	- -	81.5	- -	- -	- -	- -
4	LB-2 (S-2)	33.5-35	9.2	- -	92.7	- -	- -	- -	- -
5	LB-3 (S-2)	23.5-25	1.8	- -	- -	NL	NP	NP	- -
6	LB-3 (S-4)	33.5-35	7.2	- -	40.1	- -	- -	- -	- -
7	LB-4 (U-2)	2-4	- -	- -	- -	- -	- -	- -	- -
8	LB-4 (U-4)	6-8	- -	- -	80.3	44	15	29	- -
9	LB-4 (U-6)	13-15	- -	- -	- -	- -	- -	- -	- -
10	LB-9 (U-5)	8-10	9.4	- -	66.8	- -	- -	- -	- -
11	LB-13 (U-4)	6-8	14.0	- -	84.4	- -	- -	- -	- -
12	LB-13 (S-1)	18.5-20	9.6	- -	97.6	47	18	29	Lean clay (CL)
13	LB-14 (U-1)	1-2	- -	- -	- -	- -	- -	- -	- -
14	LB-14 (U-2)	2-4	- -	- -	81.6	37	15	22	- -
15	LB-19 (U-2)	2-4	12.5	- -	- -	40	16	24	- -
16	LB-19 (U-3)	4-6	- -	- -	- -	- -	- -	- -	- -
17	LB-19 (U-4)	6-8	4.2	100.0	41.1	18	15	3	Silty sand (SM)
18	LB-23 (U-3)	4-6	5.0	97.5	76.1	24	15	9	Lean clay w/ sand (CL)
19	LB-24 (U-3)	4-6	- -	- -	91.9	52	18	34	Fat clay (CH)
20	LB-24 (U-7)	18-20	10.3	100.0	90.8	- -	- -	- -	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 03/10/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
21	LB-28 (U-4)	6-8	- -	- -	- -	- -	- -	- -	- -
22	LB-29 (U-5)	8-10	- -	100.0	97.7	48	17	31	Lean clay (CL)

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 03/05/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
1	LB-31 (U-1)	2-4	15.1	99.7	90.1	43	18	25	Lean clay (CL)
2	LB-31 (U-2)	4-6	- -	- -	- -	- -	- -	- -	- -
3	LB-31 (U-3)	6-8	10.1	- -	- -	41	18	23	- -
4	LB-32 (U-2)	4-6	9.4	100.0	91.2	38	18	20	Lean clay (CL)
5	LB-33 (U-2)	4-6	13.3	- -	- -	- -	- -	- -	- -
6	LB-33 (U-3)	6-8	12.8	99.9	82.7	43	16	27	Lean clay w/ sand (CL)
7	LB-33 (S-1)	13.5-15	7.7	- -	- -	29	15	14	- -
8	LB-34 (S-3)	13.5-15	7.8	99.2	91.3	35	15	20	Lean clay (CL)
9	LB-35 (U-2)	2-4	7.9	- -	- -	- -	- -	- -	- -
10	LB-35 (S-3)	8.5-10	6.1	82.6	30.3	26	13	13	Clayey sand w/ gravel (SC)
11	LB-36 (U-3)	4-6	13.5	70.6	15.7	- -	- -	- -	- -
12	LB-37 U-3	4-6	10.0	100.0	91.0	44	19	25	Lean clay (CL)
13	LB-38 S-1	2-3.5	13.1	93.3	49.8	33	13	20	Clayey sand (SC)
14	LB-38 U-2	6-8	17.6	99.7	83.9	- -	- -	- -	- -
15	TP-22 G-2/3	2-4/4-6	8.6	81.6	65.2	34	16	18	Gravelly lean clay with sand (CL)

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 03/11/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
1	TP-23 (G-1)	0-2	16.3	- -	- -	- -	- -	- -	- -
2	TP-23 (G-2)	2-4	14.3	- -	- -	- -	- -	- -	- -
3	TP-23 (G-4)	6-8	12.2	99.5	84.4	- -	- -	- -	- -
4	TP-24 (G-1)	0-2	12.8	- -	- -	48	17	31	- -
5	TP-25 (G-1)	0-2	10.7	- -	- -	- -	- -	- -	- -
6	TP-25 (G-2)	2-4	14.8	- -	- -	- -	- -	- -	- -
7	TP-26, BULK 1	0-2	2.3	- -	- -	- -	- -	- -	- -
8	TP-26, BULK 2	0-2	2.1	100.0	26.4	- -	- -	- -	- -
9	LB-39 (U-1)	2-4	- -	- -	- -	51	16	35	- -
10	LB-39 (U-2)	4-6	15.0	- -	- -	- -	- -	- -	- -
11	LB-39 (U-3)	6-8	- -	- -		43	15	28	- -
12	LB-39 (G-5)	38.5-40	10.3	- -	- -	49	18	31	- -
13	LB-40 (U-1)	2-4	13.8	- -	- -	49	16	33	- -
14	LB-40 (U-3)	6-8	- -	- -	- -	- -	- -	- -	- -
15	LB-40 (S-1)	8-9.5	11.0	99.7	93.0	43	16	27	Lean clay (CL)
16	LB-40 (S-2)	13.5-15	8.6	- -	- -	39	16	23	- -
17	LB-41 (U-2)	3-5	10.5	- -	- -	- -	- -	- -	- -
18	LB-41 (U-4)	13-15	- -	- -	- -	30	13	17	- -
19	LB-41 (S-2)	18.5-20	5.1	93.2	54.9	- -	- -	- -	- -
20	LB-42 (S-1)	0.25-1.75	13.9	99.3	79.4	- -	- -	- -	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 06/11/25

Reviewed By / Date

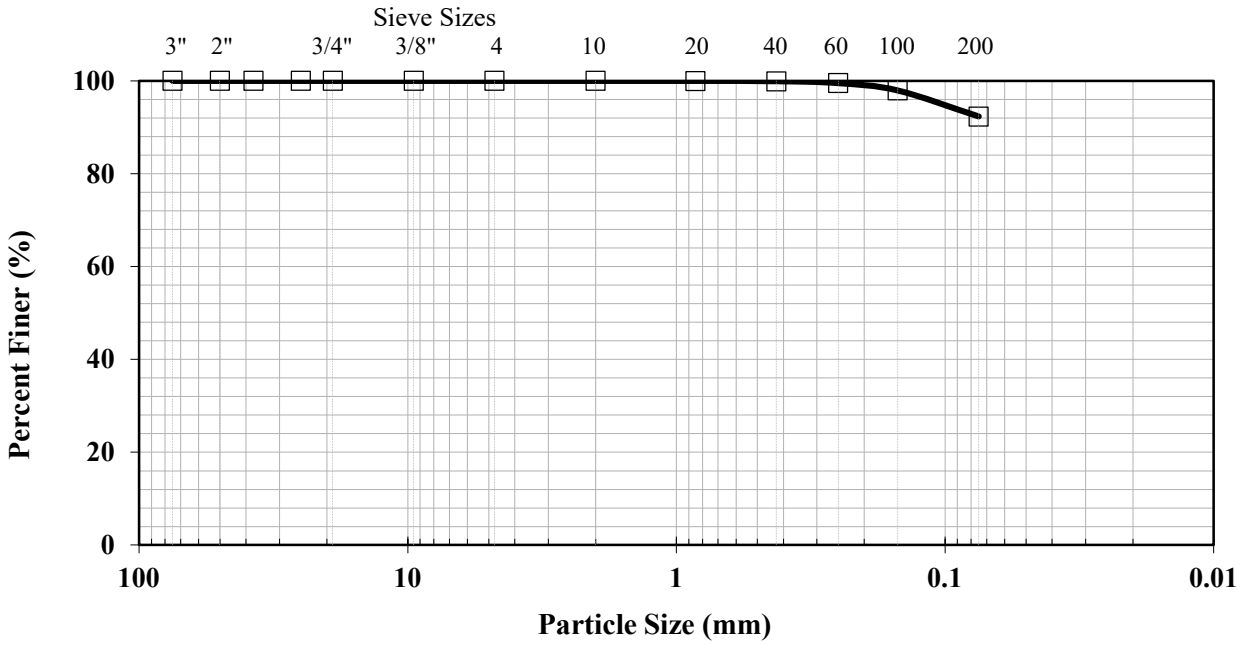
The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-1 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	100.0
No. 20 (850 µm)	100.0
No. 40 (425 µm)	99.9
No. 60 (250 µm)	99.5
No. 100 (150 µm)	97.9
No. 200 (75 µm)	92.3

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487.

Atterberg Limits (ASTM D4318)	
Liquid Limit	44
Plastic Limit	19
Plastic Index	25
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/03/25
Reviewed By / Date

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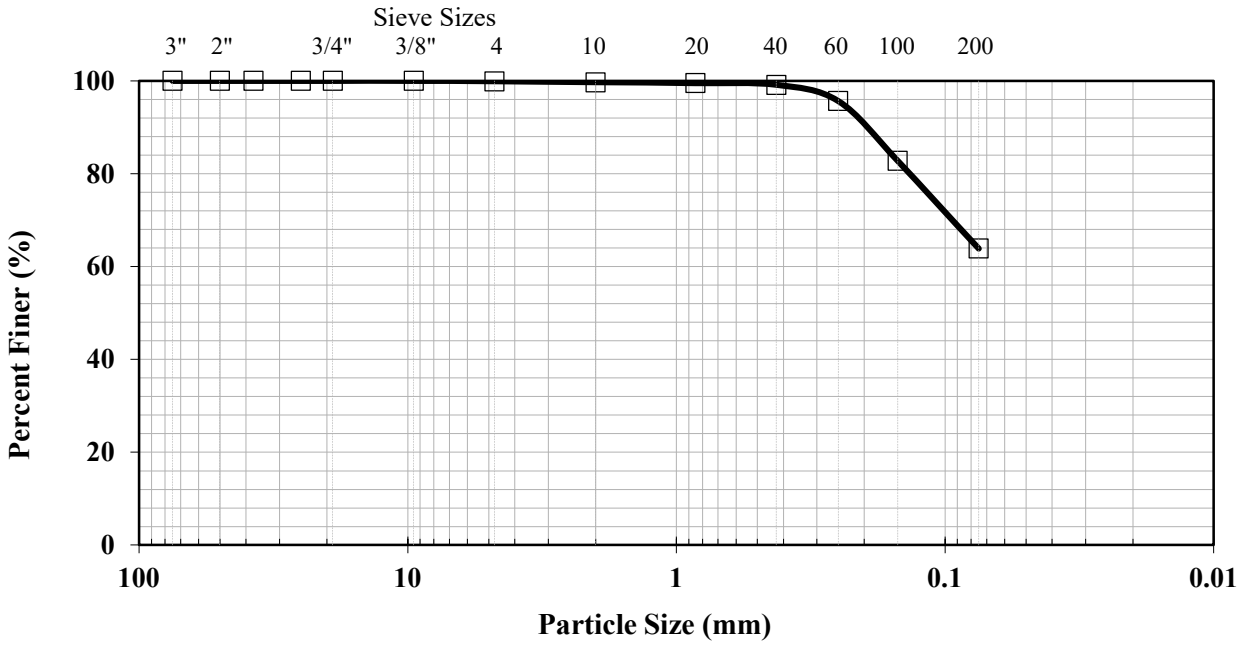
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-2 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.9
No. 10 (2.0 mm)	99.7
No. 20 (850 µm)	99.5
No. 40 (425 µm)	99.1
No. 60 (250 µm)	95.6
No. 100 (150 µm)	82.8
No. 200 (75 µm)	63.9

Note: Soil classifies as sandy lean clay (CL) in accordance with ASTM D2487.

Atterberg Limits (ASTM D4318)	
Liquid Limit	27
Plastic Limit	13
Plastic Index	14
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/03/25
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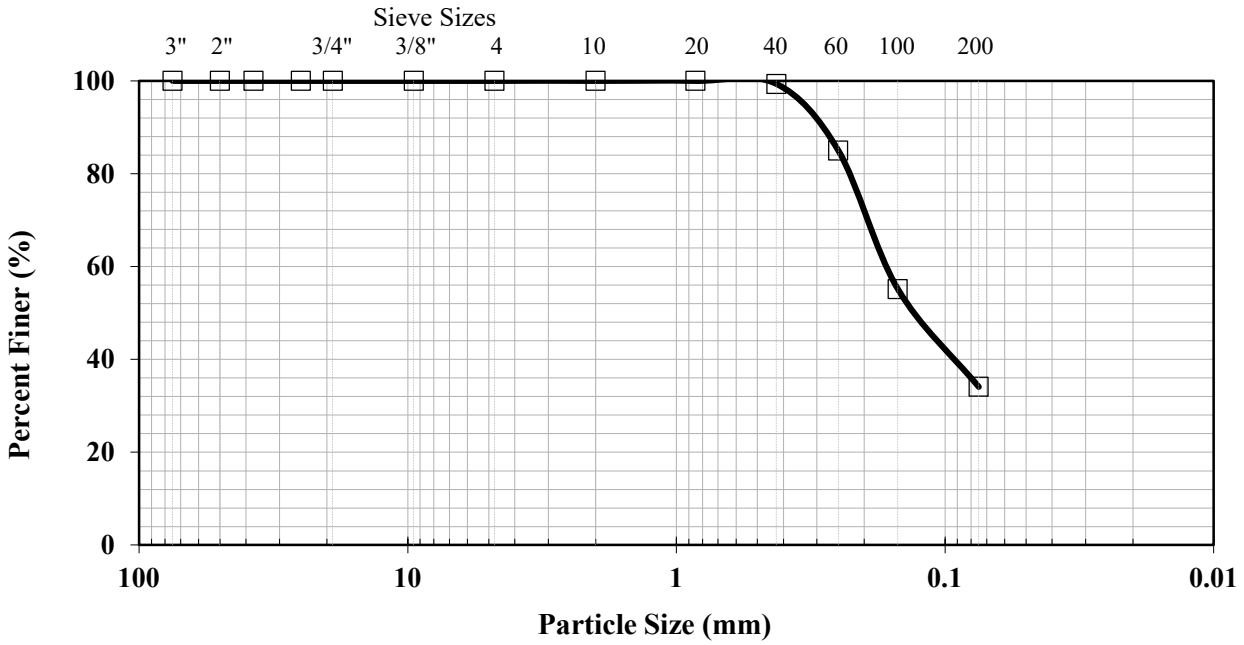
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-3 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	100.0
No. 20 (850 µm)	100.0
No. 40 (425 µm)	99.3
No. 60 (250 µm)	85.0
No. 100 (150 µm)	55.2
No. 200 (75 µm)	34.1

Note: Soil classifies as silty sand (SM) in accordance with ASTM D2487.

Atterberg Limits (ASTM D4318)	
Liquid Limit	17
Plastic Limit	16
Plastic Index	1
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.166
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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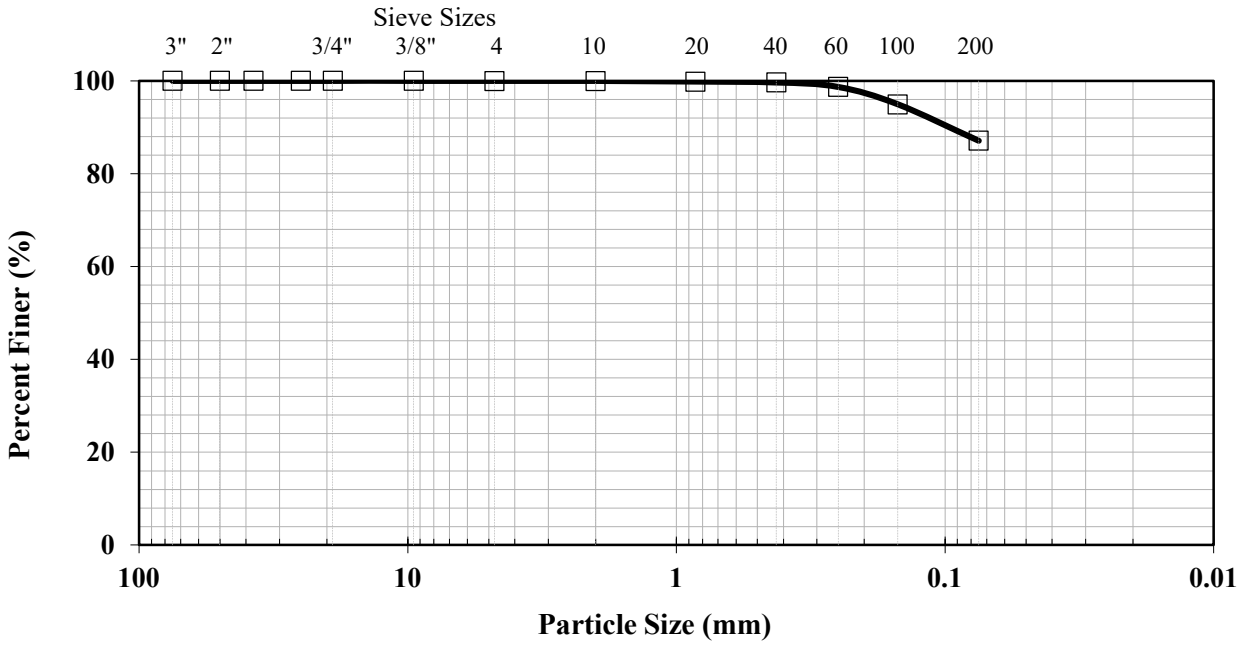
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-4 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	99.9
No. 20 (850 µm)	99.8
No. 40 (425 µm)	99.7
No. 60 (250 µm)	98.7
No. 100 (150 µm)	94.9
No. 200 (75 µm)	87.1

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487.

Atterberg Limits (ASTM D4318)	
Liquid Limit	43
Plastic Limit	17
Plastic Index	26
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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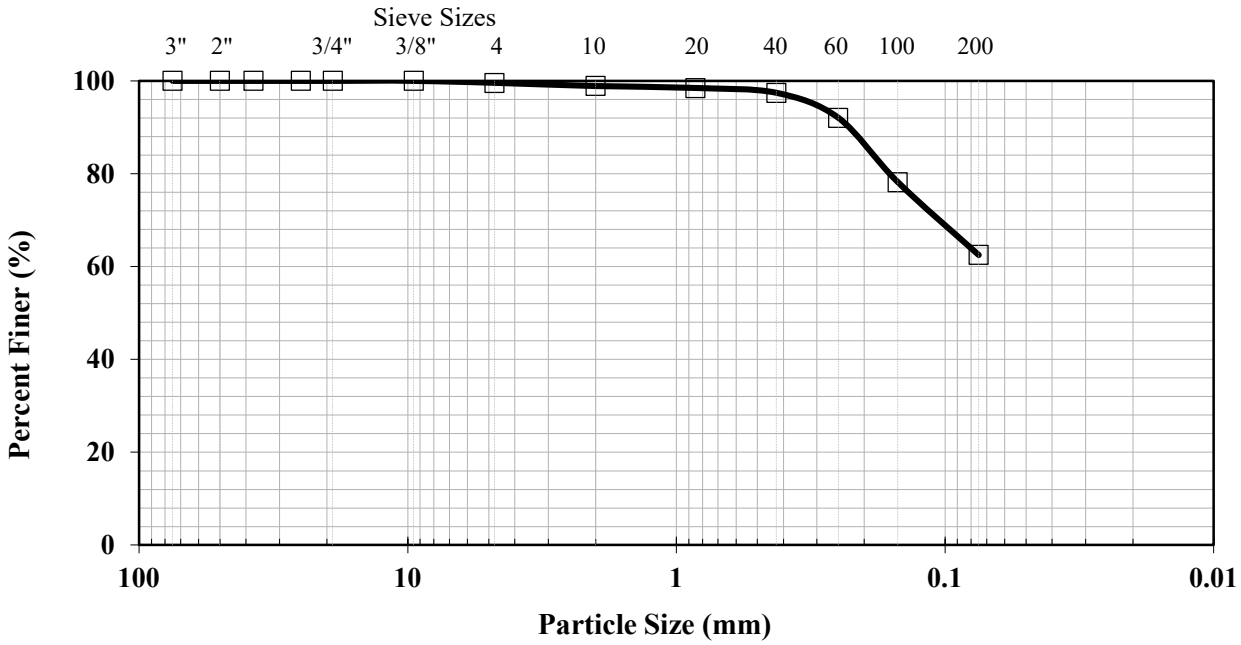
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-5 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.5
No. 10 (2.0 mm)	98.9
No. 20 (850 µm)	98.4
No. 40 (425 µm)	97.4
No. 60 (250 µm)	92.0
No. 100 (150 µm)	78.2
No. 200 (75 µm)	62.5

Note: Soil classifies as sandy lean clay (CL) in accordance with ASTM D2487.

Atterberg Limits (ASTM D4318)	
Liquid Limit	25
Plastic Limit	13
Plastic Index	12
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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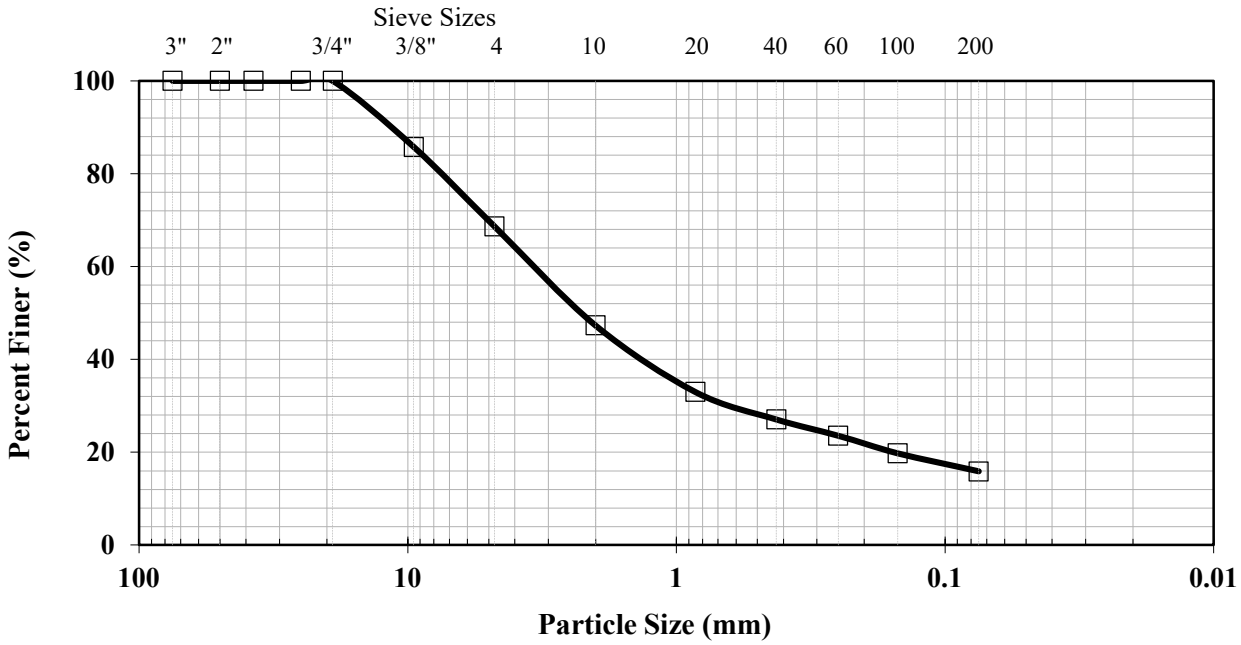
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-8 (S-5) (13.5-15 ft)

Alpine Project No.: 2501017
Test Date: 01/31/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	85.7
No. 4 (4.75 mm)	68.6
No. 10 (2.0 mm)	47.3
No. 20 (850 µm)	33.0
No. 40 (425 µm)	27.1
No. 60 (250 µm)	23.5
No. 100 (150 µm)	19.8
No. 200 (75 µm)	15.8

Note: The as-received water content was 2.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	3.637
D30 (mm)	0.635
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 02/05/25
Reviewed By / Date

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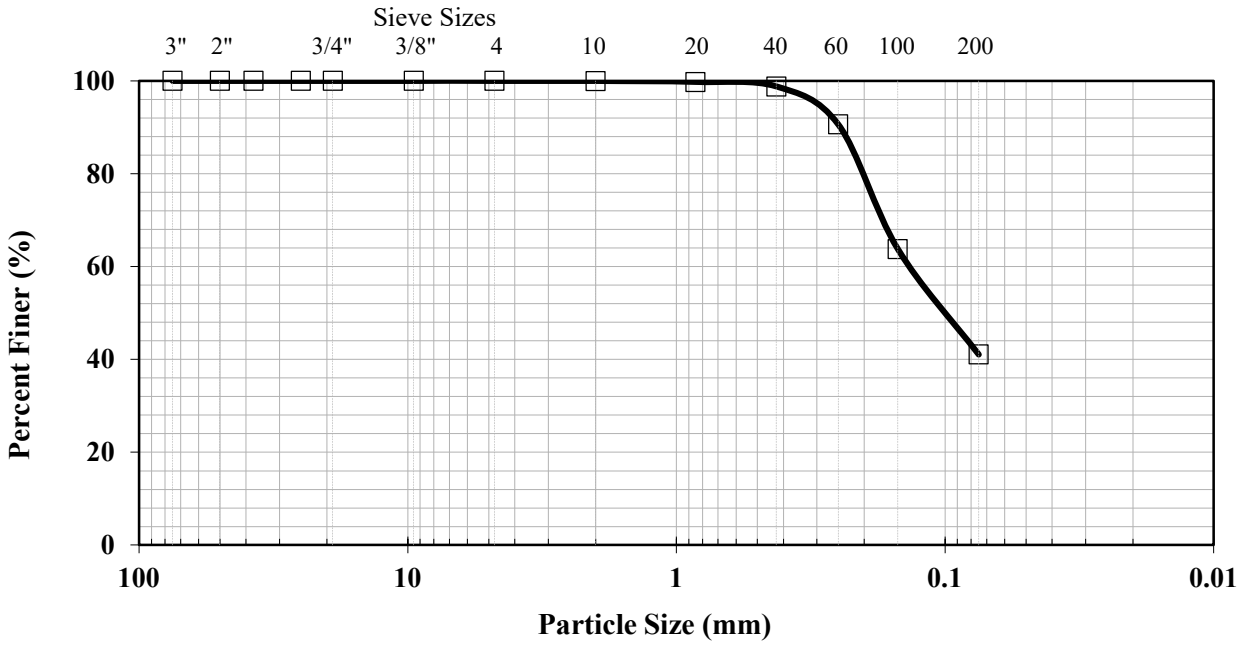
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-19 (U-4) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	99.9
No. 20 (850 µm)	99.8
No. 40 (425 µm)	98.8
No. 60 (250 µm)	90.6
No. 100 (150 µm)	63.8
No. 200 (75 µm)	41.1

Note: Soil classifies as silty sand (SM) in accordance with ASTM D2487.

The as received moisture content was 4.2 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	18
Plastic Limit	15
Plastic Index	3
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.138
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/08/25
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Hutto, TX 78634
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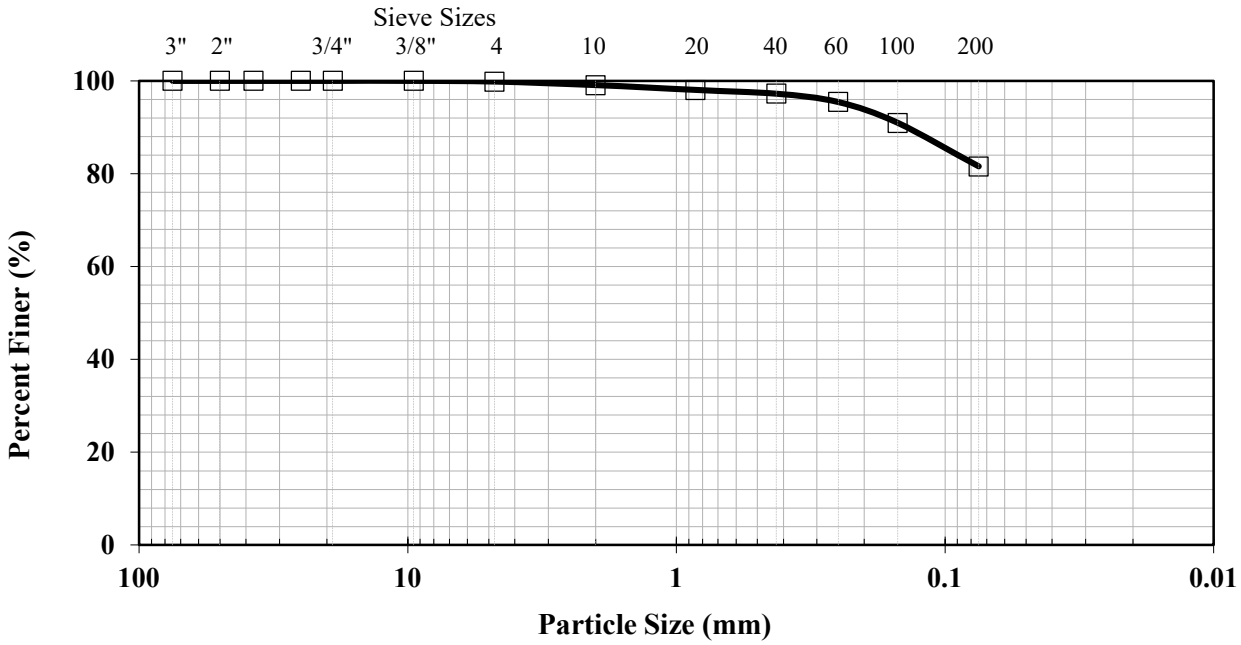
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-21 (G-1) (0-1.5 ft)

Alpine Project No.: 2501017
Test Date: 01/31/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.8
No. 10 (2.0 mm)	99.1
No. 20 (850 μm)	98.0
No. 40 (425 μm)	97.2
No. 60 (250 μm)	95.4
No. 100 (150 μm)	90.9
No. 200 (75 μm)	81.6

Note: The as-received water content was 6.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 02/05/25
Reviewed By / Date

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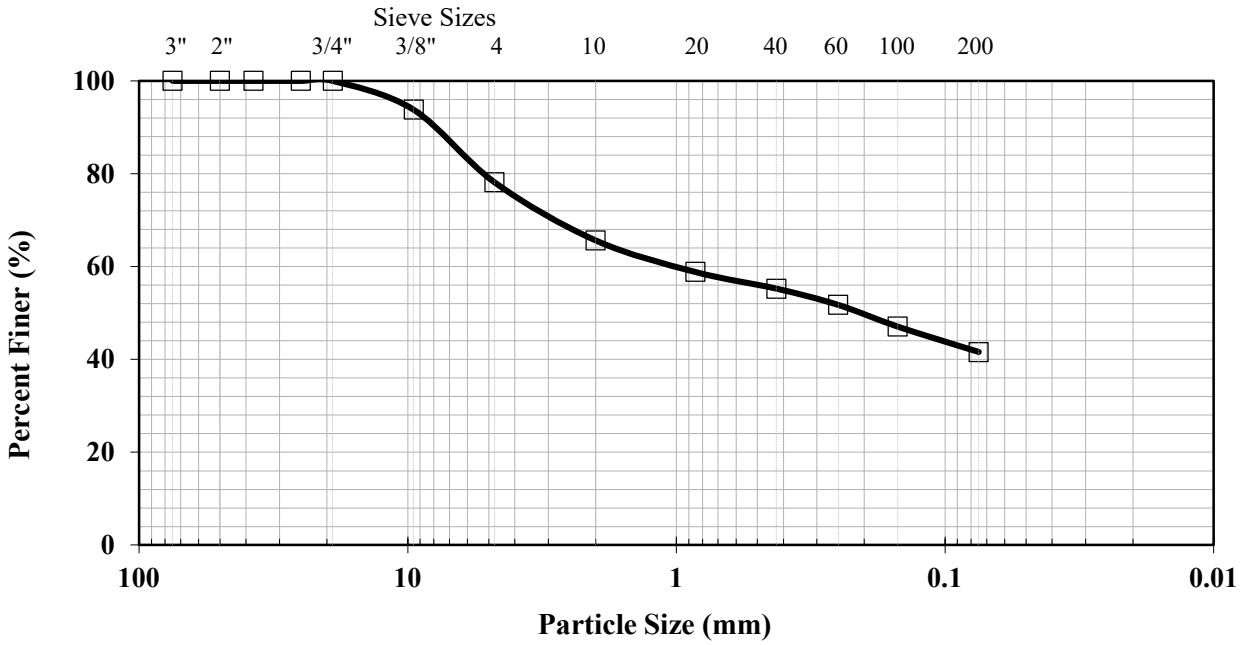
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-22 (S-1) (8.5-10 ft)

Alpine Project No.: 2501017
Test Date: 01/31/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	93.8
No. 4 (4.75 mm)	78.2
No. 10 (2.0 mm)	65.6
No. 20 (850 µm)	58.8
No. 40 (425 µm)	55.2
No. 60 (250 µm)	51.7
No. 100 (150 µm)	47.1
No. 200 (75 µm)	41.6

Note: The as-received water content was 4.2 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	1.049
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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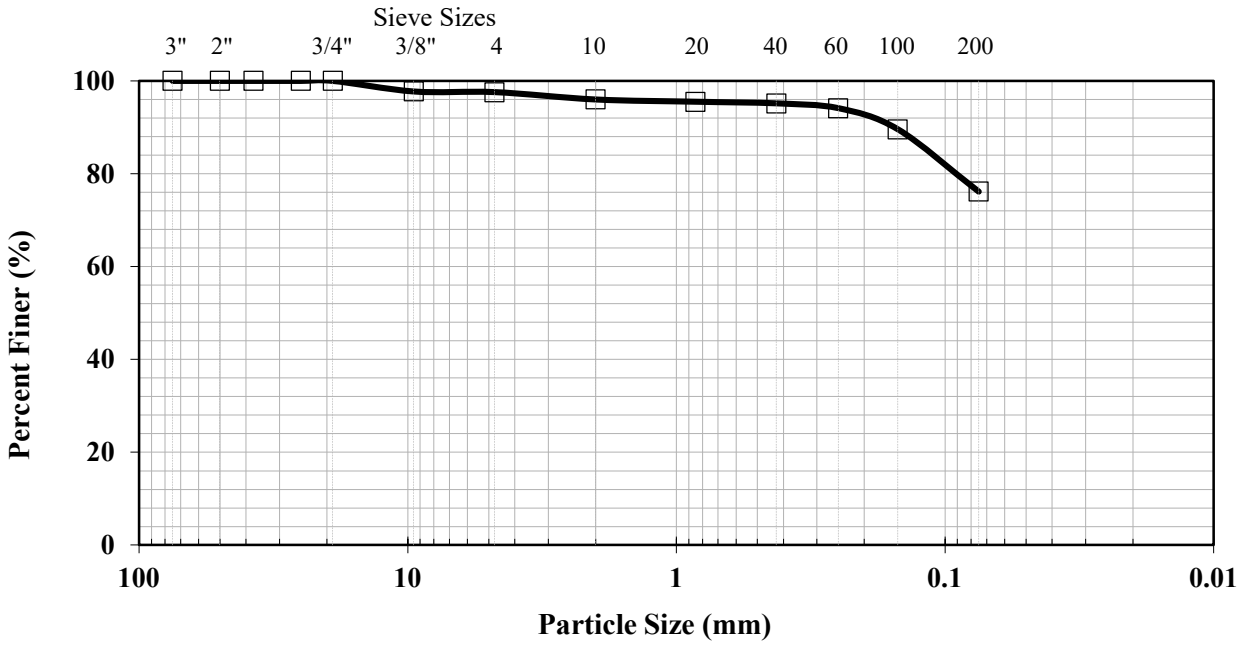
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-23 (U-3) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	97.7
No. 4 (4.75 mm)	97.5
No. 10 (2.0 mm)	96.0
No. 20 (850 µm)	95.5
No. 40 (425 µm)	95.1
No. 60 (250 µm)	94.1
No. 100 (150 µm)	89.6
No. 200 (75 µm)	76.1

Note: Soil classifies as lean clay with sand (CL) in accordance with ASTM D2487.

The as received moisture content was 5.0 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	24
Plastic Limit	15
Plastic Index	9
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/08/25
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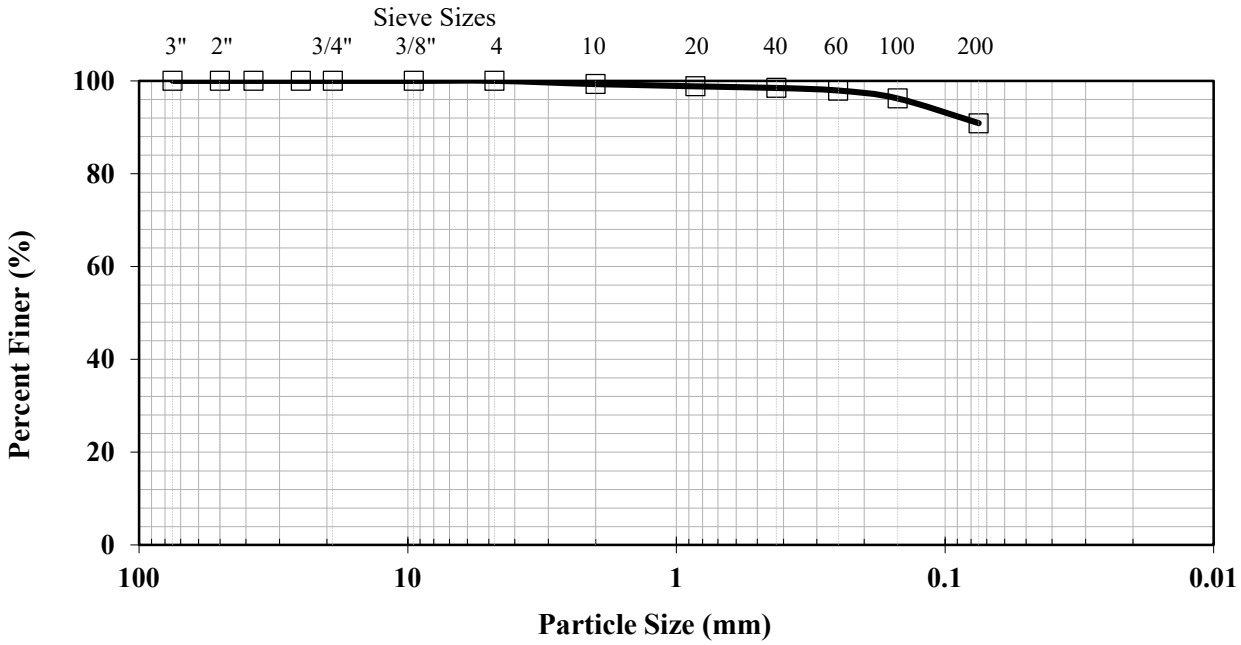
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-24 (U-7) (18-20 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	99.3
No. 20 (850 µm)	98.8
No. 40 (425 µm)	98.5
No. 60 (250 µm)	97.9
No. 100 (150 µm)	96.2
No. 200 (75 µm)	90.8

Note: The as-received water content was 10.3 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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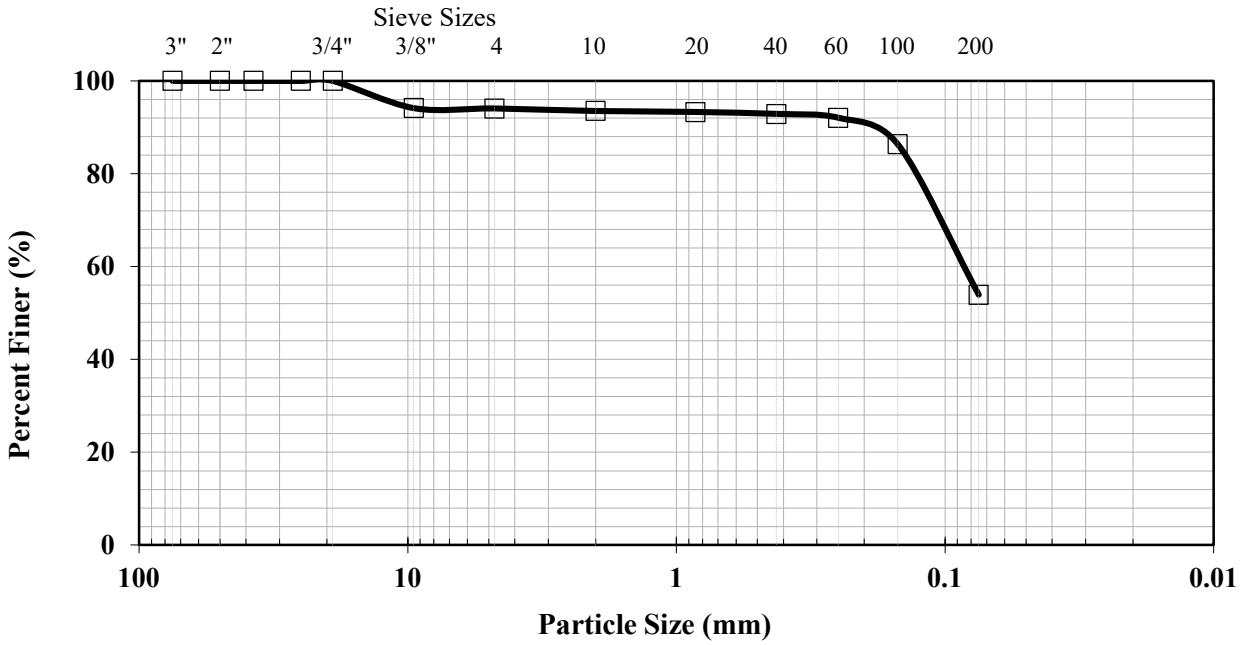
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-26 (S-3) (13-15 ft)

Alpine Project No.: 2501017
Test Date: 01/31/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	94.1
No. 4 (4.75 mm)	94.0
No. 10 (2.0 mm)	93.5
No. 20 (850 µm)	93.2
No. 40 (425 µm)	92.9
No. 60 (250 µm)	92.0
No. 100 (150 µm)	86.3
No. 200 (75 µm)	53.9

Note: The as-received water content was 2.7 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.089
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 02/05/25
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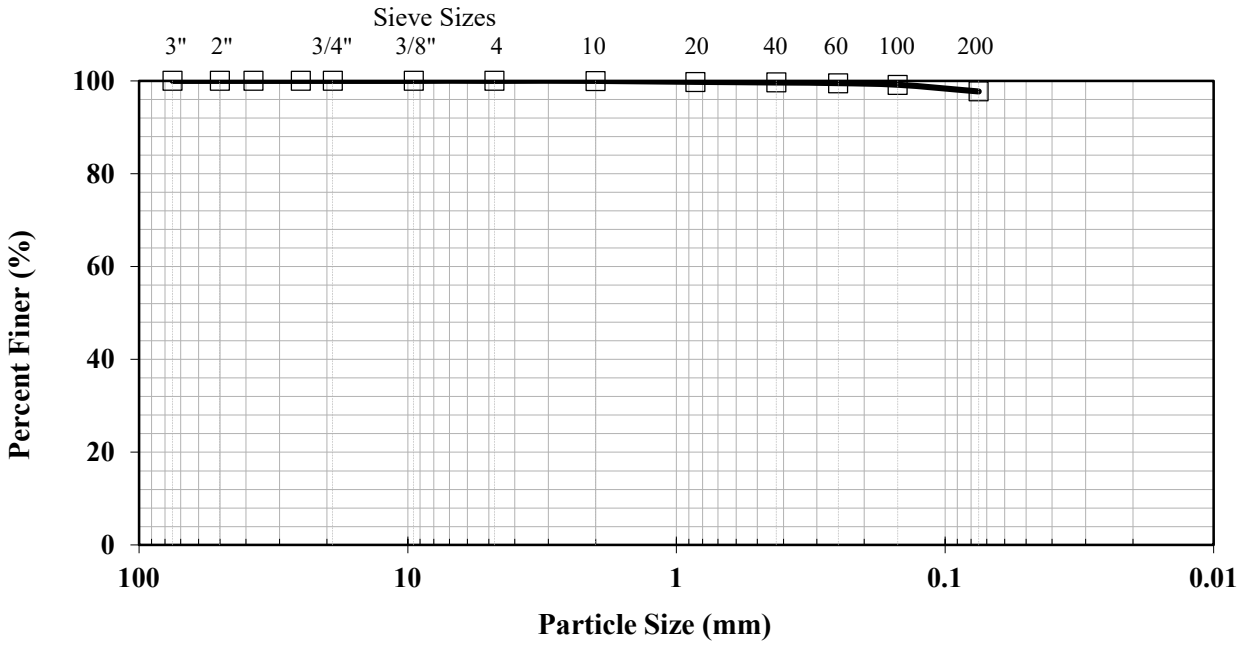
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-29 (U-5) (8-10 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	100.0
No. 20 (850 µm)	99.8
No. 40 (425 µm)	99.7
No. 60 (250 µm)	99.5
No. 100 (150 µm)	99.1
No. 200 (75 µm)	97.7

Note: Soil classifies as lean clay(CL) in accordance with ASTM D2487.

Atterberg Limits (ASTM D4318)	
Liquid Limit	48
Plastic Limit	17
Plastic Index	31
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/08/25
Reviewed By / Date

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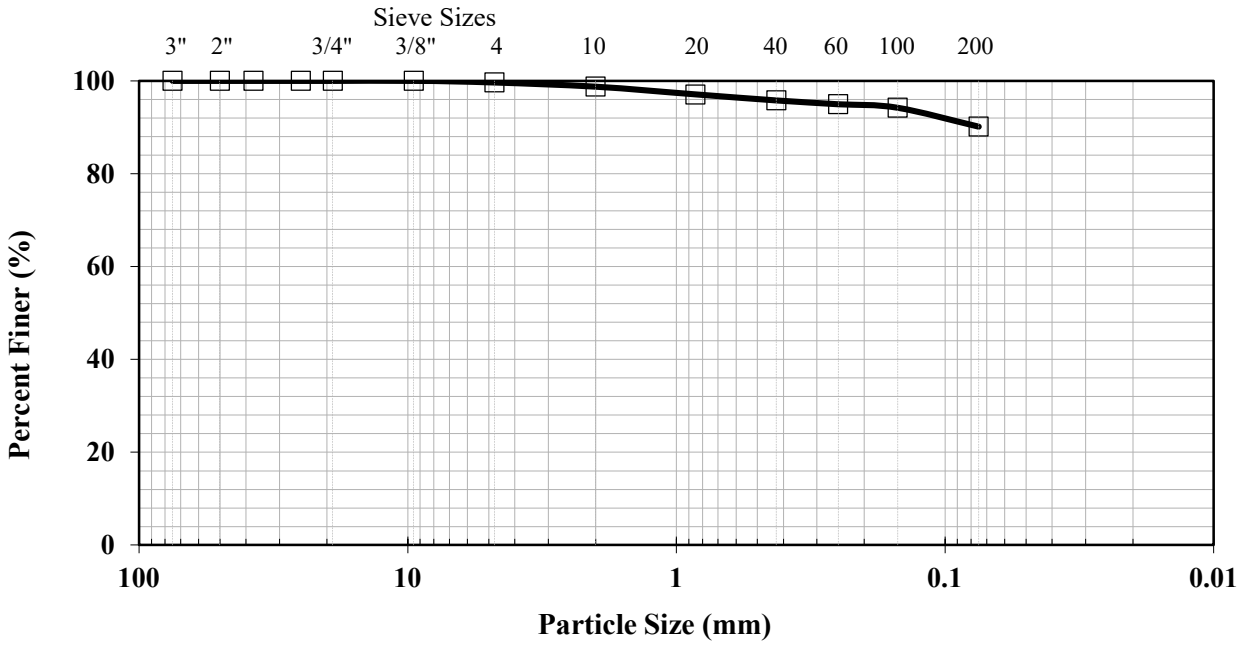
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-31 (U-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.7
No. 10 (2.0 mm)	98.7
No. 20 (850 µm)	97.1
No. 40 (425 µm)	95.8
No. 60 (250 µm)	95.0
No. 100 (150 µm)	94.2
No. 200 (75 µm)	90.1

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487.

The as received moisture content was 15.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	43
Plastic Limit	18
Plastic Index	25
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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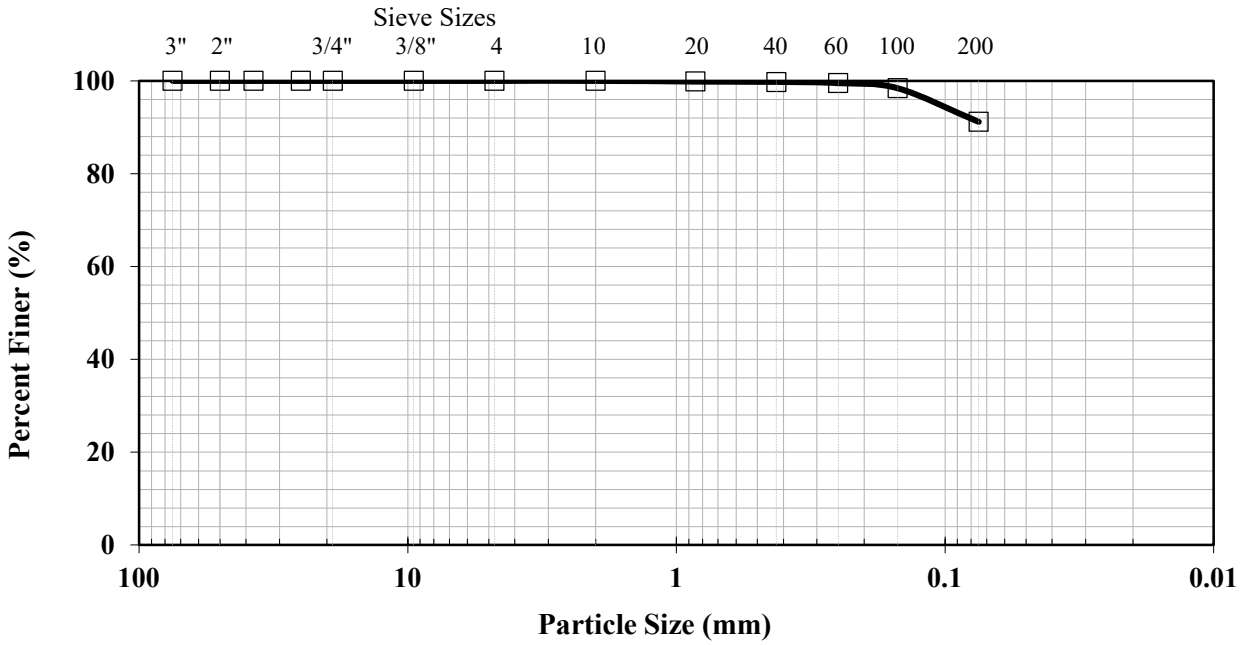
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-32 (U-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	100.0
No. 20 (850 µm)	99.8
No. 40 (425 µm)	99.7
No. 60 (250 µm)	99.5
No. 100 (150 µm)	98.4
No. 200 (75 µm)	91.2

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487.

The as received moisture content was 9.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	38
Plastic Limit	18
Plastic Index	20
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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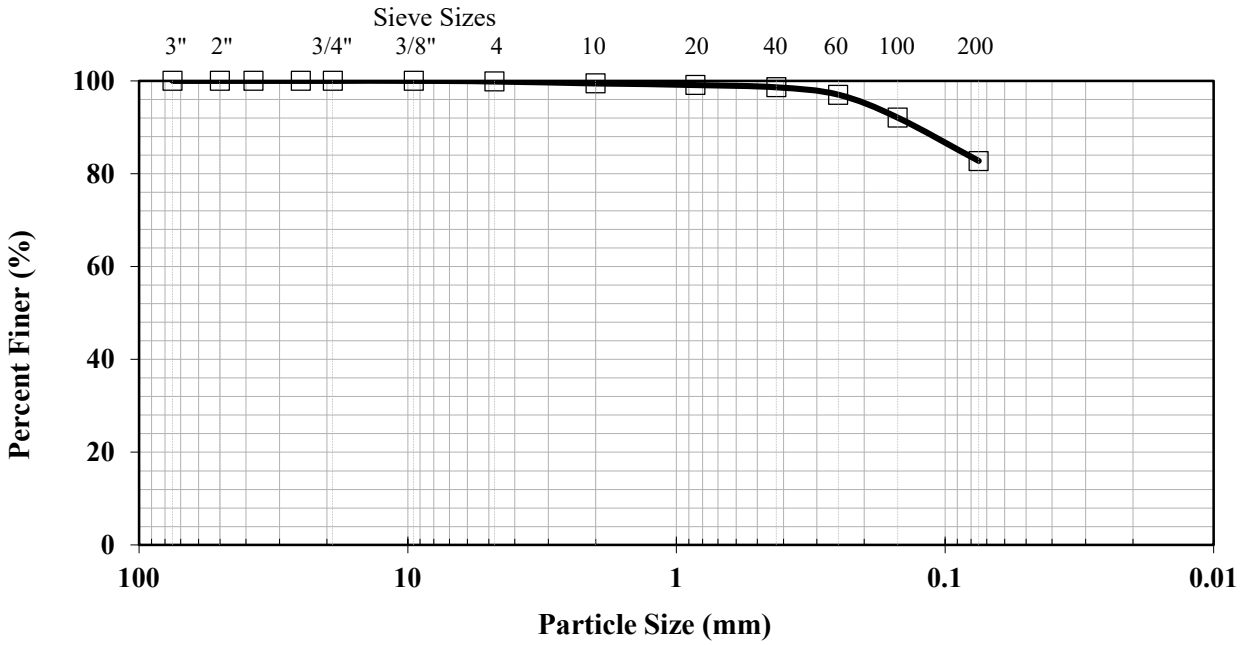
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-33 (U-3) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.9
No. 10 (2.0 mm)	99.4
No. 20 (850 µm)	99.1
No. 40 (425 µm)	98.6
No. 60 (250 µm)	97.0
No. 100 (150 µm)	92.1
No. 200 (75 µm)	82.7

Note: Soil classifies as lean clay with sand (CL) in accordance with ASTM D2487.

The as received moisture content was 12.8 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	43
Plastic Limit	16
Plastic Index	27
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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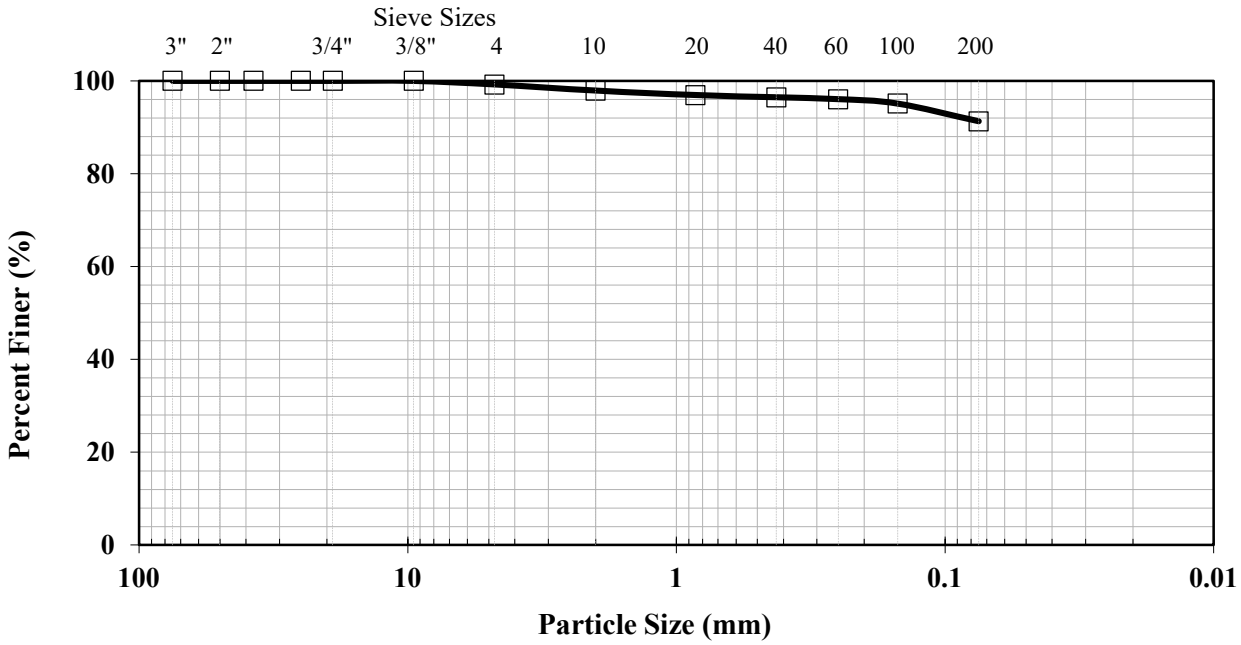
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-34 (S-3) (13.5-15 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.2
No. 10 (2.0 mm)	97.9
No. 20 (850 µm)	96.9
No. 40 (425 µm)	96.4
No. 60 (250 µm)	96.0
No. 100 (150 µm)	95.1
No. 200 (75 µm)	91.3

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487.

The as received moisture content was 7.8 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	35
Plastic Limit	15
Plastic Index	20
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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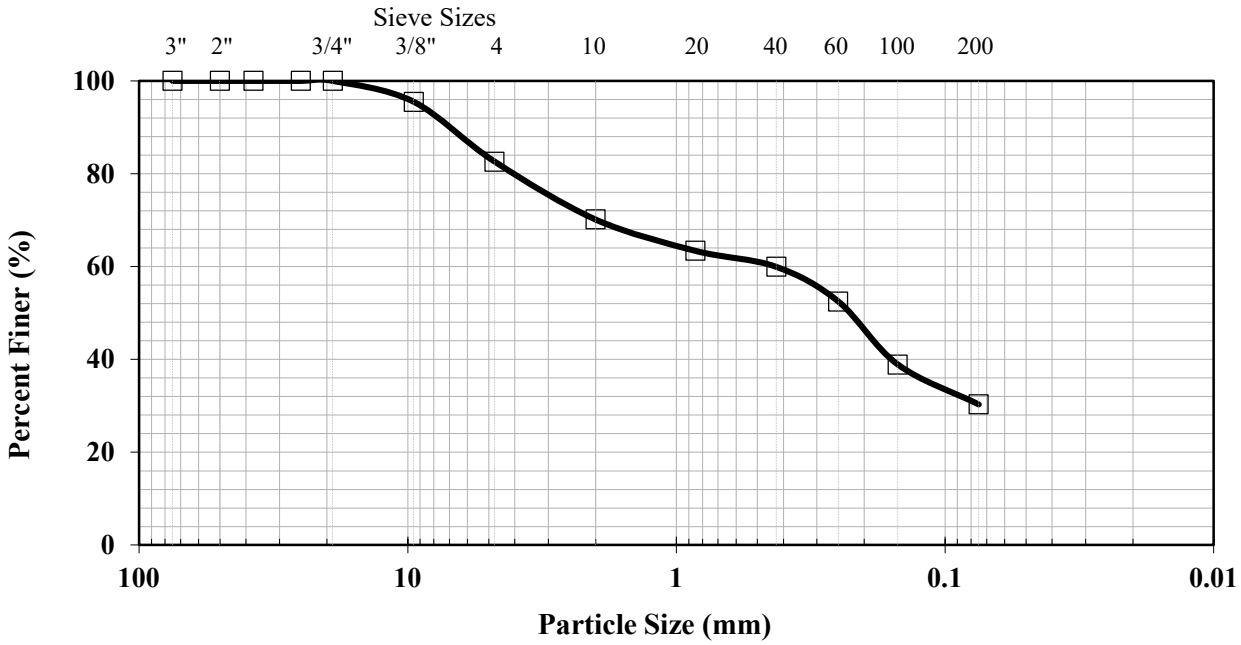
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-35 (S-3) (8.5-10 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	95.5
No. 4 (4.75 mm)	82.6
No. 10 (2.0 mm)	70.1
No. 20 (850 µm)	63.4
No. 40 (425 µm)	60.0
No. 60 (250 µm)	52.5
No. 100 (150 µm)	38.9
No. 200 (75 µm)	30.3

Note: Soil classifies as clayey sand with gravel (SC) in accordance with ASTM D2487.

The as received moisture content was 6.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	26
Plastic Limit	13
Plastic Index	13
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.431
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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Hutto, TX 78634
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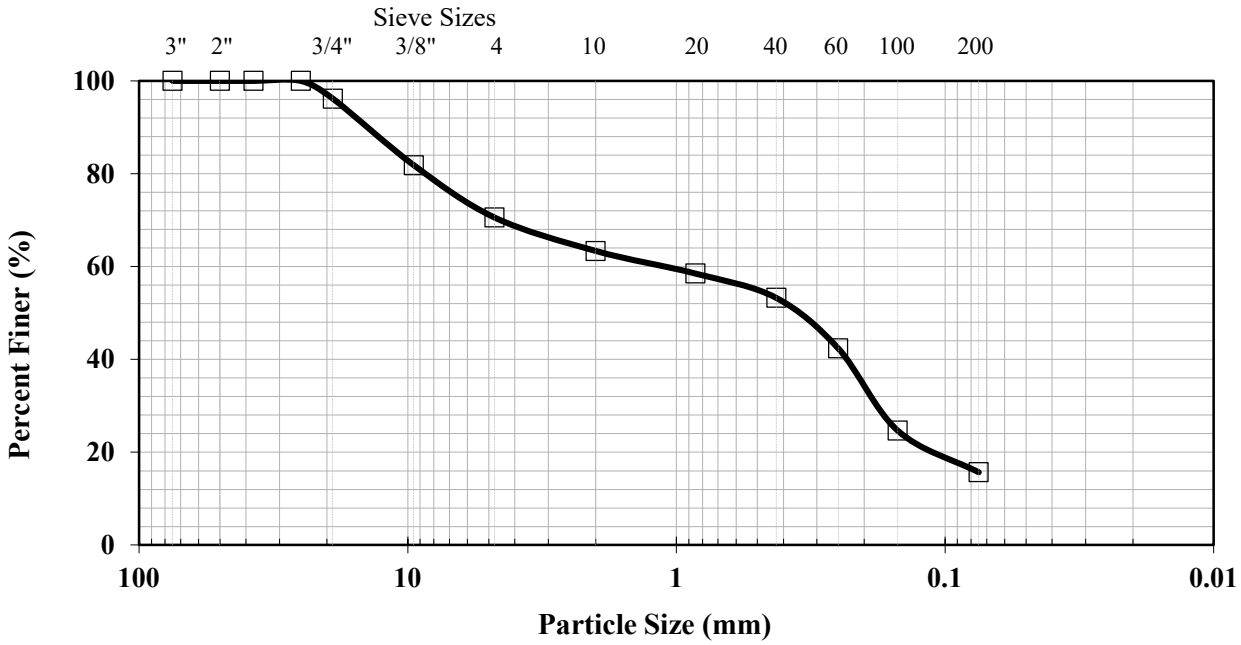
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-36 (U-3) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	96.2
3/8 in.	81.8
No. 4 (4.75 mm)	70.6
No. 10 (2.0 mm)	63.3
No. 20 (850 µm)	58.5
No. 40 (425 µm)	53.2
No. 60 (250 µm)	42.4
No. 100 (150 µm)	24.6
No. 200 (75 µm)	15.7

Note: The as received moisture content was 13.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	1.207
D30 (mm)	0.180
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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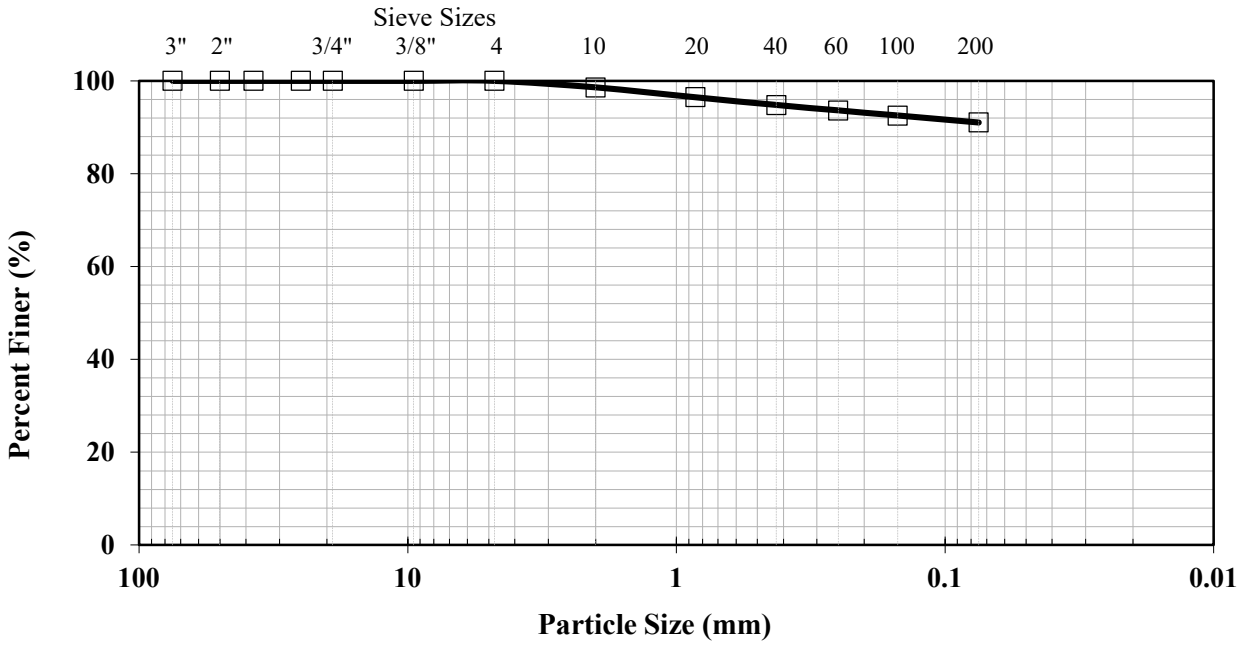
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-37 U-3 (4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	98.6
No. 20 (850 µm)	96.5
No. 40 (425 µm)	94.8
No. 60 (250 µm)	93.6
No. 100 (150 µm)	92.5
No. 200 (75 µm)	91.0

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487.

The as received moisture content was 10.0 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	44
Plastic Limit	19
Plastic Index	25
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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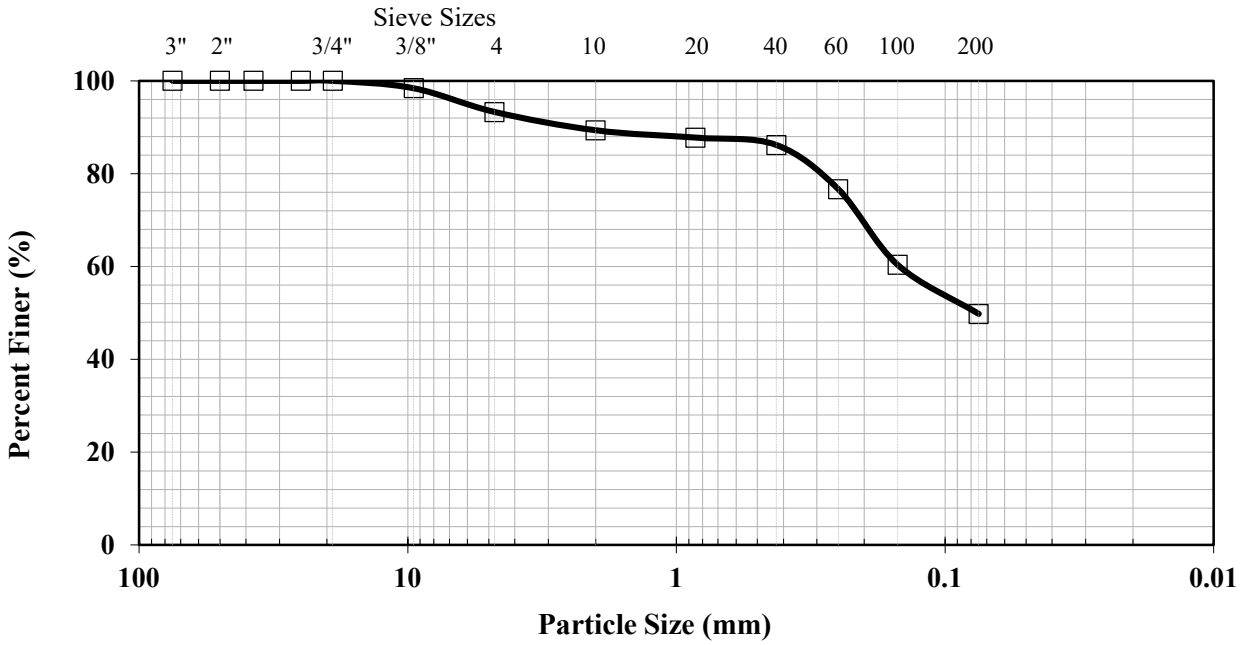
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-38 S-1 (2-3.5 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.4
No. 4 (4.75 mm)	93.3
No. 10 (2.0 mm)	89.3
No. 20 (850 µm)	87.7
No. 40 (425 µm)	86.2
No. 60 (250 µm)	76.6
No. 100 (150 µm)	60.3
No. 200 (75 µm)	49.8

Note: Soil classifies as clayey sand (SC) in accordance with ASTM D2487.

The as received moisture content was 13.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	33
Plastic Limit	13
Plastic Index	20
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.148
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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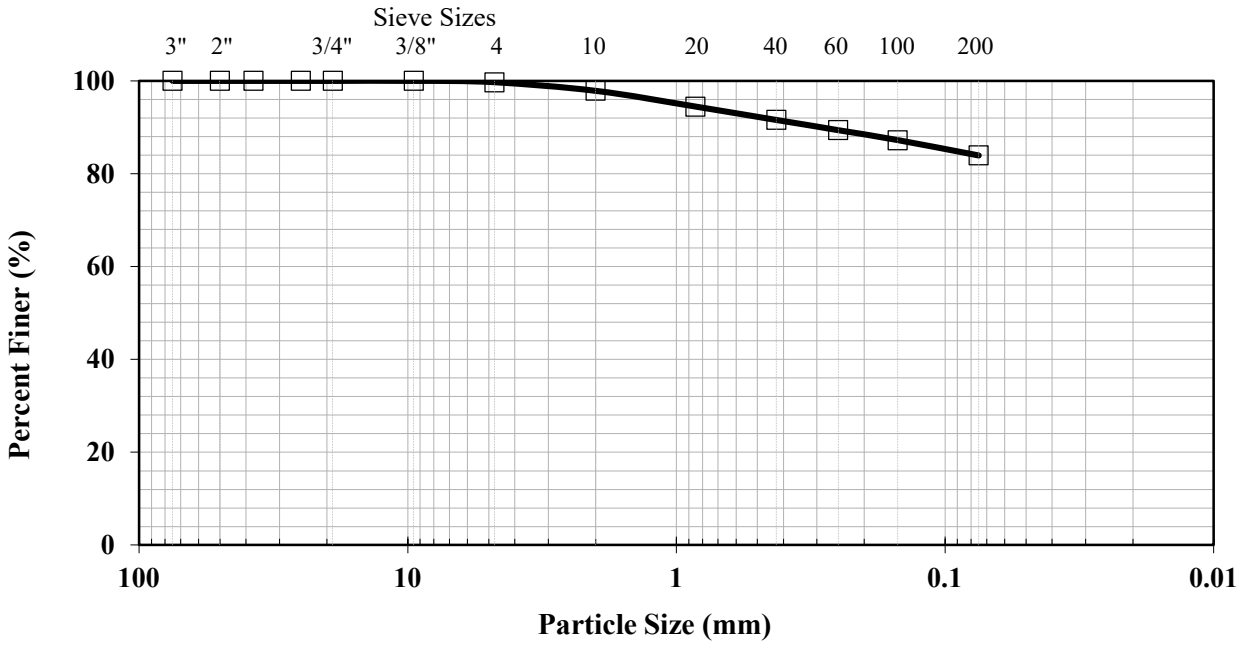
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-38 U-2 (6-8 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.7
No. 10 (2.0 mm)	97.8
No. 20 (850 µm)	94.4
No. 40 (425 µm)	91.6
No. 60 (250 µm)	89.4
No. 100 (150 µm)	87.2
No. 200 (75 µm)	83.9

Note: The as received moisture content was 17.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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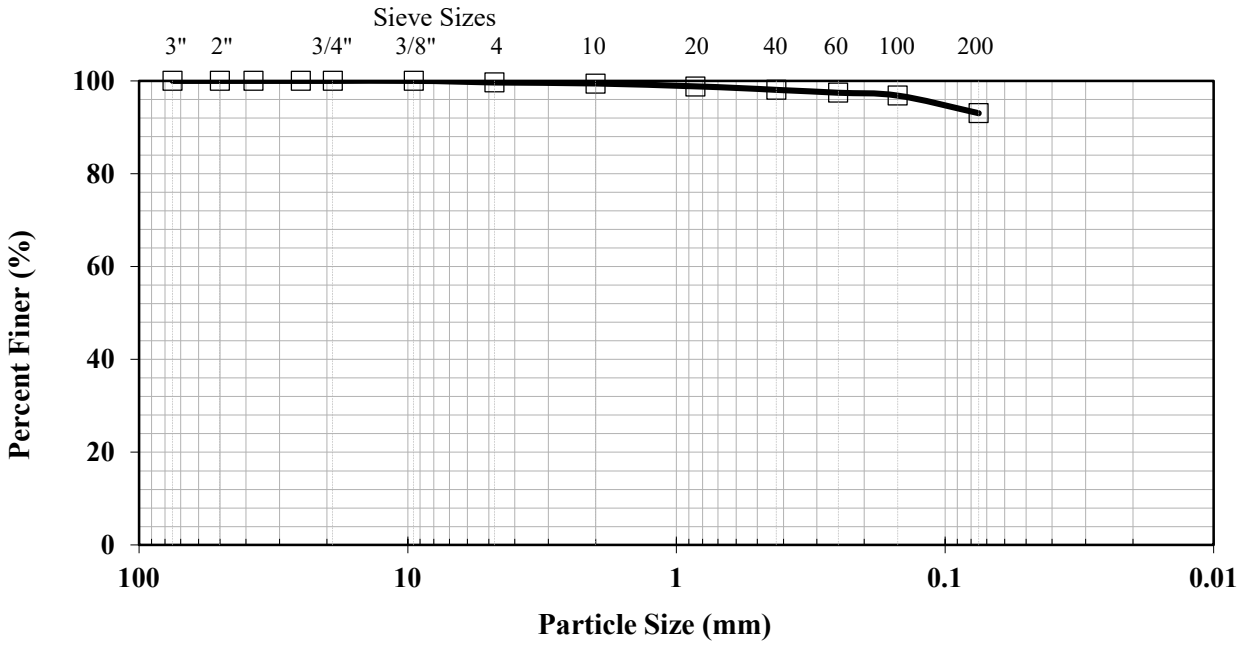
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-40 (S-1) (8-9.5 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.7
No. 10 (2.0 mm)	99.4
No. 20 (850 µm)	98.8
No. 40 (425 µm)	98.1
No. 60 (250 µm)	97.4
No. 100 (150 µm)	96.8
No. 200 (75 µm)	93.0

Note: Soil classifies as lean clay (CL) in accordance with ASTM D2487,

The as received moisture content was 11.0 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	43
Plastic Limit	16
Plastic Index	27
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/07/25
Reviewed By / Date

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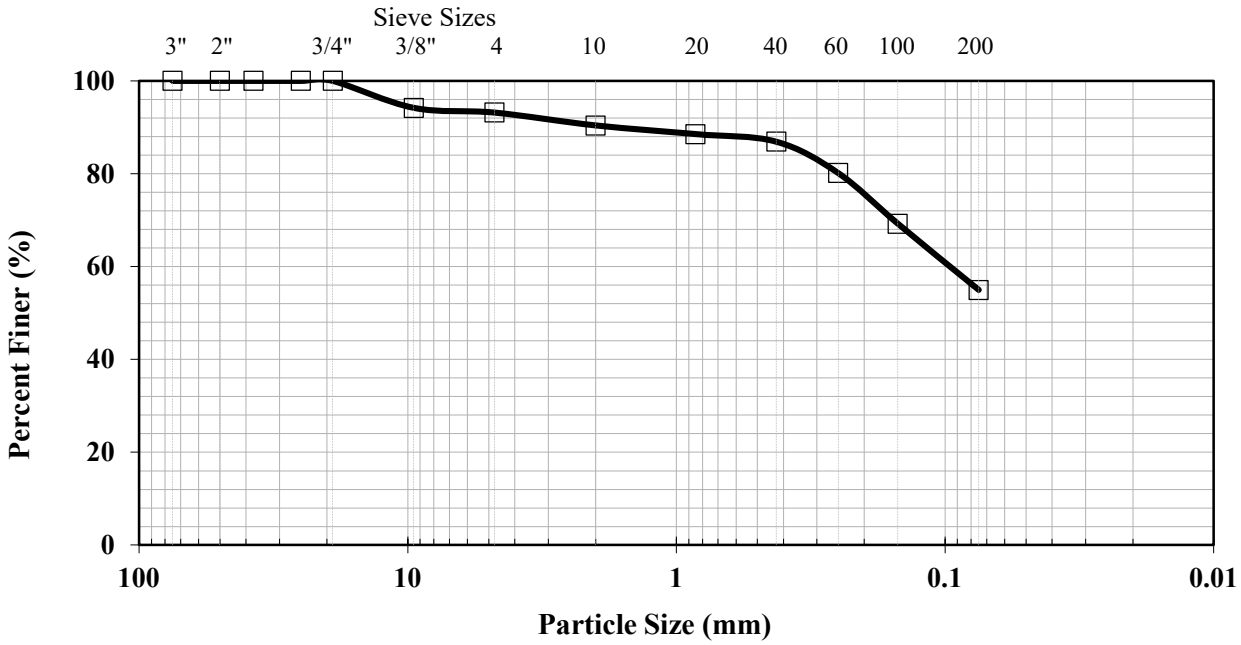
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-41 (S-2) (18.5-20 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	94.1
No. 4 (4.75 mm)	93.2
No. 10 (2.0 mm)	90.4
No. 20 (850 µm)	88.5
No. 40 (425 µm)	86.9
No. 60 (250 µm)	80.1
No. 100 (150 µm)	69.2
No. 200 (75 µm)	54.9

Note: The as received moisture content was 5.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.102
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/07/25
Reviewed By / Date

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Hutto, TX 78634
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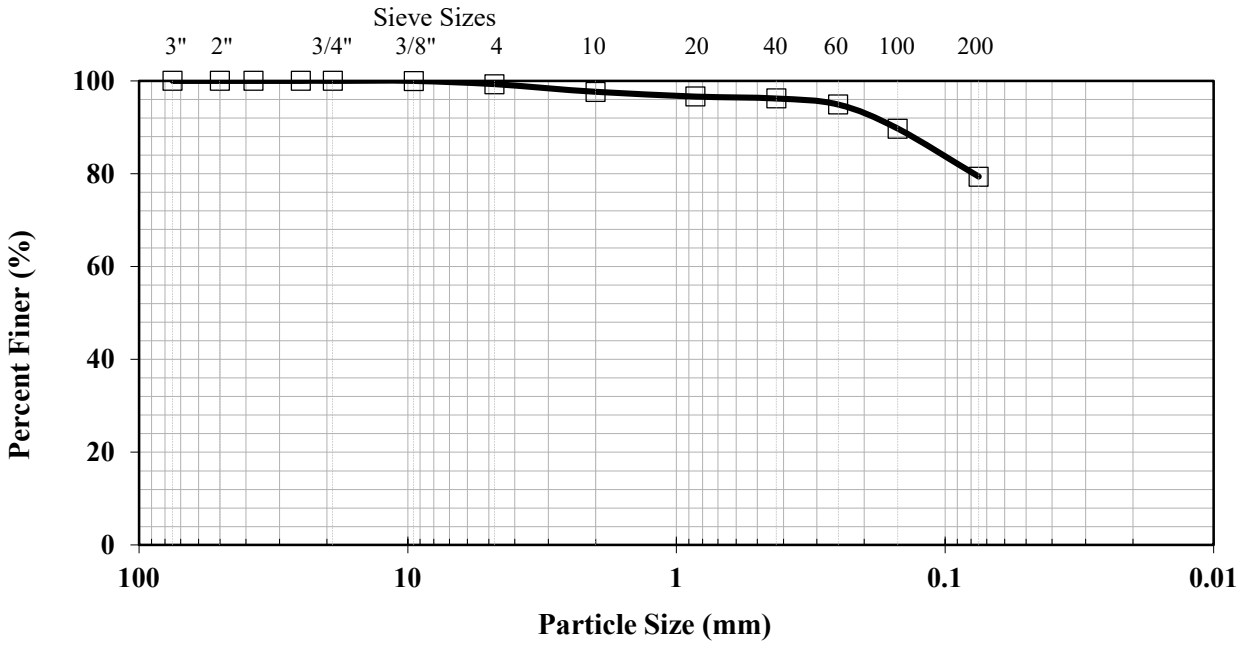
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-42 (S-1) (0.25-1.75 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.3
No. 10 (2.0 mm)	97.6
No. 20 (850 µm)	96.6
No. 40 (425 µm)	96.2
No. 60 (250 µm)	94.9
No. 100 (150 µm)	89.7
No. 200 (75 µm)	79.4

Note: The as received moisture content was 13.9 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/07/25
Reviewed By / Date

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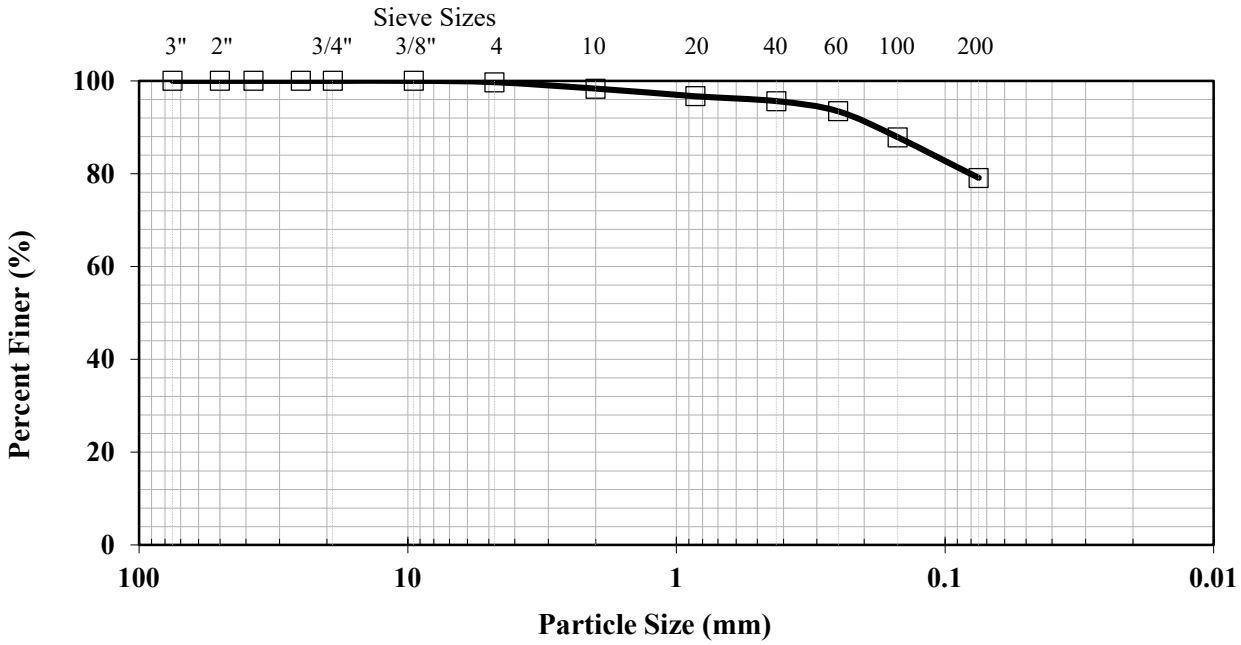
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-3 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.7
No. 10 (2.0 mm)	98.3
No. 20 (850 µm)	96.7
No. 40 (425 µm)	95.6
No. 60 (250 µm)	93.4
No. 100 (150 µm)	87.8
No. 200 (75 µm)	79.1

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

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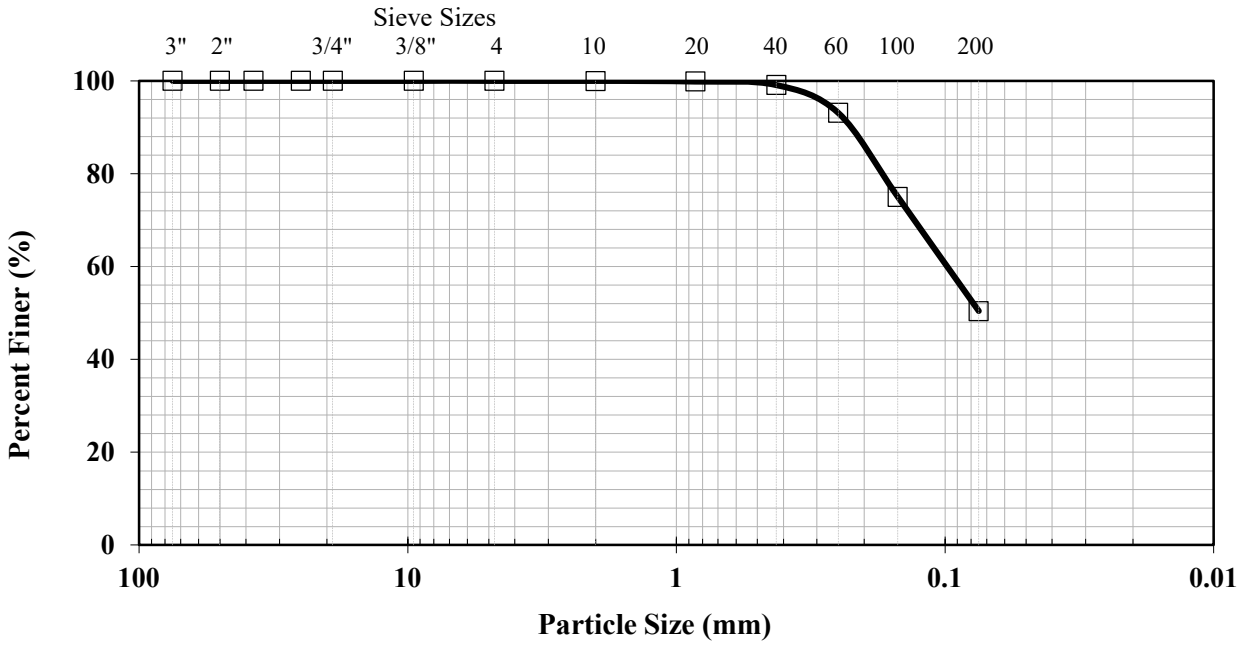
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-6 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	100.0
No. 20 (850 µm)	99.9
No. 40 (425 µm)	99.1
No. 60 (250 µm)	93.1
No. 100 (150 µm)	75.0
No. 200 (75 µm)	50.4

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.104
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

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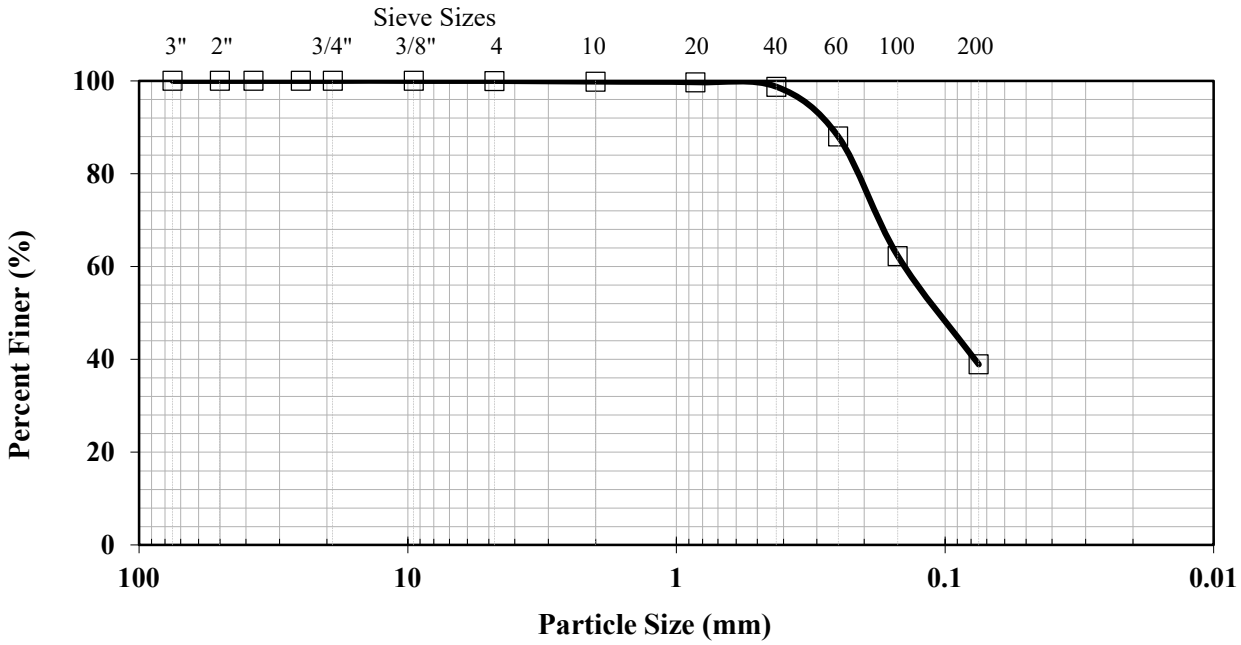
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-7 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.9
No. 10 (2.0 mm)	99.8
No. 20 (850 µm)	99.7
No. 40 (425 µm)	98.7
No. 60 (250 µm)	88.0
No. 100 (150 µm)	62.3
No. 200 (75 µm)	38.9

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.143
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

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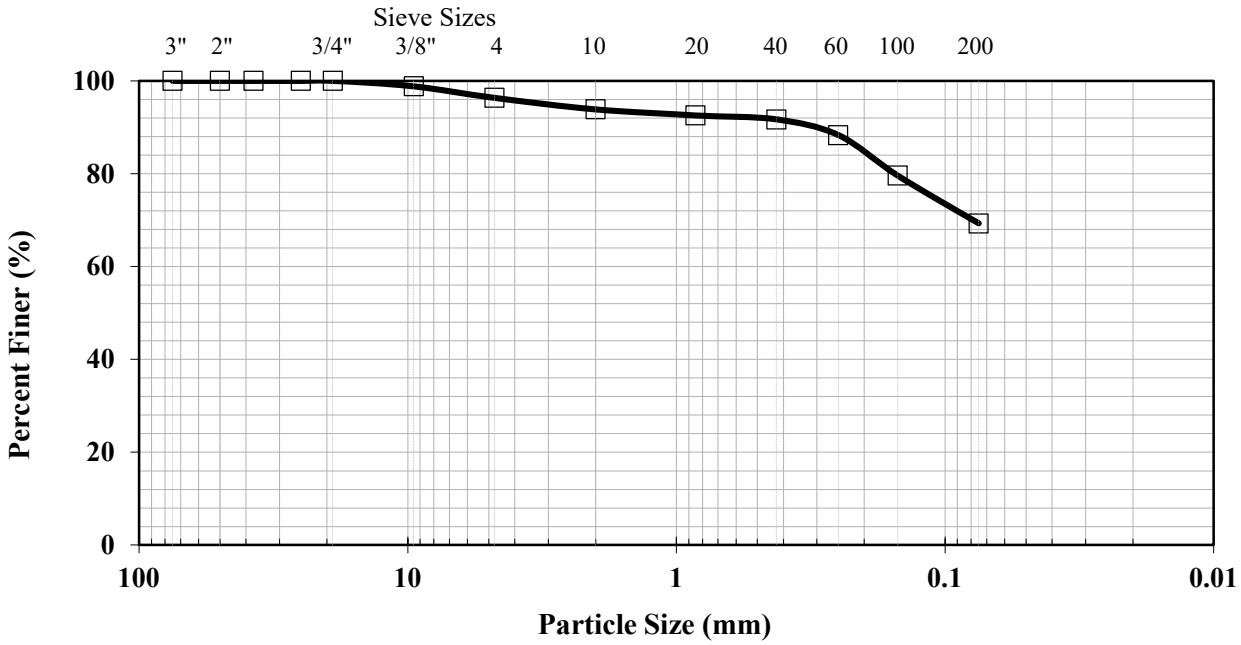
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-14 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.8
No. 4 (4.75 mm)	96.3
No. 10 (2.0 mm)	93.9
No. 20 (850 µm)	92.5
No. 40 (425 µm)	91.7
No. 60 (250 µm)	88.3
No. 100 (150 µm)	79.6
No. 200 (75 µm)	69.3

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

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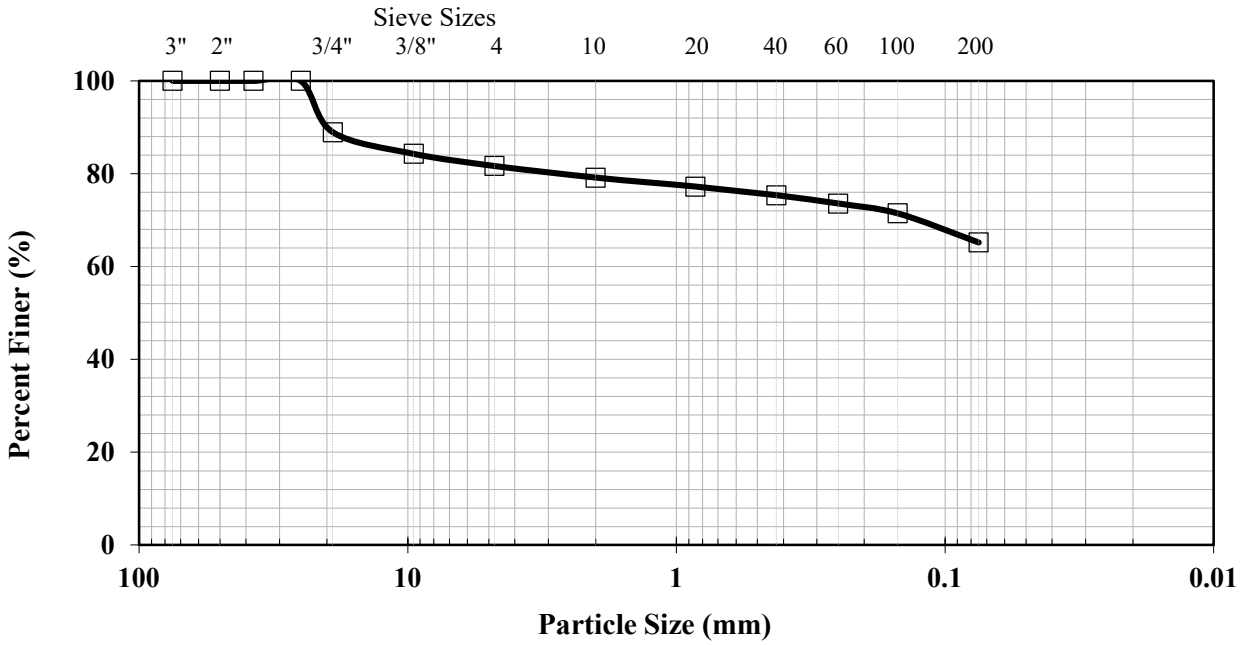
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-22 G-2/3 (2-4/4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/05/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	88.9
3/8 in.	84.3
No. 4 (4.75 mm)	81.6
No. 10 (2.0 mm)	79.1
No. 20 (850 µm)	77.2
No. 40 (425 µm)	75.3
No. 60 (250 µm)	73.6
No. 100 (150 µm)	71.4
No. 200 (75 µm)	65.2

Note: Soil classifies as gravelly lean clay with sand (CL) in accordance with ASTM D2487,

The as received moisture content was 8.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	34
Plastic Limit	16
Plastic Index	18
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 03/11/25
Reviewed By / Date

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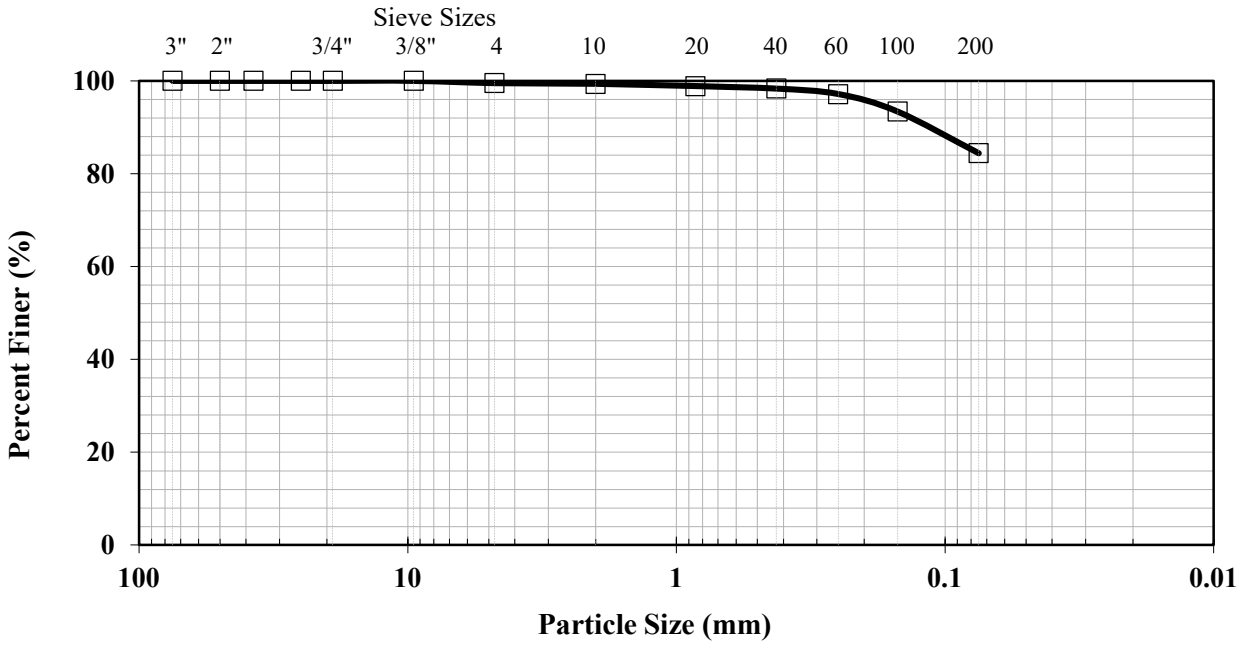
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-23 (G-4) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.5
No. 10 (2.0 mm)	99.3
No. 20 (850 µm)	98.8
No. 40 (425 µm)	98.3
No. 60 (250 µm)	97.1
No. 100 (150 µm)	93.4
No. 200 (75 µm)	84.4

Note: The as received moisture content was 12.2 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/07/25
Reviewed By / Date

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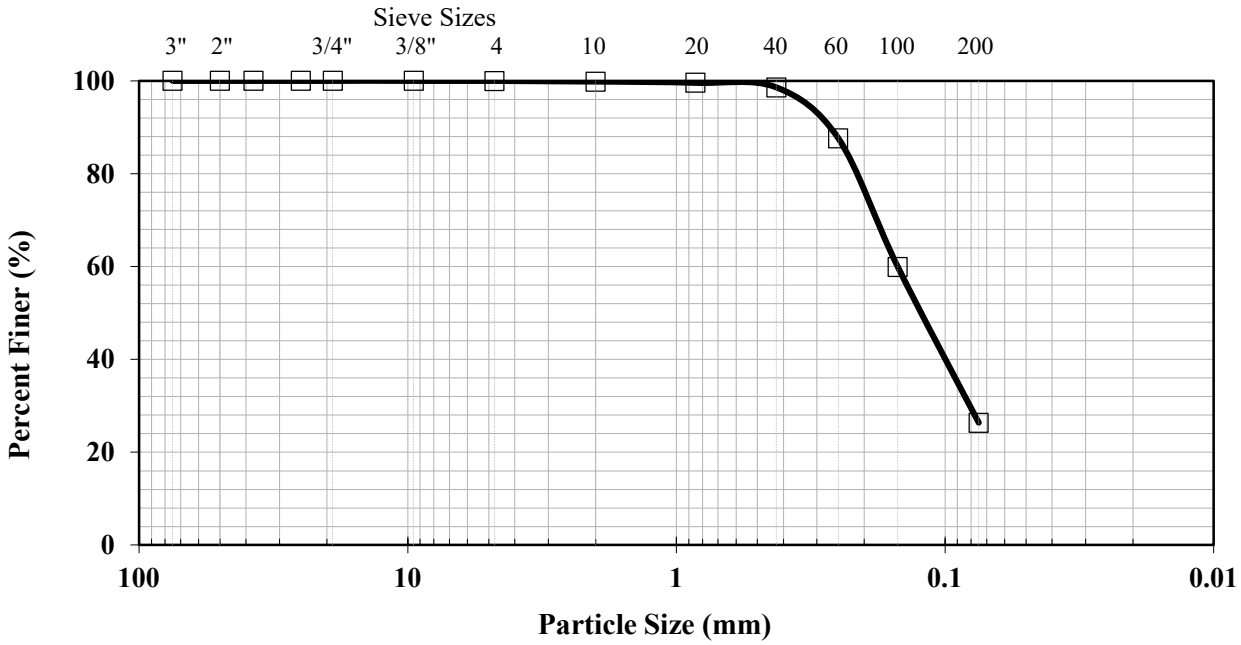
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-26, Bulk #2 (0-2 ft)

Alpine Project No.: 2501017
Test Date: 05/29/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	99.8
No. 20 (850 µm)	99.6
No. 40 (425 µm)	98.6
No. 60 (250 µm)	87.6
No. 100 (150 µm)	59.9
No. 200 (75 µm)	26.4

Note: The as received moisture content was 2.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.150
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/07/25
Reviewed By / Date

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Alpine Engineering Services, LLC
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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

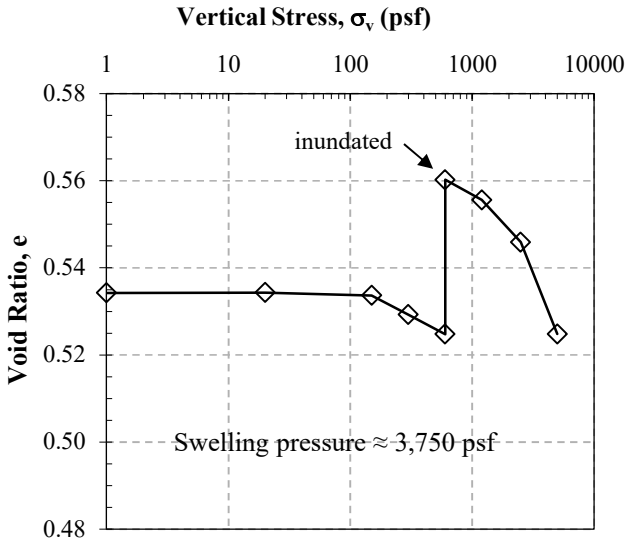
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-1 (U-3) (4-6 ft)

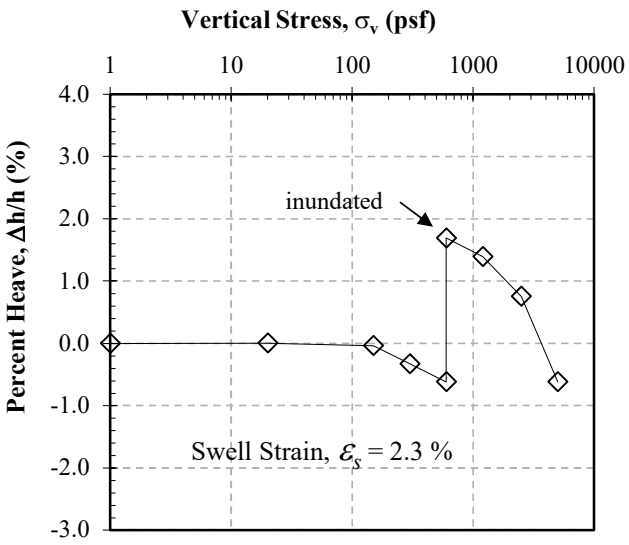
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	14.6
	Initial Specimen Height (in)	0.804
	Initial Dry Unit Weight, γ_o (pcf)	109.0
	Initial Void Ratio, e_o	0.535
	Initial Degree of Saturation (%)	73.4
End of Testing Condition	Final Water Content (%)	19.0
	Final Specimen Height (in)	0.799
	Final Dry Unit Weight, γ_f (pcf)	109.7
	Final Void Ratio, e_f	0.525
Swell Pressure at Initial Void Ratio (psf)		3,750
Swell Strain, ε_s (%)		2.3

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.498

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	150	300	600	600	1200	2500	5000
e	0.534	0.534	0.534	0.529	0.525	0.560	0.556	0.546	0.525
Δh/h (%)	0.00	0.01	-0.04	-0.33	-0.62	1.69	1.39	0.76	-0.62
Dial. Gauge* (in)	0.3834	0.3834	0.3837	0.3861	0.3884	0.3699	0.3723	0.3774	0.3884

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 03/06/25

Reviewed By / Date

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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-1 (U-3) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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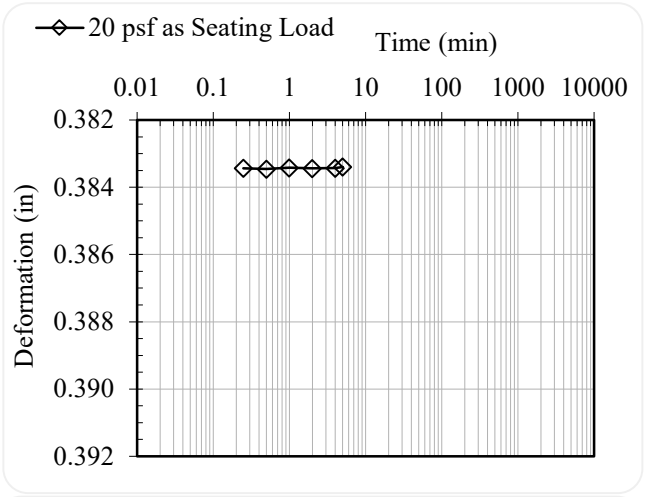
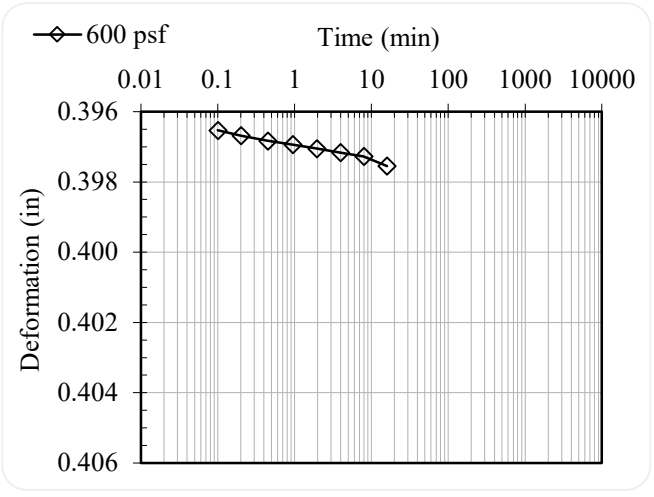
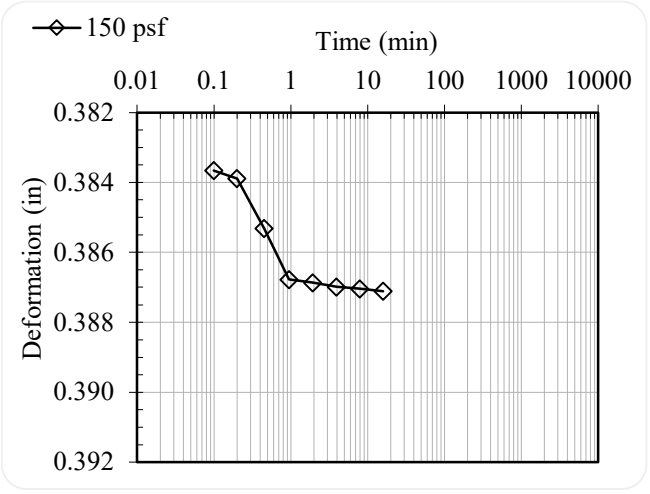
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

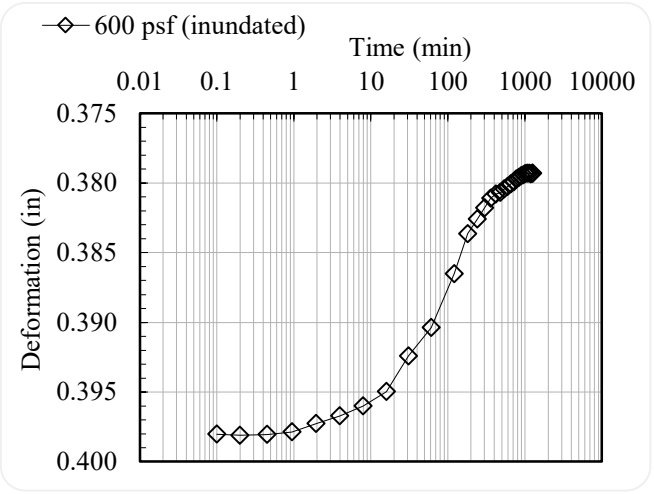
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-1 (U-3) (4-6 ft)

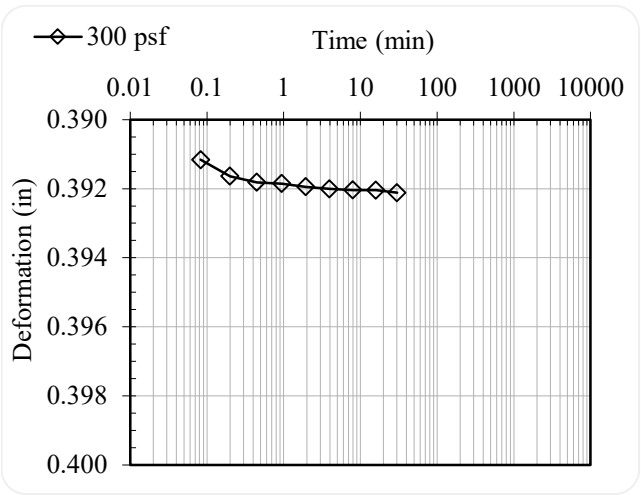
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

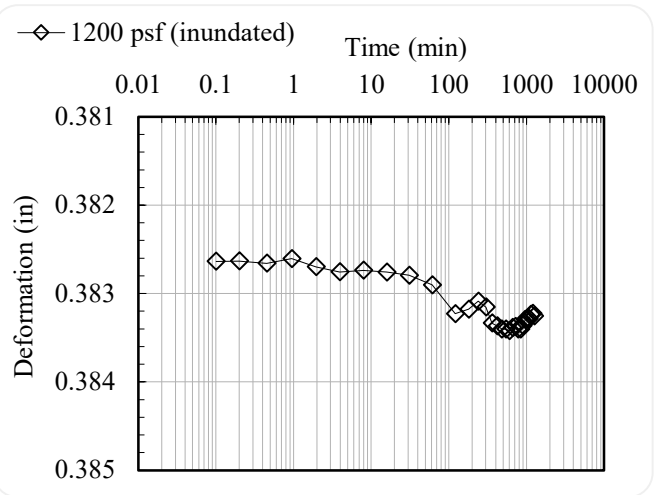












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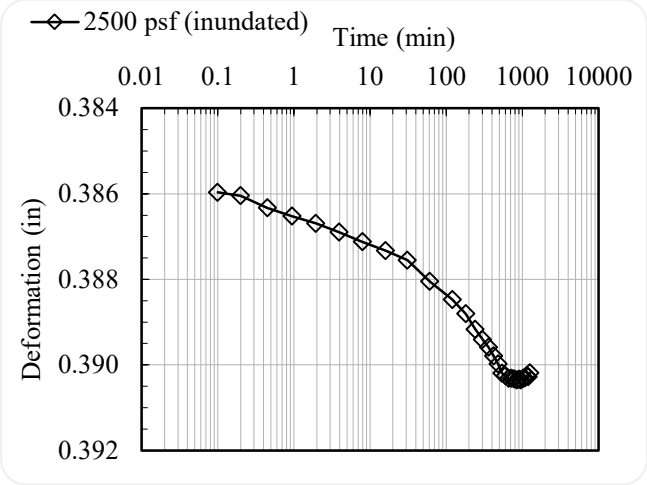
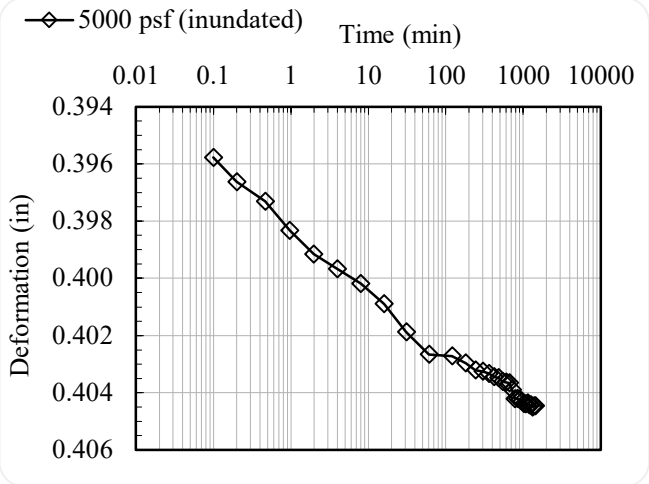
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-1 (U-3) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

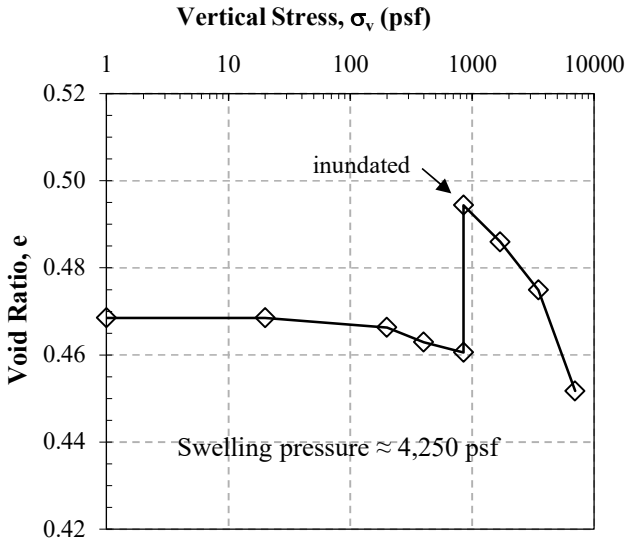
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-4 (U-4) (6-8 ft)

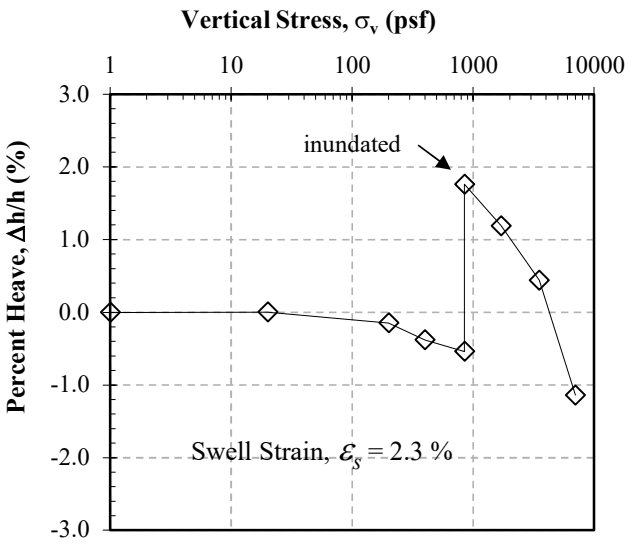
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	12.8
	Initial Specimen Height (in)	0.807
	Initial Dry Unit Weight, γ_o (pcf)	113.9
	Initial Void Ratio, e_o	0.469
	Initial Degree of Saturation (%)	73.4
End of Testing Condition	Final Water Content (%)	16.5
	Final Specimen Height (in)	0.798
	Final Dry Unit Weight, γ_f (pcf)	115.2
	Final Void Ratio, e_f	0.452
Swell Pressure at Initial Void Ratio (psf)		4,250
Swell Strain, ε_s (%)		2.3

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.498

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	200	400	850	850	1700	3500	7000
e	0.469	0.469	0.466	0.463	0.461	0.494	0.486	0.475	0.452
Δh/h (%)	0.00	0.00	-0.15	-0.38	-0.54	1.76	1.19	0.44	-1.14
Dial. Gauge* (in)	0.2717	0.2717	0.2729	0.2748	0.2761	0.2575	0.2621	0.2682	0.2809

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 03/06/25

Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-4 (U-4) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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Client: Langan Engineering
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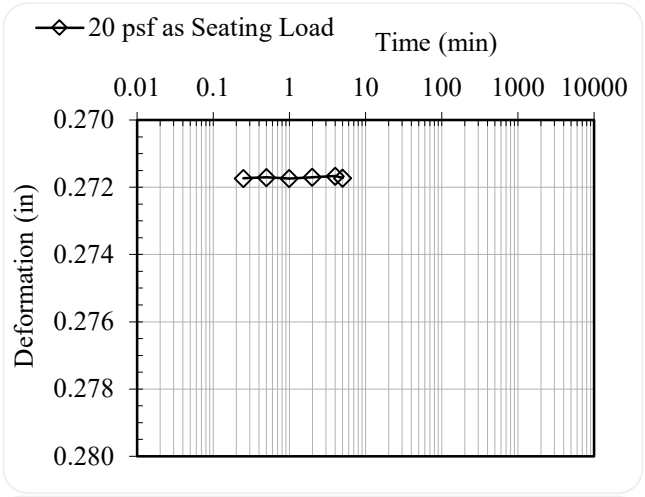
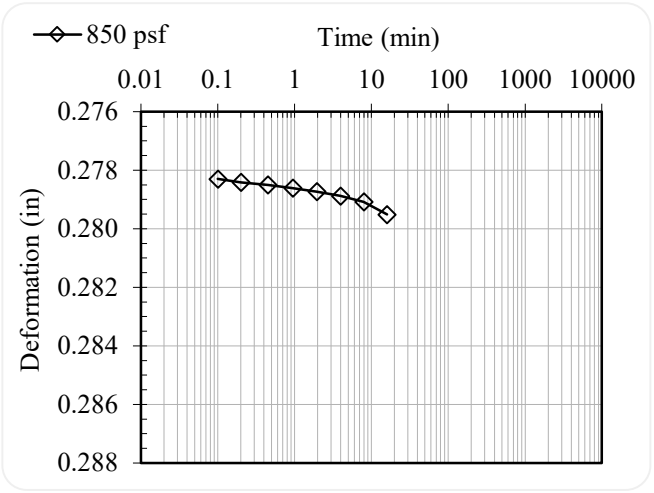
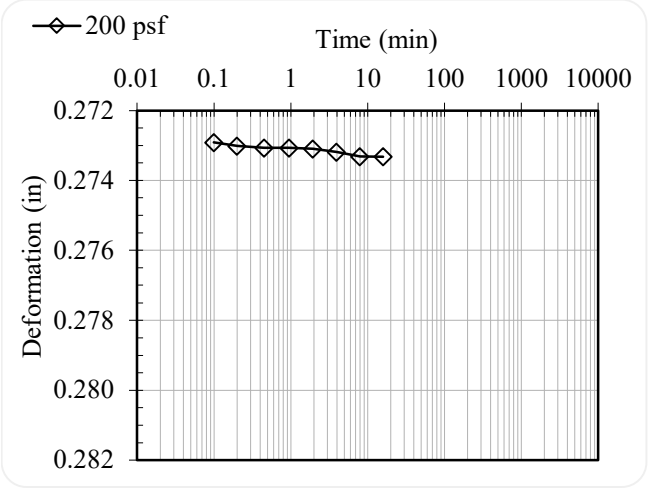
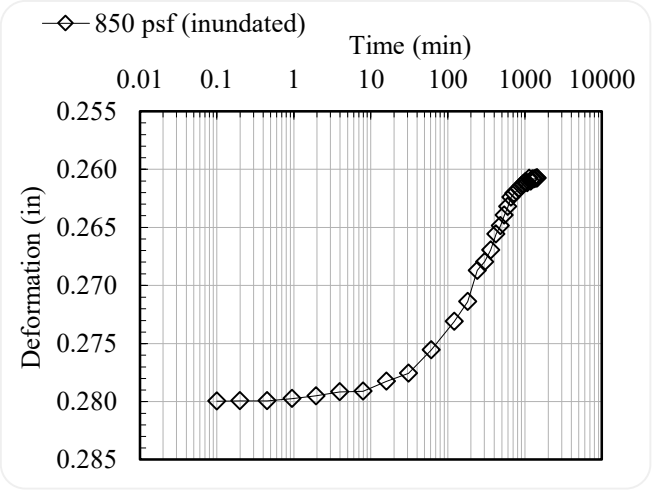
Sample ID: LB-4 (U-4) (6-8 ft)

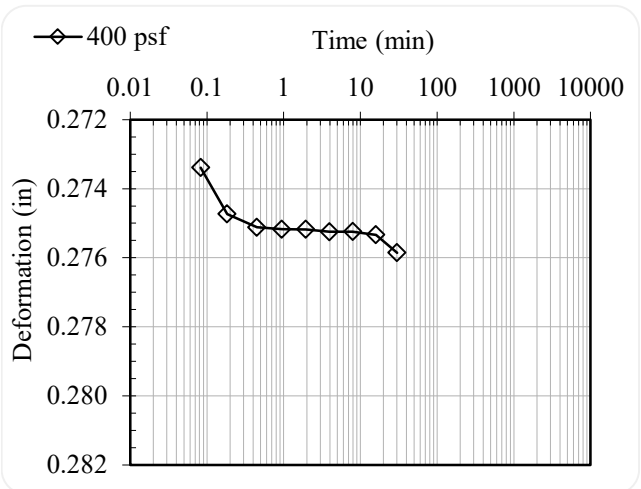
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

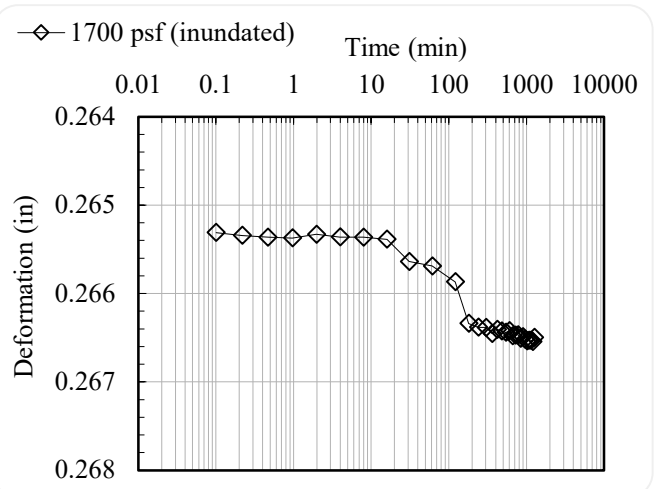












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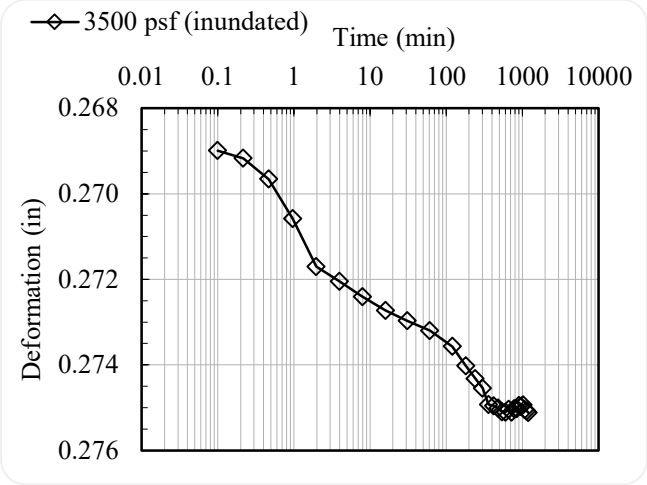
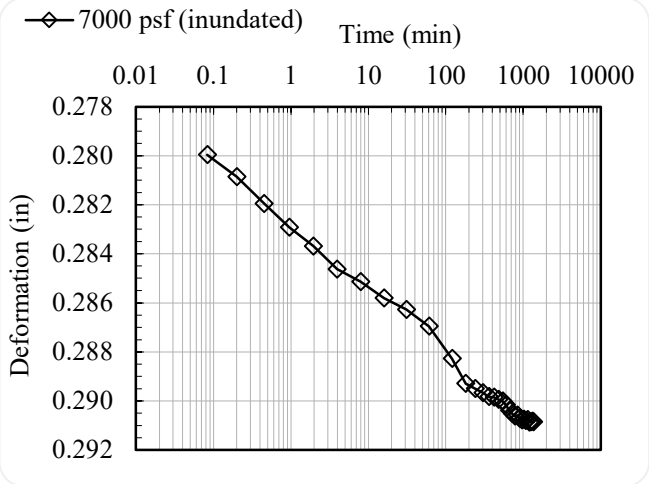
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-4 (U-4) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

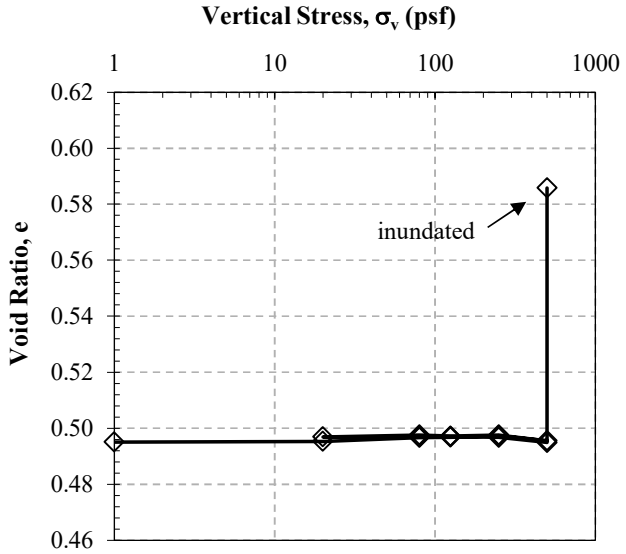
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-10 (UD-1) (2-4 ft)

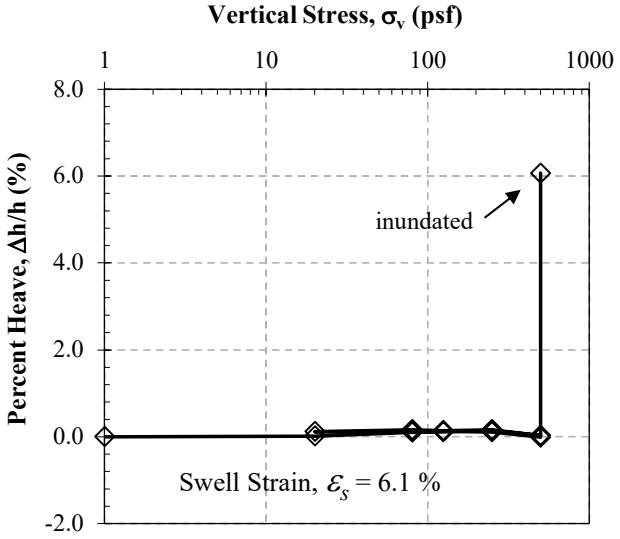
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content, w_1 (%)	13.3
	Specimen Height, h (in)	0.804
	Dry Unit Weight, γ_{d1} (pcf)	111.9
	Void Ratio, e_o	0.495
	Degree of Saturation, S_1 (%)	72.2
End of Testing Condition	Final Water Content, w_2 (%)	20.9
	Specimen Height, h_2 (in)	0.853
	Dry Unit Weight, γ_{d2} (pcf)	105.5
	Void Ratio, e_f	0.586
Swell Strain, ε_s (%)		6.1

Test Method: B
Method of Preparation: *Shelby tube*
Specimen Diameter (in): 2.497

Specimen was inundated with potable tap water during testing. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	80	125	250	500	250	125	80	20
e	0.495	0.495	0.497	0.497	0.497	0.496	0.498	0.497	0.498	0.497
Δh/h (%)	0.00	0.01	0.10	0.11	0.15	0.03	0.16	0.14	0.16	0.12
Dial. Gauge* (in)	0.2460	0.2459	0.2452	0.2451	0.2448	0.2458	0.2447	0.2449	0.2447	0.2451

σ_v (psf)	80	125	250	500	500
e	0.497	0.497	0.497	0.495	0.586
Δh/h (%)	0.12	0.13	0.11	-0.01	6.07
Dial. Gauge* (in)	0.2451	0.2450	0.2451	0.2461	0.1972

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D., 02/06/25
Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-10 (UD-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Test Method: B
Method of Preparation: *Shelby tube*

(a) As-received

(b) After Test

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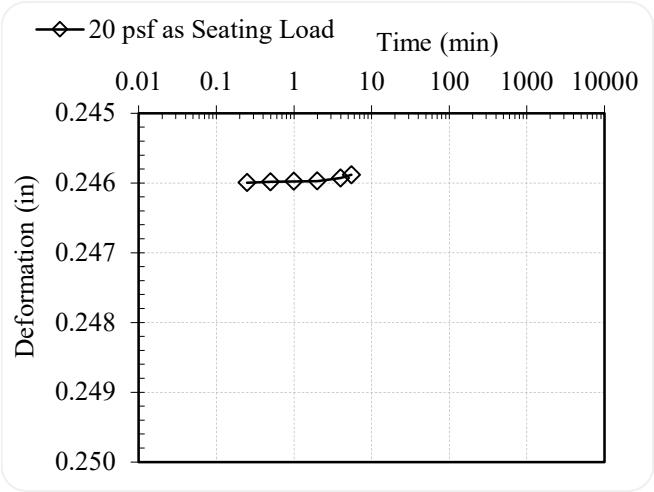
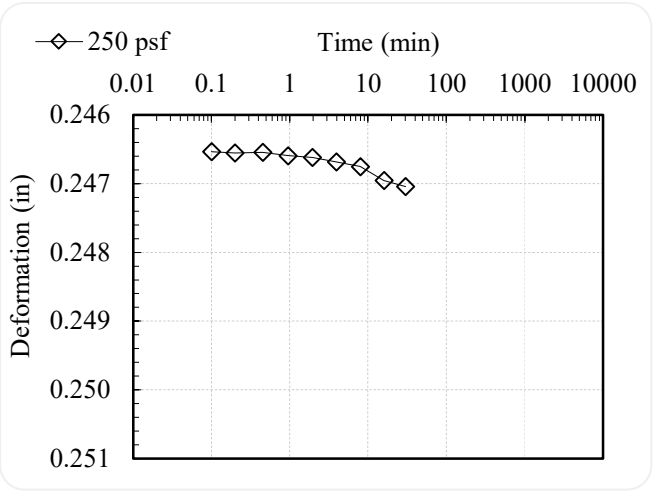
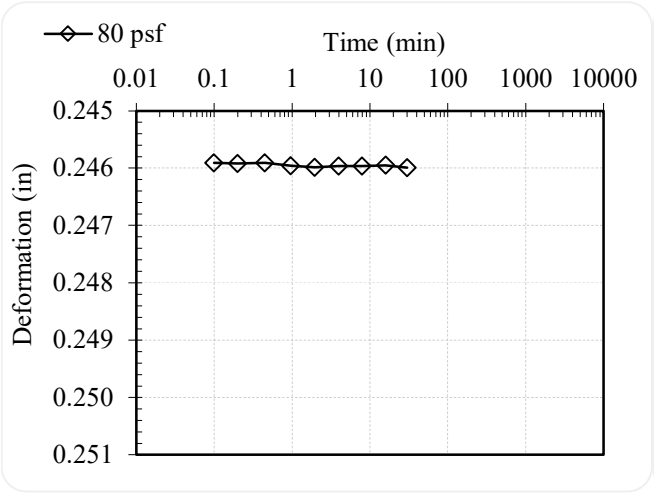
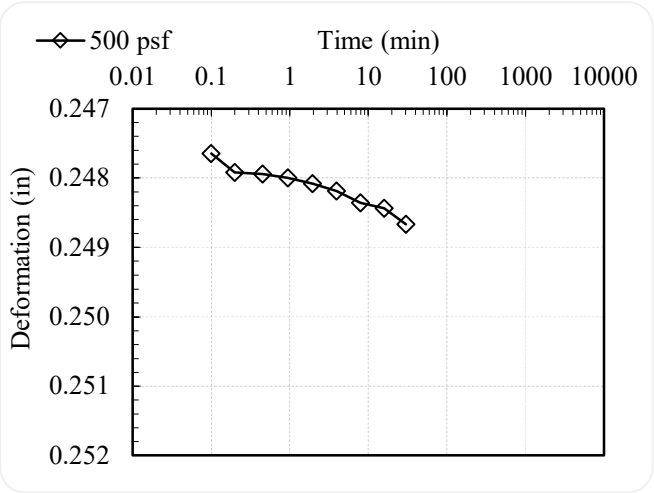
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-10 (UD-1) (2-4 ft)

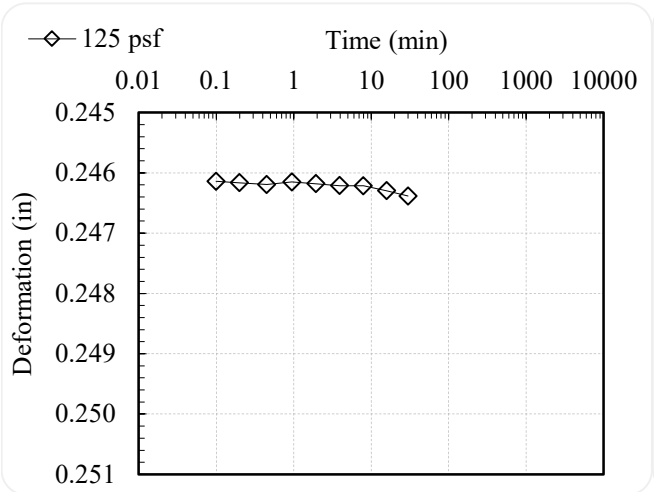
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

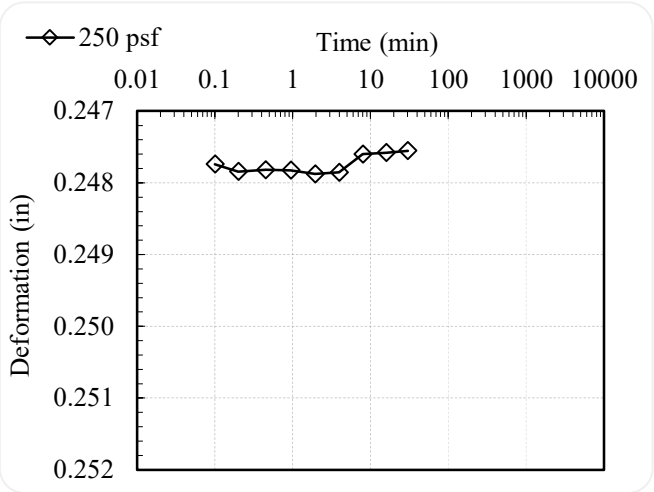












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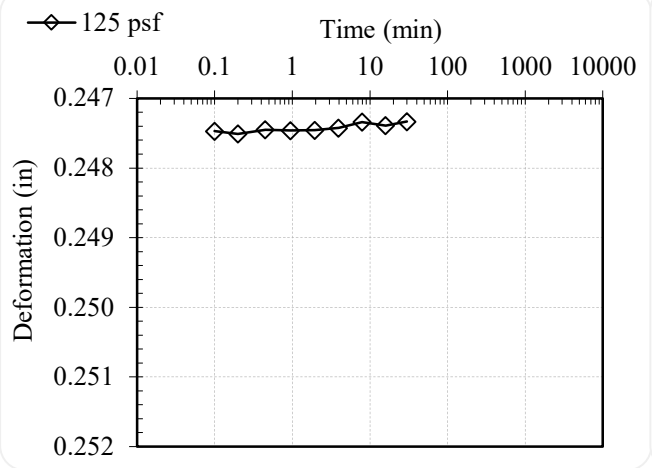
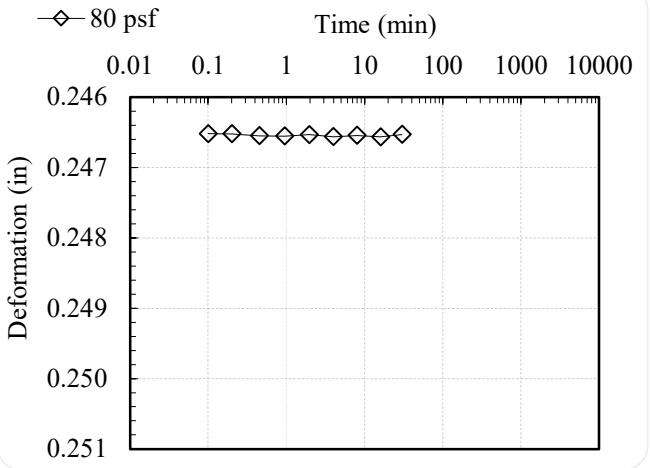
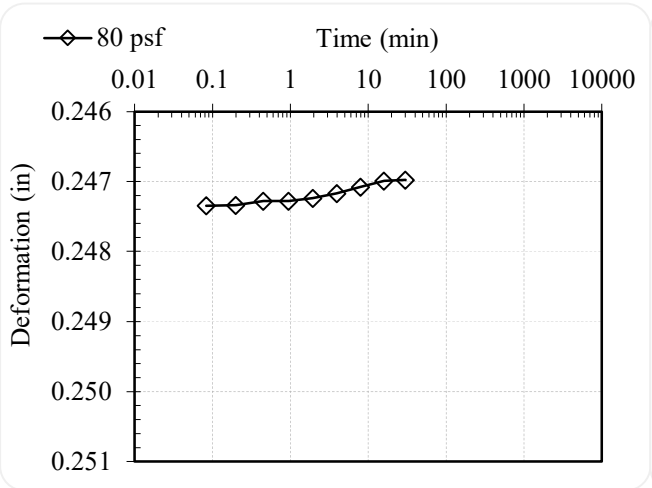
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

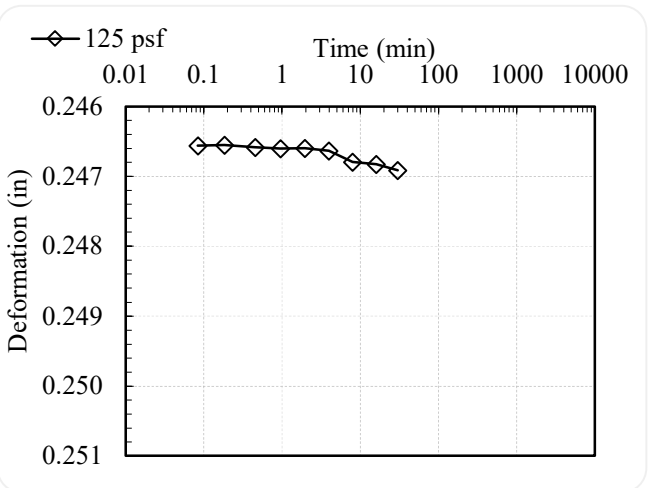
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-10 (UD-1) (2-4 ft)

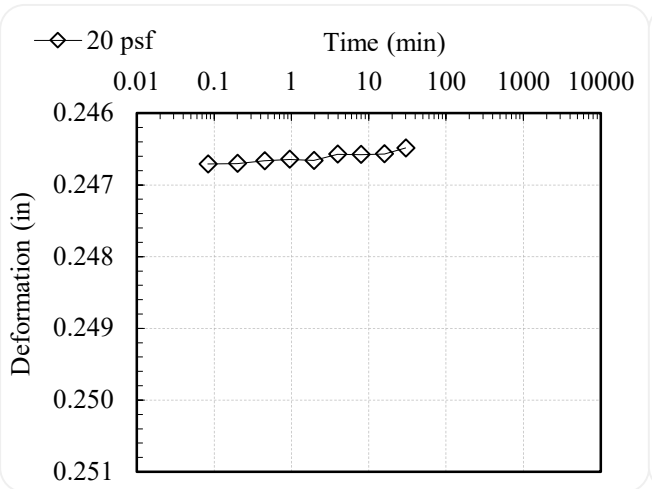
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

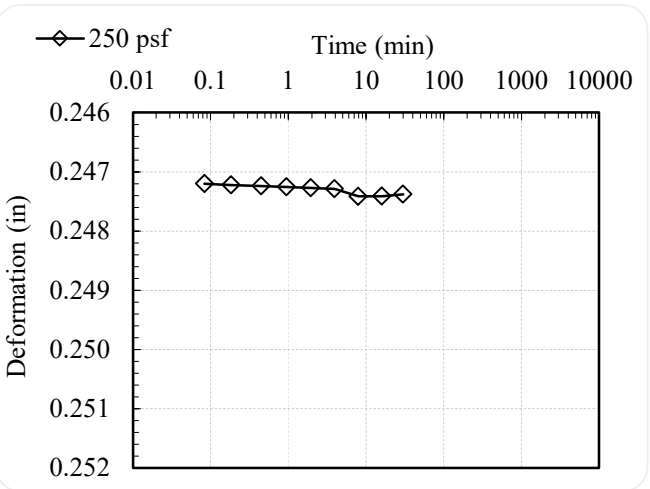












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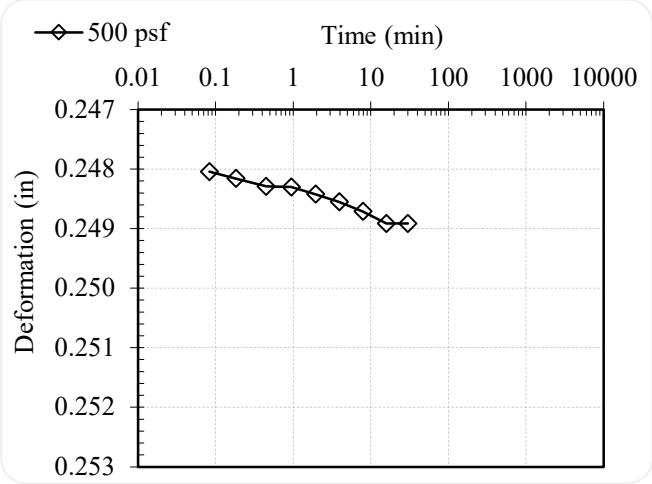
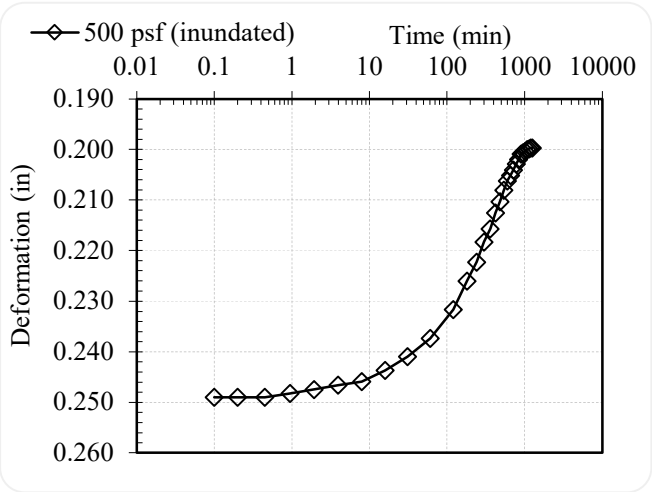
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-10 (UD-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

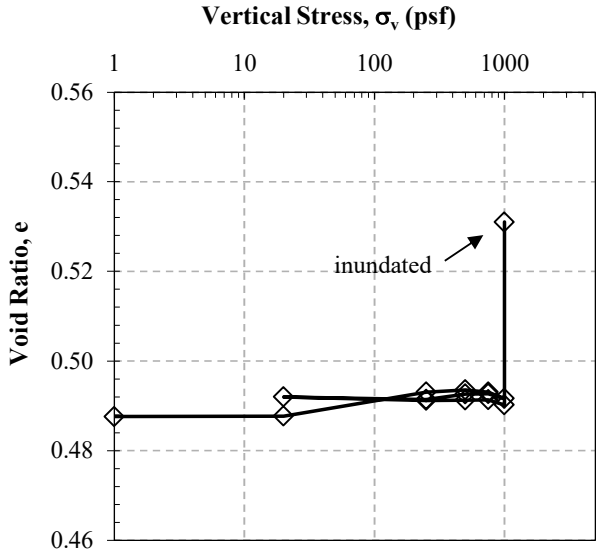
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-12 (UD-2) (4-6 ft)

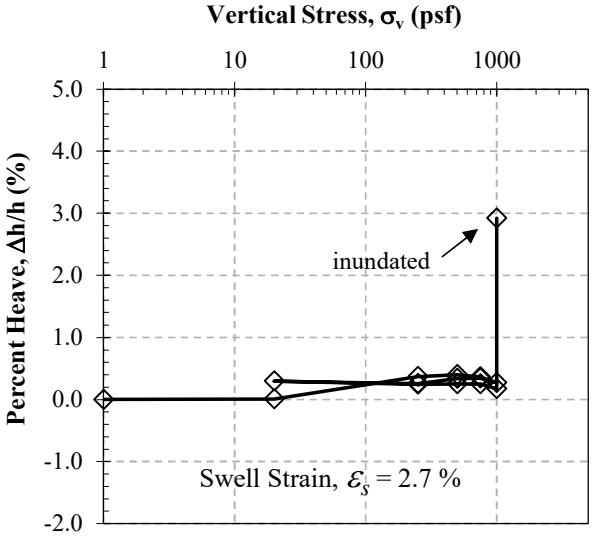
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content, w_1 (%)	11.8
	Specimen Height, h (in)	0.805
	Dry Unit Weight, γ_{d1} (pcf)	112.4
	Void Ratio, e_o	0.488
	Degree of Saturation, S_1 (%)	65.1
End of Testing Condition	Final Water Content, w_2 (%)	18.3
	Specimen Height, h_2 (in)	0.828
	Dry Unit Weight, γ_{d2} (pcf)	109.3
	Void Ratio, e_f	0.531
Swell Strain, ε_s (%)		2.7

Test Method: B
Method of Preparation: *Shelby tube*
Specimen Diameter (in): 2.500

Specimen was inundated with potable tap water during testing. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	250	500	750	1000	750	500	250	20
e	0.488	0.488	0.493	0.494	0.493	0.492	0.493	0.493	0.491	0.492
Δh/h (%)	0.00	0.01	0.37	0.40	0.37	0.27	0.35	0.34	0.26	0.30
Dial. Gauge* (in)	0.3887	0.3886	0.3857	0.3854	0.3857	0.3865	0.3859	0.3859	0.3866	0.3863

σ_v (psf)	250	500	750	1000	1000
e	0.491	0.491	0.491	0.490	0.531
Δh/h (%)	0.25	0.25	0.25	0.18	2.92
Dial. Gauge* (in)	0.3867	0.3866	0.3866	0.3872	0.3652

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D., 02/06/25
Reviewed By / Date

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Hutto, TX 78634
Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-12 (UD-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Test Method: B
Method of Preparation: *Shelby tube*

(a) As-received

(b) After Test

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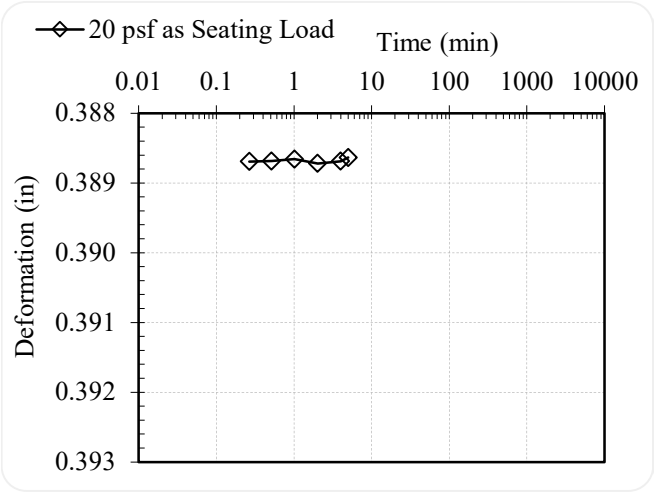
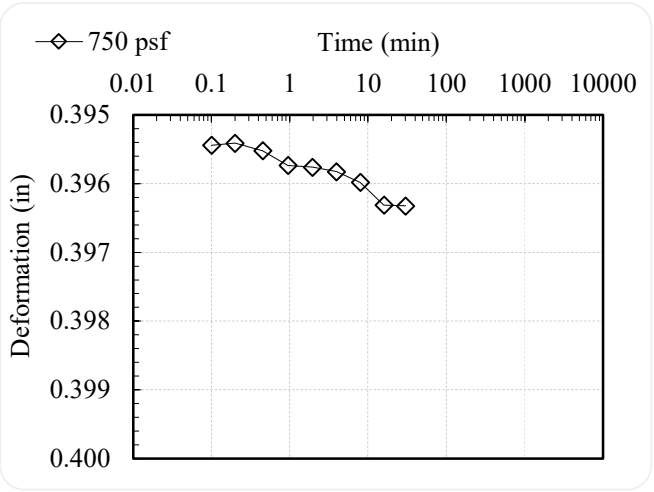
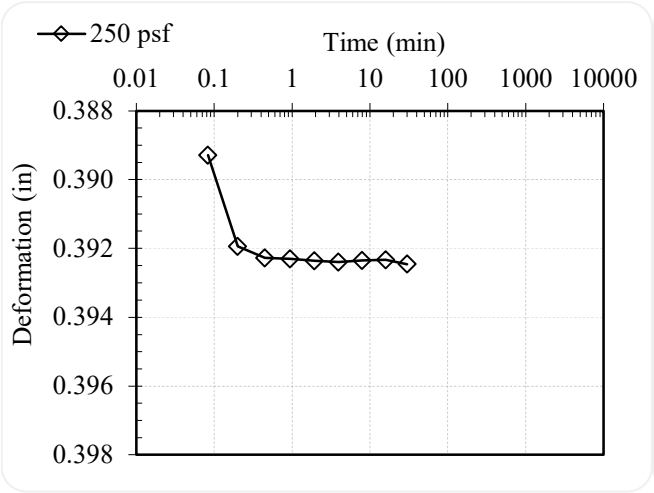
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

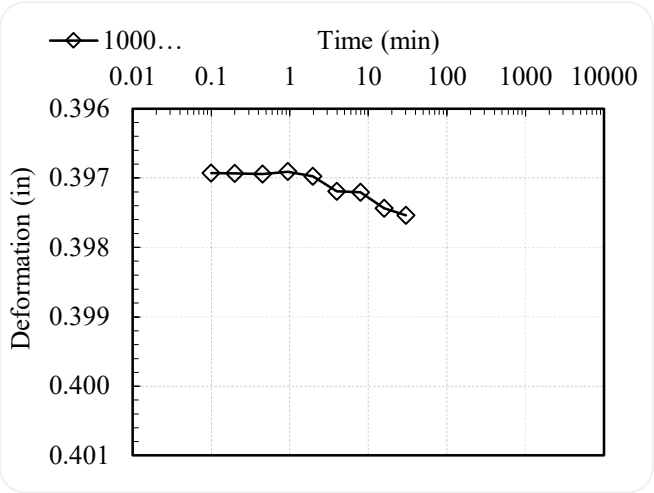
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-12 (UD-2) (4-6 ft)

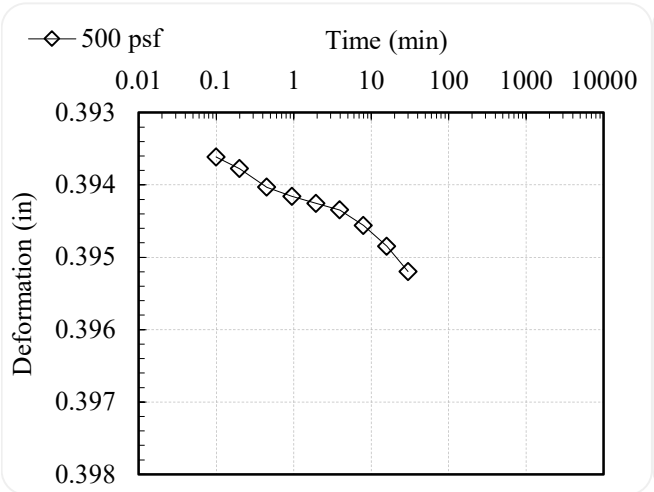
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

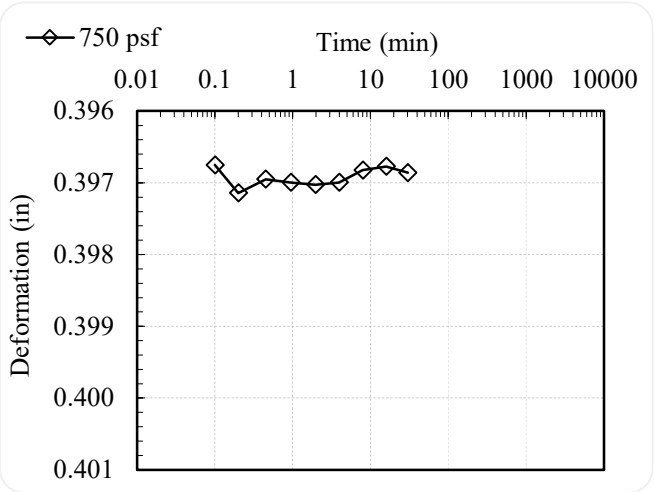












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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
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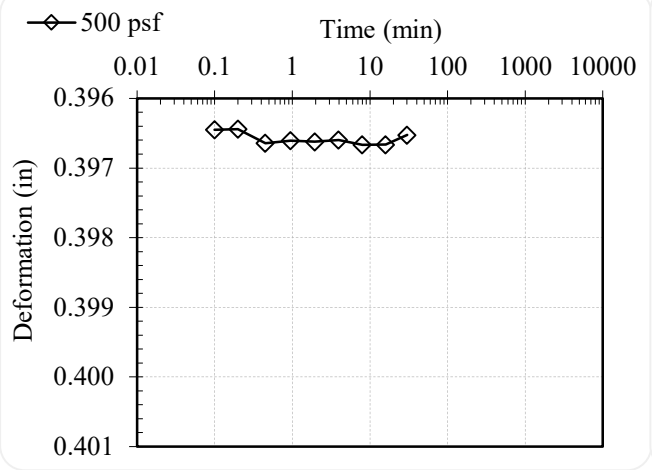
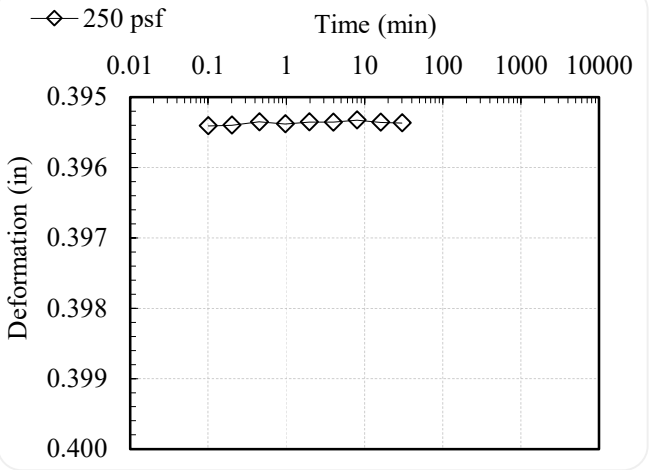
Tel: (512) 387-1287

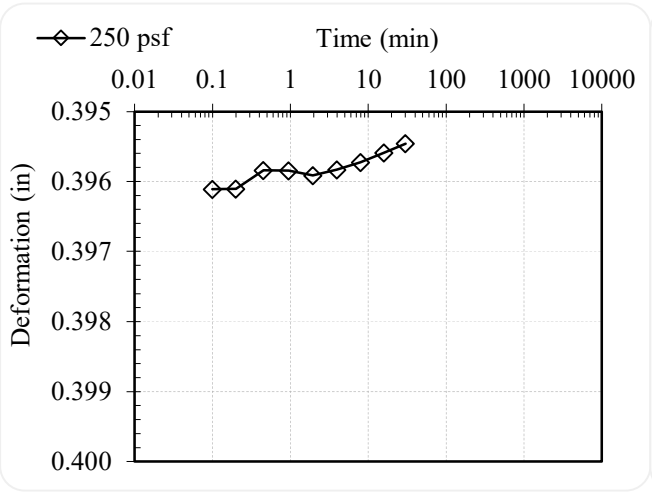
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

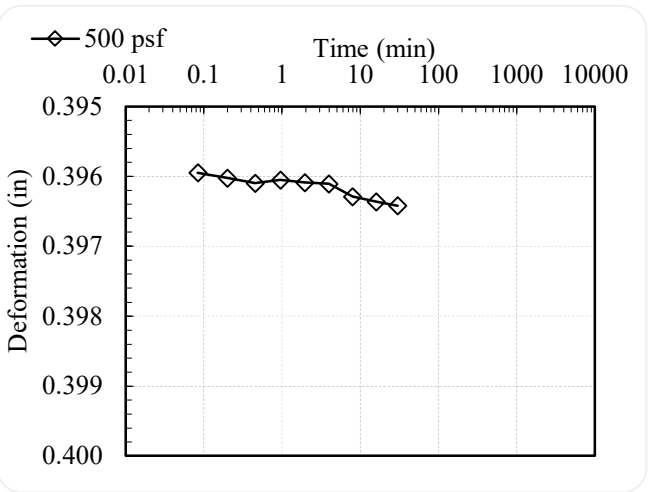
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-12 (UD-2) (4-6 ft)

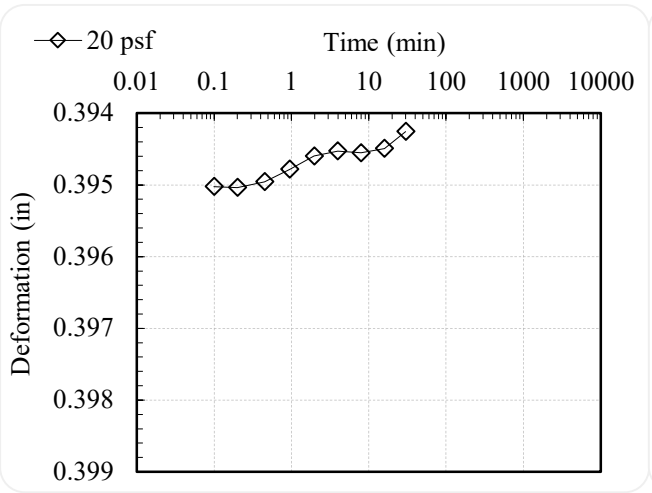
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

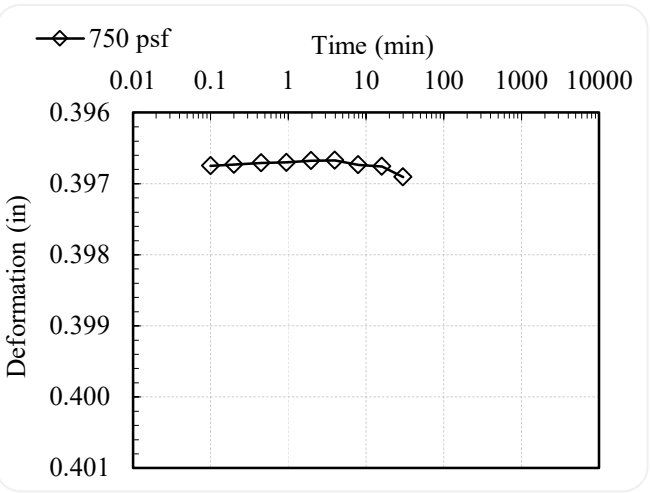












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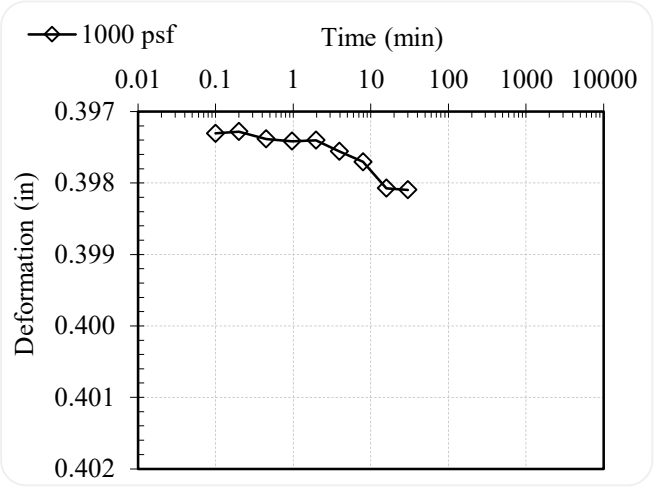
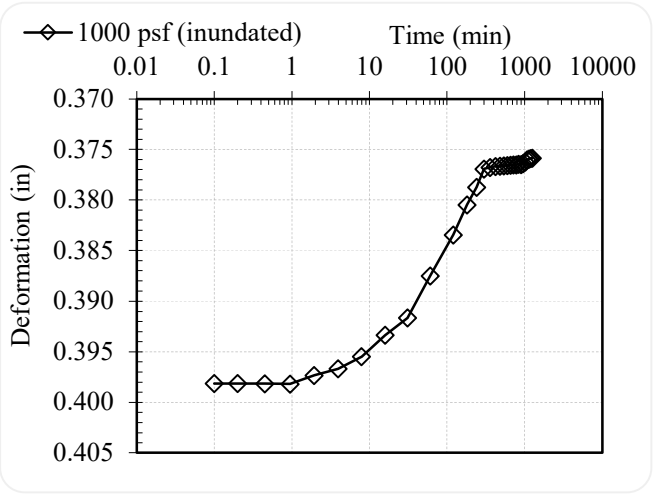
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-12 (UD-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

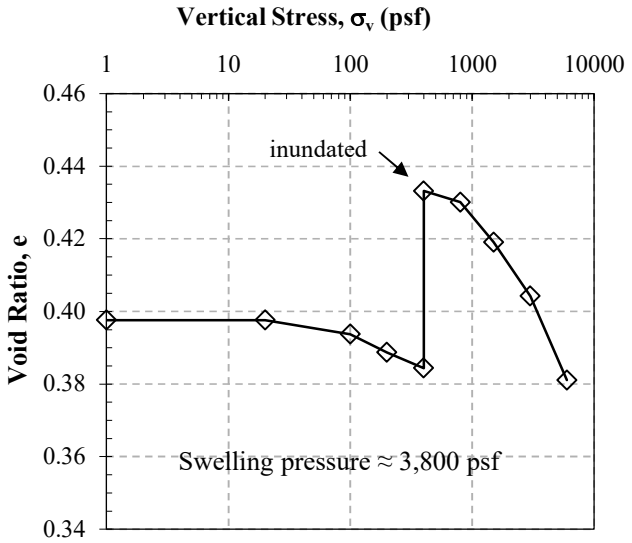
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-14 (U-2) (2-4 ft)

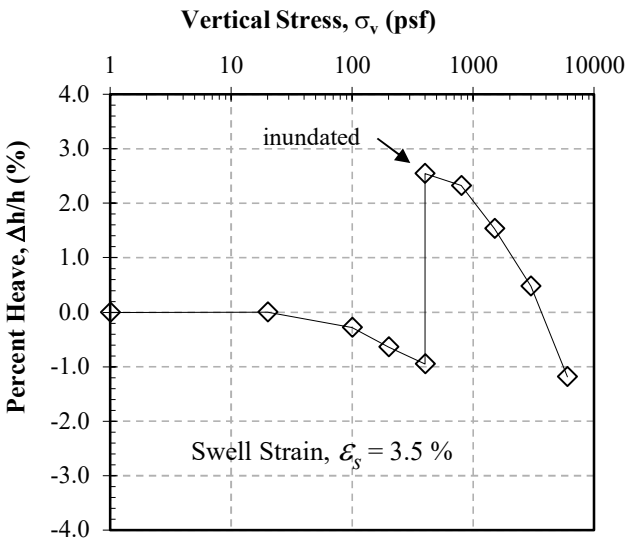
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	6.2
	Initial Specimen Height (in)	0.806
	Initial Dry Unit Weight, γ_o (pcf)	119.7
	Initial Void Ratio, e_o	0.398
	Initial Degree of Saturation (%)	42.1
End of Testing Condition	Final Water Content (%)	13.4
	Final Specimen Height (in)	0.796
	Final Dry Unit Weight, γ_f (pcf)	121.1
	Final Void Ratio, e_f	0.381
Swell Pressure at Initial Void Ratio (psf)		3,800
Swell Strain, ε_s (%)		3.5

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.497

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	100	200	401	400	800	1500	3000	6000
e	0.398	0.398	0.394	0.389	0.384	0.433	0.430	0.419	0.404	0.381
Δh/h (%)	0.00	0.00	-0.28	-0.64	-0.95	2.55	2.33	1.53	0.48	-1.18
Dial. Gauge* (in)	0.2419	0.2419	0.2442	0.2470	0.2495	0.2214	0.2232	0.2296	0.2381	0.2515

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 03/08/25

Reviewed By / Date

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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-14 (U-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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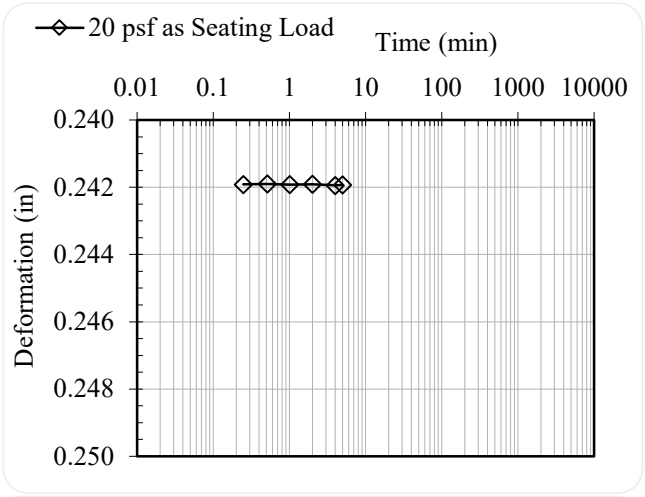
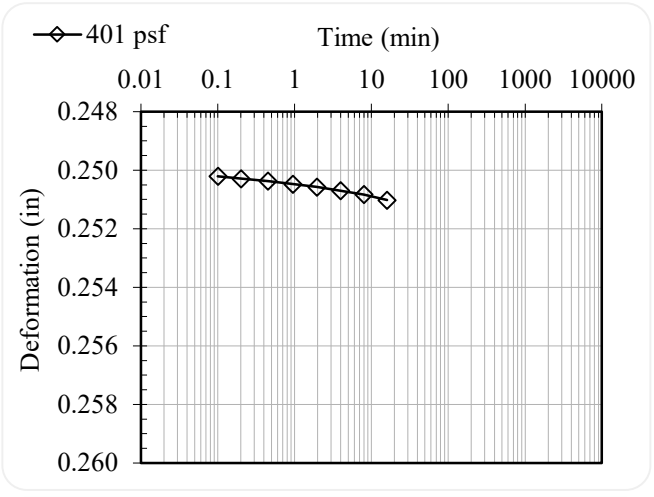
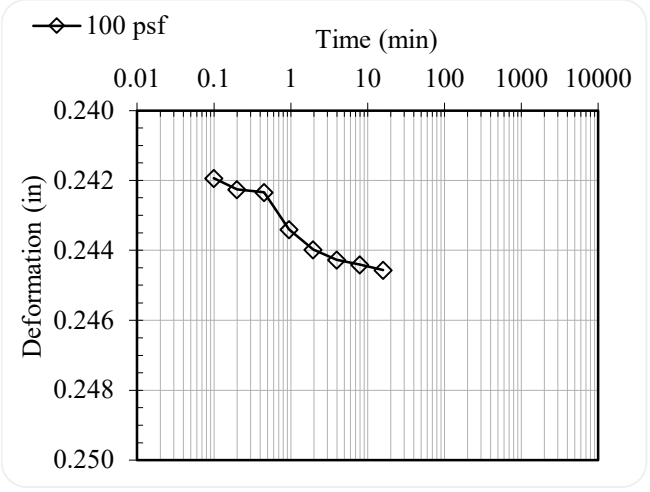
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

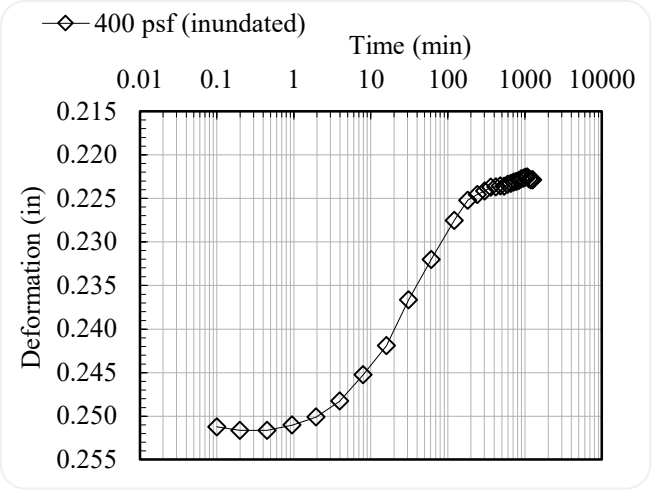
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-14 (U-2) (2-4 ft)

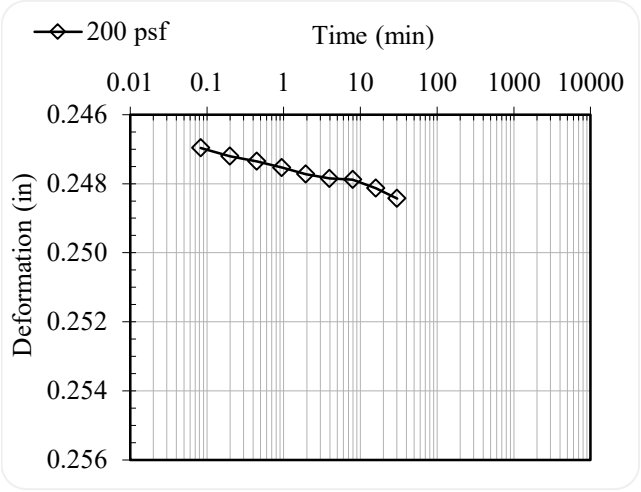
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

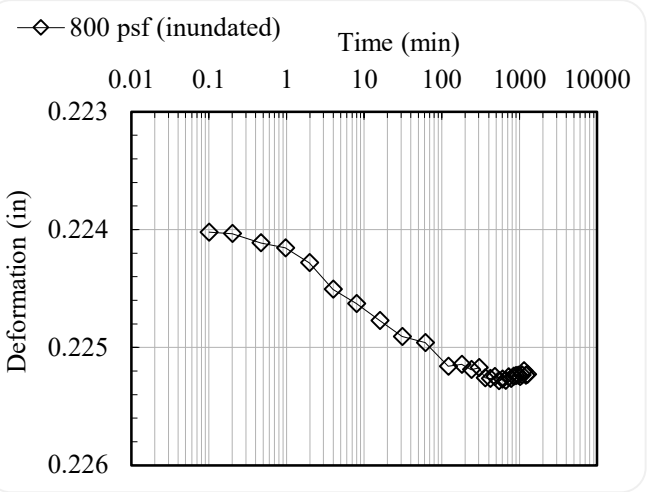












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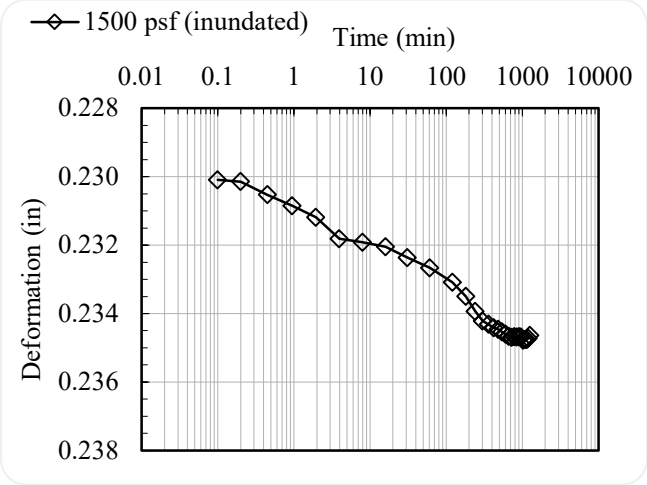
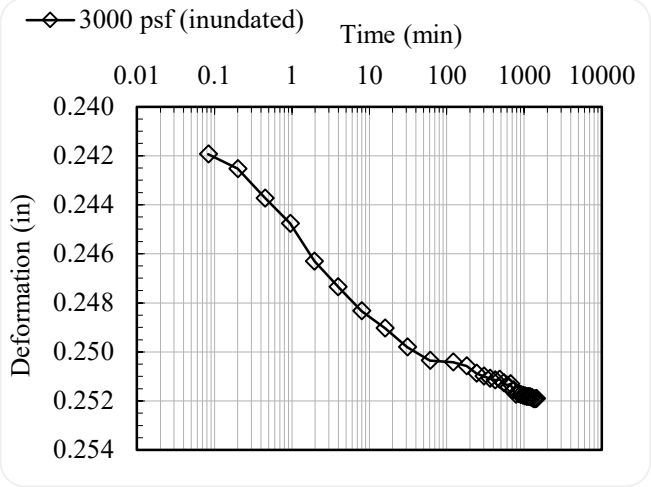
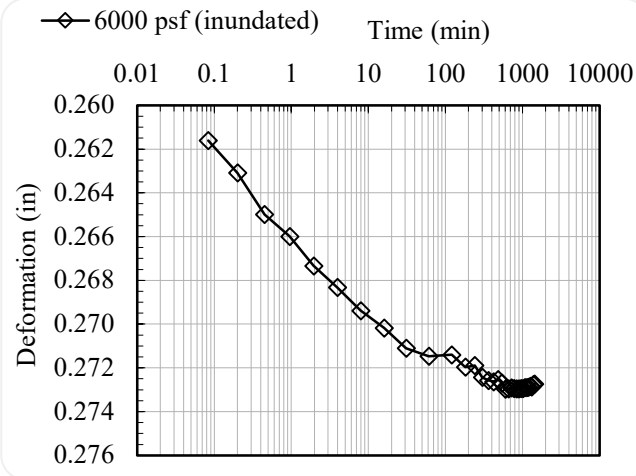
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-14 (U-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.







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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

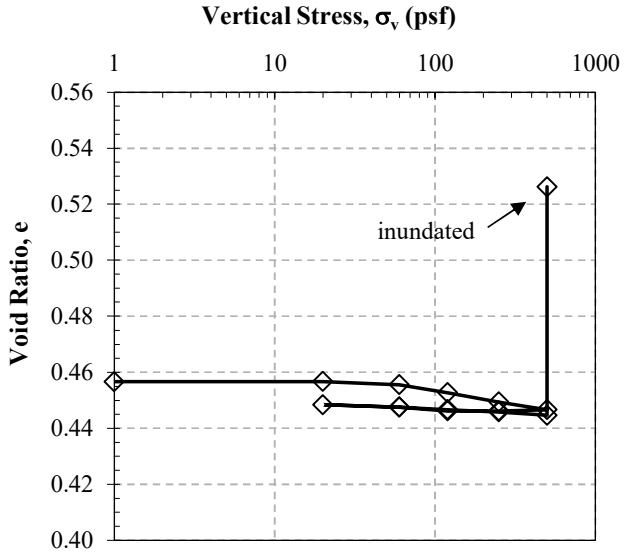
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-18 (UD-1) (2.5-4.5 ft)

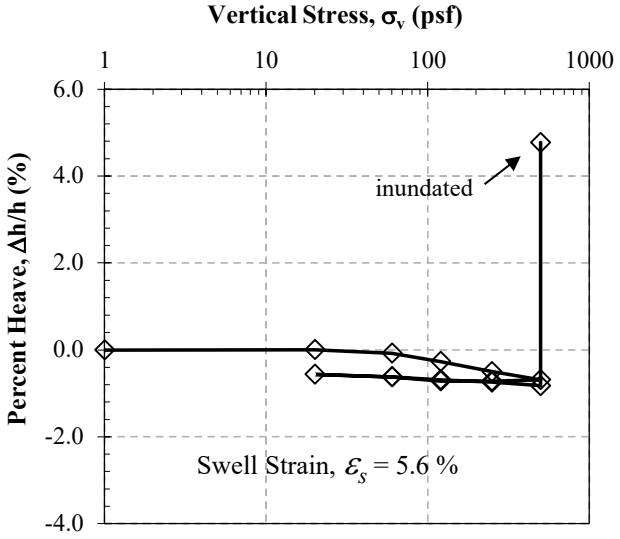
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content, w_1 (%)	11.0
	Specimen Height, h (in)	0.805
	Dry Unit Weight, γ_{d1} (pcf)	114.8
	Void Ratio, e_o	0.457
	Degree of Saturation, S_1 (%)	64.4
End of Testing Condition	Final Water Content, w_2 (%)	21.2
	Specimen Height, h_2 (in)	0.843
	Dry Unit Weight, γ_{d2} (pcf)	109.6
	Void Ratio, e_f	0.526
Swell Strain, ε_s (%)		5.6

Test Method: B
Method of Preparation: *Shelby tube*
Specimen Diameter (in): 2.500

Specimen was inundated with potable tap water during testing. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	60	120	250	500	250	120	60	20
e	0.457	0.457	0.456	0.453	0.449	0.447	0.446	0.446	0.448	0.448
Δh/h (%)	0.00	0.01	-0.08	-0.27	-0.50	-0.69	-0.72	-0.72	-0.62	-0.56
Dial. Gauge* (in)	0.4744	0.4744	0.4751	0.4766	0.4785	0.4800	0.4802	0.4802	0.4794	0.4790

σ_v (psf)	60	120	250	500	500
e	0.448	0.447	0.446	0.445	0.526
Δh/h (%)	-0.62	-0.69	-0.74	-0.83	4.78
Dial. Gauge* (in)	0.4795	0.4800	0.4804	0.4811	0.4360

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D., 02/06/25
Reviewed By / Date

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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-18 (UD-1) (2.5-4.5 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Test Method: B
Method of Preparation: *Shelby tube*

(a) As-received

(b) After Test

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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

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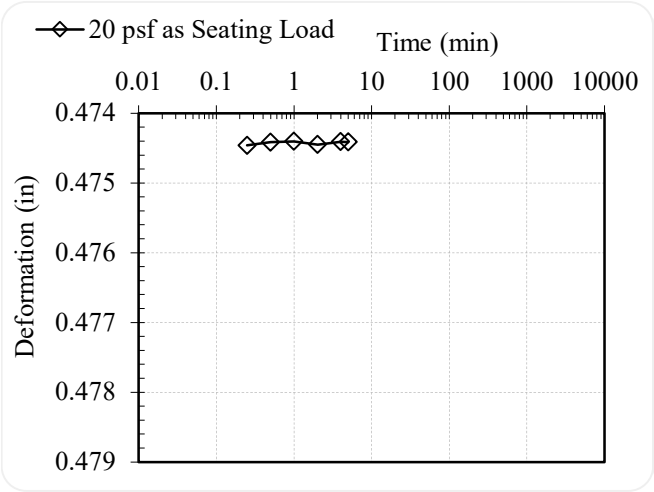
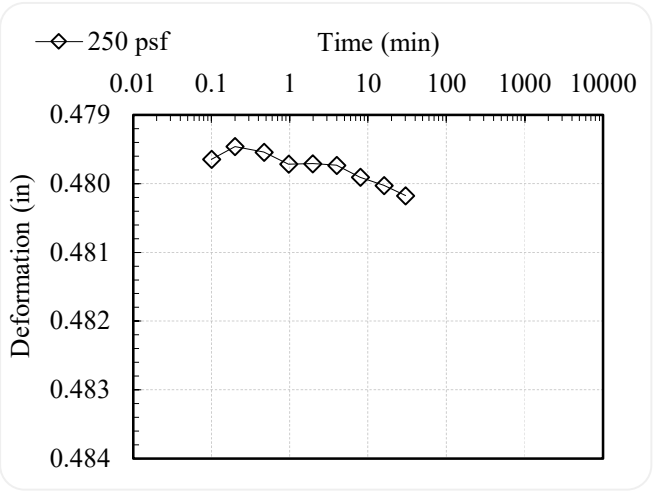
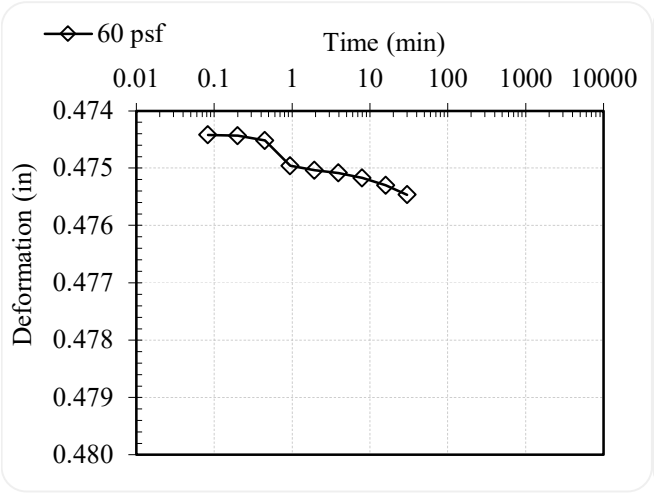
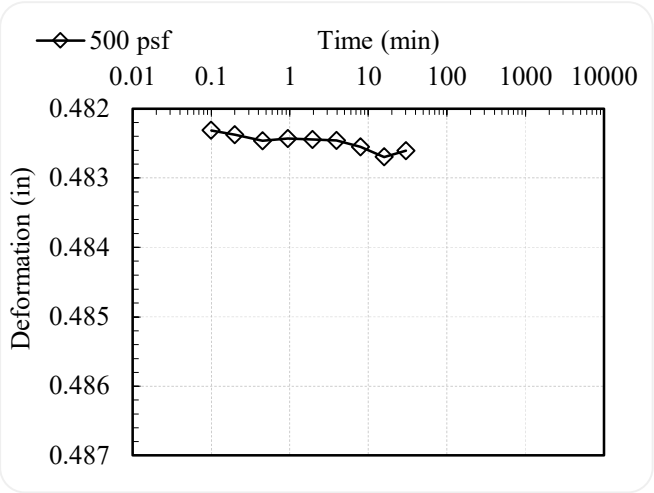
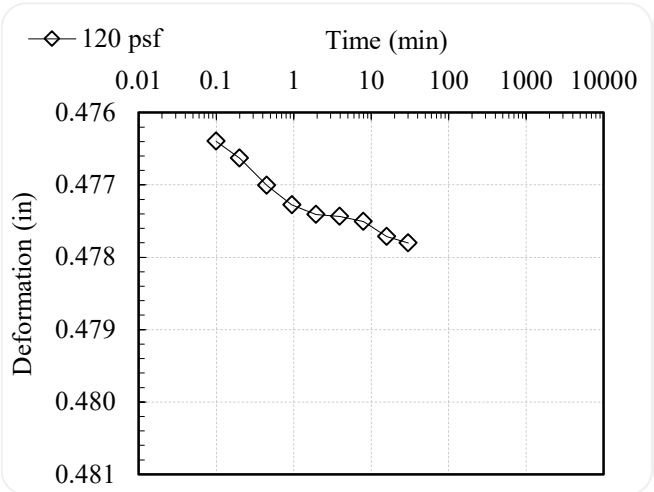
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

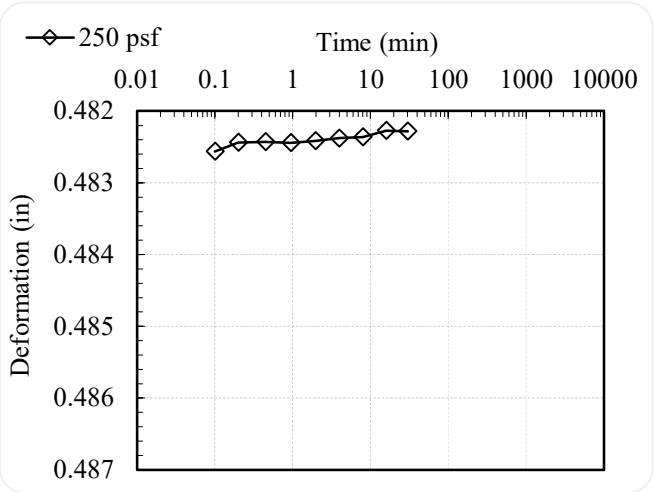












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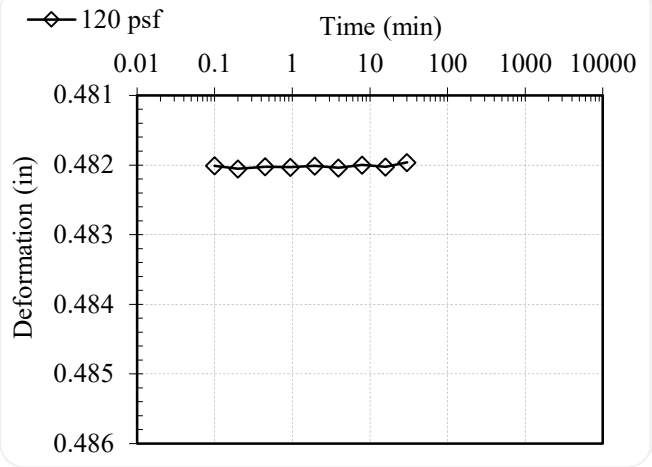
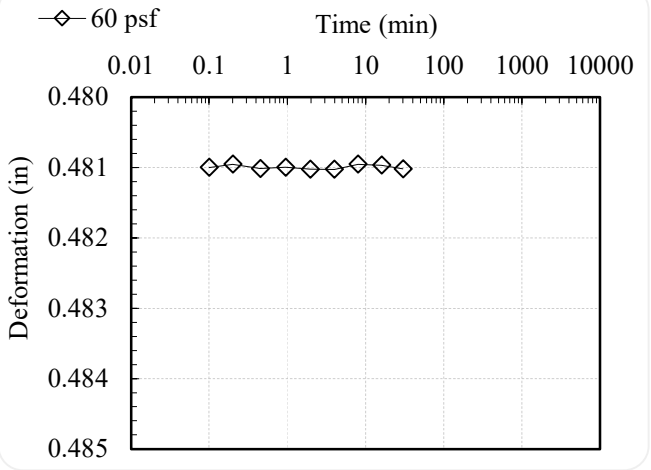
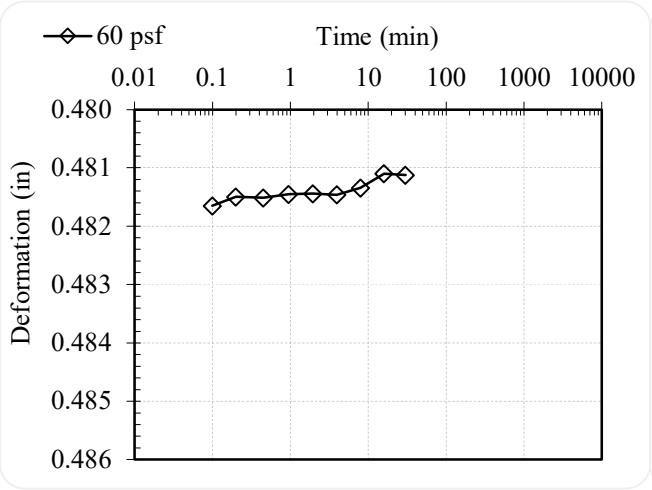
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

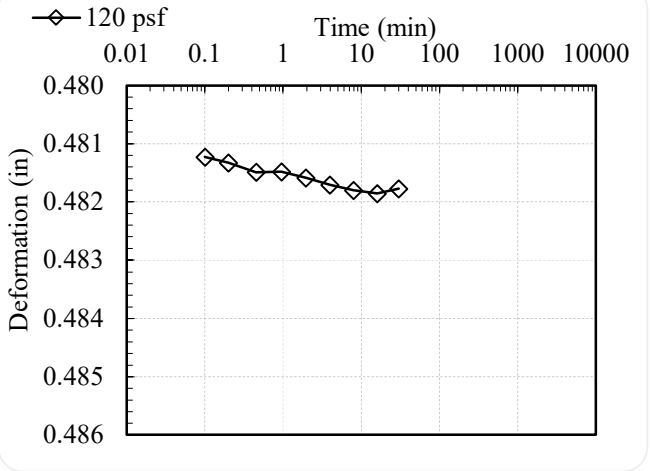
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-18 (UD-1) (2.5-4.5 ft)

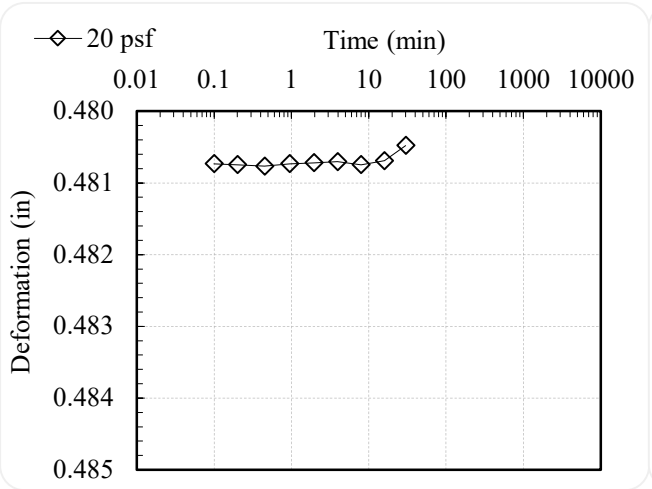
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

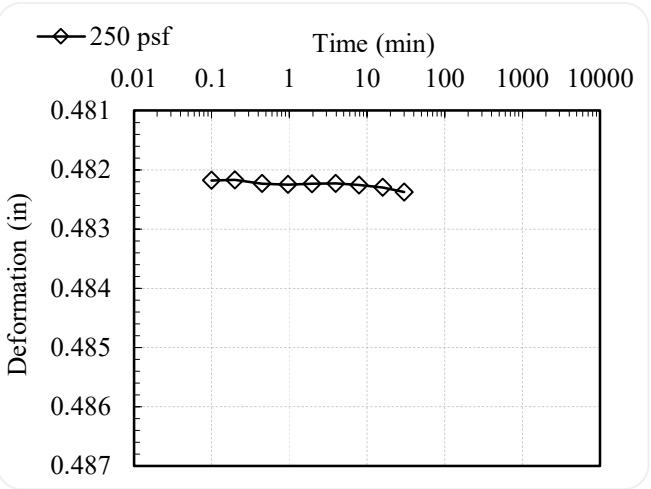












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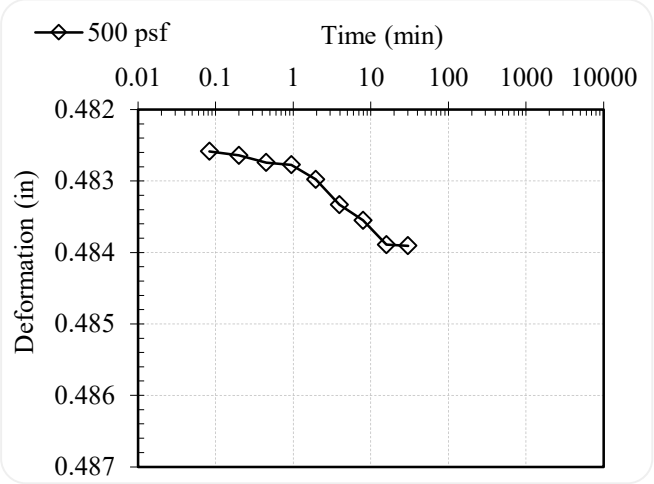
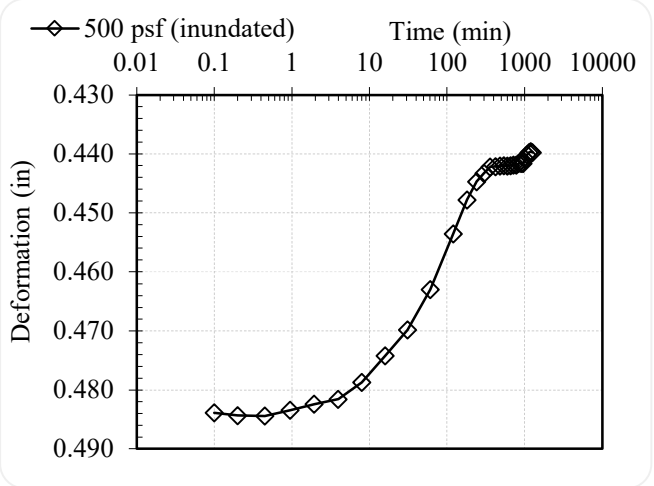
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-18 (UD-1) (2.5-4.5 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.





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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

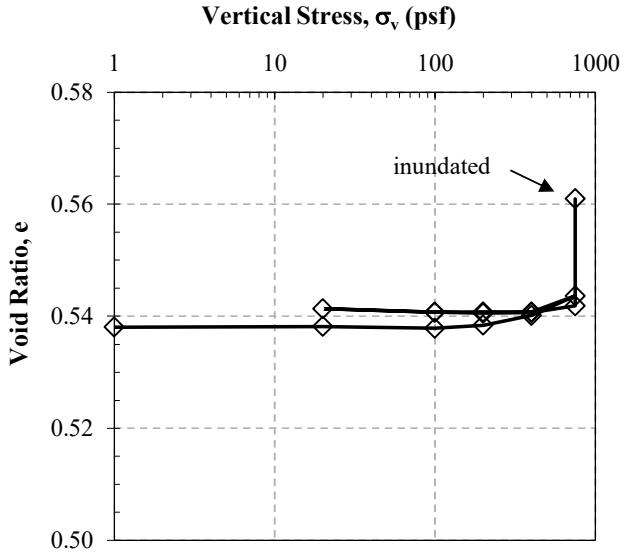
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-22 (UD-2) (4-6 ft)

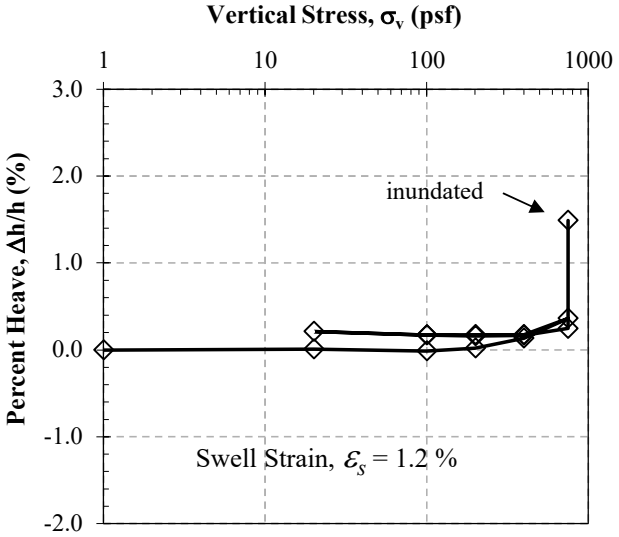
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content, w_1 (%)	13.2
	Specimen Height, h (in)	0.804
	Dry Unit Weight, γ_{d1} (pcf)	108.8
	Void Ratio, e_o	0.538
	Degree of Saturation, S_1 (%)	65.9
End of Testing Condition	Final Water Content, w_2 (%)	19.5
	Specimen Height, h_2 (in)	0.815
	Dry Unit Weight, γ_{d2} (pcf)	107.2
	Void Ratio, e_f	0.561
Swell Strain, ε_s (%)		1.2

Test Method: B
Method of Preparation: *Shelby tube*
Specimen Diameter (in): 2.498

Specimen was inundated with potable tap water during testing. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	100	200	400	750	400	200	100	20
e	0.538	0.538	0.538	0.538	0.540	0.544	0.541	0.541	0.541	0.541
Δh/h (%)	0.00	0.01	-0.01	0.02	0.13	0.36	0.17	0.17	0.17	0.21
Dial. Gauge* (in)	0.2292	0.2291	0.2293	0.2290	0.2281	0.2263	0.2278	0.2278	0.2278	0.2275

σ_v (psf)	100	200	400	750	750
e	0.541	0.541	0.541	0.542	0.561
Δh/h (%)	0.17	0.16	0.17	0.25	1.49
Dial. Gauge* (in)	0.2278	0.2279	0.2278	0.2272	0.2172

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D., 02/06/25
Reviewed By / Date

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105 Tradesmen Drive, Suite B
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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-22 (UD-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Test Method: B
Method of Preparation: *Shelby tube*

(a) As-received

(b) After Test

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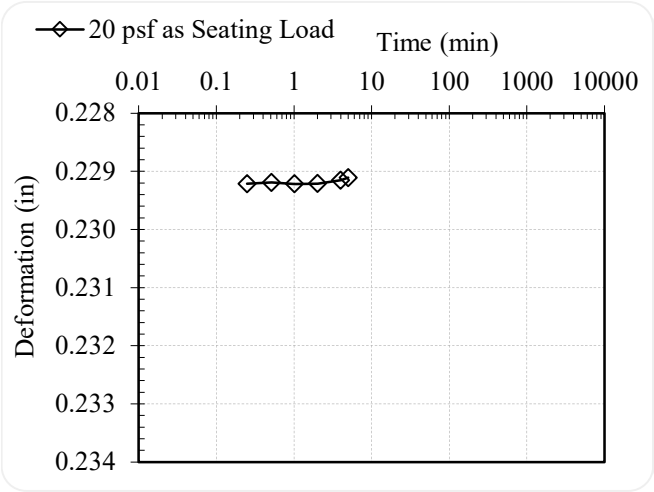
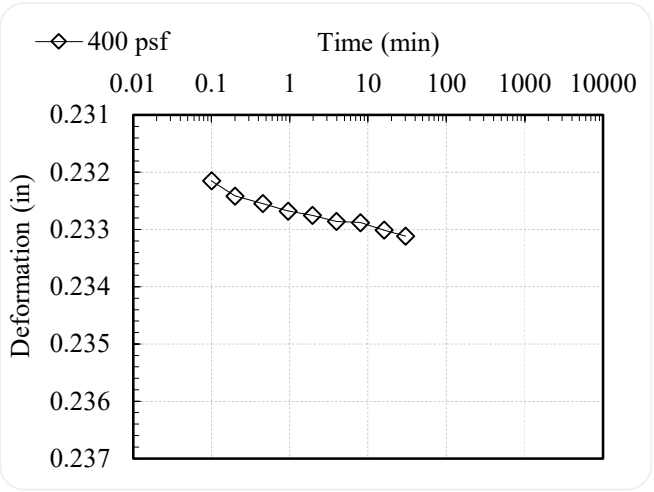
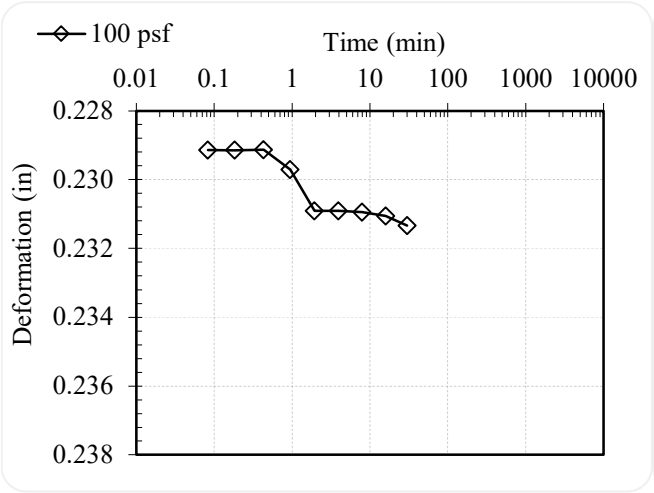
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

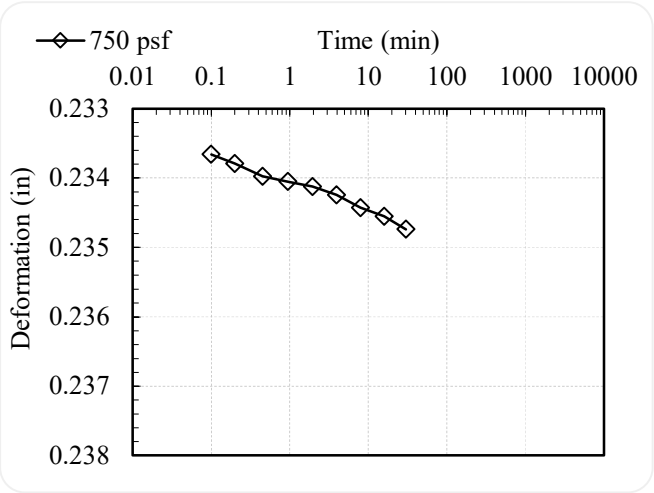
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-22 (UD-2) (4-6 ft)

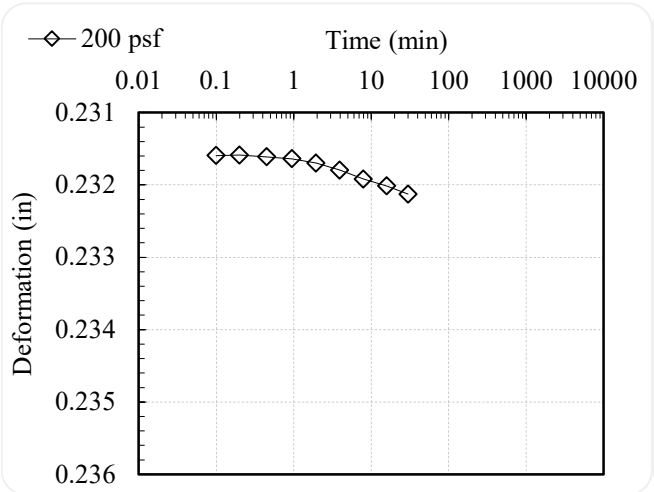
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

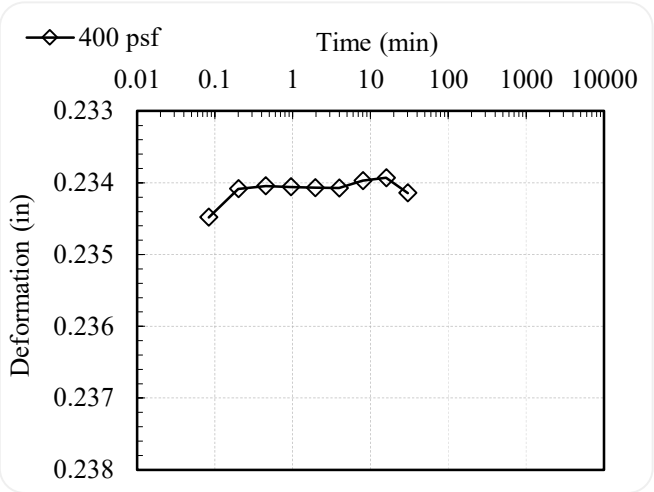












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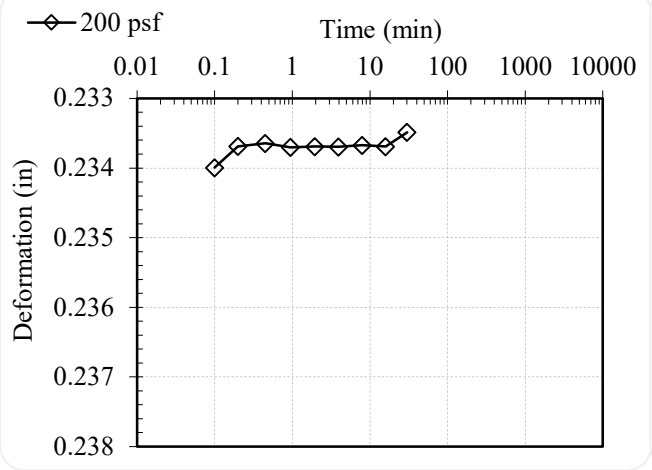
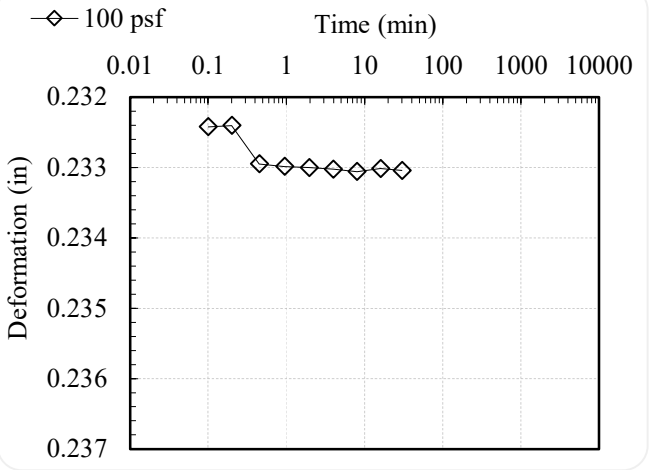
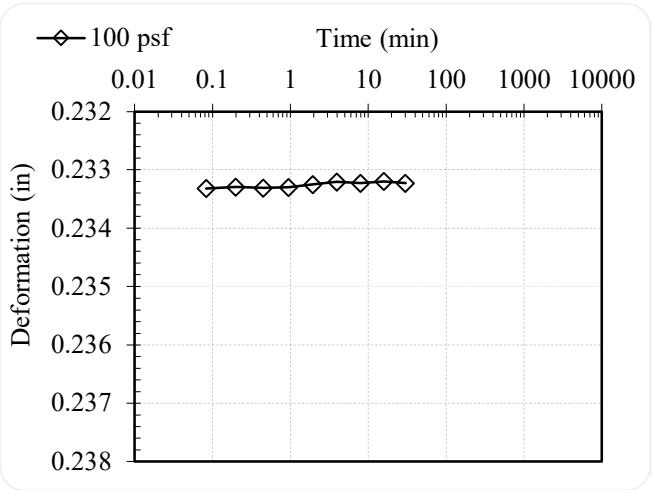
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

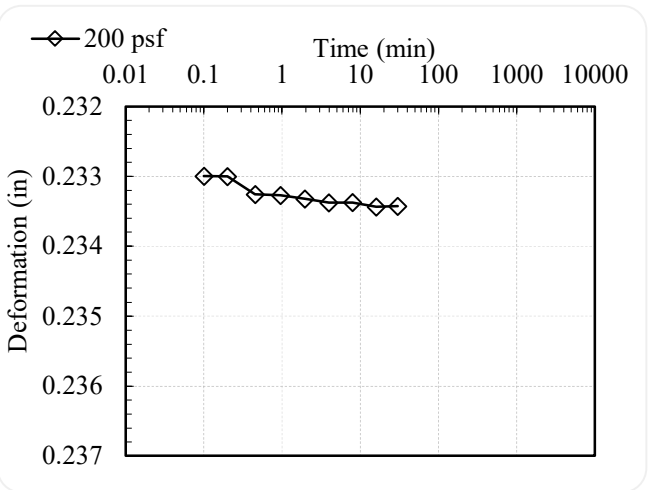
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-22 (UD-2) (4-6 ft)

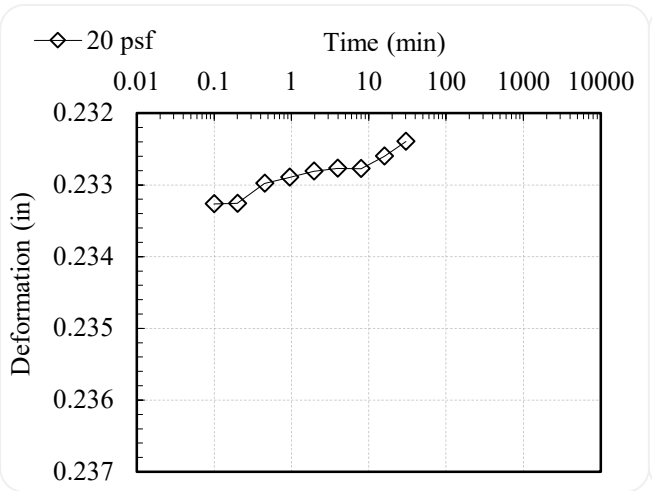
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

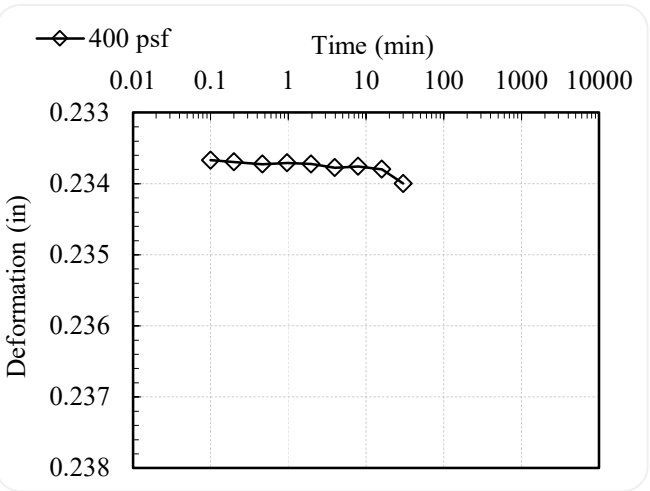












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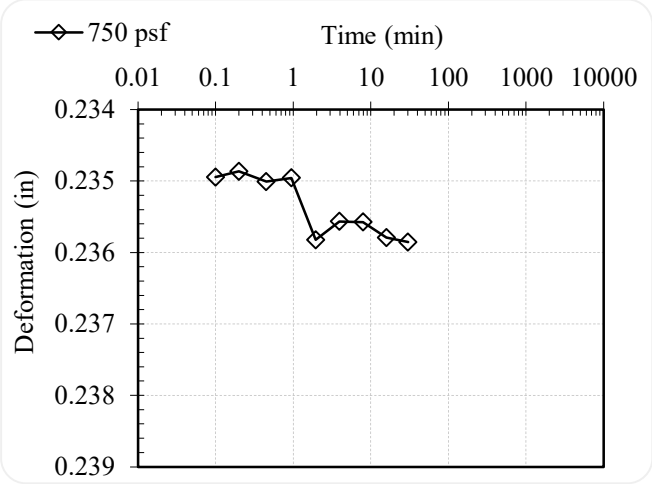
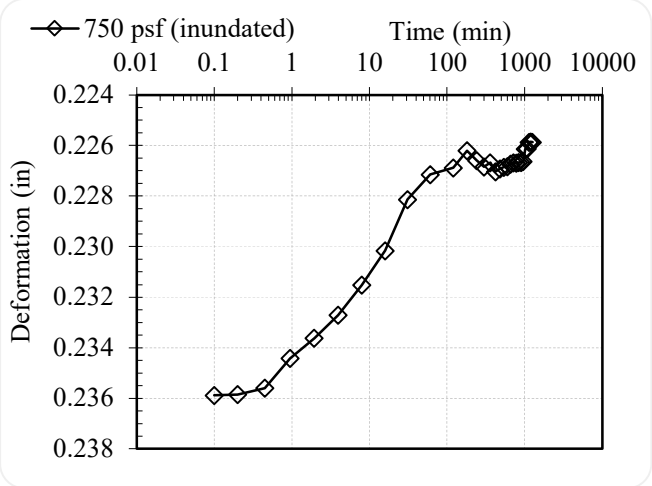
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-22 (UD-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

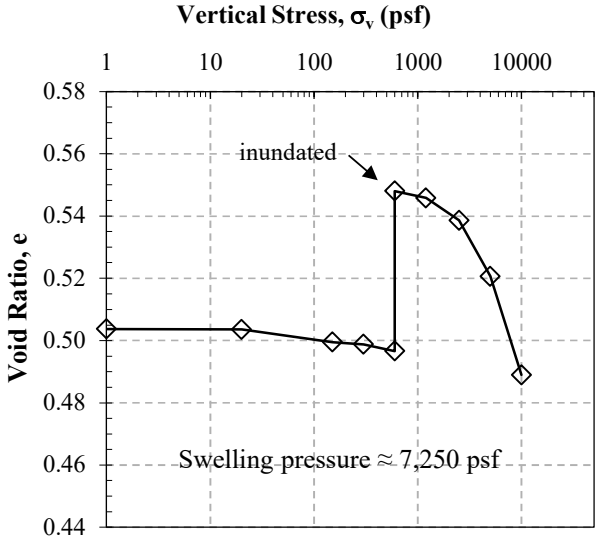
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-24 (U-3) (2-3 ft)

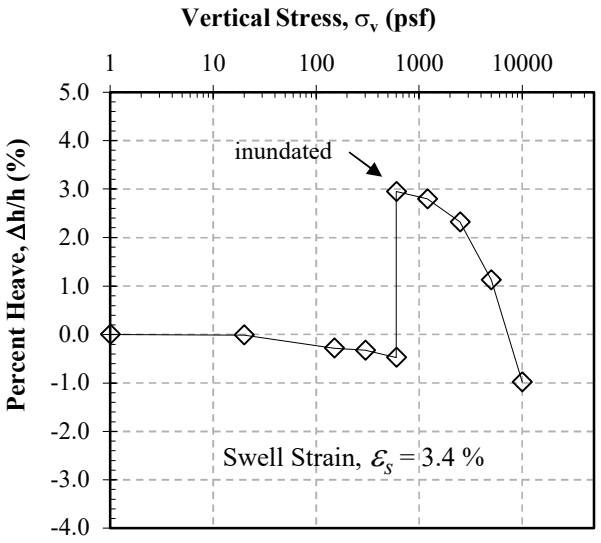
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	14.6
	Initial Specimen Height (in)	0.803
	Initial Dry Unit Weight, γ_o (pcf)	111.2
	Initial Void Ratio, e_o	0.504
	Initial Degree of Saturation (%)	77.9
End of Testing Condition	Final Water Content (%)	19.2
	Final Specimen Height (in)	0.795
	Final Dry Unit Weight, γ_f (pcf)	112.3
	Final Void Ratio, e_f	0.489
Swell Pressure at Initial Void Ratio (psf)		7,250
Swell Strain, ε_s (%)		3.4

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.498

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	150	300	600	600	1200	2500	5000	10000
e	0.504	0.504	0.499	0.499	0.497	0.548	0.546	0.539	0.521	0.489
Δh/h (%)	0.00	-0.01	-0.28	-0.32	-0.47	2.95	2.80	2.32	1.13	-0.98
Dial. Gauge* (in)	0.4330	0.4331	0.4352	0.4356	0.4368	0.4093	0.4105	0.4144	0.4239	0.4409

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 03/08/25

Reviewed By / Date

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Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-24 (U-3) (2-3 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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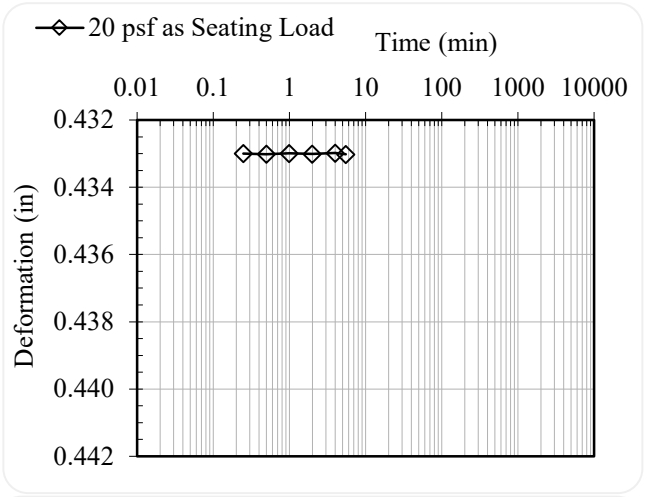
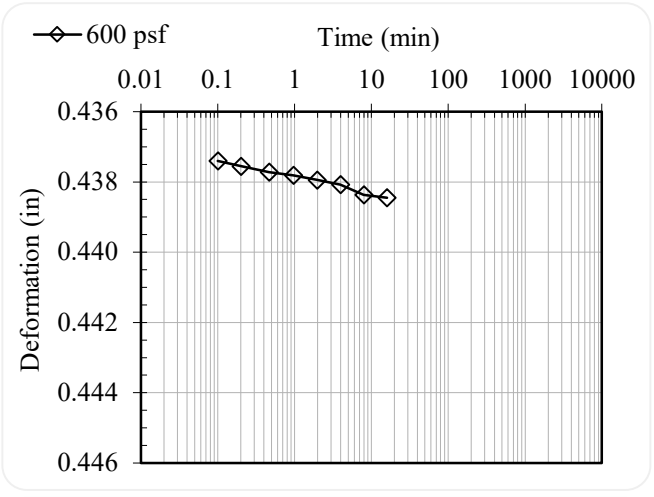
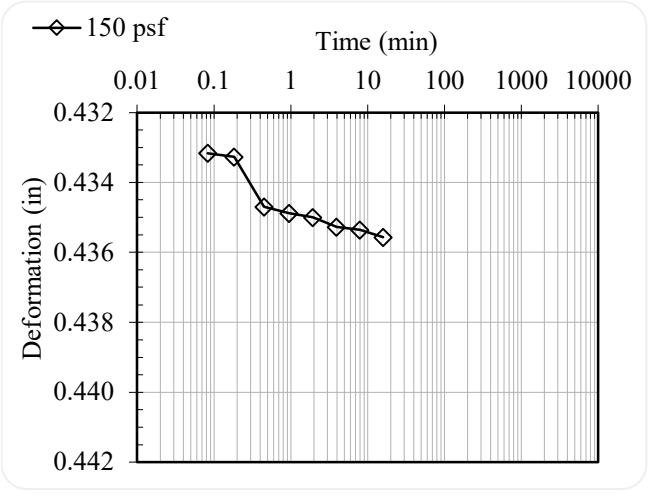
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

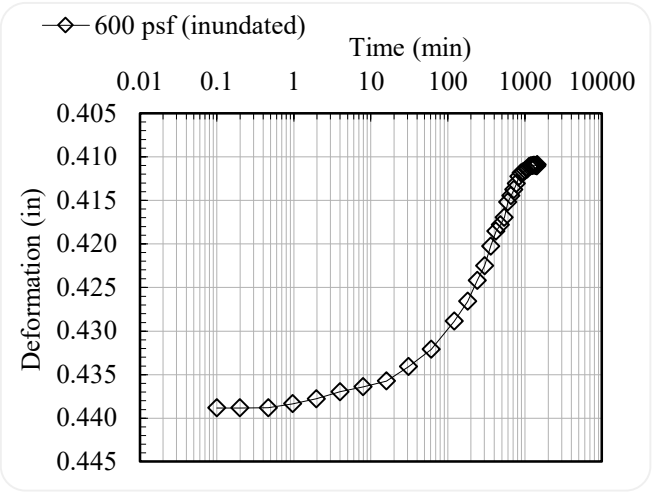
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-24 (U-3) (2-3 ft)

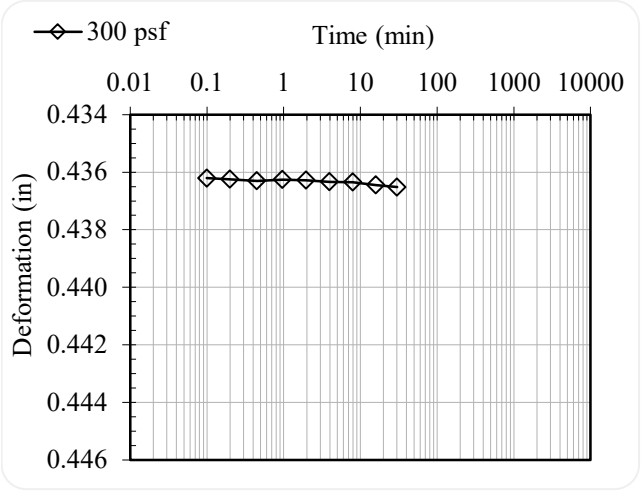
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

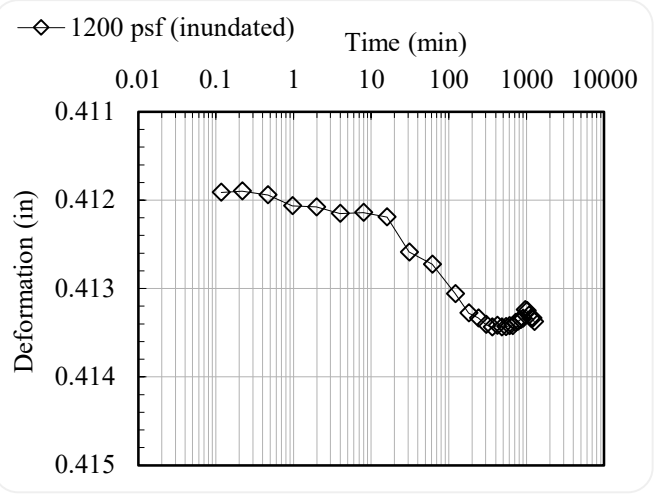












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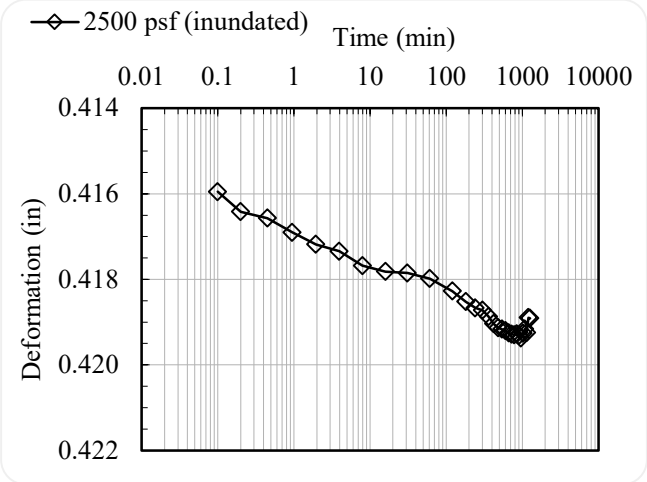
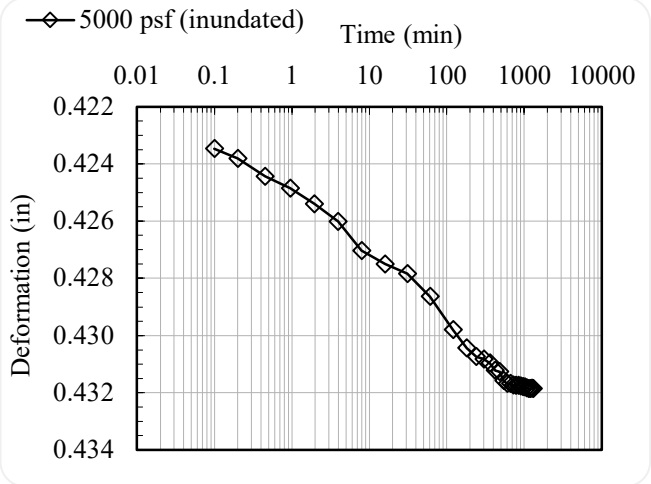
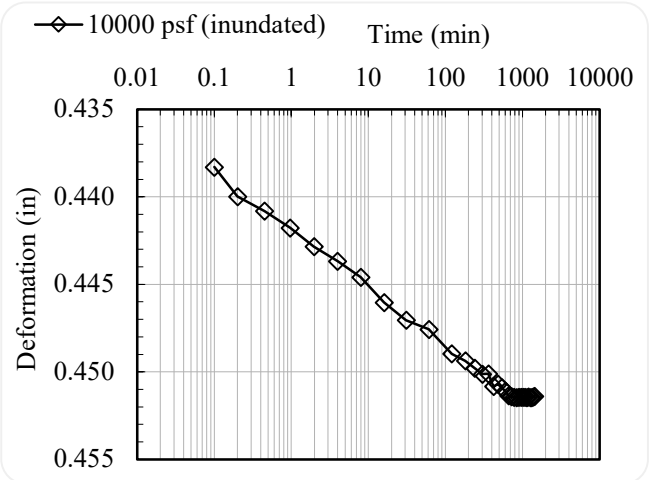
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-24 (U-3) (2-3 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.







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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

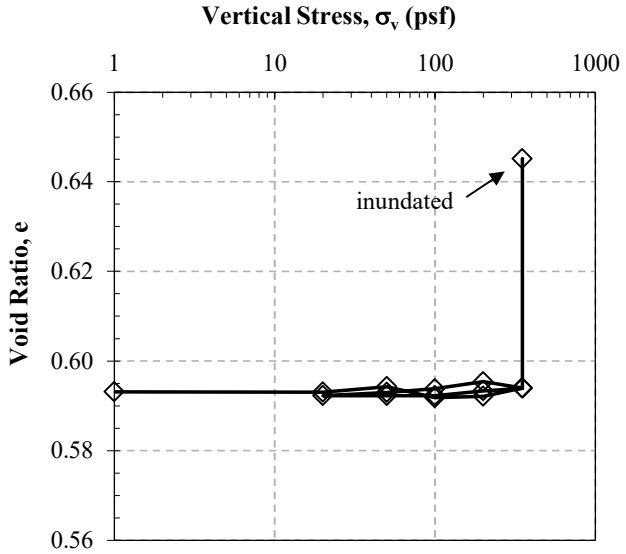
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-26 (UD-1) (2-4 ft)

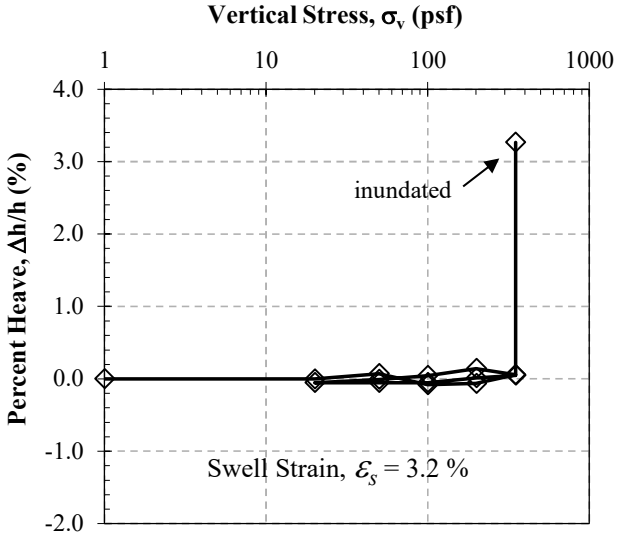
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content, w_1 (%)	12.9
	Specimen Height, h (in)	0.806
	Dry Unit Weight, γ_{d1} (pcf)	105.0
	Void Ratio, e_o	0.593
	Degree of Saturation, S_1 (%)	58.4
End of Testing Condition	Final Water Content, w_2 (%)	19.1
	Specimen Height, h_2 (in)	0.832
	Dry Unit Weight, γ_{d2} (pcf)	101.7
	Void Ratio, e_f	0.645
Swell Strain, ε_s (%)		3.2

Test Method: B
Method of Preparation: *Shelby tube*
Specimen Diameter (in): 2.497

Specimen was inundated with potable tap water during testing. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	50	100	200	350	200	100	50	20
e	0.593	0.593	0.594	0.592	0.592	0.594	0.595	0.594	0.593	0.592
Δh/h (%)	0.00	0.00	0.07	-0.08	-0.06	0.06	0.14	0.04	-0.01	-0.05
Dial. Gauge* (in)	0.5454	0.5454	0.5448	0.5460	0.5459	0.5449	0.5442	0.5450	0.5454	0.5458

σ_v (psf)	50	100	200	351	350
e	0.592	0.592	0.593	0.594	0.645
Δh/h (%)	-0.05	-0.05	0.01	0.05	3.27
Dial. Gauge* (in)	0.5458	0.5458	0.5453	0.5450	0.5190

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D., 02/06/25
Reviewed By / Date

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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-26 (UD-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

Test Method: B
Method of Preparation: *Shelby tube*

(a) As-received

(b) After Test

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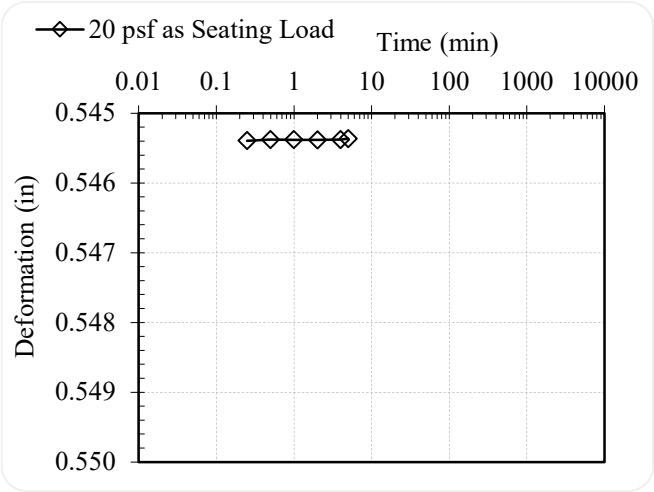
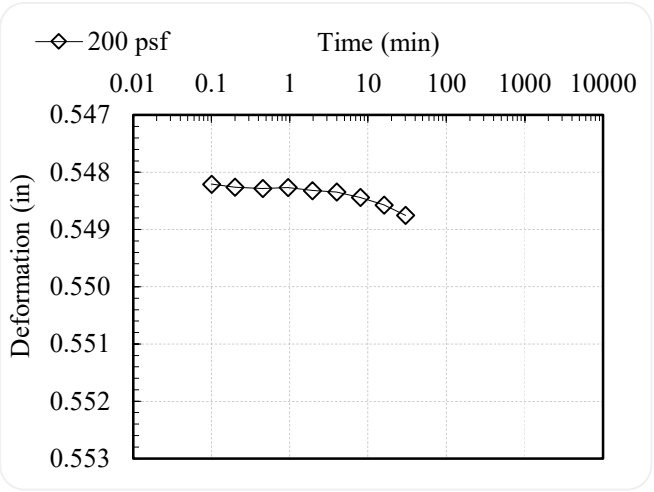
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

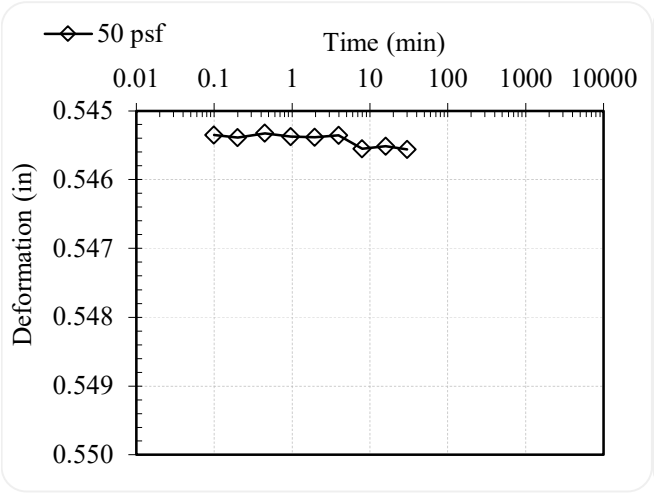
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

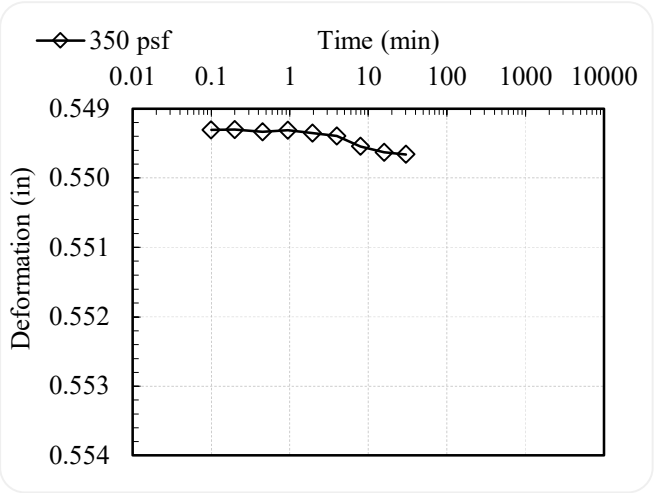
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-26 (UD-1) (2-4 ft)

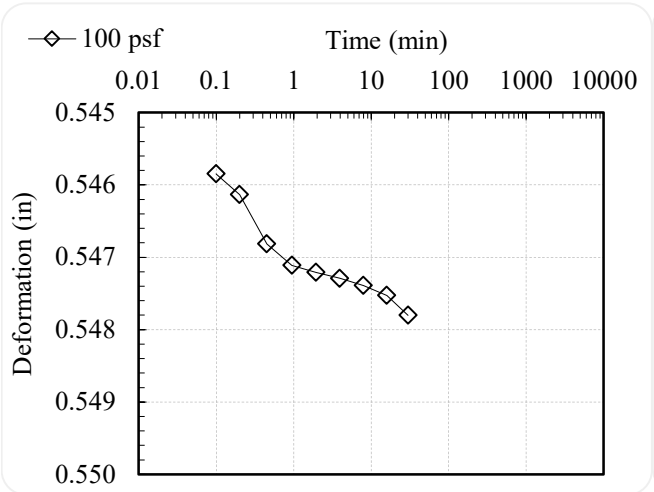
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

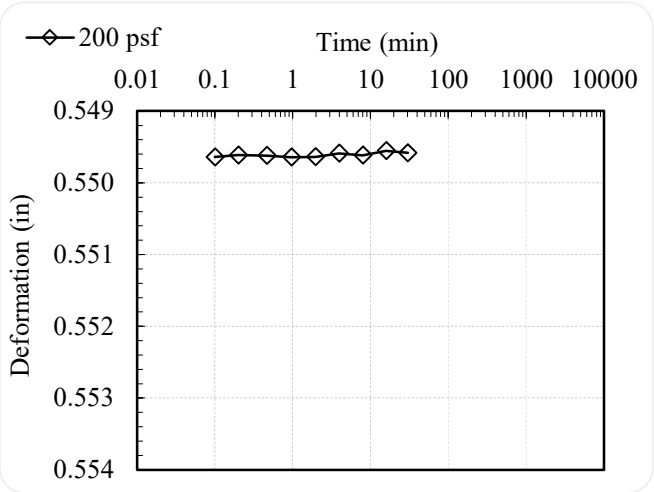












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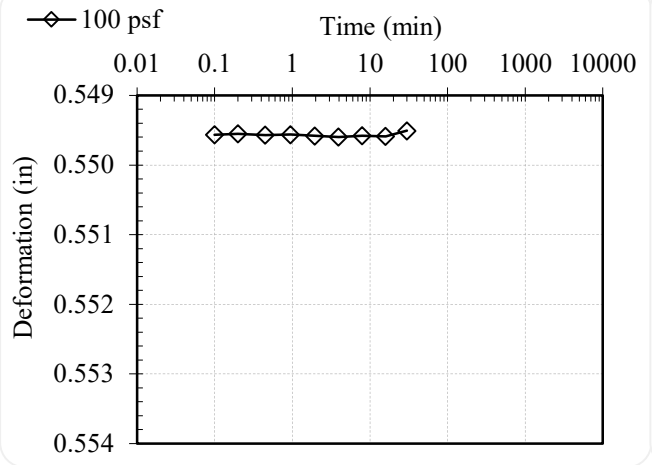
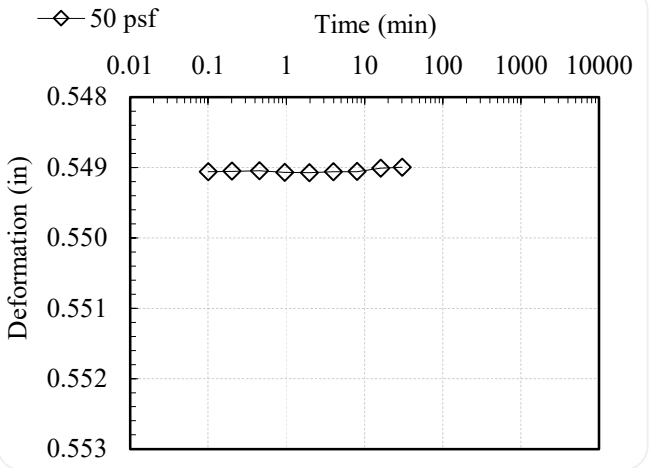
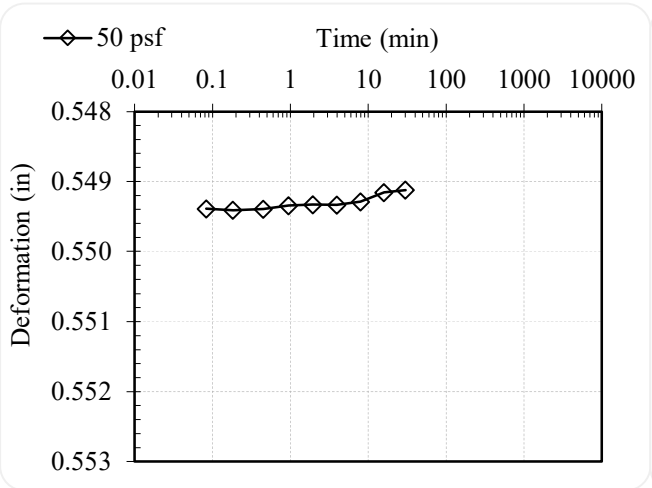
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

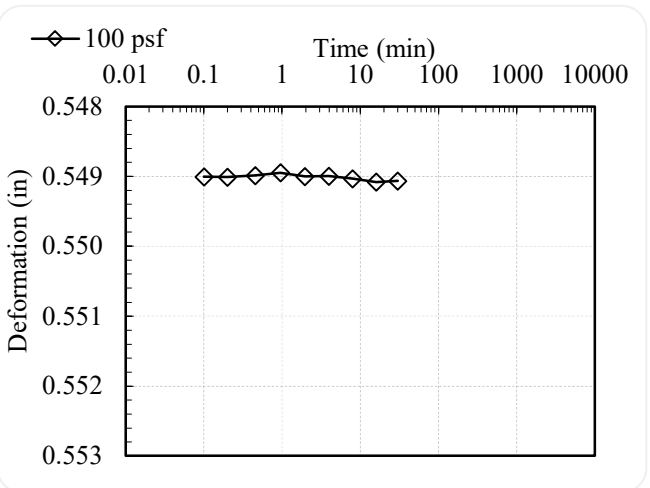
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-26 (UD-1) (2-4 ft)

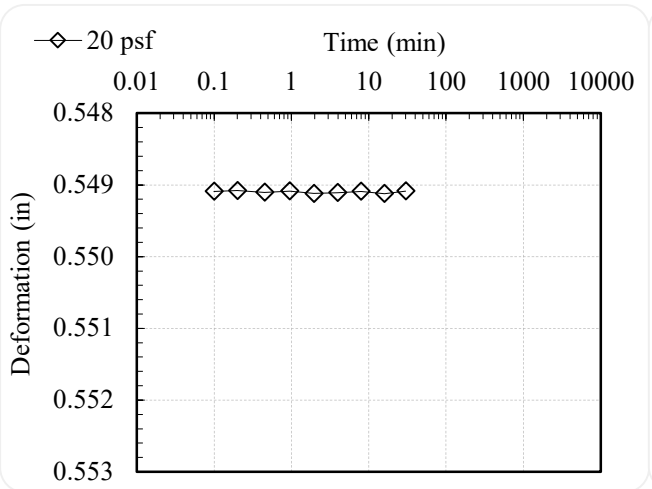
Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.

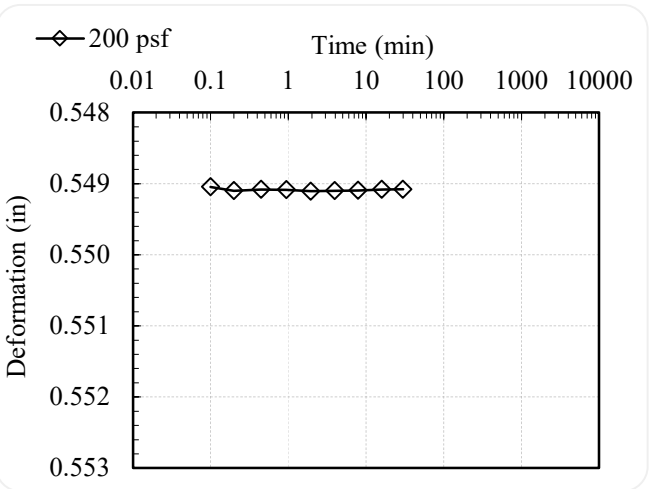












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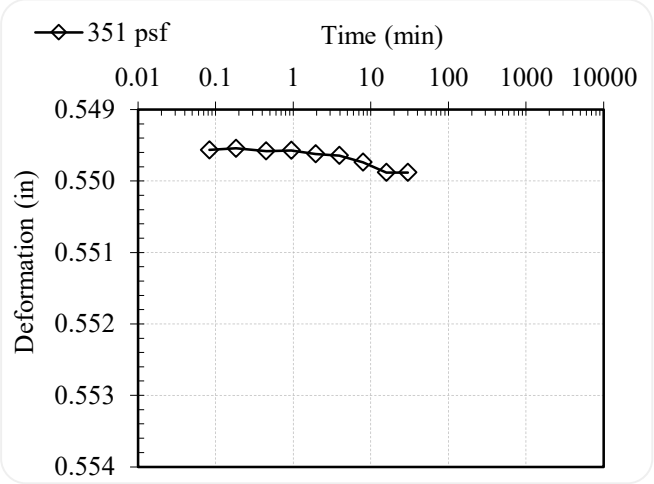
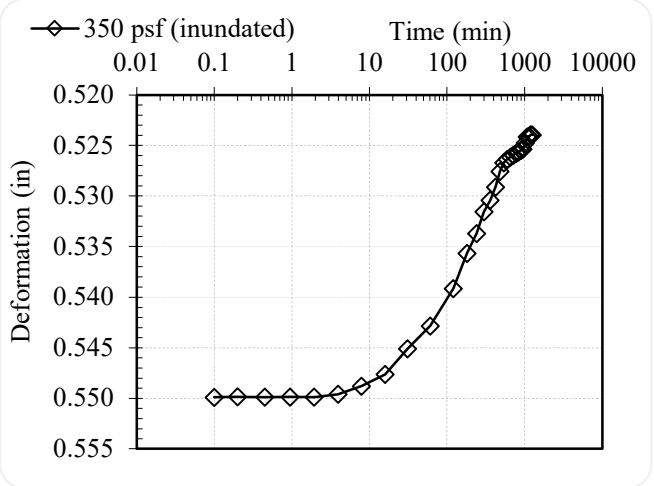
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-26 (UD-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

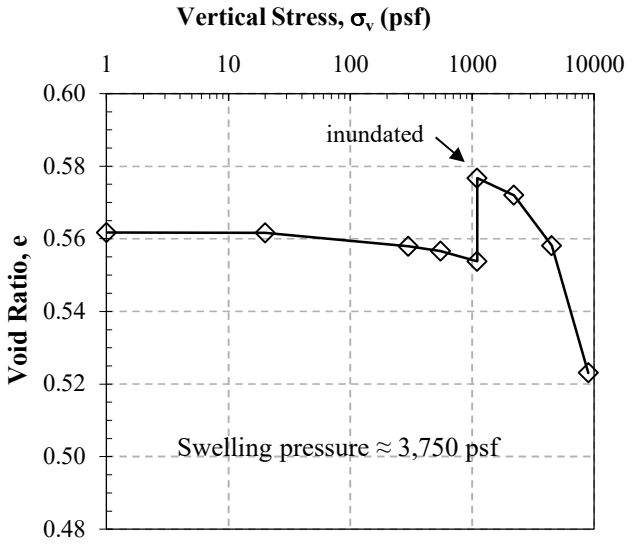
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-29 (U-5) (8-10 ft)

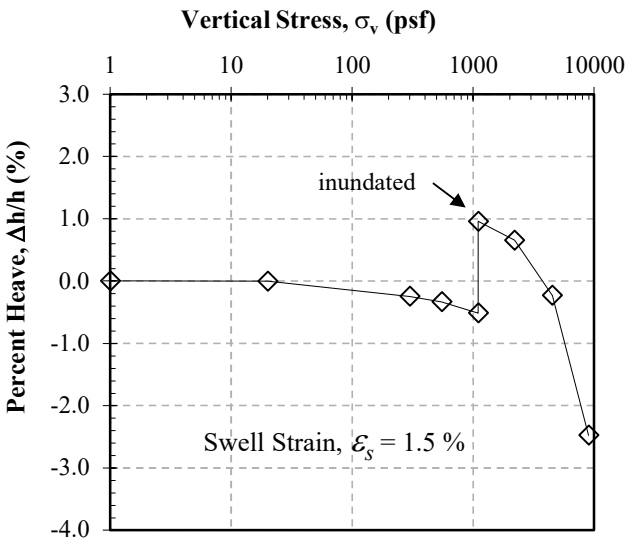
Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	14.6
	Initial Specimen Height (in)	0.805
	Initial Dry Unit Weight, γ_o (pcf)	107.1
	Initial Void Ratio, e_o	0.562
	Initial Degree of Saturation (%)	69.4
End of Testing Condition	Final Water Content (%)	19.4
	Final Specimen Height (in)	0.785
	Final Dry Unit Weight, γ_f (pcf)	109.8
	Final Void Ratio, e_f	0.523
Swell Pressure at Initial Void Ratio (psf)		3,750
Swell Strain, ε_s (%)		1.5

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.500

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	300	550	1100	1100	2200	4500	9000
e	0.562	0.562	0.558	0.557	0.554	0.577	0.572	0.558	0.523
Δh/h (%)	0.00	-0.01	-0.24	-0.33	-0.51	0.96	0.66	-0.23	-2.48
Dial. Gauge* (in)	0.4998	0.4998	0.5017	0.5024	0.5039	0.4921	0.4945	0.5016	0.5197

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 03/06/25

Reviewed By / Date

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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-29 (U-5) (8-10 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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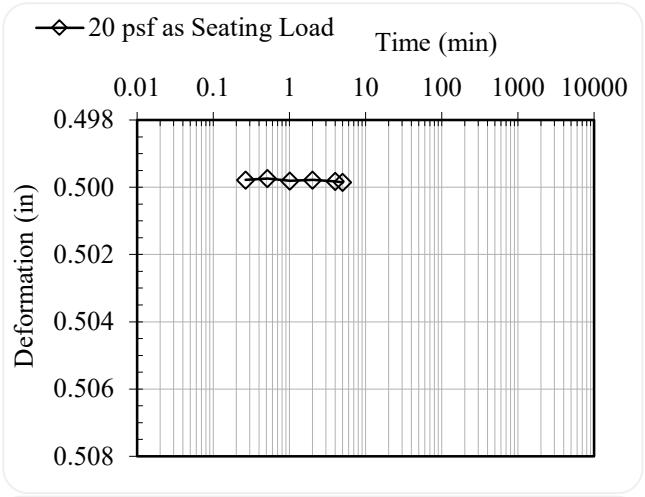

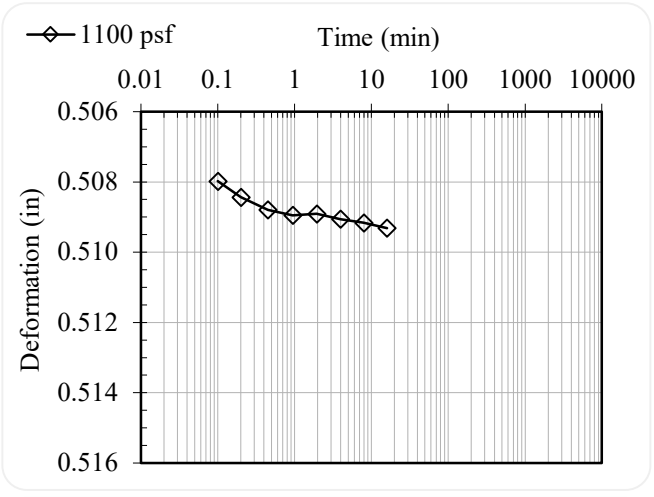

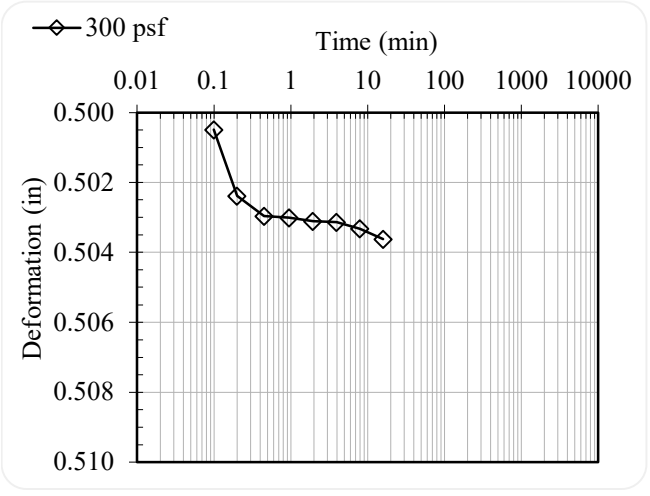

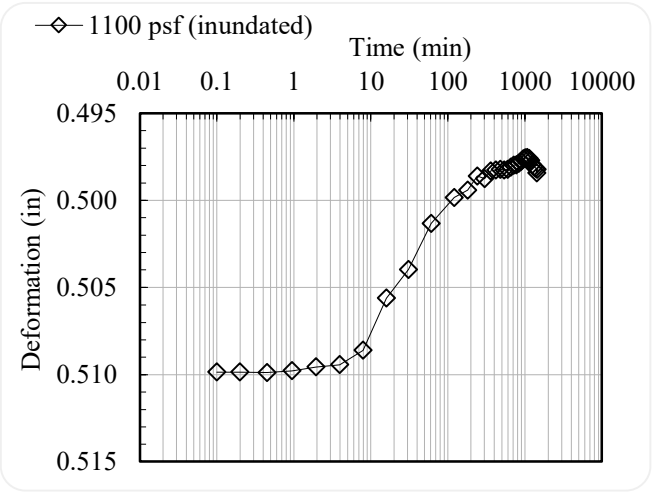

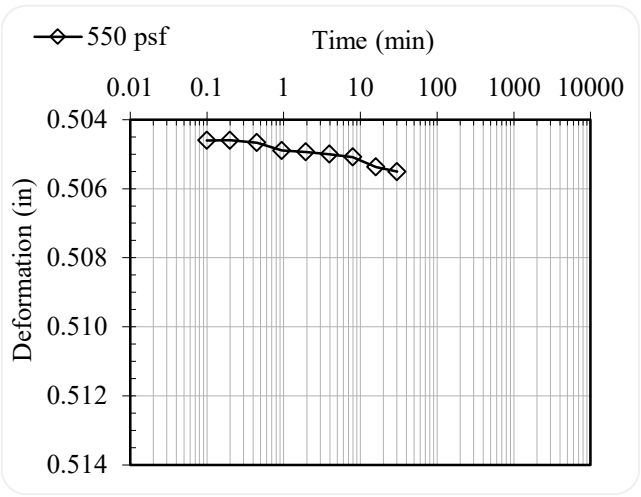

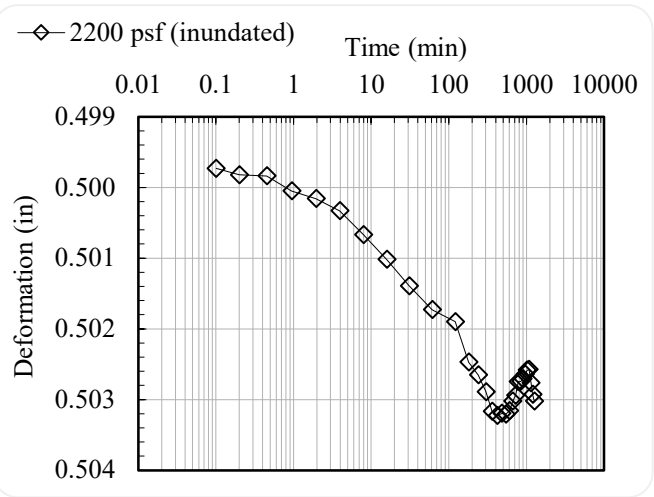

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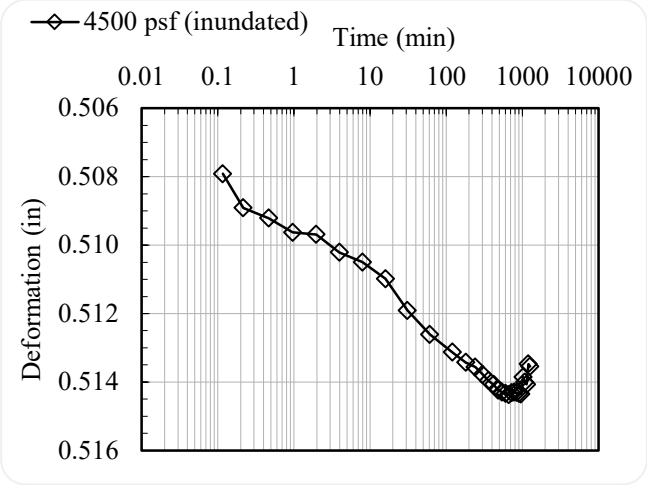
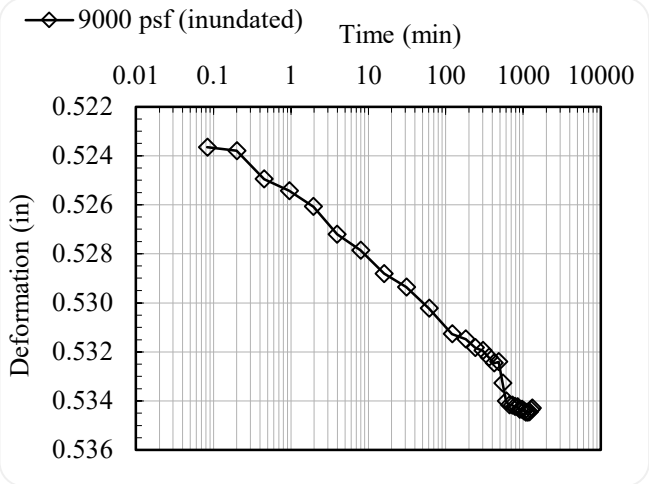
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-29 (U-5) (8-10 ft)

Alpine Project No.: 2501017
Test Date: 02/28/25
Tested By: T.D.





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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

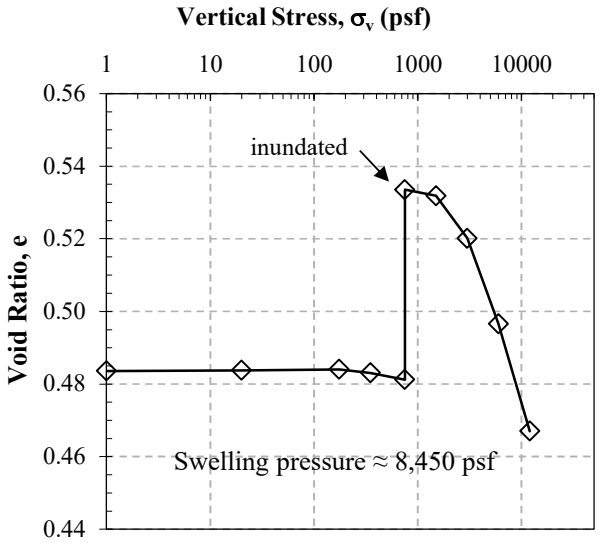
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-39 (U-2) (4-6 ft)

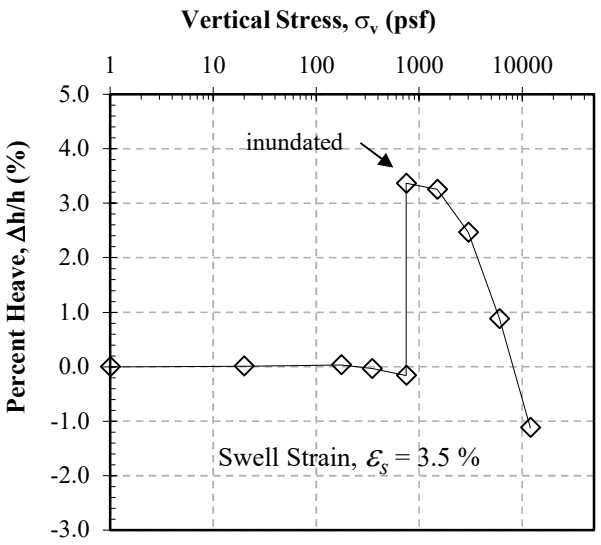
Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	15.0
	Initial Specimen Height (in)	0.804
	Initial Dry Unit Weight, γ_o (pcf)	112.8
	Initial Void Ratio, e_o	0.484
	Initial Degree of Saturation (%)	83.3
End of Testing Condition	Final Water Content (%)	18.8
	Final Specimen Height (in)	0.794
	Final Dry Unit Weight, γ_f (pcf)	114.1
	Final Void Ratio, e_f	0.467
Swell Pressure at Initial Void Ratio (psf)		8,450
Swell Strain, ε_s (%)		3.5

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.499

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	175	350	750	750	1500	3000	6000	12000
e	0.484	0.484	0.484	0.483	0.481	0.534	0.532	0.520	0.497	0.467
Δh/h (%)	0.00	0.01	0.03	-0.03	-0.16	3.37	3.26	2.46	0.88	-1.12
Dial. Gauge* (in)	0.4661	0.4660	0.4659	0.4664	0.4674	0.4391	0.4400	0.4463	0.4591	0.4751

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 06/10/25

Reviewed By / Date

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Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-39 (U-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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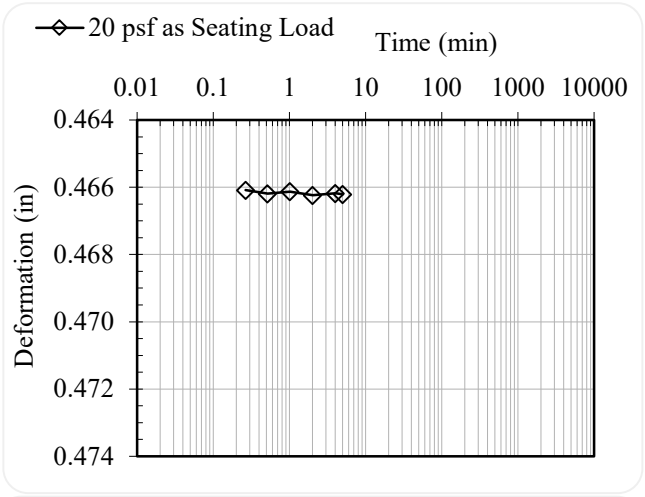
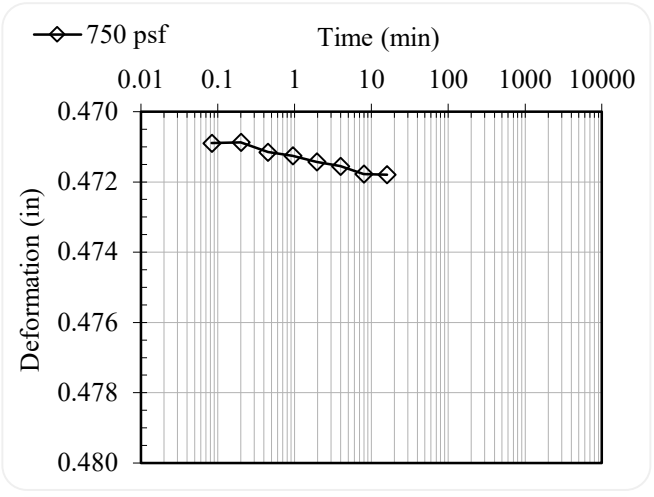
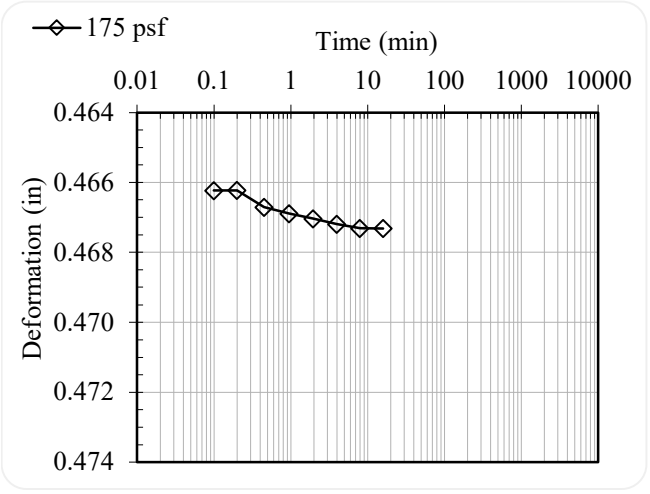
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

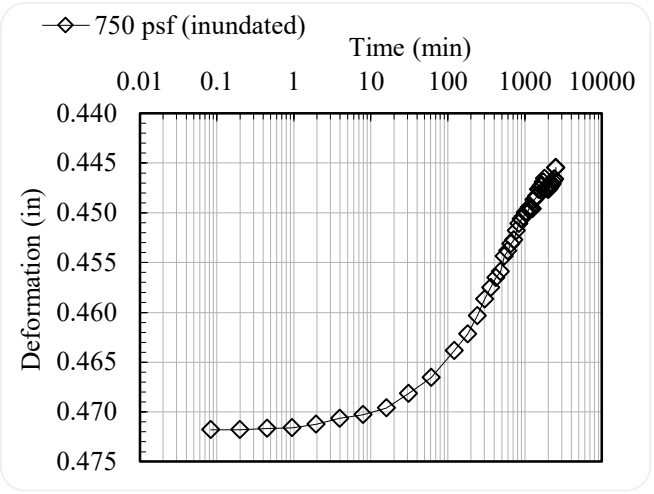
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-39 (U-2) (4-6 ft)

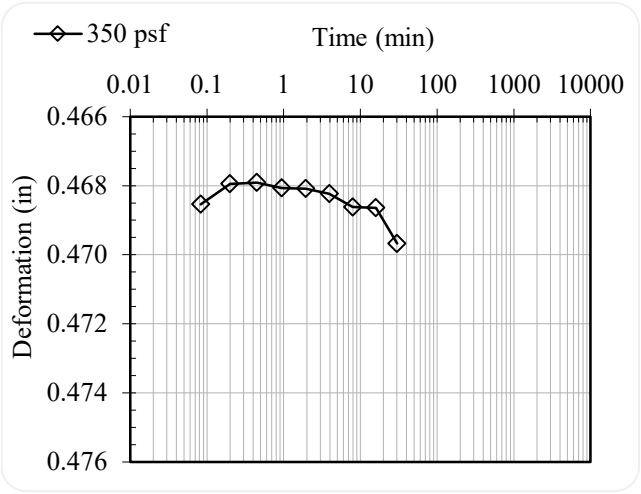
Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

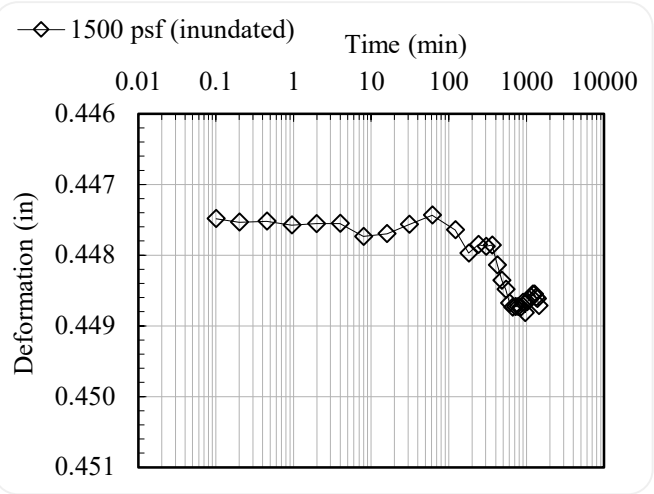












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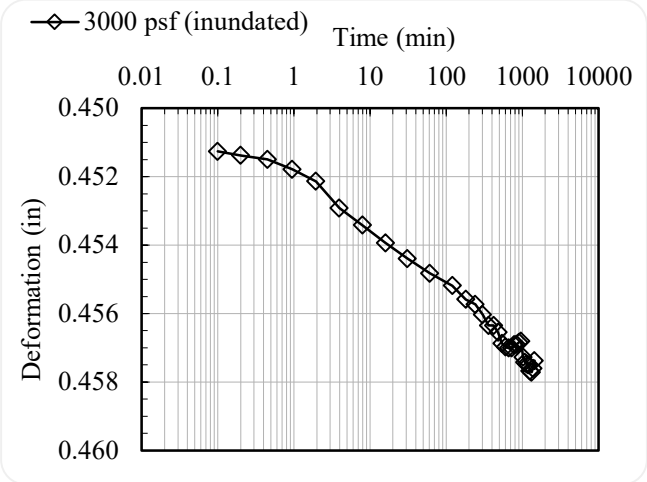
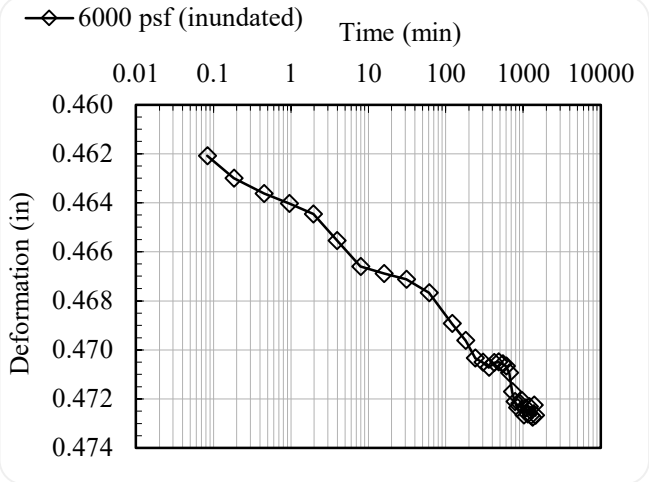
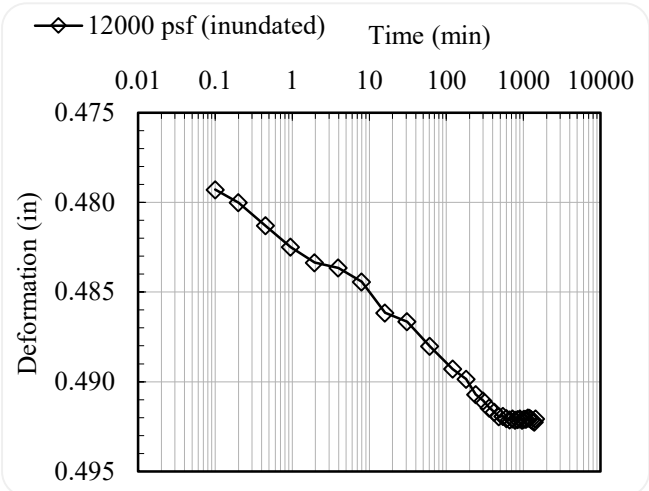
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-39 (U-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.







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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

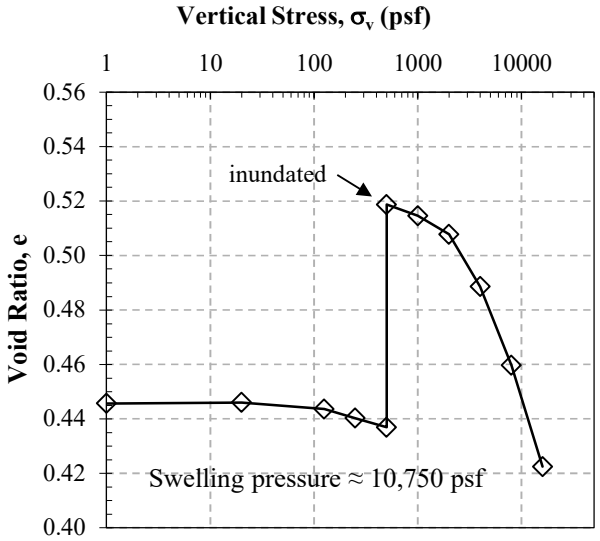
Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-40 (U-1) (2-4 ft)

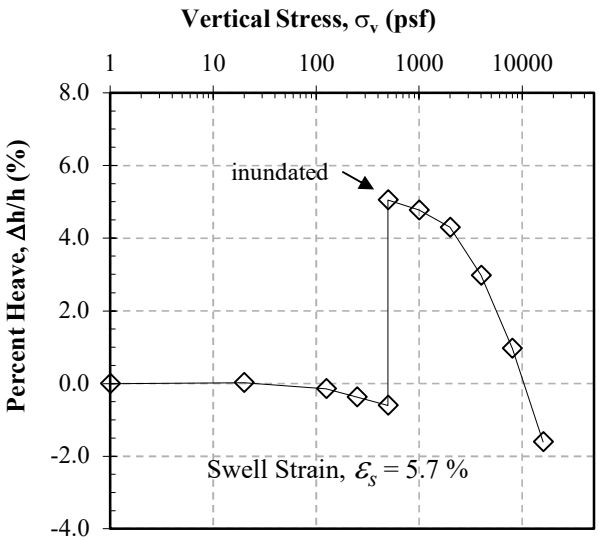
Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	13.6
	Initial Specimen Height (in)	0.803
	Initial Dry Unit Weight, γ_o (pcf)	115.7
	Initial Void Ratio, e_o	0.446
	Initial Degree of Saturation (%)	81.6
End of Testing Condition	Final Water Content (%)	17.6
	Final Specimen Height (in)	0.790
	Final Dry Unit Weight, γ_f (pcf)	117.6
	Final Void Ratio, e_f	0.422
Swell Pressure at Initial Void Ratio (psf)		10,750
Swell Strain, ε_s (%)		5.7

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.498

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	125	250	500	500	1000	2000	4000	8000
e	0.446	0.446	0.444	0.440	0.437	0.519	0.515	0.508	0.489	0.460
Δh/h (%)	0.00	0.02	-0.14	-0.37	-0.61	5.05	4.77	4.30	2.97	0.96
Dial. Gauge* (in)	0.2334	0.2332	0.2345	0.2364	0.2383	0.1928	0.1951	0.1989	0.2095	0.2257

σ_v (psf)	16000
e	0.422
Δh/h (%)	-1.61
Dial. Gauge* (in)	0.2463

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 06/11/25
Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-40 (U-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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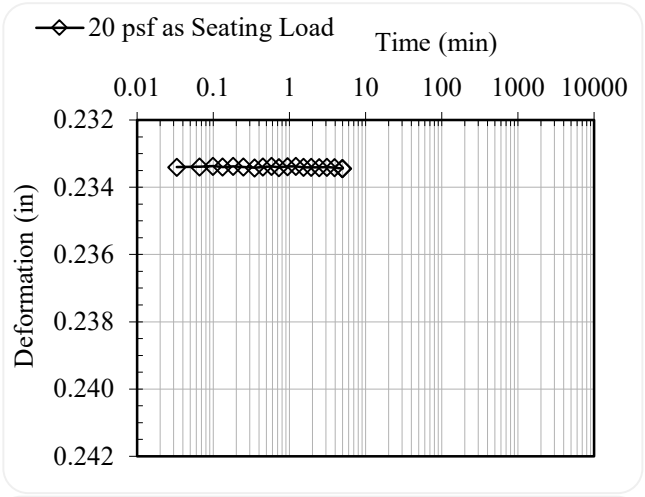
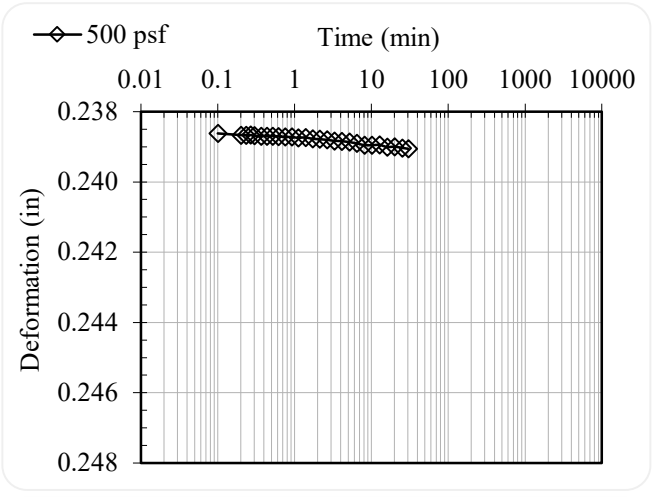
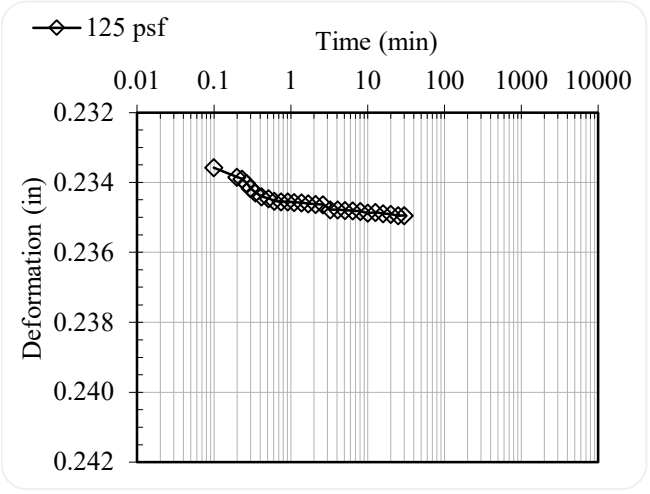
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

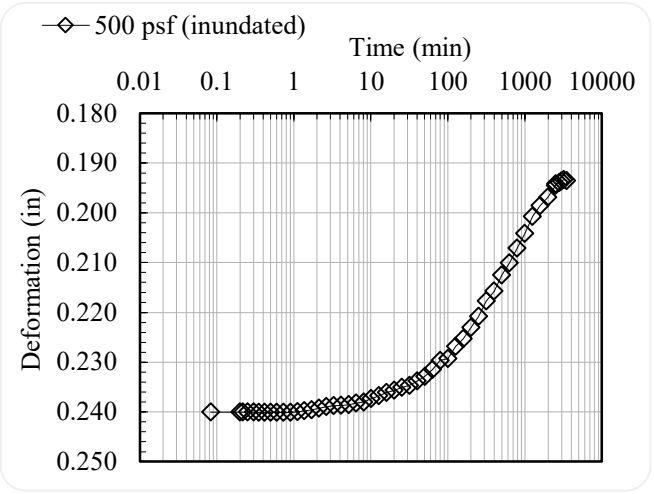
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-40 (U-1) (2-4 ft)

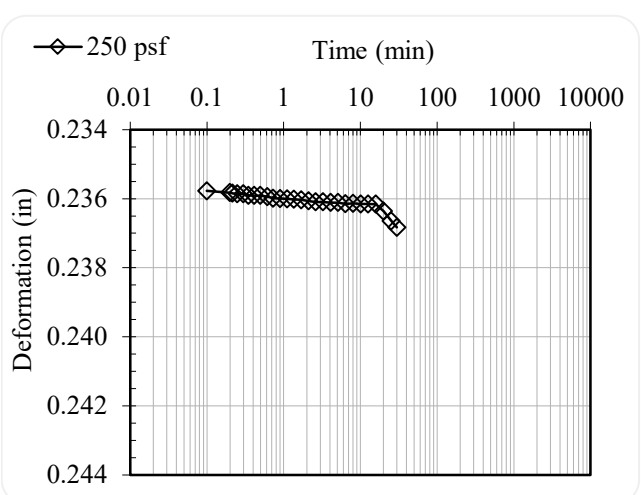
Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

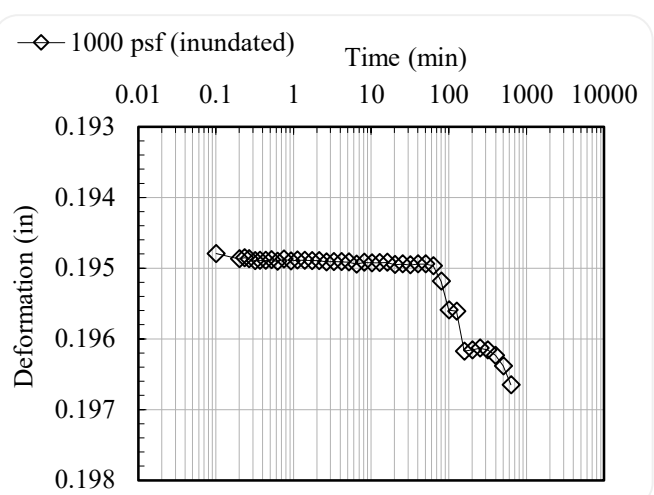












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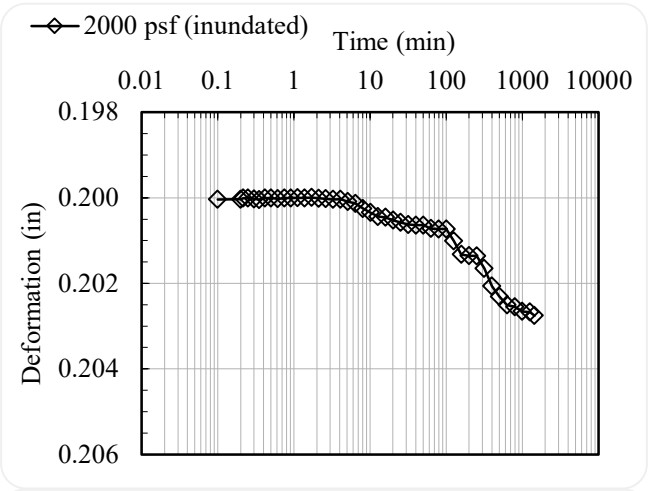
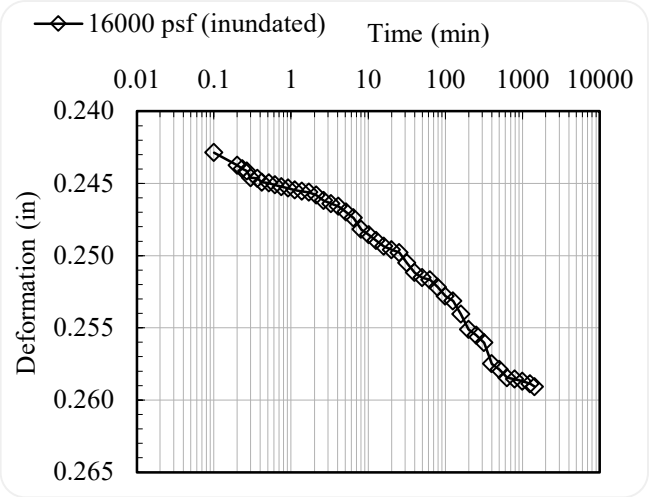
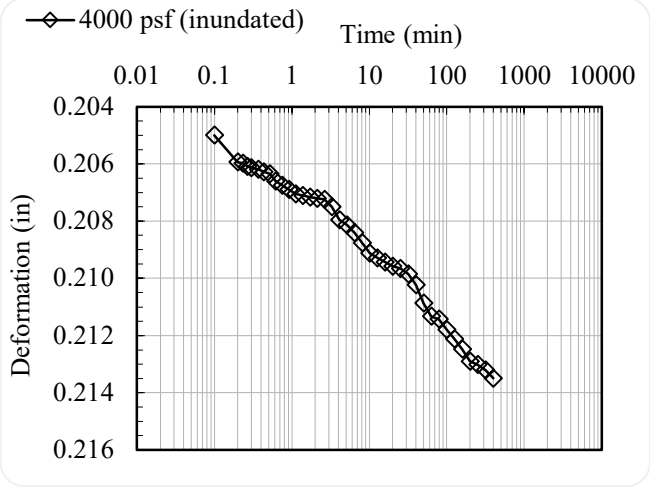
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

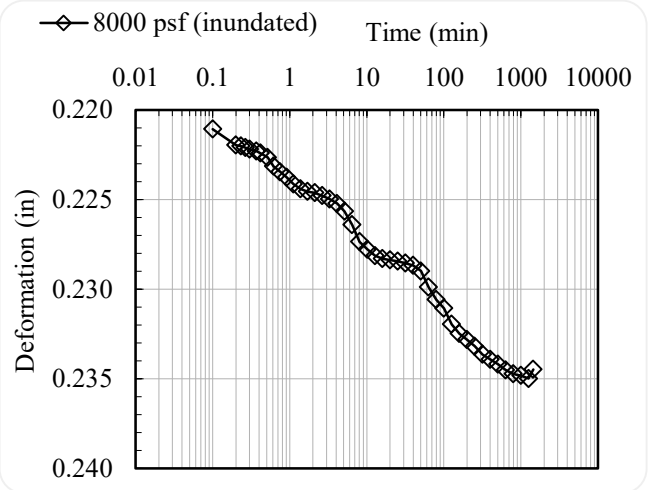
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-40 (U-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.









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One-Dimensional Swell or Collapse of Soils (ASTM D4546)

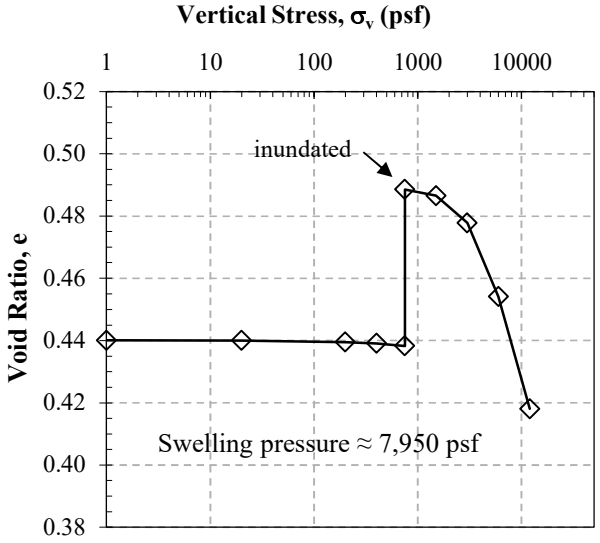
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-41 (U-2) (3-5 ft)

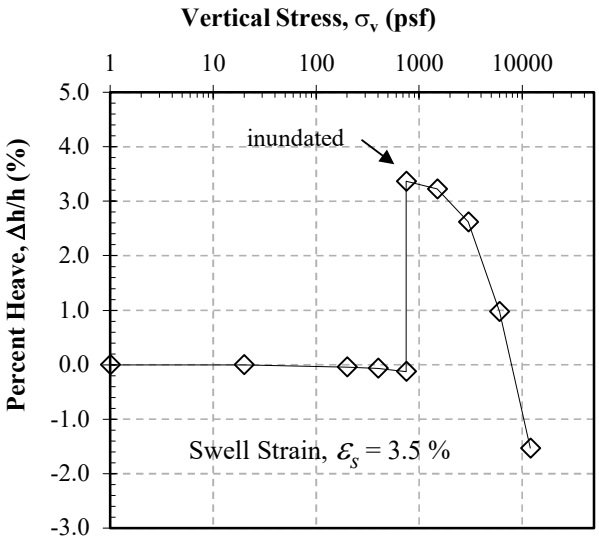
Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

Soil Testing Properties		
Initial Condition	Initial Water Content (%)	10.4
	Initial Specimen Height (in)	0.804
	Initial Dry Unit Weight, γ_o (pcf)	116.2
	Initial Void Ratio, e_o	0.440
	Initial Degree of Saturation (%)	63.2
End of Testing Condition	Final Water Content (%)	16.3
	Final Specimen Height (in)	0.791
	Final Dry Unit Weight, γ_f (pcf)	118.0
	Final Void Ratio, e_f	0.418
Swell Pressure at Initial Void Ratio (psf)		7,950
Swell Strain, ε_s (%)		3.5

Test Method: C
Method of Preparation: *Shelby Tube*
Specimen Diameter (in): 2.500

Specimen was inundated with potable tap water during testing. Loading increment duration was minimum 24 hours. Gs assumed to be 2.68. The machine deflections were measured for all loading steps that also included for the final results.





σ_v (psf)	1	20	200	400	750	750	1500	3000	6000	12000
e	0.440	0.440	0.440	0.439	0.438	0.489	0.487	0.478	0.454	0.418
Δh/h (%)	0.00	0.00	-0.04	-0.07	-0.12	3.37	3.23	2.62	0.98	-1.53
Dial. Gauge* (in)	0.2512	0.2512	0.2515	0.2517	0.2522	0.2242	0.2253	0.2301	0.2434	0.2635

*: Displacement gauge readings were included the machine deflection.

Cheng-Wei Chen, Ph.D. 06/10/25
Reviewed By / Date

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Tel: (512) 387-1287

One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-41 (U-2) (3-5 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

Test Method: C
Method of Preparation: *Shelby Tube*

(a) As-received

(b) After Test

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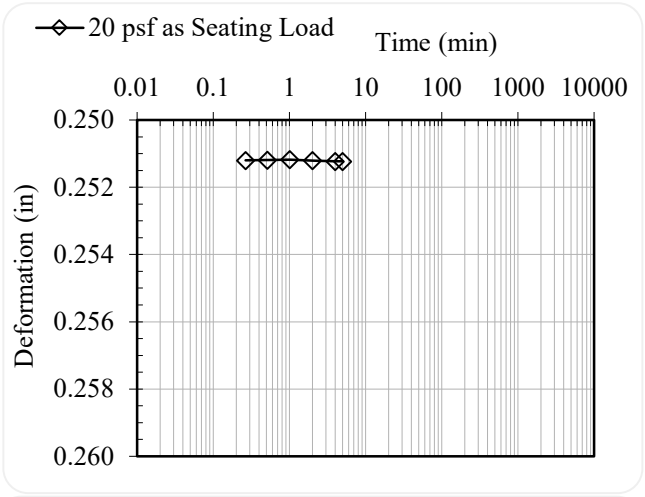
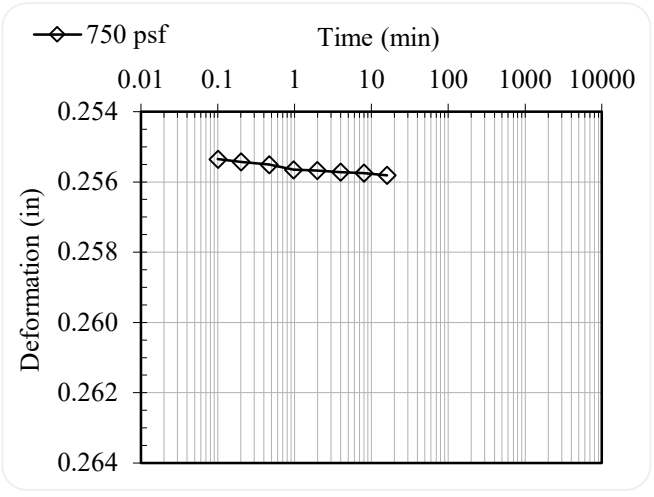
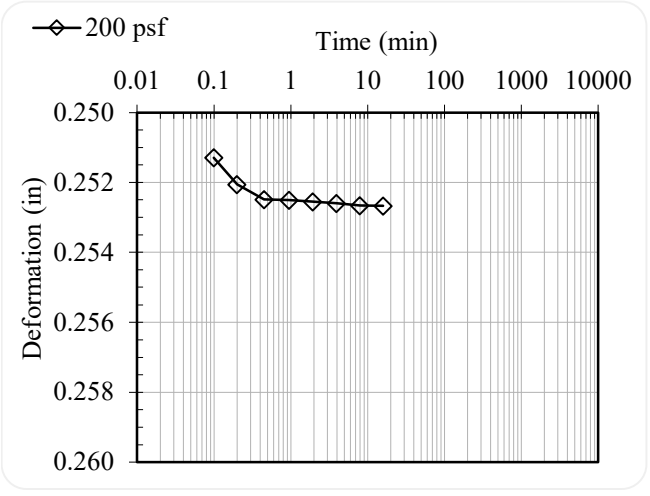
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

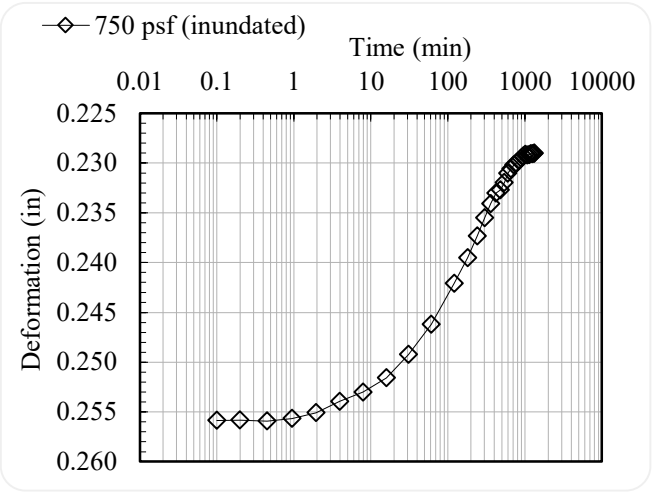
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-41 (U-2) (3-5 ft)

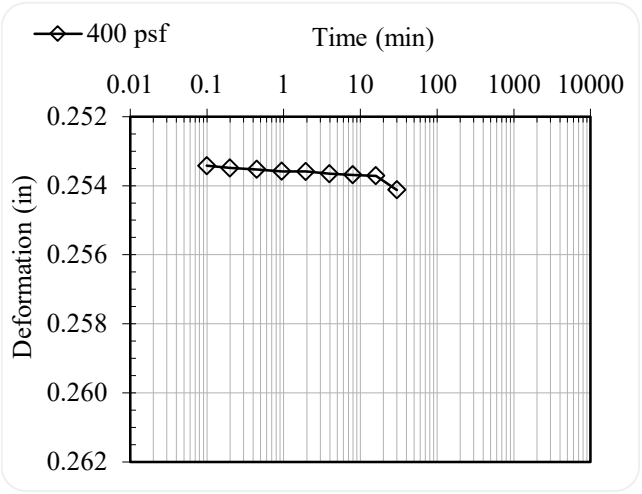
Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.

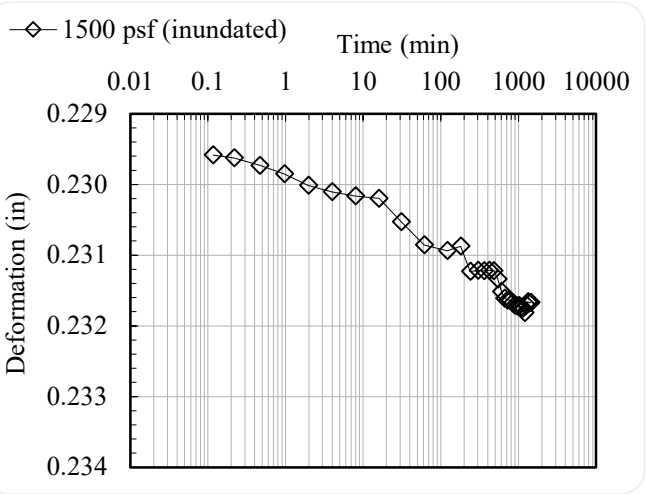












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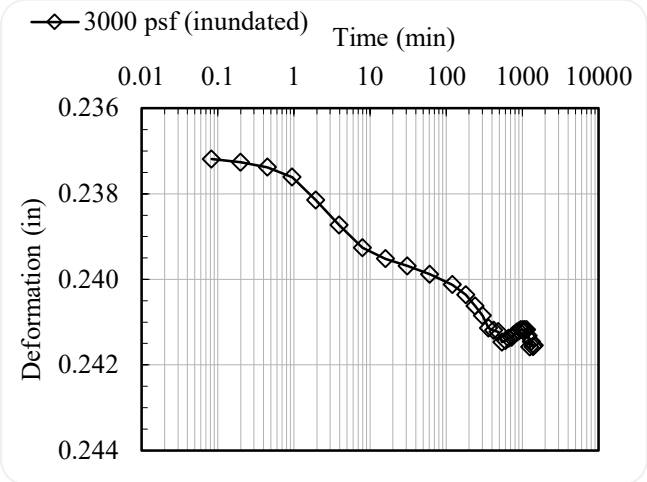
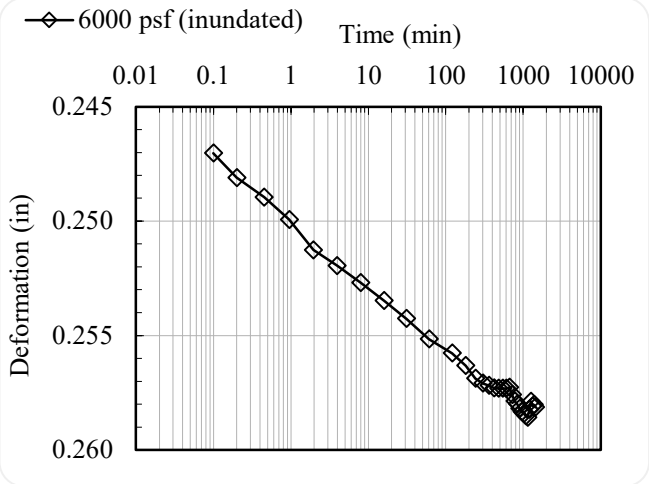
Tel: (512) 387-1287

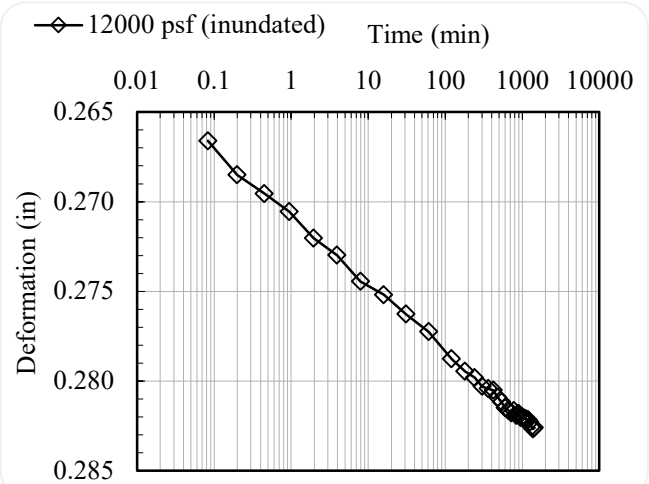
One-Dimensional Swell or Collapse of Soils (ASTM D4546)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-41 (U-2) (3-5 ft)

Alpine Project No.: 2501017
Test Date: 06/03/25
Tested By: T.D.







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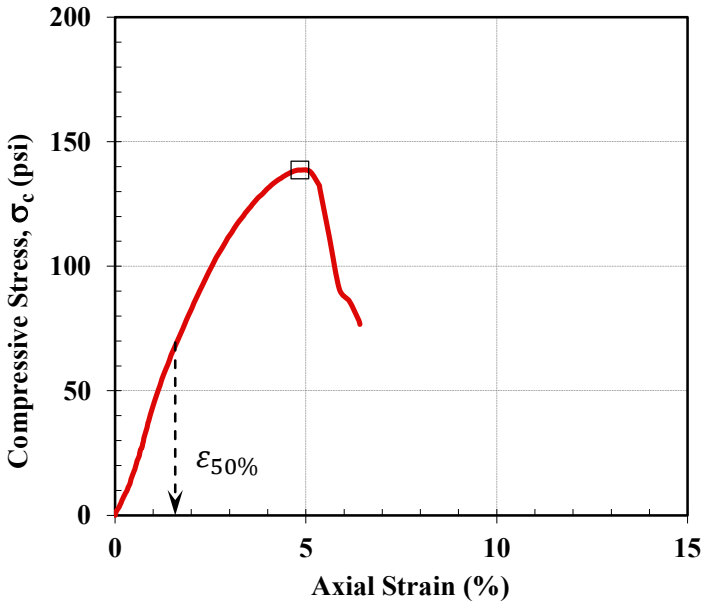
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-1 (U-7) (23-25 ft)

Alpine Project No.: 2501017
Test Date: 03/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.76
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	12.0
Total Unit Weight, γ_{total} (pcf)	133.4
Dry Unit Weight, γ_{dry} (pcf)	119.1
Void Ratio, e_0	0.40
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	4.8
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.6
Unconfined Compressive Strength, q_u (psi)	138.7
Undrained Shear Strength, S_u (tsf)	4.99

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 03/07/25
Reviewed By / Date

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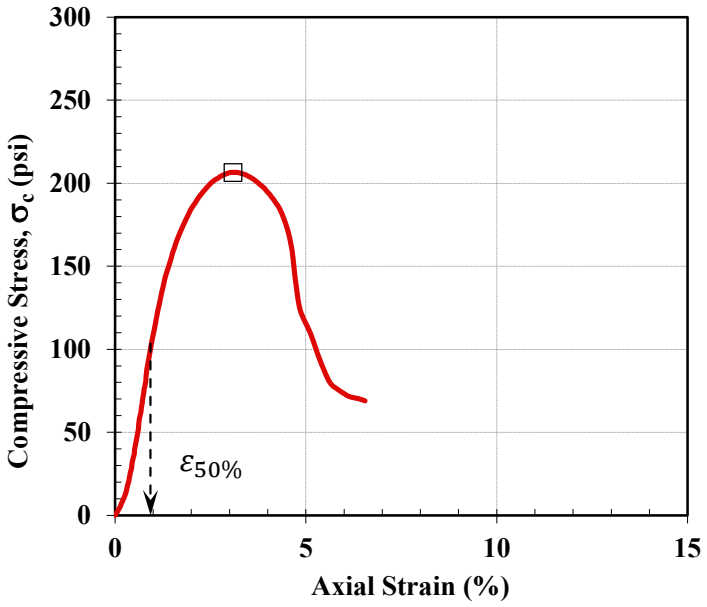
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-4 (U-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 03/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.75
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	11.3
Total Unit Weight, γ_{total} (pcf)	131.4
Dry Unit Weight, γ_{dry} (pcf)	118.1
Void Ratio, e_0	0.42
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	3.1
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.9
Unconfined Compressive Strength, q_u (psi)	206.6
Undrained Shear Strength, S_u (tsf)	7.44

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 03/07/25
Reviewed By / Date

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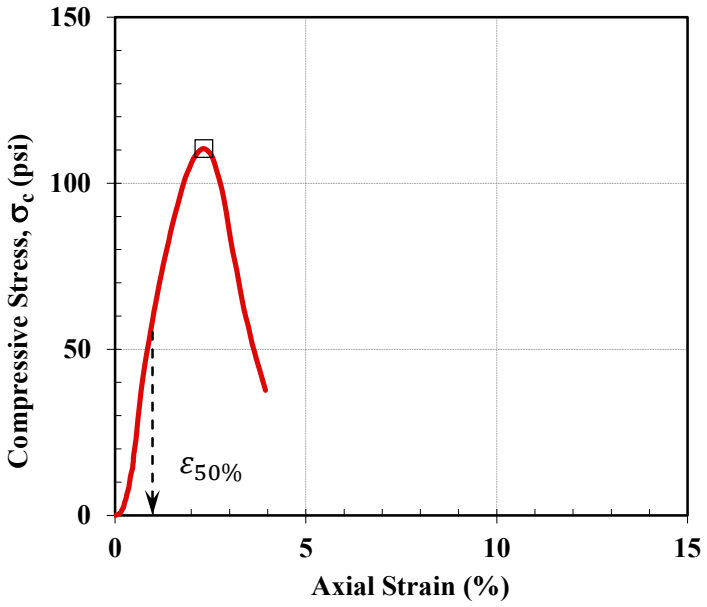
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-4 (U-6) (13-15 ft)

Alpine Project No.: 2501017
Test Date: 03/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.76
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	19.2
Total Unit Weight, γ_{total} (pcf)	127.2
Dry Unit Weight, γ_{dry} (pcf)	106.7
Void Ratio, e_0	0.57
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.3
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.0
Unconfined Compressive Strength, q_u (psi)	110.4
Undrained Shear Strength, S_u (tsf)	3.98

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 03/07/25
Reviewed By / Date

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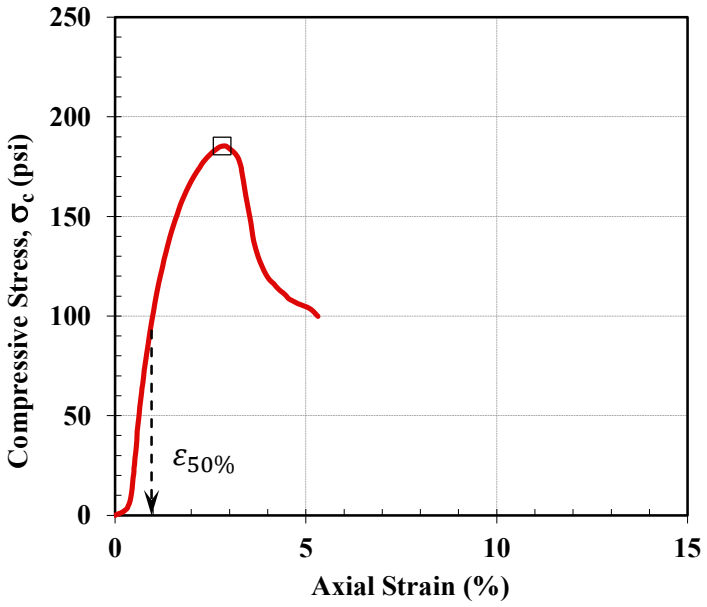
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-10 (UD-3) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.77
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	14.4
Total Unit Weight, γ_{total} (pcf)	133.9
Dry Unit Weight, γ_{dry} (pcf)	117.0
Void Ratio, e_0	0.43
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.8
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.0
Unconfined Compressive Strength, q_u (psi)	185.4
Undrained Shear Strength, S_u (tsf)	6.67

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 02/06/25
Reviewed By / Date

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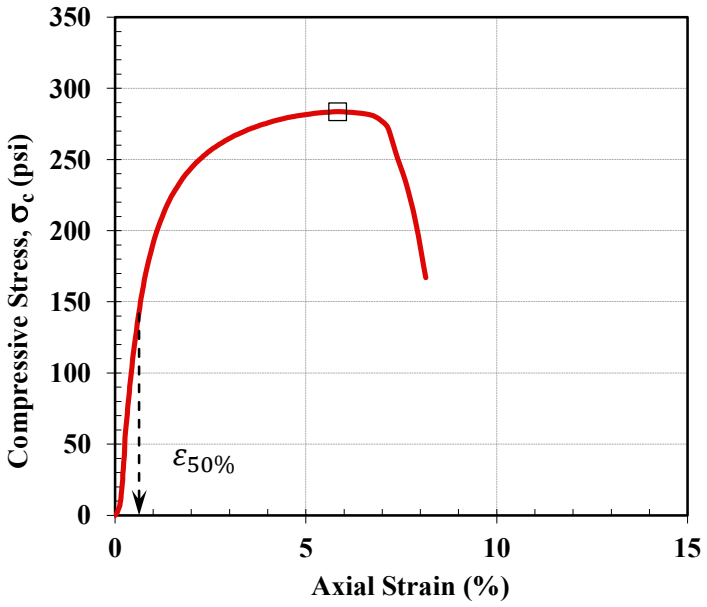
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-12 (UD-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.77
Avg. Height, H_0 (in)	5.67
Avg. Water Content (%)	12.9
Total Unit Weight, γ_{total} (pcf)	136.8
Dry Unit Weight, γ_{dry} (pcf)	121.2
Void Ratio, e_0	0.38
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	5.8
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.6
Unconfined Compressive Strength, q_u (psi)	283.6
Undrained Shear Strength, S_u (tsf)	10.21

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 02/06/25
Reviewed By / Date

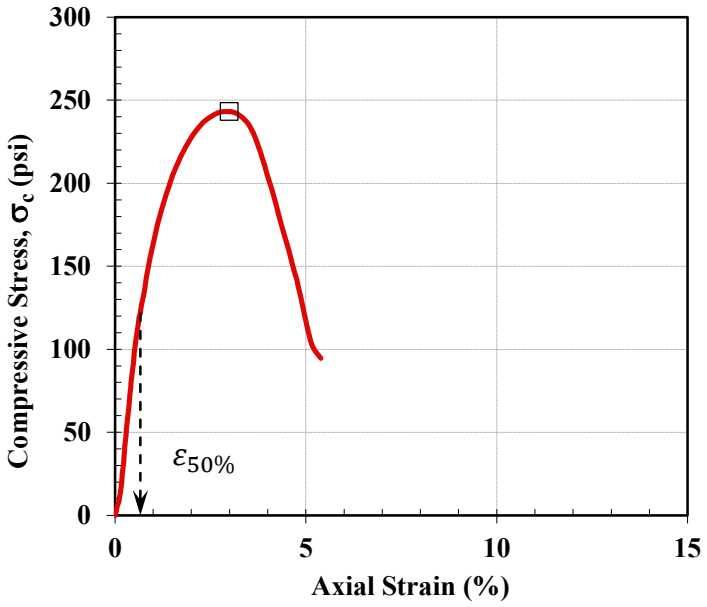
The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-12 (UD-3) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.77
Avg. Height, H_0 (in)	5.69
Avg. Water Content (%)	10.1
Total Unit Weight, γ_{total} (pcf)	136.0
Dry Unit Weight, γ_{dry} (pcf)	123.5
Void Ratio, e_0	0.35
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	3.0
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.7
Unconfined Compressive Strength, q_u (psi)	243.2
Undrained Shear Strength, S_u (tsf)	8.76

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 02/06/25
Reviewed By / Date

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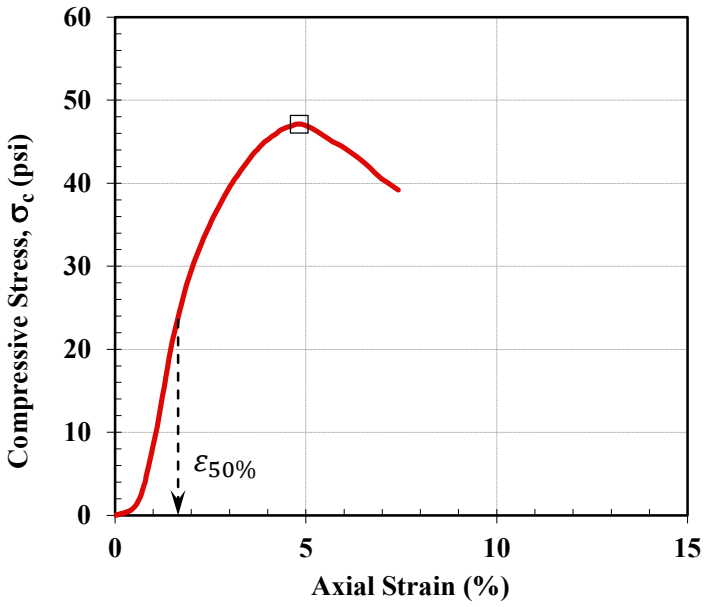
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-12 (UD-5) (13-15 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.75
Avg. Height, H_0 (in)	5.67
Avg. Water Content (%)	11.6
Total Unit Weight, γ_{total} (pcf)	134.6
Dry Unit Weight, γ_{dry} (pcf)	120.7
Void Ratio, e_0	0.39
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	4.8
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.6
Unconfined Compressive Strength, q_u (psi)	47.1
Undrained Shear Strength, S_u (tsf)	1.70

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

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Reviewed By / Date

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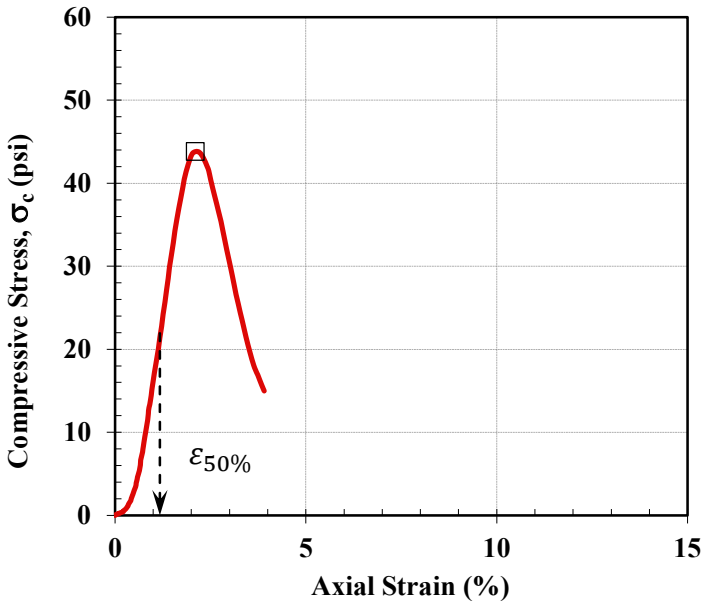
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-14 (U-1) (1-2 ft)

Alpine Project No.: 2501017
Test Date: 03/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.76
Avg. Height, H_0 (in)	5.67
Avg. Water Content (%)	10.4
Total Unit Weight, γ_{total} (pcf)	114.8
Dry Unit Weight, γ_{dry} (pcf)	104.0
Void Ratio, e_0	0.61
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.1
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.2
Unconfined Compressive Strength, q_u (psi)	43.8
Undrained Shear Strength, S_u (tsf)	1.58

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 03/07/25
Reviewed By / Date

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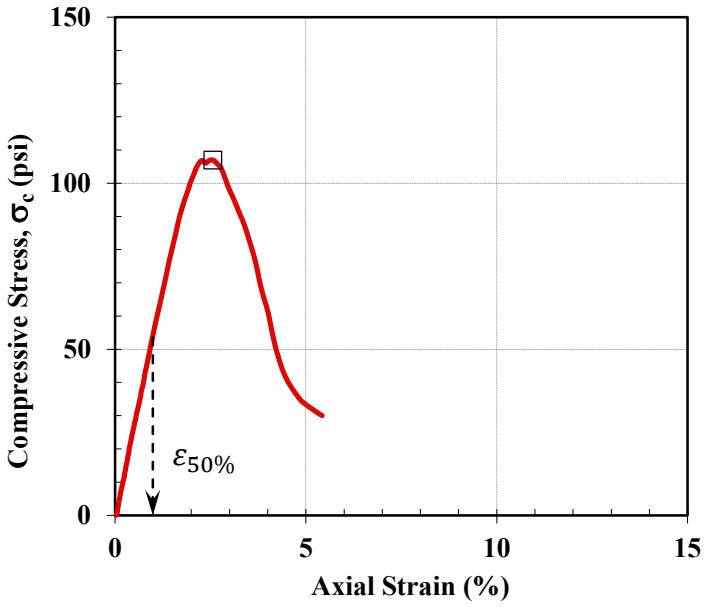
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-17 (UD-2) (6.5-8.5 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.78
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	9.6
Total Unit Weight, γ_{total} (pcf)	125.3
Dry Unit Weight, γ_{dry} (pcf)	114.3
Void Ratio, e_0	0.46
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.6
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.0
Unconfined Compressive Strength, q_u (psi)	107.0
Undrained Shear Strength, S_u (tsf)	3.85

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 02/06/25
Reviewed By / Date

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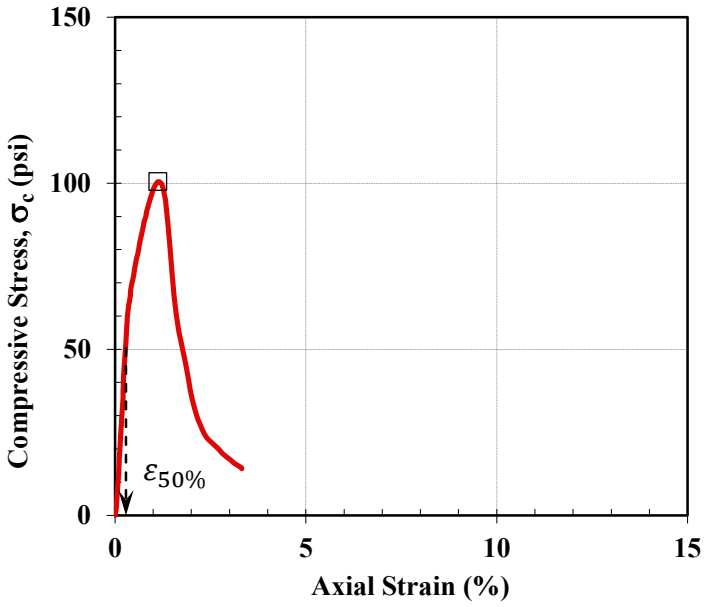
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-19 (U-3) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.75
Avg. Height, H_0 (in)	5.69
Avg. Water Content (%)	6.6
Total Unit Weight, γ_{total} (pcf)	120.7
Dry Unit Weight, γ_{dry} (pcf)	113.3
Void Ratio, e_0	0.48
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	1.1
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.3
Unconfined Compressive Strength, q_u (psi)	100.5
Undrained Shear Strength, S_u (tsf)	3.62

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 03/07/25
Reviewed By / Date

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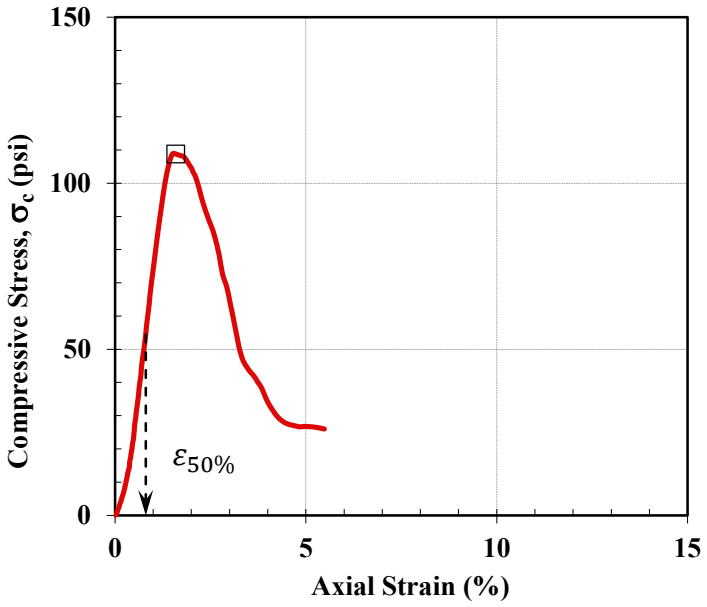
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-25 (UD-1) (8-10 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.75
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	14.2
Total Unit Weight, γ_{total} (pcf)	124.2
Dry Unit Weight, γ_{dry} (pcf)	108.8
Void Ratio, e_0	0.54
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	1.6
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.8
Unconfined Compressive Strength, q_u (psi)	108.8
Undrained Shear Strength, S_u (tsf)	3.92

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 02/06/25
Reviewed By / Date

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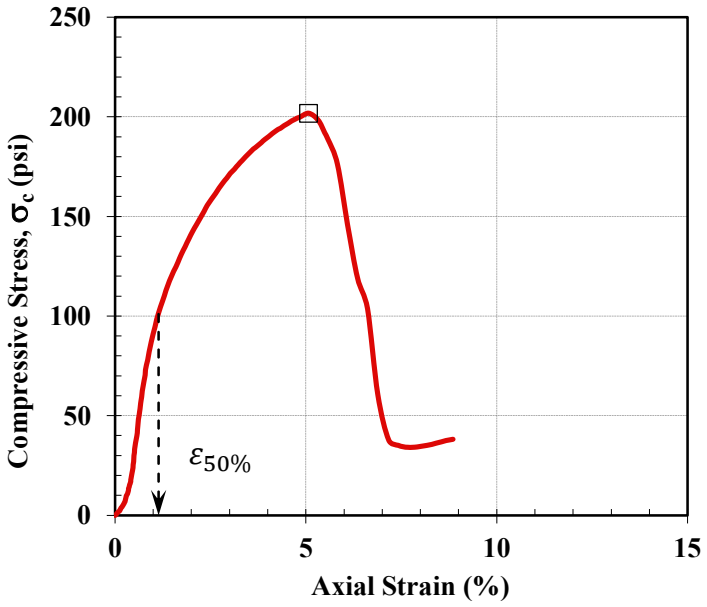
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-28 (U-4) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 03/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.75
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	16.4
Total Unit Weight, γ_{total} (pcf)	133.8
Dry Unit Weight, γ_{dry} (pcf)	114.9
Void Ratio, e_0	0.46
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	5.1
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.1
Unconfined Compressive Strength, q_u (psi)	201.8
Undrained Shear Strength, S_u (tsf)	7.27

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 03/07/25
Reviewed By / Date

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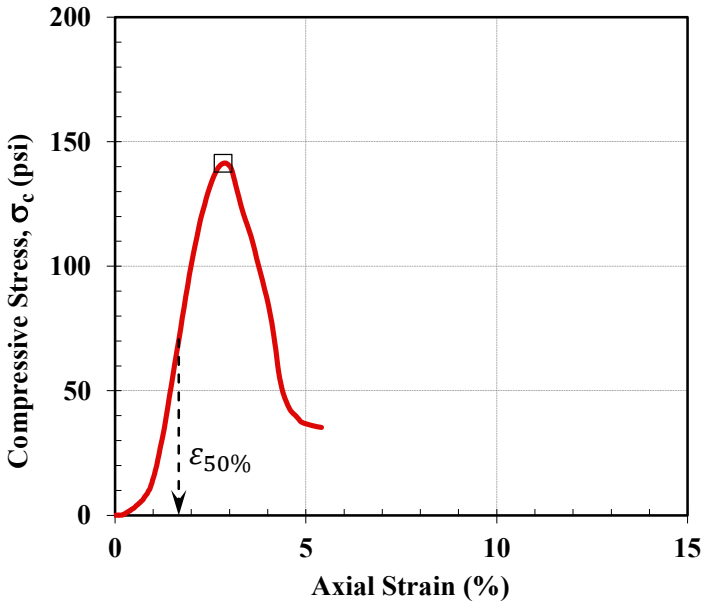
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-30 (UD-1) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 02/03/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.76
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	13.5
Total Unit Weight, γ_{total} (pcf)	123.7
Dry Unit Weight, γ_{dry} (pcf)	109.0
Void Ratio, e_0	0.53
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.8
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	1.7
Unconfined Compressive Strength, q_u (psi)	141.4
Undrained Shear Strength, S_u (tsf)	5.09

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 02/06/25
Reviewed By / Date

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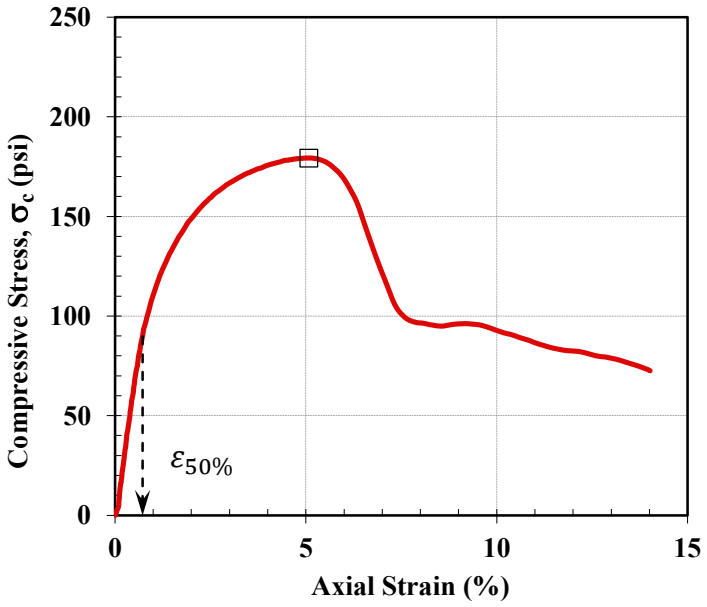
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-39 (U-1) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 06/04/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.76
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	13.8
Total Unit Weight, γ_{total} (pcf)	132.7
Dry Unit Weight, γ_{dry} (pcf)	116.6
Void Ratio, e_0	0.43
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	5.1
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.7
Unconfined Compressive Strength, q_u (psi)	179.4
Undrained Shear Strength, S_u (tsf)	6.46

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 06/05/25
Reviewed By / Date

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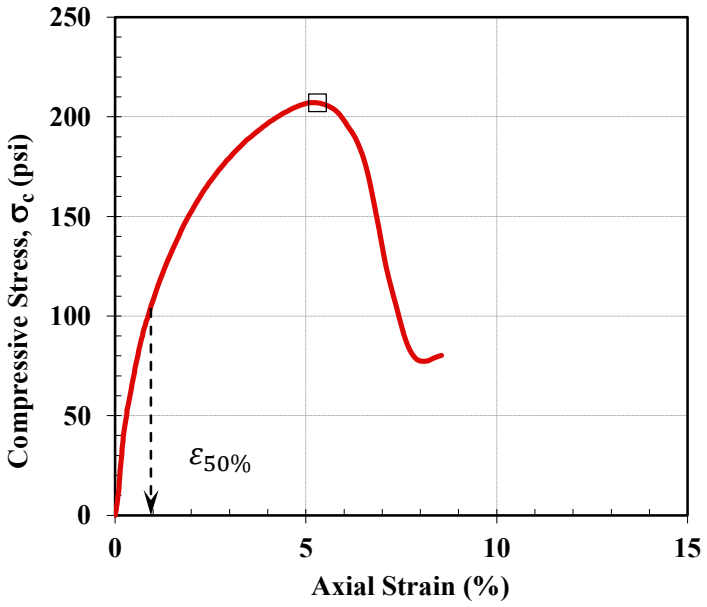
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-39 (U-3) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 06/04/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.81
Avg. Height, H_0 (in)	5.67
Avg. Water Content (%)	12.3
Total Unit Weight, γ_{total} (pcf)	132.2
Dry Unit Weight, γ_{dry} (pcf)	117.8
Void Ratio, e_0	0.42
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	5.3
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.9
Unconfined Compressive Strength, q_u (psi)	207.1
Undrained Shear Strength, S_u (tsf)	7.45

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

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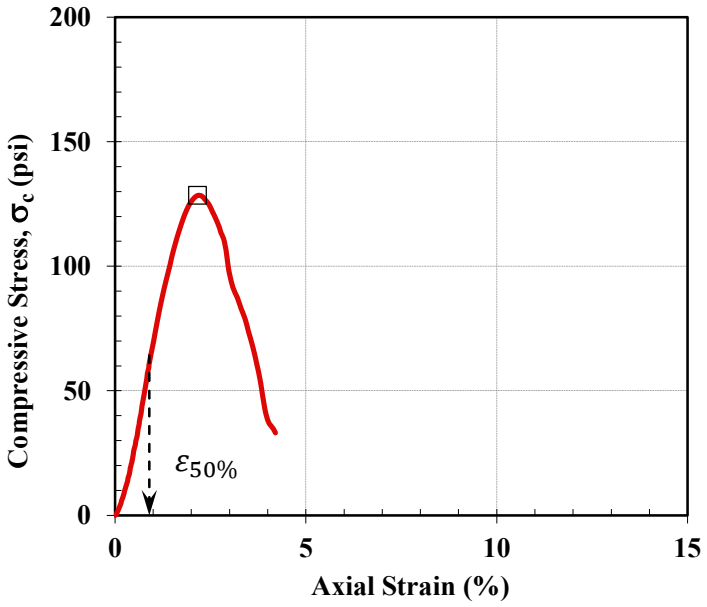
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme (PN: 520102301)
Sample ID: LB-40 (U-3) (6-8 ft)

Alpine Project No.: 2501017
Test Date: 06/04/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.77
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	10.6
Total Unit Weight, γ_{total} (pcf)	132.8
Dry Unit Weight, γ_{dry} (pcf)	120.0
Void Ratio, e_0	0.39
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.2
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.9
Unconfined Compressive Strength, q_u (psi)	128.5
Undrained Shear Strength, S_u (tsf)	4.63

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 06/05/25
Reviewed By / Date

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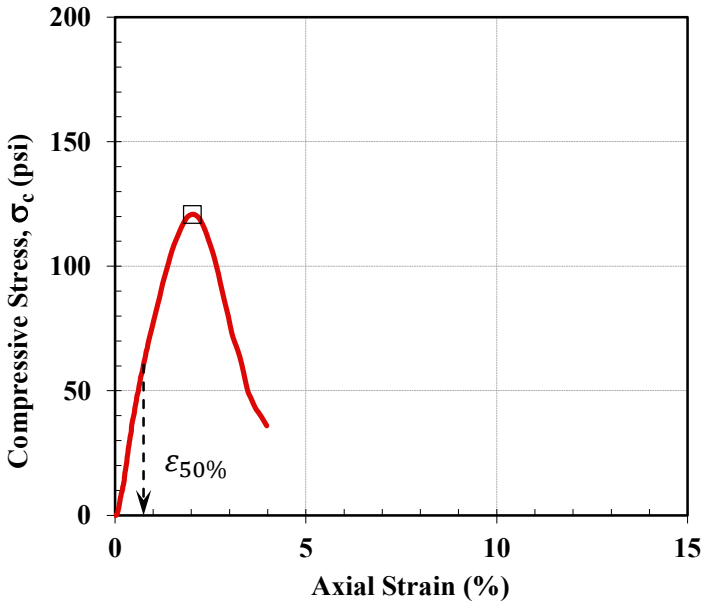
Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: LB-41 (U-4) (13-15 ft)

Alpine Project No.: 2501017
Test Date: 06/04/25
Tested By: T.D.



Initial Conditions	
Avg. Diameter (in)	2.76
Avg. Height, H_0 (in)	5.68
Avg. Water Content (%)	8.3
Total Unit Weight, γ_{total} (pcf)	125.1
Dry Unit Weight, γ_{dry} (pcf)	115.5
Void Ratio, e_0	0.45
Specific Gravity (Assumed)	2.68

Rate of Axial Strain (%/ min)	1.0

Stresses at Failure	
Axial Strain at Failure (%)	2.0
Axial Strain at 50% of q_u, $\varepsilon_{50\%}$	0.7
Unconfined Compressive Strength, q_u (psi)	120.8
Undrained Shear Strength, S_u (tsf)	4.35

Note: Failure was determined at the maximum compressive stress or stress at 15 % axial strain, whenever is obtained first.

(a) After Test

Cheng-Wei Chen, Ph.D. 06/05/25
Reviewed By / Date

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Sulfate, Chloride, & Sulfide Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: LB-31 (U-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/07/25
Tested By: C.M., T.D., & O.V.

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Calibrated Date: 03/07/25

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
271	0.027

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 23

Calibrated Date: 03/07/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.

Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Cheng-Wei Chen, Ph.D. 03/10/25

Reviewed By / Date

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Sulfate, Chloride, & Sulfide Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: LB-33 (U-2) (4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/07/25
Tested By: C.M., T.D., & O.V.

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Calibrated Date: 03/07/25

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
229	0.023

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 20

Calibrated Date: 03/07/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Cheng-Wei Chen, Ph.D. 03/10/25

Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Sulfate, Chloride, & Sulfide Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: LB-35 (U-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 03/07/25
Tested By: C.M., T.D., & O.V.

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Calibrated Date: 03/07/25

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
417	0.042

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 238

Calibrated Date: 03/07/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Cheng-Wei Chen, Ph.D. 03/10/25

Reviewed By / Date

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Alpine Engineering Services, LLC
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Hutto, TX 78634
Tel: (512) 387-1287

Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-3 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	8.61	21.1°C
In Calcium Chloride ($CaCl_2$)	7.87	21.1°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
229	0.023

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 53

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 133

Test Method: SM 2580B
Calibrated Date: 02/27/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/06/25
Reviewed By / Date

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105 Tradesmen Drive, Suite B
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Tel: (512) 387-1287

Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-6 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	7.27	21.1°C
In Calcium Chloride ($CaCl_2$)	6.40	21.1°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
313	0.031

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 75

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 176

Test Method: SM 2580B
Calibrated Date: 03/05/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/06/25

Reviewed By / Date

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Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-7 (G-3) (3-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	6.94	21.2°C
In Calcium Chloride ($CaCl_2$)	6.23	20.8°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 2/247/2025

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
271	0.027

Calibrated Date: 03/03/24

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 105

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 150

Test Method: SM 2580B

Note 4: mV in millivolt

Calibrated Date: 03/05/25

Cheng-Wei Chen, Ph.D. 03/06/25

Reviewed By / Date

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Tel: (512) 387-1287

Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-11 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	8.08	21.1°C
In Calcium Chloride ($CaCl_2$)	7.37	21.1°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
208	0.021

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 28

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 144

Test Method: SM 2580B
Calibrated Date: 03/05/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/06/25
Reviewed By / Date

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Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-13 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	8.54	21.2°C
In Calcium Chloride ($CaCl_2$)	7.79	21.1°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
250	0.025

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 15

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 171

Test Method: SM 2580B

Note 4: mV in millivolt

Calibrated Date: 03/05/25

Cheng-Wei Chen, Ph.D. 03/06/25

Reviewed By / Date

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Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-14 (G-2) (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	8.07	21.3°C
In Calcium Chloride ($CaCl_2$)	7.42	21.2°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
354	0.035

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 270

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 135

Test Method: SM 2580B
Calibrated Date: 03/05/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/06/25
Reviewed By / Date

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Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-16 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	7.82	21.0°C
In Calcium Chloride ($CaCl_2$)	7.15	20.9°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
146	0.015

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 105

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 187

Test Method: SM 2580B
Calibrated Date: 02/27/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/06/25
Reviewed By / Date

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Hutto, TX 78634
Tel: (512) 387-1287

Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-18 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	8.53	21.1°C
In Calcium Chloride ($CaCl_2$)	7.75	21.0°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
146	0.015

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 20

Calibrated Date: 03/04/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 118

Test Method: SM 2580B
Calibrated Date: 03/06/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/08/25
Reviewed By / Date

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Alpine Engineering Services, LLC
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Hutto, TX 78634
Tel: (512) 387-1287

Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-20 G-2 (2-4 ft)

Alpine Project No.: 2501017
Test Date: 02/27/25
Tested By: C.M., T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	8.94	21.2°C
In Calcium Chloride ($CaCl_2$)	7.93	21.2°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 02/24/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
375	0.038

Calibrated Date: 03/03/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 108

Calibrated Date: 03/05/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 164

Test Method: SM 2580B
Calibrated Date: 03/06/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 03/08/25
Reviewed By / Date

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Tel: (512) 387-1287

Sulfate, Chloride, & Sulfide Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-22 G-2/3 (2-4/4-6 ft)

Alpine Project No.: 2501017
Test Date: 03/07/25
Tested By: C.M., T.D., & O.V.

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Calibrated Date: 03/07/25

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
208	0.021

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 33

Calibrated Date: 03/07/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Cheng-Wei Chen, Ph.D. 03/10/25

Reviewed By / Date

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Tel: (512) 387-1287

Soil Resistivity, pH of Soil, Sulfate, Chloride, Sulfide, Redox Tests

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-24 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 06/05/25
Tested By: T.D., & O.V.

pH of Soil

Test Method: ASTM D4972, Method A

Condition	pH Value	Temperature
In Distilled Water	7.14	20.5°C
In Calcium Chloride ($CaCl_2$)	6.54	20.0°C

pH Meter: AE-258, Hanna, TA02090266
Calibrated Date: 06/04/25

Water-Soluble Sulfate in Soil

Test Method: ASTM C1580

Sulfate Content (mg SO4/kg soil)	% sulfate by mass
146	0.015

Calibrated Date: 06/05/25

Water-Soluble Chloride Ion

Test Method: ASTM D512, Method B

Chloride Ion (mg/L): 230

Calibrated Date: 06/05/25

Note 1: Average sulfate & chloride content was obtained from multiple trials.
Note 2: ND = No Detection, Below Method Detection Limit, which < 10 mg/kg (Sulfate) or < 5 mg/L (Chloride).

Sulfide Ion (mg/L): ND

Test Method: EPA 376.1

Note 3: ND = No Detection, Below Method Detection Limit, which < 6.7 mg/L.

Oxidation-Reduction Potential (**ORP**) (mV): 158

Test Method: SM 2580B
Calibrated Date: 06/05/25

Note 4: mV in millivolt

Cheng-Wei Chen, Ph.D. 06/08/25
Reviewed By / Date

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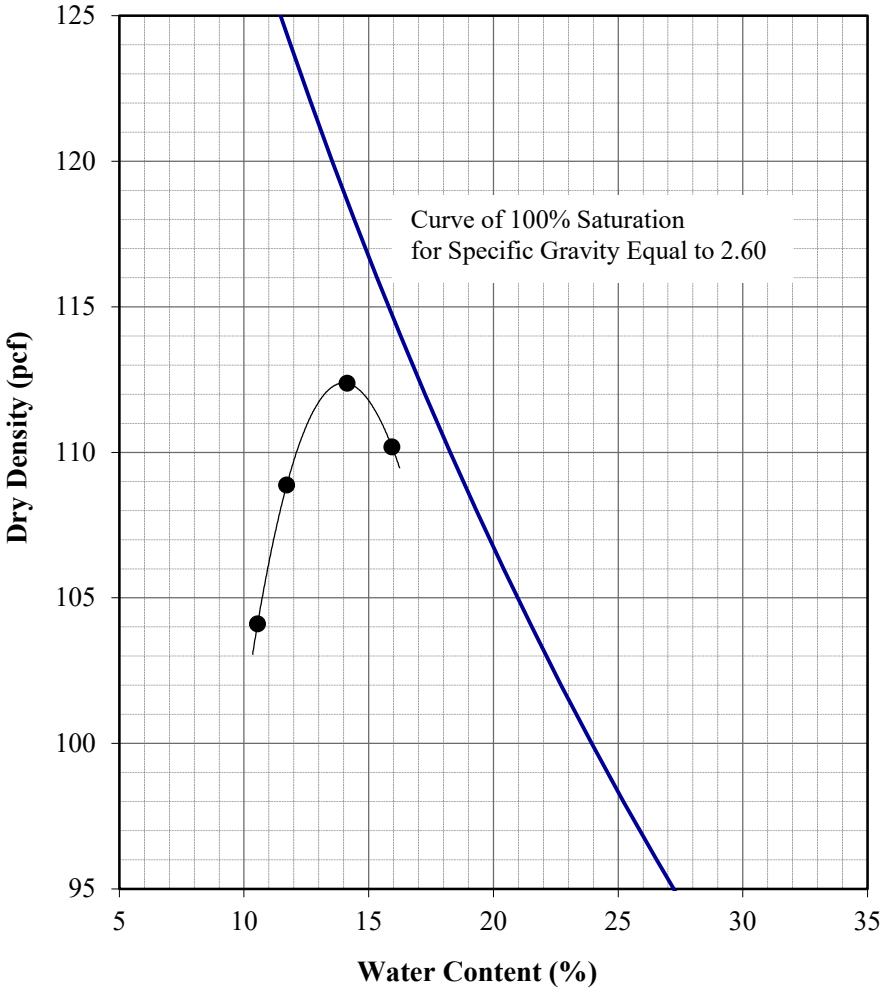
Hutto, TX 78634
Tel: (512) 387-1287

Moisture-Density Compaction Test (Standard Proctor - ASTM D698)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-2 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: C.M.



Method Used: A
Preparation Method Used: Air Dry
% Fractions Retained: 0.2%
Rammer: Mechanical
Calibrated On: 06/05/24

Water Content (%)	Dry Density (pcf)
14.1	112.4
15.9	110.2
11.7	108.9
10.5	104.1

% Passing #200	63.9
Liquid Limit	27
Plasticity Index	14
USCS	CL

Material Description: Brown sandy clay

Laboratory Compacted Samples	
Maximum Dry Density, $\gamma_{d,max}$ (pcf)	**112.4**
Optimum Water Content, w_{opt} (%)	**14.2**

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

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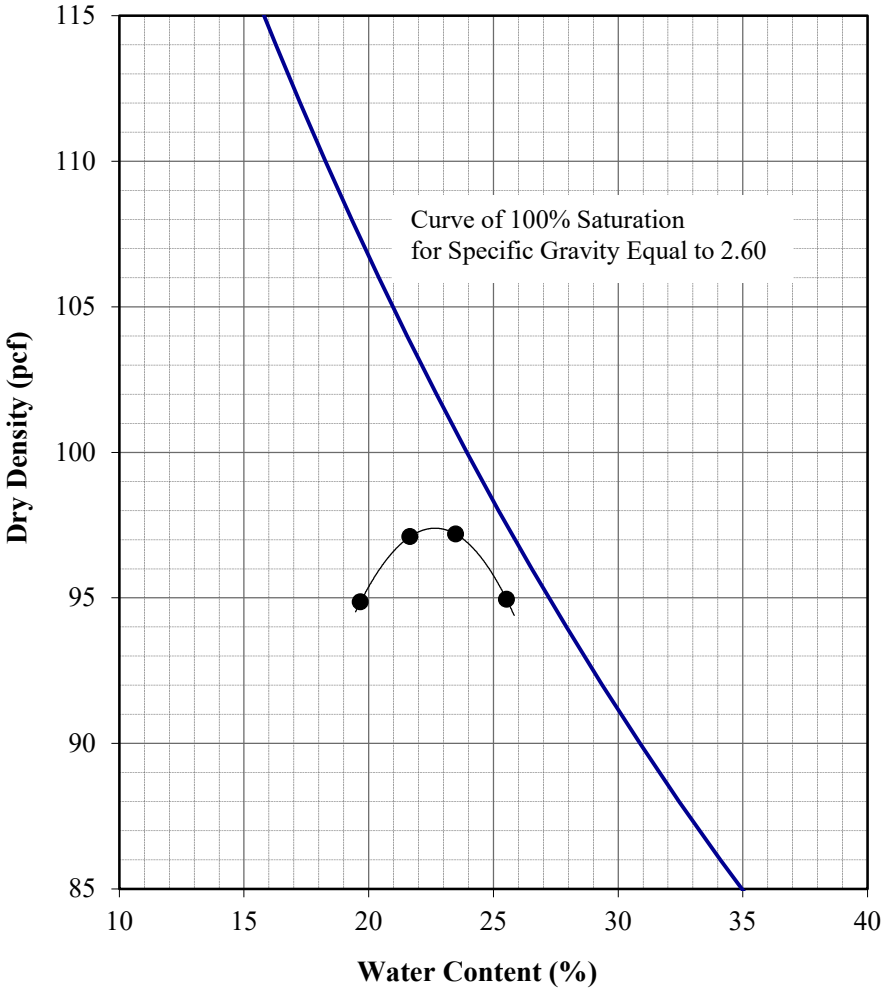
Tel: (512) 387-1287

Moisture-Density Compaction Test (Standard Proctor - ASTM D698)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-4 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: C.M.



Method Used: A
Preparation Method Used: Air Dry
% Fractions Retained: 0.1%
Rammer: Mechanical
Calibrated On: 06/05/24

Water Content (%)	Dry Density (pcf)
23.5	97.2
25.5	94.9
21.6	97.1
19.7	94.9

% Passing #200	87.1
Liquid Limit	43
Plasticity Index	26
USCS	CL

Material Description: Dark brown clay

Laboratory Compacted Samples	
Maximum Dry Density, $\gamma_{d,max}$ (pcf)	**97.4**
Optimum Water Content, w_{opt} (%)	**22.8**

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

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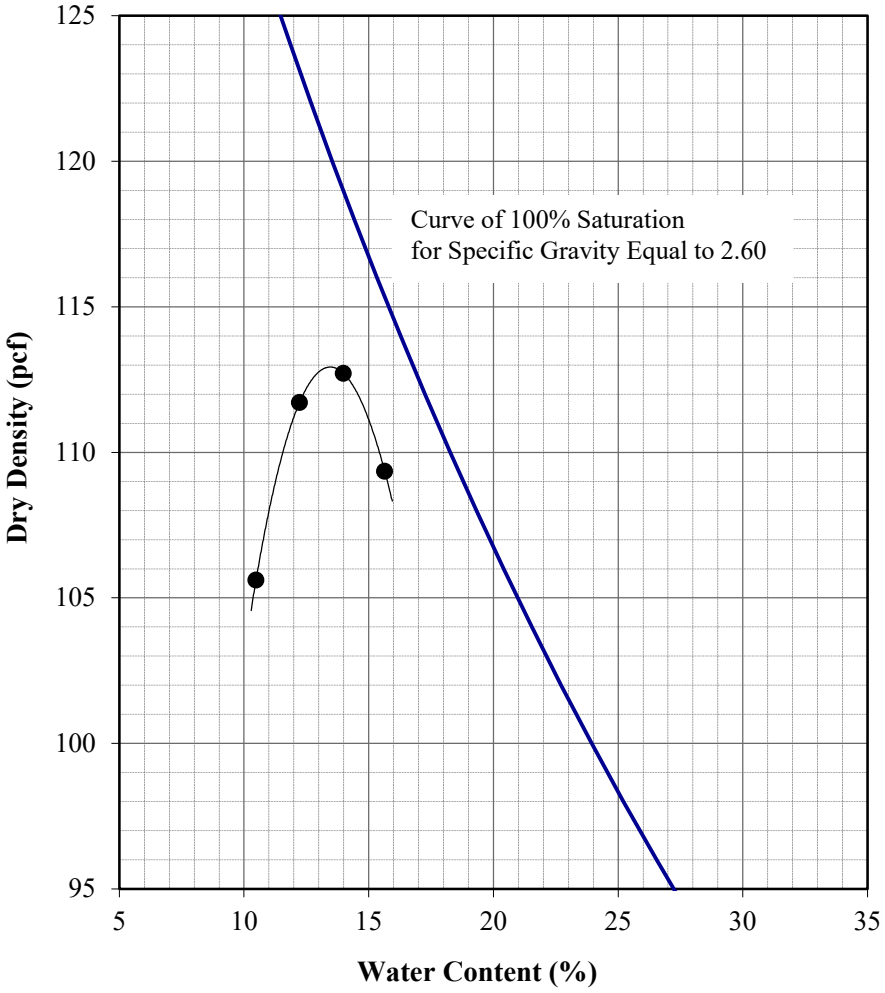
Tel: (512) 387-1287

Moisture-Density Compaction Test (Standard Proctor - ASTM D698)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: Bulk-5 (0-4 ft)

Alpine Project No.: 2501017
Test Date: 02/26/25
Tested By: C.M.



Method Used: A
Preparation Method Used: Air Dry
% Fractions Retained: 0.3%
Rammer: Mechanical
Calibrated On: 06/05/24

Water Content (%)	Dry Density (pcf)
12.2	111.7
14.0	112.7
15.6	109.3
10.5	105.6

% Passing #200	62.5
Liquid Limit	25
Plasticity Index	12
USCS	CL

Material Description: Dark brown sandy clay

Laboratory Compacted Samples	
Maximum Dry Density, $\gamma_{d,max}$ (pcf)	**112.9**
Optimum Water Content, w_{opt} (%)	**13.6**

Cheng-Wei Chen, Ph.D. 03/02/25
Reviewed By / Date

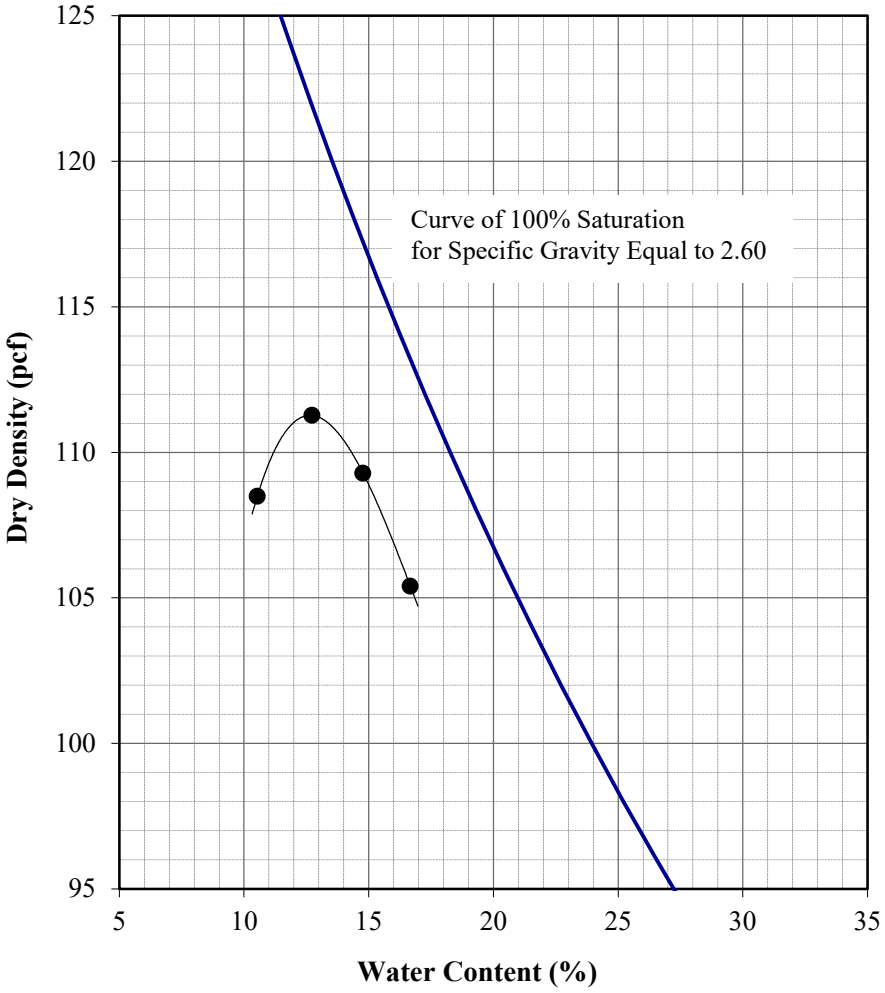
The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Moisture-Density Compaction Test (Standard Proctor - ASTM D698)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)
Sample ID: TP-26, Bulk #2 (0-2 ft)

Alpine Project No.: 2501017
Test Date: 05/30/25
Tested By: C.M.



Method Used: A
Preparation Method Used: Air Dry
% Fractions Retained: 0.3%
Rammer: Mechanical
Calibrated On: 06/05/24

Water Content (%)	Dry Density (pcf)
14.8	109.3
16.7	105.4
12.7	111.3
10.5	108.5

% Passing #200	26.4
Liquid Limit	- -
Plasticity Index	- -
USCS	- -

Material Description: Brown silty sand

Laboratory Compacted Samples	
Maximum Dry Density, $\gamma_{d,max}$ (pcf)	**111.3**
Optimum Water Content, w_{opt} (%)	**12.8**

Cheng-Wei Chen, Ph.D. 06/04/25
Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

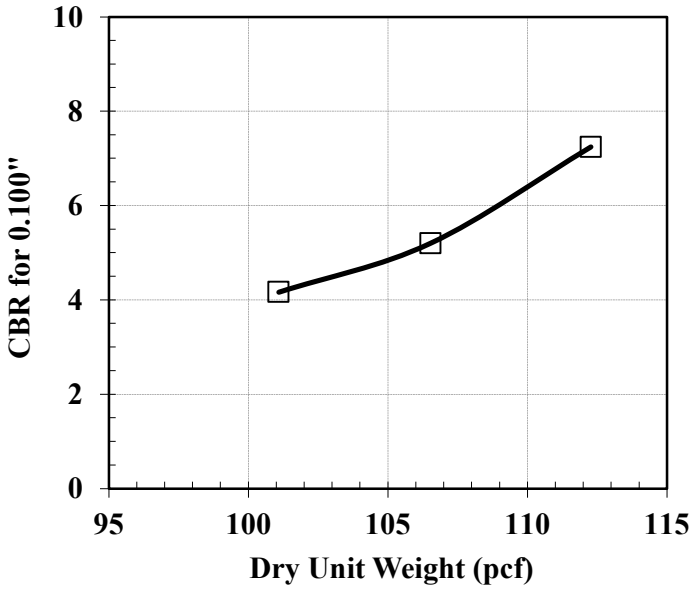
CBR (California Bearing Ratio) Test (ASTM D1883)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: Bulk-1 (0-4 ft)

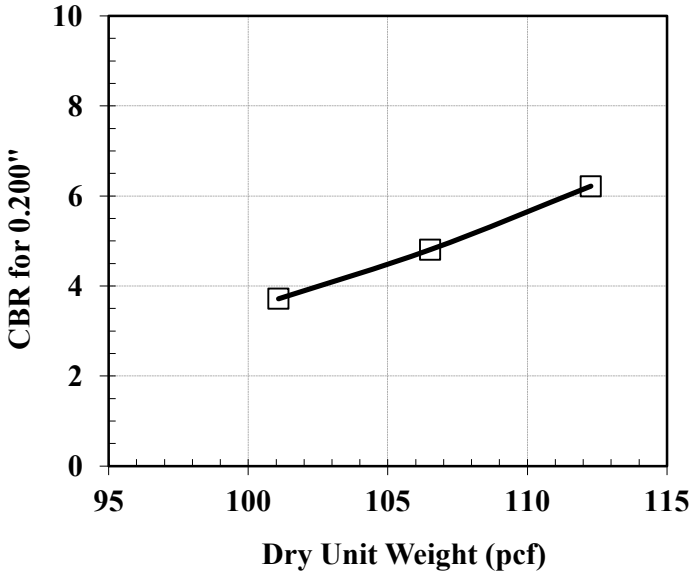
Alpine Project No.: 2501017
Test Date: 03/09/25
Tested By: C.M.

Rate of Penetration: 0.05 in/min

CBR for 0.100-inch Penetration



CBR for 0.200-inch Penetration



Initial Conditions			
Specimen No.	1	2	3
Target Dry Unit Weight (pcf)	101.2	106.8	112.4
Condition of Sample	Soaked		
Surcharge Weight (lbs)	10	10	10
Water Content (%)	14.2	14.1	14.1
Dry Unit Weight (pcf)	101.1	106.5	112.3

Final Conditions			
Water Content (%) at top 1-inch layer after soaking	24.0	22.7	21.5
Swell (% of initial height)	2.3	2.6	2.7
Bearing Ratio of Specimen at 0.100 in penetration	4.2	5.2	7.2
Bearing Ratio of Specimen at 0.200 in penetration	3.7	4.8	6.2

Note: Soil specimens were remolded to target unit weights of 90%, 95%, and 100% compaction at optimum water content (ASTM D698) per sample: Bulk-2 (0-4 ft). The 10 lbs surcharge load was placed during bearing test. It was allowed the specimens to soak for 96 hrs prior to bearing test. Prior to bearing test, removed the free water and allow the specimens to drain out for at least 15 minutes.

Cheng-Wei Chen, Ph.D. 03/14/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

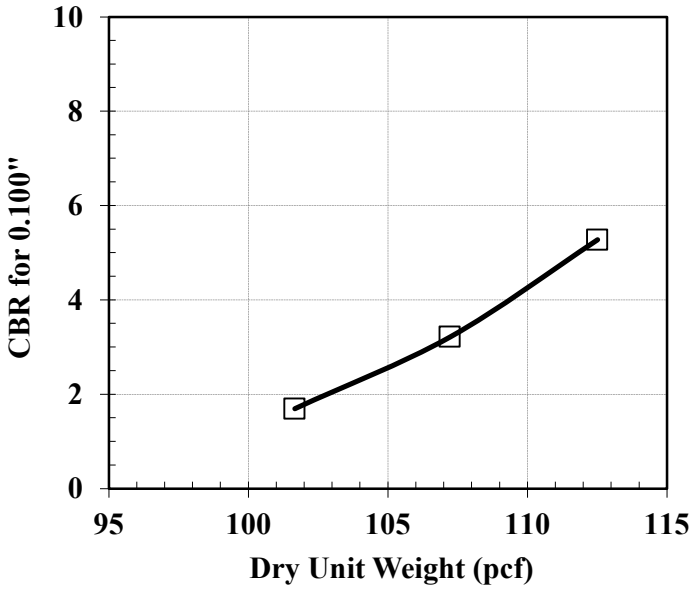
CBR (California Bearing Ratio) Test (ASTM D1883)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: Bulk-3 (0-4 ft)

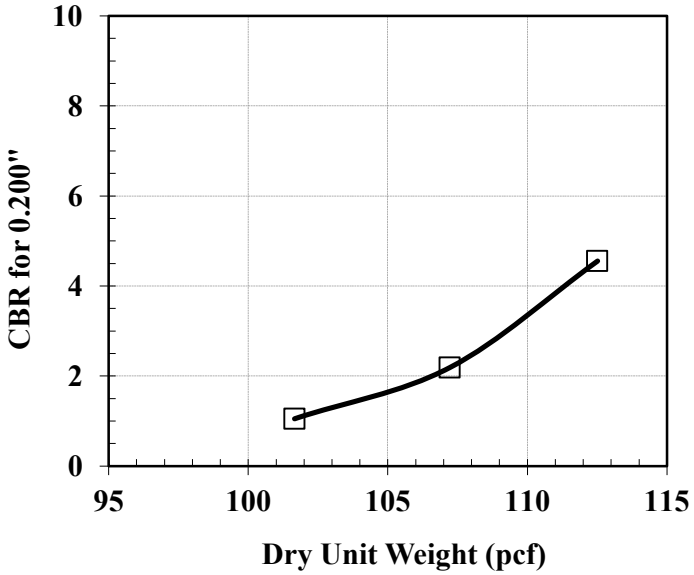
Alpine Project No.: 2501017
Test Date: 03/09/25
Tested By: C.M.

Rate of Penetration: 0.05 in/min

CBR for 0.100-inch Penetration



CBR for 0.200-inch Penetration



Initial Conditions			
Specimen No.	1	2	3
Target Dry Unit Weight (pcf)	101.6	107.3	112.9
Condition of Sample	Soaked		
Surcharge Weight (lbs)	10	10	10
Water Content (%)	13.5	13.5	13.6
Dry Unit Weight (pcf)	101.7	107.2	112.5

Final Conditions			
Water Content (%) at top 1-inch layer after soaking	18.6	15.8	14.7
Swell (% of initial height)	0.2	0.2	0.2
Bearing Ratio of Specimen at 0.100 in penetration	1.7	3.2	5.3
Bearing Ratio of Specimen at 0.200 in penetration	1.1	2.2	4.6

Note: Soil specimens were remolded to target unit weights of 90%, 95%, and 100% compaction at optimum water content (ASTM D698) per sample: Bulk-2 (0-4 ft). The 10 lbs surcharge load was placed during bearing test. It was allowed the specimens to soak for 96 hrs prior to bearing test. Prior to bearing test, removed the free water and allow the specimens to drain out for at least 15 minutes.

Cheng-Wei Chen, Ph.D. 03/14/25

Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

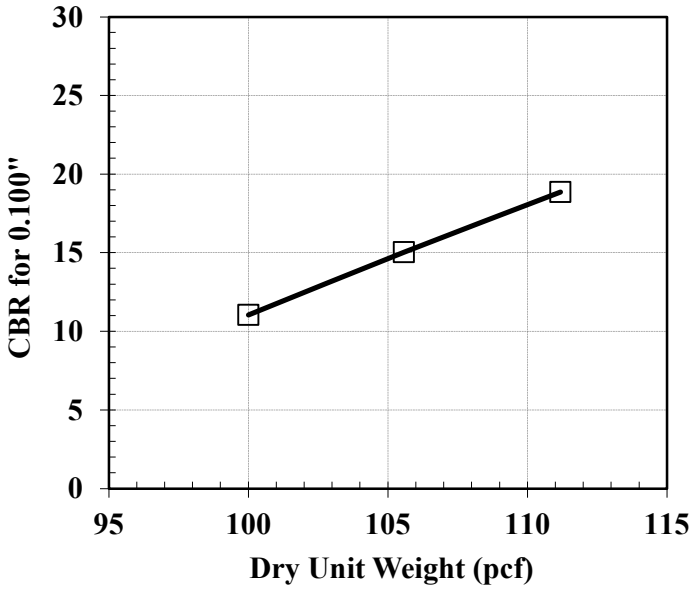
CBR (California Bearing Ratio) Test (ASTM D1883)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-26, Bulk #1 (0-2 ft)

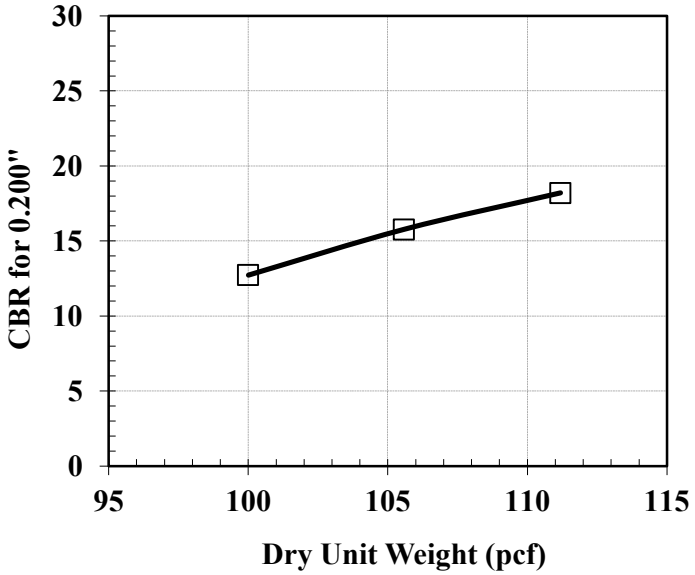
Alpine Project No.: 2501017
Test Date: 06/13/25
Tested By: C.M.

Rate of Penetration: 0.05 in/min

CBR for 0.100-inch Penetration



CBR for 0.200-inch Penetration



Initial Conditions			
Specimen No.	1	2	3
Target Dry Unit Weight (pcf)	100.2	105.7	111.3
Condition of Sample	Soaked		
Surcharge Weight (lbs)	10	10	10
Water Content (%)	12.9	12.8	12.9
Dry Unit Weight (pcf)	100.0	105.6	111.2

Final Conditions			
Water Content (%) at top 1-inch layer after soaking	16.9	16.3	15.7
Swell (% of initial height)	-0.5	-0.3	-0.2
Bearing Ratio of Specimen at 0.100 in penetration	11.0	15.0	18.8
Bearing Ratio of Specimen at 0.200 in penetration	12.7	15.8	18.2

Note: Soil specimens were remolded to target unit weights of 90%, 95%, and 100% compaction at optimum water content (ASTM D698) per sample: TP-26, Bulk #2 (0-2 ft). The 10 lbs surcharge load was placed during bearing test. It was allowed the specimens to soak for 96 hrs prior to bearing test. Prior to bearing test, removed the free water and allow the specimens to drain out for at least 15 minutes.

Material Description: Brown silty sand

Cheng-Wei Chen, Ph.D. 06/20/25

Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M.

Soil Samples & Testing Summary

No.	*Boring*	*Depth*	*Max. Dry Density*	*ASTM D698*		*LL*	*PL*	*PI*	*USGS*
				Optimum WC	*Minus 200 Sieve*				
		ft	*pcf*	*%*	*%*				
1	Bulk-2	0-4	112.4	14.2	63.9	27	13	14	Sandy lean clay (CL)
2	Bulk-4	0-4	97.4	22.8	87.1	43	17	26	Lean clay (CL)
3	Bulk-5	0-4	112.9	13.6	62.5	25	13	12	Sandy lean clay (CL)

Cheng-Wei Chen, Ph.D. 03/13/25
Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M.

"Remolded" Soil Thermal Resistivity Testing Summary

No.	*Boring*	*Depth*	*Remolded Water Content*	*Remolded Dry Unit Weight*	*Thermal Resistivity at **Wet** (ASTM D5334)*	*Thermal Resistivity at **Dry** (ASTM D5334)*
		ft	*%*	*pcf*	*°C-cm/W*	*°C-cm/W*
1[(2)]	TP-3 (G-1)	0-2	20.6	82.6	91.3	240.2
2[(3)]	TP-6 (G-1)	0-2	11.7	96.1	78.5	206.3
3[(3)]	TP-7 (G-1)	0-2	11.6	96.5	86.2	215.0
4[(1)]	TP-11 (G-1)	0-2	12.3	95.6	74.9	199.5
5[(1)]	TP-13 (G-1)	0-2	12.1	95.3	92.7	219.2
6[(1)]	TP-14 (G-1)	0-2	12.1	95.2	83.4	235.2
7[(2)]	TP-16 (G-2)	2-4	20.6	82.8	97.9	274.4
8[(2)]	TP-18 (G-2)	2-4	20.7	80.8	111.3	249.4
9[(1)]	TP-20 (G-1)	0-2	12.1	95.3	113.2	222.5

Note 1: Testing specimen remolded to 85% of maximum dry unit weight at -2% below optimum water content per the request by the client.

[(1)]: Use Proctor results of Bulk #2 (0-4 ft), [(2)]: Use Proctor results of Bulk #4 (0-4 ft), [(3)]: Use Proctor results of Bulk #5 (0-4 ft)

Cheng-Wei Chen, Ph.D. 03/13/25
Reviewed By / Date

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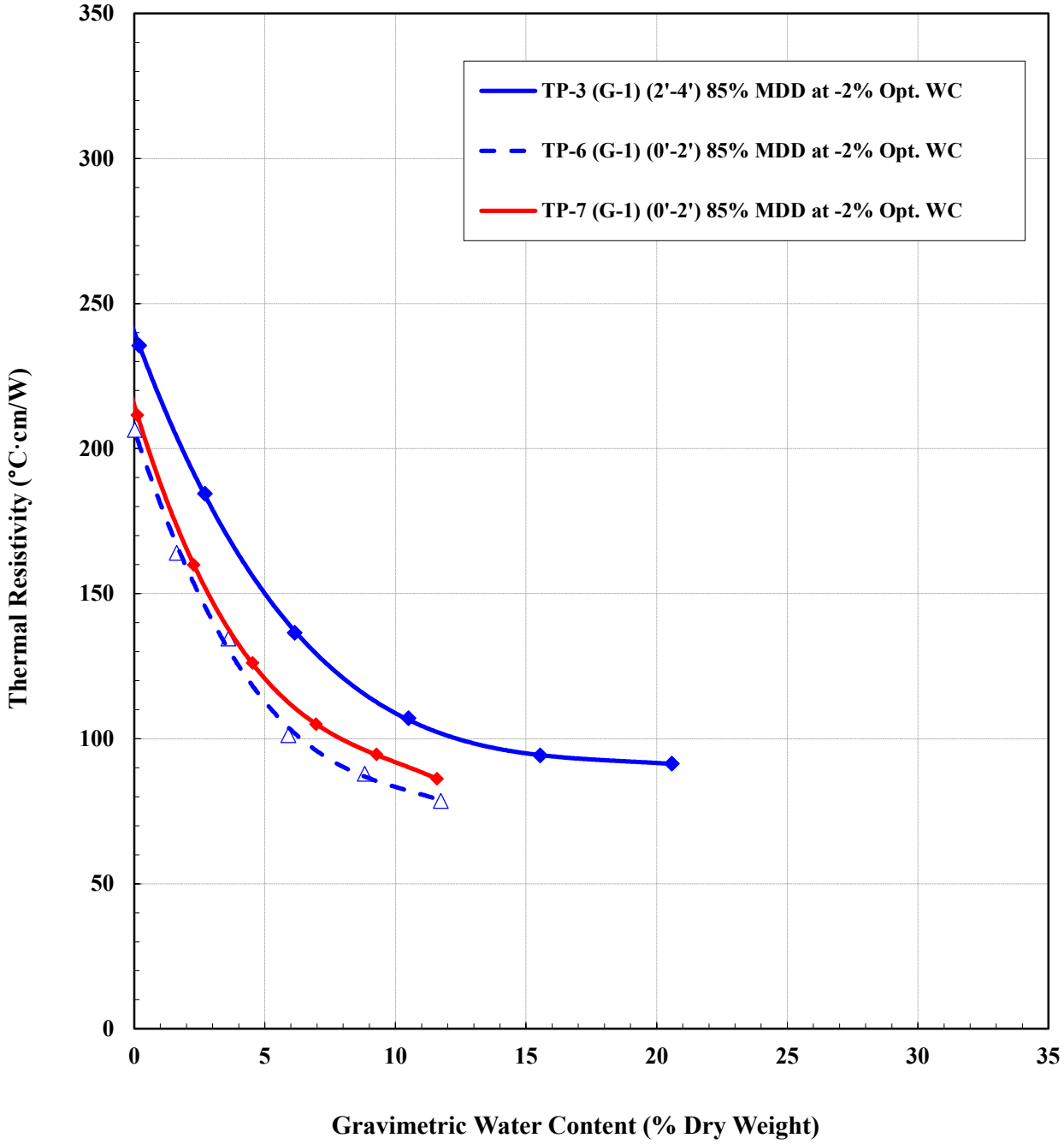
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



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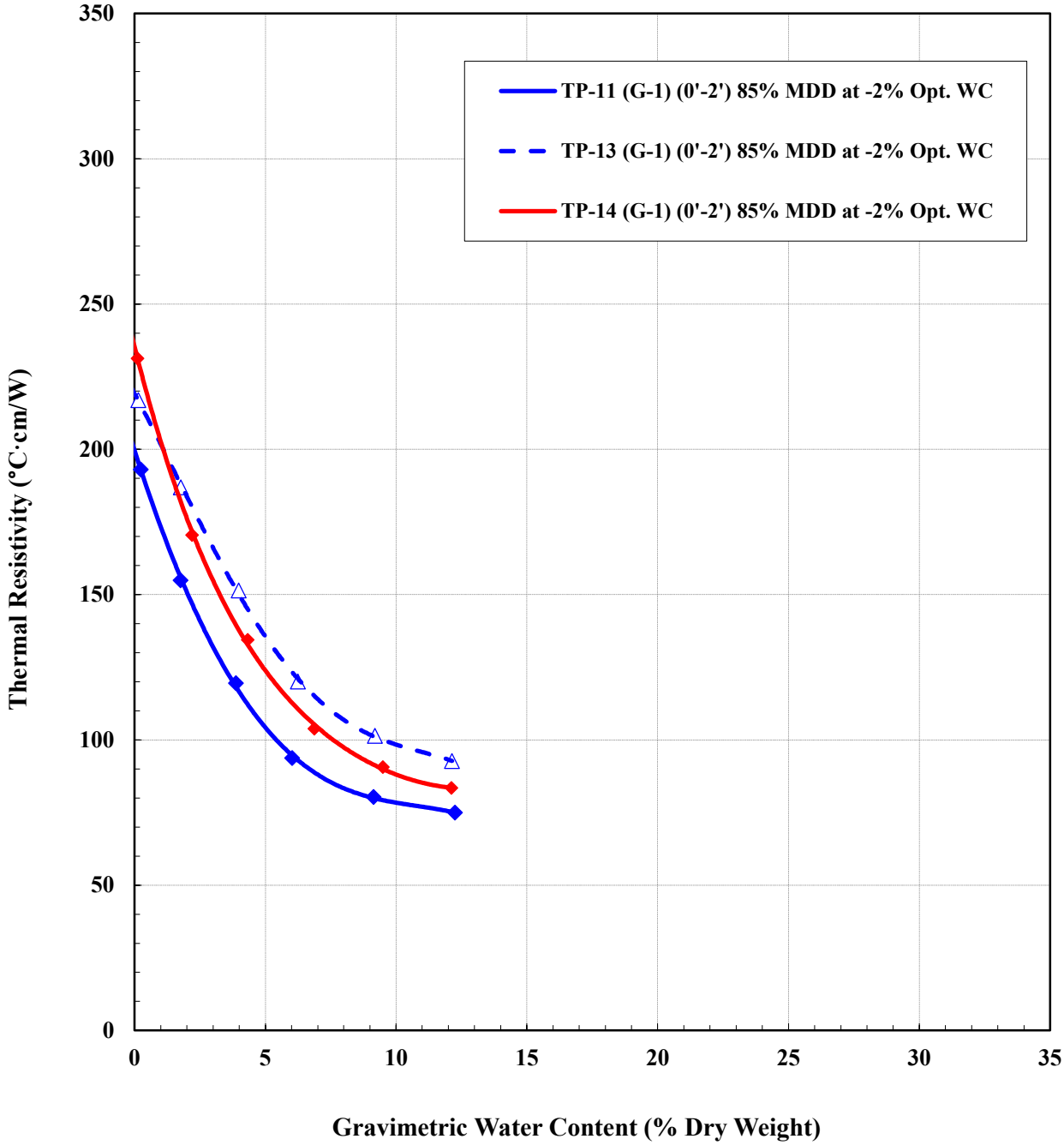
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



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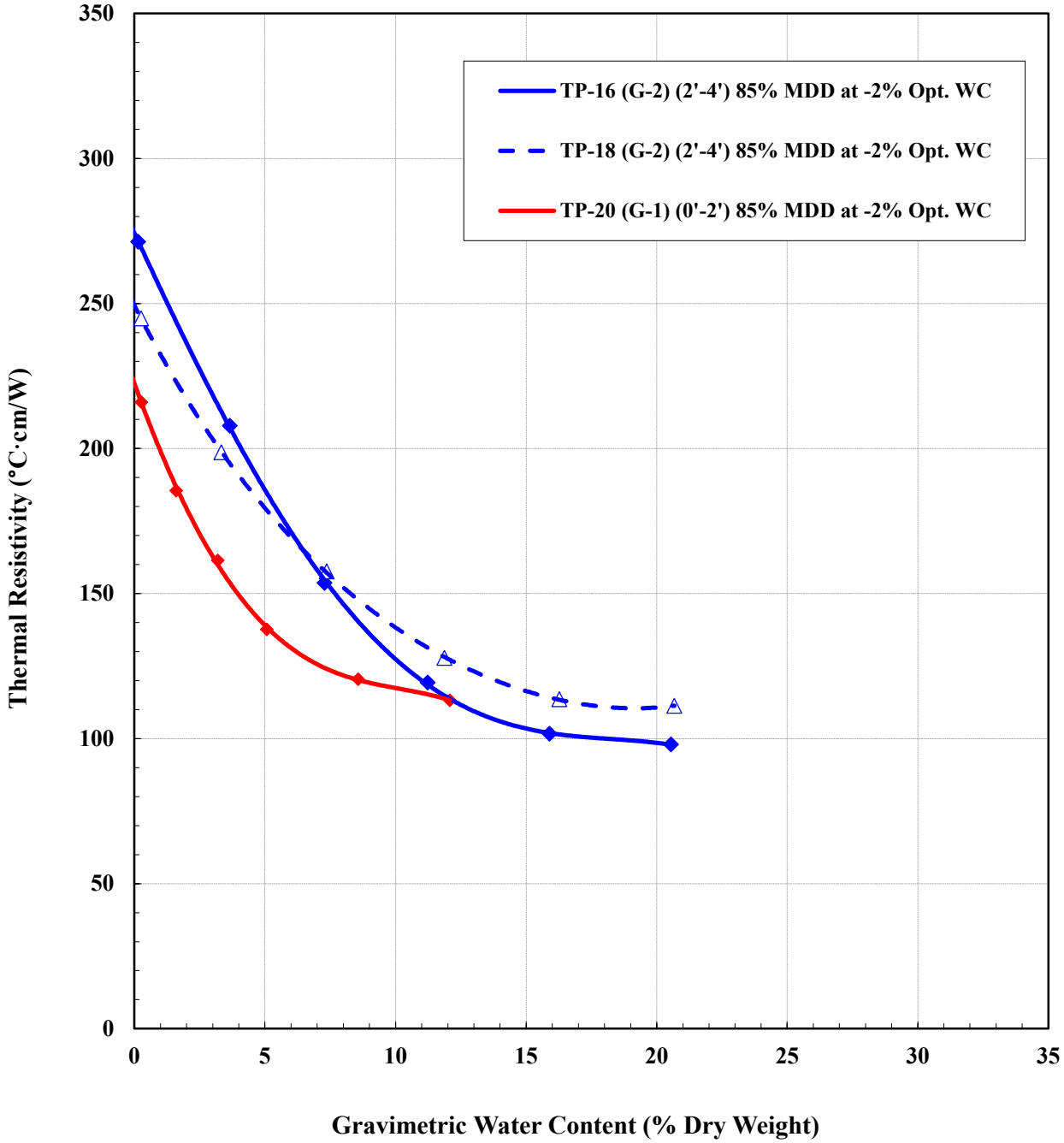
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 03/06/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme (PN: 520102301)

Alpine Project No.: 2501017
Test Date: 06/13/25
Tested By: C.M.

Soil Samples & Testing Summary

No.	Boring	Depth	ASTM D698		Minus 200 Sieve	LL	PL	PI	USGS
			Max. Dry Density	Optimum WC					
		ft	pcf	%	%				
1	Bulk-4	0-4	97.4	22.8	87.1	43	17	26	Dark brown Lean clay (CL)
2	Bulk-5	0-4	112.9	13.6	62.5	25	13	12	Dark brown sandy lean clay (CL)
3	TP-26, Bulk #2	0-2	111.3	12.8	26.4	- -	- -	- -	Brown silty sand

"Remolded" Soil Thermal Resistivity Testing Summary

No.	Boring	Depth	Remolded Water Content	Remolded Dry Unit Weight	Thermal Resistivity at ***Wet*** (ASTM D5334)	Thermal Resistivity at ***Dry*** (ASTM D5334)
		ft	%	pcf	°C-cm/W	°C-cm/W
1[(2)]	TP-23, G-2	2-4	20.9	82.8	103.4	272.1
2[(3)]	TP-25 (G-2)	2-4	11.7	95.9	97.3	255.8
3[(4)]	TP-26, Bulk #2	0-2	11.0	94.6	91.4	278.3

Note: Testing specimen remolded to 85% of maximum dry unit weight at -2% below optimum water content per the request by the client. [(1)]: Use Proctor results of Bulk-4 (0-4 ft), [(2)]: Use Proctor results of Bulk-5 (0-4 ft), [(3)]: Use Proctor results of TP-26 Bulk #2 (0-2 ft)

Cheng-Wei Chen, Ph.D. 06/21/25
Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Services, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

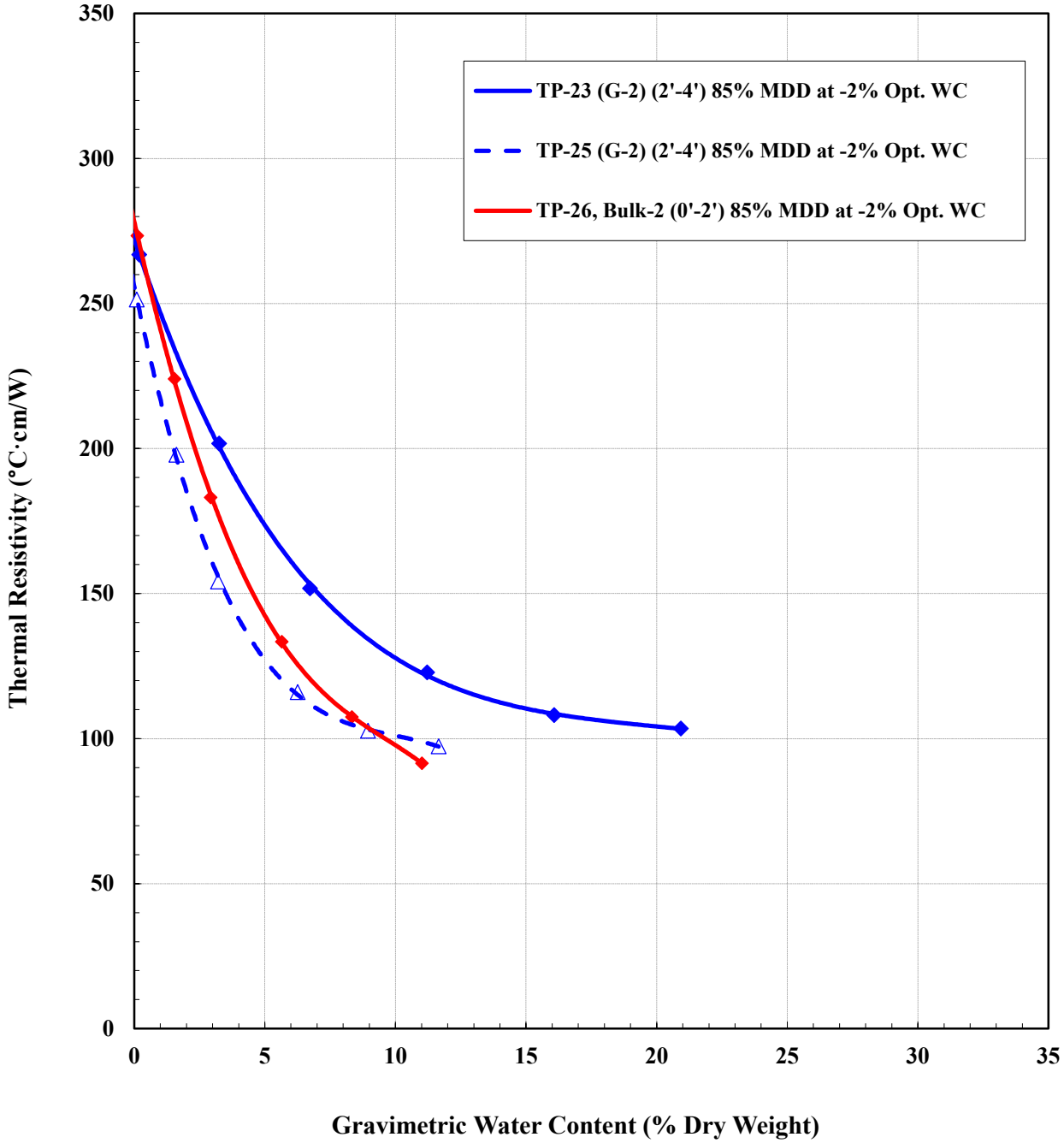
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Soil and Soft Rock Thermal Resistivity Test (ASTM D5334)

Client: Langan Engineering
Project Name: RRCE - Chisme
(PN: 520102301)

Alpine Project No.: 2501017
Test Date: 06/13/25
Tested By: C.M.

Soil Thermal Resistivity Testing Dryout Curves



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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Determining Stabilization Ability of Lime by Soil pH (Tex-121-E: Part III)

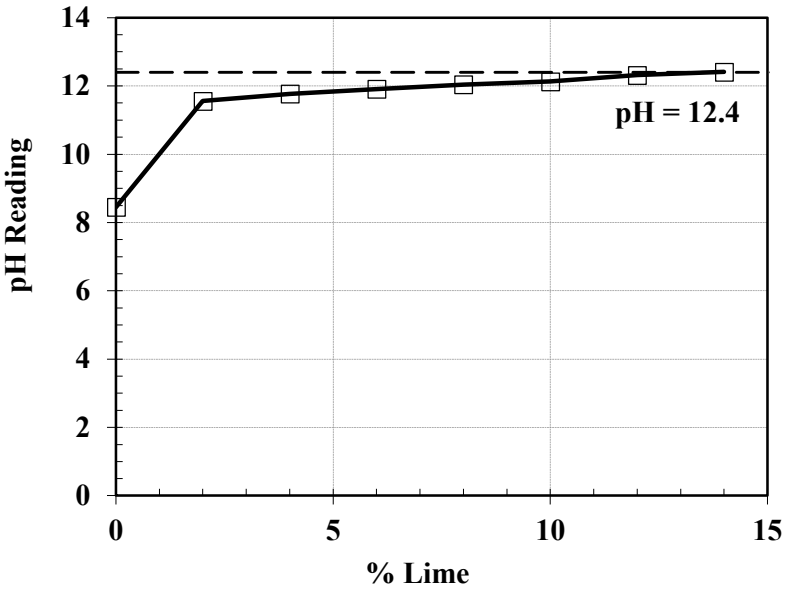
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-23 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 06/09/25
Tested By: T.D.

Brand Name: Lhoist
High Calcium Hydrated Lime
New Braunfels, TX

pH Meter: AE-224, pHep 5, HI98128
Serial No.: 5050150101
Calibrated Date: 06/09/25

Percent Lime	pH Value	Temp. (°C)
0%	8.45	27.2
2%	11.56	27.1
4%	11.77	27.4
6%	11.91	26.8
8%	12.04	25.6
10%	12.13	25.9
12%	12.32	25.2
14%	12.41	25.0



Cheng-Wei Chen, Ph.D. 06/11/25
Reviewed By / Date

The testing was performed in accordance with applicable industry standard. The results provided in this report do not constitute a professional opinion by Alpine Engineering Service, LLC (Alpine). This report may be used only by the Client and the registered design professional in charge.

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Determining Stabilization Ability of Lime by Soil pH (Tex-121-E: Part III)

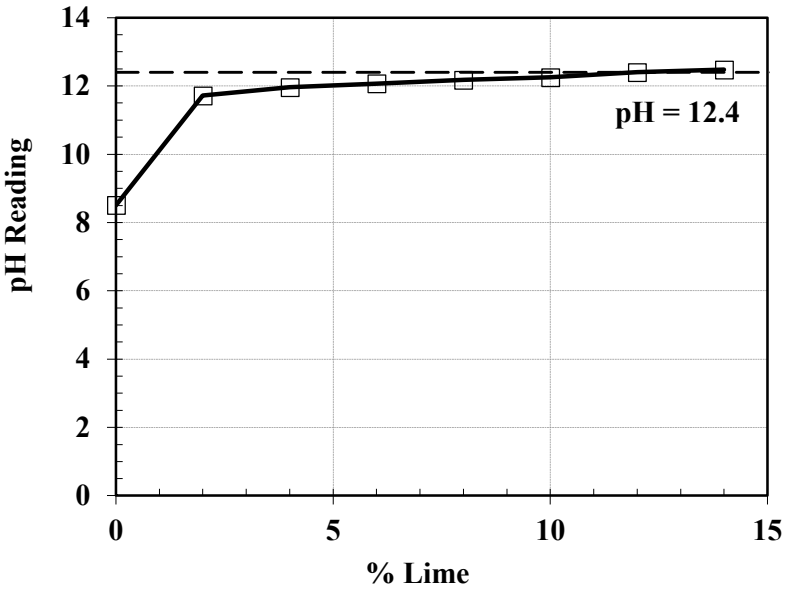
Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: TP-25 (G-1) (0-2 ft)

Alpine Project No.: 2501017
Test Date: 06/09/25
Tested By: T.D.

Brand Name: Lhoist
High Calcium Hydrated Lime
New Braunfels, TX

pH Meter: AE-224, pHep 5, HI98128
Serial No.: 5050150101
Calibrated Date: 06/09/25

Percent Lime	pH Value	Temp. (°C)
0%	8.51	27.7
2%	11.72	27.4
4%	11.96	27.5
6%	12.07	26.6
8%	12.18	25.8
10%	12.25	25.3
12%	12.40	24.4
14%	12.48	24.2



Cheng-Wei Chen, Ph.D. 06/11/25
Reviewed By / Date

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ATTACHMENT F-2

Roadway Laboratory Test Results

Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering

Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017

Test Date: 05/28/25

Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
1	PH-1 (G-1)	0-0.75	7.6	80.9	37.1	34	13	21	Clayey sand w/ gravel (SC)
2	PH-2 (G-1)	0-0.45	3.5	51.3	28.6	- -	- -	- -	- -
3	PH-2 (G-2)	0.45-1.5	13.1	97.5	78.1	43	16	27	Lean clay w/ sand (CL)
4	PH-2 (G-3)	1.5-2.5	13.3	92.1	75.1	41	15	26	Lean clay w/ sand (CL)
5	RW-01 (G-2)	1-2	5.9	95.3	10.8	NL	NP	NP	Poorly graded sand w/ silt (SP-SM)
6	RW-02 (G-1)	0-1	8.7	96.8	48.3	31	12	19	Clayey sand (SC)
7	RW-03 (G-1)	0-1	2.1	97.5	23.1	NL	NP	NP	Silty sand (SM)
8	RW-04 (G-2)	1-2	4.4	97.4	39.2	20	12	8	Clayey sand (SC)
9	RW-05 (G-1)	0-0.5	2.5	51.1	17.3	- -	- -	- -	- -
10	RW-05 (G-2)	0.5-1	6.0	99.5	36.7	19	13	6	Silty, clayey sand (SC-SM)
11	RW-06 (G-3)	2-2.75	12.9	99.7	72.1	35	14	21	Lean clay w/ sand (CL)
12	RW-07 (G-3)	2-2.5	11.3	96.4	64.3	39	14	25	Sandy lean clay (CL)
13	RW-08 (G-2)	0.25-1	4.7	91.4	61.5	- -	- -	- -	- -
14	RW-08 (G-3)	1-2	7.4	96.3	75.0	32	15	17	Lean clay w/ sand (CL)
15	RW-09 (G-2)	0.17-1	7.2	95.3	56.7	29	13	16	Sandy lean clay (CL)
16	RW-10 (G-2)	0.17-1	4.8	88.2	42.5	25	12	13	Clayey sand (SC)
17	RW-11 (G-1)	0-0.083	3.5	79.1	27.0	- -	- -	- -	- -
18	RW-11 (G-2)	0.083-0.75	0.5	64.6	8.7	- -	- -	- -	- -
19	RW-12 (G-1)	0-0.5	1.5	68.2	26.9	- -	- -	- -	- -
20	RW-12 (G-3)	0.17-1	2.4	55.4	17.4	- -	- -	- -	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 06/14/25

Reviewed By / Date

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Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Water Content, P-200. & Atterberg Limits (ASTM D2216, D1140, & D4318)

Client: Langan Engineering

Project Name: RRCE Chisme (PN: 520102301)

Alpine Project No.: 2501017

Test Date: 05/28/25

Tested By: T.D., T.V., & O.V.

No.	Boring No.	Depth (ft)	WC (%)	No. 4 Sieve[1]	Fines (%)[2]	LL	PL	PI	USCS Classification
21	RW-13 (G-1)	0-1	1.4	72.8	24.8	- -	- -	- -	- -
22	RW-14 (G-1)	0-0.58	3.6	83.4	41.4	- -	- -	- -	- -
23	RW-14 (G-2)	0.58-1	7.4	96.8	60.9	31	13	18	Sandy lean clay (CL)
24	RW-15 (G-1)	0-1.33	4.8	97.1	34.1	24	12	12	Clayey sand (SC)
25	RW-16 (G-1)	0-0.5	0.4	37.0	9.7	- -	- -	- -	- -
26	RW-16 (G-2)	0.5-1	3.9	76.2	30.4	20	14	6	Silty, clayey sand w/ gravel (SC-SM)
27	RW-17 (G-2)	0.08-0.7	4.3	65.5	24.7	- -	- -	- -	- -
28	RW-18 (G-2)	0.5-1	9.6	85.7	55.3	37	14	23	Sandy lean clay (CL)
29	RW-19 (G-2)	0.25-1	3.4	86.6	35.1	19	13	6	Silty, clayey sand (SC-SM)
30	RW-20 (G-1)	0-0.25	1.6	69.0	21.8	- -	- -	- -	- -
31	RW-20 (G-2)	0.25-0.75	0.6	45.9	15.4	- -	- -	- -	- -

[1] Percent passing No. 4 sieve per ASTM D6913.

[2] Percent passing No. 200 sieve per ASTM D1140.

Note: Soil was air dried, 3-point Liquid Limit procedure used. NL = No Liquid Limit, NP = No Plastic Limit.

Cheng-Wei Chen, Ph.D., 06/14/25

Reviewed By / Date

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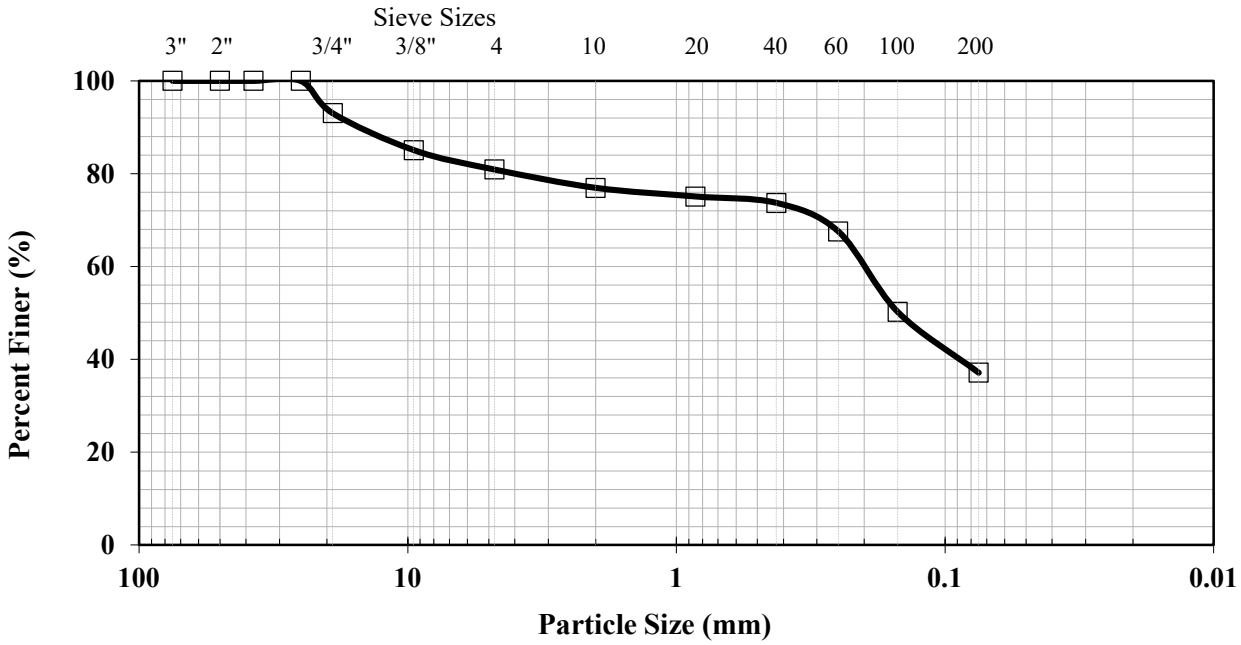
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: PH-1 (G-1) (0-0.75 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	93.0
3/8 in.	85.1
No. 4 (4.75 mm)	80.9
No. 10 (2.0 mm)	76.9
No. 20 (850 µm)	75.1
No. 40 (425 µm)	73.7
No. 60 (250 µm)	67.5
No. 100 (150 µm)	50.2
No. 200 (75 µm)	37.1

Note: Soil classifies as clayey sand with gravel (SC) in accordance with ASTM D2487,

The as received moisture content was 7.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	34
Plastic Limit	13
Plastic Index	21
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.206
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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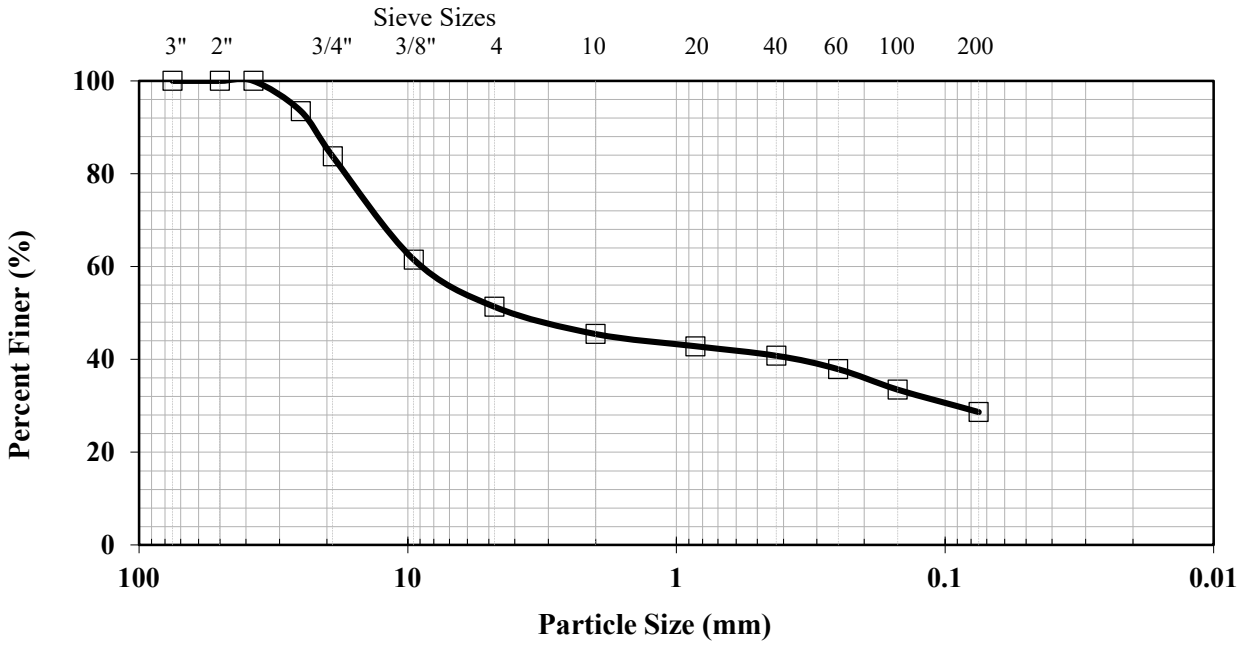
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: PH-2 (G-1) (0-0.45 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	93.5
3/4 in.	83.7
3/8 in.	61.5
No. 4 (4.75 mm)	51.3
No. 10 (2.0 mm)	45.5
No. 20 (850 µm)	42.8
No. 40 (425 µm)	40.8
No. 60 (250 µm)	37.9
No. 100 (150 µm)	33.5
No. 200 (75 µm)	28.6

Note: The as received moisture content was 3.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	8.812
D30 (mm)	0.096
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/10/25
Reviewed By / Date

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105 Tradesmen Drive, Suite B
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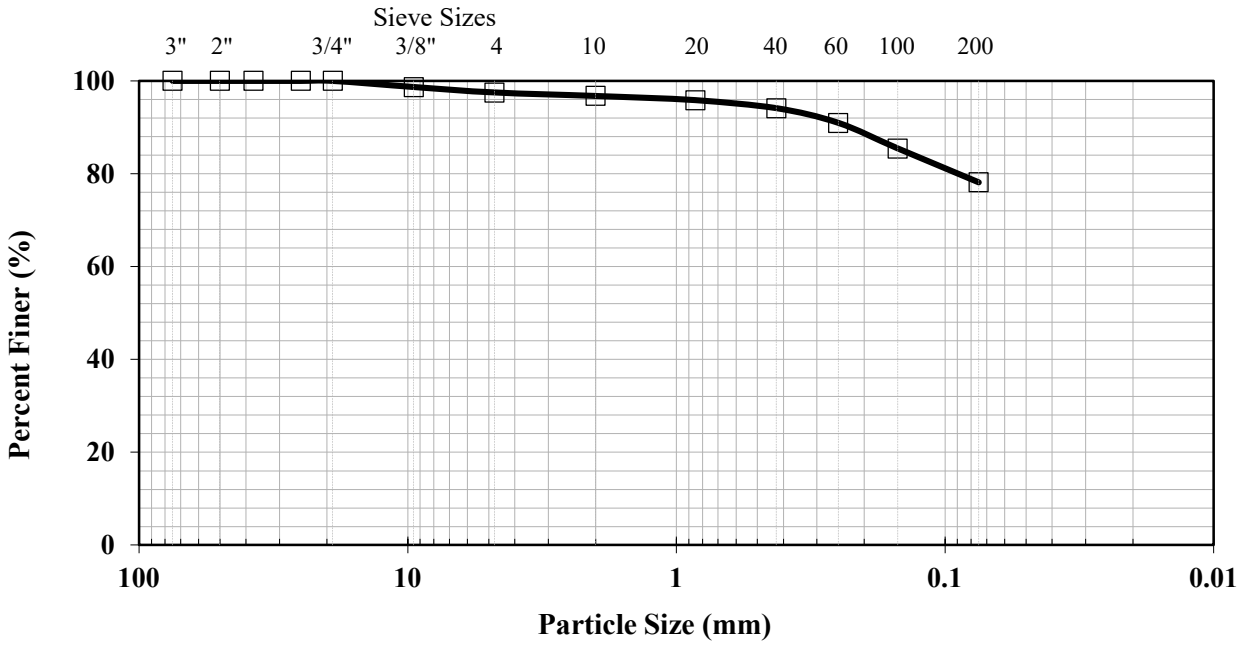
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: PH-2 (G-2) (0.45-1.5 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.6
No. 4 (4.75 mm)	97.5
No. 10 (2.0 mm)	96.7
No. 20 (850 µm)	95.8
No. 40 (425 µm)	94.1
No. 60 (250 µm)	90.9
No. 100 (150 µm)	85.4
No. 200 (75 µm)	78.1

Note: Soil classifies as lean clay with sand (CL) in accordance with ASTM D2487,

The as received moisture content was 13.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	43
Plastic Limit	16
Plastic Index	27
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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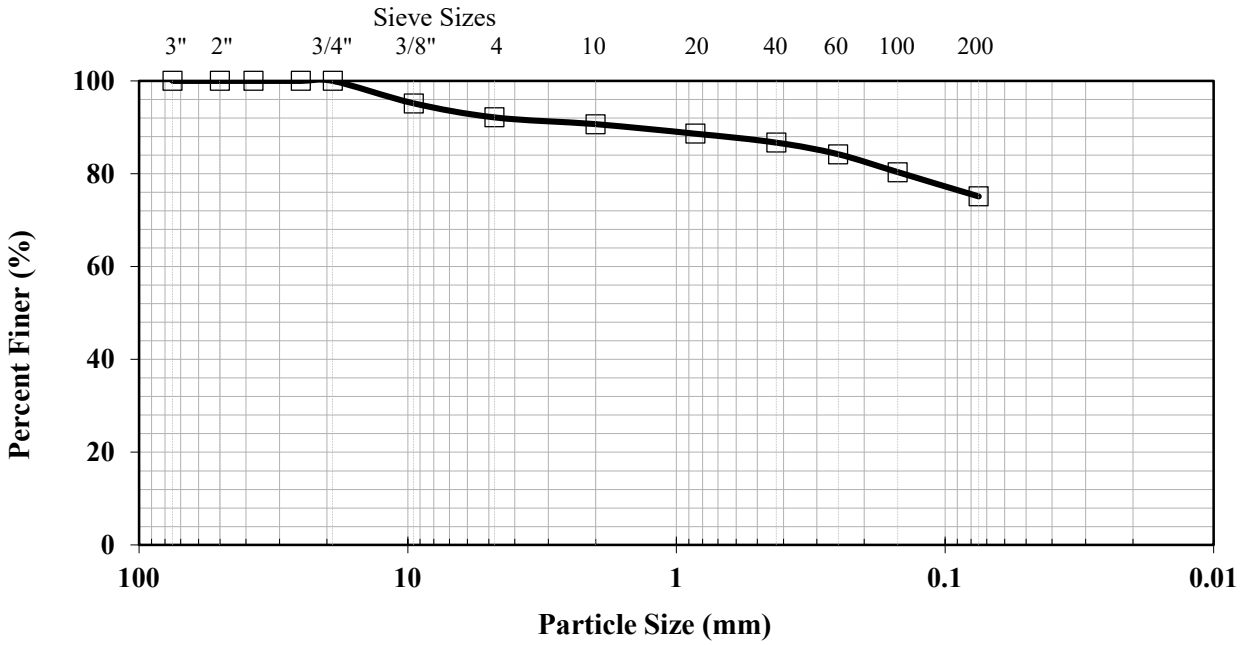
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: PH-2 (G-3) (1.5-2.5 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	95.1
No. 4 (4.75 mm)	92.1
No. 10 (2.0 mm)	90.6
No. 20 (850 µm)	88.6
No. 40 (425 µm)	86.7
No. 60 (250 µm)	84.2
No. 100 (150 µm)	80.3
No. 200 (75 µm)	75.1

Note: Soil classifies as lean clay with sand (CL) in accordance with ASTM D2487,

The as received moisture content was 13.3 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	41
Plastic Limit	15
Plastic Index	26
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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105 Tradesmen Drive, Suite B
Hutto, TX 78634
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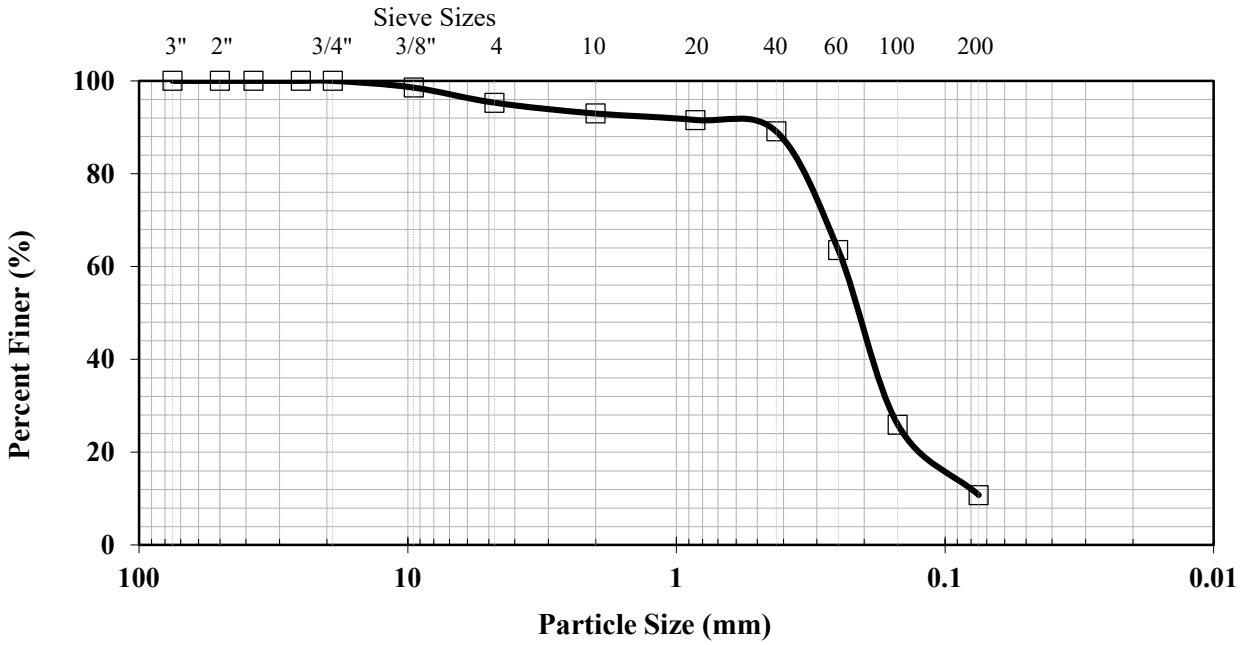
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-01 (G-2) (1-2 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.5
No. 4 (4.75 mm)	95.3
No. 10 (2.0 mm)	93.0
No. 20 (850 µm)	91.5
No. 40 (425 µm)	89.1
No. 60 (250 µm)	63.6
No. 100 (150 µm)	25.9
No. 200 (75 µm)	10.8

Note: Soil classifies as poorly graded sand with silt (SP-SM) in accordance with ASTM D2487,

The as received moisture content was 5.9 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	NL
Plastic Limit	NP
Plastic Index	NP
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.241
D30 (mm)	0.161
D10 (mm)	0.071

Coeff. of Uniformity, Cu : 3.38
Coeff. of Curvature, Cc : 1.51

Cheng-Wei Chen, Ph.D. 06/11/25
Reviewed By / Date

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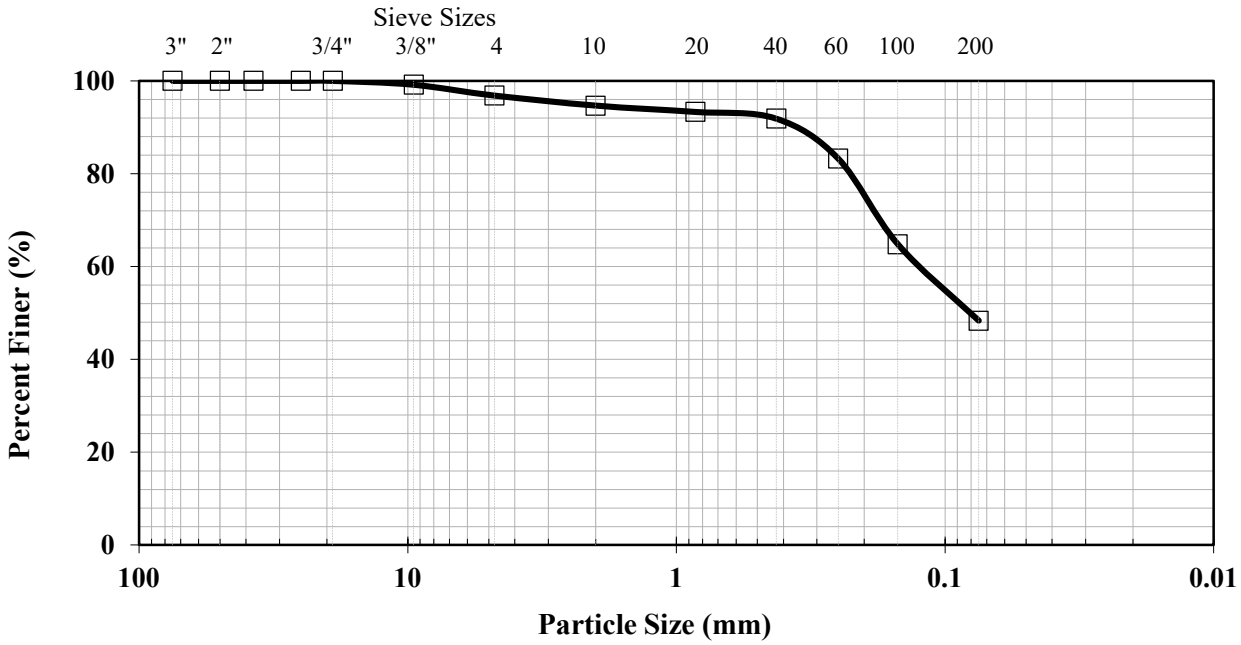
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-02 (G-1) (0-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	99.1
No. 4 (4.75 mm)	96.8
No. 10 (2.0 mm)	94.6
No. 20 (850 µm)	93.3
No. 40 (425 µm)	91.9
No. 60 (250 µm)	83.2
No. 100 (150 µm)	64.8
No. 200 (75 µm)	48.3

Note: Soil classifies as clayey sand (SC) in accordance with ASTM D2487,

The as received moisture content was 8.7 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	31
Plastic Limit	12
Plastic Index	19
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.128
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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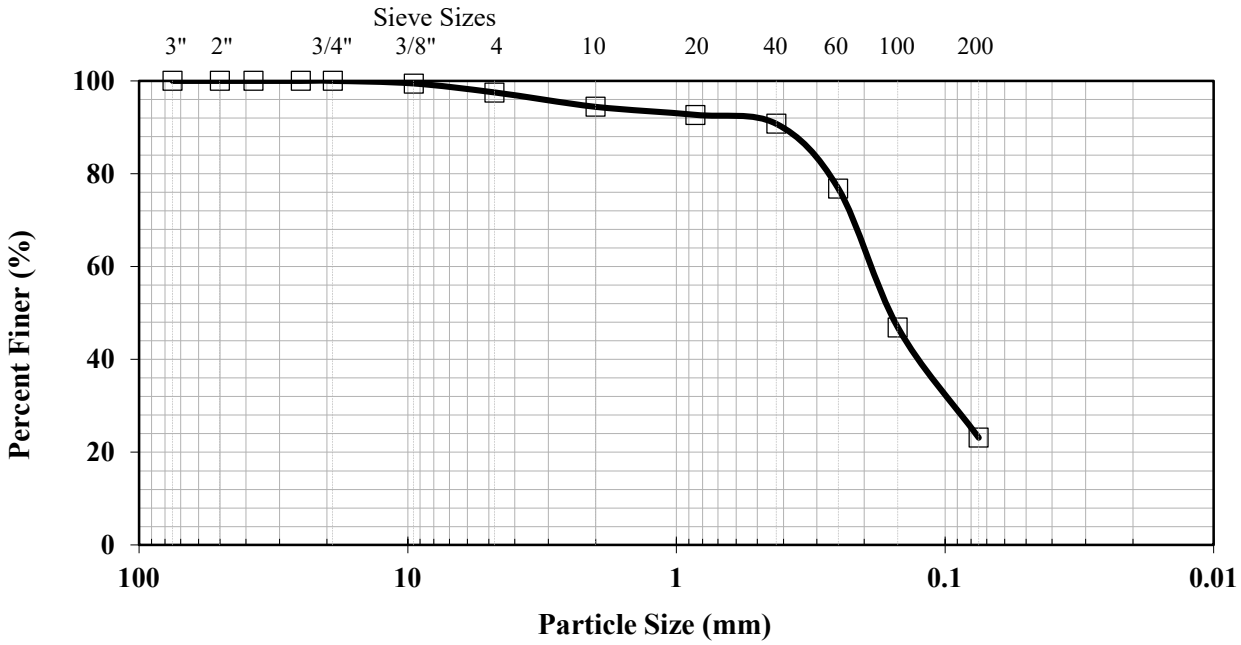
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-03 (G-1) (0-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	99.4
No. 4 (4.75 mm)	97.5
No. 10 (2.0 mm)	94.4
No. 20 (850 µm)	92.6
No. 40 (425 µm)	90.7
No. 60 (250 µm)	76.8
No. 100 (150 µm)	46.9
No. 200 (75 µm)	23.1

Note: Soil classifies as silty sand (SM) in accordance with ASTM D2487,

The as received moisture content was 2.1 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	NL
Plastic Limit	NP
Plastic Index	NP
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.194
D30 (mm)	0.097
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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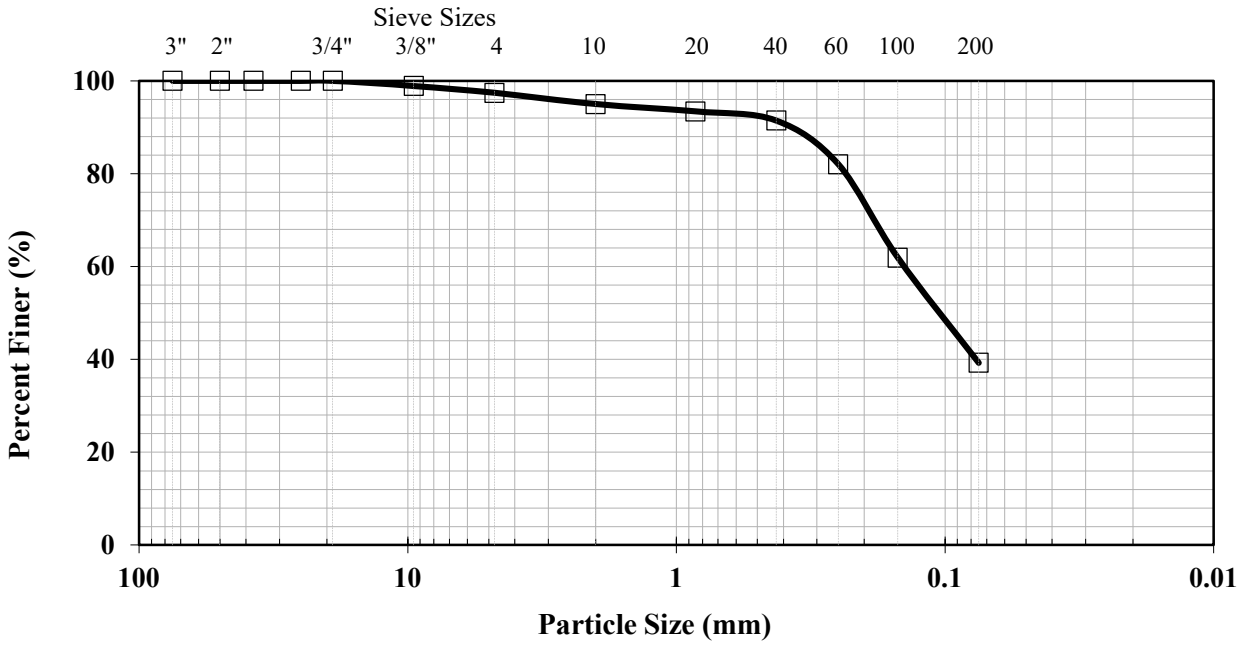
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-04 (G-2) (1-2 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.9
No. 4 (4.75 mm)	97.4
No. 10 (2.0 mm)	95.0
No. 20 (850 µm)	93.4
No. 40 (425 µm)	91.4
No. 60 (250 µm)	82.0
No. 100 (150 µm)	61.9
No. 200 (75 µm)	39.2

Note: Soil classifies as clayey sand (SC) in accordance with ASTM D2487,

The as received moisture content was 4.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	20
Plastic Limit	12
Plastic Index	8
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.144
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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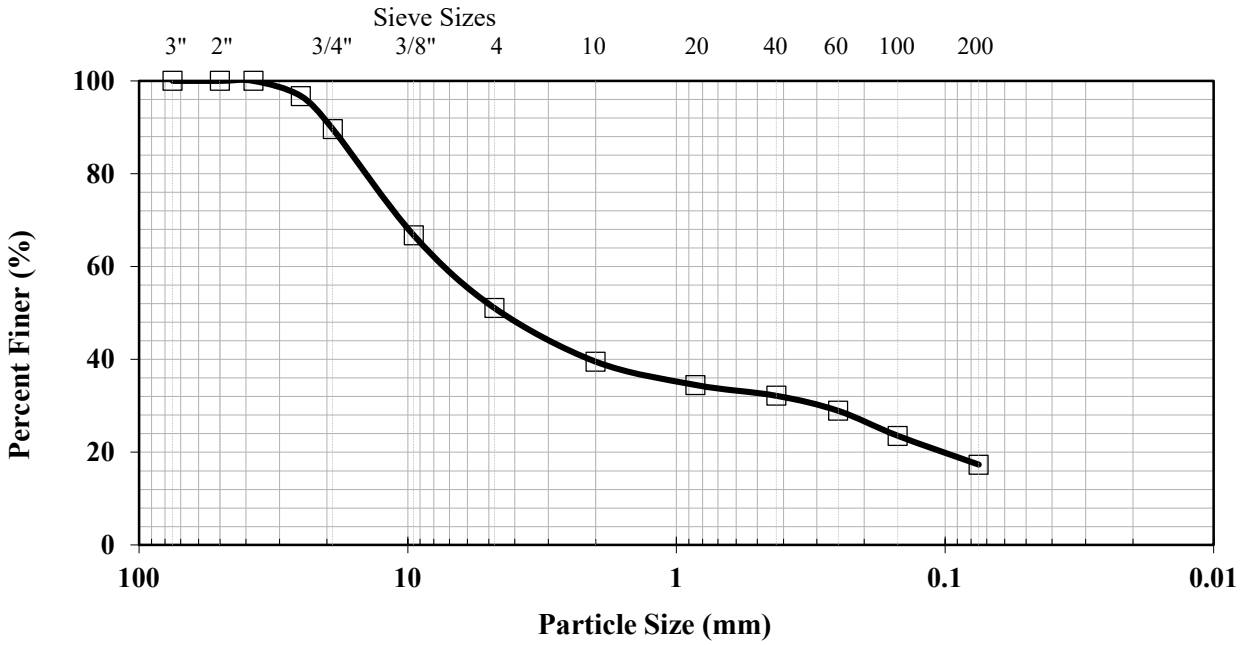
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-05 (G-1) (0-0.5 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	96.7
3/4 in.	89.6
3/8 in.	66.7
No. 4 (4.75 mm)	51.1
No. 10 (2.0 mm)	39.5
No. 20 (850 µm)	34.5
No. 40 (425 µm)	32.2
No. 60 (250 µm)	28.9
No. 100 (150 µm)	23.5
No. 200 (75 µm)	17.3

Note: The as received moisture content was 2.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	7.463
D30 (mm)	0.308
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/10/25
Reviewed By / Date

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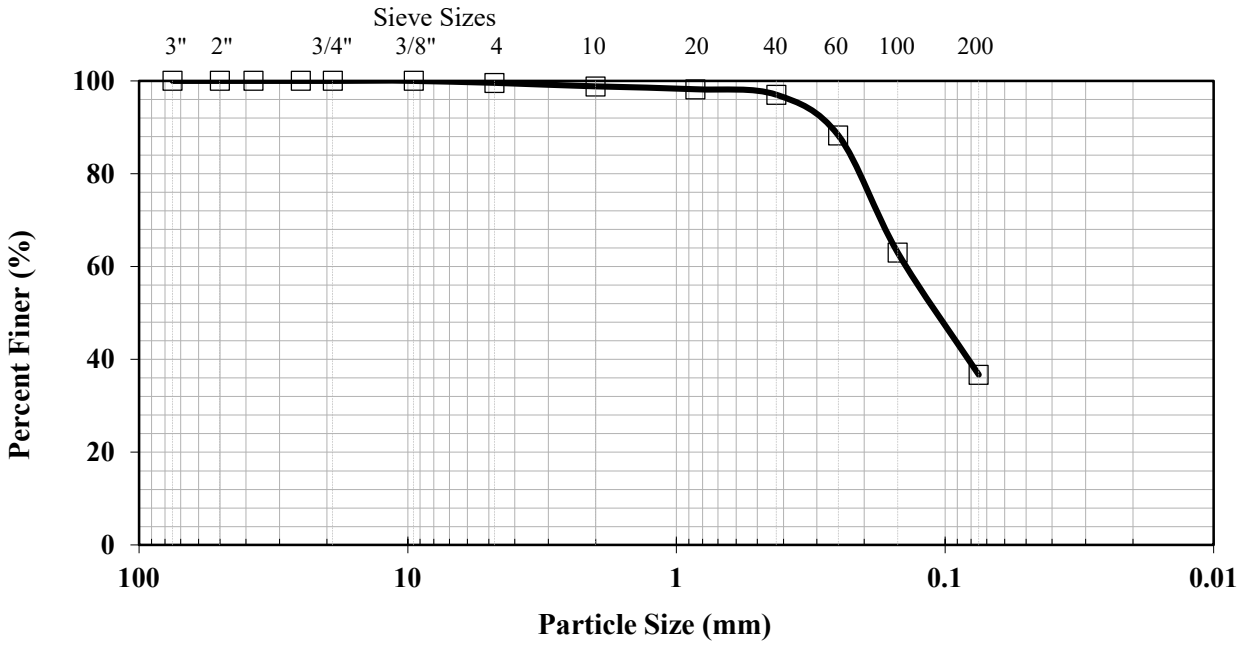
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-05 (G-2) (0.5-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.5
No. 10 (2.0 mm)	98.8
No. 20 (850 µm)	98.2
No. 40 (425 µm)	97.0
No. 60 (250 µm)	88.2
No. 100 (150 µm)	63.0
No. 200 (75 µm)	36.7

Note: Soil classifies as silty, clayey sand (SC-SM) in accordance with ASTM D2487,

The as received moisture content was 6.0 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	19
Plastic Limit	13
Plastic Index	6
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.142
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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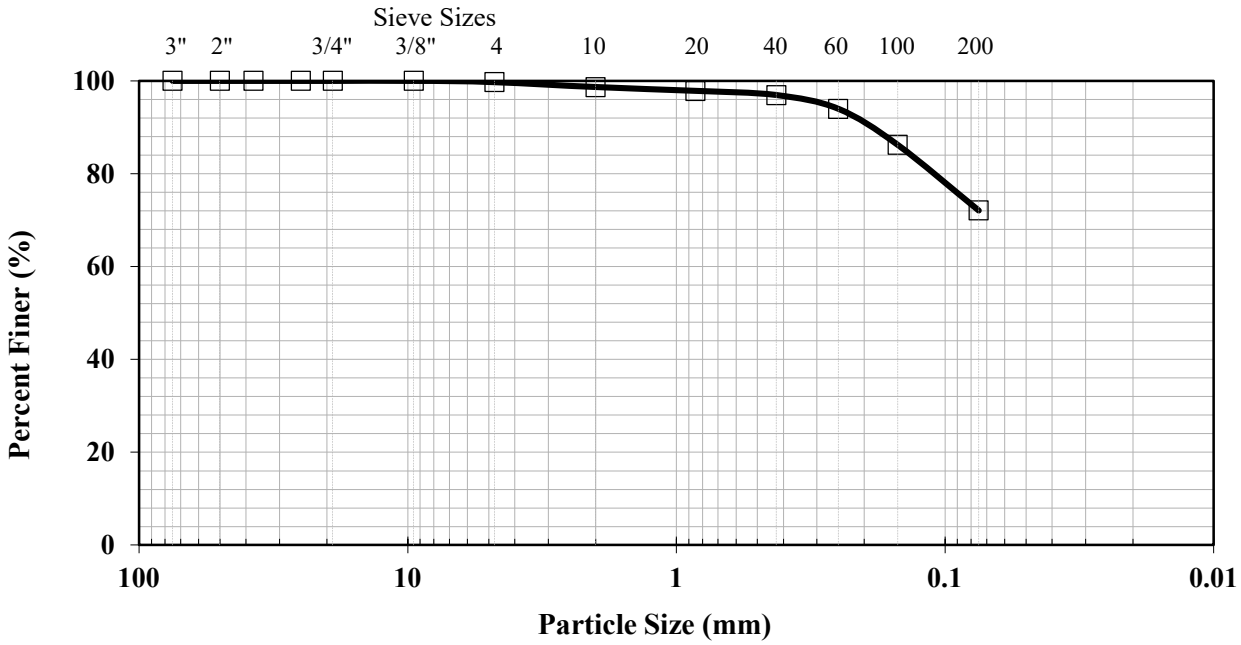
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-06 (G-3) (2-2.75 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.7
No. 10 (2.0 mm)	98.6
No. 20 (850 µm)	97.8
No. 40 (425 µm)	96.9
No. 60 (250 µm)	94.0
No. 100 (150 µm)	86.2
No. 200 (75 µm)	72.1

Note: Soil classifies as lean clay with sand (CL) in accordance with ASTM D2487,

The as received moisture content was 12.9 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	35
Plastic Limit	14
Plastic Index	21
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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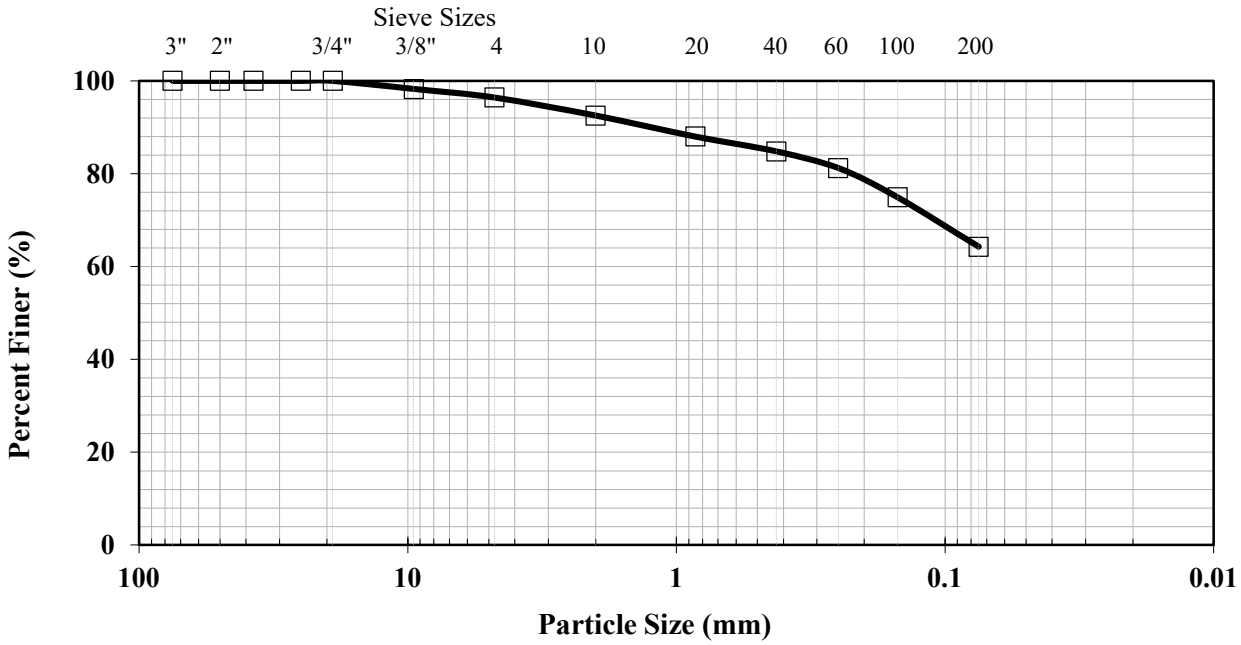
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-07 (G-3) (2-2.5 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	98.2
No. 4 (4.75 mm)	96.4
No. 10 (2.0 mm)	92.5
No. 20 (850 µm)	88.0
No. 40 (425 µm)	84.8
No. 60 (250 µm)	81.2
No. 100 (150 µm)	74.9
No. 200 (75 µm)	64.3

Note: Soil classifies as sandy lean clay (CL) in accordance with ASTM D2487,

The as received moisture content was 11.3 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	39
Plastic Limit	14
Plastic Index	25
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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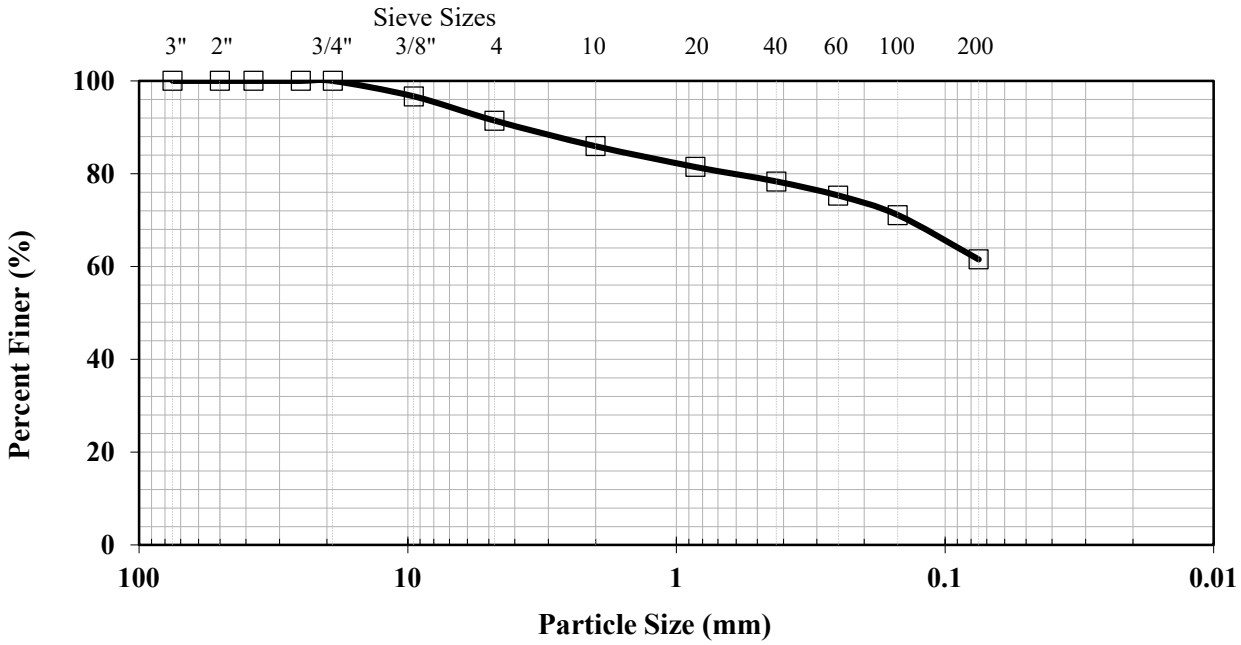
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-08 (G-2) (0.25-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	96.6
No. 4 (4.75 mm)	91.4
No. 10 (2.0 mm)	85.9
No. 20 (850 µm)	81.4
No. 40 (425 µm)	78.3
No. 60 (250 µm)	75.3
No. 100 (150 µm)	71.1
No. 200 (75 µm)	61.5

Note: The as received moisture content was 4.7 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/10/25
Reviewed By / Date

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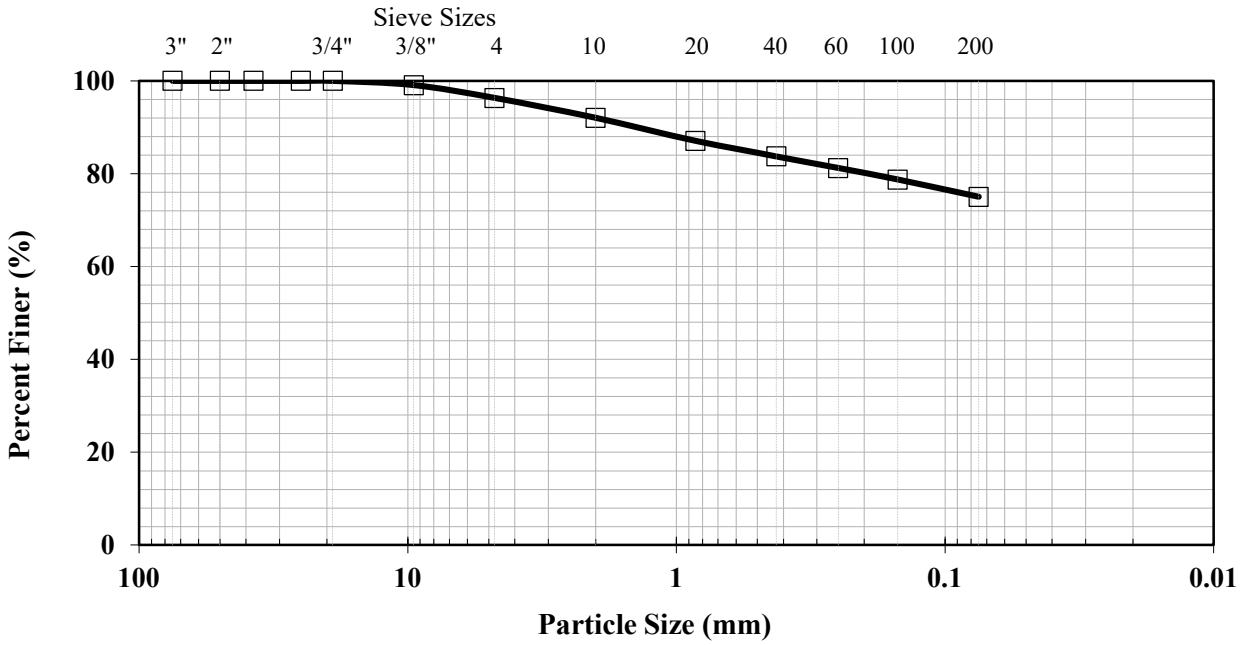
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-08 (G-3) (1-2 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	99.1
No. 4 (4.75 mm)	96.3
No. 10 (2.0 mm)	92.0
No. 20 (850 µm)	87.1
No. 40 (425 µm)	83.7
No. 60 (250 µm)	81.2
No. 100 (150 µm)	78.7
No. 200 (75 µm)	75.0

Note: Soil classifies as lean clay with sand (CL) in accordance with ASTM D2487,

The as received moisture content was 7.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	32
Plastic Limit	15
Plastic Index	17
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
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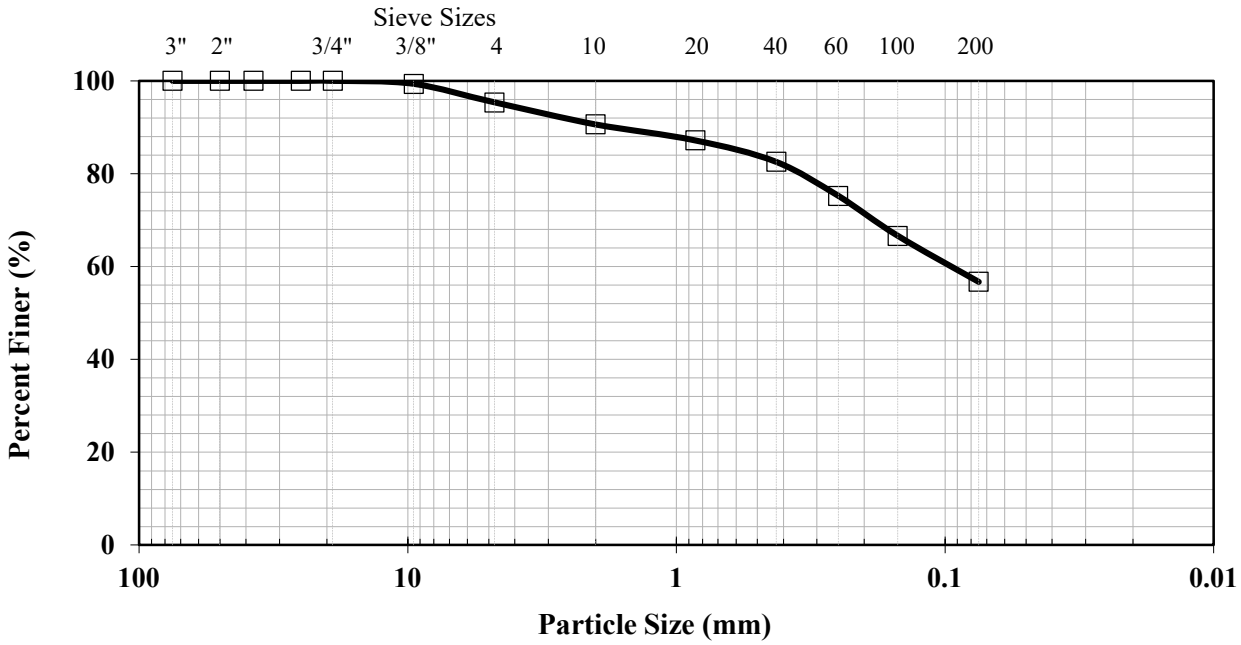
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-09 (G-2) (0.17-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	99.3
No. 4 (4.75 mm)	95.3
No. 10 (2.0 mm)	90.6
No. 20 (850 µm)	87.2
No. 40 (425 µm)	82.5
No. 60 (250 µm)	75.2
No. 100 (150 µm)	66.6
No. 200 (75 µm)	56.7

Note: Soil classifies as sandy lean clay (CL) in accordance with ASTM D2487,

The as received moisture content was 7.2 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	29
Plastic Limit	13
Plastic Index	16
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.100
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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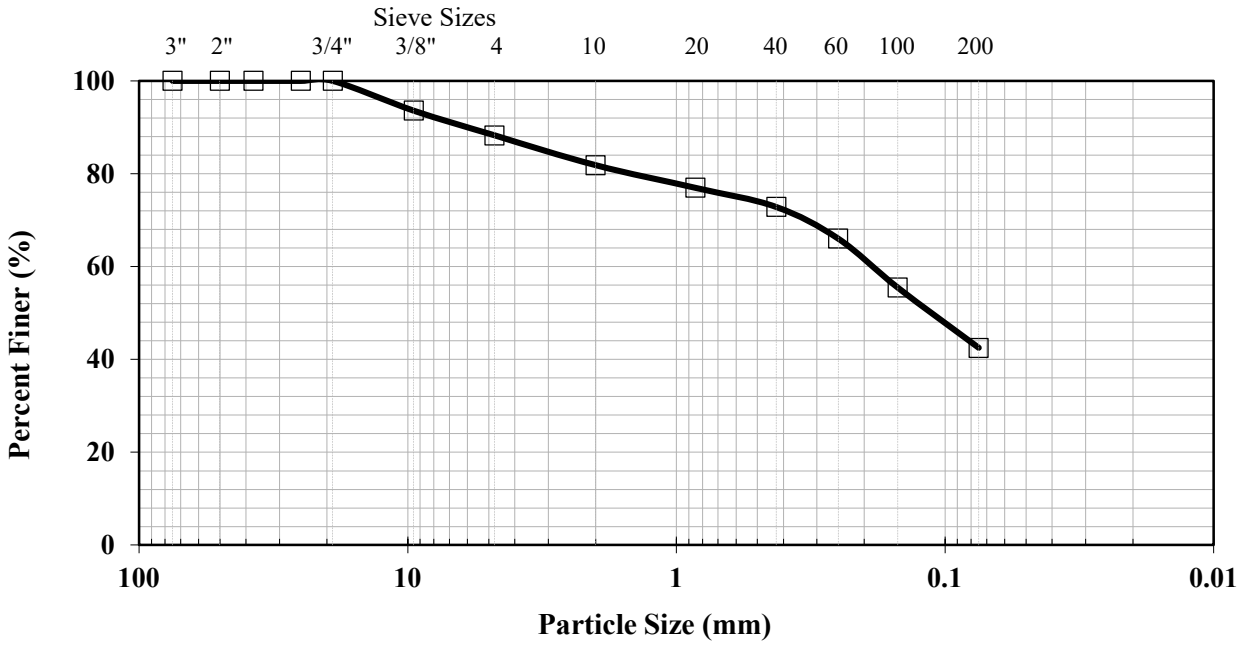
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-10 (G-2) (0.17-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	93.6
No. 4 (4.75 mm)	88.2
No. 10 (2.0 mm)	81.8
No. 20 (850 µm)	77.0
No. 40 (425 µm)	72.8
No. 60 (250 µm)	66.0
No. 100 (150 µm)	55.4
No. 200 (75 µm)	42.5

Note: Soil classifies as clayey sand (SC) in accordance with ASTM D2487,

The as received moisture content was 4.8 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	25
Plastic Limit	12
Plastic Index	13
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.193
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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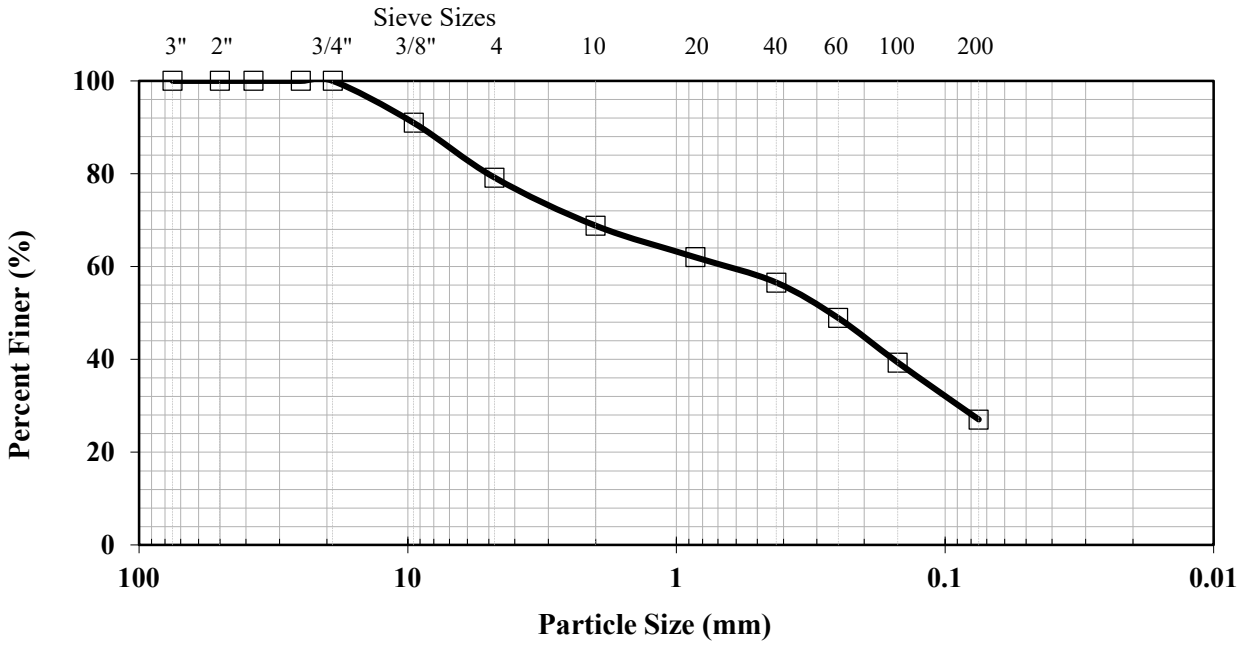
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-11 (G-1) (0-0.083 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	91.0
No. 4 (4.75 mm)	79.1
No. 10 (2.0 mm)	68.8
No. 20 (850 µm)	62.0
No. 40 (425 µm)	56.5
No. 60 (250 µm)	48.9
No. 100 (150 µm)	39.3
No. 200 (75 µm)	27.0

Note: The as received moisture content was 3.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.694
D30 (mm)	0.093
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/11/25
Reviewed By / Date

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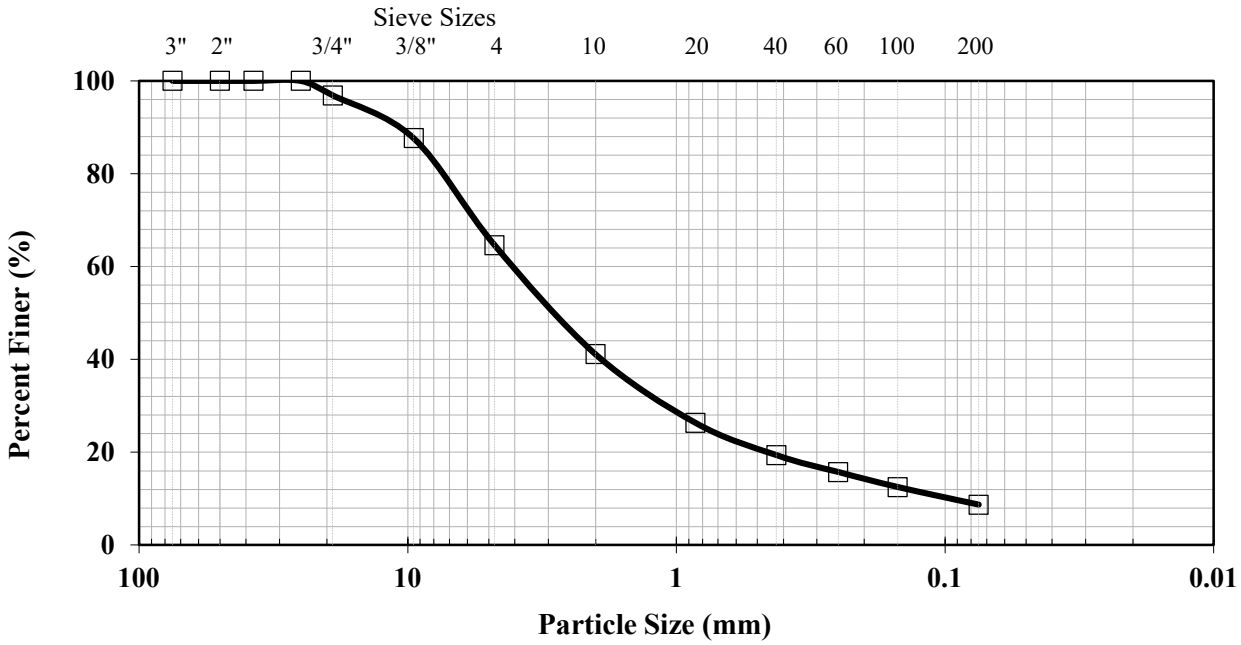
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-11 (G-2) (0.083-0.75 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	96.9
3/8 in.	87.7
No. 4 (4.75 mm)	64.6
No. 10 (2.0 mm)	41.1
No. 20 (850 µm)	26.3
No. 40 (425 µm)	19.4
No. 60 (250 µm)	15.7
No. 100 (150 µm)	12.5
No. 200 (75 µm)	8.7

Note: The as received moisture content was 0.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	4.214
D30 (mm)	1.135
D10 (mm)	0.101

Coeff. of Uniformity, Cu : 41.69
Coeff. of Curvature, Cc : 3.03

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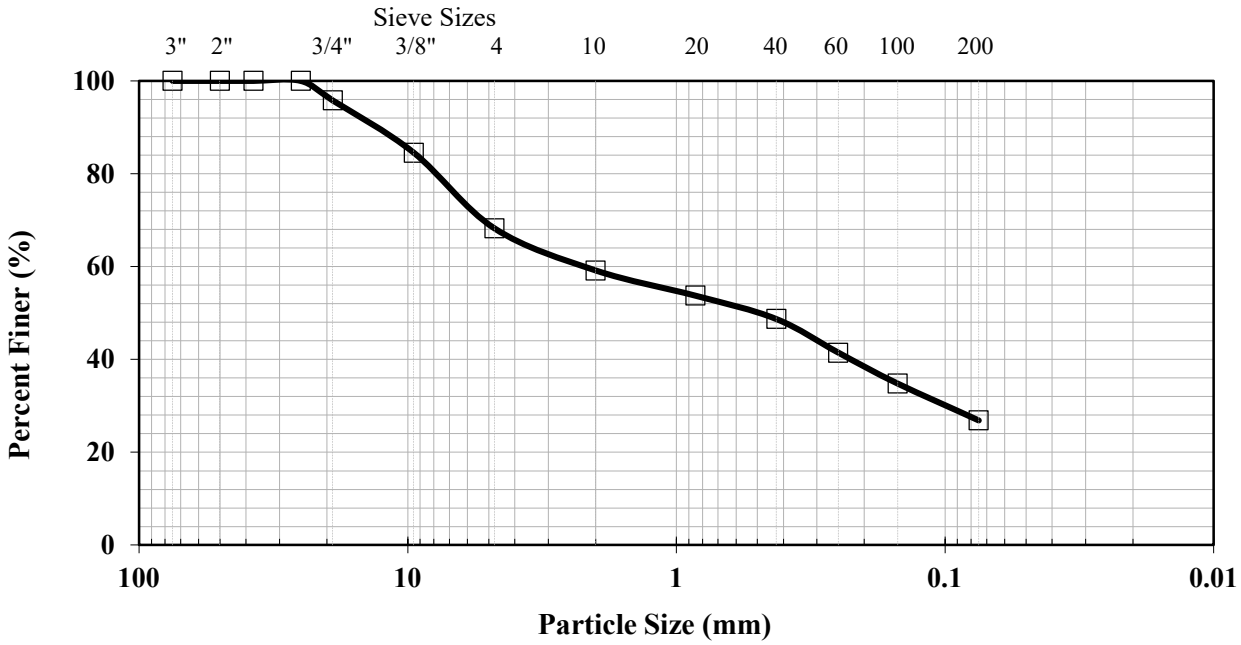
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-12 (G-1) (0-0.5 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	95.8
3/8 in.	84.5
No. 4 (4.75 mm)	68.2
No. 10 (2.0 mm)	59.1
No. 20 (850 µm)	53.7
No. 40 (425 µm)	48.7
No. 60 (250 µm)	41.4
No. 100 (150 µm)	34.8
No. 200 (75 µm)	26.9

Note: The as received moisture content was 1.5 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	2.261
D30 (mm)	0.105
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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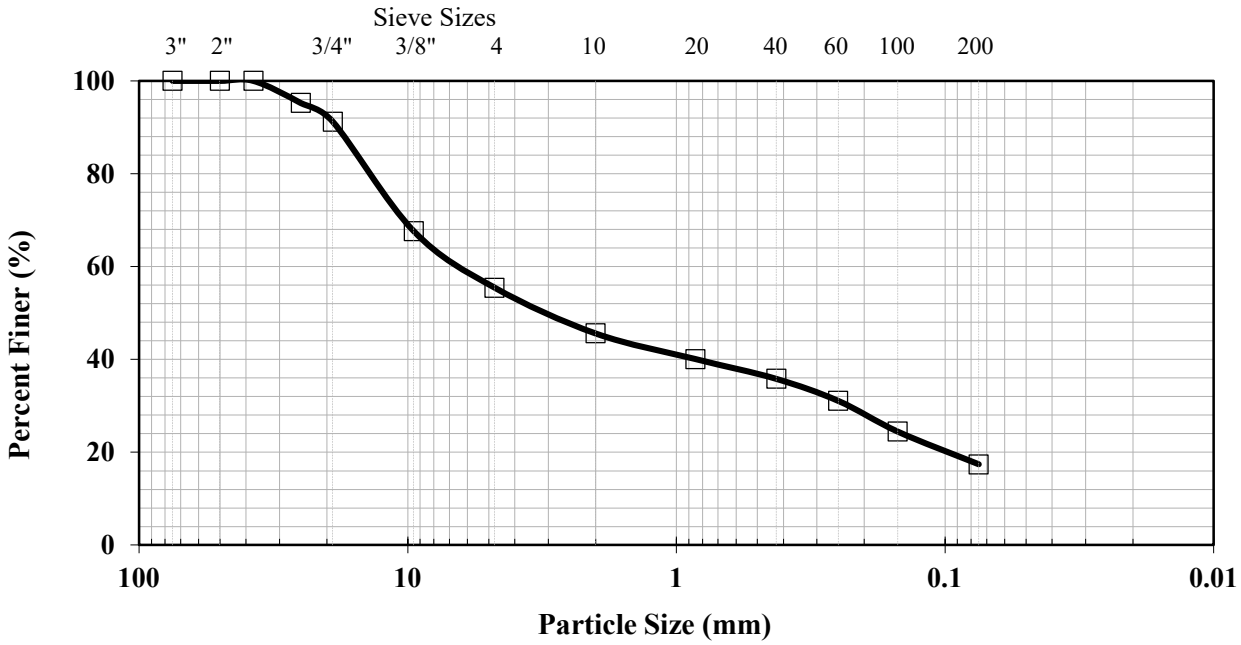
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-12 (G-3) (0.17-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	95.2
3/4 in.	91.2
3/8 in.	67.6
No. 4 (4.75 mm)	55.4
No. 10 (2.0 mm)	45.6
No. 20 (850 µm)	40.0
No. 40 (425 µm)	35.8
No. 60 (250 µm)	31.1
No. 100 (150 µm)	24.4
No. 200 (75 µm)	17.4

Note: The as received moisture content was 2.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	6.528
D30 (mm)	0.234
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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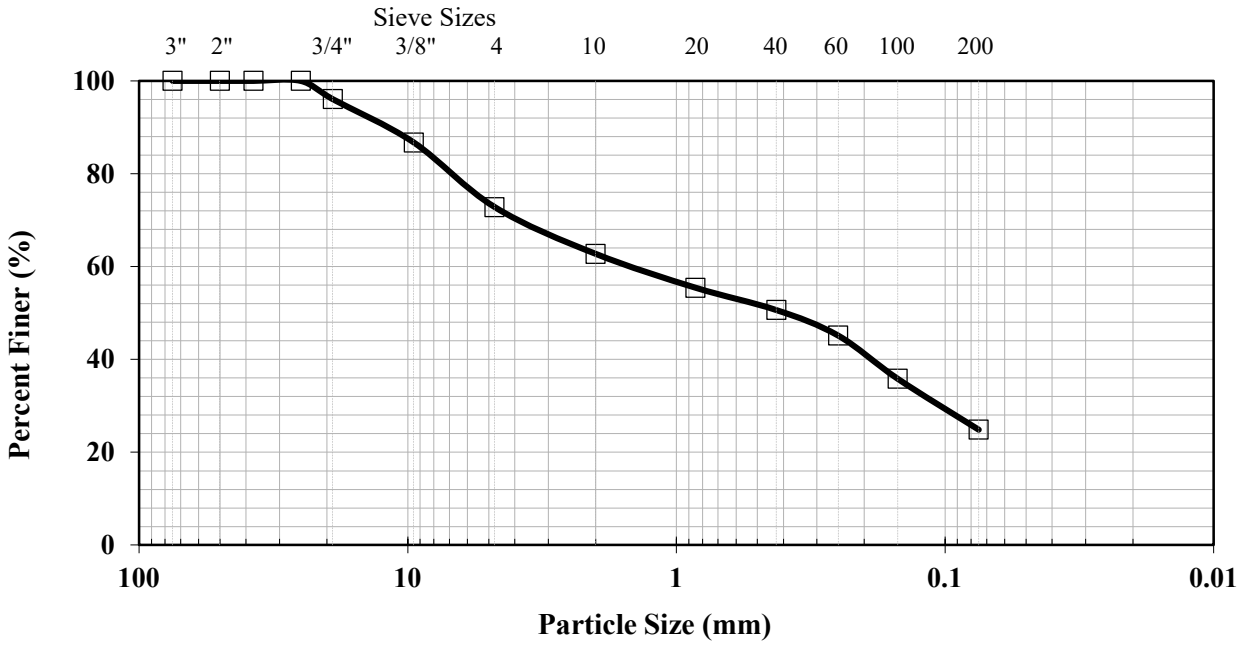
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-13 (G-1) (0-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	96.1
3/8 in.	86.7
No. 4 (4.75 mm)	72.8
No. 10 (2.0 mm)	62.7
No. 20 (850 µm)	55.4
No. 40 (425 µm)	50.6
No. 60 (250 µm)	45.1
No. 100 (150 µm)	35.8
No. 200 (75 µm)	24.8

Note: The as received moisture content was 1.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	1.572
D30 (mm)	0.110
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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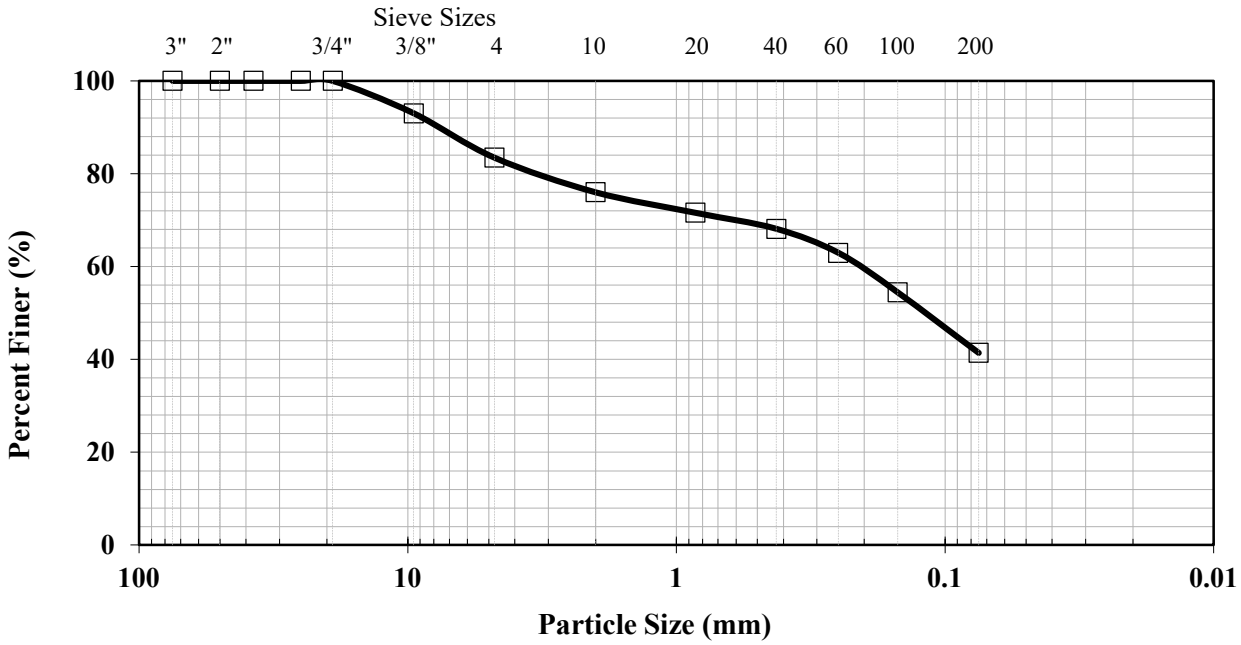
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-14 (G-1) (0-0.58 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	93.0
No. 4 (4.75 mm)	83.4
No. 10 (2.0 mm)	76.0
No. 20 (850 µm)	71.6
No. 40 (425 µm)	68.1
No. 60 (250 µm)	63.0
No. 100 (150 µm)	54.4
No. 200 (75 µm)	41.4

Note: The as received moisture content was 3.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.215
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/10/25
Reviewed By / Date

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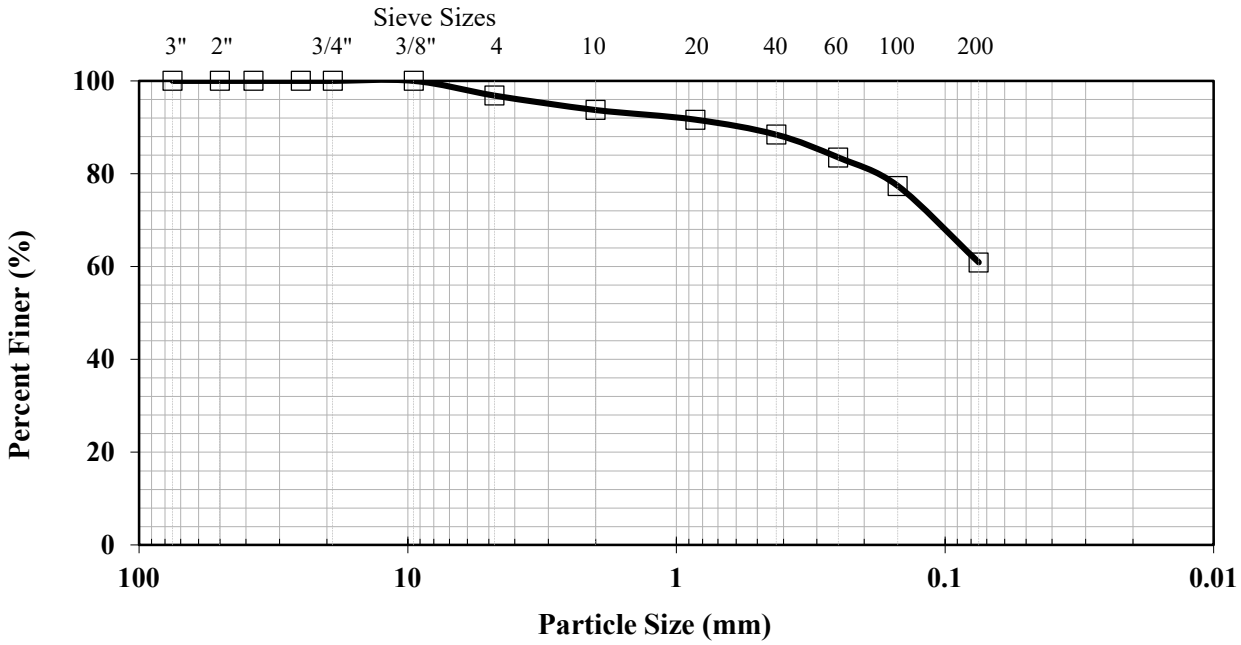
Alpine Engineering Services, LLC
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-14 (G-2) (0.58-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	96.8
No. 10 (2.0 mm)	93.7
No. 20 (850 µm)	91.6
No. 40 (425 µm)	88.4
No. 60 (250 µm)	83.5
No. 100 (150 µm)	77.3
No. 200 (75 µm)	60.9

Note: Soil classifies as sandy lean clay (CL) in accordance with ASTM D2487,

The as received moisture content was 7.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	31
Plastic Limit	13
Plastic Index	18
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	- -
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/11/25
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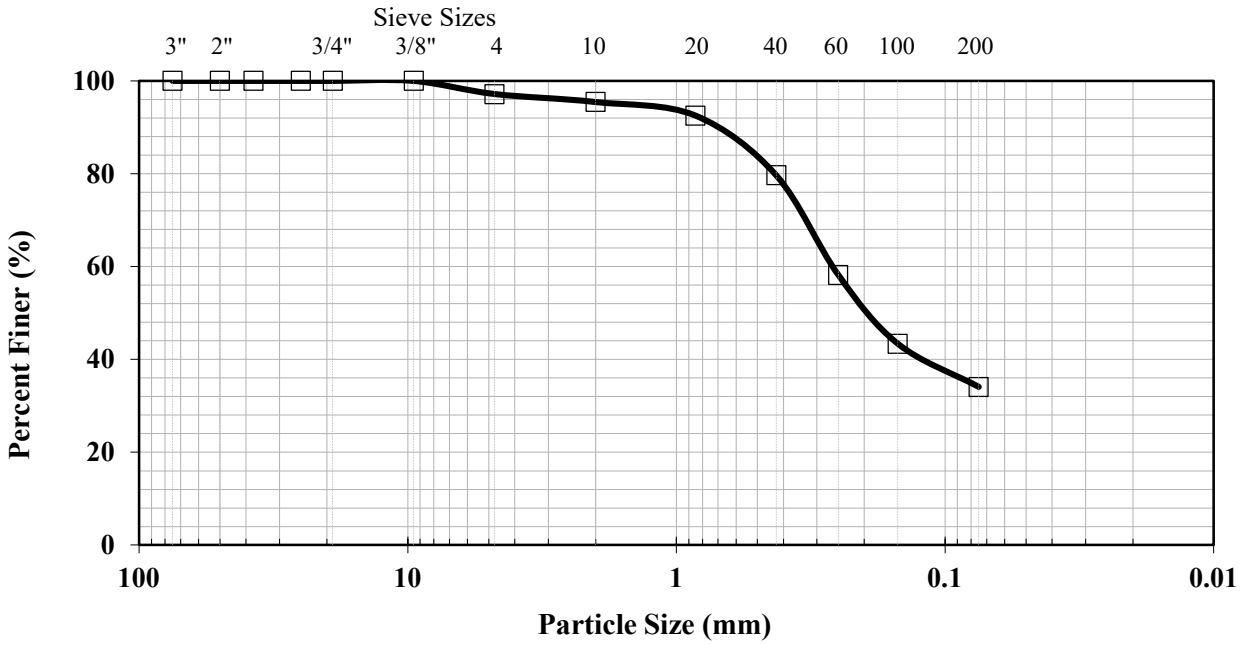
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-15 (G-1) (0-1.33 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	97.1
No. 10 (2.0 mm)	95.4
No. 20 (850 µm)	92.5
No. 40 (425 µm)	79.6
No. 60 (250 µm)	58.2
No. 100 (150 µm)	43.3
No. 200 (75 µm)	34.1

Note: Soil classifies as clayey sand (SC) in accordance with ASTM D2487,

The as received moisture content was 4.8 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	24
Plastic Limit	12
Plastic Index	12
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.265
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/13/25
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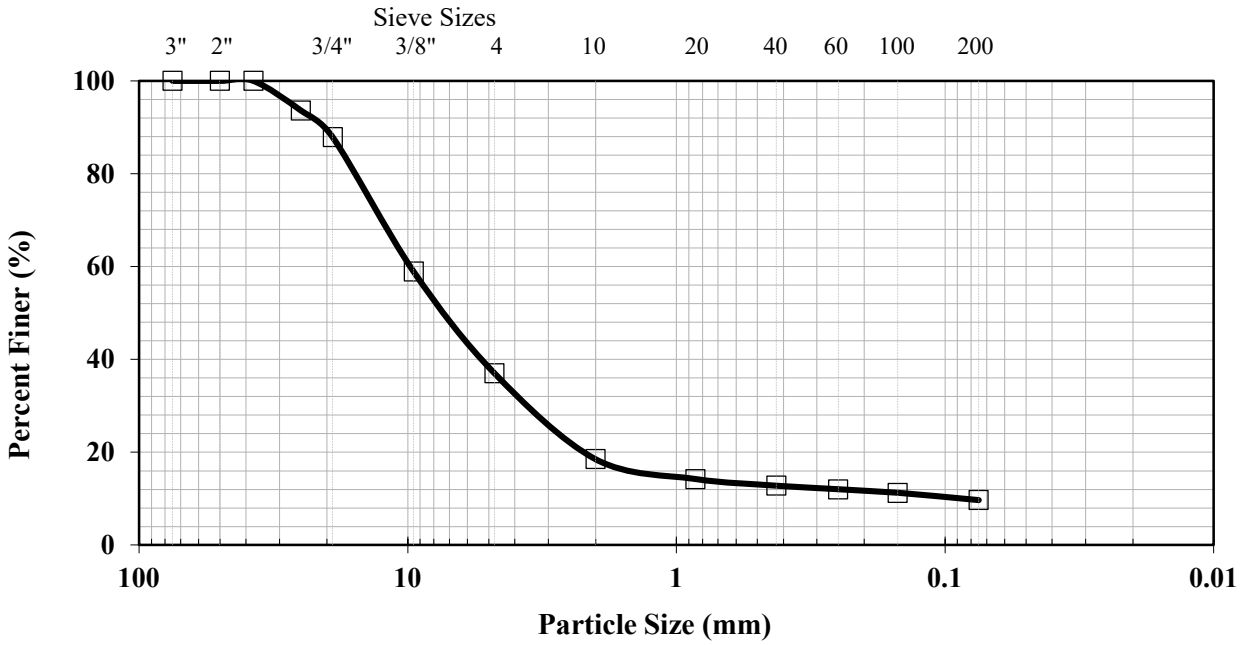
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-16 (G-1) (0-0.5 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	93.6
3/4 in.	87.8
3/8 in.	58.9
No. 4 (4.75 mm)	37.0
No. 10 (2.0 mm)	18.5
No. 20 (850 µm)	14.2
No. 40 (425 µm)	12.8
No. 60 (250 µm)	12.0
No. 100 (150 µm)	11.2
No. 200 (75 µm)	9.7

Note: The as received moisture content was 0.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	9.856
D30 (mm)	3.708
D10 (mm)	0.090

Coeff. of Uniformity, Cu : 109.01
Coeff. of Curvature, Cc : 15.43

Cheng-Wei Chen, Ph.D. 06/11/25
Reviewed By / Date

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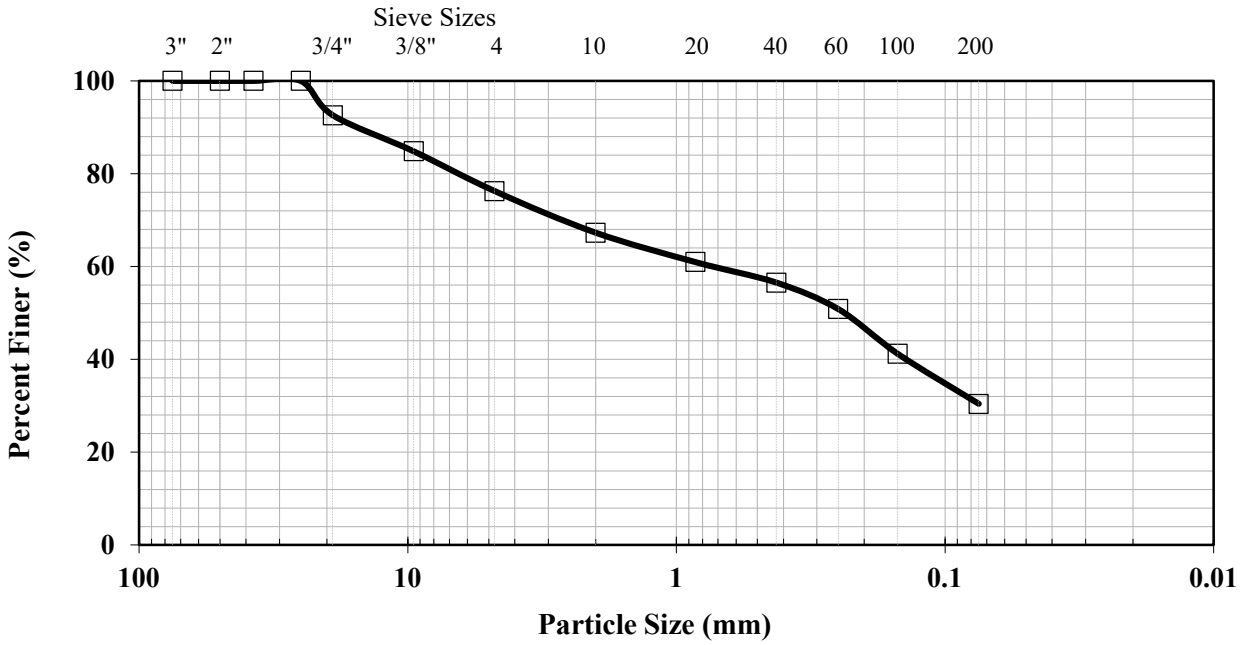
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-16 (G-2) (0.5-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	92.6
3/8 in.	84.8
No. 4 (4.75 mm)	76.2
No. 10 (2.0 mm)	67.3
No. 20 (850 µm)	61.0
No. 40 (425 µm)	56.5
No. 60 (250 µm)	50.8
No. 100 (150 µm)	41.2
No. 200 (75 µm)	30.4

Note: Soil classifies as silty, clayey sand with gravel (SC-SM) in accordance with ASTM D2487,

The as received moisture content was 3.9 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	20
Plastic Limit	14
Plastic Index	6
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.758
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/13/25
Reviewed By / Date

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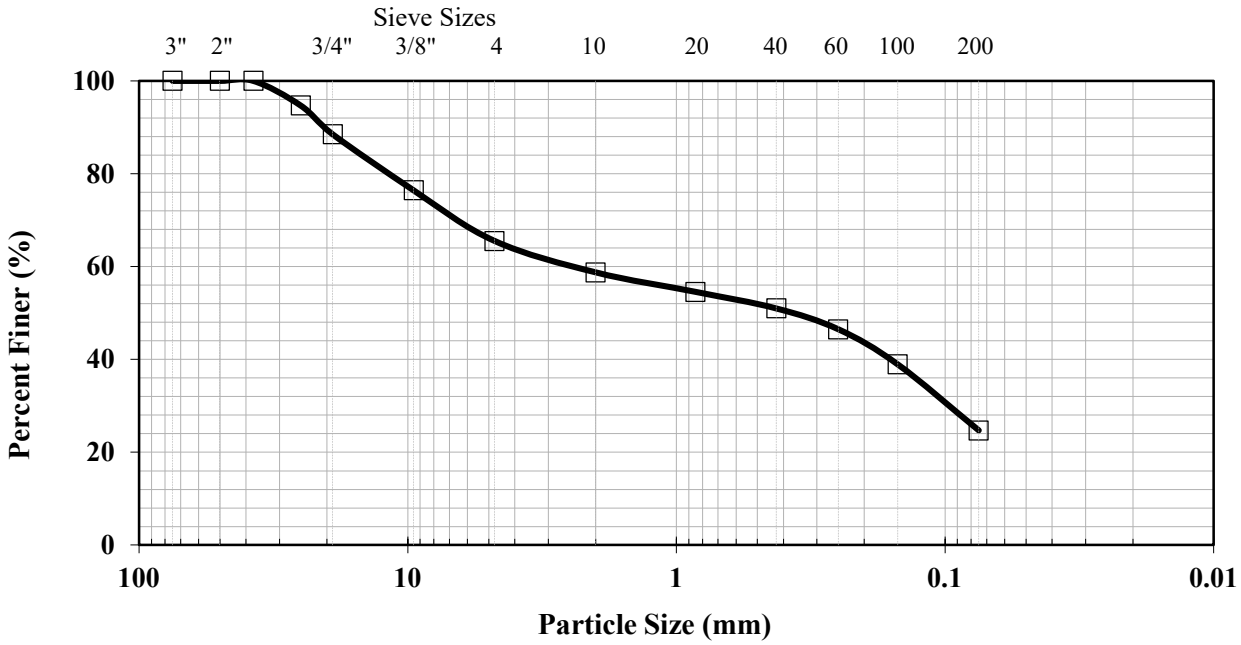
Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-17 (G-2) (0.08-0.7 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	94.7
3/4 in.	88.5
3/8 in.	76.4
No. 4 (4.75 mm)	65.5
No. 10 (2.0 mm)	58.7
No. 20 (850 µm)	54.5
No. 40 (425 µm)	51.0
No. 60 (250 µm)	46.5
No. 100 (150 µm)	38.9
No. 200 (75 µm)	24.7

Note: The as received moisture content was 4.3 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	2.520
D30 (mm)	0.103
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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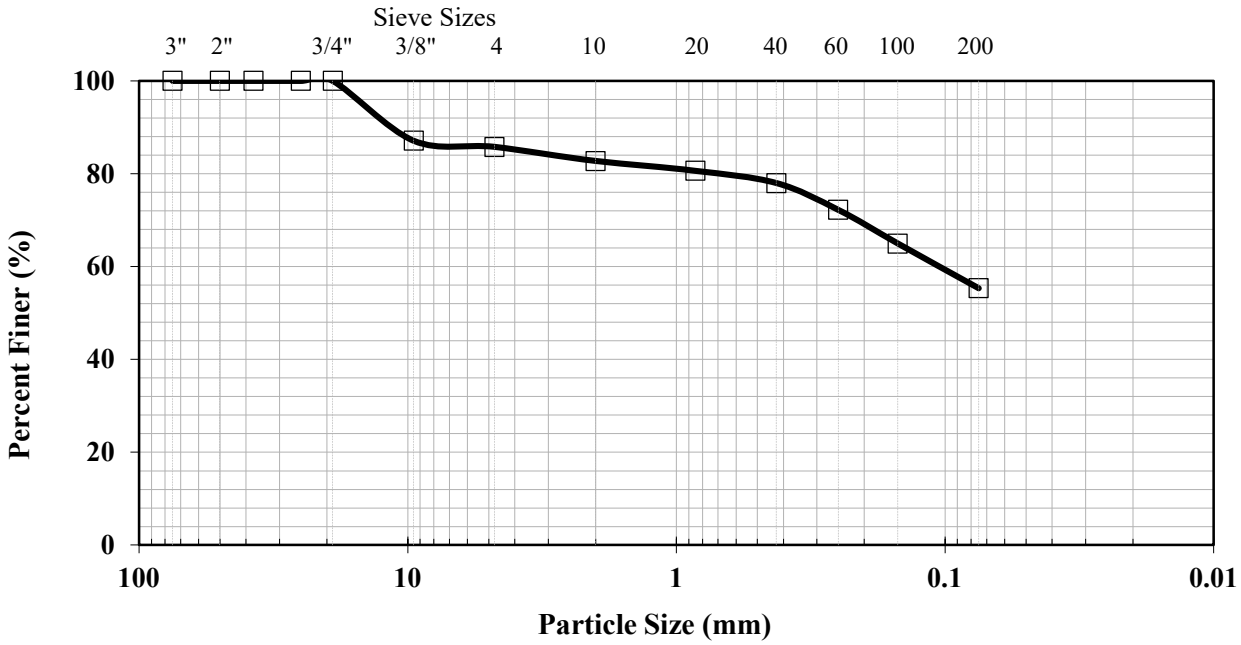
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-18 (G-2) (0.5-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	87.1
No. 4 (4.75 mm)	85.7
No. 10 (2.0 mm)	82.7
No. 20 (850 µm)	80.6
No. 40 (425 µm)	78.0
No. 60 (250 µm)	72.2
No. 100 (150 µm)	64.9
No. 200 (75 µm)	55.3

Note: Soil classifies as sandy lean clay (CL) in accordance with ASTM D2487,

The as received moisture content was 9.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	37
Plastic Limit	14
Plastic Index	23
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.111
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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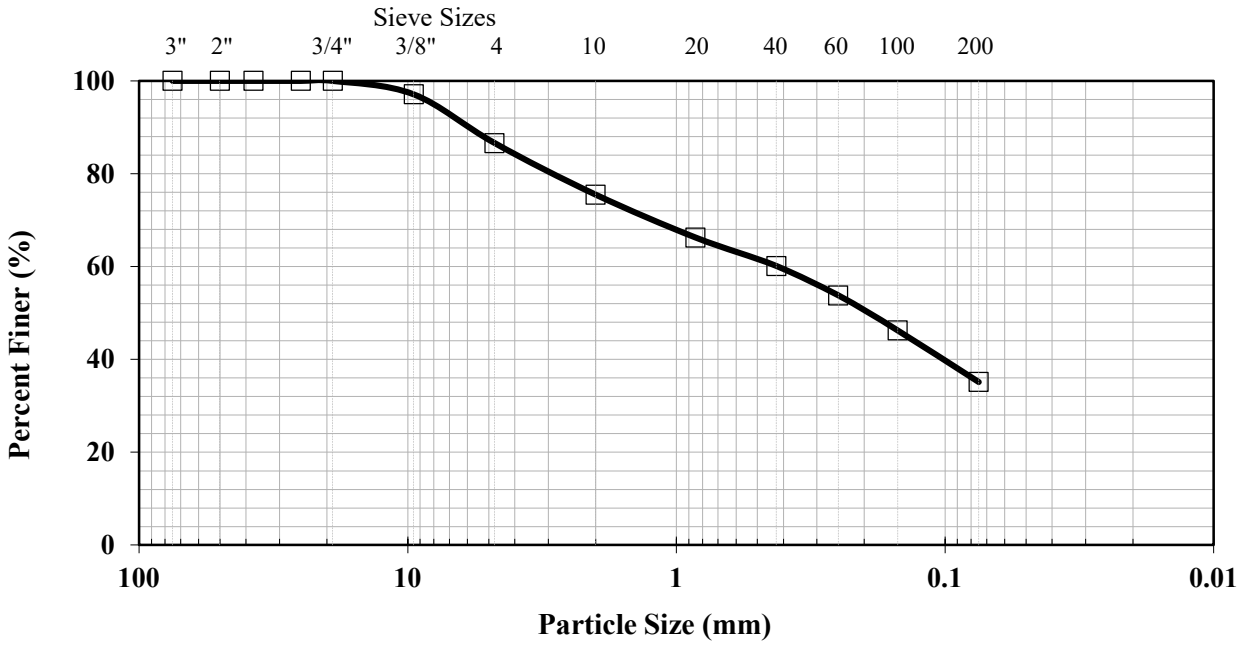
105 Tradesmen Drive, Suite B
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-19 (G-2) (0.25-1 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	97.1
No. 4 (4.75 mm)	86.6
No. 10 (2.0 mm)	75.5
No. 20 (850 µm)	66.3
No. 40 (425 µm)	60.1
No. 60 (250 µm)	53.8
No. 100 (150 µm)	46.2
No. 200 (75 µm)	35.1

Note: Soil classifies as silty, clayey sand (SC-SM) in accordance with ASTM D2487,

The as received moisture content was 3.4 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	19
Plastic Limit	13
Plastic Index	6
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	0.422
D30 (mm)	- -
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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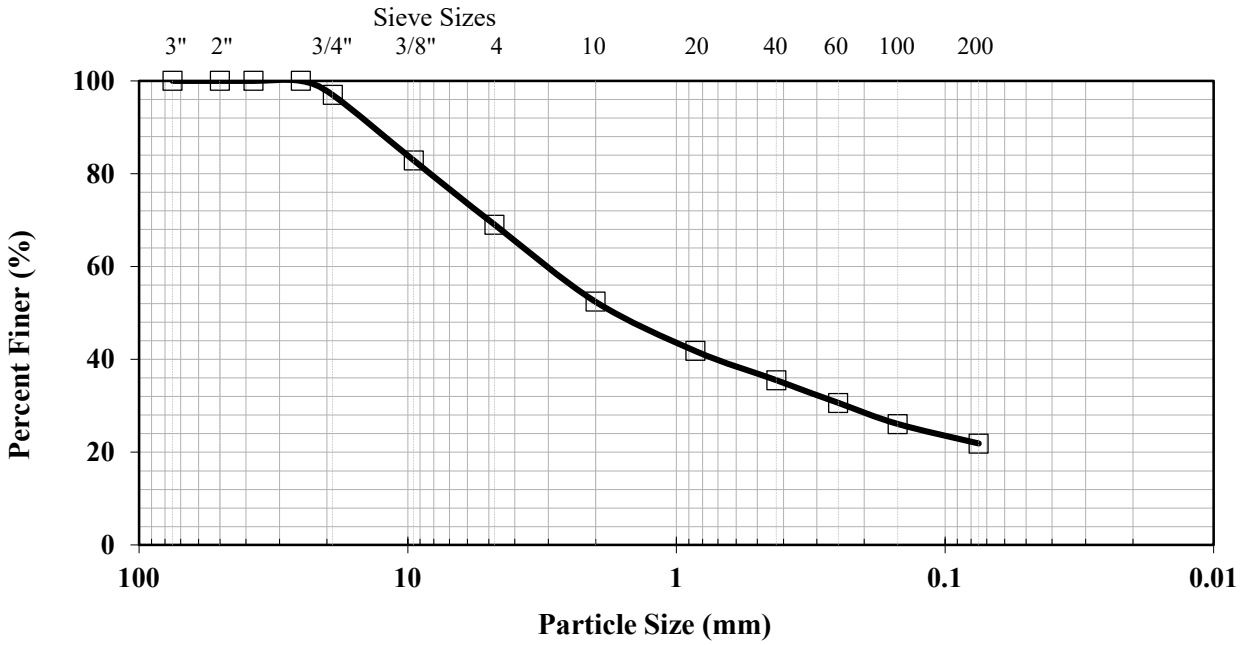
Hutto, TX 78634
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-20 (G-1) (0-0.25 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	96.9
3/8 in.	82.9
No. 4 (4.75 mm)	69.0
No. 10 (2.0 mm)	52.4
No. 20 (850 µm)	41.8
No. 40 (425 µm)	35.5
No. 60 (250 µm)	30.6
No. 100 (150 µm)	26.1
No. 200 (75 µm)	21.8

Note: The as received moisture content was 1.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	3.257
D30 (mm)	0.237
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

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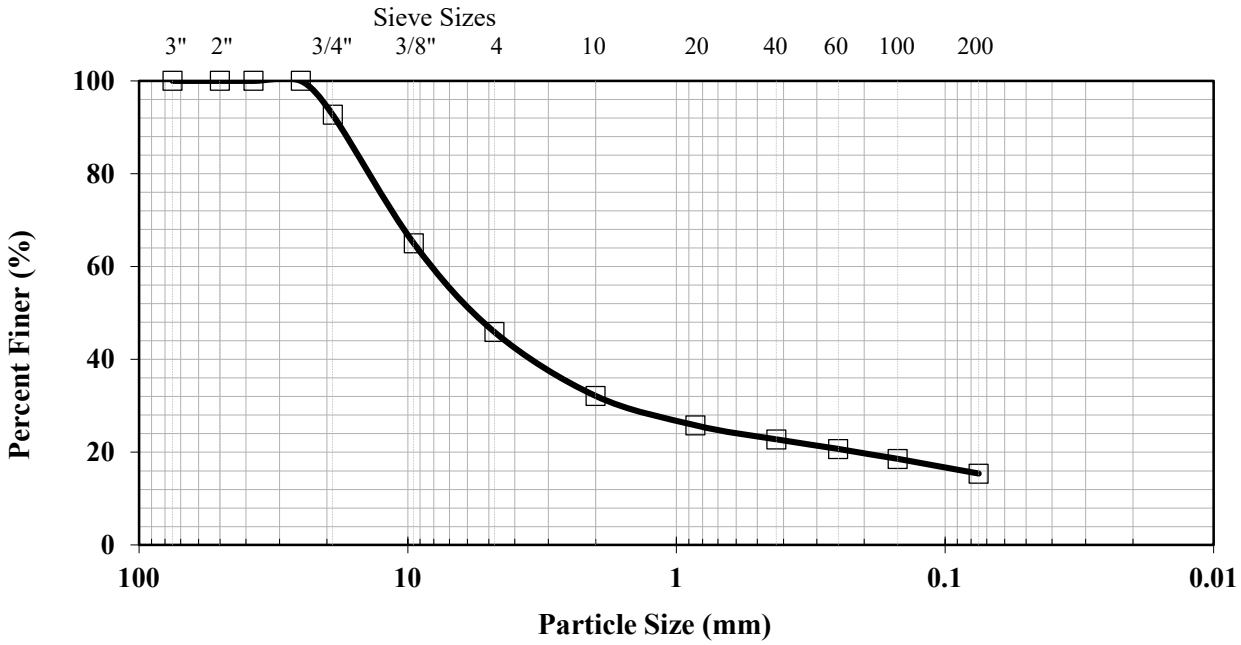
Tel: (512) 387-1287

Particle Size Analysis for Soils (ASTM D6913)

Client: Langan Engineering
Project Name: RRCE Chisme
(PN: 520102301)
Sample ID: RW-20 (G-2) (0.25-0.75 ft)

Alpine Project No.: 2501017
Test Date: 06/06/25
Tested By: T.D., & T.V.



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	92.7
3/8 in.	65.0
No. 4 (4.75 mm)	45.9
No. 10 (2.0 mm)	32.1
No. 20 (850 µm)	25.8
No. 40 (425 µm)	22.8
No. 60 (250 µm)	20.7
No. 100 (150 µm)	18.5
No. 200 (75 µm)	15.4

Note: The as received moisture content was 0.6 % as determined by ASTM D2216.

Atterberg Limits (ASTM D4318)	
Liquid Limit	- -
Plastic Limit	- -
Plastic Index	- -
Note: Specimen was air dried, 3-pt Liquid Limit procedure was used.	

D60 (mm)	8.256
D30 (mm)	1.613
D10 (mm)	- -

Coeff. of Uniformity, Cu : - -
Coeff. of Curvature, Cc : - -

Cheng-Wei Chen, Ph.D. 06/12/25
Reviewed By / Date

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WETLAND DELINEATION AND LISTED SPECIES HABITAT ASSESSMENT REPORT

Chisme Solar—Mills and Brown Counties, Texas

December 2023

Prepared for:

Red River Clean Energy, LLC, a subsidiary of Concord New Energy
107 Spring Street, Seattle, WA 98104

Prepared by:
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Tel: (512) 338-2223
www.stantec.com

Project Number:
235301227

Revision	Description	Author	Date
1	Develop report	Kevin Rubio, Biologist	December 7, 2023
2	Tech Review/QC	Chad Martin, PM	December 8, 2023

The conclusions in the Report titled **Wetland Delineation and Listed Species Habitat Assessment Report, Texas** are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Red River Clean Energy, LLC (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

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Prepared by:

Signature

Kevin Rubio, Biologist

Printed Name

Reviewed by:

Signature

Chad Martin, Project Manager

Printed Name

Approved by:

Signature

Chad Martin, Project Manager

Printed Name

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Acronyms / Abbreviations

FAC	Facultative Plant
FACU	Facultative Upland Plants
FACW	Facultative Wetland Plant
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GPS	Global Positioning System
HUC	Hydrologic Unit Code
NWP	Nation Wide Permit
OBL	Obligate Wetland Plant
PEM	Palustrine Emergent Wetland
PUB	Palustrine Unconsolidated-Bottom Wetland
Project Area	Approximately 722 Acres within the Proposed Chisme Solar Facility in Mills and Brown counties, Texas
Project	Proposed Chisme Solar Facility
TNW	Traditionally Navigable Water
UPL	Obligate Upland Plant
US	United States
USACE	US Army Corps of Engineers

USDA	US Department of Agriculture
USDA-NRCS	US Department of Agriculture, Natural Resources Conservation Service
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geologic Survey
WOTUS	Waters of the US

1 Executive Summary

Stantec was contracted by Red River Clean Energy, LLC, to conduct a wetland delineation for the proposed Chisme Solar Facility (Project) that would be constructed on approximately 722 acres in Mills and Brown counties, Texas (Project Area). The tasks performed as part of the wetland delineation included a review of historical and current topographic maps, true color and infrared aerial imagery, wetland inventory maps, flood maps, and soil survey data. The methodology, results, and recommendations of the review for the Project Area are summarized below.

In compliance with Section 404 of the Clean Water Act, this report contains a delineation of potential waters of the US (WOTUS) that would fall under the jurisdiction of the US Army Corps of Engineers (USACE). The field delineation was performed by Stantec scientists on October 31, 2023. Potential wetlands identified using the US Fish and Wildlife Service's National Wetlands Inventory and potential waters identified using the National Hydrography Dataset within the Project Area were investigated in the field.

Stantec scientists identified 5 wetlands and 8 streams within the Project Area. Of these features, 2 streams appear to have hydrologic connection to onsite and offsite streams that flow into Fisk Creek and Pecan Bayou, a tributary of the Colorado River, which is a traditionally navigable waterway. A total of 0 acres (0%) of the Project Area are within the Federal Emergency Management Agency 100-year floodplain. If Project construction were to affect jurisdictional streams or wetlands, a Section 404 permit may be required from USACE.

Under Section 404 of the Clean Water Act, the Project could be completed under Nationwide Permit (NWP) 51, *Land-Based Renewable Energy Generation Facilities*; NWP 14, *Linear Transportation Projects*; and/or NWP C/57, *Electric Utility Line and Telecommunications Activities*. Additionally, Red River Clean Energy would need to develop a Storm Water Pollution Prevention Plan for the Project and provide Notice of Intent prior to construction. As stated in the NWPs, the discharge of dredged or fill material into wetlands and non-tidal WOTUS must not cause the loss of greater than 0.5 acre of wetlands and non-tidal WOTUS. If activities from the construction of the Project and associated infrastructure, such as roads, parking lots, stormwater management facilities, and pipelines, permanently affect less than 0.5 acre, then Red River Clean Energy, LLC may proceed with the Project using an NWP. Permanent impacts that exceed the 0.5-acre threshold for NWPs require an Individual Permit.

2 Introduction

Stantec, was contracted by Red River Clean Energy, LLC, to perform a preliminary delineation of potential waters of the US (WOTUS) for the proposed Chisme Solar Facility (Project) that would be constructed on approximately 722 acres in Mills and Brown Counties, Texas (Project Area; Figure 2-1). This report presents a delineation of all resources that potentially fall under the jurisdiction of the US Army Corps of Engineers (USACE).

Stantec conducted desktop investigations to meet the following objectives:

- Review physical characteristics of the Project Area for potential WOTUS, and
- Identify potential environmental permits that may be required to construct the Project.

Stantec scientists conducted field delineations of the entire Project Area on October 31, 2023, to meet the following objectives:

- Delineate the approximate boundaries of potential wetlands and waterbodies within the Project Area,
- Determine if potential habitat exists for listed species, and
- Document general site conditions.

Stantec evaluated features in the Project Area for potential federal jurisdiction. Stantec's interpretation was made based on available documentation from the US Environmental Protection Agency (USEPA), including guidance titled Current Implementation of Waters of the United States, which refers to the original 1986/1988 promulgation and subsequent Supreme Court cases that further defined the term, with the most current definition below determined by the 2008 ruling following the Rapanos v. United States case (USEPA 2021). This rule was amended on August 29, 2023; due to ongoing litigation, Texas is one of the 27 states that continue to interpret WOTUS consistent with the pre-2015 regulatory regime and applicable conditions of the 2023 Sackett ruling.

USACE and USEPA assert jurisdiction over the following waters:

- Traditionally navigable waters (TNWs),
- Wetlands adjacent to TNWs,
- Non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months), and
- Wetlands that directly abut such tributaries.

USACE and USEPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a surface connection with a TNW:

- Non-navigable tributaries that are not relatively permanent,
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent, and
- Wetlands adjacent to but not directly abutting a relatively permanent non-navigable tributary.

USACE and USEPA generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low-volume, infrequent, or short-duration flow), and
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.
- Non relatively permanent waters (ephemeral streams)

The following sections of this Report describe the proposed Project location; present the assessment methodology, results of the desktop review and field investigations, and conclusions and recommendations; and provide the supporting references.

Project Area

N

0 1,000 2,000
Feet
(At original document size of 8.5x11)
1:42,843

Notes
1. Coordinate System: NAD 1983 StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources: ESRI Hybrid Reference Layer
3. Background: NAIP Imagery (2023)

Stantec

Project Location:
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	215301227
Client	Red River Clean Energy, LLC
Project	Chrome Solar
Report	Wetland Report

Figure No.
2-1

Title
Project Area Overview

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

3 Proposed Project Location

The proposed Project would be located in a rural setting approximately 14 miles southeast of Brownwood, Texas, in northwestern Mills County. According to the USEPA's Level III and IV Ecoregions of EPA, the Project falls within the Western Cross Timbers (29c) ecoregion (Griffith, Omernik, Cleland, McMahon, & Woods et. al 2004).

3.1 Ecoregion 29c Western Cross Timbers Level IV Ecoregion

The Western Cross Timbers ecoregion covers the wooded areas west of the Grand Prairie (29d) on sandstone and shale beds. The landscape has cuesta topography consisting of sandstone ridges with a gentle dip slope on one side and a steeper scarp on the other. The soils are mostly fine sandy loams with clay subsoils that retain water. As in the Eastern Cross Timbers (29b), the dominant trees are post oak and blackjack oak with an understory of greenbriar, little bluestem, and purpletop grasses. Some researchers contend that these woodland areas would be savanna-like if they experienced fire, although one early account described the Cross Timbers as "an immense natural hedge" or belt of thick impenetrable forest. It is likely that there were more prairie openings between the belts of forest. The area has a long history of coal, oil, and natural gas production from the Pennsylvanian sandstone/limestone/shale beds. Deeper soils in the eastern part of this ecoregion support a dairy industry, pastureland, and cultivation of forage sorghum, silage, corn, and peanuts.

3.2 Hydrology

The Project is located within the following watershed:

- Mackinally Creek-Pecan Bayou (Hydrologic Unit Code [HUC 12] 120901070407)

The entirety of the Project Area is located within the Mackinally Creek-Pecan Bayou watershed.

USACE, Fort Worth Regulatory District, office exercises regulatory jurisdiction over the Project Area. Tributaries to navigable waters may not be navigable themselves but have a significant impact on water quality in downstream waters through a surface connection and, therefore, are also under the jurisdiction of USACE. During the wetland delineation, Stantec scientists found all waterways within the Project Area to be natural. The entire Project Area drains into the Mackinally Creek-Pecan Bayou watershed.

According to the Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Map panel 48049C0550E (effective August 8, 2018), 0 acres (0 percent) of the Project Area is within the 100-year floodplain. Overall, hydrology, represented by the National Hydrography Dataset data and Watershed Boundary Dataset data (US Geological Survey [USGS] 2023a), streams, and floodplains are depicted in Figure 3-1.

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3.3 Land Use

The National Land Cover Dataset (NLCD) maps most of the Project Area as Grassland/Herbaceous, which constitutes 55% of the Surveyed Area (Table 3-1, Figure 3-2). Four additional land cover types are mapped within the Surveyed Area.

Table 3-1 NLCD Land Cover Types Within the Project Area

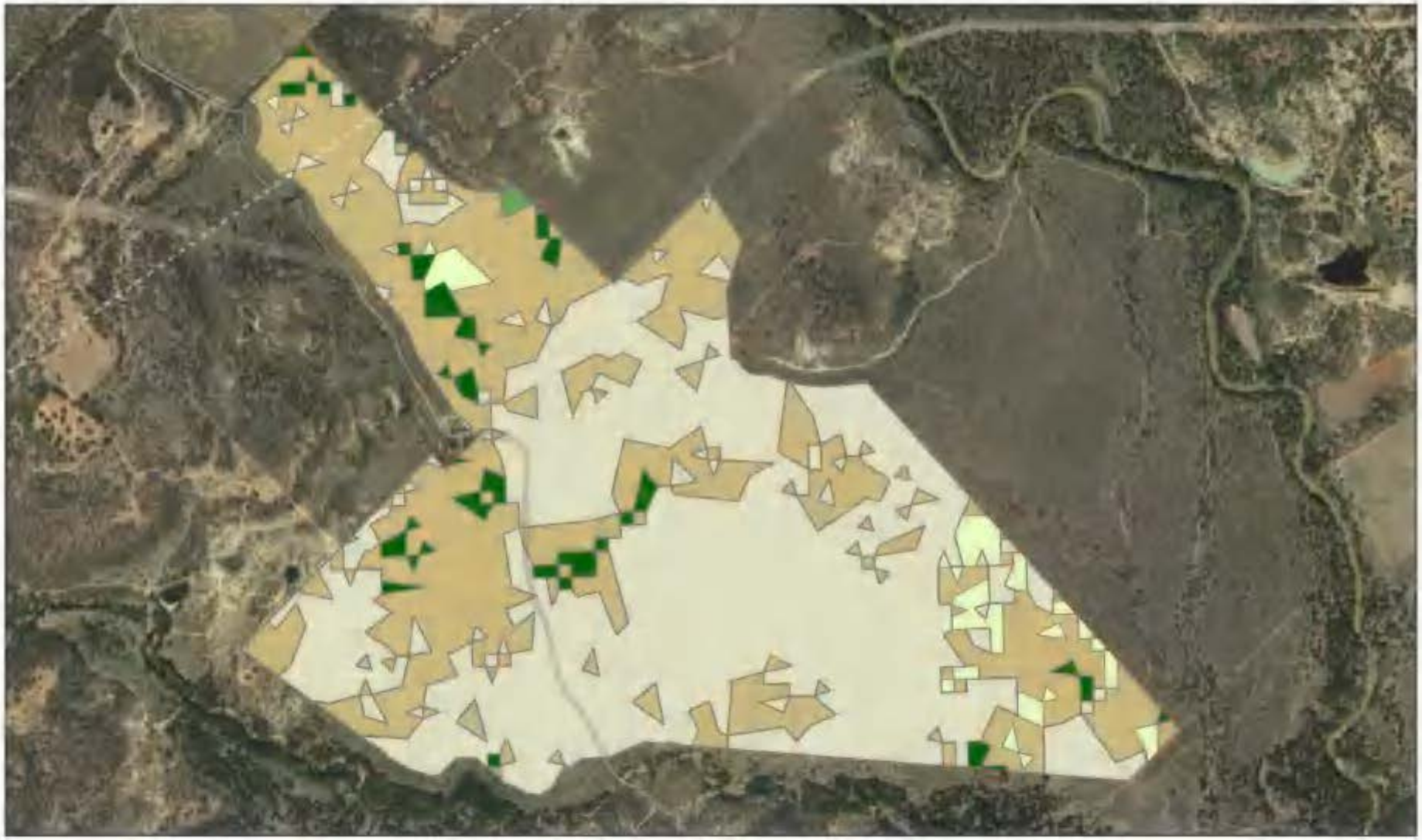
NLCD Cover Type	Acres within Project Area	Percentage of Project Area
Grassland/Herbaceous	396.7	55.0%
Shrub/Scrub	281.1	38.9%
Evergreen Forest	21.7	3.0%
Mixed Forest	21.1	2.9%
Deciduous Forest	1.2	0.2%

Source: US Geological Survey (USGS) 2021
Notes: NLCD - National Land Cover Dataset
Percentages and acreages may be slightly off due to rounding.

3.4 Soil Series

Soils within the Project Area can be generally described as moderately well drained and well drained soils. According to the US Department of Agriculture, Natural Resource Conservation Service (USDA-NRCS) website accessed December 2023, the Project Area is located within 9 soil map units, which are listed in Table 3-2. Two soil types within the Project Area boundaries met the hydric soil criteria as described by the National Technical Committee for Hydric Soils (Figure 3-3). Six of the soils are considered prime farmland and 3 of the soils are not considered prime farmland.

It should be noted that caution must be used when comparing the list of hydric components to soil survey maps. Many of the soil lists have ranges in water table depths that allow the soil component to range from hydric to non-hydric depending on the location of the soil within the landscape as described in the map unit. Lists of hydric soils along with soil survey maps are good offsite ancillary tools to assist in wetland determinations, but they are not a substitute for observations made during onsite investigations.



- Project Area
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Herbaceous
- Shrub/Scrub
- Grassland/Herbaceous

0 500 1,000 Feet
(At original document size of 8.5x11)
1:17,219

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources: National Land Cover Dataset (NLCD)
3. Background: NAIP Imagery (2023)

Stantec

Project Location:
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	236301227
Client	Red River Clean Energy, LLC
Project	Chrome Solar
Report	Wetland Report

Figure No.
3-2

Title
National Land Cover Dataset

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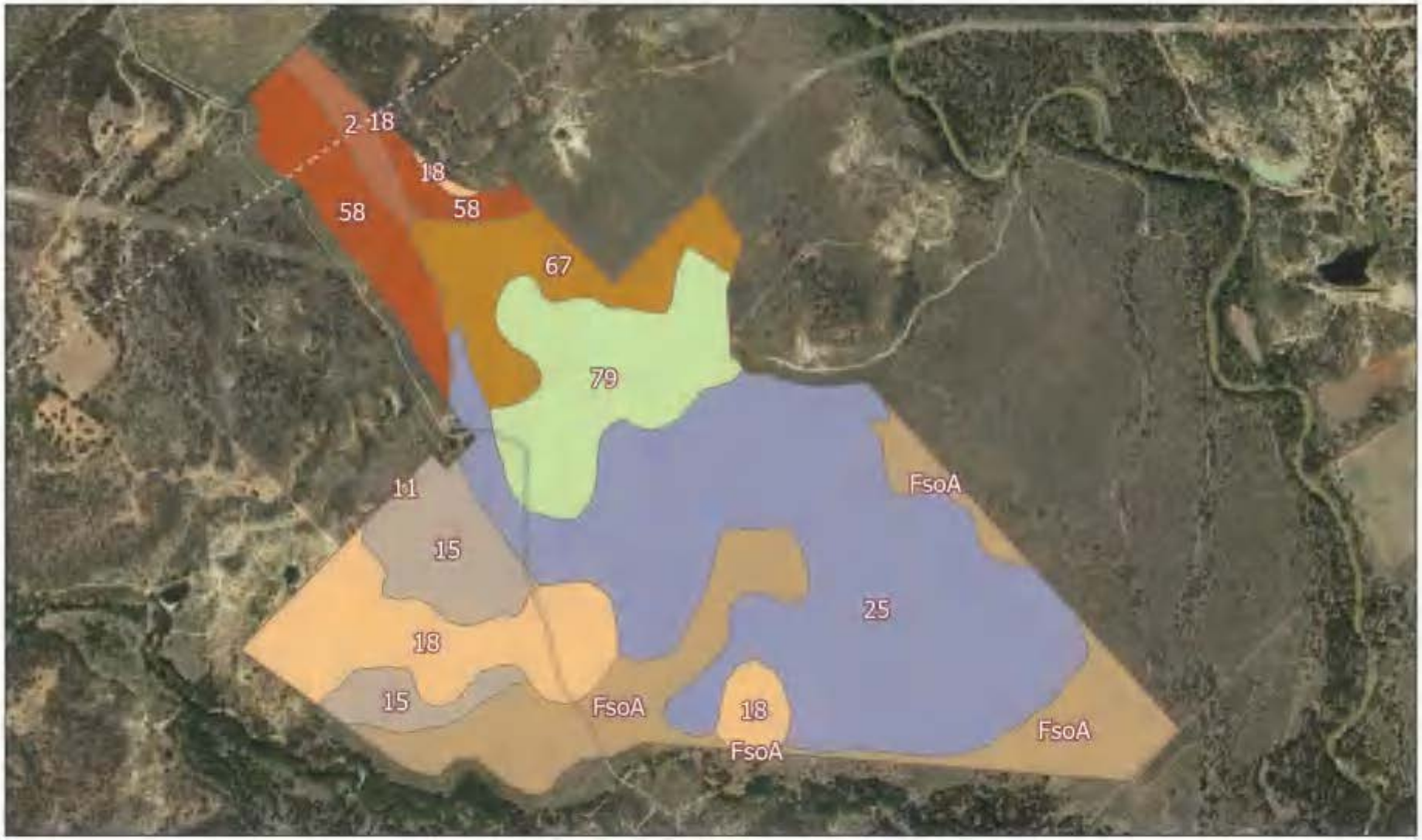
Table 3-2 Characteristics of Soil Mapping Units within the Project Area

Soil Name	Soil Symbol	Drainage Class	Permeability	Surface Runoff	Meets Hydric Criteria	Meets Prime Farmland	Percentage of Project Area
Abilene clay loam, moist, 1 to 3 percent slopes	2	Well drained	Moderately high	Medium	No	All areas are prime farmland	1.9%
Bonti-Owens complex, 8 to 30 percent slopes	11	Well drained	Moderately high	High	No	Not prime farmland	0.0%
Callahan loam, 1 to 3 percent slopes	15	Well drained	Very low to moderately low	High	No	Not prime farmland	7.4%
Callahan-Throck complex, 1 to 8 percent slopes	18	Well drained	Moderately low to moderately low	High	No	Not prime farmland	11.6%
Deleon silty clay, 0 to 1 percent slopes, rarely flooded	25	Moderately well drained	Moderately low to moderately high	Medium	Yes	All areas are prime farmland	37.8%
Pedernales fine sandy loam, 1 to 3 percent slopes	58	Well drained	Moderately high	Medium	No	All areas are prime farmland	7.2%
Sagerton clay loam, warm, 1 to 3 percent slopes	67	Well Drained	Moderately high	Medium	No	All areas are prime farmland	7.5%
Winters fine sandy loam, 1 to 3 percent slopes	79	Well drained	Moderately high	Medium	Yes	All areas are prime farmland	10.8%
Frio silty clay loam, 0 to 1 percent slopes, occasionally flooded	FsoA	Well drained	Moderately high	Low	No	All areas are prime farmland	15.9%

Source: USDA-NRCS 2023



Non-Hydric			Hydric
11	25	58	25
15	58	67	79
18	67	79	
2	79	FsoA	
	FsoA		

N

0 500 1,000 Feet

(At original document size of 8.5x11)
1:17,216

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources: NRCS Web Soil Survey
3. Background: NAIP Imagery (2023)

Stantec

Project Location:
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	215301227
Client	Red River Clean Energy, LLC
Project	Chrome Solar
Report	Wetland Report

Figure No.
3-3

Title
Soils Within the Project Area

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

4 Assessment Methodology

4.1 Desktop Site Investigation

Stantec conducted a desktop investigation of the Project Area using federal and local geographic information system (GIS) data to identify potential wetlands, waterbodies, floodplains, and habitats that could affect the Project development process. Potential WOTUS were identified using the US Fish and Wildlife Service's (USFWS's) National Wetlands Inventory (USFWS 2023a), USGS's National Hydrography Dataset GIS data layers and topographic maps (USGS 2023b), and FEMA's Flood Insurance Rate Map (FEMA 2023).

4.2 Field Site Investigation

Stantec scientists performed a field survey of the Project Area on October 31, 2023. Approximately 722 acres were surveyed for the presence of WOTUS, listed species, or potential habitats. Stantec scientists performed all wetland delineation surveys in accordance with the USACE's *Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (USACE 2010).

4.3 Wetlands and Waterbodies

Wetlands are collectively defined by USACE and USEPA as those areas that are inundated or saturated by surface water or groundwater at a frequency or duration sufficient to support, under normal circumstances, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987). An area is a wetland if it meets the wetland hydrology, hydrophytic vegetation, and hydric soil criteria established in the USACE manual.

Stantec scientists surveyed the Project Area for the presence/absence of wetlands and waterbodies (Appendix A). All pertinent field data were collected using the USACE's Great Plains wetland determination datasheets (Appendix B).

4.3.1 Hydrophytic Vegetation

Hydrophytic vegetation is defined as "the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (USACE 1987). Stantec identified dominant vegetation and categorized it in accordance with the regional indicator status in USACE's national list of plant species that occur in wetlands. The indicator status of a plant species is expressed in terms of the estimated probability of that species occurring in wetland conditions within a given region (USACE 2020). Table 4-1 lists the plant indicator status categories. A vegetative community would be determined to be hydrophytic if more than 50 percent of the dominant species present were facultative (FAC), facultative wetland (FACW), or obligate wetland (OBL).

Table 4-1 Plant Indicator Status Categories

Indicator Category	Indicator	Frequency of Occurrence in Wetlands (percent)
Obligate Wetland Plants	OBL	Plants that occur almost always (estimated probability >99%) in wetlands under natural conditions but that may also occur rarely (estimated probability <1%) in non-wetlands. Examples: *Carya aquatica* and *Persicaria punctata*.
Facultative Wetland Plants	FACW	Plants that usually occur (estimated probability 67–99%) in wetlands but also occur in non-wetlands. Examples: *Spartina patens* and *Panicum dichotomiflorum*.
Facultative Plants	FAC	Plants with a similar likelihood (estimated probability of 33–67%) of occurring in both wetlands and non-wetlands. Examples: *Stenotaphrum secundatum* and *Rumex cripus*.
Facultative Upland Plants	FACU	Plants that occur sometimes (estimated probability 1–33%) in wetlands but that occur more often (estimated probability 67–99%) in non-wetlands. Examples: *Cirsium vulgare* and *Rubus trivialis.*
Obligate Upland Plants	UPL	Plants that occur rarely (estimated probability <1%) in wetlands but almost always (>99% estimated probability) occur in non-wetlands. Example: *Geranium carolinianum.*

4.3.2 Wetland Hydrology

Wetland hydrology includes all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils from anaerobic and reducing conditions, respectively (USACE 1987).

4.3.3 Hydric Soils

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper stratum. In general, hydric soils are flooded, ponded, or saturated for a week or more during the growing season when soil temperatures are above 32 degrees Fahrenheit. The anaerobic conditions created by repeated or prolonged saturation or flooding result in permanent changes in soil color and chemistry and are used to differentiate hydric from non-hydric soils (USACE 1987).

At each recorded data point, a pit up to 20 inches deep was excavated for evaluation. Soils were surveyed to identify horizon profile, matrix, value, chroma, texture, and concretions.

Hydric soils were determined to be present if one primary hydric soil indicator was present. Background soils information for the Project Area was obtained from the USDA-NRCS Web Soil Survey (USDA-NRCS 2023).

4.4 Mapping

All delineated features were recorded using a sub-meter Global Positioning System (GPS) device. The GPS was programmed to record points with a minimum of four satellites and a position dilution of precision value that was no greater than 6.0. Stantec scientists delineated water features by collecting GPS points along the perimeter of the wetland or ordinary high-water mark with suitable frequency to represent the feature within the Project Area. Maps of delineated features are provided in Appendix A, and supporting datasheets are provided in Appendix B.

4.5 Photographs

Photographs are the visual documentation of site conditions as they existed during the field survey. Representative photographs were taken at all delineated features. For all features, a minimum of one photograph was taken. The photographic log is provided in Appendix C.

5 Results of Findings

5.1 Threatened and Endangered Species Assessment

Stantec conducted desktop environmental assessments and onsite habitat evaluations for listed species within the Project Area. Table 5-1 lists the state and federally protected species that were identified by the USFWS's IPaC (USFWS 2023c) database as having the potential to occur within the Project Area or be affected by the Project. Copies of the IPaC and state lists are provided in Appendix A. In total, 4 listed species were identified by the USFWS IPaC database as potentially occurring in Mills and Brown counties. Of the listed species, none were determined to have a moderate likelihood of occurring in the Project Area based on the available habitat and site conditions. No presence of these species was recorded during the site investigation.

Table 5-1 Listed Species for Decatur and Shelby Counties

Category	Common Name	Scientific Name	Federal Status[1]	Likelihood of Occupying the Project Area
Mammals	Tricolored bat	*Perimyotis subflavus*	PE	Low
Birds	Piping Plover	*Charadrius melodus*	T	Low
	Rufa Red Knot	*Calidris canutus rufa*	T	Low
Insect	Monarch butterfly	*Danaus plexippus*	C	Low

Notes: C – Candidate
E – Endangered
T – Threatened
PE – Proposed Endangered
PT – Proposed Threatened

5.1.1.1.1 Birds

The USFWS iPaC listed species list for Mills and Brown counties identified the Piping plover (*Charadrius melodus*) and Rufa red knot (*Calidris canutus rufa*) as a species of concern. Per the iPaC, the Piping plover and Rufa red knot only need to be considered for wind energy projects, so they do not apply to this Project.

5.1.1.1.2 Mammals

Stantec examined the Project Area for potential bat habitat. The tricolored bat (*Perimyotis subflavus*) primarily roost in caves, mines, and culverts during the winter and in trees or structures during the summer roosting season (USFWS, 2022). No known refuges are known to occur in Mills and Brown counties for the species according to USFWS's publicly available map application. No caves or snags for potential roosting were identified. To avoid potential impacts to bats, the Project should avoid waterways, wetlands, and forested areas, and if any trees bordering riparian areas need to be cleared; clearing would occur only during the non-roosting season (winter), outside the active bat season (generally Spring through Fall); then, the Project is not likely to adversely affect federally listed bat species.

5.1.1.1.3 Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) is a candidate species for federal listing, but it is not state protected. Consequently, it does not have federal protection. Milkweeds were not observed in during the October visit. Solar panel construction and conversion of cropland or woodlands may allow for diversity and growth of wildflowers, potentially creating more habitat for milkweeds and monarch butterflies.

5.1.1.2 Regulatory Framework

The following sections provide descriptions of state and federal regulations that pertain to the protection of wildlife and plant species. These regulations may need to be considered if development of the Project would impact protected species or associated habitats.

5.1.1.2.1 Federal Regulations

Endangered Species Act

The Endangered Species Act of 1973 (ESA; 16 United States Code [USC] 1531 et seq. [1973]) establishes a national policy for conserving threatened and endangered (T&E) species of fish, wildlife, and plants and the critical habitats on which they depend. The US Fish and Wildlife Service (USFWS; for terrestrial and freshwater species) and the National Oceanic and Atmospheric Administration Fisheries (for marine species) jointly administer the ESA and are responsible for listing a species as threatened or endangered, designating critical habitat, developing and implementing protective regulations and recovery plans, and undertaking several other management and conservation efforts pursuant to the ESA (e.g., review of project impacts and mitigation, impact determinations, and issuing permits). The Project would fall under the jurisdiction of USFWS.

Section 9 of the ESA prohibits the *take* of any fish or wildlife species listed under the ESA as endangered or of any endangered plant species on federal lands (16 USC 1538 [1973]). By regulation, USFWS has extended this take prohibition to most species listed as threatened (50 Code of Federal Regulations [CFR] 17.31 [2019]). Because the Project is on private land (see Section 3), federally listed plants would not be regulated in the Project Area. Under the ESA, the term *take* for fish and wildlife means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (16 USC 1532(19) [1973]). If a project may adversely affect a species listed under the ESA, non-federal projects can obtain an incidental take authorization by applying for an incidental take permit, which involves developing, funding, and implementing a USFWS-approved Habitat Conservation Plan to minimize and mitigate the effects of the proposed taking (16 USC 1539(a)(2) [1973] and 50 CFR 17.22(b) [1985]). The determination of the potential for a Project to affect a threatened or endangered species is determined through consultation with the USFWS and may require additional surveys to further determine if a species would be affected by a proposed Project.

Bald and Golden Eagle Protection Act

Bald eagles *(Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) eagles are afforded protection under the Bald and Golden Eagle Protection Act of 1940 (BGEPA; 50 CFR 22.26 [2009]). The BGEPA, along with its implementing regulations, provides additional protection to bald and golden eagles. In this statute, the definition of take is to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest, or disturb.” The term disturb, as defined in regulations found at 50 CFR 22.3 (1974), is “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by

substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

USFWS published a final rule (Eagle Permit Rule) on September 11, 2009, under the BGEPA authorizing limited issuance of permits to take bald eagles and golden eagles ''for the protection of other interests in any particular locality.'' This rule applies where the take is compatible with the preservation of the bald and golden eagles, is associated with and not the purpose of an otherwise lawful activity and cannot practicably be avoided (74 Federal Register 46836 [September 11, 2009]).

If further evaluation identifies nests and/or high eagle use in an area and construction of a project may result in take of the species, a nest disturbance permit could be acquired to comply with the regulations of the BGEPA. No nests were documented during habitat surveys.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA; 16 USC 703−712 [1918]) assigns legal authority to USFWS to protect more than 1,000 species of raptors, diurnal migrants, and passerine migratory birds from take. USFWS maintains a list of species protected by the MBTA at 50 CFR 10.13 (1973). The MBTA prohibits the "taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior" (16 USC 703 [1918]). The term take is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR 10.12 [1973]). However, there is currently no mechanism for authorizing incidental take under the MBTA. If significant tree clearing would be required to construct the Project then it is recommended that tree clearing occur outside of the bird nesting season April 1 through August 31 or a pre-clearing nest survey be conducted to eliminate potential take (USDA 2018). During the July 2023 site visit, one active nest of baby songbirds was discovered in an oak sapling close to the ground. Specific species could not be identified but the young appeared to be either a species of swallow or potentially oriole.

5.2 Precipitation Data

According to the USACE's Antecedent Precipitation Tool (version 1.0.19), climatic conditions at the Project Area during the time of survey were considered normal conditions. The drought index through the Palmer Drought Severity Index indicated the area was experiencing wetter than normal conditions at the time of survey. The nearest reporting regional station with historical precipitation data (100 miles east of the Project in Waco, TX) reported 2.73 inches for the week prior to the survey. During the week of the survey, 1.05 inches of precipitation were recorded in Mills and Brown counties, Texas. The rainfall data for the Project Area are presented in Table 5-1.

Table 5-2 Rainfall Data for Mills and Brown Counties, Texas.

Month	Recorded Monthly Rainfall (inches)
July, 2023	0
August, 2023	0.08
September, 2023	3.34
October, 2023	4.90
November, 2023	1.80

Source: Weather Underground 2023

Precipitation amounts were typical for July through November.

5.3 Wetlands

Stantec scientists investigated the Project Area for wetlands that exhibited the three USACE criteria (hydrophytic vegetation, wetland hydrology, and hydric soils) and delineated 5 wetlands: 2 palustrine emergent (PEM) wetlands and 3 palustrine unconsolidated bottom (PUB) wetlands, totaling 2.66 acres (Table 5-2). A figure depicting delineated features is included in Appendix A, and datasheets are presented in Appendix B.

Table 5-3 Delineated Wetlands

Map ID[1]	Wetland Classification[2]	Latitude[3]	Longitude[3]	Acreage within Survey Area	Potentially Jurisdictional?
WET-1	PEM	31.57428	-98.828117	0.08	No
WET-2	PUB	31.574127	-98.828463	0.31	No
WET-3	PEM	31.569901	-98.827491	1.18	No
WET-4	PUB	31.565749	-98.83087	0.99	No
WET-5	PUB	31.56432	-98.82625	0.10	No
			Potentially Non-Jurisdictional	*2.66*	
			Total	**2.66**	

[1] Map identification represents unique designations given to each wetland during field surveys.
[2] Wetland classification represents the wetland classes based on Cowardin et al. (1979).
[3] Latitude and longitude presented in North American Datum of 1983 decimal degrees.

Notes: PEM – palustrine emergent wetland
PUB – palustrine unconsolidated-bottom wetland (pond)

5.4 Waterbodies

Stantec scientists identified 6 ephemeral streams totaling 4,438 feet (0.84 miles) within the Project Area (Table 5-3). A map book depicting all delineated streams can be found in Appendix A.

Table 5-4 Delineated Streams

Map ID[1]	Stream Classification[2]	Latitude[3]	Longitude[3]	Linear Feet within Project Area	Miles within Project Area	Potentially Jurisdictional?
S-1	Ephemeral	31.574292	-98.828262	80.16	0.02	No
S-2	Ephemeral	31.569374	-98.826927	147.75	0.03	No
S-3	Ephemeral	31.570639	-98.827972	245.28	0.05	No
S-4	Ephemeral	31.562938	-98.809992	349.68	0.07	No
S-5	Ephemeral	31.562781	-98.81029	178.56	0.03	No
S-6	Ephemeral	31.563209	-98.810166	190.96	0.04	No
S-7	Intermittent	31.570678	-98.819424	6147.85	1.16	Yes
S-8	Intermittent	31.5624065	-98.809942	232.10	0.04	Yes

Map ID[1]	Stream Classification[2]	Latitude[3]	Longitude[3]	Linear Feet within Project Area	Miles within Project Area	Potentially Jurisdictional?
			Potentially Jurisdictional Subtotal[4]	*6,379.95*	*1.2*	
			Potentially Non-Jurisdictional[4]	*1,192.39*	*0.23*	
			Total[4]	**7,572.34**	**1.43**	

1 Map identification represents unique designations given to each stream during field surveys.
2 Stream classification determined from topographic maps and field observations.
3 Latitude and longitude presented in North American Datum of 1983 decimal degrees.
4 Column may not equal the sum of all rows due to rounding.

6 Conclusion and Recommendations

Stantec reviewed historical and current topographic maps, historical and current aerial imagery, wetland inventory maps, flood maps, and soil survey data as part of a desktop investigation during its wetland delineation. Stantec also completed wetland and waterbody field surveys to document WOTUS within the Project Area.

In compliance with Section 404 of the Clean Water Act, this report contains a delineation of potential WOTUS that may fall under the jurisdiction of USACE. The desktop review and field delineation were performed by Stantec scientists in which all potentially jurisdictional waters within the Project Area were mapped and characterized. Stantec scientists identified 5 wetlands and 8 streams within the Project Area. Only 2 stream features appear to have hydrologic connection to onsite and offsite streams that flow into Fisk Creek and into Pecan Bayou, a tributary of the Colorado River, which is a TNW. A total of 0 acres (0 percent) of the Project Area is within the FEMA 100-year floodplain. If the Project were to impact potentially jurisdictional waters, Stantec recommends obtaining a jurisdictional determination from the USACE, Fort Worth Regulatory District, office to determine whether the identified wetlands and waterways would be considered jurisdictional by USACE.

7 References

Cowardin, L., V. Carter, E. Golet, and T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. US Department of the Interior, Fish and Wildlife Service, Washington, D.C.

FEMA (Federal Emergency Management Agency). 2023. National Flood Hazard Layer (NFHL) ArcGIS Viewer. Retrieved from National Flood Hazard Layer. Available at: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd. Accessed December 2023.

Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D., 2004, Ecoregions of Texas (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,500,000). Available at: Ecoregion Download Files by State - Region 6 | US EPA. Accessed December 2023.

USACE (US Army Corps of Engineers). 1987. *Corps of Engineers Wetlands Delineation Manual*. Environmental Laboratory, Vicksburg, Mississippi.

————. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region.* Version 2.0. US Army Engineer Research and Development Center, Vicksburg, Mississippi.

————. 2020. National Wetland Plant List. Available at: https://wetland-plants.sec.usace.army.mil/nwpl_static/v34/home/home.html. Accessed December 2023.

USDA-NRCS (US Department of Agriculture, Natural Resources Conservation Service). 2023. Web Soil Survey: Area of Interest Interactive Map. Available at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed December 2023.

USEPA (US Environmental Protection Agency). 2021. *Current Implementation of Waters of the United States*. Available at: https://www.epa.gov/wotus/current-implementation-waters-united-states. Accessed December 2023.

USFWS (US Fish and Wildlife Service). 2023a. National Wetland Inventory: Wetlands Mapper. Available at: https://fws.gov/wetlands/data/Mapper.html. Accessed December 2023.

USGS (US Geological Survey). 2023a. National Hydrography Dataset; Watershed Boundary Dataset. Available at: https://apps.nationalmap.gov/downloader/#/. Accessed December 2023.

——— 2023b. TNM Download V2.0. Retrieved from National Map Download at: https://apps.nationalmap.gov/downloader/. Accessed December 2023.

Weather Underground. 2023. Weather History for Goldthwaite, TX (Waco Regional Airport Station). Available at: https://www.wunderground.com/history/daily/us/tx/goldthwaite/KACT. Accessed December 2023.

APPENDIX A

Delineated Features

Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

0 640 Feet
(At original document size of 8.5x11)
1:17,218

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources:
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Nolan and Brown Counties, Texas

Prepared by KR on 12/9/2025

Client/Project 215301227
Client Red River Clean Energy, LLC
Project Chisme Solar
Report Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 100 Feet
(At original document size of 8.5x11)
1:2,889

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources:
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	215301227
Client	Red River Clean Energy, LLC
Project	Chisme Solar
Report	Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

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Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 40
Feet
(At original document size of 8.5x11)
1:1,309

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	215301227
Client	Red River Clean Energy, LLC
Project	Chisme Solar
Report	Wetland Report

Appendix:
A

Title
Wetlands and Waterbodies

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Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 80
Feet
(At original document size of 8.5x11)
1:2,216

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources:
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	235301227
Client	Red River Clean Energy, LLC
Project	Chisme Solar
Report	Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

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Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 75 Feet
(At original document size of 8.5x11)
1:2,045

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources:
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	235301227
Client	Red River Clean Energy, LLC
Project	Chisme Solar
Report	Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

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Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 120
Feet
(At original document size of 8.5x11)
1:3,195

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources:
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	215301227
Client	Red River Clean Energy, LLC
Project	Chisme Solar
Report	Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

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Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 50 Feet
(At original document size of 8.5x11)
1:1,497

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	235301227
Client	Red River Clean Energy, LLC
Project	Chisme Solar
Report	Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

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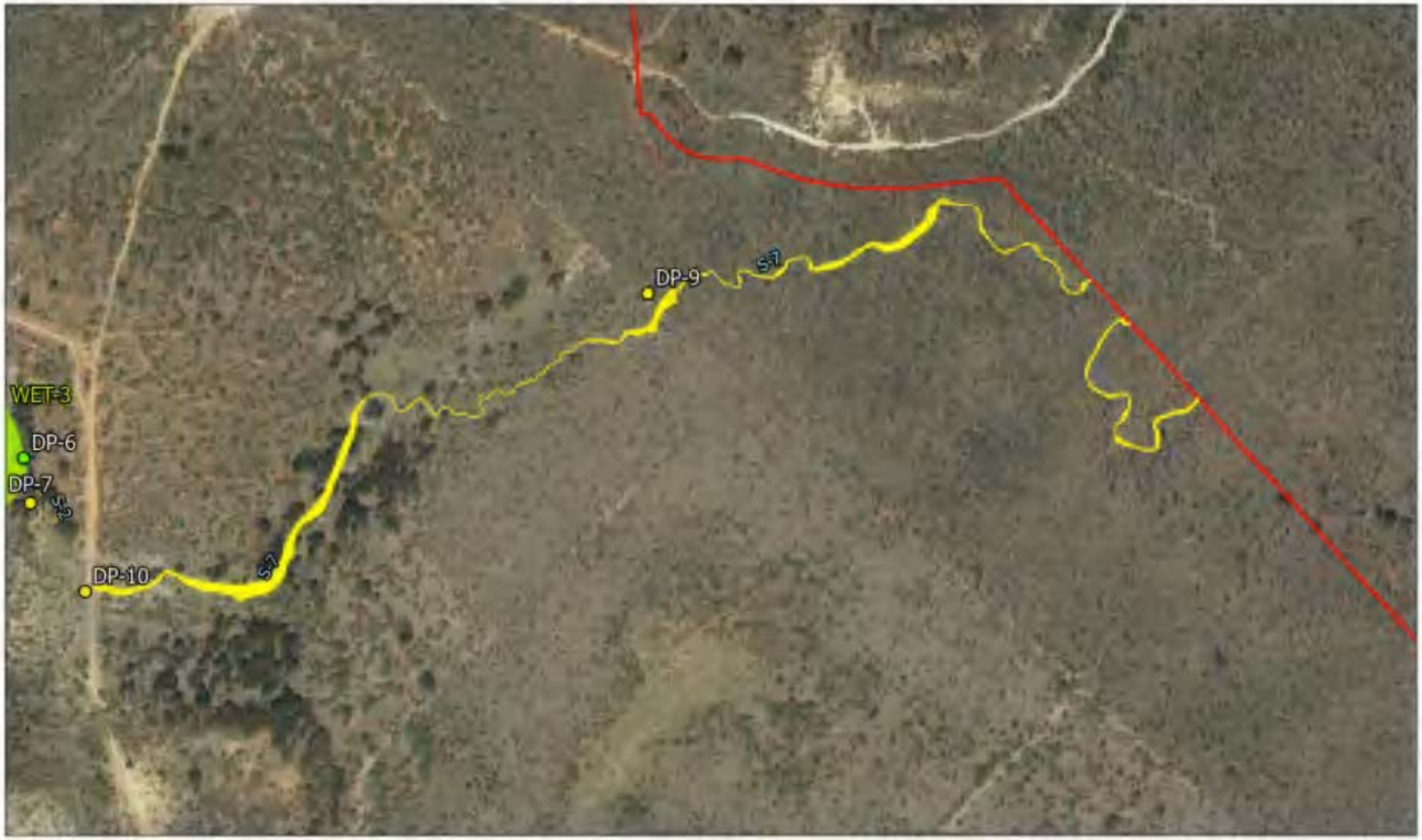

Project Area
PEM
PUB
Ephemeral
Intermittent
Perennial
Upland Datapoint
Wetland Datapoint

N

0 240
Feet
(At original document size of 8.5x11)
1:6,499

Notes
1. Coordinate System: NAD 1983 HARN StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources
3. Background: NAIP Imagery (2023)

Stantec

Project Location
Nolan and Brown Counties, Texas

Prepared by KR on 12/8/2023

Client/Project	215301227
Client	Red River Clean Energy, LLC
Project	Dhanis Solar
Report	Wetland Report

Appendix
A

Title
Wetlands and Waterbodies

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APPENDIX B

Wetland Determination Datasheets

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-1

Investigator(s): Section, Township, Range:

Landform (hillside, terrace, etc.): Talf Local relief (concave, convex, none): Linear Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.579726 Long: -98.834564 Datum: WGS84

Soil Map Unit Name: 58 - Pedernales fine sandy loam, 1 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prosopis glandulosa*	15	Yes	FACU
2.			
3.			
4.			
5.			
	15 = Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Opuntia engelmannii*	25	Yes	UPL
3. *Solanum carolinense*	15	Yes	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 5/4	100					Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: CL

Depth (inches): 16

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes ___	No X	Depth (inches): ___
Water Table Present	Yes ___	No X	Depth (inches): ___
Saturation Present (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-2

Investigator(s): CJ, KR Section, Township, Range:

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.573641 Long: -98.828582 Datum: WGS84

Soil Map Unit Name: 67 - Sagerton clay loam, warm, 1 to 3 percent slopes NWI classification: PUSCh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____

Hydric Soil Present? Yes X No ____

Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

15 ft

Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.	0		
	= Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Iva annua*	50	Yes	FAC
3. *Juncus effusus*	35	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	85 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	95%	10YR 4/4	5	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes X	No ___	Depth (inches):	2
Water Table Present	Yes X	No ___	Depth (inches):	6
Saturation Present (includes capillary fringe)	Yes X	No ___	Depth (inches):	4

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-3

Investigator(s): CJ, KR Section, Township, Range:

Landform (hillside, terrace, etc.): Rise Local relief (concave, convex, none): Linear Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.574247 Long: -98.828224 Datum: WGS84

Soil Map Unit Name: 67 - Sagerton clay loam, warm, 1 to 3 percent slopes NWI classification: PEM1Ah

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)

Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

15 ft

Sapling/Shrub Stratum (Plot size: ____)			
1. Opuntia – Cylindropuntia leptocaulis	25	Yes	UPL
2.			
3.			
4.			
5.	25		
	= Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Solanum elaeagnifolium*	25	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16							Clay Loam	10YR 3/2 100%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present Yes ___ No ___ Depth (inches): ___

Water Table Present Yes ___ No ___ Depth (inches): ___

Saturation Present (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-4

Investigator(s): CJ,KR Section, Township, Range:

Landform (hillside, terrace, etc.): Talf Local relief (concave, convex, none): Linear Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.575363 Long: -98.825227 Datum: WGS84

Soil Map Unit Name: 67 - Sagerton clay loam, warm, 1 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2. *Prosopis glandulosa*	25	Yes	UPL
3.			
4.			
5.			
	25 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prosopis glandulosa*	60	Yes	FACU
2.			
3.			
4.			
5.	60		
	= Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Megathyrsus maximus*	25	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	7.5YR 3/2	100					Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16)
- ___ **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16)
- ___ **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes ___	No X	Depth (inches): ___
Water Table Present	Yes ___	No X	Depth (inches): ___
Saturation Present (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: TX Sampling Point: DP-5

Investigator(s): KR CJ Section, Township, Range:

Landform (hillside, terrace, etc.): Talf Local relief (concave, convex, none): Linear Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.576264 Long: -98.825512 Datum: WGS84

Soil Map Unit Name: 67 - Sagerton clay loam, warm, 1 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prosopis glandulosa*	80	Yes	FACU
2.			
3.			
4.			
5.	80 = Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Opuntia Engelmannii*	20	Yes	UPL
3. *Megathyrsus maximus*	10	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.	30 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	80	x 4 =	320
UPL species	20	x 5 =	100
Column Totals:	110 (A)		450 (B)

Prevalence Index = B/A = 4.09

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	7.5YR 3/2	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**
- ___ 1 cm Muck (A9) **(LRR I, J)**

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes ___	No X	Depth (inches): ___
Water Table Present	Yes ___	No X	Depth (inches): ___
Saturation Present (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-6

Investigator(s): CJ, KR Section, Township, Range:

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.569861 Long: -98.827211 Datum: WGS84

Soil Map Unit Name: 25 - Deleon silty clay, 0 to 1 percent slopes, rarely flooded NWI classification: PUSCh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____

Hydric Soil Present? Yes X No ____

Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2. *Ulmus crassifolia*	45	Yes	FAC
3.			
4.			
5.			
	45 = Total Cover		

15 ft

Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.	0		
	____ = Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Juncus effusus*	60	Yes	OBL
3. *Iva annua*	25	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	85 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- - 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	75	10YR 3/6	25	C	M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16)
- ___ **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16)
- ___ **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): 16

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes X	No ___	Depth (inches):	12
Water Table Present	Yes X	No ___	Depth (inches):	6
Saturation Present (includes capillary fringe)	Yes X	No ___	Depth (inches):	4

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-7

Investigator(s): CJ, KR Section, Township, Range:

Landform (hillside, terrace, etc.): Talf Local relief (concave, convex, none): Linear Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.5694 Long: -98.827098 Datum: WGS84

Soil Map Unit Name: 25 - Deleon silty clay, 0 to 1 percent slopes, rarely flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prosopis glandulosa*	30	Yes	UPL
2. *Ulmus crassifolia*	15	Yes	FAC
3. *Cylindropuntia leptocaulis*	15	No	UPL
4.			
5.			
	60 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1.			
2. *Chasmanthium latifolia*	20	Yes	FAC
3. *Lysimachia nummularia*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	25 = Total Cover		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- - 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 4/4	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) **(LRR F)**
- 1 cm Muck (A9) **(LRR F, G, H)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**
- 1 cm Muck (A9) **(LRR I, J)**

Indicators for Problematic Hydric Soils[3]:

- Coast Prairie Redox (A16) **(LRR F, G, H)**
- Dark Surface (S7) **(LRR G)**
- High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: CL

Depth (inches):

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Dry-Season Water Table (C2)
- Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- Presence of Reduced Iron (C4)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Sparsely Vegetated Concave Surface (B8)
- Drainage Patterns (B10)
- Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)
- Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes ____	No X	Depth (inches): ____
Water Table Present	Yes ____	No X	Depth (inches): ____
Saturation Present (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: Tex Sampling Point: DP-8

Investigator(s): CJ,KR Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope %: 1-2

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.563052 Long: -98.809999 Datum: WGS84

Soil Map Unit Name: FsoA - Frio silty clay loam, 0 to 1 percent slopes, occasionally NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prosopis glandulosa*	60	Yes	FACU
2.			
3.			
4.			
5.			
	60 = Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Chasmanthium latifolium*	60	Yes	FACU
3. *Tridens albescens*	20	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 3/3	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes ___	No X	Depth (inches): ___
Water Table Present	Yes ___	No X	Depth (inches): ___
Saturation Present (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: TX Sampling Point: DP-9

Investigator(s): KR CJ Section, Township, Range:

Landform (hillside, terrace, etc.): Talf Local relief (concave, convex, none): Linear Slope %: 0

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.571521 Long: -98.819864 Datum: WGS84

Soil Map Unit Name: 25 - Deleon silty clay, 0 to 1 percent slopes, rarely flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

15 ft

Sapling/Shrub Stratum (Plot size: ____)			
1. *Prosopis glandulosa*	15	No	FACU
2.			
3.			
4.			
5.	15		
	= Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Opuntia engelmannii*	10	No	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	10 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 3/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**
- ___ 1 cm Muck (A9) **(LRR I, J)**

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes X	No ___	Depth (inches):	5
Water Table Present	Yes ___	No X	Depth (inches):	___
Saturation Present (includes capillary fringe)	Yes ___	No X	Depth (inches):	___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Flooded depression, holding spillover water from main stream, not functioning as a stream or wetland

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Texas Solar Sites - Chisme Solar City/County: Mills, Brown Sampling Date: 10/31/2023

Applicant/Owner: Red River Clean Energy, LLC State: TX Sampling Point: DP-10

Investigator(s): KR CJ Section, Township, Range:

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 1-2

Subregion (LRR or MLRA): LRR J, MLRA 84B Lat: 31.56851 Long: -98.826483 Datum: WGS84

Soil Map Unit Name: 25 - Deleon silty clay, 0 to 1 percent slopes, rarely flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____ , Soil ____ , or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes ____ No X

Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks: (Explain alternative procedures here or in a separate report.)
Wetter than Normal

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prosopis glandulosa*	60	Yes	FACU
2.			
3.			
4.			
5.	60 = Total Cover		

Herb Stratum (Plot size: 5 ft)			
1.			
2. *Opuntia engelmannii*	15	Yes	UPL
3. *Cylindropuntia leptocaulis*	5	Yes	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.	20 = Total Cover		

Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	60	x 4 =	240
UPL species	20	x 5 =	100
Column Totals:	80 (A)		340 (B)

Prevalence Index = B/A = 4.25

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	7.5YR 3/2	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9) **(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR I, J)**
- ___ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present	Yes ___	No X	Depth (inches): ___
Water Table Present	Yes ___	No X	Depth (inches): ___
Saturation Present (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C

Threatened and Endangered Species Documents

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Austin Ecological Services Field Office
1505 Ferguson Lane
Austin, TX 78754-4501
Phone: (512) 937-7371

In Reply Refer To:
Project Code: 2024-0023834
Project Name: Chisme Solar

December 06, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Austin Ecological Services Field Office
1505 Ferguson Lane
Austin, TX 78754-4501
(512) 937-7371

PROJECT SUMMARY

Project Code: 2024-0023834
Project Name: Chisme Solar
Project Type: Power Gen - Solar
Project Description: Solar project in Mills and Brown counties, Texas
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@31.572072249999998,-98.82193864003699,14z

Counties: Brown and Mills counties, Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is final critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot *Calidris canutus rufa* There is proposed critical habitat for this species. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency:	Stantec
Name:	Kevin Rubio
Address:	8401 Shoal Creek Boulevard
Address Line 2:	Suite 100
City:	Austin
State:	TX
Zip:	78757
Email	kevin.rubio@stantec.com
Phone:	7134471938

APPENDIX D

Photographic Log

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No. 1 | **Date:** 10/31/2023

Coordinates: 31.57427977, -98.82811726

Photo Direction: NE

Description: WET-1 Palustrine Emergent Weland (PEM) at DP-2

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No. 2 | **Date:** 10/31/2023

Coordinates: 31.5741274,98.8284626

Photo Direction: S

Description: WET-2 Palustrine Unconsolidated Bottom (PUB)

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
3	10/31/2023

Coordinates: 31.56990052, 98.82749148

Photo Direction: N

Description: WET-3 Palustrine Emergent Weland (PEM) at DP-6

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
4	10/31/2023

Coordinates: 31.56574855, -98.8308703

Photo Direction: NE

Description: WET-4 Palustrine Unconsolidated Bottom (PUB)

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
5	10/31/2023

Coordinates:
31.5643200,-98.82624985

Photo Direction:
S

Description:
WET-5 Palustrine Unconsolidated Bottom (PUB)

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
6	10/31/2023

Coordinates:
31.574349, 98.82821

Photo Direction:
NE

Description:
Upstream view of ephemeral stream S-1

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
7	10/31/2023

Coordinates:
31.569252, -98.826846

Photo Direction:
NW

Description:
Downstream view of ephemeral stream S-2

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
8	10/31/2023

Coordinates:
31.5706554, -98.827973

Photo Direction:
NW

Description:
Downstream view of ephemeral stream S-3

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
9	10/31/2023

Coordinates:
31.562805, -98.81008

Photo Direction:
S

Description:
Upstream view of ephemeral stream S-4

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
10	10/31/2023

Coordinates:
31.562832, -98.81034

Photo Direction:
SE

Description:
Upstream view of ephemeral stream S-5

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
11	10/31/2023

Coordinates:
31.563034, -98.81002

Photo Direction:
SW

Description:
Downstream view of ephemeral stream S-6

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
12	10/31/2023

Coordinates:
31.570205, -98.823338

Photo Direction:
SW

Description:
Upstream view of Intermittent stream S-7

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
13	10/31/2023

Coordinates:
31.562438, -98.809962

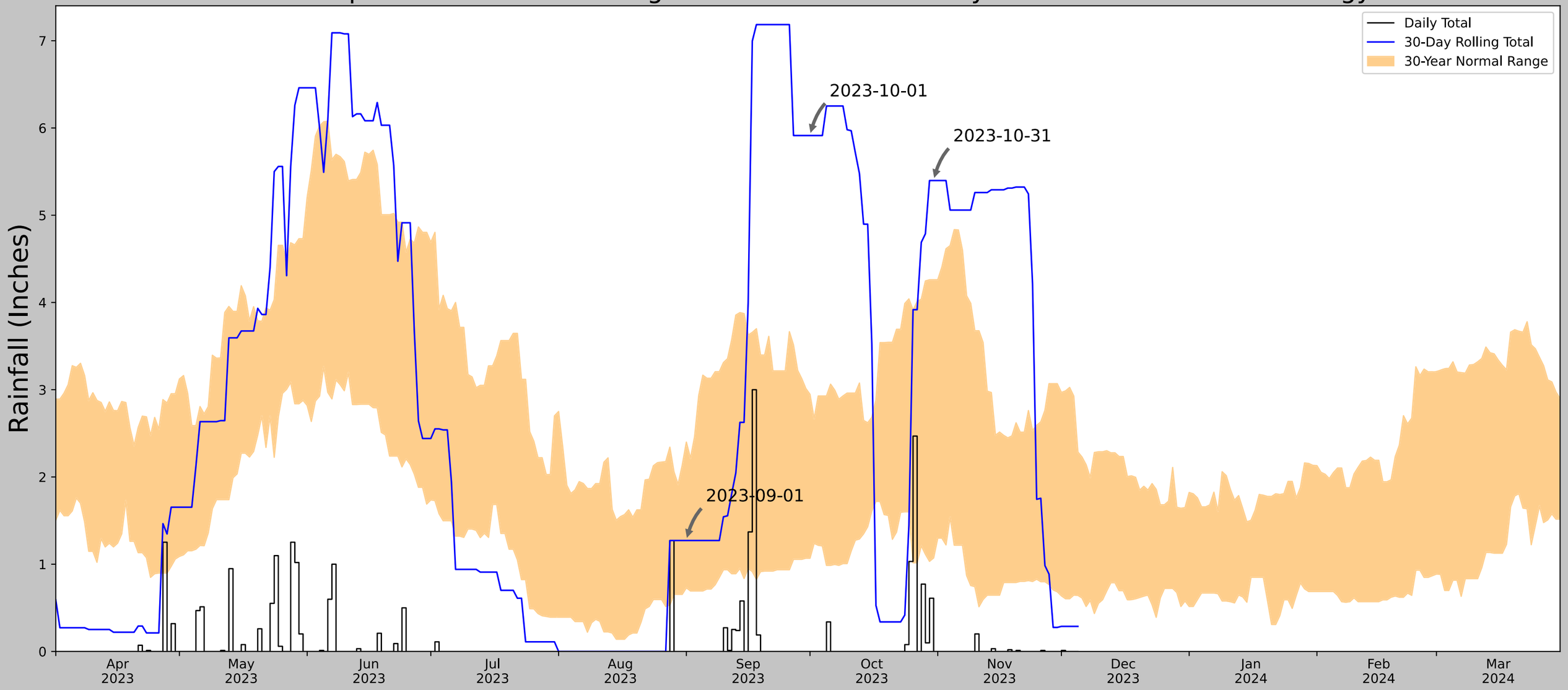
Photo Direction:
W

Description:
Upstream view of intermittent stream S-8 (Fisk Creek)

APPENDIX E

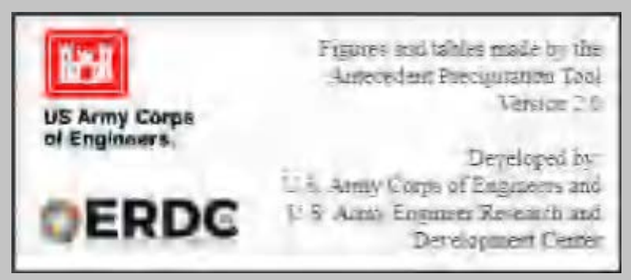
APT Results

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	31.5684635, -98.8215451
Observation Date	2023-10-31
Elevation (ft)	1267.878
Drought Index (PDSI)	Moderate drought
WebWIMP H_2O Balance	Dry Season

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-10-31	1.072047	4.260236	5.397638	Wet	3	3	9
2023-10-01	1.068898	2.94685	5.913386	Wet	3	2	6
2023-09-01	0.729528	2.399213	1.271654	Normal	2	1	2
Result							Wetter than Normal - 17



Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
GOLDTHWAITE 1 WSW	31.4406, -98.5903	1506.89	16.236	239.012	11.187	11124	89
GOLDTHWAITE 5.1 WNW	31.4745, -98.6538	1367.126	4.415	139.764	2.604	43	0
GOLDTHWAITE 6.9 ENE	31.4985, -98.4664	1500.984	8.326	5.906	3.796	0	1
MULLIN 3.9 WSW	31.528, -98.7243	1372.047	9.94	134.843	5.813	2	0
CENTER CITY	31.4683, -98.4106	1365.158	10.763	141.732	6.369	183	0

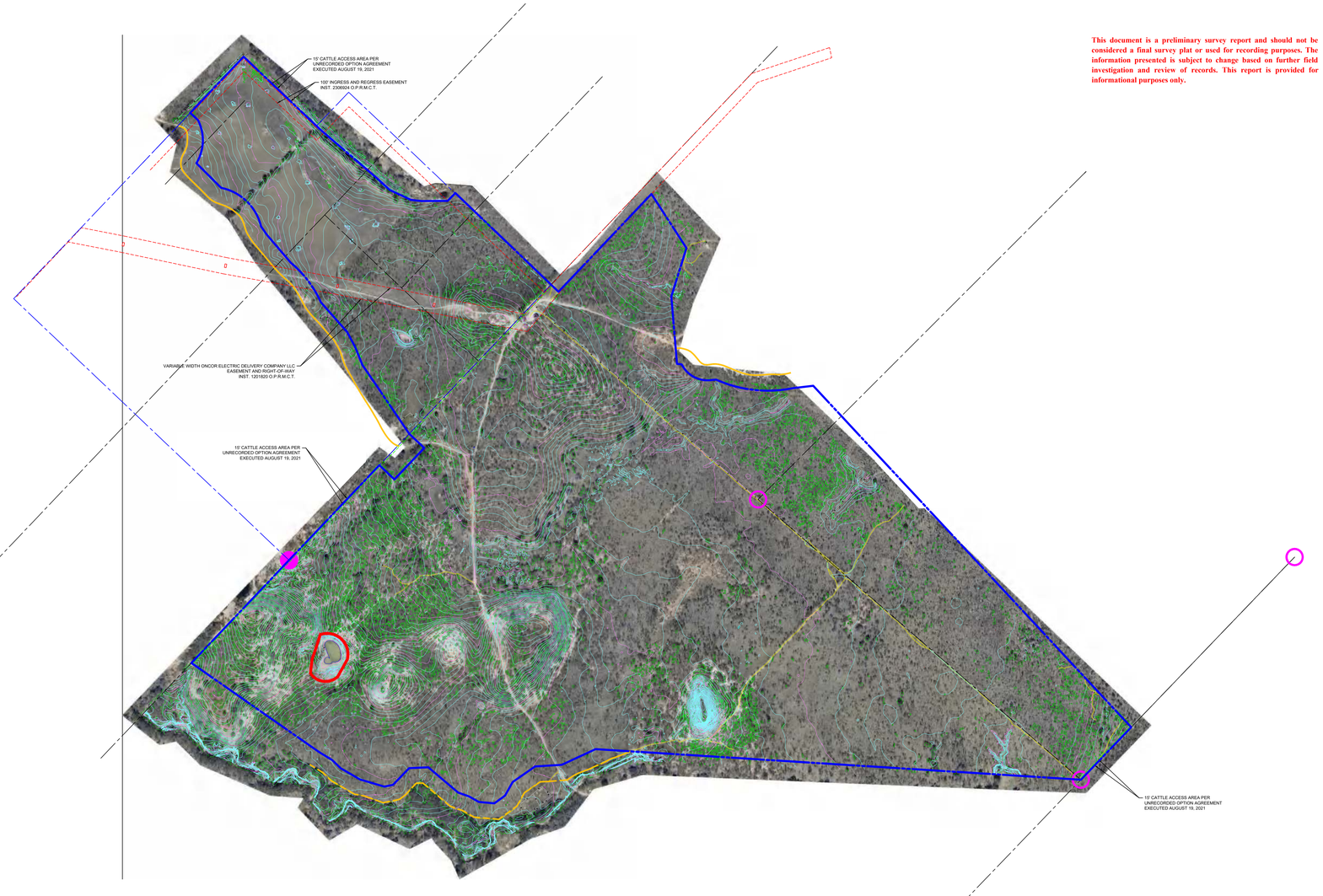
LEGEND AND ABBREVIATIONS (NOT SHOWN TO SCALE)

SOME ITEMS MAY NOT PERTAIN TO THIS SURVEY. THE IDENTIFICATION IS SUBJECT TO INTERPRETATION. VERIFICATION MAY BE REQUIRED.

- HYDRANT
- STREET LIGHT
- AREA LIGHT
- SIGNAL POLE
- POLE
- GUY WIRE
- ANCHOR POLE
- MANHOLE
- MANHOLE (DRAINAGE)
- MANHOLE (SANITARY SEWER)
- MANHOLE (ELECTRIC)
- MANHOLE (WATER)
- MANHOLE (NATURAL GAS)
- MANHOLE (TELEPHONE)
- MANHOLE (FORCE MAIN)
- MANHOLE (STEAM)
- MANHOLE (UNKNOWN UTILITY)
- WATER VALVE
- GAS VALVE
- SHRUB
- CATCH BASIN
- CLEAN OUT
- TREE
- SIGN
- BOLLARD
- PEDESTRIAN WALK SIGNAL
- DOOR
- DOUBLE DOOR
- OVERHEAD DOOR
- PARKING METER
- METAL COVER
- ELECTRIC BOX
- SOIL BORING
- MONITORING WELL
- TEST PIT
- BENCHMARK
- ROOF DRAIN
- x322.35 — SPOT ELEVATION
- SET IRON AND CAP STAMPED "LANGAN"
- SET PK AND WASHER STAMPED "LANGAN"

EP	EDGE OF PAVEMENT
CC	CONCRETE CURB
CONC	CONCRETE
ASPH	ASPHALT
DP	DETECTABLE PAD
GI	GRATE INLET
MH	MANHOLE
DC	DROP CURB
BWS	BROKEN WHITE STRIPE
SYS	SINGLE YELLOW STRIPE
DYS	DOUBLE YELLOW STRIPE
SWS	SINGLE WHITE STRIPE
RCP	REINFORCED CONCRETE PIPE
DIP	DUCTILE IRON PIPE
CMP	CORRUGATED METAL PIPE
NVP	NO VISIBLE PIPE
PVC	POLYVINYL CHLORIDE PIPE
FWW	FILLED WITH WATER
FWD	FILLED WITH DEBRIS
N	NOTHING
E	EASTING
EL	ELEVATION
LSA	LANDSCAPED AREA
VOL.	VOLUME
INST.#	INSTRUMENT
PG.	PAGE NUMBER
R/W	RIGHT OF WAY
No.	NUMBER
S.F.	SQUARE FEET
P.O.B.	POINT OF BEGINNING
P.O.C.	POINT OF COMMENCING
A.K.A.	ALSO KNOWN AS
F.K.A.	FORMERLY KNOWN AS
R	RADIUS
A	ARC LENGTH
CB	CHORD BEARING
CL	CHORD DISTANCE
D	CENTRAL ANGLE
ESMT	EASEMENT
BL	BUILDING LINE OR BUILDING SETBACK
ETJ	EXTRATERRITORIAL JURISDICTION
FEMA	FEDERAL EMERGENCY MANAGEMENT ADMINISTRATION
O.P.R._C.T.	OFFICIAL PUBLIC RECORDS _____ COUNTY TEXAS
D.R._C.T.	DEED RECORDS _____ COUNTY TEXAS
P.R._C.T.	PLAT RECORDS _____ COUNTY TEXAS
NAVD'88	NORTH AMERICAN VERTICAL DATUM OF 1988

- D — STORM DRAIN
- S — SANITARY LINE
- COMB — COMBINED UTILITY LINE
- UNK — UNKNOWN UTILITY LINE
- G — GAS LINE
- W — WATER LINE
- E — ELECTRIC LINE
- T — TELEPHONE LINE
- C — CABLE TV LINE
- ST — STEAM LINE
- FM — FORCE MAIN
- FO — FIBER OPTIC
- (_)* — REFERENCED UTILITY LINE (TYPE AS NOTED) BASED ON RECORD MAPPING
- OVERHEAD WIRE
- GUIDE RAIL(TYPE AS NOTED)
- CHAIN LINK FENCE
- WOOD/STOCKADE FENCE
- WIRE FENCE
- IRON FENCE
- TREE LINE
- EASEMENT LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- 322 — CONTOUR LINE



PROJECT LOCATION MAP

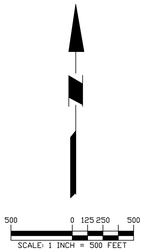
SCALE: NOT TO SCALE

SOURCE: maps.gis/

GENERAL NOTES

1. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A COMMITMENT FOR TITLE INSURANCE. THEREFORE, THERE MAY BE EASEMENTS OR DOCUMENTS PERTAINING TO THE SUBJECT TRACT THAT ARE NOT SHOWN OR REFERENCED HEREON.
2. HORIZONTAL DATUM: NAD83/2011 - EPOCH 2010.
3. VERTICAL DATUM: NAVD 88 GEOID 12B.
4. GRID TO GROUND COMBINED SCALE FACTOR OF 1.0001632873.
5. BEARING BASIS: TEXAS STATE PLANE, CENTRAL ZONE.
6. DISTANCES SHOWN ARE SURFACE VALUES, U.S. SURVEY FEET.
7. THIS SURVEY IS NOT VALID UNLESS EMBOSSED WITH SEAL AND SIGNATURE OF THE PROFESSIONAL.
8. FIELDWORK WAS COMPLETED ON AUGUST 8, 2024.

This document is a preliminary survey report and should not be considered a final survey plat or used for recording purposes. The information presented is subject to change based on further field investigation and review of records. This report is provided for informational purposes only.



Date	Description	No.
Revisions		

LANGAN
Langan Engineering and Environmental Services, Inc.
2999 Olympus Blvd, Suite 165
Dallas, TX 75019
TBPELS Firm #10194888
T: 817.328.3200 www.langan.com

Project

CHISME SOLAR & STORAGE

LAT: 31°34'28.4", LONG: N 98°49'29.5"W
NEAR THE TOWN OF ZEPHYR

MILLS & BROWN COUNTIES **TEXAS**

Drawing Title

ORTHOMOSAIC & TOPOGRAPHIC SURVEY

RRCE PROJECT NO.: TX-PS-2703

Project No.	520102901
Date	03/20/2025
Drawn By	RB
Checked By	MM

AB101

Sheet 1 of 1

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Chisme Solar Project—Brown and Mills counties, Texas

Reconnaissance Date:
October 31, 2023

December 2023

Prepared for:

Red River Clean Energy, LLC, a subsidiary of Concord New Energy
107 Spring Street, Seattle, WA 98104

Prepared by:

Stantec Consulting Services Inc.
8401 Shoal Creek Blvd STE 100
Austin, Texas 78757
Tel: (512) 338-2223
www.stantec.com

Project Number:235301227

Revision	Description	Author	Date
1.0	Draft	Kevin Rubio	12/8/2023
	Technical Review	Chad Martin	12/12/2023

The conclusions in the Report titled Phase I Environmental Site Assessment, Chisme Solar Project—Mills and Brown counties, Texas are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Red River Clean Energy, LLC (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

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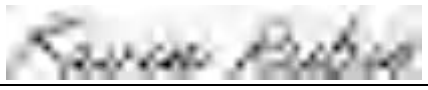
Prepared by: 

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APPENDICES

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Acronyms and Abbreviations

ACM	Asbestos-containing material
AST	Aboveground Storage Tank
ASTM	American Society of Testing and Material
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS	Corrective Actions
CREC	Controlled Recognized Environmental Condition
ENSITE	Environmental Site Information System
ERIS	Environmental Risk Information Services
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FINDS/FRS	Facility Registery Index
FIRM	Flood Insurance Rate Map
HREC	Historical Recognized Environmental Condition
LBP	Lead-based paint
LQG	Large Quantity Generator
LUCIS	Land Use Control Information System
LUST	Leaking Underground Storage Tank
IDEM	Indiana Department of Environmental Management
NFRAP	No Further Remedial Action Planned
NPL	National Priorities List
PACM	Presumed Asbestos-containing Material
PCB	Polychlorinated Biphenyl
RCRA	Resource Conservation and Recover Act (RCRA)
RCRIS	Resource Conservation and Recovery Information System
REC	Recognized Environmental Conditions
USDA	US Department of Agriculture
SQG	Small Quantity Generator
USEPA	US Environmental Protection Agency
UST	Underground Storage Tank
VEC	Vapor Encroachment Condition

Executive Summary

General Information

Project Information:	Approximately 722 acres across 8 parcels
Site Information:	Chisme Solar—Mills and Brown Counties, Texas
Reconnaissance Dates:	October 31, 2023
Site Assessors:	Kevin Rubio, Carinne Johnston

Findings and Conclusions Summary

Stantec performed this Phase I Environmental Site Assessment (ESA) for the Chisme Solar Project (Project) that consists of an approximately 722-acre site located in Mills and Brown counties, Texas (Project Area) in conformance with the scope and limitations of American Society of Testing and Material (ASTM) Standard Practice E 2247-16. Any exceptions to, or deletions from, this practice are described in Section 1.4 of this report. This ESA identified evidence of one of recognized environmental conditions (RECs) and one site of environmental concern in connection with the Chisme Solar Project located in Mills and Brown counties near the town of Brownwood(Project Area).

Significant Data Gap Summary

Data gaps may have been encountered during the performance of this Phase I ESA and are discussed in the section of the report in which they were encountered. According to ASTM Standard Practice E 2247-16, data gaps are only significant if "other information and/or professional experience raise reasonable concerns involving the data gap." Table ES-1 presents a list of common sources of *significant data gaps* and Stantec's experience with them on this Phase I ESA.

Table ES-1. Significant Data Gap Summary

Report Section		Description
2.4	Current Uses of the Properties	No significant data gap identified.
3.0	User-Provided Information	No significant data gap identified.
4.1	Standard Environmental Records	No significant data gap identified.
4.2	Physical Setting Sources	No significant data gap identified.
4.3	Historical Records Sources	No significant data gap identified.
5.1	Methodology and Limiting Conditions	No significant data gap identified.
6.0	Interviews	No data gap identified, responses were not received from landowner questionnaires, the Texas Department of Environmental Management, or the Mills and Brown counties Emergency Management Agency regarding records of environmental contamination in the Project Area.

Findings

Recognized Environmental Condition

A *recognized environmental condition,* or REC, refers to the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property resulting from its release to the environment, under conditions indicative of a release to the environment, or under conditions that pose a material threat of a future release to the environment.

Stantec did not identify any RECs at the Project Area while conducting this Phase I ESA.

Controlled Recognized Environmental Condition

A CREC refers to a REC that resulted from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority with hazardous substances or petroleum products, allowing it to remain in place subject to the implementation of required controls.

Stantec did not identify any CRECs within the Project Area while conducting this Phase I ESA.

Historical Recognized Environmental Condition

A *historical recognized environmental condition* (HREC) refers to a past release of any hazardous substances or petroleum products occurring in connection with the Project Area that has been addressed to the satisfaction of the applicable regulatory authority or meets unrestricted use criteria established by a regulatory authority, without subjecting the Project Area to any required controls.

Stantec did not identify any HRECs at the Project Area while conducting this Phase I ESA.

Environmental Issue

An *environmental issue* refers to environmental concerns identified by Stantec that warrant further discussion but that do not qualify as RECs.

Stantec did determine that this area was a formerly part of Camp Bowie and is listed as a FUDS Property No. K06TX0009. No unexploded ordinance was found during the Phase I ESA site reconnaissance or the wetland delineation; however the opportunity for UXO's to be onsite is high. Information concerning the probability of UXO's onsite during construction should be communicated to the EPC contractor or any other individuals performing earth moving activities.

Conclusions, Opinions and Recommendations

Stantec performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E2247-16 in the Project Area located in Mills and Brown counties near the town of Brownwood, Texas. Any exceptions to, or deletions from, are described in Section 1.4 of this report.

This Phase I ESA did not reveal evidence of historical or current RECs within the Project Area.

1 Introduction

1.1 PURPOSE

Stantec, conducted this Phase I Environmental Site Assessment (ESA) to identify recognized environmental conditions (RECs) and certain potential environmental conditions outside the scope of American Society of Testing and Material (ASTM) Standard Practice E 2247-16 in connection with the Chisme Solar Project located in Mills and Brown counties near the Town of Brownwood, Texas (Project Area) at the time of the site reconnaissance. This report documents the Stantec's findings, opinions, and conclusions of the Phase I ESA

1.2 SCOPE

Stantec conducted this Phase I ESA in general accordance with the ASTM Standard Practice E 2247-16, consistent with a level of care and skill ordinarily practiced in the environmental consulting profession by specialists currently providing similar services under similar circumstances. Significant additions, deletions, or exceptions to ASTM Standard Practice E 2247-16 are noted below or in the corresponding sections of this report (ASTM 2016). The scope of this Phase I ESA included an evaluation of the following elements:

- Physical setting characteristics of the Project Area through a review of referenced sources such as topographic maps and geologic, soils, and hydrologic reports.
- Use of the Project Area, adjoining properties, and surrounding area through a review of referenced historical sources such as land title records, fire insurance maps, city directories, aerial photographs, prior reports, and interviews.
- Use, treatment, storage, disposal, or generation of hazardous substances, petroleum products, hazardous wastes, non-hazardous solid wastes, and wastewater in the Project Area through observations and interviews.
- Use of adjoining and surrounding properties and the likely effects of known or suspected releases of hazardous substances or petroleum products in the Project Area.
- Information referenced in environmental agency databases and local environmental records within the specified, approximate minimum search distance from the Project Area.

The scope of the Phase I ESA also included consideration of the following environmental issues or conditions that are beyond the scope of ASTM Standard Practice E 2247-16:

- Visual observation of suspected asbestos-containing material (ACM) within the Project Area. Visual observation consists of providing an opinion about the condition of suspected ACM within the Project Area based upon visual examination during the site reconnaissance. Limited surveys were performed to identify the presence of readily accessible suspected ACM and to develop recommendations regarding the need for a more thorough survey and/or an operations and maintenance program.
- Radon document review, consisting of the review of published radon data regarding the potential for elevated levels of radon gas in the area surrounding the Project Area.

- Visual observation of lead-based paint (LBP), consisting of providing an opinion about the potential for LBP based on the construction date of buildings within the Project Area and visual examination of the condition of suspected LBP.
- Floodplain document review, consisting of a review of a reasonably ascertainable flood plain map of the surrounding area to note whether the Project Area is identified as being located within a floodplain.

1.3 SIGNIFICANT ASSUMPTION

Any assumptions in this report were not considered as having significant impact on the determination of RECs associated with the Project Area.

1.4 LIMITATIONS AND EXCEPTIONS

Stantec prepared this Phase I ESA report using reasonable efforts to identify RECs associated with hazardous substances or petroleum products within the Project Area. Findings contained within this report are based on information collected from observations made on the day(s) of the site reconnaissance and from reasonably ascertainable information obtained from certain public agencies and other referenced sources.

ASTM Standard Practice E 2247-16 recognizes inherent limitations for Phase I ESAs, including, but not limited to, the following:

- *Uncertainty Not Eliminated*—A Phase I ESA cannot eliminate uncertainty regarding the potential for RECs in connection with any property.
- *Not Exhaustive*—A Phase I ESA is not an exhaustive investigation of the Project Area and environmental conditions on such property.
- *Past Uses of the Property*—Phase I requirements only require review of standard historical sources at five-year intervals; therefore, past uses of the Project Area at fewer than five-year intervals may not be discovered.

Users of this report may refer to ASTM Standard Practice E 2247-16 for further information regarding these and other limitations. This report is not definitive and should not be assumed to be a complete and/or specific definition of all conditions above or below grade. Current subsurface conditions may differ from the conditions determined by surface observations, interviews, and reviews of historical sources. The most reliable method of evaluating subsurface conditions is through intrusive techniques that are beyond the scope of this Project. Information in this report is not intended to be used as a construction document and should not be used for demolition, renovation, or other property construction purposes. Any use of this report by any party, beyond the scope and intent of the original parties, shall be at the sole risk and expense of such user.

Stantec makes no representation or warranty that the past or current operations in the Project Area are, or have been, in compliance with all applicable federal, state, and local laws, regulations, and codes. This report does not warrant against future operations or conditions or warrant against operations or conditions present of a type or at a location not investigated. Regardless of the findings stated in this report, Stantec is not responsible for consequences or conditions arising from facts not fully disclosed to Stantec while its staff conducted this Phase I ESA.

An independent data research company provided the government agency database referenced in this report. Information on properties in the surrounding area was requested for approximate minimum search distances and is assumed to be correct and complete unless obviously contradicted by Stantec's observations or other credible sources that Stantec staff reviewed while conducting this Phase I ESA. Stantec shall not be liable for any such database firm's failure to make relevant files or documents properly available, to properly index files, or to otherwise fail to maintain or produce accurate or complete records.

Stantec used reasonable efforts to identify evidence of aboveground storage tanks (AST) and underground storage tanks (UST) and ancillary equipment within the Project Area while conducting this Phase I ESA. *Reasonable efforts* were limited to observing accessible areas, reviewing referenced public records, and conducting interviews. These reasonable efforts may not identify subsurface equipment or evidence hidden from view by things including, but not limited to, snow cover, paving, construction activities, stored materials, and landscaping.

Any estimates of costs or quantities in this report are approximations for the purpose of due diligence in commercial real estate transactions. They are based on the Phase I ESA findings, opinions, and conclusions, which are limited by the scope, schedule demands, cost constraints, accessibility limitations, and other factors associated with performing the Phase I ESA. Subsequent determinations of costs or quantities may vary from the estimates in this report. The estimated costs or quantities in this report are not intended to be used for financial disclosure related to the Financial Accounting Standards Board Statement No. 143 and Interpretation No. 47, Sarbanes/Oxley Act, or any United States Securities and Exchange Commission reporting obligations and may not be used for such purposes in any form without the express written permission of Stantec.

Stantec is not a professional title insurance or land surveyor firm and makes no guarantee, express or implied, that any land title records acquired or reviewed in this report, or any physical descriptions or depictions of the Project Area in this report represent a comprehensive definition or precise delineation of property ownership or boundaries.

The Environmental Professional Statement in the front matter of this report does not "certify" the findings contained in this report and is not a legal opinion of the Environmental Professional. The Environmental Professional Statement is intended to document Stantec's opinion that an individual meeting the qualifications of an Environmental Professional was involved in conducting the Phase I ESA and that the activities performed by, or under the supervision of, the Environmental Professional were performed in conformance with the standards and practices set forth in 40 Code of Federal Regulations (CFR) Part 312 per the methodology in ASTM Standard Practice E 2247-16 and the scope of work for this Phase I ESA.

Per ASTM Standard Practice E 2247-16, Section 6, User Responsibilities, the user of this Phase I ESA has specific obligations for performing tasks that will help identify the possibility of RECs in connection with the Project Area. Failure by the user to fully comply with the requirements may impact the ability to use this report to help qualify for Landowner Liability Protections under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Stantec makes no representations or warranties regarding a user's qualification for protection under any federal, state, or local laws, rules, or regulations.

In accordance with the ASTM Standard Practice E 2247-16, this report is presumed to be valid for a six-month period. If the report is older than six months, the following information must be updated for the report to be valid: (1) regulatory review, (2) site visit, (3) interviews, (4) specialized knowledge, and (5) environmental liens search. Reports older than one year may not meet the ASTM Standard Practice 2247-16; therefore, the entire report must be updated to reflect current conditions and property-specific information.

Other limitations and exceptions that are specific to the scope of this report may be found in corresponding sections.

1.5 SPECIAL TERMS AND CONDITIONS (USER RELIANCE)

This report is for the use and benefit of, and may be relied upon by, Red River Clean Energy, LLC , its affiliates, and third parties authorized in writing by Stantec, including the lender(s) in connection with a secured financing of the Project Area, and their respective successors and assigns. Any third party agrees by accepting this report that any use or reliance on it shall be limited by the exceptions and limitations in this report and with the acknowledgment that actual Project Area conditions may change with time and that hidden conditions that were not discovered within the authorized scope of the Phase I ESA may exist within the Project Area. Any use by or distribution of this report to third parties, without the express written consent of Stantec, is at the sole risk and expense of such third party.

Stantec makes no other representation to any third party except that it has used the degree of care and skill ordinarily exercised by environmental consultants in the preparation of the report and in the assembling of data and related information. No other warranties are made to any third party, either expressed or implied. Unless otherwise agreed upon in writing by Stantec and a third party, Stantec's liability to any third party authorized to use or rely on this report with respect to any acts or omissions shall be limited to a total maximum amount of $50,000.

2 Site Description

2.1 PARCEL DESCRIPTION

The Project Area is located outside the municipal limits of the town of Brownwood. The Project Area consists of the following eight Mills and Brown counties parcels, as presented in Table 2-1:

Table 2-1. Mills and Brown Counties Parcels

Assessor Parcel Number	Owner Name	Approximate Acres
8465	CHILDRESS CHARLES GRADY SR &	154.62
8464	CHILDRESS CHARLES GRADY SR &	75.88
8462	CHILDRESS CHARLES GRADY SR &	100.95
5250	GILGER JOHN R	71.00
5958	GILGER JOHN R	24.00
1461	HARDBERGER GEORGE ROBERT TRUSTEE OF THE	1,588.00
3122	CLAYTON RANCHES LTD	1,777.99
28342	CHILDRESS, CHARLES GRADY & ALICE ELAINE	54.10
Note: Acreages are representative of the Assessor Parcel and not Project parcel. Project parcel may be a portion of the assessor parcel.		

A site vicinity map is presented in Appendix A.

2.2 CURRENT USE OF THE PROPERTY

The Project Area is designated for agricultural use and is considered a legal use in its current configuration. Vehicular access to the Project Area can be accessed by, County Road 268.

Photographs of the Project Area are provided in Appendix B.

2.3 DESCRIPTION OF PROPERTY IMPROVEMENTS

Table 2-2 provides general descriptions of the Project Area improvements.

Table 2-2. Property Improvements

Size of Properties (approximate)	Percent of Property
Approximate % Unimproved Areas	39%
Approximate % Agricultural Areas	60%
Approximate % Developed Areas	0%
Approximate % Surface Water and Wetlands	1%
Number of Occupied Buildings	No residences are located within the Project Area
Unoccupied Buildings/Spaces/Structures	No unoccupied buildings are located within the Project Area.

Size of Properties (approximate)	Percent of Property
General Buildings Description	The only structures within the project area are cow feeders.

2.4 CURRENT USES OF ADJOINING PROPERTIES

The immediate vicinity of the Project Area generally included land used for agricultural purposes or undeveloped ranchland.

3 User-Provided Information

The following section summarizes information (if any) provided by Red River Clean Energy, LLC (the user) regarding the Phase I ESA. Documentation may be found where referenced in this report.

3.1 TITLE RECORDS

The user did not provide title record information for the Project Area.

3.2 ENVIRONMENTAL LIENS OR ACTIVITY AND USE LIMITATIONS

A review of environmental liens and activity and use limitation documents not included in the scope of this Phase I ESA.

3.3 SPECIALIZED KNOWLEDGE

The user did not provide specialized knowledge regarding RECs associated with the Project Area.

3.4 SIGNIFICANT VALUATION REDUCTION FOR ENVIRONMENTAL ISSUES

The user did not provide information regarding a significant valuation reduction for environmental issues associated with the Project Area.

3.5 OWNER, PROPERTY MANAGER, AND OCCUPANT INFORMATION

The user provided Stantec with site access and current landowner information.

3.6 REASON FOR PERFORMING PHASE I ESA

The user indicated that the Phase I ESA was being completed prior to a financial transaction regarding the Project Area.

3.7 OTHER USER-PROVIDED DOCUMENTS

The User and property owners were provided an environmental questionnaire concerning the Project Area. To date, Stantec has received one completed landowner questionnaire and the completed User questionnaire. The landowner questionnaire indicated pesticide use (Tordon) for controlling mesquite and indicated that a portion of the property was used by the U.S. Army during World War two. Pesticide use is typical in agricultural areas and does not constitute an environmental concern. The former use of the property by the U.S. Army is an environmental concern for the Project and is further discussed in Section 4.1. The User questionnaire did not identify any environmental concerns or RECs for the Project No other documents were supplied to Stantec as described in ASTM Standard Practice E 2247-16.

4 Records Review

4.1 STANDARD ENVIRONMENTAL RECORDS

The regulatory agency databases report discussed in this section, provided by Environmental Risk Information Services (ERIS), of Toronto, Ontario, was reviewed for information regarding reported releases of hazardous substances and petroleum products on or near the Project Area. Stantec also reviewed the *unmappable* (also referred to as *orphan*) listings in the database report, cross-referencing available address information and facility names. Unmappable sites are listings that could not be plotted with confidence but potentially occur in the general area of the Project Area based on the partial street address, city, or zip code. Any unmappable site that Stantec identified as a being within the approximate minimum search distance from the Project Area, based on the site reconnaissance and/or cross-referencing to mapped listings, is discussed in this section. The complete regulatory agency database reports are provided in Appendix D. Table 4-1 provides a summary of the findings of the database record review.

Table 4-1. Summary of Federal, State, and Tribal Database Findings

Database ID	Database Name	Search Radius (Mile)	Within Subject Property	Within 1 Mile of Subject Property	Total
Federal					
NPL	National Priority List	1	0	0	0
PROPOSED NPL	National Priority List—Proposed	1	0	0	0
DELETED NPL	Deleted National Priority List	0.5	0	0	0
SEMS	Superfund Enterprise Management System—List 8R Active Site Inventory	0.5	0	0	0
SEMS ARCHIVE	Superfund Enterprise Management System—List 8R Archive Sites	0.5	0	0	0
ODI	Inventory of Open Dumps	0.5	0	0	0
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System	0.5	0	0	0
IODI	EPA Report on the Status of Open Dumps on Indian Lands	0.5	0	0	0
CERCLIS NFRAP	Comprehensive Environmental Response, Compensation and Liability Information System—No Further Remedial Action Planned	0.5	0	0	0
CERCLIS LIENS	Comprehensive Environmental Response, Compensation and Liability Information System—Liens	PO	0	N/A	0
RCRA CORRACTS	Resource Conservation and Recovery Act—Corrective Action	1	0	0	0
RCRA TSD	Resource Conservation and Recovery Act non-CORRACTS Treatment, Storage, and/or Disposal Facilities	0.5	0	0	0

Database ID	Database Name	Search Radius (Mile)	Within Subject Property	Within 1 Mile of Subject Property	Total
RCRA LQG	Resource Conservation and Recovery Act—Generator List	0.25	0	0	0
RCRA SQG	Resource Conservation and Recovery Act—Small Quantity Generators List	0.25	0	0	0
RCRA VSQG	Resource Conservation and Recovery Act—Very Small Quantity Generators List	0.25	0	0	0
RCRA NON GEN	Resource Conservation and Recovery Act—Non-Generators	0.25	0	0	0
RCRA CONTROLS	Resource Conservation and Recovery Act—Sites with Controls	0.5	0	0	0
FED ENG	Federal Engineering Controls	0.5	0	0	0
FED INST	Federal Institutional Controls	0.5	0	0	0
LUCIS	Land Use Control Information System	0.5	0	0	0
NPL IC	Institutional Control Boundaries at National Priority List Sites	0.5	0	0	0
ERNS 1982 TO 1986	Emergency Response Notification System—1982 to 1986	PO	0	N/A	0
ERNS 1987 TO 1989	Emergency Response Notification System—1987 to 1989	PO	0	N/A	0
ERNS	Emergency Response Notification System	PO	0	N/A	0
FED BROWNFIELDS	The Assessment, Cleanup and Redevelopment Exchange System Brownfield Database	0.5	0	0	0
FEMA UST	Underground Storage Tank Listing	0.25	0	0	0
FRP	Facility Response Plan	0.25	0	0	0
DELISTED FRP	Delisted Facility Response Plans	0.25	0	0	0
HIST GAS STATIONS	Historical Gas Stations	0.25	0	0	0
REFN	Petroleum Refineries	0.25	0	0	0
BULK TERMINAL	Petroleum Product and Crude Oil Rail Terminals	0.25	0	0	0
SEMS LIEN	Superfund Enterprise Management System—Lien on Property	PO	0	N/A	0
SUPERFUND ROD	Superfund Decision Documents	1	0	0	0
DOE FUSRAP	Formerly Utilized Sites Remedial Action Program	1	0	0	0
State					
SUPERFUND	State Superfund Sites	1	0	0	0
SHWS	State Hazardous Waste Sites	1	0	0	0
DELISTED SHWS	Delisted State Superfund Registry List	1	0	0	0
SWF/LF	Permitted Solid Waste Facilities	0.5	0	0	0
CLI	Closed Landfill Inventory	0.5	0	0	0

Database ID	Database Name	Search Radius (Mile)	Within Subject Property	Within 1 Mile of Subject Property	Total
HGAC CLI	Houston- Galveston Closed Landfill Inventory	0.5	0	0	0
AACOG CLI	Alamo Area Council of Gov. Closed Landfill Inventory	0.5	0	0	0
IHW	Commercial Management Facilities for Hazardous Waste and Industrial Solid Wastes	0.25	0	0	0
IHW RECEIVER	Industrial and Hazardous Waste- Receivers	0.5	0	0	0
RWS	Radioactive Waste Sites	0.5	0	0	0
LPST	Leaking Petroleum Storage Tank Database	0.5	0	0	0
DELISTED LST	Delisted Leaking Storage Tanks	0.5	0	0	0
UST	Underground Petroleum Storage Tanks	0.25	0	0	0
AST	Aboveground Storage Tanks	0.25	0	0	0
PST	Petroleum Storage Tanks Database	0.25	0	0	0
HIST TANK	Historical Tank Construction Notification	0.25	0	0	0
UST AUSTIN	Austin Underground Storage Tanks	0.25	0	0	0
PETROL CAVERN	Salt Caverns for Petroleum Storage	0.25	0	0	0
DTNK	Delisted Storage Tanks	0.25	0	0	0
AUL	Sites with Controls	0.5	0	0	0
VCP	Voluntary Cleanup Program	0.5	0	0	0
VCP RRC	Texas Railroad Commission Voluntary Cleanup Program	0.5	0	0	0
OP CLEANUP	Operator Cleanup Program	0.5	0	0	0
IOP	Innocent Owner/Operator Program	0.5	0	0	0
BROWNFIELDS	Brownfield Site Assessments Database	0.5	0	0	0
BROWN RRC	Texas Railroad Commission Brownfields	0.5	0	0	0
MSD	Municipal Setting Designation	0.5	0	0	0
Tribal					
INDIAN LUST	Leaking Underground Storage Tanks on Indian Lands	0.5	0	0	0
INDIAN UST	Underground Storage Tanks on Indian Lands	0.25	0	0	0
DELISTED LST	Delisted Tribal Leaking Storage Tanks	0.5	0	0	0
DELISTED UST	Delisted Tribal Underground Storage Tanks	0.25	0	0	0
Additional Environmental Records—Federal					
FINDS/FRS	Facility Registry Service/Facility Index	PO	0	N/A	0
TRIS	Toxics Release Inventory Program	PO	0	N/A	0
PFAS NPL	PFOA/PFOS Contaminated Sites	0.5	0	0	0
PFAS FED SITES	Federal Agency Locations with Known or Suspected PFAS Detections	0.5	0	0	0

Database ID	Database Name	Search Radius (Mile)	Within Subject Property	Within 1 Mile of Subject Property	Total
PFAS SSEHRI	Social Science Environmental Health Research Institute PFAS Contamination Sites	0.5	0	0	0
ERNS PFAS	National Response Center PFAS Spills	0.5	0	0	0
PFAS NPDES	PFAS NPDES Discharge Monitoring	0.5	0	0	0
PFAS TRI	Per Fluorinated Alkyl Substances Releases	0.5	0	0	0
PFAS WATER	Per Fluorinated Alkyl Substances Water Quality	0.5	0	0	0
PFAS TSCA	PFAS TSCA Manufacture and Import Facilities	0.5	0	0	0
PFAS E-MANIFEST	PFAS Waste Transfers from RCRA e-Manifest	0.5	0	0	0
PFAS IND	PFAS Industry Sectors	0.5	0	0	0
HMIRS	Hazardous Materials Information Reporting System	0.125	0	0	0
NCDL	National Clandestine Drug Labs	0.125	0	0	0
TSCA	Toxic Substances Control Act	0.125	0	0	0
HIST TSCA	Historic Toxic Substances Control Act	0.125	0	0	0
FTTS ADMIN	Federal Insecticide, Fungicide, and Rodenticide Act Administrative Case Listing	PO	0	N/A	0
FTTS INSP	Federal Insecticide, Fungicide, and Rodenticide Act Administrative Inspection Case Listing	PO	0	N/A	0
PRP	Potentially Responsible Parties List	PO	0	N/A	0
SCRD DRYCLEANER	State Coalition for Remediation of Drycleaners Listing	0.5	0	0	0
ICIS	Integrated Compliance Information System	PO	0	N/A	0
FED DRYCLEANERS	Drycleaner Facilities—Enforcement and Compliance History Online	0.25	0	0	0
DELISTED FED DRY	Delisted Drycleaner Facilities -Integrated Compliance Information System	0.25	0	0	0
FUDS	Formerly Used Defense Sites	1	1	0	1
FUDS MRS	FUDS Munitions Response Sites	1	1	0	1
FORMER NIKE	Former Military Nike Missile Sites	1	0	0	0
PIPELINE INCIDENT	Pipeline and Hazardous Materials Safety Administration—Pipeline Safety Flagged Incidents	PO	0	N/A	0
MLTS	Material Licensing Tracking System	PO	0	N/A	0
HIST MLTS	Historic Material Licensing Tracking System Sites	PO	0	N/A	0
MINES	Mines Master Index File	0.25	0	0	0
SMCRA	Surface Mining Control and Reclamation Act Sites	1	0	0	0

Database ID	Database Name	Search Radius (Mile)	Within Subject Property	Within 1 Mile of Subject Property	Total
MRDS	Mineral Resource Data System	1	0	0	0
LM SITES	Doe Legacy Management Sites	1	0	0	0
ALT FUELS	Alternative Fueling Stations	0.25	0	0	0
CONSENT DECREES	Superfunds Consent Decrees	0.25	0	0	0
AFS	Air Facility System	PO	0	N/A	0
SSTS	Registered Pesticide Establishments	0.25	0	0	0
PCBT	Polychlorinated Biphenyl (PCB) Transformers	0.5	0	0	0
PCB	Polychlorinated Biphenyl (PCB) Notifiers	0.5	0	0	0
Additional Environmental Records—State					
PRIORITY CLEAN	Dry Cleaner Remediation Program Prioritization List	0.5	0	0	0
DRYCLEANERS	Registered Dry Cleaning Facilities	0.25	0	0	0
DELISTED DRYCLEANERS	Delisted Drycleaning Facility List	0.25	0	0	0
GWCC	Groundwater Contamination Cases	0.125	0	0	0
GWCC HIST	Historical Groundwater Contamination Cases	0.125	0	0	0
APAR	Affected Property Assessment Reports	0.5	0	0	0
SPILLS	Spills Database	0.125	0	0	0
PFAS	Per- and Polyfluoroalkyl Substances	0.5	0	0	0
IHW CORR ACTION	Industrial and Hazardous Waste Sites with Corrective Actions	1	0	0	0
LAND APPL	Land Application Permits	0.25	0	0	0
NOV	Notice of Violation	0.25	0	0	0
NOE	Notices of Enforcement	0.25	0	0	0
LIENS	Environmental Liens Listing	PO	0	0	0
ORD	Court Orders & Administrative Orders	0.25	0	0	0
HIST RCRA NONRCRA	Inactive RCRA and Non-RCRA Facilities	0.5	0	0	0
RTOL	Recycle Texas Online Program	0.25	0	0	0
UIC	Underground Injection Control	0.25	0	0	0
IHW GENERATOR	Industrial and Hazardous Waste- Generators	0.125	0	0	0
IHW TRANSPORT	Industrial and Hazardous Waste- Transporters	0.125	0	0	0
AIR PERMITS	New Source Review (NSR) Permits	0.25	0	0	0
EMISSIONS	Point Source Emissions Inventory	0.25	0	0	0
TIER 2	Tier 2 Report	0.125	0	0	0

Database ID	Database Name	Search Radius (Mile)	Within Subject Property	Within 1 Mile of Subject Property	Total
EDWARDS AQUIFER	Edwards Aquifer Permits	PO	0	NA	0

EPA = Environmental Protection Agency
Source: ERIS 2023a

4.1.1 Project Area Listings

A listing for FUDS (Formerly Used Defense Sites) and FUDS Munition Response Sites was identified in the ERIS report. These listings are due to the Project Area's past usage as a military operation known as Camp Bowie. From the ERIS report:

"The land was first acquired by the U.S. in June 1943. It was conveyed to private ownership in the late 1940s and was repurchased in July 1953 as potential support for the Korean War. The U.S. again sold the land in 1963. The property was returned to private ownership with no land use restrictions.

This property is known or suspected to contain military munitions and explosives of concern (e.g., unexploded ordnance) and therefore may present an explosive hazard. "

During the October 31 site investigation, no visible presence of unexploded ordinance or military munitions were identified on site.

4.1.2 Surrounding Property Listings

No listings were recorded within 1-mile surrounding the Project Area.

4.1.3 Orphan Listings

The ERIS database report identified zero unplottable or orphan listings for the Project Area.

4.1.4 State Environmental Records

Name of Agency:	Texas Commission on Environmental Quality
Website:	https://www.tceq.texas.gov/agency/directory
Agency Address:	12100 Park Thirty-Five Cir, Austin, Texas
Agency Phone Number:	512-239-1000
Date of Contact:	October 27, 2023
Method of Communication:	Telephone
Communication Summary:	No response has been received at the date of this report.

4.1.5 Emergency Management Department

Name of Agency:	Texas Division of Emergency Management
Website:	https://www.tdem.texas.gov/
Agency Address:	2883 Highway 71 E, Del Valle, Texas 78617
Agency Phone Number:	(512) 424-2208
Date of Contact:	October 27, 2023
Method of Communication:	Telephone
Communication Summary:	No relevant information was available

4.1.6 Oil and Gas Transmission

Name of Agency:	US Department of Transportation's National Pipeline Mapping System
Website:	https://pvnpms.phmsa.dot.gov/PublicViewer/
Date of Contact:	November 2023
Method of Communication:	Online
Communication Summary:	According to the online GIS viewer, there is crude oil transmission pipeline (Sunoco) approximately 4 miles north/northeast of the Project Area. The pipeline does not pose an environmental concern.

Utility providers for the Project Area are detailed in the following table:

Table 4-2. Utilities and Providers in the General Project Area.

Utility	Provider
Electrical Utility Company:	Atmos Energy
Water Utilities:	City of Brownswood
Sewer Utility:	City of Brownswood Wasterwater Treatment
Natural Gas Utility:	Atmos Energy

4.1.7 Other Local Environmental Records Sources

No additional local environmental records sources were reviewed for this Phase I ESA.

4.2 PHYSICAL SETTING SOURCES

4.2.1 Topography

The US Geological Survey 7.5-minute topographic series maps for *Blanket Springs, TX,* were reviewed for this Phase I ESA. The contour lines on the topographic maps show that the Project Area has relatively flat topography, gently sloping towards stream features and ranges from approximately 1200 to 1300 feet above mean sea level.

4.2.2 Geology/Soils

Geology of the Project Area includes sand, silt, clay, and gravel. The Quaternary deposit unit age is Phanerozoic and Cenozoic age.

Most of the soils within the Project Area range from sandy loam to clay loam (US Department of Agriculture, Natural Resources Conservation Service 2022).

4.2.3 Hydrology

According to topographic map interpretation, Fisk Creek and Pecan Bayou are mapped to flow within and around the Project Area. The direction of groundwater in the vicinity of the Project Area is inferred to flow toward the Colorado River. Groundwater in the area is very scarce according to nearby water well data. The depth to the water throughout the Project Area is approximately 150ft according to 2013 water well drill logs.

4.2.3.1 Flood Plain Map

Stantec performed a review of the Flood Insurance Rate Maps (FIRMs), published by the Federal Emergency Management Agency (FEMA). According to FIRM numbers 48049C0550E (effective August 8, 2018) 0 acres fall within the 100-year floodplain (Zone A) for Brown County. Copies of the FEMA FIRMs are included in Appendix E. FEMA floodplain information is not available for Mills County, but it is expected that the southern portion and southeast tip are within the 100 year floodlplain.

4.2.3.2 Wetlands Map

A formal determination is provided under a separate report.

4.3 HISTORICAL RECORDS SOURCES

Table 4-3 summarizes the findings of the research presented in the following subsections pertaining to historical property and surrounding area uses.

Table 4-3. Historical Use Information

Period/Date	Source	Description/Use
1928–2019	Topographic Maps	Undeveloped land with two structures on the map in 1928.
1948–2022	Aerial Photographs	Land is primarily used for agriculture and ranching. A high voltage electric transmission line is seen in the NW corner in 2012.

Potential environmental concerns were not identified in association with the current or former use of the Project Area.

4.3.1 Aerial Photographs

Stantec reviewed aerial photographs of the Project Area and the surrounding areas dated from 1948 to 2022. The aerial photographs were obtained from ERIS on October 2023 (ERIS 2023c). Stantec staff did not identify any potential environmental concerns associated with the current or former use of the Project Area during the review of these photographs. Copies of the aerial photographs obtained for this report are included in Appendix F.

4.3.2 Historical US Geological Survey Topographic Quadrangles

Stantec staff also reviewed historical topographic maps of the Project Area dated from 1928–2019. These maps were obtained from ERIS on October 2023 (ERIS 2023d). Stantec did not identify any potential environmental concerns associated with the current or former use of the Project Area during the review of these topographic maps. Copies of these topographic maps are included in Appendix G of this report.

4.3.3 Fire Insurance Maps

Fire insurance maps were requested for the Project Area however, no information was available. The ERIS report indicating no information is available is provided as Appendix H.

4.3.4 Property Tax Files

Property owner information was obtained and provided by the User. Additional historical ownership information was not available.

4.3.5 Recorded Land Title Records and Activity and Use Limitations

The acquisition of recorded land title records was not required by the scope of work for this Phase I ESA.

4.3.6 City Directories

Stantec Staff reviewed the city directory for the Project Area. The city directory included residential listing Prior Reports. Due to the proximity of the Project to the town of Brownwood and the nature of Chisme Solar Project none of the listings rise to the level of being an environmental concern. The City Directory is provided in Appendix I.

No other reports were reviewed for this Phase I ESA.

4.3.7 Other Historical Sources

No other historical sources were reviewed for this Phase I ESA.

5 Site Reconnaissance

The unaccompanied site reconnaissance was conducted by Kevin Rubio and Carinne Johnston of Stantec on October 31, 2023. This visit was focused on the property and only pasture-related structures were noted during the site reconnaissance.

The Project Area was found to only contain cow feeders. No records of spills are associated with this area. Photographs of the Project Area are included in Appendix B.

5.1 METHODOLOGY AND LIMITING CONDITIONS

The site reconnaissance consisted of visual and/or physical observations of the Project Area and improvements, adjoining sites as viewed from the Project Area, and the surrounding area based on visual observations made during the trip to and from the Project Area. At the time of the first inspection of the Project Area, weather conditions were cloudy and approximately 60 degrees Fahrenheit.

5.2 HAZARDOUS SUBSTANCE USE, STORAGE, AND DISPOSAL

No ASTs containing unknown substances were observed within the Project Area

5.3 ABOVEGROUND AND UNDERGROUND HAZARDOUS SUBSTANCE OR PETROLEUM PRODUCT STORAGE TANKS

Stantec staff observed no ASTs or barrels containing labeled and unknown substances within the Project Area.

5.4 POLYCHLORINATED BIPHENYLS

Older transformers and other electrical equipment could contain polychlorinated biphenyls (PCBs) at a level that subjects them to regulation by the US Environmental Protection Agency (USEPA). PCBs in electrical equipment are controlled by USEPA regulations 40 CFR, Part 761. Under the regulations, electrical equipment can be classified into three categories: (1) *Non-PCB* – less than 50 parts per million (ppm) of PCBs, (2) *PCB-Contaminated* – 50 to 500 ppm, and (3) *PCB-Containing* – greater than 500 ppm. The manufacture, process, or distribution in commerce or use of any PCB in any manner other than in a totally enclosed manner was prohibited after January 1, 1977.

The onsite reconnaissance addressed outdoor transformers that may contain PCBs. In total, zero pole-mounted transformers were observed throughout the Project Area. Additionally, no other potential PCB-containing equipment (e.g., interior transformers, oil-filled switches, hoists, lifts, dock levelers, hydraulic elevators, balers) was observed within the Project Area.

5.5 UNIDENTIFIED SUBSTANCE CONTAINERS

Stantec staff did not observe any containers that contained labeled or unknown substances within the Project area.

5.6 DE MINIMIS AND OTHER OBSERVATIONS

Stantec staff did not observe evidence of *de minimis* or other chemical products on adjoining properties associated with agricultural operations.

5.7 WASTEWATER

Stantec staff did not observe evidence of generated, treated, or discharged (including sanitary sewage and storm water) wastewater within the Project Area or on adjoining properties.

5.8 SUMPS

Stantec staff did not observe evidence of sumps or oil/water separators within the Project Area.

5.9 SEPTIC SYSTEMS

Stantec staff did not observe any signs of relic septic tanks.

5.10 STORMWATER MANAGEMENT SYSTEM

No stormwater management systems were observed.

5.11 WELLS

Stantec did not observe groundwater wells within the Project Area.

6 Interviews

Table 6-1 lists the entities who were interviewed to obtain information regarding RECs in connection with the Project Area. Pertinent information (if any) identified during those interviews is discussed in the respective sections of this report.

Table 6-1 Record of Communication

Communication with	Date	Summary of Communication
Texas Department of Environmental Management	October 23, 2023	Stantec contacted the TDEM regarding records for the Project Area and no relevant information was available.
Brownwood Emergency Management	October 23, 2023	Stantec contacted the Brownwood Emergency Management Agency, and no relevant information was available.

7 Other Environmental Conditions

7.1 ASBESTOS-CONTAINING MATERIAL

Asbestos is the name given to a number of naturally occurring, fibrous silicate minerals mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The Occupational Safety and Health Administration's regulation 29 CFR 1926.1101 requires that certain construction materials are presumed to contain asbestos. All thermal system insulation, surfacing material, and asphalt/vinyl flooring that are present in a building constructed prior to 1981 and have not been appropriately tested are *presumed asbestos-containing material* (or PACM).

Because of the agricultural use of the Project Area, ACMs were not considered within the scope of this Phase I ESA.

7.2 RADON

Radon is a colorless, odorless, naturally occurring, radioactive, inert, gaseous element formed by radioactive decay of radium (Ra) atoms. The EPA has prepared a map to assist national, state, and local organizations with targeting their resources and with implementation of radon-resistant building codes. The map divides the country into three Radon Zones, as detailed in Table 7-1.

Table 7-1. EPA Radon Zones

Zones	Average Predicted Radon Levels	Potential
Zone 1	Exceed 4.0 pCi/L	Highest
Zone 2	Between 2.0 and 4.0 pCi/L	Moderate
Zone 3	Less than 2.0 pCi/L	Low

Note: pCi/L – picocuries per liter

It is important to note that the EPA has found homes with elevated levels of radon in all three zones and that they recommend site-specific testing to determine radon levels at a specific location; however, the map provides a valuable indication of the propensity of radon gas to accumulate in structures.

Radon sampling was not conducted as part of this Phase I ESA. Review of the EPA map of Radon Zones places the Project Area in Zone 1 (Appendix I). Based upon the radon zone classification, radon does not present a significant environmental concern.

7.3 LEAD IN DRINKING WATER

According to the TDEM Drinking Water Watch, the water supplied to the Project Area is in compliance with all state and federal regulations pertaining to drinking water standards, including lead and copper.

7.4 LEAD-BASED PAINT

Lead is a highly toxic metal that affects virtually every system of the body. LBP is defined as any paint, varnish, stain, or other applied coating that has 1 milligram per square centimeter (mg/cm^2), or 5,000 micrograms per gram ($\mu g/g$) or 0.5 percent by weight or more of lead. Congress passed the Residential Lead-Based Paint Hazard Reduction Act of 1992, also known as *Title X*, to protect families from exposure to lead from paint, dust, and soil. Under Section 1017 of Title X, intact LBP on most walls and ceilings is not considered to be a hazard, although the condition of the paint should be monitored and maintained to ensure that it does not become deteriorated. Further, Section 1018 of this law directed the US Department of Housing and Urban Development and the EPA to require the disclosure of known information on LBP and LBP hazards before the sale or lease of most housing built before 1978.

Because of the agricultural use of the Project Area, LBP was not considered within the scope of this Phase I ESA.

7.5 MOLD SCREENING

Molds are microscopic organisms found virtually everywhere, both indoors and outdoors. Mold grows and multiplies under the right conditions, needing only sufficient moisture (e.g., in the form of very high humidity, condensation, or water from a leaking pipe) and organic material (e.g., ceiling tile, drywall, paper, or natural fiber carpet padding) (ASTM 2006).

No obvious indications of water damage or mold growth were observed during Stantec's visual assessment.

7.6 VAPOR ENCROACHMENT

Stantec did not conduct a limited screening for potential vapor encroachment conditions (VEC) that may affect the Project Area. A VEC screening would focus on the current and historical usage of the Project Area. Stantec instead used the regulatory database report provided by ERIS to evaluate the potential for chemicals of concern, including petroleum hydrocarbons. If the Client should choose to further evaluate the potential VECs, Stantec can provide those services accordingly.

8 References

ASTM (ASTM International). 2006. Standard Guide for Readily Observable Mold and Conditions Conducive to Mold in Commercial Buildings: Baseline Survey Process, ASTM Designation E 2418-06 March 2006.

ASTM. 2016. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, ASTM Designation E 2247-16. December 2016.

ERIS (Environmental Risk Information Services). 2023a. *Database Report, Order Number* 23100500123, dated October, 2023

ERIS. 2023b. Physical Setting Report, *Order Number* 23100500123, dated October, 2023

ERIS. 2023c. *Historical Aerials, Order Number* 23100500123, dated October, 2023

ERIS. 2023d. *Topographic Maps, Order Number* 23100500123, dated October, 2023

ERIS. 2023e. City Directory Report, *Order Number* 23100500123, dated October, 2023

ERIS. 2023f. Fire Insurance Rate Map, Order Number 23100500123, dated October, 2023

USDA-NRCS (US Department of Agriculture Natural Resource Conservation Service). 2022. Web Soil Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed October 2023.

APPENDIX A

Site Vicinity Map

Project Area

N

0 1,000 2,000 Feet

(At original document size of 8.5x11)
1:17,258

Notes
1. Coordinate System: NAD 1983 StatePlane Texas North Central FIPS 4202 Feet
2. Data Sources: ESRI Hybrid Reference Layer
3. Background: NAIP Imagery (2023)

Stantec

Project Location:
Mills and Brown Counties, Texas

Prepared by KR on 12/6/2023

Client/Project	236301227
Client	Red River Clean Energy, LLC
Project	Cheme Solar
Report	PHASE I ESA

Appendix:
A

Title:
Site Vicinity Map

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

APPENDIX B

Project Area Photographs

PHOTOGRAPHIC LOG

Project Name:	County/State:	Project No.
Chisme Solar	Brown and Mills counties, Texas	235301227

Photo No.	Date:
1	10/31/2023

Coordinates:
98.8262807,
31.5711865

Description:
Cow Feeder

APPENDIX C

User Questionnaires

All Appropriate Inquiry Questionnaire

Stantec

The All Appropriate Inquiry rule (40 CFR Part 312) requires that certain inquiries be made to past and present owners, operators and occupants to help evaluate the environmental conditions of the property. Please answer all questions to the best of your ability.

Name: Charles Childress Date: 1/18/2024

Property address: 8991 CR 268 Early, TX 78602

1) What is the current use(s) of the property? For instance, residential, commercial, agricultural (multiple responses are acceptable). Please list all on-site businesses and contact information for each owner / operator, if any.

agriculture

2) List the known uses/occupants of all adjacent properties including which direction the property is located relative to yours.

East- cattle & small acreage farm

North & South - cattle

west - cattle & small acreage farm

3) Do you know the past uses of the property? ■Yes ☐No

List: (i.e, undeveloped prior to 1940, agricultural 1940 to 1968, etc).

1930 and before cattle and farming

1930-1945 + -US Army training

1945 to present cattle & farming

4) What have adjacent properties been used for in the past (please include which direction the property is located relative to yours)?

1930 and before cattle & farming, 1930-1945 + -US Army training

1945 to present cattle & farming

all directions

5) What is the total acreage of the property? 700 +or- acres and the square footage of each building? no buildings

6) When was each structure built and what was there before construction?
na

7) What is the heating source of each building? na

8) Was the fuel source for the building(s) ever heating oil? ☐ Yes ■ No ☐ Unknown

9) What is the water source for the property? ☐ Public Supply ☐ Well ☐ Unknown Dirt TANKS

10) What is the sanitary service for the property? ☐ Public Sanitary Sewer ☐ Septic System N.A ☐ Unknown

11) Has there ever been a septic system on the property? ☐ Yes ■ No ☐ Unknown

12) Are any wells present on the property? ☐ Yes ■ No ☐ Unknown

13) Are floor drains present on the property? ☐ Yes ■ No ☐ Unknown

14) Where do the drains discharge? ■ N/A

15) Are any sumps, sand traps, grease traps or oil-water separators present now or historically on the property? ☐ Yes ■ No ☐ Unknown

16) Are there any transformers, hydraulic lifts or other potentially PCB-containing equipment on the property? ☐ Yes ■ No ☐ Unknown

17) If so, has the PCB content been tested? ☐ Yes ☑ No ☐ Unknown

18) Have areas of the property been used as borrow pits? ☐ Yes ■ No If yes, please explain:

19) Have areas of the property been filled with debris or fill of unknown origin? ■ Yes ☐ No
If yes, please explain: one small pit 15' x 30'. It was used by deer hunters. It contains old blinds, chairs, plywood, etc.

20) Is there now or has there been automobile/farm equipment/equipment repair, a parts washer or degreaser present at the property? ☐ Yes ■ No If yes, please explain:

21) Are hazardous substances or petroleum products stored, generated, treated or disposed at the property? ☐ Yes ■ No If yes, please list / explain:

22) Are there now or have there ever been underground storage tanks (USTs) present on the property? ☐ Yes ■ No If yes, please list / explain:

23) How many USTs are/were present? (Please provide the contents, age, location, and size for each) ■ N/A

24) Are the USTs in service, closed-in-place or removed? Please provide applicable closure/removal reports or current tightness testing results. ☐ In Service ☐ Removed ☐ Closed-in-place ■ N/A

25) Are there now or have there ever been aboveground storage tanks (ASTs) present on the property? ☐ Yes ■ No If yes, please list / explain:

26) How many ASTs are/were present? (Please provide the contents, age, location, and size for each) ■ N/A

27) Are the ASTs in service or removed? Please provide applicable closure/removal reports or current tightness testing results. ☐ In Service ☐ Removed ■ N/A

28) Were chemicals such as solvents, petroleum products, inks, paints, oils, or pesticides used in the past? ☐ Yes ■ No If yes, please explain: _____

29) Do you know of specific chemicals that are present or once were present at the property or adjacent properties? ■ Yes ☐ No If yes, please list:
Tordon (Herbicide) was sprayed to control mesquite

30) Were hazardous substances or petroleum products stored, generated, treated or disposed at the property? ☐ Yes ■ No If yes, please explain / list:

31) Do you know of spills or other chemical releases that have taken place at the property or adjacent properties? ☐ Yes ■ No If yes, please explain: _____

32) Do you know of any environmental cleanups that have taken place at the property or adjacent properties? ☐ Yes ■ No If yes, please explain: _____

33) Has the property been the recipient of any notices or other correspondence from any government agency relating to past or present violations of environmental laws, rules or codes? ☐ Yes ■ No If yes, please explain: _____

34) Do you know of any obvious indicators that point to the presence or likely presence of contamination at the property or adjacent properties? ☐ Yes ■ No If yes, please explain:

35) Are you aware of any environmental cleanup liens or pending enforcement actions against the property that are filed or recorded under federal, tribal, state or local law?

☐ Yes ■ No If yes, please explain:

36) Are you aware of any Activity and Use Limitations (AULs), such as engineering controls, land use restrictions or institutional controls that are in place at the property and/or have been filed or recorded in a registry under federal, tribal, state or local law? ☐ Yes ■ No

If yes, please explain:

37) Do you have any other information that might indicate potential environmental concerns associated with the property or adjacent properties? ■ Yes ☐ No If yes, please explain:

The US Army operated on this property for about 15 years prior to and during World War II. I have no idea if they left any hazordous materials(Chemical or Mechanical) If you are unsure you should contact the US Army at FT Hood in Killeen, TX or Camp Bowie in Brownwood, Tx

I have completed this questionnaire in good faith and to the best of my knowledge.

Signature: Charles Childress Sr.	Name: Charles Childress
Company:	Title: operator
Relationship to the property: Operator	Number of years associated with the property: 50 + years

All Appropriate USER Inquiry Questionnaire

USER QUESTIONNAIRE

In order to qualify for one of the *Landowner Liability Protections (LLPs)*[A] offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the "Brownfields Amendments"),[B] the *user* **must provide** the following information (if available) to the *environmental professional*. Failure to provide this information could result in a determination that "all appropriate inquiry" is not complete.

1. **Environmental cleanup liens that are filed or recorded against the site (40 CFR 312.25).**

Are you aware of any environmental cleanup liens against the *property* that are filed or recorded under federal, tribal, state or local law?

No, we are not aware of any environmental cleanup liens against the property.

2. **Activity and land use limitations that are in place on the site or have that been filed or recorded in a registry (40 CFR 312.26).**

Are you aware of any *AULs*, such as *engineering controls*, land use restrictions or *institutional controls* that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law?

No, we are not aware of any AULs filed or recorded related to the property.

3. **Specialized knowledge or experience of the person seeking to qualify for the LLP (40 CFR 312.28).**

As the user of this ESA do you have any specialized knowledge or experience related to the *property* or nearby properties? For example, are you involved in the same line of business as the current or former *occupants* of the *property* or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?

No, I do not posess specialized knowledge or experience related to the property.

4. **Relationship of the purchase price to the fair market value of the property if it were not contaminated (40 CFR 312.29).**

Does the purchase price being paid for this *property* reasonably reflect the fair market value of the *property*? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the *property*?

We are leasing, not purchasing the property. In our opinion the lease rate does reflect fair market value.

5. **Commonly known or reasonably ascertainable information about the property (40 CFR 312.30).**

Are you aware of commonly known or reasonably ascertainable information about the *property* that would help the environmental professional to identify conditions indicative of releases or threatened releases? For example, as user,

a) Do you know the past uses of the *property*?

We understand from the landowner that the past use of the property include farming, raising cattle and a period where the property was used by the US Military.

b) Do you know of specific chemicals that are present or once were present at the *property*?

No.

c) Do you know of spills or other chemical releases that have taken place at the *property*?

No.

d) Do you know of any environmental cleanups that have taken place at the *property*?

No.

6. **The degree of obviousness of the presence of likely presence of contamination at the property, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).**

As the user of this ESA, based on your knowledge and experience related to the *property* are there any obvious indicators that point to the presence or likely presence of contamination at the *property*?

No, based on my knowledge and experince, there are no such likely indicators.

In addition, certain information should be collected, if available, and provided to the environmental professional selected to conduct the Phase I. This information is intended to assist the environmental professional but is not necessarily required to qualify for one of the *LLPs*. The information includes:

the reason why the Phase I is required, the type of property and type of property transaction, for example, sale, purchase, exchange, and so forth, the complete and correct address for the property (a map or other documentation showing property location and boundaries is helpful), the scope of services desired for the Phase I (including whether any parties to the property transaction may have a required standard scope of services on whether any considerations beyond the requirements of Practice E2247 are to be considered), identification of all parties who will rely on the Phase I report, identification of the site contact and how the contact can be reached, any special terms and conditions which must be agreed upon by the environmental professional, any other knowledge or experience with the property that may be pertinent to

the environmental professional (for example, copies of any available prior environmental site assessment reports, documents, correspondence, and so forth, concerning the property and its environmental condition).

Nathan Stumpff, Red River Clean Energy

User

1/25/2024

Date

[A] *Landowner Liability Protections*, or *LLPs*, is the term used to describe the three types of potential defenses to Superfund liability in EPA's *Interim Guidance Regarding Criteria Landowners Must Meet in Order to Qualify for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA Liability* ("*Common Elements*" Guide) issued on March 6, 2003.

[B] *P.L. 107*-118.

APPENDIX D

ERIS Database Report

DATABASE REPORT

Project Property:	*Chisme Solar* *N/A* *Early TX*
Project No:	
Report Type:	*Database Report*
Order No:	*23100500123*
Requested by:	*Stantec Consulting Ltd.*
Date Completed:	*October 6, 2023*

Environmental Risk Information Services
A division of Glacier Media Inc.
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Executive Summary

Property Information:

Project Property:		*Chisme Solar* *N/A Early TX*
Project No:		
Coordinates:		
	Latitude:	*31.56903014*
	Longitude:	*-98.82239878*
	UTM Northing:	*3,492,681.23*
	UTM Easting:	*516,853.39*
	UTM Zone:	*14R*
Elevation:		*1,268 FT*

Order Information:

Order No:	*23100500123*
Date Requested:	*October 5, 2023*
Requested by:	*Stantec Consulting Ltd.*
Report Type:	*Database Report*

Historicals/Products:

Aerial Photographs	*Historical Aerials (with Project Boundaries)*
City Directory Search	*CD - 2 Street Search*
ERIS Xplorer	*ERIS Xplorer*
Excel Add-On	*Excel Add-On*
Fire Insurance Maps	*US Fire Insurance Maps*
Physical Setting Report (PSR)	*Physical Setting Report (PSR)*
Topographic Map	*Topographic Maps*

Executive Summary: Report Summary

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
Standard Environmental Records								
Federal								
NPL	Y	1	0	0	0	0	0	0
PROPOSED NPL	Y	1	0	0	0	0	0	0
DELETED NPL	Y	0.5	0	0	0	0	-	0
SEMS	Y	0.5	0	0	0	0	-	0
SEMS ARCHIVE	Y	0.5	0	0	0	0	-	0
ODI	Y	0.5	0	0	0	0	-	0
CERCLIS	Y	0.5	0	0	0	0	-	0
IODI	Y	0.5	0	0	0	0	-	0
CERCLIS NFRAP	Y	0.5	0	0	0	0	-	0
CERCLIS LIENS	Y	PO	0	-	-	-	-	0
RCRA CORRACTS	Y	1	0	0	0	0	0	0
RCRA TSD	Y	0.5	0	0	0	0	-	0
RCRA LQG	Y	0.25	0	0	0	-	-	0
RCRA SQG	Y	0.25	0	0	0	-	-	0
RCRA VSQG	Y	0.25	0	0	0	-	-	0
RCRA NON GEN	Y	0.25	0	0	0	-	-	0
RCRA CONTROLS	Y	0.5	0	0	0	0	-	0
FED ENG	Y	0.5	0	0	0	0	-	0
FED INST	Y	0.5	0	0	0	0	-	0
LUCIS	Y	0.5	0	0	0	0	-	0
NPL IC	Y	0.5	0	0	0	0	-	0
ERNS 1982 TO 1986	Y	PO	0	-	-	-	-	0
ERNS 1987 TO 1989	Y	PO	0	-	-	-	-	0
ERNS	Y	PO	0	-	-	-	-	0
FED BROWNFIELDS	Y	0.5	0	0	0	0	-	0
FEMA UST	Y	0.25	0	0	0	-	-	0
FRP	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
DELISTED FRP	Y	0.25	0	0	0	-	-	0
HIST GAS STATIONS	Y	0.25	0	0	0	-	-	0
REFN	Y	0.25	0	0	0	-	-	0
BULK TERMINAL	Y	0.25	0	0	0	-	-	0
SEMS LIEN	Y	PO	0	-	-	-	-	0
SUPERFUND ROD	Y	1	0	0	0	0	0	0
DOE FUSRAP	Y	1	0	0	0	0	0	0
State								
SUPERFUND	Y	1	0	0	0	0	0	0
SHWS	Y	1	0	0	0	0	0	0
DELISTED SHWS	Y	1	0	0	0	0	0	0
SWF/LF	Y	0.5	0	0	0	0	-	0
CLI	Y	0.5	0	0	0	0	-	0
HGAC CLI	Y	0.5	0	0	0	0	-	0
AACOG CLI	Y	0.5	0	0	0	0	-	0
IHW	Y	0.25	0	0	0	-	-	0
IHW RECEIVER	Y	0.5	0	0	0	0	-	0
RWS	Y	0.5	0	0	0	0	-	0
LPST	Y	0.5	0	0	0	0	-	0
DELISTED LST	Y	0.5	0	0	0	0	-	0
UST	Y	0.25	0	0	0	-	-	0
AST	Y	0.25	0	0	0	-	-	0
PST	Y	0.25	0	0	0	-	-	0
HIST TANK	Y	0.25	0	0	0	-	-	0
UST AUSTIN	Y	0.25	0	0	0	-	-	0
PETROL CAVERN	Y	0.25	0	0	0	-	-	0
DTNK	Y	0.25	0	0	0	-	-	0
AUL	Y	0.5	0	0	0	0	-	0
VCP	Y	0.5	0	0	0	0	-	0
VCP RRC	Y	0.5	0	0	0	0	-	0
OP CLEANUP	Y	0.5	0	0	0	0	-	0
IOP	Y	0.5	0	0	0	0	-	0
BROWNFIELDS	Y	0.5	0	0	0	0	-	0
BROWN RRC	Y	0.5	0	0	0	0	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
MSD	Y	0.5	0	0	0	0	-	0
Tribal								
INDIAN LUST	Y	0.5	0	0	0	0	-	0
INDIAN UST	Y	0.25	0	0	0	-	-	0
DELISTED INDIAN LST	Y	0.5	0	0	0	0	-	0
DELISTED INDIAN UST	Y	0.25	0	0	0	-	-	0
County	***No County standard environmental record sources available for this State.***							
Additional Environmental Records								
Federal								
FINDS/FRS	Y	PO	0	-	-	-	-	0
TRIS	Y	PO	0	-	-	-	-	0
PFAS NPL	Y	0.5	0	0	0	0	-	0
PFAS FED SITES	Y	0.5	0	0	0	0	-	0
PFAS SSEHRI	Y	0.5	0	0	0	0	-	0
ERNS PFAS	Y	0.5	0	0	0	0	-	0
PFAS NPDES	Y	0.5	0	0	0	0	-	0
PFAS TRI	Y	0.5	0	0	0	0	-	0
PFAS WATER	Y	0.5	0	0	0	0	-	0
PFAS TSCA	Y	0.5	0	0	0	0	-	0
PFAS E-MANIFEST	Y	0.5	0	0	0	0	-	0
PFAS IND	Y	0.5	0	0	0	0	-	0
HMIRS	Y	0.125	0	0	-	-	-	0
NCDL	Y	0.125	0	0	-	-	-	0
TSCA	Y	0.125	0	0	-	-	-	0
HIST TSCA	Y	0.125	0	0	-	-	-	0
FTTS ADMIN	Y	PO	0	-	-	-	-	0
FTTS INSP	Y	PO	0	-	-	-	-	0
PRP	Y	PO	0	-	-	-	-	0
SCRD DRYCLEANER	Y	0.5	0	0	0	0	-	0
ICIS	Y	PO	0	-	-	-	-	0
FED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED FED DRY	Y	0.25	0	0	0	-	-	0
FUDS	Y	1	**1**	0	0	0	0	**1**
FUDS MRS	Y	1	**1**	0	0	0	0	**1**

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
FORMER NIKE	Y	1	0	0	0	0	0	0
PIPELINE INCIDENT	Y	PO	0	-	-	-	-	0
MLTS	Y	PO	0	-	-	-	-	0
HIST MLTS	Y	PO	0	-	-	-	-	0
MINES	Y	0.25	0	0	0	-	-	0
SMCRA	Y	1	0	0	0	0	0	0
MRDS	Y	1	0	0	0	0	0	0
LM SITES	Y	1	0	0	0	0	0	0
ALT FUELS	Y	0.25	0	0	0	-	-	0
CONSENT DECREES	Y	0.25	0	0	0	-	-	0
AFS	Y	PO	0	-	-	-	-	0
SSTS	Y	0.25	0	0	0	-	-	0
PCBT	Y	0.5	0	0	0	0	-	0
PCB	Y	0.5	0	0	0	0	-	0
State								
PRIORITY CLEAN	Y	0.5	0	0	0	0	-	0
DRYCLEANERS	Y	0.25	0	0	0	-	-	0
DELISTED DRYCLEANERS	Y	0.25	0	0	0	-	-	0
GWCC	Y	0.125	0	0	-	-	-	0
GWCC HIST	Y	0.125	0	0	-	-	-	0
APAR	Y	0.5	0	0	0	0	-	0
SPILLS	Y	0.125	0	0	-	-	-	0
PFAS	Y	0.5	0	0	0	0	-	0
IHW CORR ACTION	Y	1	0	0	0	0	0	0
LAND APPL	Y	0.25	0	0	0	-	-	0
NOV	Y	0.25	0	0	0	-	-	0
NOE	Y	0.25	0	0	0	-	-	0
LIENS	Y	PO	0	-	-	-	-	0
ORD	Y	0.25	0	0	0	-	-	0
HIST RCRA NONRCRA	Y	0.5	0	0	0	0	-	0
RTOL	Y	0.25	0	0	0	-	-	0
UIC	Y	0.25	0	0	0	-	-	0
IHW GENERATOR	Y	0.125	0	0	-	-	-	0
IHW TRANSPORT	Y	0.125	0	0	-	-	-	0
AIR PERMITS	Y	0.25	0	0	0	-	-	0

Database	Searched	Search Radius	Project Property	Within 0.12mi	0.125mi to 0.25mi	0.25mi to 0.50mi	0.50mi to 1.00mi	Total
EMISSIONS	Y	0.25	0	0	0	-	-	0
TIER 2	Y	0.125	0	0	-	-	-	0
EDWARDS AQUIFER	Y	PO	0	-	-	-	-	0
Tribal	***No Tribal additional environmental record sources available for this State.***							
County	***No County additional environmental record sources available for this State.***							
Total:			***2***	*0*	*0*	*0*	*0*	***2***

**** PO – Property Only***
**** 'Property and adjoining properties' database search radii are set at 0.25 miles.***

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number
1	FUDS	CAMP BOWIE	BROWNWOOD TX ***FUDS Property No:*** *K06TX0009*	SE	0.00 / 0.00	0	17
1	FUDS MRS	CAMP BOWIE	TX	SE	0.00 / 0.00	0	17

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Direction	Distance (mi/ft)	Elev Diff (ft)	Page Number

No records found in the selected databases for the surrounding properties.

Executive Summary: Summary by Data Source

Non Standard

Federal

FUDS - Formerly Used Defense Sites

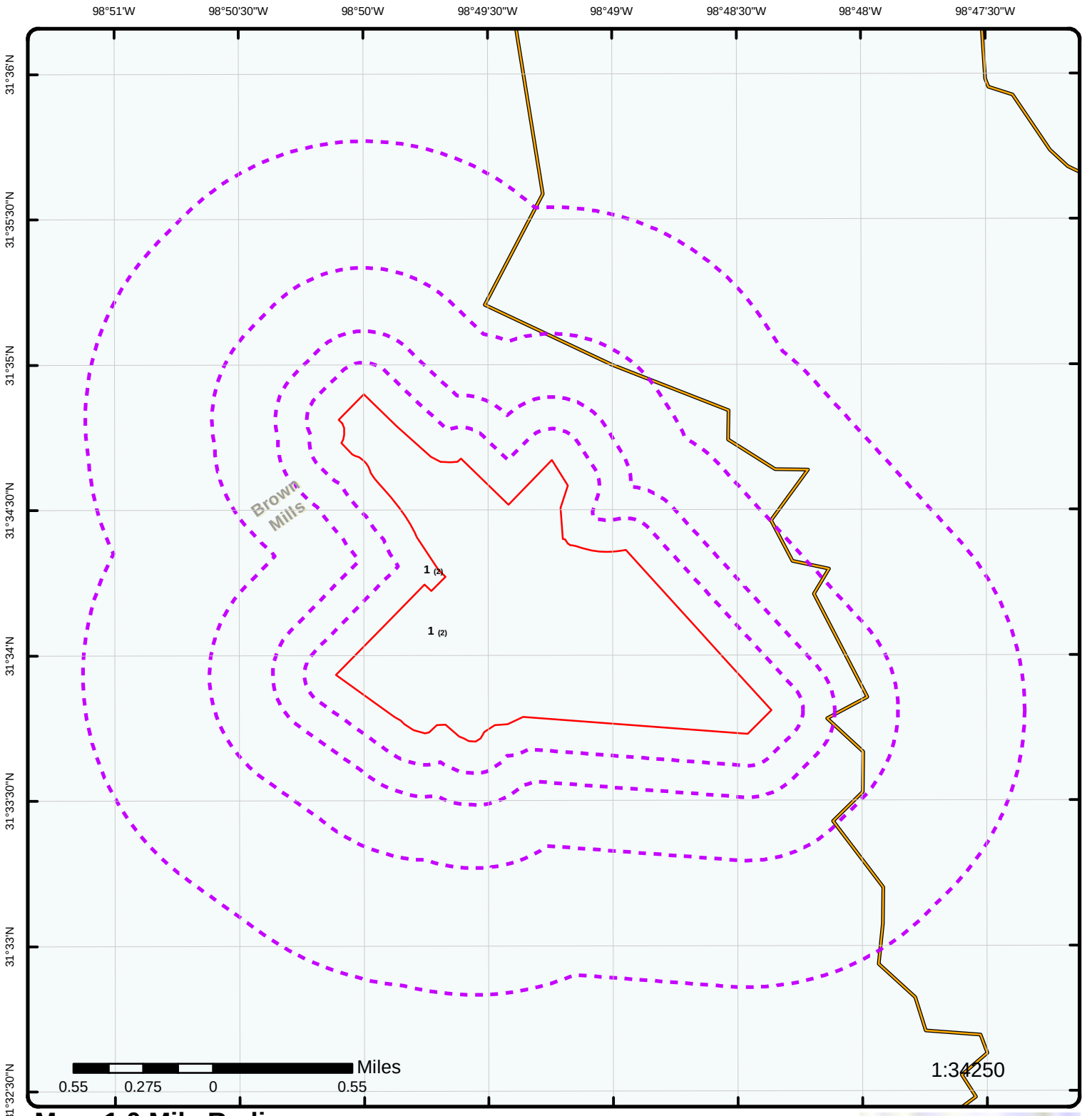
A search of the FUDS database, dated Jul 12, 2022 has found that there are 1 FUDS site(s) within approximately 1.00 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
CAMP BOWIE	BROWNWOOD TX ***FUDS Property No**: K06TX0009*	SE	0.00 / 0.00	1

FUDS MRS - FUDS Munitions Response Sites

A search of the FUDS MRS database, dated Jul 12, 2022 has found that there are 1 FUDS MRS site(s) within approximately 1.00 miles of the project property.

Equal/Higher Elevation	Address	Direction	Distance (mi/ft)	Map Key
CAMP BOWIE	TX	SE	0.00 / 0.00	1



Map: 1.0 Mile Radius

Order Number: 23100500123

Address: N/A, Early, TX

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

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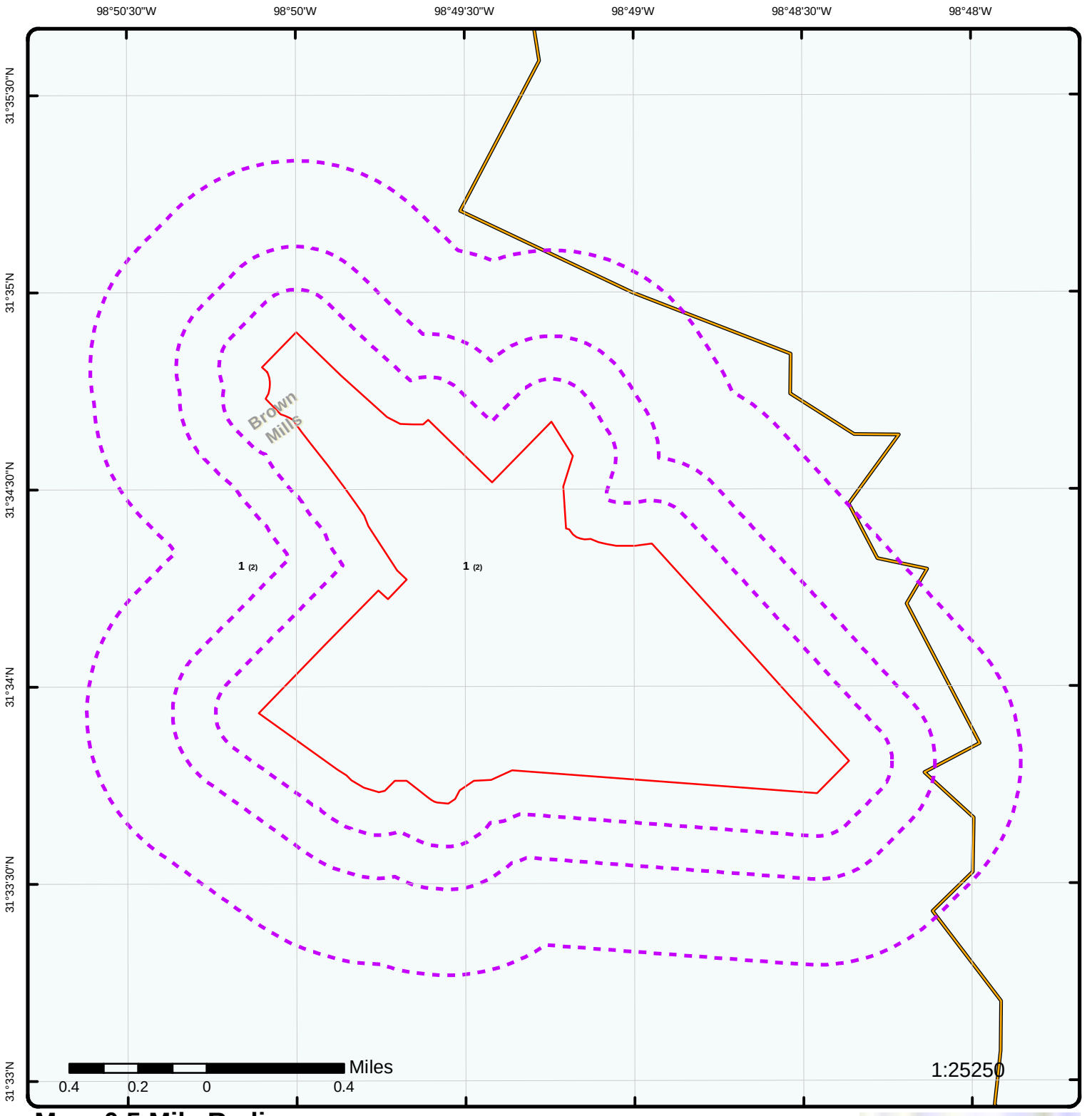

Map: 0.5 Mile Radius

Order Number: 23100500123

Address: N/A, Early, TX

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

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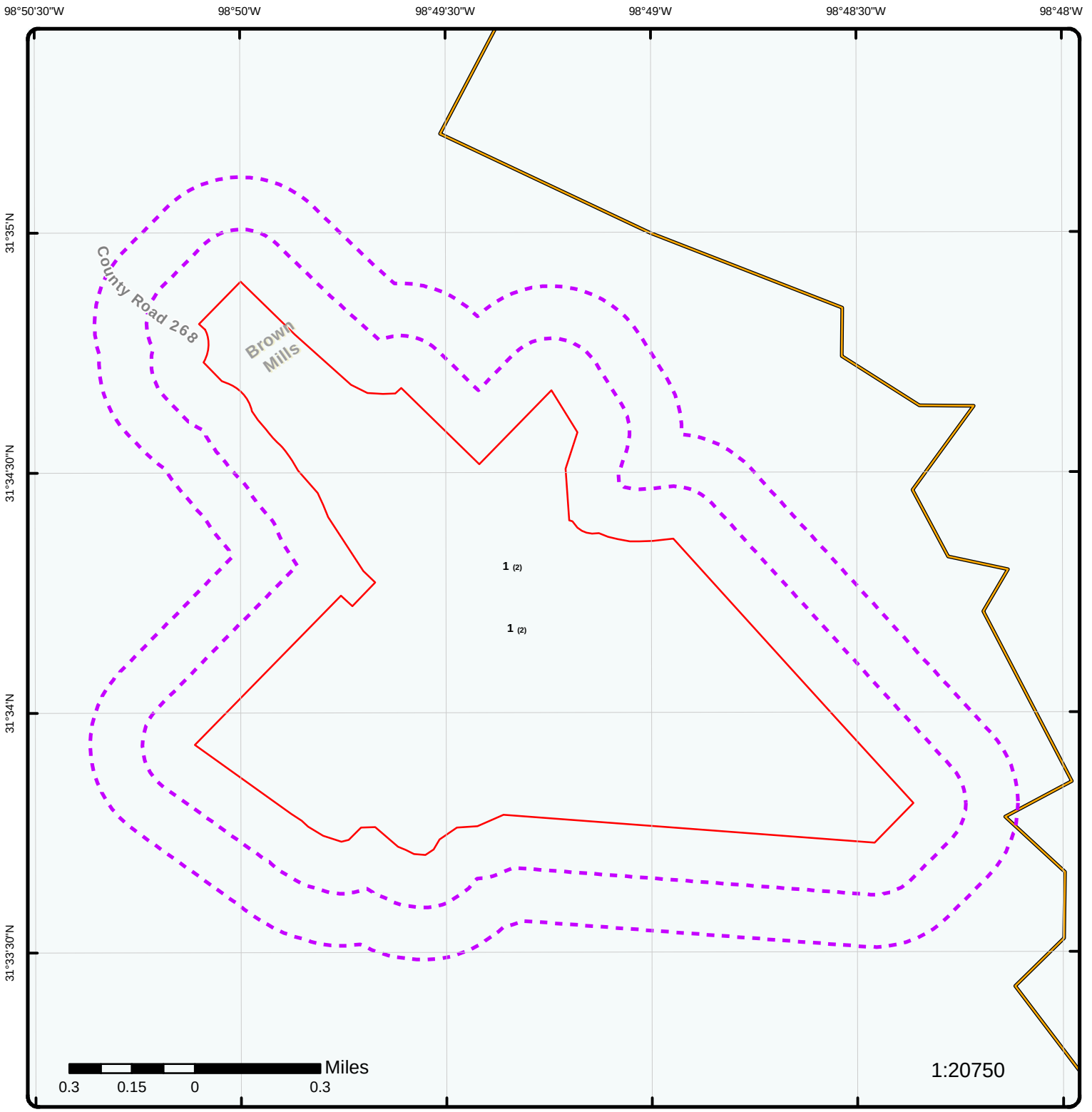

Map: 0.25 Mile Radius

Order Number: 23100500123

Address: N/A, Early, TX

- Project Property
- Buffer Outline
- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- Areas with Higher Elevation
- Areas with Same Elevation
- Areas with Lower Elevation
- Areas with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major & Minor Arterial
- Traffic Circle; Ramp
- Local Road
- Rail
- State
- Country
- National Wetland
- Indian Reserve Land
- Plume
- 100 Year Flood Zone
- 500 Year Flood Zone
- FWS Special Designation Areas
- National Priorities List (Active, Delisted, Proposed, Institutional Control)

Source: © 2021 ESRI StreetMap Premium

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Aerial **Year: 2022**

Address: N/A, Early, TX

Source: ESRI World Imagery

Order Number: 23100500123

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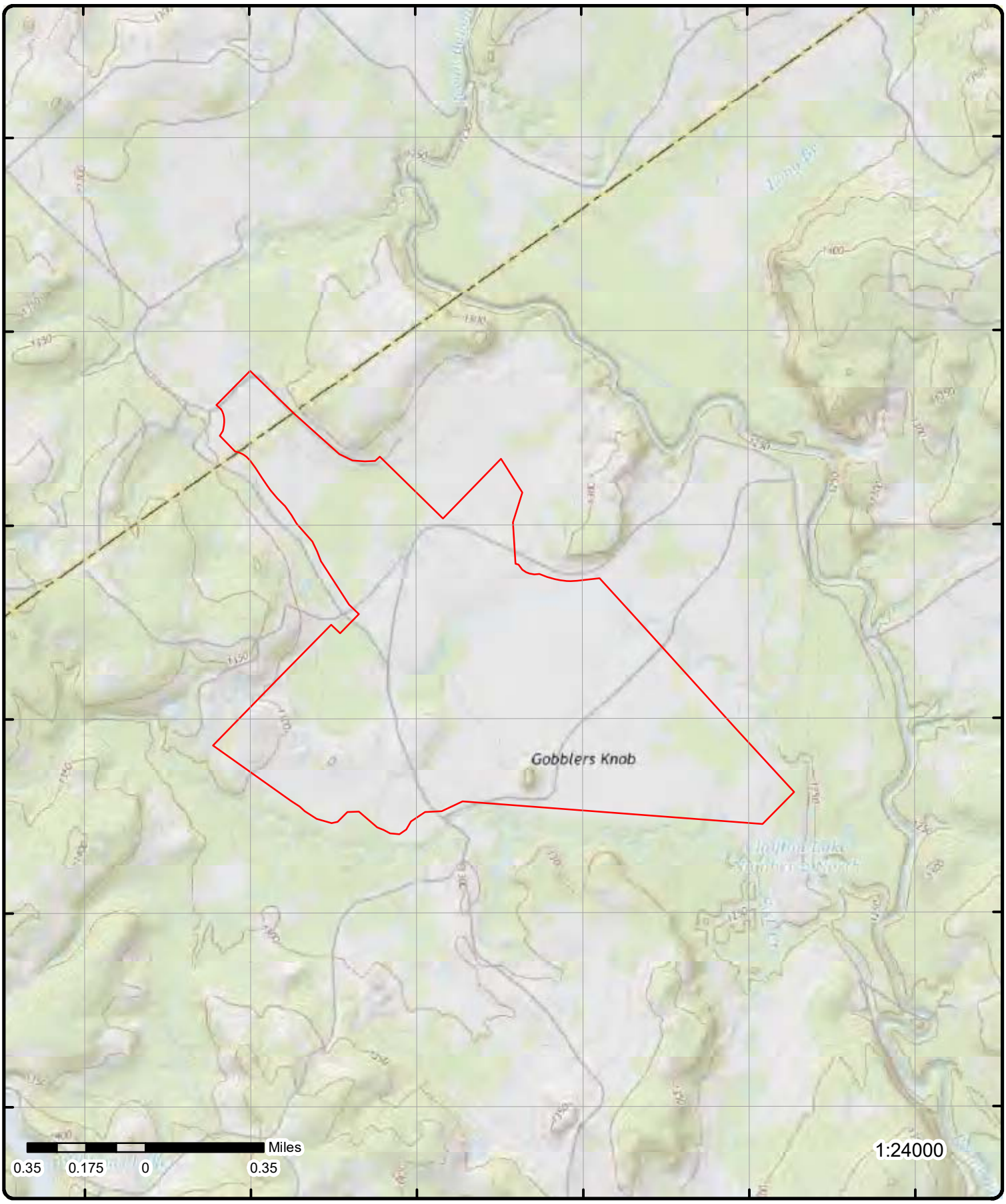

Topographic Map

Year: 2019

Address: N/A, TX

Quadrangle(s): Blanket Springs TX

Source: USGS Topographic Map

Order Number: 23100500123

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Detail Report

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	1 of 2	SE	0.00 / 0.00	1,267.60 / 0	CAMP BOWIE BROWNWOOD TX	FUDS

FUDS Property No: K06TX0009
EMS Map Link: https://fudsportal.usace.army.mil/ems/inventory/map?id=58080
FUDS INST ID: TX69799F644400
Status: Properties with projects
SDS ID:
NPL Status Code: Not Listed
Eligibility: Eligible
Site Eligib: Eligible
Current Owner: Local Government; Private Sector
Has Project: Yes
DOD FUDS Pro:
Project Required:
No Further Action:
Congressional District: 11
Media ID:
Metadata ID:
Feature Desc:
EPA Region: 06
County: BROWN
Latitude: 31.67916667
Longitude: -98.97416667
Fiscal year: 2020
USACE Division: swd
USACE District: swf
Shape Area: .04551247
Shape Len: 1.09746251
X:
Y:
Property History:

The land was first acquired by the U.S. in June 1943. It was conveyed to private ownership in the late 1940s and was repurchased in July 1953 as potential support for the Korean War. The U.S. again sold the land in 1963. The property was returned to private ownership with no land use restrictions. This property is known or suspected to contain military munitions and explosives of concern (e.g., unexploded ordnance) and therefore may present an explosive hazard.

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
1	2 of 2	SE	0.00 / 0.00	1,267.60 / 0	CAMP BOWIE TX	FUDS MRS

FUDS Property ID: K06TX0009
DERP Program: mmrp
Fiscal Year: 2022
FUDS Installatn ID: TX69799F644400
FUDS Site ID: 14
Media ID:
Official Site Name:
Feature Name: ARTILLERY IMPACT AREAS
Feature Desc:

Project Category:
Project No: K06TX000914
Project Status: investigation
Relative Priority:
SDS ID:
USACE District: swf
USACE Division: swd

Additional Information

Map Key	Number of Records	Direction	Distance (mi/ft)	Elev/Diff (ft)	Site	DB
Shape Length:		.89953748				
Shape Area:		.0183653				

Unplottable Summary

Total: 0 Unplottable sites

DB	Company Name/Site Name	Address	City	Zip	ERIS ID

No unplottable records were found that may be relevant for the search criteria.

Unplottable Report

No unplottable records were found that may be relevant for the search criteria.

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ERIS updates databases as set out in ASTM Standard E1527-13 and E1527-21, Section 8.1.8 Sources of Standard Source Information:

"Government information from nongovernmental sources may be considered current if the source updates the information at least every 90 days, or, for information that is updated less frequently than quarterly by the government agency, within 90 days of the date the government agency makes the information available to the public."

Standard Environmental Record Sources

Federal

National Priority List: NPL

Sites on the United States Environmental Protection Agency (EPA)'s National Priorities List of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. The NPL, which EPA is required to update at least once a year, is based primarily on the score a site receives from EPA's Hazard Ranking System. A site must be on the NPL to receive money from the Superfund Trust Fund for remedial action. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: May 25, 2023

National Priority List - Proposed: PROPOSED NPL

Sites proposed by the United States Environmental Protection Agency (EPA), the state agency, or concerned citizens for addition to the National Priorities List (NPL) due to contamination by hazardous waste and identified by the EPA as a candidate for cleanup because it poses a risk to human health and/or the environment. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: May 25, 2023

Deleted NPL: DELETED NPL

Sites deleted from the United States Environmental Protection Agency (EPA)'s National Priorities List. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate. Sites are represented by boundaries where available in the EPA Superfund Site Boundaries maintained by the Shared Enterprise Geodata and Services (SEGS). Site boundaries represent the footprint of a whole site, the sum of all of the Operable Units and the current understanding of the full extent of contamination; for Federal Facility sites, the total site polygon may be the Facility boundary. Where there is no polygon boundary data available for a given site, the site is represented as a point.

Government Publication Date: May 25, 2023

SEMS List 8R Active Site Inventory: SEMS

The U.S. Environmental Protection Agency's (EPA) Superfund Program has deployed the Superfund Enterprise Management System (SEMS), which integrates multiple legacy systems into a comprehensive tracking and reporting tool. This inventory contains active sites evaluated by the Superfund program that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The Active Site Inventory Report displays site and location information at active SEMS sites. An active site is one at which site assessment, removal, remedial, enforcement, cost recovery, or oversight activities are being planned or conducted. This data includes SEMS sites from the List 8R Active file as well as applicable sites from the SEMS GIS/REST file layer obtained from EPA's Facility Registry Service.

Government Publication Date: Jul 26, 2023

SEMS List 8R Archive Sites: SEMS ARCHIVE

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) Archived Site Inventory displays site and location information at sites archived from SEMS. An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. This data includes sites from the List 8R Archived site file.

Government Publication Date: Jul 26, 2023

Inventory of Open Dumps, June 1985: ODI

The Resource Conservation and Recovery Act (RCRA) provides for publication of an inventory of open dumps. The Act defines "open dumps" as facilities which do not comply with EPA's "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 CFR 257).

Government Publication Date: Jun 1985

Comprehensive Environmental Response, Compensation and Liability Information System - CERCLIS: CERCLIS

Superfund is a program administered by the United States Environmental Protection Agency (EPA) to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. The EPA administers the Superfund program in cooperation with individual states and tribal governments; this database is made available by the EPA.

Government Publication Date: Oct 25, 2013

EPA Report on the Status of Open Dumps on Indian Lands: IODI

Public Law 103-399, The Indian Lands Open Dump Cleanup Act of 1994, enacted October 22, 1994, identified congressional concerns that solid waste open dump sites located on American Indian or Alaska Native (AI/AN) lands threaten the health and safety of residents of those lands and contiguous areas. The purpose of the Act is to identify the location of open dumps on Indian lands, assess the relative health and environment hazards posed by those sites, and provide financial and technical assistance to Indian tribal governments to close such dumps in compliance with Federal standards and regulations or standards promulgated by Indian Tribal governments or Alaska Native entities.

Government Publication Date: Dec 31, 1998

CERCLIS - No Further Remedial Action Planned: CERCLIS NFRAP

An archived site is one at which EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program at this time. The Archive designation means that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL). This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Government Publication Date: Oct 25, 2013

CERCLIS Liens: CERCLIS LIENS

A Federal Superfund lien exists at any property where EPA has incurred Superfund costs to address contamination ("Superfund site") and has provided notice of liability to the property owner. A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. This database is made available by the United States Environmental Protection Agency (EPA). This database was provided by the United States Environmental Protection Agency (EPA). Refer to SEMS LIEN as the current data source for Superfund Liens.

Government Publication Date: Jan 30, 2014

RCRA CORRACTS-Corrective Action: RCRA CORRACTS

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. At these sites, the Corrective Action Program ensures that cleanups occur. EPA and state regulators work with facilities and communities to design remedies based on the contamination, geology, and anticipated use unique to each site.

Government Publication Date: Jul 10, 2023

RCRA non-CORRACTS TSD Facilities: RCRA TSD

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. This database includes Non-Corrective Action sites listed as treatment, storage and/or disposal facilities of hazardous waste as defined by RCRA.

Government Publication Date: Jul 10, 2023

RCRA Generator List: RCRA LQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Large Quantity Generators (LQGs) generate 1,000 kilograms per month or more of hazardous waste or more than one kilogram per month of acutely hazardous waste.

Government Publication Date: Jul 10, 2023

RCRA Small Quantity Generators List: RCRA SQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.

Government Publication Date: Jul 10, 2023

RCRA Very Small Quantity Generators List: RCRA VSQG

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Very Small Quantity Generators (VSQG) generate 100 kilograms or less per month of hazardous waste, or one kilogram or less per month of acutely hazardous waste. Additionally, VSQG may not accumulate more than 1,000 kilograms of hazardous waste at any time.

Government Publication Date: Jul 10, 2023

RCRA Non-Generators: RCRA NON GEN

RCRA Info is the U.S. Environmental Protection Agency's (EPA) comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRA Info replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). A hazardous waste generator is any person or site whose processes and actions create hazardous waste (see 40 CFR 260.10). Non-Generators do not presently generate hazardous waste.

Government Publication Date: Jul 10, 2023

RCRA Sites with Controls: RCRA CONTROLS

List of Resource Conservation and Recovery Act (RCRA) facilities with institutional controls in place. RCRA gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

Government Publication Date: Jul 10, 2023

Federal Engineering Controls-ECs: FED ENG

This list of Engineering controls (ECs) is provided by the United States Environmental Protection Agency (EPA). ECs encompass a variety of engineered and constructed physical barriers (e.g., soil capping, sub-surface venting systems, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property. The EC listing includes remedy component data from Superfund decision documents issued in fiscal years 1982-2021 for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Aug 23, 2023

Federal Institutional Controls- ICs: FED INST

This list of Institutional controls (ICs) is provided by the United States Environmental Protection Agency (EPA). ICs are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Although it is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable, ICs play an important role in site remedies because they reduce exposure to contamination by limiting land or resource use and guide human behavior at a site. The IC listing includes remedy component data from Superfund decision documents issued in fiscal years 1982-2021 for applicable sites on the final or deleted on the National Priorities List (NPL); and sites with a Superfund Alternative Approach (SAA) Agreement in place. The only sites included that are not on the NPL; proposed for NPL; or removed from proposed NPL, are those with an SAA Agreement in place.

Government Publication Date: Aug 23, 2023

Land Use Control Information System: LUCIS

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

Government Publication Date: Sep 1, 2006

Institutional Control Boundaries at NPL sites: NPL IC

Boundaries of Institutional Control areas at sites on the United States Environmental Protection Agency (EPA)'s National Priorities List, or Proposed or Deleted, made available by the EPA's Shared Enterprise Geodata and Services (SEGS). United States Environmental Protection Agency (EPA)'s National Priorities List of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program. Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.

Government Publication Date: May 25, 2023

Emergency Response Notification System: ERNS 1982 TO 1986

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1982-1986

Emergency Response Notification System: ERNS 1987 TO 1989

Database of oil and hazardous substances spill reports controlled by the National Response Center. The primary function of the National Response Center is to serve as the sole national point of contact for reporting oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.

Government Publication Date: 1987-1989

Emergency Response Notification System: ERNS

Database of oil and hazardous substances spill reports made available by the United States Coast Guard National Response Center (NRC). The NRC fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. These data contain initial incident data that has not been validated or investigated by a federal/state response agency.

Government Publication Date: Apr 3, 2023

The Assessment, Cleanup and Redevelopment Exchange System (ACRES) Brownfield Database: FED BROWNFIELDS

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands. This data is provided by the United States Environmental Protection Agency (EPA) and includes Brownfield sites from the Cleanups in My Community (CIMC) web application.

Government Publication Date: Sep 13, 2022

FEMA Underground Storage Tank Listing: FEMA UST

The Federal Emergency Management Agency (FEMA) of the Department of Homeland Security maintains a list of FEMA owned underground storage tanks.

Government Publication Date: Dec 31, 2017

Facility Response Plan: FRP

This listing contains facilities that have submitted Facility Response Plans (FRPs) to the U.S. Environmental Protection Agency (EPA). Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit FRPs. Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments. This listing includes FRP facilities from an applicable EPA FOIA file and Homeland Infrastructure Foundation-Level Data (HIFLD) data file.

Government Publication Date: May 2, 2023

Delisted Facility Response Plans: DELISTED FRP

Facilities that once appeared in - and have since been removed from - the list of facilities that have submitted Facility Response Plans (FRP) to EPA. Facilities that could reasonably be expected to cause "substantial harm" to the environment by discharging oil into or on navigable waters are required to prepare and submit Facility Response Plans (FRPs). Harm is determined based on total oil storage capacity, secondary containment and age of tanks, oil transfer activities, history of discharges, proximity to a public drinking water intake or sensitive environments.

Government Publication Date: May 2, 2023

Historical Gas Stations: HIST GAS STATIONS

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

Government Publication Date: Jul 1, 1930

Petroleum Refineries: REFN

List of petroleum refineries from the U.S. Energy Information Administration (EIA) Refinery Capacity Report. Includes operating and idle petroleum refineries (including new refineries under construction) and refineries shut down during the previous year located in the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and other U.S. possessions. Survey locations adjusted using public data.

Government Publication Date: Mar 9, 2023

Petroleum Product and Crude Oil Rail Terminals: BULK TERMINAL

List of petroleum product and crude oil rail terminals made available by the U.S. Energy Information Administration (EIA). Includes operable bulk petroleum product terminals located in the 50 States and the District of Columbia with a total bulk shell storage capacity of 50,000 barrels or more, and/or the ability to receive volumes from tanker, barge, or pipeline; also rail terminals handling the loading and unloading of crude oil that were active between 2017 and 2018. Petroleum product terminals comes from the EIA-815 Bulk Terminal and Blender Report, which includes working, shell in operation, and shell idle for several major product groupings. Survey locations adjusted using public data.

Government Publication Date: Jun 29, 2022

LIEN on Property: SEMS LIEN

The U.S. Environmental Protection Agency's (EPA) Superfund Enterprise Management System (SEMS) provides Lien details on applicable properties, such as the Superfund lien on property activity, the lien property information, and the parties associated with the lien.

Government Publication Date: Jul 26, 2023

Superfund Decision Documents: SUPERFUND ROD

This database contains a list of decision documents for Superfund sites. Decision documents serve to provide the reasoning for the choice of (or) changes to a Superfund Site cleanup plan. The decision documents include completed Records of Decision (ROD), ROD Amendments, Explanations of Significant Differences (ESD) for active and archived sites stored in the Superfund Enterprise Management System (SEMS), along with other associated memos and files. This information is maintained and made available by the U.S. Environmental Protection Agency.

Government Publication Date: May 25, 2023

Formerly Utilized Sites Remedial Action Program: DOE FUSRAP

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

Government Publication Date: Mar 4, 2017

State

Superfund Sites Boundaries: SUPERFUND

List of sites that may constitute an imminent and substantial endangerment to public health and safety or the environment due to a release or threatened release of hazardous substances into the environment provided by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Aug 10, 2021

State Superfund Registry: SHWS

List of sites identified or evaluated by the Texas Commission on Environmental Quality (TCEQ) which may constitute an imminent and substantial endangerment to public health and safety or to the environment due to a release or threatened release of hazardous substances into the environment. The TCEQ updates the state Superfund sites list in accordance with the Texas Health and Safety Code (THSC). This database is state equivalent NPL.

Government Publication Date: Aug 30, 2023

Delisted State Superfund Registry List: DELISTED SHWS

List of sites that once appeared on - and have since been removed from - the State Superfund Registry made available by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Aug 30, 2023

Permitted Solid Waste Facilities: SWF/LF

List of active, inactive, and post-closure Municipal Solid Waste landfills and processing facilities with issued permits and authorizations, as well as pending, withdrawn, or denied applications registered with the Texas Commission on Environmental Quality (TCEQ) under the Texas Administrative Code (TAC) Title 30 Chapter 330.

Government Publication Date: Apr 28, 2023

Closed Landfill Inventory: CLI

Inventory of permitted and unauthorized closed or abandoned municipal solid waste landfills throughout Texas compiled by the Texas Commission on Environmental Quality (TCEQ), in collaboration with regional Councils of Government (COG).

Government Publication Date: Late 1990's

Houston-Galveston Closed Landfill Inventory: HGAC CLI

List of closed and abandoned landfill sites which fall under the Houston Galveston Area Council of Government. Texas Councils of Governments (COGs) are required to maintain an inventory of closed municipal solid waste landfills for their regional solid waste management plans.

Government Publication Date: Oct 19, 2022

AACOG Closed Landfill Inventory: AACOG CLI

A list of permitted and unpermitted closed landfill sites made available by the Alamo Area Council of Governments (AACOG). Alamo Area Council of Governments (AACOG) is requested to maintain an inventory of closed municipal solid waste landfills for their regional solid waste management plans.

Government Publication Date: Feb 6, 2020

Commercial Management Facilities for Hazardous Waste and Industrial Solid Wastes: IHW

This publication lists facilities that have permits or authorizations from the Texas Commission on Environmental Quality (TCEQ) to receive, on a commercial basis, and manage hazardous waste, industrial nonhazardous waste, or both.

Government Publication Date: Dec 1, 2020

Industrial and Hazardous Waste - Receivers: IHW RECEIVER

List of active, inactive, and post-closure Industrial and Hazardous Waste Receiver Facilities permitted by or registered with the Texas Commission on Environmental Quality (TCEQ) under the Texas Administrative Code (TAC) Title 30 Chapter 335.

Government Publication Date: Jun 22, 2023

Radioactive Waste Sites: RWS

This Texas Commission on Environmental Quality (TCEQ) database contains all sites in the State of Texas designated as Radioactive Waste sites as of 2006. The TCEQ no longer maintains this site listing.

Government Publication Date: Jul 11, 2006

Leaking Petroleum Storage Tank Database: LPST

List of cleanup sites where contamination was caused by spills, leaks, or other releases of petroleum or hazardous substances from underground and/or aboveground storage tanks regulated by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Aug 28, 2023

Delisted Leaking Storage Tanks: DELISTED LST

List of cleanup sites that once appeared on - and have since been removed from - the list of Leaking Petroleum Storage Tank Cleanups made available by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Aug 28, 2023

Underground Petroleum Storage Tanks: UST

List of facilities that have one or more Underground Storage Tank (UST)s registered and regulated by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Jun 2, 2023

Aboveground Storage Tanks: AST

List of facilities that have one or more Aboveground Storage Tank (AST)s registered and regulated by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Jun 2, 2023

Petroleum Storage Tanks Database: PST

List of facilities included on the list of tank facilities made available by the Texas Commission on Environmental Quality (TCEQ) that have no association as either underground or aboveground tanks.

Government Publication Date: Jun 2, 2023

Historical Tank Construction Notification: HIST TANK

A list of facilities with historic petroleum storage tank construction notification activity made available by the Texas Commission on Environmental Quality (TCEQ). Any person who intends either to install a new or replacement undergound storage tank (UST), to remove a UST from the ground, to conduct a permanent abandonment in-place of a UST, or make any repairs or improvements of a UST must submit a Construction Notification Form.

Government Publication Date: Jun 2, 2023

Austin Underground Storage Tanks: UST AUSTIN

A list of underground gas storage tanks both current and historical from the City of Austin Open Data Portal. Data provided by Planning and Zoning, City of Austin.

Government Publication Date: Jul 3, 2023

Salt Caverns for Petroleum Storage: PETROL CAVERN

Listing of salt caverns for petroleum storage, made available by the Railroad Commission of Texas. Salt caverns, constructed in naturally occurring salt domes or salt beds, are used as storage for hydrocarbons including crude oil and natural gases.

Government Publication Date: Sep 1, 2006

Delisted Storage Tanks: DTNK

List of tank facilities that once appeared on - and have since been removed from - the Petroleum Storage Tanks Database made available by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Jul 3, 2023

Sites with Controls: AUL

Sites under several Texas Commission on Environmental Quality (TCEQ) remediation programs which have institutional or engineering controls.

Government Publication Date: Jul 24, 2023

Voluntary Cleanup Program: VCP

List of sites which have participated or are currently participating in the Voluntary Cleanup Program (VCP) administered by the Texas Commission on Environmental Quality (TCEQ). The VCP provides administrative, technical, and legal incentives to encourage the cleanup of contaminated sites in Texas.

Government Publication Date: May 22, 2023

Texas Railroad Commission Voluntary Cleanup Program: VCP RRC

List of facilities which have participated in or are currently participating in the Voluntary Cleanup Program (VCP) operated by the Railroad Commission of Texas (RRC). The RRC VCP provides an incentive to remediate Oil & Gas related pollution.

Government Publication Date: Aug 15, 2023

Operator Cleanup Program: OP CLEANUP

A list of sites in the Texas Railroad Commission (RRC)'s Operator Cleanup Program (OCP). The OCP, under the Site Remediation Section, is tasked with oversight of complex pollution cleanups performed by the oil and gas industry. Complex sites include those that occur in sensitive environmental areas as defined by 16 TAC3.91 (SWR 91) and may require site specific cleanup levels based on risk. When cleanup activities are successfully completed by the operator, Commission staff may issue a "No Further Action" letter acknowledging completion.

Government Publication Date: Jun 5, 2023

Innocent Owner/Operator Program: IOP

A list of sites in the Innocent Owner/Operator Program (IOP) made available by Texas Commission of Environmental Quality (TCEQ) . IOP provides certificates to innocent owners or operators whom their properties are contaminated as a result of a release or migration of contaminants from a source or sources not located on the property, and they did not cause or contribute to the source or sources of contamination.

Government Publication Date: May 29, 2023

Brownfields Site Assessments Database: BROWNFIELDS

The Texas Commission on Environmental Quality (TCEQ) Brownfields Site Assessment Program (BSA) layer is used to identify the geographic location of all "Active and Inactive BSA" sites within the State of Texas.

Government Publication Date: Jul 3, 2023

Texas Railroad Commission Brownfields: BROWN RRC

List of sites which have participated or are currently participating in the Railroad Commission of Texas (RRC) Brownfields Response Program (BRP). The RRC BRP provides technical and financial support for redevelopment of abandoned oil and gas sites.

Government Publication Date: Aug 15, 2023

Municipal Setting Designation: MSD

Municipal Setting Designations (MSD) list is maintained by Texas Commission on Environmental Quality (TCEQ). An MSD is an official state designation given to property within a municipality or its extraterritorial jurisdiction that certifies that designated groundwater at the property is not used as potable water, and is prohibited from future use as potable water because that groundwater is contaminated in excess of the applicable potable-water protective concentration level.

Government Publication Date: Sep 4, 2023

Tribal

Leaking Underground Storage Tanks (LUSTs) on Tribal/Indian Lands: INDIAN LUST

This list of leaking underground storage tanks (LUSTs) on Tribal/Indian Lands in Region 6, which includes Texas, is made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Oct 6, 2017

Underground Storage Tanks on Tribal/Indian Lands: INDIAN UST

This list of underground storage tanks (USTs) on Tribal/Indian Lands in Region 6, which includes Texas, is provided by the United States Environmental Protection Agency (EPA).

Government Publication Date: Apr 26, 2023

Delisted Tribal Leaking Storage Tanks: DELISTED INDIAN LST

Leaking Underground Storage Tank (LUST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian LUST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Apr 26, 2023

Delisted Tribal Underground Storage Tanks: DELISTED INDIAN UST

Underground Storage Tank (UST) facilities which once appeared on - and have since been removed from - the Regional Tribal/Indian UST lists made available by the United States Environmental Protection Agency (EPA).

Government Publication Date: Apr 26, 2023

County

No County standard environmental record sources available for this State.

Additional Environmental Record Sources

Federal

Facility Registry Service/Facility Index: FINDS/FRS

The Facility Registry Service (FRS) is a centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS creates high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures that incorporate information from program national systems, state master facility records, and data collected from EPA's Central Data Exchange registrations and data management personnel. This list is made available by the U.S. Environmental Protection Agency (EPA).

Government Publication Date: Mar 2, 2023

Toxics Release Inventory (TRI) Program: TRIS

The U.S. Environmental Protection Agency's Toxics Release Inventory (TRI) is a database containing data on disposal or other releases of toxic chemicals from U.S. facilities and information about how facilities manage those chemicals through recycling, energy recovery, and treatment. There are currently 770 individually listed chemicals and 33 chemical categories covered by the TRI Program. Facilities that manufacture, process or otherwise use these chemicals in amounts above established levels must submit annual reporting forms for each chemical. Note that the TRI chemical list does not include all toxic chemicals used in the U.S. One of TRI's primary purposes is to inform communities about toxic chemical releases to the environment.

Government Publication Date: Oct 19, 2022

PFOA/PFOS Contaminated Sites: PFAS NPL

This list of Superfund Sites with Per- and Polyfluoroalkyl Substances (PFAS) detections is made available by the U.S. Environmental Protection Agency (EPA) in their PFAS Analytic Tools data, previously the list was obtained by EPA FOIA requests. EPA's Office of Land and Emergency Management and EPA Regional Offices maintain what is known about site investigations, contamination, and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) where PFAS is present in the environment. Limitations: Detections of PFAS at National Priorities List (NPL) sites do not mean that people are at risk from PFAS, are exposed to PFAS, or that the site is the source of the PFAS. The information in the Superfund NPL and Superfund Alternative Agreement (SAA) PFAS detection site list is years old and may not be accurate today. Site information such as site name, site ID, and location has been confirmed for accuracy; however, PFAS-related information such as media sampled, drinking water being above the health advisory, or mitigation efforts has not been verified. For Federal Facilities data, the other Federal agencies (OFA) are the lead agency for their data and provided them to EPA.

Government Publication Date: Sep 14, 2023

Federal Agency Locations with Known or Suspected PFAS Detections: PFAS FED SITES

List of Federal agency locations with known or suspected detections of Per- and Polyfluoroalkyl Substances (PFAS), made available by the U.S. Environmental Protection Agency (EPA) in their PFAS Analytic Tools data. EPA outlines that these data are gathered from several federal entities, such as the Federal Superfund program, Department of Defense (DOD), National Aeronautics and Space Administration, Department of Transportation, and Department of Energy. The dates this data was extracted for the PFAS Analytic Tools range from March 2022 to April 2023. Sites on this list do not necessarily reflect the source/s of PFAS contamination and detections do not indicate level of risk or human exposure at the site. Agricultural notifications in this data are limited to DOD sites only. At this time, the EPA is aware that this list is not comprehensive of all Federal agencies.

Government Publication Date: Apr 24, 2023

SSEHRI PFAS Contamination Sites: PFAS SSEHRI

This PFAS Contamination Site Tracker database is compiled by the Social Science Environmental Health Research Institute (SSEHRI) at Northeastern University. According to the SSEHRI, the database records qualitative and quantitative data from each known site of PFAS contamination, including timeline of discovery, sources, levels, health impacts, community response, and government response. The goal of this database is to compile information and support public understanding of the rapidly unfolding issue of PFAS contamination. All data presented was extracted from government websites, news articles, or publicly available documents, and this is cited in the tracker. Locations for the Known PFAS Contamination Sites are sourced from the PFAS Sites and Community Resources Map, credited to the Northeastern University's PFAS Project Lab, Silent Spring Institute, and the PFAS-REACH team. Disclaimer: The source conveys the data undergoes regular updates as new information becomes available, some sites may be missing and/or contain information that is incorrect or outdated, as well as their information represents all contamination sites SSEHRI is aware of, not all possible contamination sites. This data is not intended to be used for legal purposes. Access the following source link for the most current information: https://pfasproject.com/pfas-sites-and-community-resources/

Government Publication Date: Oct 9, 2022

National Response Center PFAS Spills: ERNS PFAS

This Per- and Poly-Fluoroalkyl Substances (PFAS) Spills dataset is made available via the U.S. Environmental Protection Agency's (EPA) PFAS Analytic Tools. The National Response Center (NRC), operated by the U.S. Coast Guard, serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. Response center calls from 1990 to the most recent complete calendar year where there was indication of Aqueous Film Forming Foam (AFFF) usage are included in this dataset. NRC calls may reference AFFF usage in the "Material Involved" or "Incident Description" fields. Limitations: The data from the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency. Keyword searches may misidentify some incident reports that do not contain PFAS. This dataset should also not be considered to be exhaustive of all PFAS spills/release incidents.

Government Publication Date: Apr 15, 2023

PFAS NPDES Discharge Monitoring: PFAS NPDES

This list of National Pollutant Discharge Elimination System (NPDES) permitted facilities with required monitoring for Per- and Polyfluoroalkyl (PFAS) Substances is made available via the U.S. Environmental Protection Agency (EPA)'s PFAS Analytic Tools. Any point-source wastewater discharger to waters of the United States must have a NPDES permit, which defines a set of parameters for pollutants and monitoring to ensure that the discharge does not degrade water quality or impair human health. This list includes NPDES permitted facilities associated with permits that monitor for Per- and Polyfluoroalkyl Substances (PFAS), limited to the years 2007 - present. EPA further advises the following regarding these data: currently, fewer than half of states have required PFAS monitoring for at least one of their permittees, and fewer states have established PFAS effluent limits for permittees. For states that may have required monitoring, some reporting and data transfer issues may exist on a state-by-state basis.

Government Publication Date: May 1, 2023

Perfluorinated Alkyl Substances (PFAS) from Toxic Release Inventory: PFAS TRI

List of Toxics Release Inventory (TRI) facilities at which the reported chemical is a per- or polyfluoroalkyl (PFAS) substance included in the U.S. Environmental Protection Agency's (EPA) consolidated PFAS Master List of PFAS Substances. Encompasses Toxics Release Inventory records included in the EPA PFAS Analytic Tools. The EPA's TRI database currently tracks information on disposal or releases of 770 individually listed toxic chemicals and 33 chemical categories from thousands of U.S. facilities and details about how facilities manage those chemicals through recycling, energy recovery, and treatment.

Government Publication Date: Oct 19, 2022

Perfluorinated Alkyl Substances (PFAS) Water Quality: PFAS WATER

The Water Quality Portal (WQP) is a cooperative service sponsored by the United States Geological Survey (USGS), the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC). This listing includes records from the Water Quality Portal where the characteristic (environmental measurement) is in the Environmental Protection Agency (EPA)'s consolidated Master List of PFAS Substances.

Government Publication Date: Jul 20, 2020

PFAS TSCA Manufacture and Import Facilities: PFAS TSCA

The U.S. Environmental Protection Agency (EPA) issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) and requires chemical manufacturers and facilities that manufacture or import chemical substances to report data to EPA. This list is specific only to TSCA Manufacture and Import Facilities with reported per- and poly-fluoroalkyl (PFAS) substances. Data file is sourced from EPA's PFAS Analytic Tools TSCA dataset which includes CDR/Inventory Update Reporting data from 1998 up to 2020. Disclaimer: This data file includes production and importation data for chemicals identified in EPA's CompTox Chemicals Dashboard list of PFAS without explicit structures and list of PFAS structures in DSSTox. Note that some regulations have specific chemical structure requirements that define PFAS differently than the lists in EPA's CompTox Chemicals Dashboard. Reporting information on manufactured or imported chemical substance amounts should not be compared between facilities, as some companies claim Chemical Data Reporting Rule data fields for PFAS information as Confidential Business Information.

Government Publication Date: Jan 5, 2023

PFAS Waste Transfers from RCRA e-Manifest : PFAS E-MANIFEST

This Per- and Poly-Fluoroalkyl Substances (PFAS) Waste Transfers dataset is made available via the U.S. Environmental Protection Agency's (EPA) PFAS Analytic Tools. Every shipment of hazardous waste in the U.S. must be accompanied by a shipment manifest, which is a critical component of the cradle-to-grave tracking of wastes mandated by the Resource Conservation and Recovery Act (RCRA). According to the EPA, currently no Federal Waste Code exists for any PFAS compounds. To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: • PFAS • PFOA • PFOS • PERFL • AFFF • GENX • GEN-X (plus the Vermont state-specific waste codes). Limitations: Amount or concentration of PFAS being transferred cannot be determined from the manifest information. Keyword searches may misidentify some manifest records that do not contain PFAS. This dataset should also not be considered to be exhaustive of all PFAS waste transfers.

Government Publication Date: Apr 9, 2023

PFAS Industry Sectors: PFAS IND

This Per- and Poly-Fluoroalkyl Substances (PFAS) Industry Sectors dataset is made available via the U.S. Environmental Protection Agency's (EPA) PFAS Analytic Tools. The EPA developed the dataset from various sources that show which industries may be handling PFAS including: EPA's Enforcement and Compliance History Online (ECHO) records restricted to potential PFAS-handling industry sectors; ECHO records for Fire Training Sites identified where fire-fighting foam may have been used in training exercises; and 14 CFR Part 139 Airports compiled from historic and current records from the FAA Airport Data and Information Portal. Since July 2006, all certificated Part 139 Airports are required to have fire-fighting foam onsite that meet certain military specifications, which to date have been fluorinated (Aqueous Film Forming Foam). Limitations: Inclusion in this dataset does not indicate that PFAS are being manufactured, processed, used, or released by the facility. Listed facilities potentially handle PFAS based on their industrial profile, but are unconfirmed by the EPA. Keyword searches in ECHO for Fire Training sites may misidentify some facilities and should not be considered to be an exhaustive list of fire training facilities in the U.S.

Government Publication Date: Apr 16, 2023

Hazardous Materials Information Reporting System: HMIRS

US DOT - Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Incidents Reports Database taken from Hazmat Intelligence Portal, U.S. Department of Transportation.

Government Publication Date: Sep 1, 2020

National Clandestine Drug Labs: NCDL

The U.S. Department of Justice ("the Department"), Drug Enforcement Administration (DEA), provides this data as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy.

Government Publication Date: Jul 26, 2023

Toxic Substances Control Act: TSCA

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.
The CDR enables EPA to collect and publish information on the manufacturing, processing, and use of commercial chemical substances and mixtures (referred to hereafter as chemical substances) on the TSCA Chemical Substance Inventory (TSCA Inventory). This includes current information on chemical substance production volumes, manufacturing sites, and how the chemical substances are used. This information helps the Agency determine whether people or the environment are potentially exposed to reported chemical substances. EPA publishes submitted CDR data that is not Confidential Business Information (CBI).

Government Publication Date: Apr 11, 2019

Hist TSCA: HIST TSCA

The Environmental Protection Agency (EPA) is amending the Toxic Substances Control Act (TSCA) section 8(a) Inventory Update Reporting (IUR) rule and changing its name to the Chemical Data Reporting (CDR) rule.
The 2006 IUR data summary report includes information about chemicals manufactured or imported in quantities of 25,000 pounds or more at a single site during calendar year 2005. In addition to the basic manufacturing information collected in previous reporting cycles, the 2006 cycle is the first time EPA collected information to characterize exposure during manufacturing, processing and use of organic chemicals. The 2006 cycle also is the first time manufacturers of inorganic chemicals were required to report basic manufacturing information.

Government Publication Date: Dec 31, 2006

FTTS Administrative Case Listing: FTTS ADMIN

An administrative case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

FTTS Inspection Case Listing: FTTS INSP

An inspection case listing from the Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA) and Toxic Substances Control Act (TSCA), together known as FTTS. This database was obtained from the Environmental Protection Agency's (EPA) National Compliance Database (NCDB). The FTTS and NCDB was shut down in 2006.

Government Publication Date: Jan 19, 2007

Potentially Responsible Parties List: PRP

Early in the site cleanup process, the U.S. Environmental Protection Agency (EPA) conducts a search to find the Potentially Responsible Parties (PRPs). The EPA looks for evidence to determine liability by matching wastes found at the site with parties that may have contributed wastes to the site. This listing contains PRPs, Noticed Parties, at sites in the EPA's Superfund Enterprise Management System (SEMS).

Government Publication Date: Aug 23, 2023

State Coalition for Remediation of Drycleaners Listing: SCRD DRYCLEANER

The State Coalition for Remediation of Drycleaners (SCRD) was established in 1998, with support from the U.S. Environmental Protection Agency (EPA) Office of Superfund Remediation and Technology Innovation. Coalition members are states with mandated programs and funding for drycleaner site remediation. Current members are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin. Since 2017, the SCRD no longer maintains this data, refer to applicable state source data where available.

Government Publication Date: Nov 08, 2017

Integrated Compliance Information System (ICIS): ICIS

The Integrated Compliance Information System (ICIS) database contains integrated enforcement and compliance information across most of U.S. Environmental Protection Agency's (EPA) programs. The vision for ICIS is to replace EPA's independent databases that contain enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions and a subset of the Permit Compliance System (PCS), which supports the National Pollutant Discharge Elimination System (NPDES). This information is maintained by the EPA Headquarters and at the Regional offices. A future release of ICIS will completely replace PCS and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities that support compliance and enforcement programs, including incident tracking, compliance assistance, and compliance monitoring.

Government Publication Date: Jan 21, 2023

Drycleaner Facilities: FED DRYCLEANERS

A list of drycleaner facilities from Enforcement and Compliance History Online (ECHO) data as made available by the U.S. Environmental Protection Agency (EPA), sourced from the ECHO Exporter file. The EPA tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

Government Publication Date: Apr 15, 2023

Delisted Drycleaner Facilities: DELISTED FED DRY

List of sites removed from the list of Drycleaner Facilities (sites in the EPA's Integrated Compliance Information System (ICIS) with NAIC or SIC codes identifying the business as a drycleaner establishment).

Government Publication Date: Apr 15, 2023

Formerly Used Defense Sites: FUDS

Formerly Used Defense Sites (FUDS) are properties that were formerly owned by, leased to, or otherwise possessed by and under the jurisdiction of the Secretary of Defense prior to October 1986, where the Department of Defense (DOD) is responsible for an environmental restoration. The FUDS Annual Report to Congress (ARC) is published by the U.S. Army Corps of Engineers (USACE). This data is compiled from the USACE's Geospatial FUDS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) FUDS dataset.

Government Publication Date: Jul 12, 2022

FUDS Munitions Response Sites: FUDS MRS

Boundaries of Munitions Response Sites (MRS), published with the Formerly Used Defense Sites (FUDS) Annual Report to Congress (ARC) by the U.S. Army Corps of Engineers (USACE). An MRS is a discrete location within a Munitions response area (MRA) that is known to require a munitions response. An MRA means any area on a defense site that is known or suspected to contain unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC). This data is compiled from the USACE's Geospatial MRS data layers and Homeland Infrastructure Foundation-Level Data (HIFLD) MRS dataset.

Government Publication Date: Jul 12, 2022

Former Military Nike Missile Sites: FORMER NIKE

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

Government Publication Date: Dec 2, 1984

PHMSA Pipeline Safety Flagged Incidents: PIPELINE INCIDENT

A list of flagged pipeline incidents made available by the U.S. Department of Transportation (US DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA regulations require incident and accident reports for five different pipeline system types.

Government Publication Date: Dec 30, 2022

Material Licensing Tracking System (MLTS): MLTS

A list of sites that store radioactive material subject to the Nuclear Regulatory Commission (NRC) licensing requirements. This list is maintained by the NRC. As of September 2016, the NRC no longer releases location information for sites. Site locations were last received in July 2016.

Government Publication Date: May 11, 2021

Historic Material Licensing Tracking System (MLTS) sites: HIST MLTS

A historic list of sites that have inactive licenses and/or removed from the Material Licensing Tracking System (MLTS). In some cases, a site is removed from the MLTS when the state becomes an "Agreement State". An Agreement State is a State that has signed an agreement with the Nuclear Regulatory Commission (NRC) authorizing the State to regulate certain uses of radioactive materials within the State.

Government Publication Date: Jan 31, 2010

Mines Master Index File: MINES

The Master Index File (MIF) is provided by the United States Department of Labor, Mine Safety and Health Administration (MSHA). This file, which was originally created in the 1970's, contained many Mine-IDs that were invalid. MSHA removes invalid IDs from the MIF upon discovery. MSHA applicable data includes the following: all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970; mine addresses for all mines in the database except for Abandoned mines prior to 1998 from MSHA's legacy system (addresses may or may not correspond with the physical location of the mine itself); violations that have been assessed penalties as a result of MSHA inspections beginning on 1/1/2000; and violations issued as a result of MSHA inspections conducted beginning on 1/1/2000.

Government Publication Date: May 1, 2023

Surface Mining Control and Reclamation Act Sites: SMCRA

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by the Office of Surface Mining Reclamation and Enforcement (OSMRE) to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). This inventory contains information on the type and extent of Abandoned Mine Land (AML) impacts, as well as information on the cost associated with the reclamation of those problems. The data is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed. Disclaimer: Per the OSMRE, States and tribes who enter their data into eAMLIS (AML Inventory System) may truncate their latitude and longitude so the precise location of usually dangerous AMLs is not revealed in an effort to protect the public from searching for these AMLs, most of which are on private property. If more precise location information is needed, please contact the applicable state/tribe of interest.

Government Publication Date: Jun 13, 2023

Mineral Resource Data System: MRDS

The Mineral Resource Data System (MRDS) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS. The USGS has ceased systematic updates of the MRDS database with their focus more recently on deposits of critical minerals while providing a well-documented baseline of historical mine locations from USGS topographic maps.

Government Publication Date: Mar 15, 2016

DOE Legacy Management Sites: LM SITES

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) currently manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The LM manages sites with diverse regulatory drivers (statutes or programs that direct cleanup and management requirements at DOE sites) or as part of internal DOE or congressionally-recognized programs, such as but not limited to: Formerly Utilized Sites Remedial Action Program (FUSRAP), Uranium Mill Tailings Radiation Control Act (UMTRCA Title I, Tile II), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Decontamination and Decommissioning (D&D), Nuclear Waste Policy Act (NWPA). This site listing includes data exported from the DOE Office of LM's Geospatial Environmental Mapping System (GEMS). GEMS Data disclaimer: The DOE Office of LM makes no representation or warranty, expressed or implied, regarding the use, accuracy, availability, or completeness of the data presented herein.

Government Publication Date: May 25, 2023

Alternative Fueling Stations: ALT FUELS

This list of alternative fueling stations is sourced from the Alternative Fuels Data Center (AFDC). The U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy launched the AFDC in 1991 as a repository for alternative fuel vehicle performance data, which provides a wealth of information and data on alternative and renewable fuels, advanced vehicles, fuel-saving strategies, and emerging transportation technologies. The data includes Biodiesel (B20 and above), Compressed Natural Gas (CNG), Electric, Ethanol (E85), Hydrogen, Liquefied Natural Gas (LNG), Propane (LPG), and Renewable Diesel (R20 and above) fuel type locations.

Government Publication Date: Aug 30, 2023

Superfunds Consent Decrees: CONSENT DECREES

This list of Superfund consent decrees is provided by the Department of Justice, Environment & Natural Resources Division (ENRD) through a Freedom of Information Act (FOIA) applicable file. This listing includes Consent Decrees for CERCLA or Superfund Sites filed and/or as proposed within the ENRD's Case Management System (CMS) since 2010. CMS may not reflect the latest developments in a case nor can the agency guarantee the accuracy of the data. ENRD Disclaimer: Congress excluded three discrete categories of law enforcement and national security records from the requirements of the FOIA; response is limited to those records that are subject to the requirements of the FOIA; however, this should not be taken as an indication that excluded records do, or do not, exist.

Government Publication Date: Apr 19, 2023

Air Facility System: AFS

This EPA retired Air Facility System (AFS) dataset contains emissions, compliance, and enforcement data on stationary sources of air pollution. Regulated sources cover a wide spectrum; from large industrial facilities to relatively small operations such as dry cleaners. AFS does not contain data on facilities that are solely asbestos demolition and/or renovation contractors, or landfills. ECHO Clean Air Act data from AFS are frozen and reflect data as of October 17, 2014; the EPA retired this system for Clean Air Act stationary sources and transitioned to ICIS-Air.

Government Publication Date: Oct 17, 2014

Registered Pesticide Establishments: SSTS

This national list of active EPA-registered foreign and domestic pesticide and/or device-producing establishments is based on data from the Section Seven Tracking System (SSTS). The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 7 requires that each producing establishment must place its EPA establishment number on the label or immediate container of each pesticide, active ingredient or device produced. An EPA establishment number on a pesticide product label identifies the EPA registered location where the product was produced. The list of establishments is made available by the U.S. Environmental Protection Agency (EPA).

Government Publication Date: Mar 1, 2023

Polychlorinated Biphenyl (PCB) Transformers: PCBT

Locations of Transformers Containing Polychlorinated Biphenyls (PCBs) registered with the United States Environmental Protection Agency. PCB transformer owners must register their transformer(s) with EPA. Although not required, PCB transformer owners who have removed and properly disposed of a registered PCB transformer may notify EPA to have their PCB transformer de-registered. Data made available by EPA.

Government Publication Date: Oct 15, 2019

Polychlorinated Biphenyl (PCB) Notifiers: PCB

Facilities included in the national list of facilities that have notified the United States Environmental Protection Agency (EPA) of Polychlorinated Biphenyl (PCB) activities. Any company or person storing, transporting or disposing of PCBs or conducting PCB research and development must notify the EPA and receive an identification number.

Government Publication Date: Mar 20, 2023

State

Dry Cleaner Remediation Program Prioritization List: PRIORITY CLEAN

The Texas Commission on Environmental Quality (TCEQ) implements environmental standards for dry cleaners. The Dry Cleaner Remediation Program (DCRP) establishes a prioritization list of dry cleaner sites and administers the Dry Cleaning Remediation fund to assist with remediation of contamination caused by dry cleaning solvents. Includes prioritized sites identified under the DCRP, as well as sites closed under the DCRP.

Government Publication Date: Mar 1, 2023

Registered Dry Cleaning Facilities: DRYCLEANERS

The Texas Commission of Environment Quality (TCEQ) maintains a statewide registration list of current dry cleaners.

Government Publication Date: Aug 28, 2023

Delisted Drycleaning Facility List: DELISTED DRYCLEANERS

A list of sites which were have been removed from the list of dry cleaning facilities registered with the Texas Commission of Environment Quality (TCEQ). Sites are removed when they are no longer used as dry cleaning facilities.

Government Publication Date: Aug 28, 2023

Groundwater Contamination Cases: GWCC

List of sites present in the TCEQ Groundwater Contamination Viewer, which represent groundwater contamination cases in Texas as per TCEQ publication SFR-056 (current and some previous years). The Joint Groundwater Monitoring and Contamination Report (SFR-056) was designed and produced by the Texas Groundwater Protection Committee in fulfillment of requirements given in Section 26.406 of the Texas Water Code. The information does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

Government Publication Date: Dec 31, 2021

Historical Groundwater Contamination Cases: GWCC HIST

List of sites from a Joint Groundwater Monitoring and Contamination Report provided by the Texas Commission on Environmental Quality (TCEQ) with the Railroad Commission of Texas (RRC). The annual report describes the status of groundwater monitoring activities conducted or required by each agency at regulated facilities or associated with regulated activities. The report provides a general overview of groundwater monitoring by participating members on a program by program basis. Groundwater contamination is broadly defined in the report as any detrimental alteration of the naturally occurring quality of groundwater.

Government Publication Date: Dec 31, 2018

Affected Property Assessment Reports: APAR

List of sites for which an Affected Property Assessment Report has been submitted to the Texas Commission on Environmental Quality (TCEQ). An APAR is required when a person is addressing a release of COCs under 30 TAC Chapter 350, the Texas Risk Reduction Program (TRRP). The purpose of the APAR is to document all relevant affected property information to identify all release sources and chemicals of concern (COCs), determine the extent of all COCs, identify all transport/exposure pathways, and to determine if any response actions are necessary.

Government Publication Date: Mar 24, 2023

Spills Database: SPILLS

List of Spills reported to Emergency Response Division of the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Jul 31, 2023

Per- and Polyfluoroalkyl Substances (PFAS): PFAS

A list of sites from the Central Registry and ARTS databases where Per- and Polyfluoroalkyl substances (PFAS) containing materials may be of concern. This list is made available by the Remediation Division of the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Aug 3, 2022

Industrial and Hazardous Waste Sites with Corrective Actions: IHW CORR ACTION

List of Industrial and Hazardous Waste sites with Corrective Actions made available by the Texas Commission of Environmental Quality (TCEQ). The mission of the industrial and hazardous waste (IHW) corrective action program is to oversee the cleanup of sites contaminated from industrial and municipal hazardous and industrial nonhazardous wastes.

Government Publication Date: Aug 28, 2023

Land Application Permits: LAND APPL

Texas Land Application Permits are a requirement from the Texas Commission on Environmental Quality for any domestic facility that disposes of treated effluent by land application such as surface irrigation, evaporation, drainfields or subsurface land application.

Government Publication Date: Jul 17, 2023

Notice of Violation: NOV

List of sites that have been sent a Notice of Violation (NOV) by the Texas Commission on Environmental Quality (TCEQ) Office of Compliance and Enforcement. A Notice of Violation is sent out when a site falls out of compliance and has a prescribed time period to return to compliance.

Government Publication Date: May 2, 2022

Notices of Enforcement: NOE

Listing of investigations resulting in a Notice of Enforcement (NOE), made available by the Texas Commission on Environmental Quality, Office of Compliance & Enforcement. Multiple violations may be due to identified noncompliance with different regulatory requirements (citations).

Government Publication Date: Jun 15, 2023

Environmental Liens Listing: LIENS

List of sites/facilities against which the Texas Commission on Environmental Quality (TCEQ) has placed liens to recover cleanup costs associated with Federal or State Superfund cleanup activities.

Government Publication Date: Jul 24, 2023

Court Orders & Administrative Orders: ORD

List of sites that have been sent an Administrative Order or Court Order by the Texas Commission on Environmental Quality (TCEQ) Office of Compliance and Enforcement.

Government Publication Date: May 22, 2023

Inactive RCRA and Non-RCRA Facilities: HIST RCRA NONRCRA

A list of inactive or no longer registered Resource Conservation and Recovery Act (RCRA) and non-RCRA facilities, provided by the Texas Commission on Environmental Quality (TCEQ). This list includes both hazardous and non-hazardous waste generators, transporters, and receivers. If an unregistered/inactive industrial site generates less than 220 pounds of hazardous or Class 1 industrial waste, it does not have to notify or report to the TCEQ.

Government Publication Date: May 5, 2023

Recycle Texas Online Program: RTOL

A list of recycling facilities under the Recycle Texas Online service/program made available by the Texas Commission of Environmental Quality (TCEQ). This program allowed facilities to self-report and post their own company/facility information. This program is no longer maintained and these data will not be updated.

Government Publication Date: Oct 10, 2011

Underground Injection Control: UIC

List of underground injection control (UIC) permits in the Texas Commission on Environmental Quality (TCEQ) Central Registry database. Includes Class I, Class III, Class IV, Class 5, and non permitted UICs; does not include injection wells regulated by the Railroad Commission of Texas.

Government Publication Date: Jul 24, 2023

Industrial and Hazardous Waste - Generators: IHW GENERATOR

List of active, inactive, and post-closure Industrial and Hazardous Waste Generator Facilities permitted by or registered with the Texas Commission on Environmental Quality (TCEQ) under the Texas Administrative Code (TAC) Title 30 Chapter 335.

Government Publication Date: Jun 22, 2023

Industrial and Hazardous Waste - Transporters: IHW TRANSPORT

List of active, inactive, and post-closure Industrial and Hazardous Waste Transporter Facilities permitted by or registered with the Texas Commission on Environmental Quality (TCEQ) under the Texas Administrative Code (TAC) Title 30 Chapter 335.

Government Publication Date: Jun 22, 2023

New Source Review (NSR) Permits: AIR PERMITS

A list of facilities that have applied for New Source Review air permits made available by the Texas Commission on Environmental Quality (TCEQ).

Government Publication Date: Aug 30, 2023

Point Source Emissions Inventory: EMISSIONS

A list of Texas Commission on Environmental Quality (TCEQ) Point Source Emissions Inventory sites. The Point Source Emissions Inventory is an annual survey of chemical plants, refineries, electric utility plants and other industrial sites that meet the reporting criteria in the TCEQ emissions inventory rule (30 TAC §101.10Exit the TCEQ).

Government Publication Date: Apr 26, 2022

Tier 2 Report: TIER 2

Historica listing of facilities in Texas that store hazardous chemicals and are required to report them under the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986. This data was provided by the Department of State Health Services (DSHS) and contains facility reports for the 2005 through the 2012 calendar years. Since 2012, agencies are unable to release this listing, as Tier II information is confidential under Texas Government Code Chapter 418, the Texas Disaster Act (TDA). Site specific inquiries can be made to the Texas Commission on Environmental Quality Tier II Chemical Reporting Division.

Government Publication Date: Dec 31, 2012

Edwards Aquifer Permits: EDWARDS AQUIFER

Listing of Edward Aquifer permits made available by the Texas Commission on Environmental Quality (TCEQ). The Edwards Aquifer is home to diverse fauna and is a drinking water source for the city of San Antonio and surrounding central Texas communities. Before building on the recharge, transition, or contributing zones of the Edwards Aquifer, a plan must first be reviewed and approved by the TCEQ Edwards Aquifer Protection Program.

Government Publication Date: Jul 6, 2023

Tribal

No Tribal additional environmental record sources available for this State.

County

No County additional environmental record sources available for this State.

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

APPENDIX E

Physical Resource Map

Property Information

Order Number:		23100500123p
Date Completed:		October 6, 2023
Project Number:		
Project Property:		Chisme Solar N/A Early TX
Coordinates:		
	Latitude:	31.56903014
	Longitude:	-98.82239878
	UTM Northing:	3492681.23148 Meters
	UTM Easting:	516853.387939 Meters
	UTM Zone:	UTM Zone 14R
	Elevation:	1,267.60 ft
	Slope Direction:	ENE

Topographic Information....2
Hydrologic Information....12
Geologic Information....22
Soil Information....27
Pipeline and Survey Map....42
Wells and Additional Sources....48
  Summary....65
  Detail Report....68
Radon Information....79
Appendix....80
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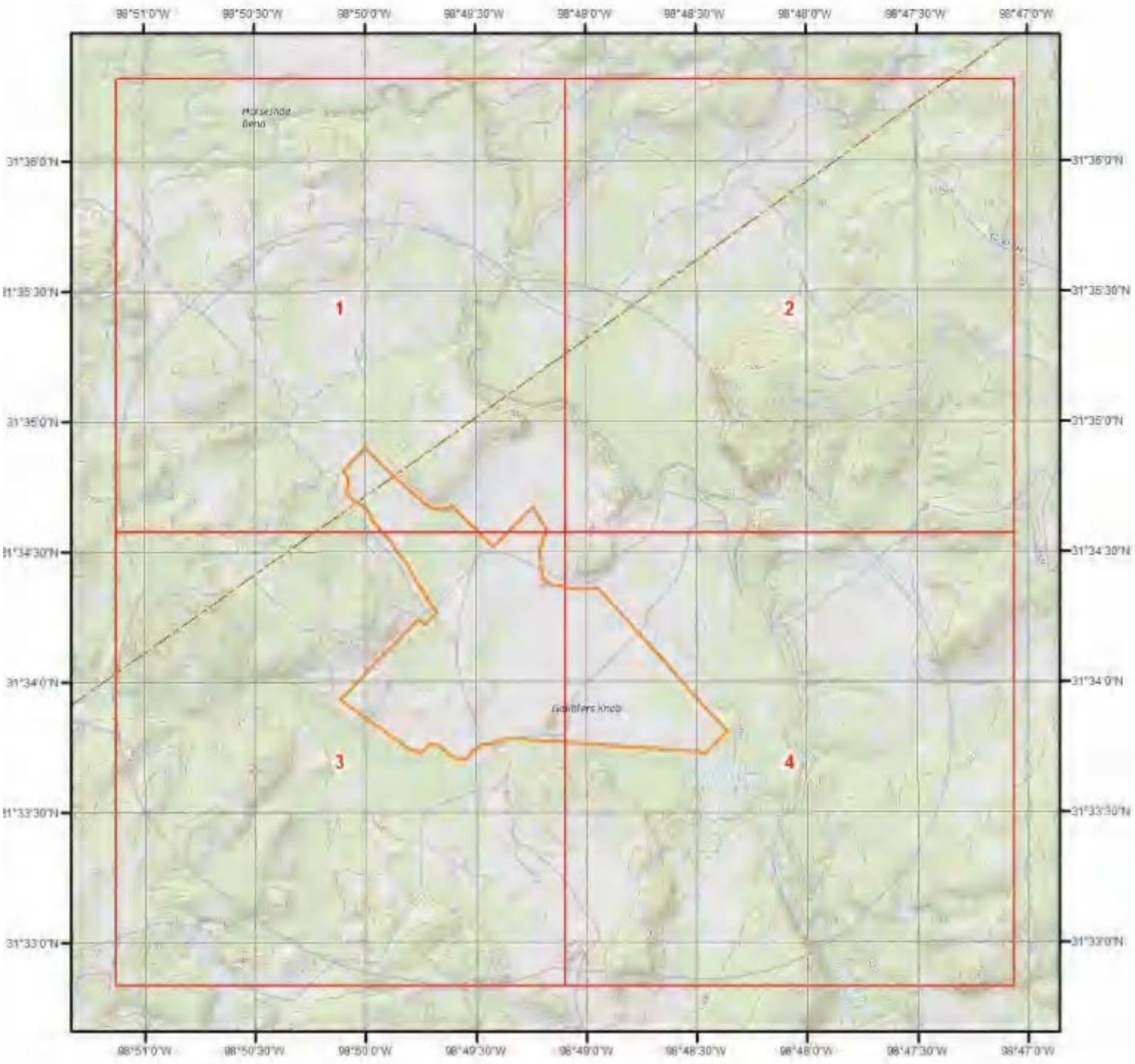
The ERIS ***Physical Setting Report - PSR*** provides comprehensive information about the physical setting around a site and includes a complete overview of topography and surface topology, in addition to hydrologic, geologic and soil characteristics. The location and detailed attributes of oil and gas wells, water wells, public water systems and radon are also included for review.

The compilation of both physical characteristics of a site and additional attribute data is useful in assessing the impact of migration of contaminants and subsequent impact on soils and groundwater.

Disclaimer

This Report does not provide a full environmental evaluation for the site or adjacent properties. Please see the terms and disclaimer at the end of the Report for greater detail.

Topographic Information



Current USGS Topo (2019)

0 0.2 0.4 0.8 1.2 1.6 Miles

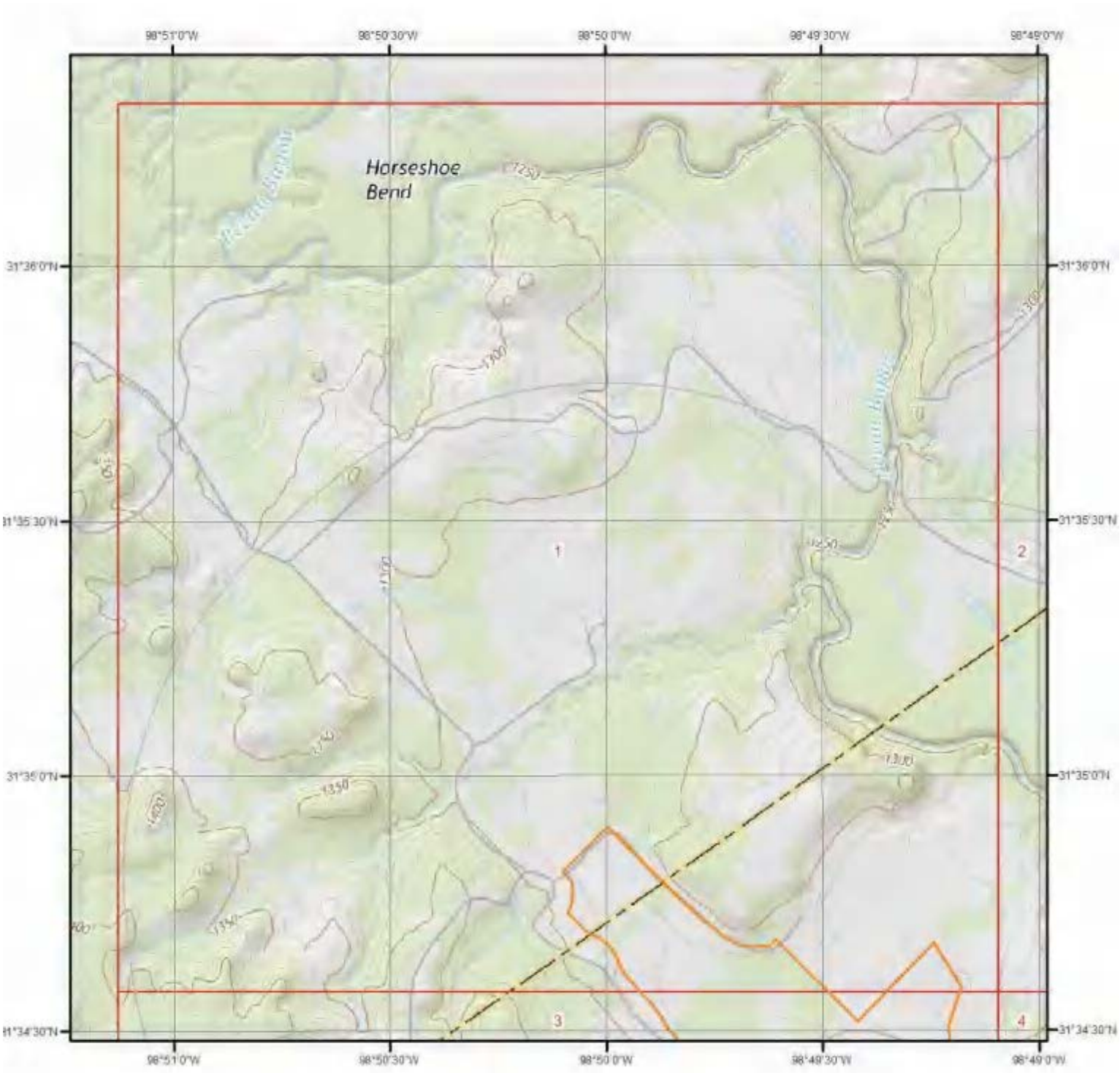
N

Quadrangle(s): Blanket Springs,TX; Regency,TX; Bowser,TX; Big Valley North,TX; Mullin,TX; Brownwood,TX; Zephyr,TX; Democrat,TX; Inc

ERIS

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 1

0 0.2 0.4 0.8 Miles

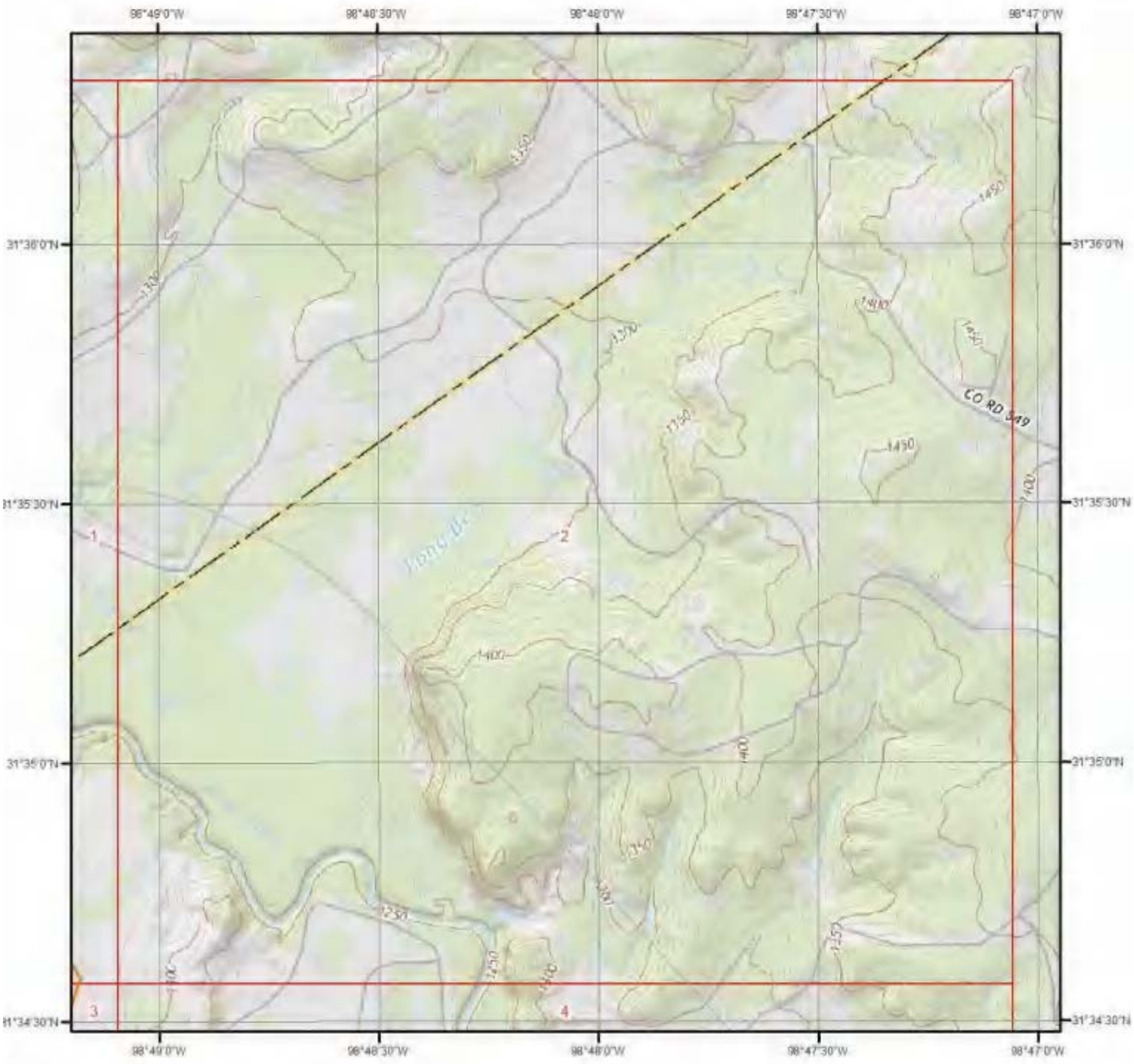
N

Quadrangle(s): Blanket Springs, TX

Source: USGS 7.5 Minute Topographic Map

ERIS

Topographic Information



Current USGS Topo - Page 2

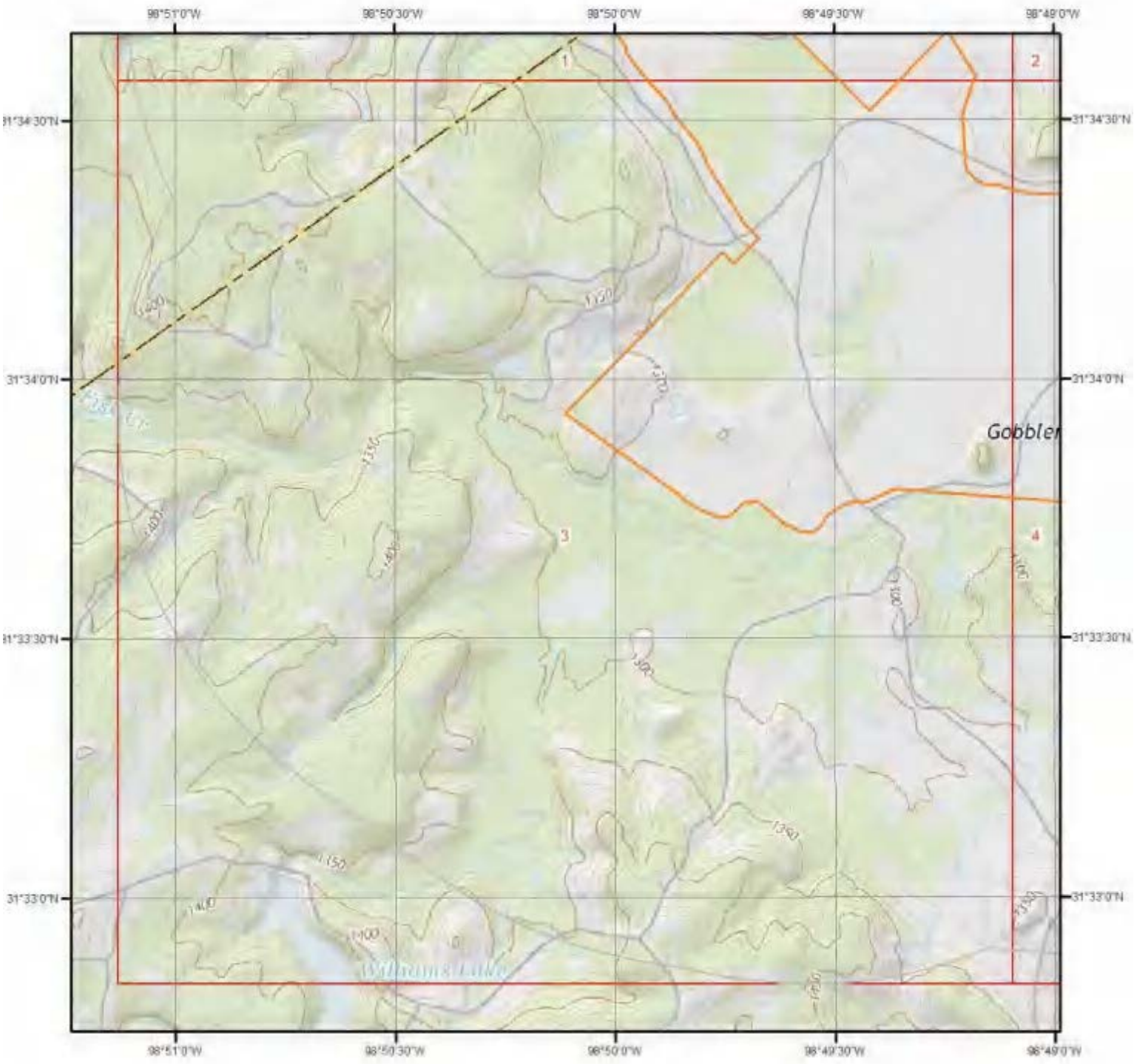
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Blanket Springs, TX

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 3

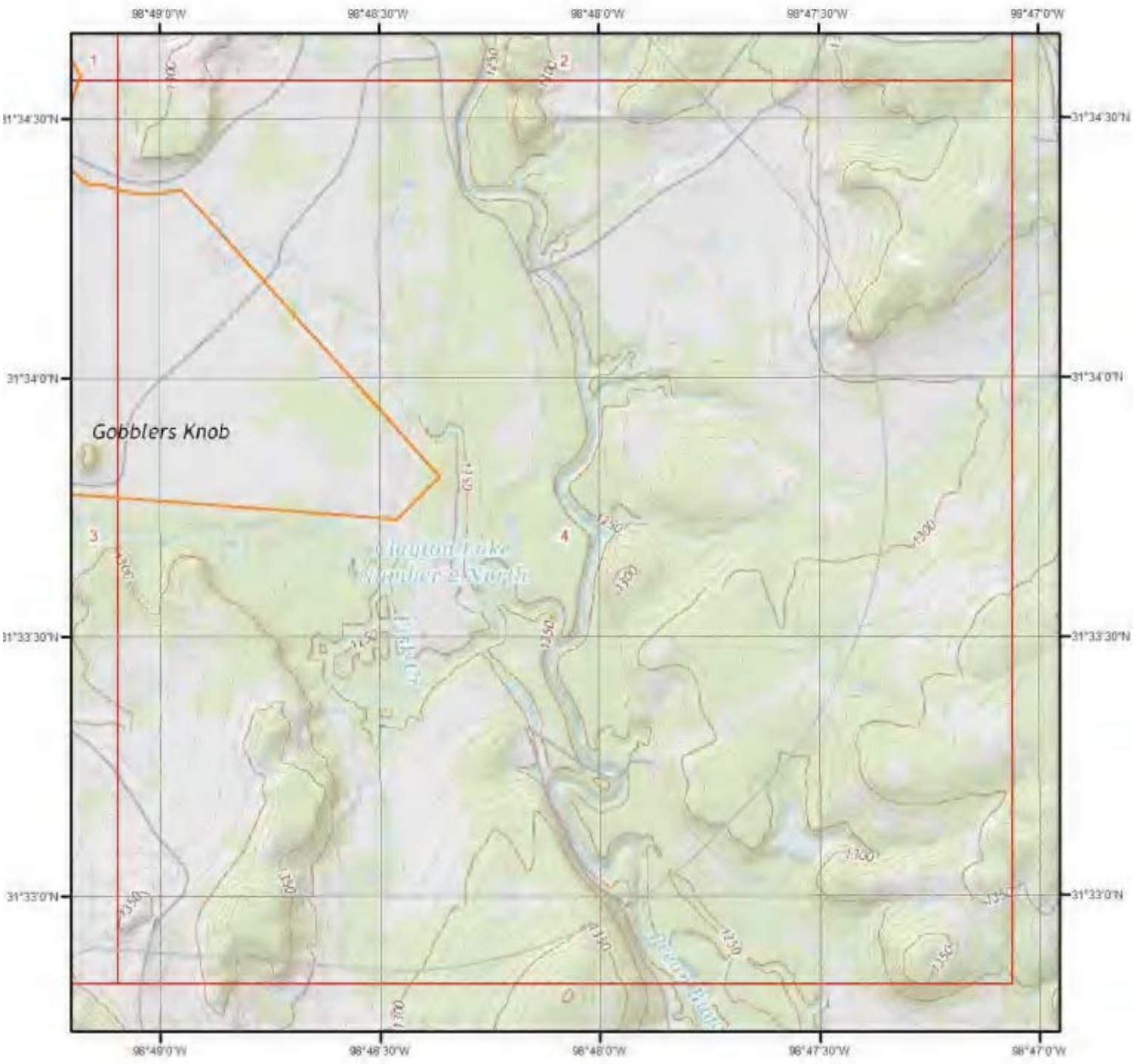
0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Blanket Springs, TX

Source: USGS 7.5 Minute Topographic Map

Topographic Information



Current USGS Topo - Page 4

0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Blanket Springs,TX

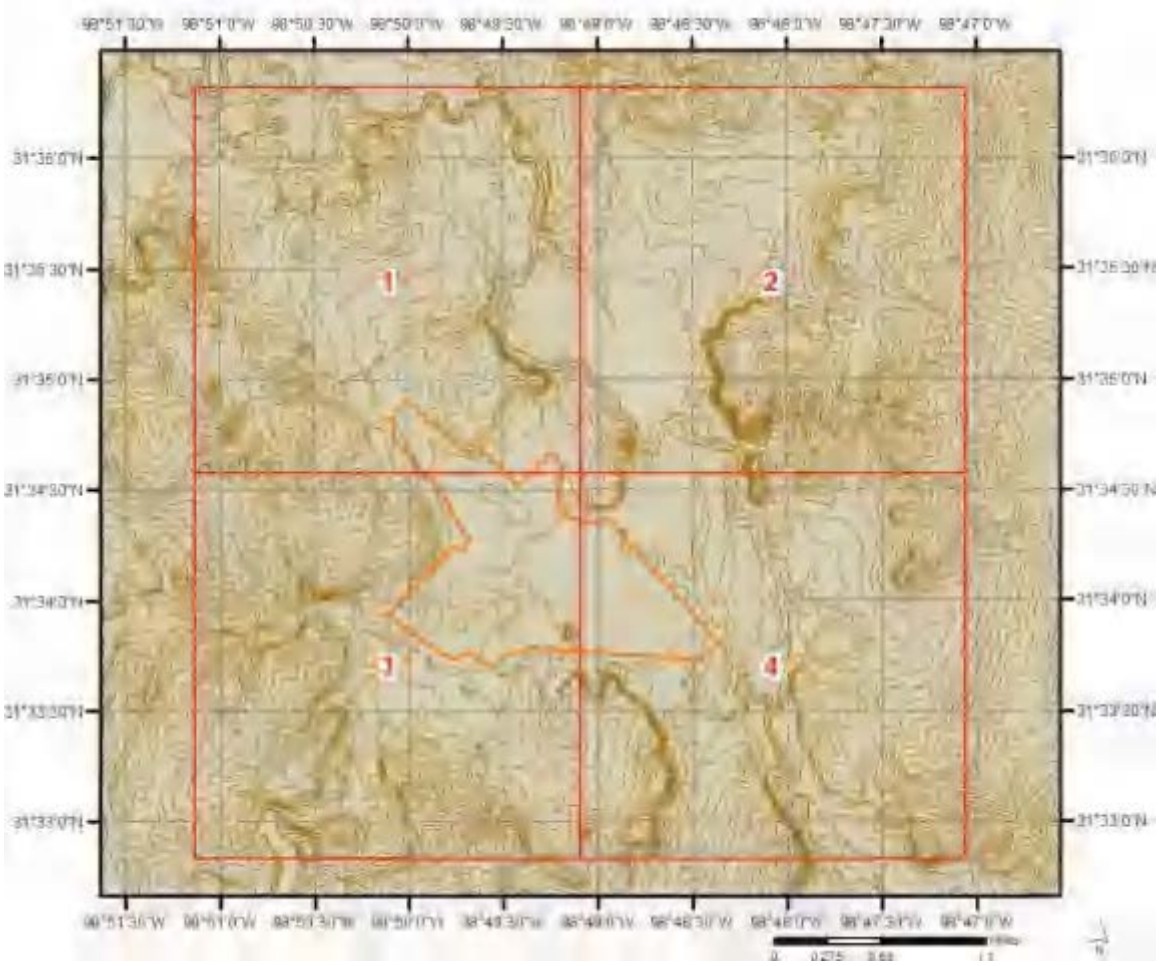
Source: USGS 7.5 Minute Topographic Map

Topographic Information

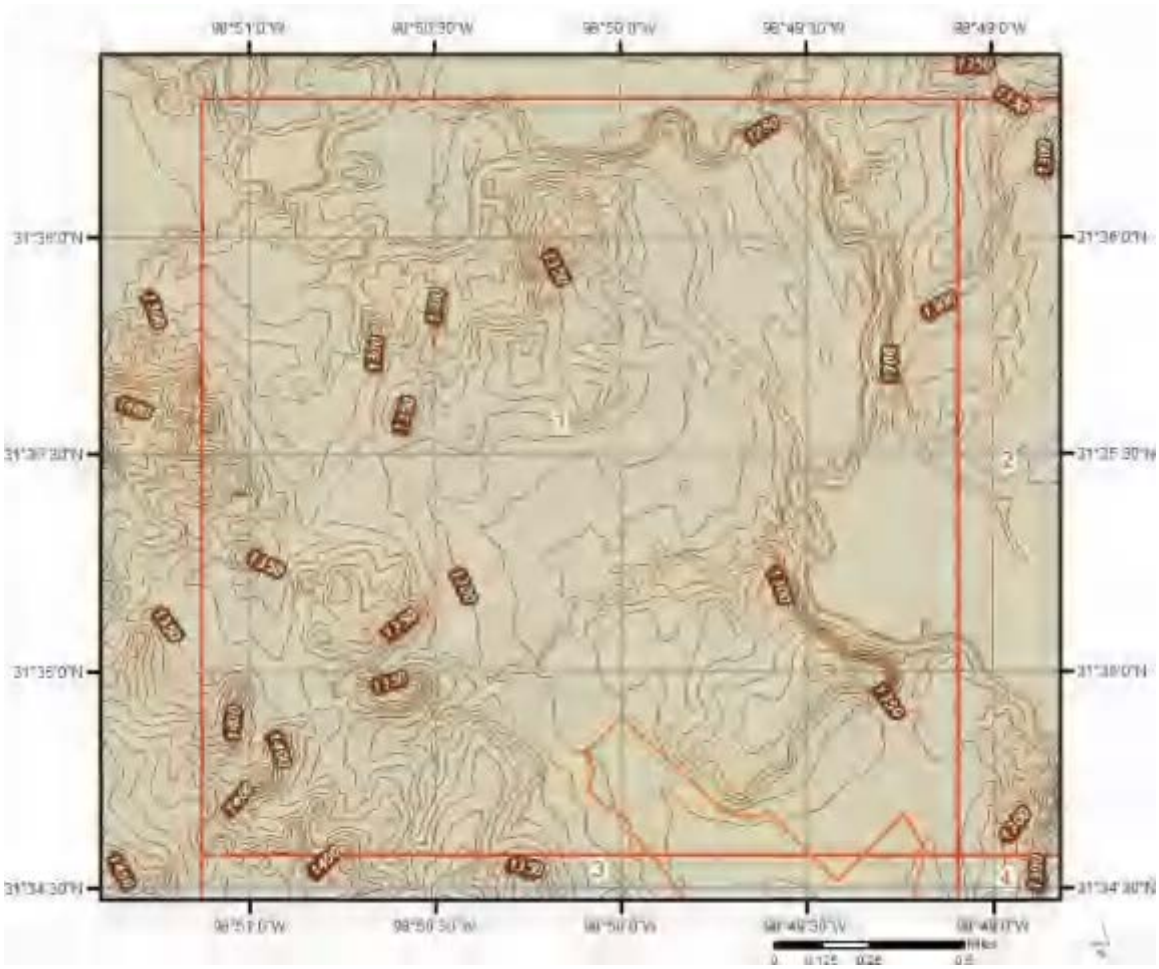
The previous topographic map(s) are created by seamlessly merging and cutting current USGS topographic data. Below are shaded relief map(s), derived from USGS elevation data to show surrounding topography in further detail.

Topographic information at project property:

Elevation:	1,267.60 ft
Slope Direction:	ENE



Topographic Information



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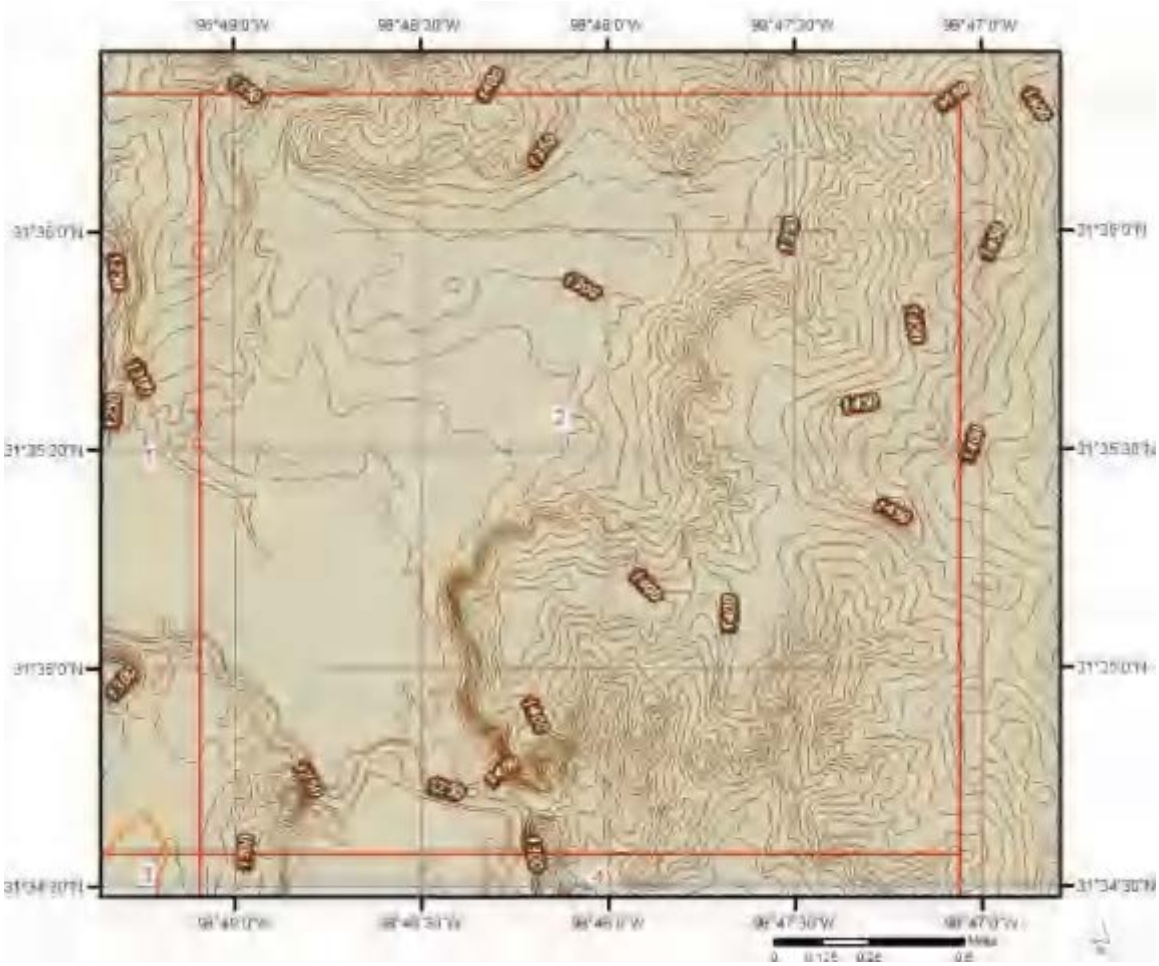
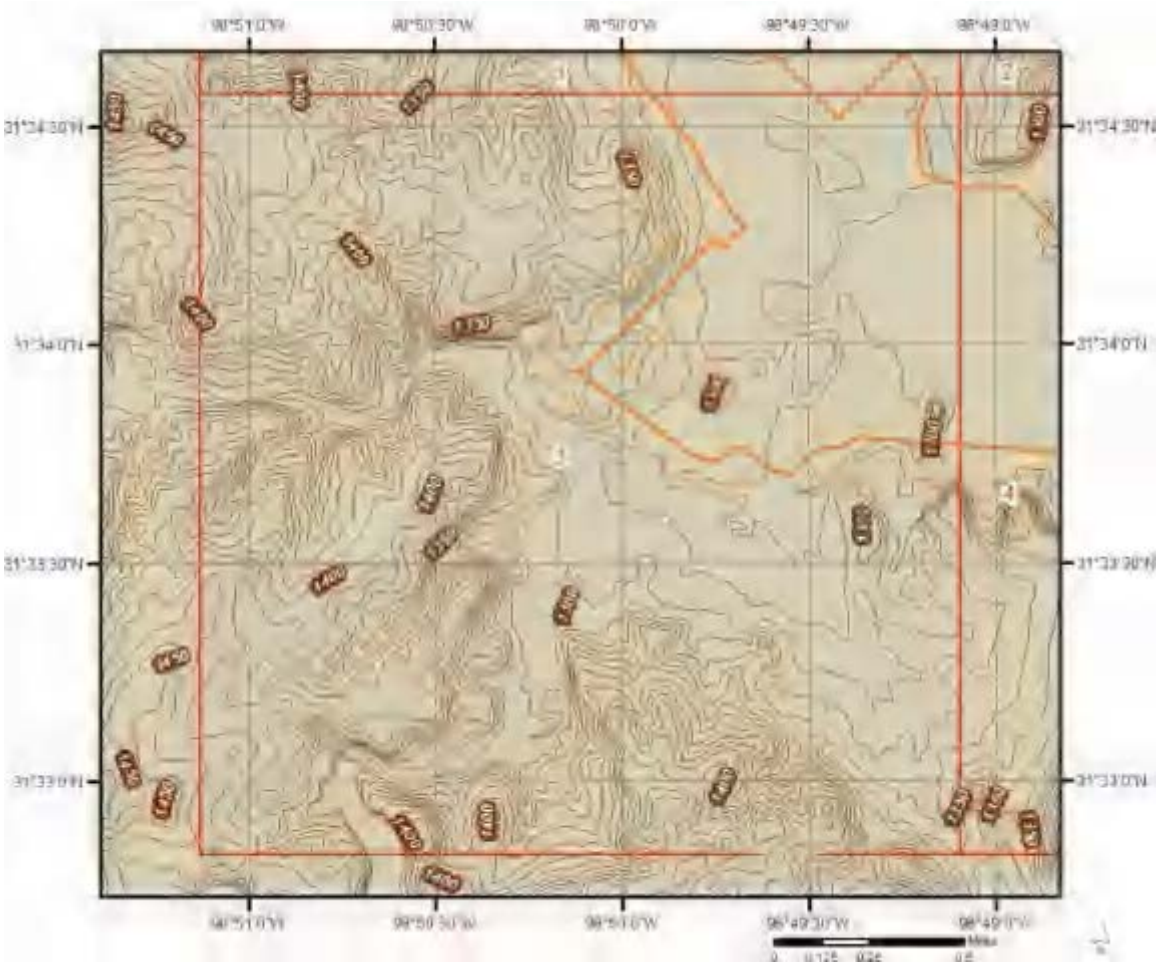
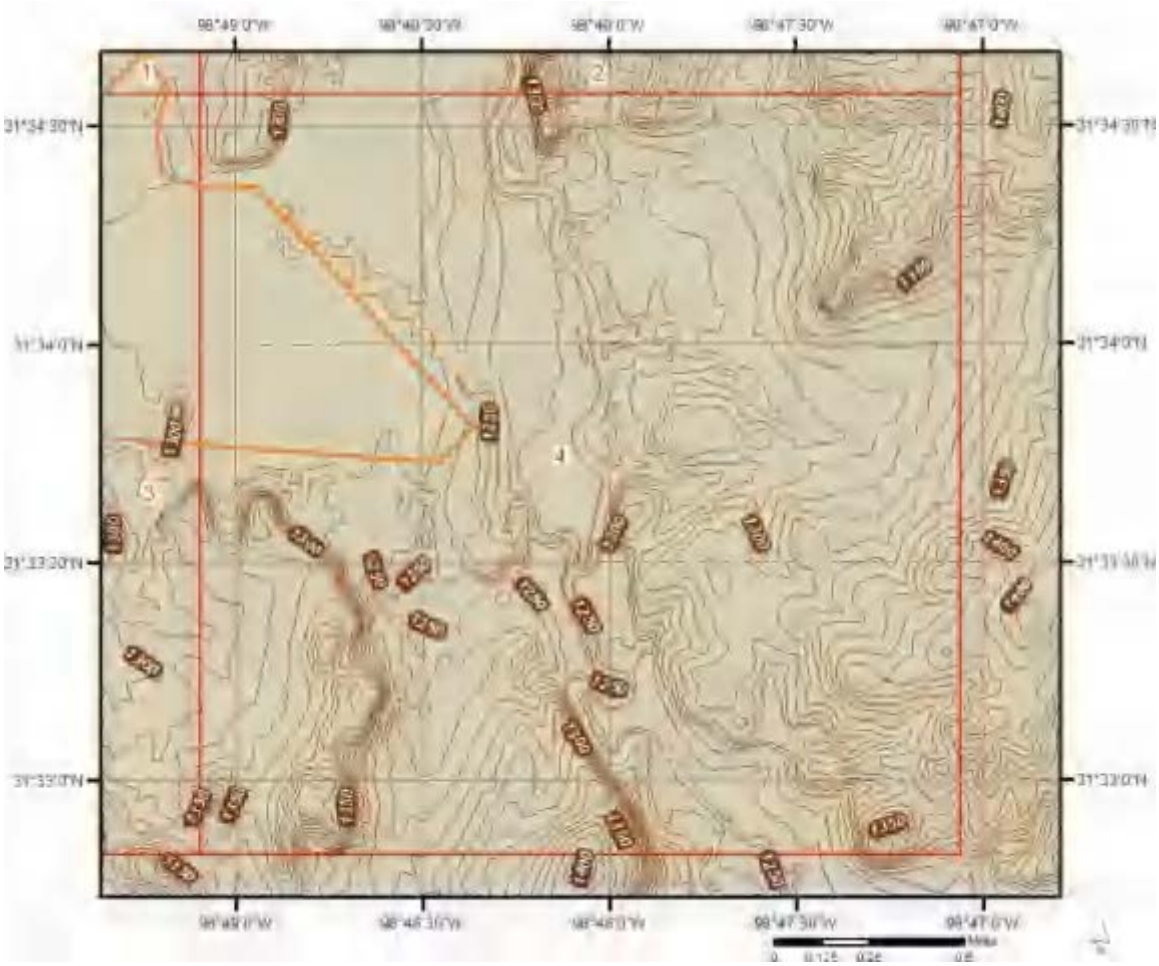


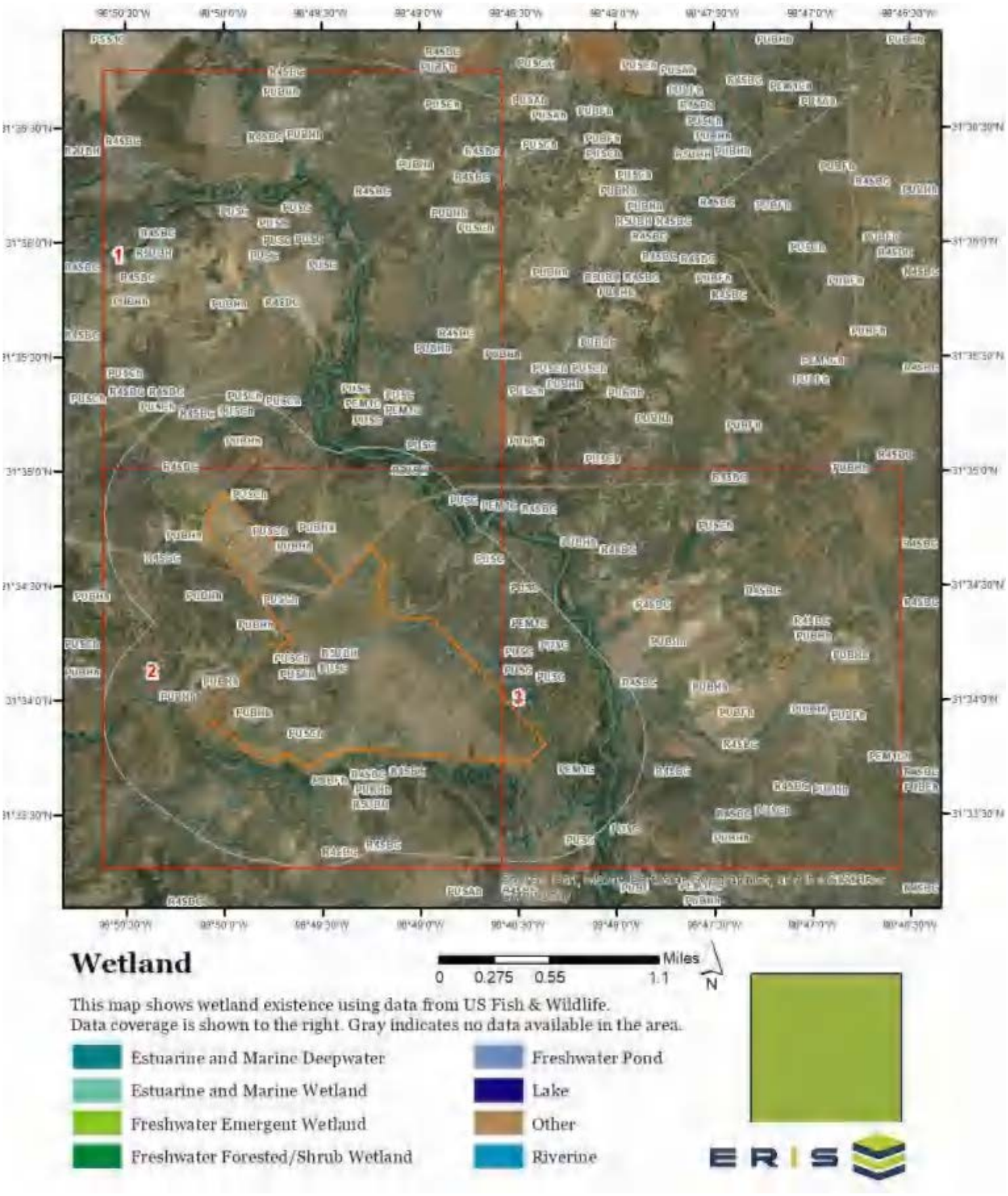
Topographic Information



Topographic Information



Hydrologic Information



Hydrologic Information

Wetland Type - Page 1

0 0.125 0.25 0.5 Miles

N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information

Wetland Type - Page 2

0 0.125 0.25 0.5 Miles

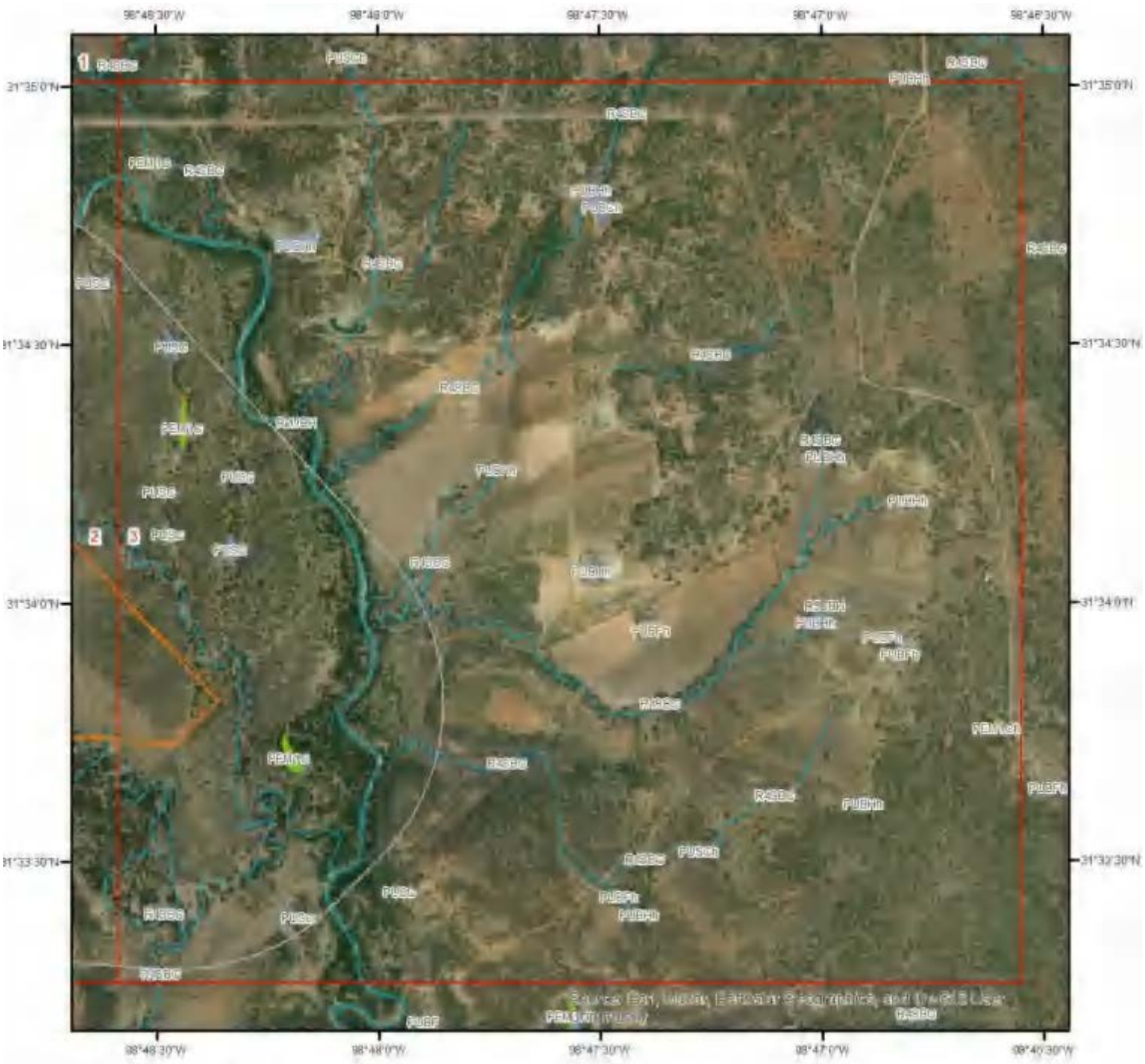
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information



Wetland Type - Page 3

0 0.125 0.25 0.5 Miles

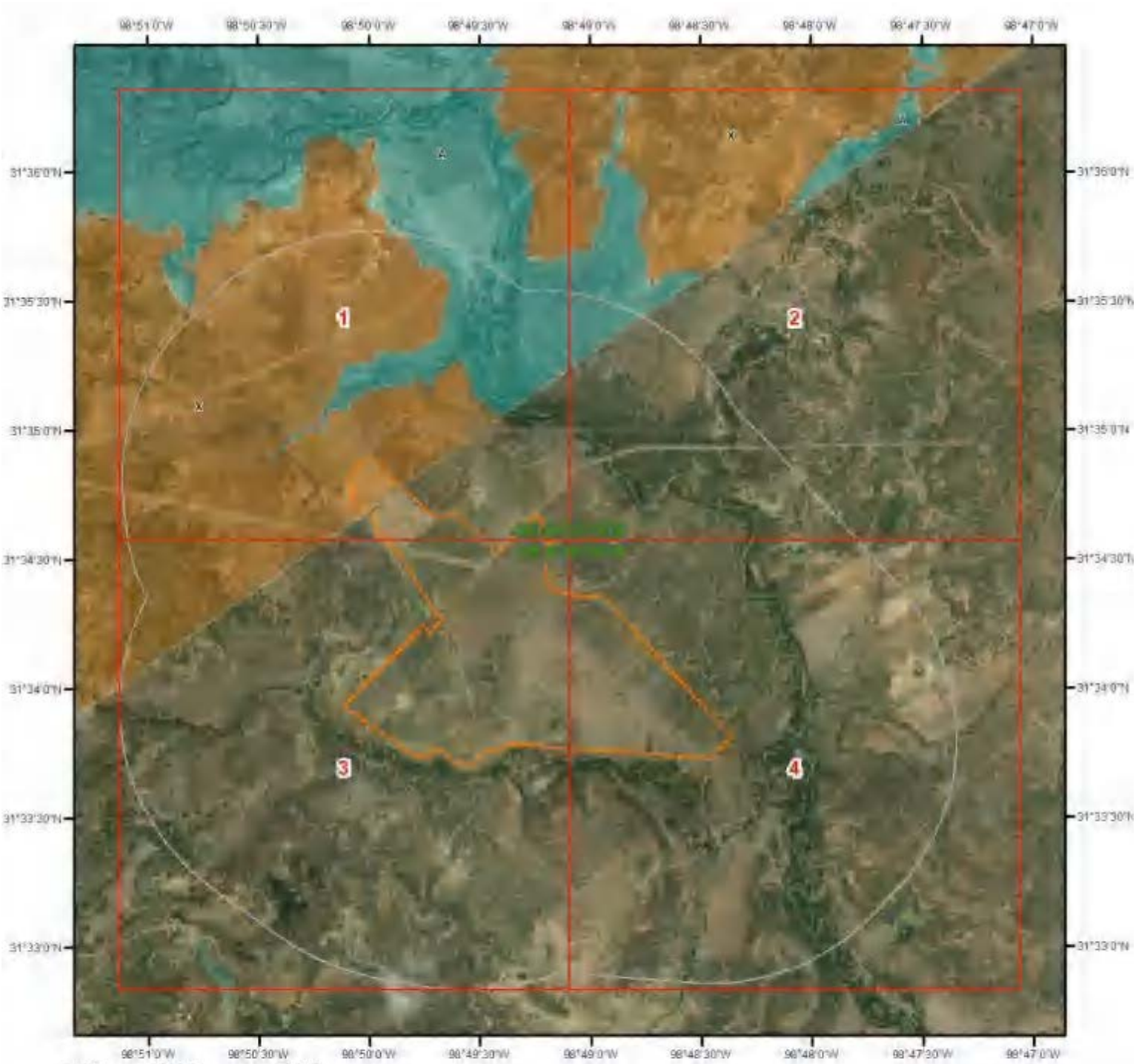
N

This map shows wetland existence using data from US Fish & Wildlife.
Data coverage is shown to the right. Gray indicates no data available in the area.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

ERIS

Hydrologic Information



Flood Hazard Zones

This map shows FEMA flood hazard zones based on FEMA's National Flood Hazard Layer. FIRM Panels are overlayed. An absent FIRM panel represents no data available.

Miles
0 0.2 0.4 0.8

N

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee
- Open Water

Quadrangle(s): Blanket Springs,TX; Regency,TX; Bowser,TX; Big Valley

ERIS

Hydrologic Information

Flood Hazard Zones - Page 1

This map shows FEMA flood hazard zones based on FEMA's National Flood Hazard Layer. FIRM Panels are overlayed. An absent FIRM panel represents no data available.

Miles
0 0.2 0.4

N

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee
- Open Water

Quadrangle(s):

ERIS

Hydrologic Information

Flood Hazard Zones - Page 2

This map shows FEMA flood hazard zones based on FEMA's National Flood Hazard Layer. FIRM Panels are overlayed. An absent FIRM panel represents no data available.

Miles
0 0.2 0.4

N

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee
- Open Water

Quadrangle(s):

ERIS

Hydrologic Information

Flood Hazard Zones - Page 3

This map shows FEMA flood hazard zones based on FEMA's National Flood Hazard Layer. FIRM Panels are overlayed. An absent FIRM panel represents no data available.

0 0.2 0.4 Miles

N

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee
- Open Water

Quadrangle(s):

ERIS

Hydrologic Information

Flood Hazard Zones - Page 4

This map shows FEMA flood hazard zones based on FEMA's National Flood Hazard Layer. FIRM Panels are overlayed. An absent FIRM panel represents no data available.

Miles
0 0.2 0.4

N

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee
- Open Water

Quadrangle(s):

ERIS

Hydrologic Information

The Wetland Type map shows wetland existence overlaid on an aerial imagery. The Flood Hazard Zones map shows FEMA flood hazard zones overlaid on an aerial imagery. Relevant FIRM panels and detailed zone information is provided below.
For detailed Zone descriptions please click the link: https://floodadvocate.com/fema-zone-definitions

Available FIRM Panels in area:	48049C0550E(effective:2018-08-28)

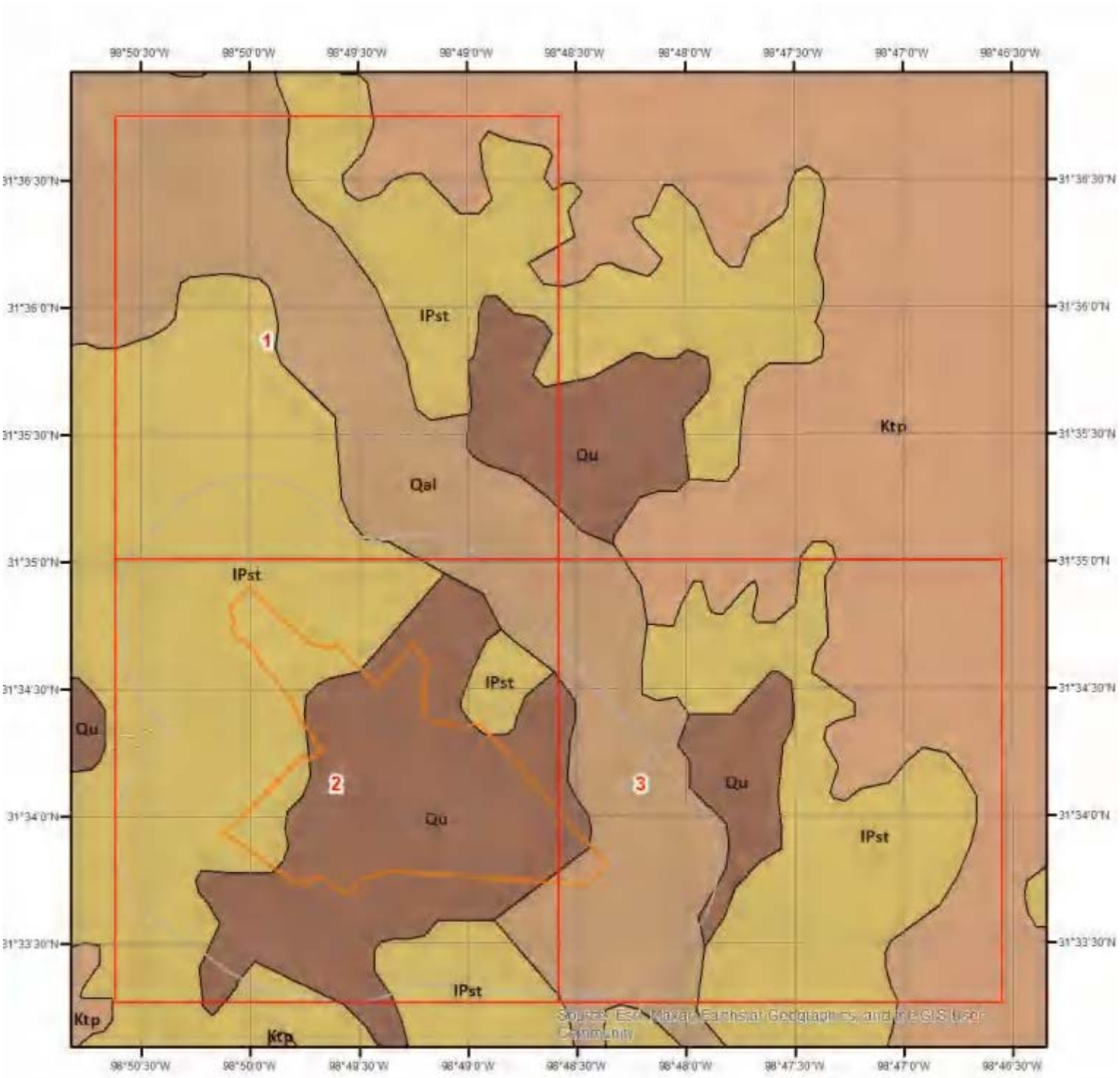
Flood Zone A-01

Zone:	A
Zone subtype:	

Flood Zone X-12

Zone:	X
Zone subtype:	AREA OF MINIMAL FLOOD HAZARD

Geologic Information

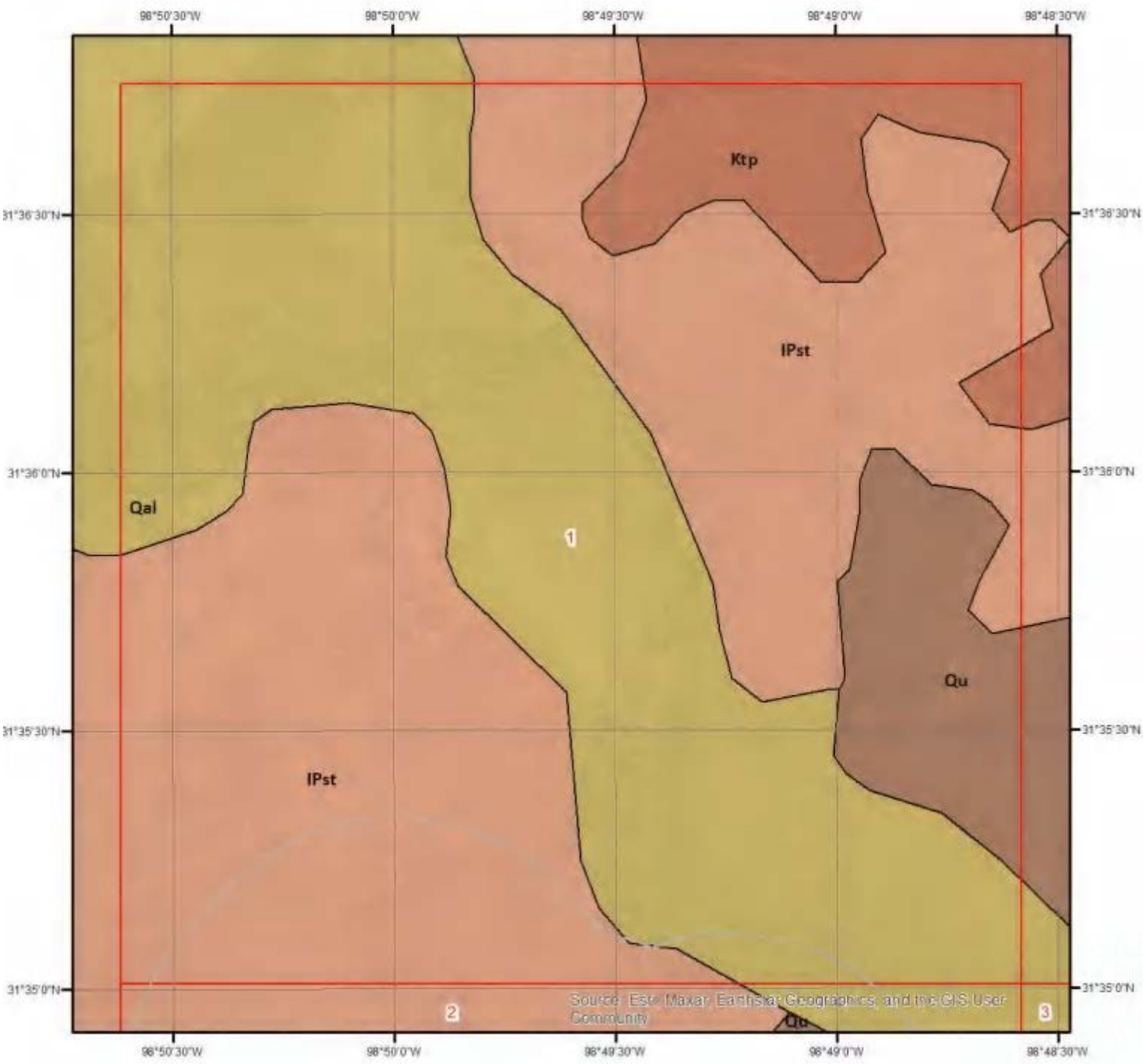


Geologic Units

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

ERIS

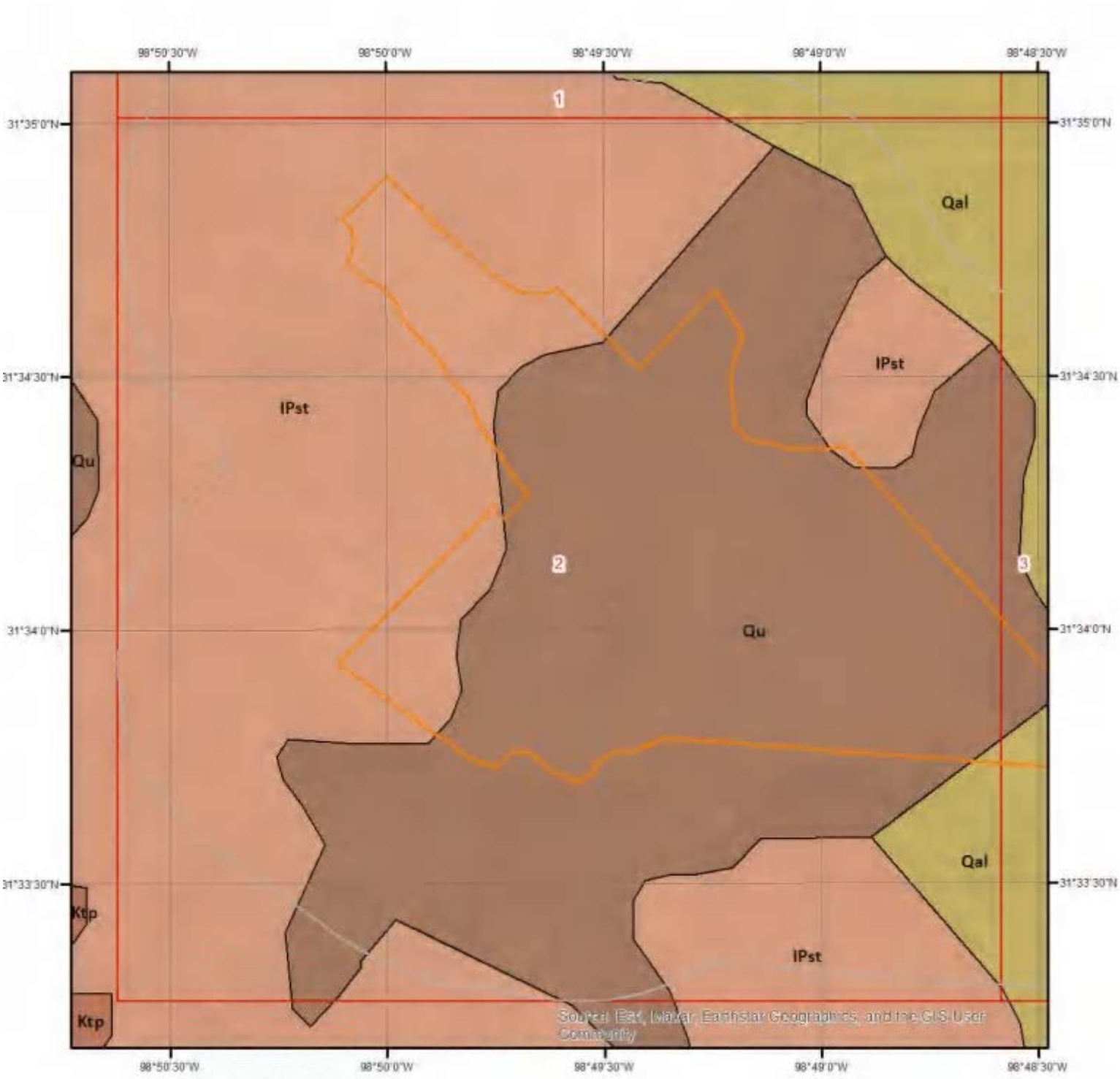
Geologic Information



Geologic Units - Page 1

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

Geologic Information



Miles
0 0.2 0.4

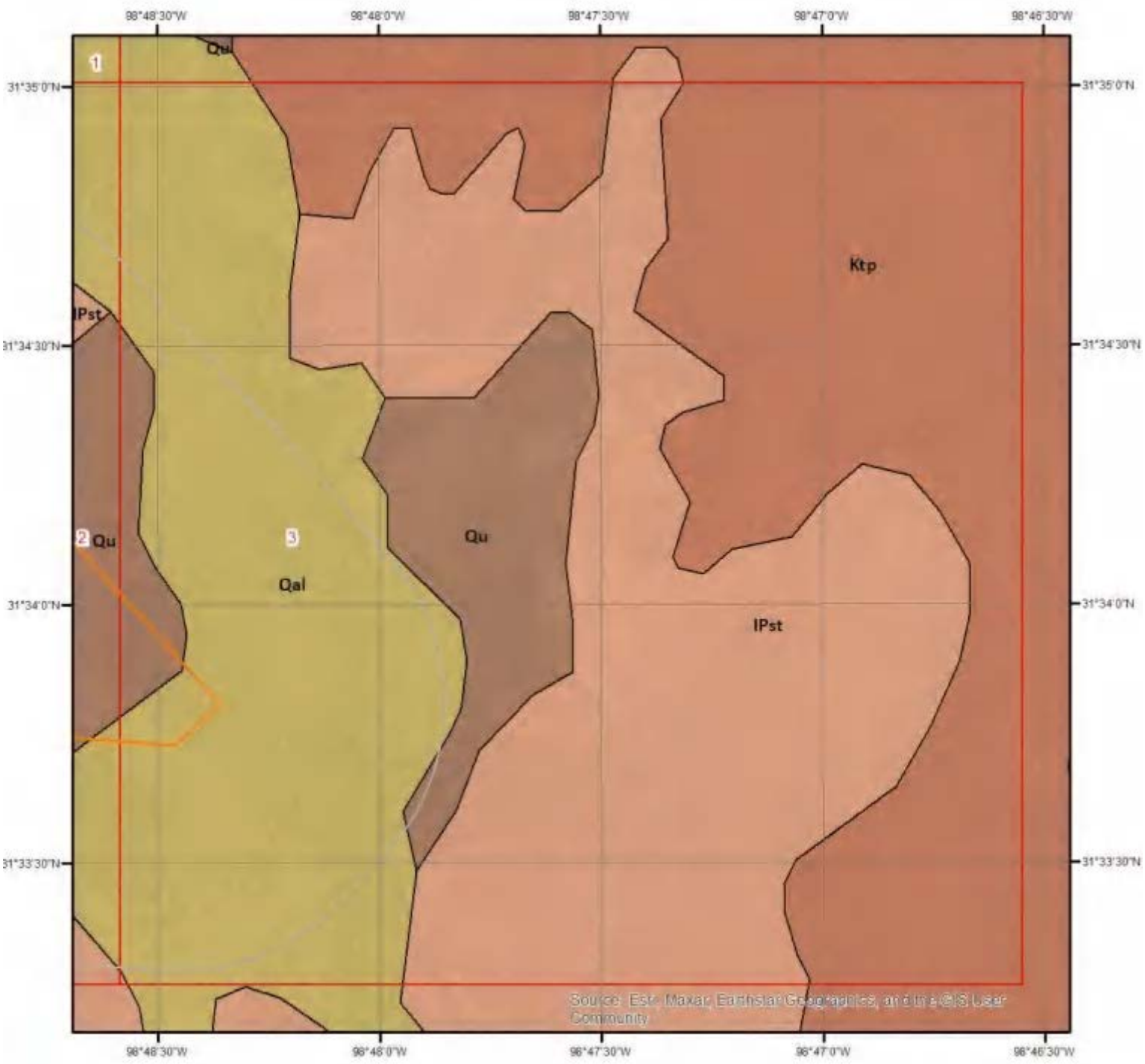
N

Geologic Units - Page 2

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

ERIS

Geologic Information



Geologic Units - Page 3

This maps shows geologic units in the area. Please refer to the report for detailed descriptions.

ERIS

Geologic Information

The previous page shows USGS geology information. Detailed information about each unit is provided below.

Geologic Unit Qal

Unit Name:	alluvium
Unit Age:	Phanerozoic | Cenozoic | Quaternary | Holocene
Primary Rock Type:	sand
Secondary Rock Type:	silt
Unit Description:	alluvium

Geologic Unit IPst

Unit Name:	Strawn Group
Unit Age:	Phanerozoic | Paleozoic | Carboniferous Pennsylvanian-Middle [Atoka Des Moines]
Primary Rock Type:	shale
Secondary Rock Type:	sandstone
Unit Description:	Strawn Group

Geologic Unit Qu

Unit Name:	Quaternary deposit, undivided
Unit Age:	Phanerozoic | Cenozoic | Quaternary
Primary Rock Type:	sand
Secondary Rock Type:	silt
Unit Description:	sand, silt, clay, and gravel. locally indurated with calcium carbonate (caliche); includes point bar, natural levee, stream channel, sand dune, terrace, alluvial fan, landslide bolson and playa deposits

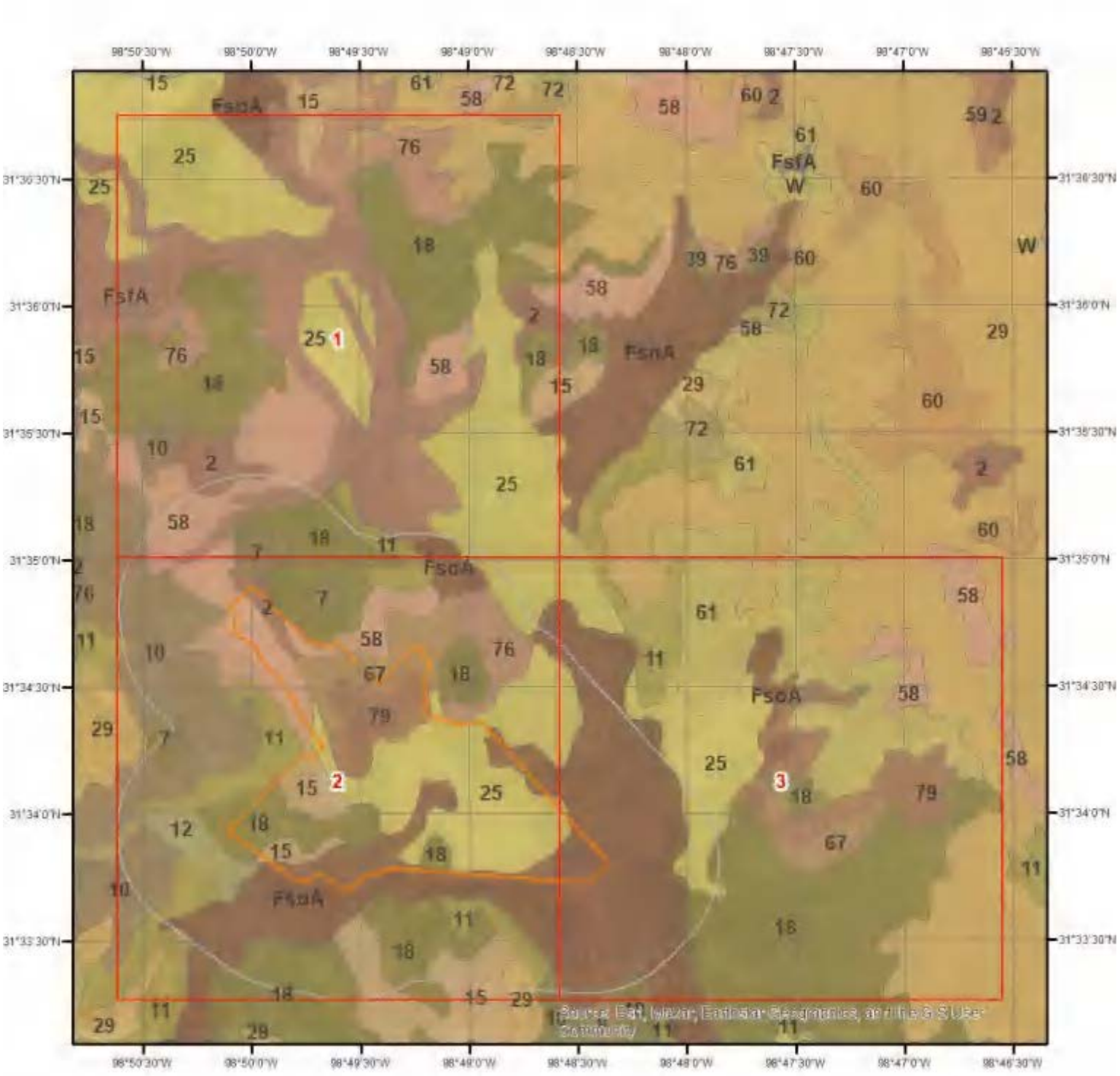
Geologic Unit IPst

Unit Name:	Strawn Group
Unit Age:	Phanerozoic | Paleozoic | Carboniferous Pennsylvanian-Middle [Atoka Des Moines]
Primary Rock Type:	shale
Secondary Rock Type:	sandstone
Unit Description:	Strawn Group

Geologic Unit Qu

Unit Name:	Quaternary deposit, undivided
Unit Age:	Phanerozoic | Cenozoic | Quaternary
Primary Rock Type:	sand
Secondary Rock Type:	silt
Unit Description:	sand, silt, clay, and gravel. locally indurated with calcium carbonate (caliche); includes point bar, natural levee, stream channel, sand dune, terrace, alluvial fan, landslide bolson and playa deposits

Soil Information



SSURGO Soils

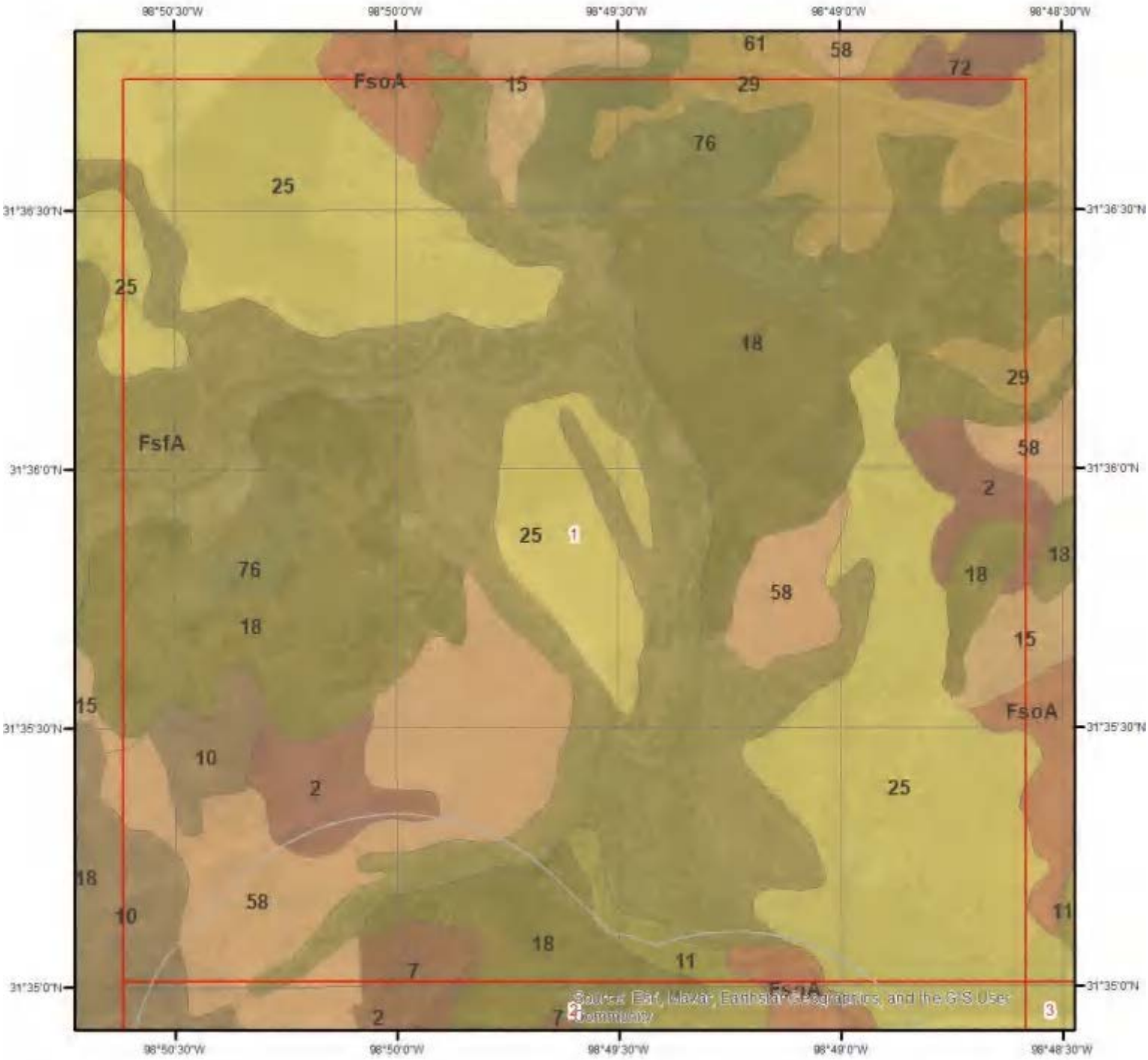
0 0.2 0.4 0.8 1.2 Miles

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information



SSURGO Soils - Page 1

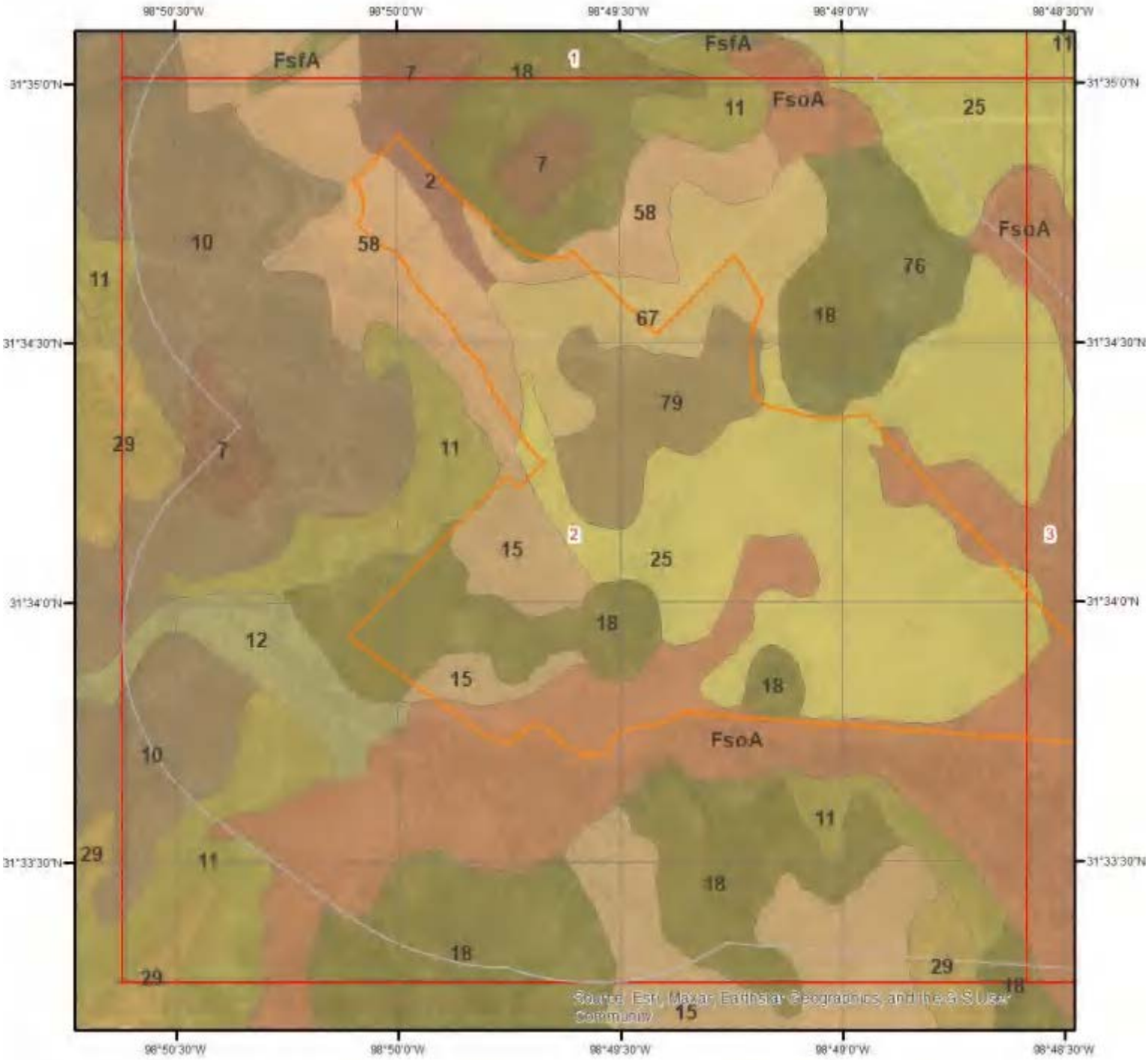
Miles
0 0.2 0.4

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information



SSURGO Soils - Page 2

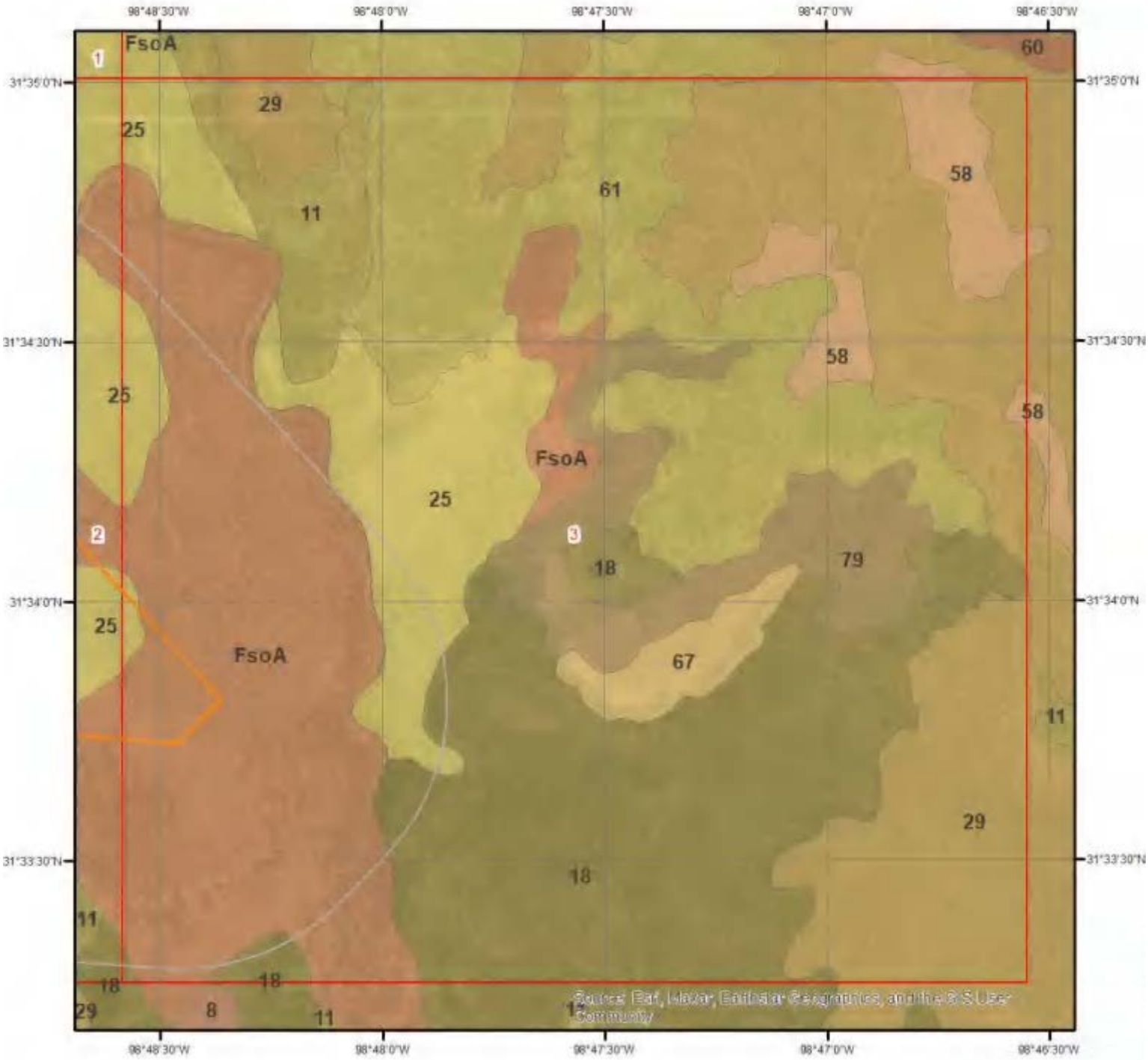
Miles
0 0.2 0.4

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information



SSURGO Soils - Page 3

Miles
0 0.2 0.4

N

This maps shows SSURGO soil units around the target property. Please refer to the report for detailed soil descriptions.

ERIS

Soil Information

The previous page shows a soil map using SSURGO data from USDA Natural Resources Conservation Service. Detailed information about each unit is provided below.

Map Unit 10 (6.86%)

Map Unit Name:	Bonti-Callahan association, 1 to 8 percent slopes, extremely stony
Bedrock Depth - Min:	91cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Bonti(60%)	
horizon A(0cm to 20cm)	Fine sandy loam
horizon E(20cm to 28cm)	Fine sandy loam
horizon Bt(28cm to 97cm)	Clay loam
horizon Cr(97cm to 203cm)	Bedrock
Callahan(25%)	
horizon Ap(0cm to 18cm)	Loam
horizon Bt(18cm to 46cm)	Clay
horizon Btk(46cm to 91cm)	Clay
horizon Cdk(91cm to 178cm)	Clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 10 - Bonti-Callahan association, 1 to 8 percent slopes, extremely stony

Component: Bonti (60%)
The Bonti component makes up 60 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of loamy and/or clayey residuum weathered from sandstone and/or claystone over sandstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R080BY159TX Sandy Loam 26-33" Pz ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Callahan (25%)
The Callahan component makes up 25 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY147TX Claypan 26-33" Pz ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 6 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Exray (8%)
Generated brief soil descriptions are created for major soil components. The Exray soil is a minor component.

Component: Truce (5%)
Generated brief soil descriptions are created for major soil components. The Truce soil is a minor component.

Component: Owens (2%)
Generated brief soil descriptions are created for major soil components. The Owens soil is a minor component.

Soil Information

Map Unit 11 (5.02%)

Map Unit Name:	Bonti-Owens complex, 8 to 30 percent slopes
Bedrock Depth - Min:	56cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Bonti(50%)	
horizon A(0cm to 20cm)	Stony fine sandy loam
horizon Bt(20cm to 76cm)	Clay
horizon Cr(76cm to 102cm)	Bedrock
Owens(38%)	
horizon A(0cm to 25cm)	Clay
horizon Bk(25cm to 56cm)	Clay
horizon Cd(56cm to 152cm)	Clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 11 - Bonti-Owens complex, 8 to 30 percent slopes

Component: Bonti (50%)
The Bonti component makes up 50 percent of the map unit. Slopes are 8 to 30 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from sandstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY157TX Sandstone Hill 26-33" Pz ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Owens (38%)
The Owens component makes up 38 percent of the map unit. Slopes are 10 to 30 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 14 to 30 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R080BY156TX Rocky Hill 26-33" Pz ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 3 within 30 inches of the soil surface.

Component: Unnamed (12%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Map Unit 12 (1.86%)

Map Unit Name:	Bosque loam, 0 to 1 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Bosque(90%)	
horizon A(0cm to 66cm)	Loam
horizon Bk1(66cm to 122cm)	Loam

horizon Bk2(122cm to 203cm)	Loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 12 - Bosque loam, 0 to 1 percent slopes, occasionally flooded

Component: Bosque (90%)
The Bosque component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R085XY181TX Loamy Bottomland 30-38" Pz ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 13 percent.

Component: Unnamed (9%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Unnamed (1%)
Generated brief soil descriptions are created for major soil components. The Unnamed, hydric soil is a minor component.

Map Unit 15 (2.57%)

Map Unit Name:	Callahan loam, 1 to 3 percent slopes
Bedrock Depth - Min:	91cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Callahan(80%)

horizon Ap(0cm to 18cm)	Loam
horizon Bt(18cm to 46cm)	Clay
horizon Btk(46cm to 91cm)	Clay
horizon Cdk(91cm to 178cm)	Clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 15 - Callahan loam, 1 to 3 percent slopes

Component: Callahan (80%)
The Callahan component makes up 80 percent of the map unit. Slopes are 1 to 3 percent. This component is on low ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY147TX Claypan 26-33" Pz ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 6 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Bonti (10%)
Generated brief soil descriptions are created for major soil components. The Bonti soil is a minor component.

Component: Throck (10%)
Generated brief soil descriptions are created for major soil components. The Throck soil is a minor component.

Soil Information

Map Unit 18 (27.53%)

Map Unit Name:	Callahan-Throck complex, 1 to 8 percent slopes
Bedrock Depth - Min:	76cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Callahan(52%)	
horizon A(0cm to 15cm)	Stony clay loam
horizon Bt(15cm to 81cm)	Clay
horizon Cd(81cm to 203cm)	Clay
Throck(44%)	
horizon A(0cm to 15cm)	Stony clay
horizon Bk(15cm to 76cm)	Clay
horizon Cd(76cm to 203cm)	Clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 18 - Callahan-Throck complex, 1 to 8 percent slopes

Component: Callahan (52%)
The Callahan component makes up 52 percent of the map unit. Slopes are 1 to 8 percent. This component is on low ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY147TX Claypan 26-33" Pz ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 6 percent.

Component: Throck (44%)
The Throck component makes up 44 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of residuum weathered from claystone and/or residuum weathered from limestone and/or residuum weathered from siltstone. Depth to a root restrictive layer, bedrock, densic, is 30 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY604TX Clay Slopes 26-33" Pz ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 28 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 12 within 30 inches of the soil surface.

Component: Unnamed (4%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Map Unit 2 (0.75%)

Map Unit Name:	Abilene clay loam, moist, 1 to 3 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Abilene(90%)	
horizon Ap(0cm to 25cm)	Clay loam
horizon Bt(25cm to 61cm)	Clay

horizon Btk(61cm to 107cm)	Clay
horizon BCk(107cm to 203cm)	Clay loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 2 - Abilene clay loam, moist, 1 to 3 percent slopes

Component: Abilene (90%)
The Abilene, moist component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on dissected plains. The parent material consists of calcareous alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R078AY119TX Clay Loam 25-28" Pz ecological site. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Sagerton (5%)
Generated brief soil descriptions are created for major soil components. The Sagerton soil is a minor component.

Component: Rowena (5%)
Generated brief soil descriptions are created for major soil components. The Rowena soil is a minor component.

Map Unit 25 (10.47%)

Map Unit Name:	Deleon silty clay, 0 to 1 percent slopes, rarely flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Moderately well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Deleon(93%)

horizon A1(0cm to 15cm)	Silty clay
horizon A2(15cm to 168cm)	Silty clay
horizon C(168cm to 203cm)	Silty clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 25 - Deleon silty clay, 0 to 1 percent slopes, rarely flooded

Component: Deleon (93%)
The Deleon component makes up 93 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of clayey and/or loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R080BY144TX Clayey Bottomland 26-33" Pz ecological site. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Unnamed (6%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Unnamed (1%)
Generated brief soil descriptions are created for major soil components. The Unnamed, hydric soil is a minor component.

Soil Information

Map Unit 29 (0.65%)

Map Unit Name:	Doudle-Real association, 1 to 8 percent slopes
Bedrock Depth - Min:	46cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded.

Major components are printed below

Doudle(56%)	
horizon A(0cm to 15cm)	Cobbly loam
horizon Bk(15cm to 91cm)	Loam
horizon Cr(91cm to 152cm)	Bedrock
Real(34%)	
horizon A(0cm to 46cm)	Very gravelly clay loam
horizon Cr(46cm to 102cm)	Bedrock

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 29 - Doudle-Real association, 1 to 8 percent slopes

Component: Doudle (56%)
The Doudle component makes up 56 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from limestone. Depth to a root restrictive layer, bedrock, paralithic, is 22 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R085XY565TX Pink Caliche 30-38" Pz ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 50 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Real (34%)
The Real component makes up 34 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges, hills. The parent material consists of loamy residuum weathered from limestone. Depth to a root restrictive layer, bedrock, paralithic, is 8 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 6 percent. This component is in the R085XY176TX Adobe 30-38" Pz ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 55 percent.

Component: Unnamed (10%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Map Unit 58 (4.35%)

Map Unit Name:	Pedernales fine sandy loam, 1 to 3 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Pedernales(90%)	
horizon A(0cm to 18cm)	Fine sandy loam
horizon Bt1(18cm to 53cm)	Sandy clay

horizon Bt2(53cm to 102cm)	Sandy clay
horizon BCk(102cm to 135cm)	Sandy clay loam
horizon CBk(135cm to 200cm)	Sandy clay loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 58 - Pedernales fine sandy loam, 1 to 3 percent slopes

Component: Pedernales (90%)
The Pedernales component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R084BY175TX Tight Sandy Loam 29-33" Pz ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Cisco (3%)
Generated brief soil descriptions are created for major soil components. The Cisco soil is a minor component.

Component: Chaney (3%)
Generated brief soil descriptions are created for major soil components. The Chaney soil is a minor component.

Component: Wise (2%)
Generated brief soil descriptions are created for major soil components. The Wise soil is a minor component.

Component: Blanket (2%)
Generated brief soil descriptions are created for major soil components. The Blanket soil is a minor component.

Map Unit 67 (1.21%)

Map Unit Name:	Sagerton clay loam, warm, 1 to 3 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Sagerton(85%)

horizon Ap(0cm to 18cm)	Clay loam
horizon Bt1(18cm to 33cm)	Clay loam
horizon Bt2(33cm to 97cm)	Clay loam
horizon Btk1(97cm to 122cm)	Clay loam
horizon Btk2(122cm to 203cm)	Clay loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 67 - Sagerton clay loam, warm, 1 to 3 percent slopes

Component: Sagerton (85%)
The Sagerton, warm component makes up 85 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on alluvial plains. The parent material consists of calcareous loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY146TX Clay Loam 26-33" Pz ecological site. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does

not exceed 25 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Rowena (7%)
Generated brief soil descriptions are created for major soil components. The Rowena soil is a minor component.

Component: Winters (4%)
Generated brief soil descriptions are created for major soil components. The Winters soil is a minor component.

Component: Leeray (4%)
Generated brief soil descriptions are created for major soil components. The Leeray soil is a minor component.

Map Unit 7 (0.9%)

Map Unit Name:	Bonti fine sandy loam, 1 to 3 percent slopes
Bedrock Depth - Min:	86cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Bonti(80%)

horizon A(0cm to 20cm)	Fine sandy loam
horizon Bt(20cm to 86cm)	Clay
horizon Cr(86cm to 203cm)	Bedrock

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 7 - Bonti fine sandy loam, 1 to 3 percent slopes

Component: Bonti (80%)
The Bonti component makes up 80 percent of the map unit. Slopes are 1 to 3 percent. This component is on ridges on hills. The parent material consists of loamy and/or clayey residuum weathered from sandstone and/or claystone over sandstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R080BY159TX Sandy Loam 26-33" Pz ecological site. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Exray (8%)
Generated brief soil descriptions are created for major soil components. The Exray soil is a minor component.

Component: Thurber (5%)
Generated brief soil descriptions are created for major soil components. The Thurber soil is a minor component.

Component: Truce (5%)
Generated brief soil descriptions are created for major soil components. The Truce soil is a minor component.

Component: Owens (2%)
Generated brief soil descriptions are created for major soil components. The Owens soil is a minor component.

Map Unit 76 (0.76%)

Map Unit Name:	Owens-Harpersville complex, 8 to 45 percent slopes, extremely bouldery
Bedrock Depth - Min:	18cm
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained

Soil Information

Hydrologic Group - Dominant:	D - Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.

Major components are printed below

Owens(55%)	
horizon A(0cm to 15cm)	Clay
horizon Bk(15cm to 48cm)	Clay
horizon Cd(48cm to 203cm)	Silty clay
Harpersville(30%)	
horizon A(0cm to 18cm)	Clay
horizon Cd(18cm to 203cm)	Clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 76 - Owens-Harpersville complex, 8 to 45 percent slopes, extremely bouldery

Component: Owens (55%)
The Owens, extremely bouldery component makes up 55 percent of the map unit. Slopes are 8 to 35 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 14 to 30 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R080BY156TX Rocky Hill 26-33" Pz ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 3 within 30 inches of the soil surface.

Component: Harpersville (30%)
The Harpersville, extremely bouldery component makes up 30 percent of the map unit. Slopes are 8 to 45 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 3 to 14 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R080BY156TX Rocky Hill 26-33" Pz ecological site. Nonirrigated land capability classification is 8s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a maximum sodium adsorption ratio of 2 within 30 inches of the soil surface.

Component: Palopinto (6%)
Generated brief soil descriptions are created for major soil components. The Palopinto soil is a minor component.

Component: Set (3%)
Generated brief soil descriptions are created for major soil components. The Set soil is a minor component.

Component: Truce (3%)
Generated brief soil descriptions are created for major soil components. The Truce soil is a minor component.

Component: Bluegrove (3%)
Generated brief soil descriptions are created for major soil components. The Bluegrove soil is a minor component.

Map Unit 79 (0.88%)

Map Unit Name:	Winters fine sandy loam, 1 to 3 percent slopes
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Winters(93%)

horizon A(0cm to 15cm)	Fine sandy loam
horizon Bt1(15cm to 25cm)	Clay loam
horizon Bt2(25cm to 91cm)	Clay
horizon Bt3(91cm to 122cm)	Clay loam
horizon Btk(122cm to 165cm)	Clay loam
horizon Ck(165cm to 203cm)	Clay loam

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 79 - Winters fine sandy loam, 1 to 3 percent slopes

Component: Winters (93%)
The Winters component makes up 93 percent of the map unit. Slopes are 1 to 3 percent. This component is on plains on alluvial plain remnants. The parent material consists of mixed loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R080BY164TX Tight Sandy Loam 26-33" Pz ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Unnamed (6%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Unnamed (1%)
Generated brief soil descriptions are created for major soil components. The Unnamed, hydric soil is a minor component.

Map Unit FsfA (19.5%)

Map Unit Name:	Frio silty clay loam, 0 to 1 percent slopes, frequently flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Frio(85%)

horizon A(0cm to 56cm)	Silty clay loam
horizon Bk1(56cm to 86cm)	Silty clay
horizon Bk2(86cm to 203cm)	Silty clay

Component Description:

Minor map unit components are excluded from this report.

Map Unit: 32 - Frio silty clay loam, 0 to 1 percent slopes, frequently flooded

Component: Frio (90%)
The Frio component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy alluvium derived from limestone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is frequently flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R080BY151TX Loamy Bottomland 26-33" Pz ecological site. Nonirrigated land capability classification is 5w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 28 percent.

Component: Unnamed (9%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Soil Information

Component: Unnamed (1%)
Generated brief soil descriptions are created for major soil components. The Unnamed, hydric soil is a minor component.

Map Unit FsoA (16.71%)

Map Unit Name:	Frio silty clay loam, 0 to 1 percent slopes, occasionally flooded
Bedrock Depth - Min:	null
Watertable Depth - Annual Min:	null
Drainage Class - Dominant:	Well drained
Hydrologic Group - Dominant:	C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted.

Major components are printed below

Frio(85%)

horizon A(0cm to 56cm)	Silty clay loam
horizon Bk1(56cm to 86cm)	Silty clay
horizon Bk2(86cm to 203cm)	Silty clay

Component Description:

Minor map unit components are excluded from this report.

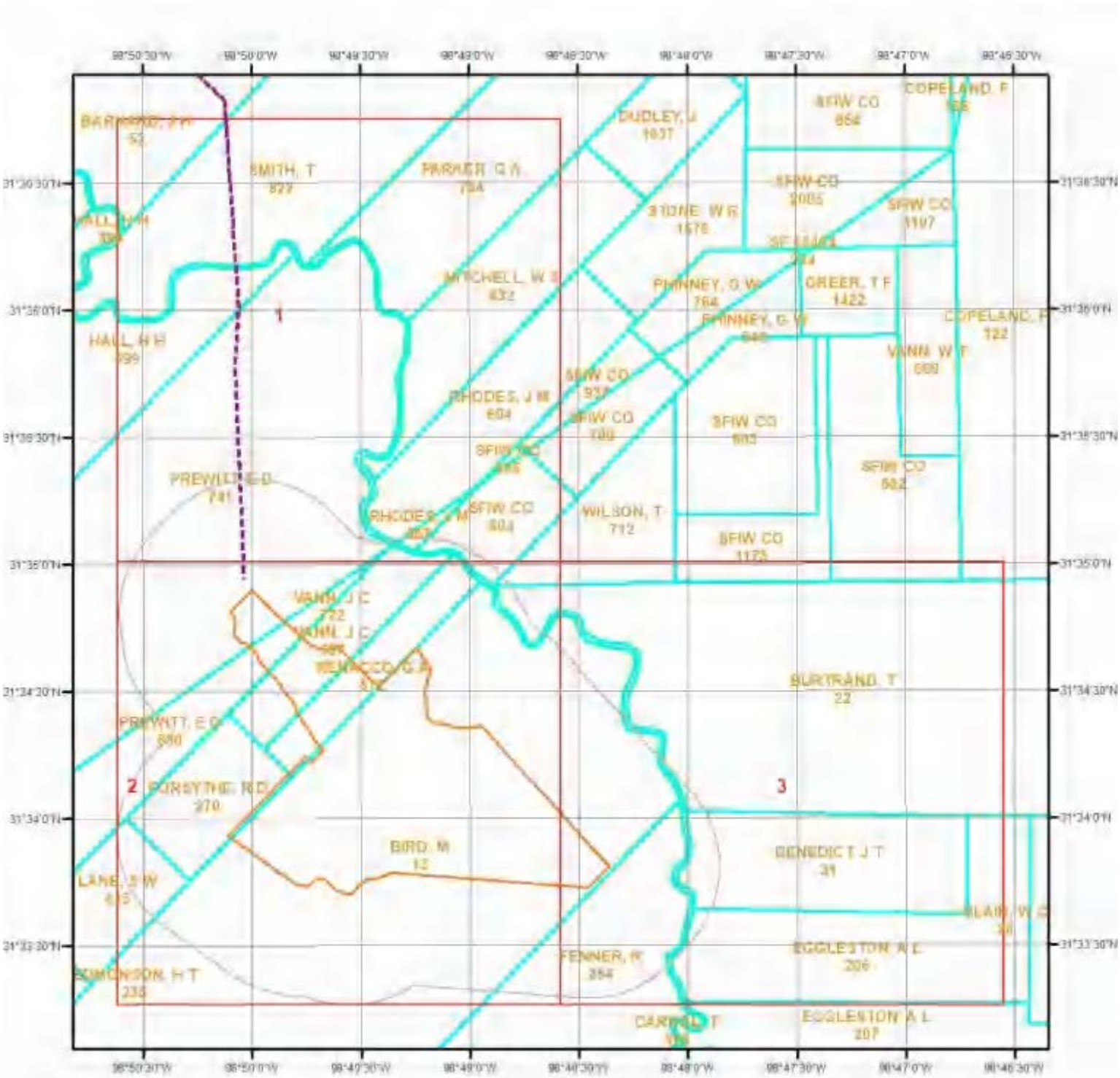
Map Unit: 31 - Frio silty clay loam, 0 to 1 percent slopes, occasionally flooded

Component: Frio (90%)
The Frio component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy and clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R080BY151TX Loamy Bottomland 26-33" Pz ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 28 percent.

Component: Unnamed (9%)
Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Unnamed (1%)
Generated brief soil descriptions are created for major soil components. The Unnamed, hydric soil is a minor component.

Pipeline and Survey Information



Survey & Pipeline Map

Miles
0 0.2 0.4 0.8 1.2

N

This maps shows Survey & Pipeline around the target property. Please refer to the report for detailed descriptions.

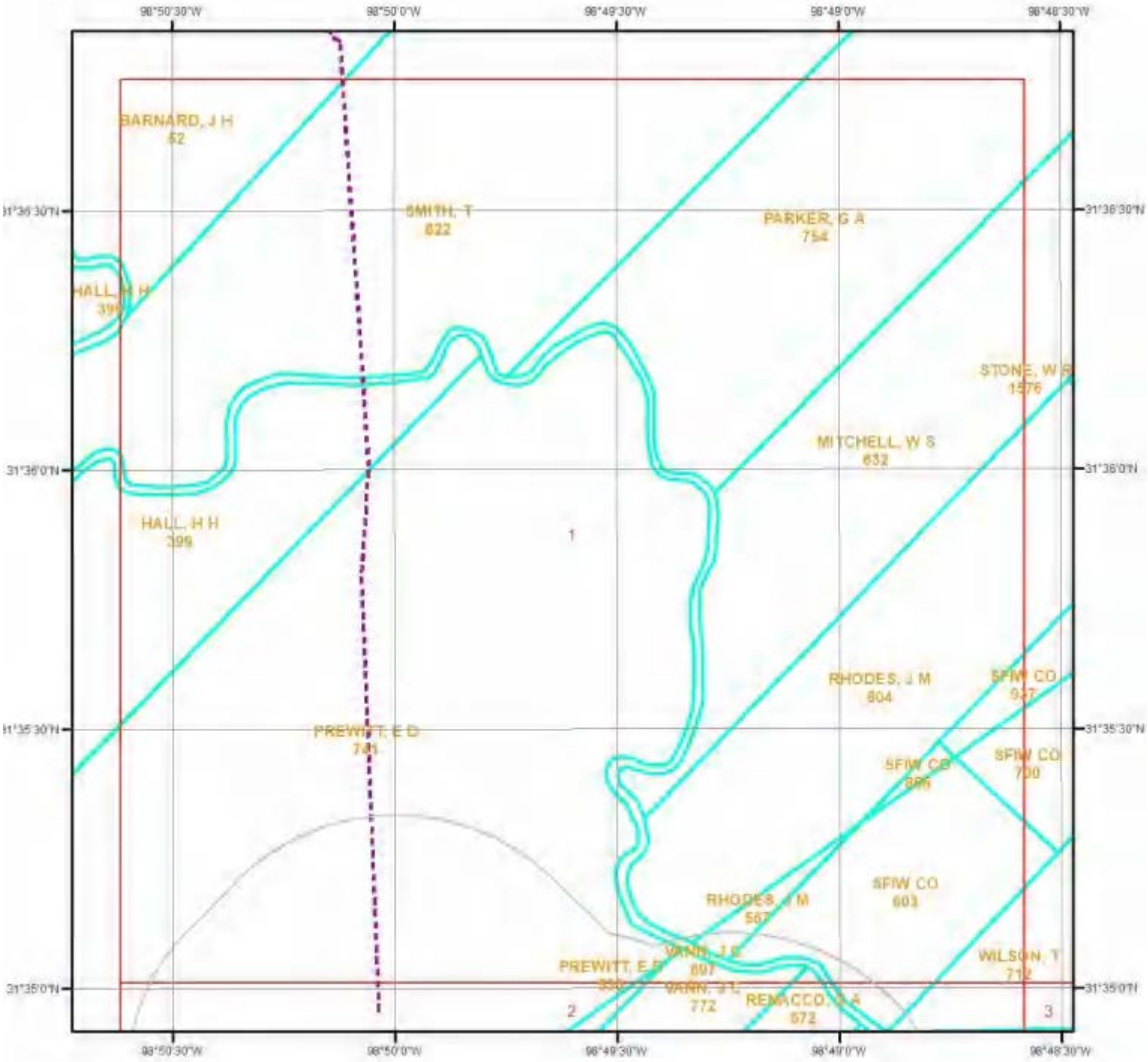
Legend

----- Pipeline

Survey

ERIS

Pipeline and Survey Information



Survey & Pipeline - Page 1

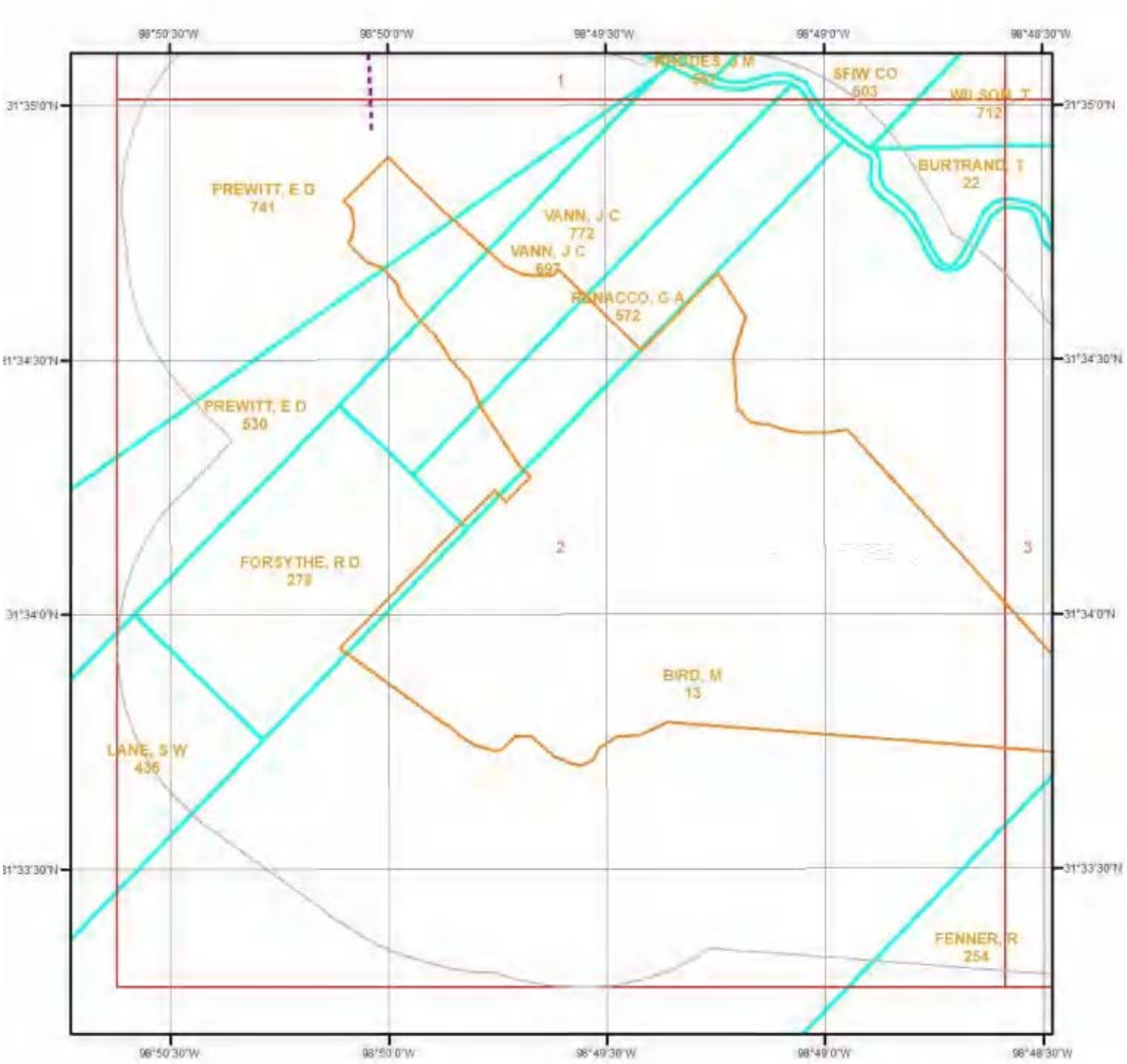
0 0.2 0.4 0.8 Miles

N

This maps shows Survey & Pipeline around the target property. Please refer to the report for detailed descriptions.

ERIS

Pipeline and Survey Information



Survey & Pipeline - Page 2

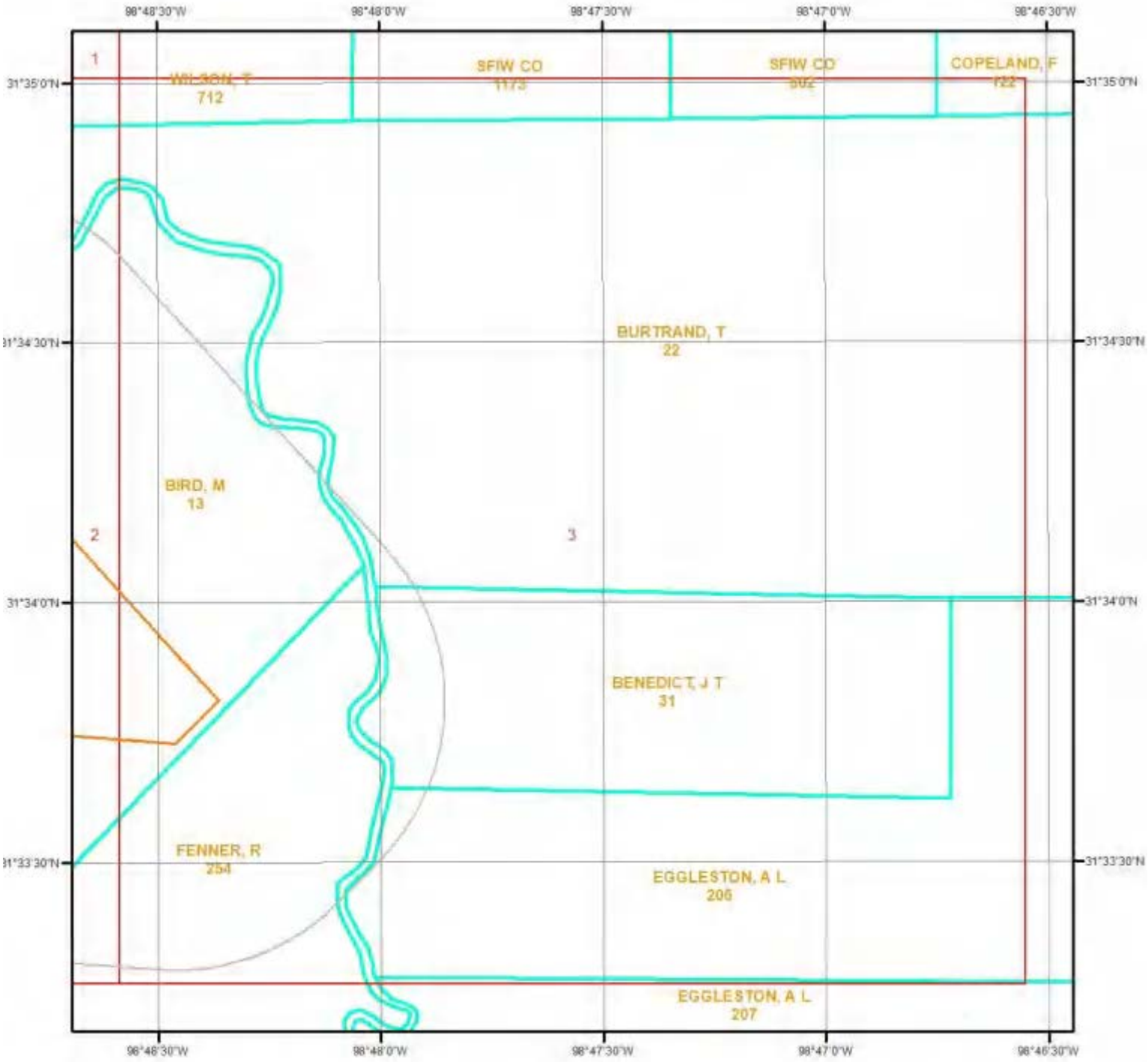
0 0.2 0.4 0.8 Miles

N

This maps shows Survey & Pipeline around the target property. Please refer to the report for detailed descriptions.

ERIS

Pipeline and Survey Information



Survey & Pipeline - Page 3

0 0.2 0.4 0.8 Miles

N

This maps shows Survey & Pipeline around the target property. Please refer to the report for detailed descriptions.

ERIS

Pipeline and Survey Detail Report

The previous page shows a pipeline and survey map. Detailed information about each unit is provided below.

Pipe Line ID	
Status	I
T4 Permit NO	04753
Commodity	NGG
Cmdty Desc	NATURAL GAS
Operator	CEDAR RIDGE ENERGY, INC.
System Name	MCBEE SYSTEM
Diameter (inches)	3.5

Pipe Line ID	
Status	I
T4 Permit NO	04753
Commodity	NGG
Cmdty Desc	NATURAL GAS
Operator	CEDAR RIDGE ENERGY, INC.
System Name	MCBEE SYSTEM
Diameter (inches)	3.5

Pipe Line ID	
Status	I
T4 Permit NO	04753
Commodity	NGG
Cmdty Desc	NATURAL GAS
Operator	CEDAR RIDGE ENERGY, INC.
System Name	MCBEE SYSTEM
Diameter (inches)	2.38

Pipe Line ID	21001
Status	I
T4 Permit NO	00994
Commodity	CRO
Cmdty Desc	CRUDE OIL
Operator	SUNOCO PIPELINE L.P.
System Name	100 LINE
Diameter (inches)	10.75

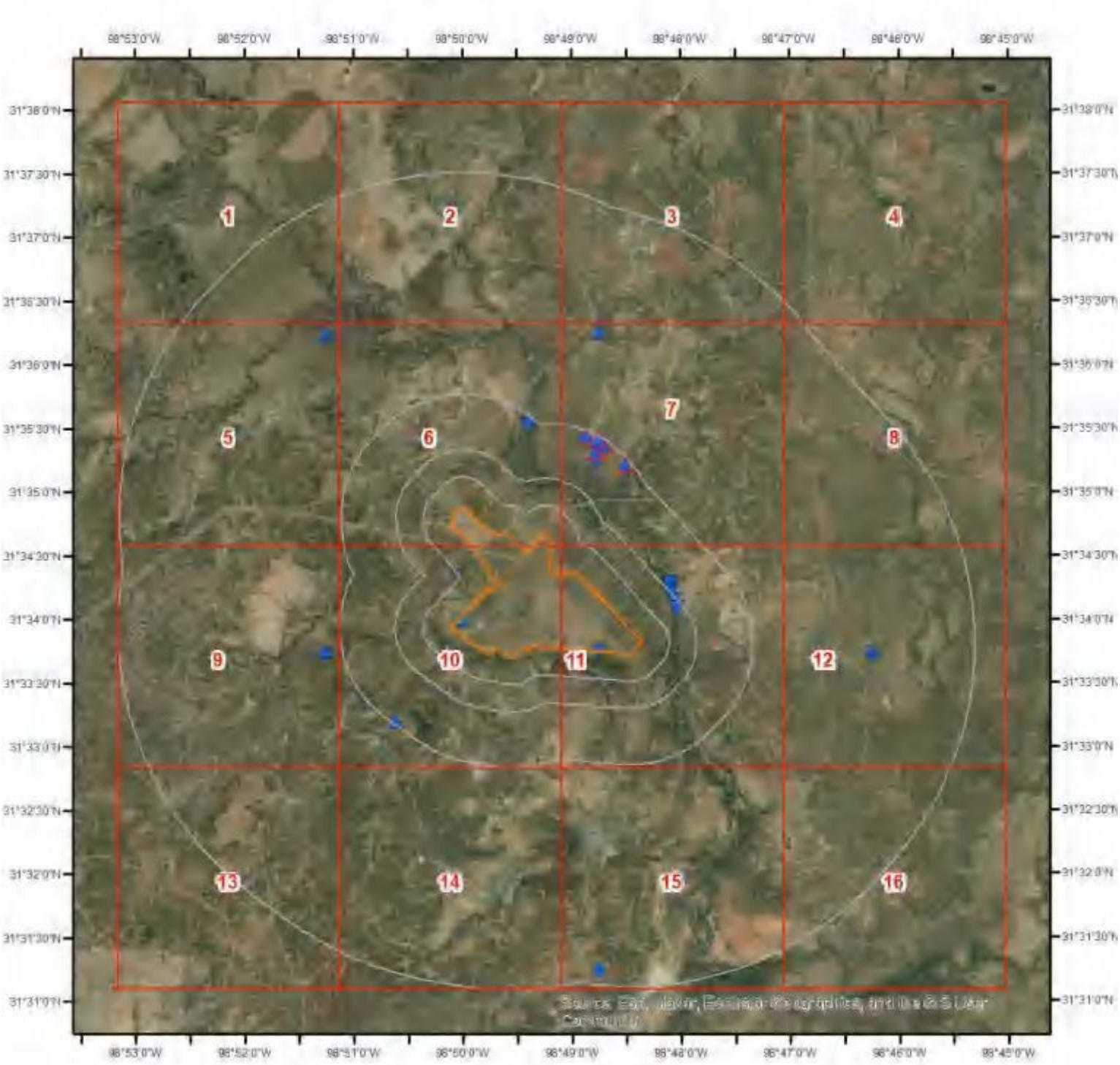
Pipe Line ID	21001
Status	I
T4 Permit NO	00994
Commodity	CRO

Pipeline and Survey Detail Report

Cmdty Desc	CRUDE OIL
Operator	SUNOCO PIPELINE L.P.
System Name	100 LINE
Diameter (inches)	10.75

Pipe Line ID	21001
Status	I
T4 Permit NO	00994
Commodity	CRO
Cmdty Desc	CRUDE OIL
Operator	SUNOCO PIPELINE L.P.
System Name	100 LINE
Diameter (inches)	10.75

Wells and Additional Sources



Wells & Additional Sources

N

0 0.5 1 2 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells and Additional Sources

Wells & Additional Sources - Page 2

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 3

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 4

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 5

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells and Additional Sources

Wells and Additional Sources

Wells & Additional Sources - Page 8

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells and Additional Sources

Wells & Additional Sources - Page 10

N

0 0.15 0.3 0.6 Miles

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 11

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 12

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells and Additional Sources

Wells & Additional Sources - Page 14

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 15

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources

Wells & Additional Sources - Page 16

Miles
0 0.15 0.3 0.6

- Sites with Higher Elevation
- Sites with Same Elevation
- Sites with Lower Elevation
- Sites with Unknown Elevation
- OGW Sites with Higher Elevation
- OGW Sites with Same Elevation
- OGW Sites with Lower Elevation
- OGW Sites with Unknown Elevation

ERIS

Wells and Additional Sources Summary

Federal Sources

Public Water Systems Violations and Enforcement Data

Map Key	ID	Distance (ft)	Direction
	No records found		

Safe Drinking Water Information System (SDWIS)

Map Key	ID	Distance (ft)	Direction
	No records found		

USGS National Water Information System

Map Key	ID	Distance (ft)	Direction
	No records found		

Wells from NWIS

Map Key	ID	Distance (ft)	Direction
	No records found		

State Sources

Fort Bend Subsidence District Water Wells

Map Key	ID	Distance (ft)	Direction
	No records found		

Groundwater Database

Map Key	ID	Distance (ft)	Direction
	No records found		

Harris Galveston Subsidence District Water Wells

Map Key	ID	Distance (ft)	Direction
	No records found		

High Plains Water Wells

Map Key	ID	Distance (ft)	Direction
	No records found		

Wells and Additional Sources Summary

Oil and Gas Wells

Map Key	API	Distance (ft)	Direction
7	33330239	4097.79	NNE
8	33330244	4564.28	NNE
8	33330240	4564.28	NNE
9	33330234	4985.55	NNE
10	33330235	5038.08	NNE
11	33330236	5013.96	NNE
12	33330243	5118.54	NNE
12	33330242	5118.54	NNE

Plotted Water Wells

Map Key	WWD ID	Distance (ft)	Direction
2	960846	0.00	-
15	733893	6007.85	WSW
16	733888	9908.60	NNE
17	733884	10450.30	NW
18	960848	10974.70	E
19		15087.28	S

Plugged Water Wells

Map Key	ID	Distance (ft)	Direction
	No records found		

Public Water Systems Wells and Surface Intakes

Map Key	ID	Distance (ft)	Direction
	No records found		

Select Wells from SDR

Map Key	ID	Distance (ft)	Direction
	No records found		

Submitted Drillers Report Database

Map Key	Well Rpt Track No	Distance (ft)	Direction
1	312551	0.00	-
3	52566	2670.79	E
4	183392	2942.72	E
5	105780	2590.66	E
6	183391	2382.50	E
13	79746	4868.75	N
14	394296	5135.02	SW

Underground Injection Control

Map Key	ID	Distance (ft)	Direction
	No records found		

Wells and Additional Sources Summary

Water Utility Database

Map Key	ID	Distance (ft)	Direction
	No records found		

Well Log Reports from Plotted Water Wells

Map Key	ID	Distance (ft)	Direction
	No records found		

Wells and Additional Sources Detail Report

Oil and Gas Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
7	NNE	0.78	4,097.79	1,267.24	OGW

API:	33330239	Object ID:	
Uniq ID:	816829	GIS Lat27:	31.58679264
GIS API5:	30239	GIS Long27:	-98.81264846
GIS Well No:	7	GIS Lat83:	31.5869522
Sym No:	2	GIS Long83:	-98.81297414
GIS Symbol Desc:	Permitted Location	X:	-98.81297405719495
Reliab:	40	Y:	31.58695227166243
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
8	NNE	0.86	4,564.28	1,269.08	OGW

API:	33330244	Object ID:	
Uniq ID:	816827	GIS Lat27:	31.58834389
GIS API5:	30244	GIS Long27:	-98.81265794
GIS Well No:	8	GIS Lat83:	31.58850342
Sym No:	2	GIS Long83:	-98.81298354
GIS Symbol Desc:	Permitted Location	X:	-98.81298354009427
Reliab:	40	Y:	31.58850344399772
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
8	NNE	0.86	4,564.28	1,269.08	OGW

API:	33330240	Object ID:	
Uniq ID:	816828	GIS Lat27:	31.58834389
GIS API5:	30240	GIS Long27:	-98.81265794
GIS Well No:	8	GIS Lat83:	31.58850342
Sym No:	2	GIS Long83:	-98.81298354
GIS Symbol Desc:	Permitted Location	X:	-98.81298354009427
Reliab:	40	Y:	31.58850344399772
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
9	NNE	0.94	4,985.55	1,269.06	OGW

API:	33330234	Object ID:	
Uniq ID:	816830	GIS Lat27:	31.5865905

GIS API5:	30234	GIS Long27:	-98.808223
GIS Well No:	6	GIS Lat83:	31.58675015
Sym No:	3	GIS Long83:	-98.80854861
GIS Symbol Desc:	Dry Hole	X:	-98.80854858002849
Reliab:	40	Y:	31.58675018591586
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
10	NNE	0.95	5,038.08	1,268.43	OGW

API:	33330235	Object ID:	
Uniq ID:	816826	GIS Lat27:	31.5891461
GIS API5:	30235	GIS Long27:	-98.8113072
GIS Well No:	5	GIS Lat83:	31.58930559
Sym No:	5	GIS Long83:	-98.81163282
GIS Symbol Desc:	Gas Well	X:	-98.81163275980276
Reliab:	40	Y:	31.58930564446383
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
11	NNE	0.95	5,013.96	1,270.39	OGW

API:	33330236	Object ID:	
Uniq ID:	816823	GIS Lat27:	31.5903759
GIS API5:	30236	GIS Long27:	-98.8141041
GIS Well No:	4	GIS Lat83:	31.5905353
Sym No:	5	GIS Long83:	-98.81442974
GIS Symbol Desc:	Gas Well	X:	-98.81442967347287
Reliab:	40	Y:	31.590535373479106
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
12	NNE	0.97	5,118.54	1,269.53	OGW

API:	33330243	Object ID:	
Uniq ID:	816824	GIS Lat27:	31.58993473
GIS API5:	30243	GIS Long27:	-98.81230104
GIS Well No:	11	GIS Lat83:	31.59009414
Sym No:	2	GIS Long83:	-98.81262663
GIS Symbol Desc:	Permitted Location	X:	-98.81262663356154
Reliab:	40	Y:	31.590094213475794
GIS Location Source:	Operator reported location - Distances and Plat		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
12	NNE	0.97	5,118.54	1,269.53	OGW

Wells and Additional Sources Detail Report

API:	33330242	Object ID:	
Uniq ID:	816825	GIS Lat27:	31.58993473
GIS API5:	30242	GIS Long27:	-98.81230104
GIS Well No:	11	GIS Lat83:	31.59009414
Sym No:	9	GIS Long83:	-98.81262663
GIS Symbol Desc:	Canceled / Abandoned Location	X:	-98.81262663356154
Reliab:	40	Y:	31.590094213475794
GIS Location Source:	Operator reported location - Distances and Plat		

Plotted Water Wells

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
2	-	0.00	0.00	1,260.98	WATER WELLS

WWD ID:	960846	Deg:	41
Grid No:	41-26-5	Sev Min:	26
TX Grid ID:	43877.0	Two Min:	5
TX Grid:	44311.0	Shape Length:	0.0
Perimeter:	17116.736	Shape Area:	0.00173640962683
County:	MILLS		
Data Source :	Water Well Report Viewer, 2.5 Minute Quad Grid (Map); TCEQ Water Well Public AGO		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
15	WSW	1.14	6,007.85	1,372.18	WATER WELLS

WWD ID:	733893	Deg:	41
Grid No:	41-26-4	Sev Min:	26
TX Grid ID:	43876.0	Two Min:	4
TX Grid:	44317.0	Shape Length:	0.0
Perimeter:	17115.168	Shape Area:	0.00173606592708
County:	BROWN		
Data Source :	Water Well Report Viewer, 2.5 Minute Quad Grid (Map); TCEQ Water Well Public AGO		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
16	NNE	1.88	9,908.60	1,338.21	WATER WELLS

WWD ID:	733888	Deg:	41
Grid No:	41-26-2	Sev Min:	26
TX Grid ID:	43541.0	Two Min:	2
TX Grid:	43975.0	Shape Length:	0.0
Perimeter:	17112.861	Shape Area:	0.00173631323978
County:	BROWN		
Data Source :	Water Well Report Viewer, 2.5 Minute Quad Grid (Map); TCEQ Water Well Public AGO		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
17	NW	1.98	10,450.30	1,273.94	WATER WELLS

WWD ID:	733884	Deg:	41
Grid No:	41-26-1	Sev Min:	26
TX Grid ID:	43540.0	Two Min:	1
TX Grid:	43981.0	Shape Length:	0.0
Perimeter:	17111.293	Shape Area:	0.00173596955758
County:	BROWN		
Data Source :	Water Well Report Viewer, 2.5 Minute Quad Grid (Map); TCEQ Water Well Public AGO		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
18	E	2.08	10,974.70	1,337.91	WATER WELLS

WWD ID:	960848	Deg:	41
Grid No:	41-26-6	Sev Min:	26
TX Grid ID:	43878.0	Two Min:	6
TX Grid:	44307.0	Shape Length:	0.0
Perimeter:	17115.244	Shape Area:	0.00173608263572
County:	MILLS		
Data Source :	Water Well Report Viewer, 2.5 Minute Quad Grid (Map); TCEQ Water Well Public AGO		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
19	S	2.86	15,087.28	1,413.94	WATER WELLS

WWD ID:		Deg:	41
Grid No:	41-26-8	Sev Min:	26
TX Grid ID:	44213.0	Two Min:	8
TX Grid:	44647.0	Shape Length:	0.0
Perimeter:	17119.611	Shape Area:	0.0017363170718
County:			
Data Source :	Water Well Report Viewer, 2.5 Minute Quad Grid (Map)		

Submitted Drillers Report Database

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
1	-	0.00	0.00	1,326.86	SDR WELLS

License No:	58358	Well Address1:	11 CR 306
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	Goldthwaite
Well Rpt Track No:	312551	Well Zip:	76844
Orig Well Rpt Trk No:		Owner Well No:	1
Apprentice Reg No:		Owner Name:	Scott Esse
No of Wells Drill:		Owner Addr1:	p.o. box 63
Date Submitted:	2013-03-03	Owner Addr2:	

Wells and Additional Sources Detail Report

Type of Work:	New Well	Owner City:	Goldthwaite
Typ of Wrk Oth Descr:		Owner State:	TX
Seal Method:	Other	Owner Zip:	76844
Seal Mthd Oth Desc:	handmix	Owner Country:	
Plugged w/i 48Hrs:	No	Driller Name:	Anthony W Faught
Drilling Start Dt:	2013-01-07	Driller Address1:	14272 W FM 580
Drilling End Dt:	2013-01-08	Driller Addr2:	
Proposed Use:	Domestic	Driller City:	Lometa
Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76853
Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	
Sealed by Driller:	Yes	Dist to Sep Contam:	over 100
Sealed by Name:		Dist to Septic Tk:	
Driller Signed:	Anthony Faught	Dist to Prop Line:	over 50
Apprentice Signed:		Dist Verifi Method:	none in site
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	
Complt by Driller:		Latitude:	31.566667
Pump Type:	Submersible	Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	34
Pump Depth:		Lat Second:	0
Chemical Analysis:	No	Longitude:	-98.833334
Injurious Water:	No	Long Degree:	98
County:	Mills	Long Minute:	50
Known Loc Error:	No	Long Second:	0
Grid No:	41-26-4		
Company Name:	Faught Hill Country Drilling, inc		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=312551&Type=SDR-Well		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
3	E	0.51	2,670.79	1,257.92	SDR WELLS

License No:	54697	Well Address1:	
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	
Well Rpt Track No:	52566	Well Zip:	
Orig Well Rpt Trk No:		Owner Well No:	#1
Apprentice Reg No:		Owner Name:	Mike Crarford
No of Wells Drill:		Owner Addr1:	3620 Lakeside Dr.
Date Submitted:	2005-02-02	Owner Addr2:	
Type of Work:	New Well	Owner City:	Rockwall
Typ of Wrk Oth Descr:		Owner State:	TX

Seal Method:	Unknown	Owner Zip:	75087
Seal Mthd Oth Desc:		Owner Country:	
Plugged w/i 48Hrs:	No	Driller Name:	John Spencer
Drilling Start Dt:	2005-01-11	Driller Address1:	301 Hwy 2921
Drilling End Dt:	2005-01-11	Driller Addr2:	
Proposed Use:	Irrigation	Driller City:	DeLeon
Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76444
Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	
Sealed by Driller:	Yes	Dist to Sep Contam:	
Sealed by Name:		Dist to Septic Tk:	
Driller Signed:	John Spencer	Dist to Prop Line:	
Apprentice Signed:		Dist Verifi Method:	
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	1319
Complt by Driller:		Latitude:	31.570278
Pump Type:		Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	34
Pump Depth:		Lat Second:	13
Chemical Analysis:	No	Longitude:	-98.801667
Injurious Water:	No	Long Degree:	98
County:	Mills	Long Minute:	48
Known Loc Error:	No	Long Second:	6
Grid No:	41-26-5		
Company Name:	F&F Drilling, Inc.		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=52566&Type=SDR-Well		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
4	E	0.56	2,942.72	1,256.31	SDR WELLS

License No:	2317	Well Address1:	
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	
Well Rpt Track No:	183392	Well Zip:	
Orig Well Rpt Trk No:		Owner Well No:	
Apprentice Reg No:		Owner Name:	Mike Crawford
No of Wells Drill:		Owner Addr1:	3620 Lakeside Dr.
Date Submitted:	2009-06-21	Owner Addr2:	
Type of Work:	New Well	Owner City:	Rockwall
Typ of Wrk Oth Descr:		Owner State:	TX
Seal Method:	Unknown	Owner Zip:	75087
Seal Mthd Oth Desc:		Owner Country:	

Plugged w/i 48Hrs:	No	Driller Name:	Jerry Glen Fronterhouse
Drilling Start Dt:	2009-06-02	Driller Address1:	301 Hwy 2921
Drilling End Dt:	2009-06-02	Driller Addr2:	
Proposed Use:	Irrigation	Driller City:	De Leon
Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76444
Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	
Sealed by Driller:	No	Dist to Sep Contam:	
Sealed by Name:	F & F Drilling Inc	Dist to Septic Tk:	
Driller Signed:	Jerry Fronterhouse	Dist to Prop Line:	
Apprentice Signed:		Dist Verifi Method:	
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	1253
Complt by Driller:		Latitude:	31.571389
Pump Type:		Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	34
Pump Depth:		Lat Second:	17
Chemical Analysis:	No	Longitude:	-98.801667
Injurious Water:	No	Long Degree:	98
County:	Mills	Long Minute:	48
Known Loc Error:	No	Long Second:	6
Grid No:	41-26-5		
Company Name:	F & F Drilling Inc.		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=183392&Type=SDR-Well		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
5	E	0.49	2,590.66	1,260.34	SDR WELLS

License No:	2317	Well Address1:	cr 119
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	
Well Rpt Track No:	105780	Well Zip:	
Orig Well Rpt Trk No:		Owner Well No:	
Apprentice Reg No:		Owner Name:	mike crawford
No of Wells Drill:		Owner Addr1:	3620 lake side dr
Date Submitted:	2007-03-05	Owner Addr2:	
Type of Work:	New Well	Owner City:	rockwall
Typ of Wrk Oth Descr:		Owner State:	TX
Seal Method:	Unknown	Owner Zip:	75087
Seal Mthd Oth Desc:		Owner Country:	
Plugged w/i 48Hrs:	No	Driller Name:	Jerry Glen Fronterhouse
Drilling Start Dt:	2007-01-06	Driller Address1:	301 hwy 2921

Drilling End Dt:	2007-01-06	Driller Addr2:	
Proposed Use:	Irrigation	Driller City:	deleon
Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76444
Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	
Sealed by Driller:	No	Dist to Sep Contam:	
Sealed by Name:	f&f drilling	Dist to Septic Tk:	
Driller Signed:	jerry fronterhouse	Dist to Prop Line:	
Apprentice Signed:		Dist Verifi Method:	
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	1305
Complt by Driller:		Latitude:	31.569167
Pump Type:		Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	34
Pump Depth:		Lat Second:	9
Chemical Analysis:	No	Longitude:	-98.800834
Injurious Water:	No	Long Degree:	98
County:	Mills	Long Minute:	48
Known Loc Error:	No	Long Second:	3
Grid No:	41-26-5		
Company Name:	f & f drilling		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=105780&Type=SDR-Well		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
6	E	0.45	2,382.50	1,257.74	SDR WELLS

License No:	2317	Well Address1:	
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	
Well Rpt Track No:	183391	Well Zip:	
Orig Well Rpt Trk No:		Owner Well No:	
Apprentice Reg No:		Owner Name:	Mike Crawford
No of Wells Drill:		Owner Addr1:	3620 Lakeside Dr.
Date Submitted:	2009-06-21	Owner Addr2:	
Type of Work:	New Well	Owner City:	Rockwall
Typ of Wrk Oth Descr:		Owner State:	TX
Seal Method:	Unknown	Owner Zip:	75087
Seal Mthd Oth Desc:		Owner Country:	
Plugged w/i 48Hrs:	No	Driller Name:	Jerry Glen Fronterhouse
Drilling Start Dt:	2009-06-02	Driller Address1:	301 Hwy 2921
Drilling End Dt:	2009-06-02	Driller Addr2:	
Proposed Use:	Irrigation	Driller City:	De Leon

Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76444
Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	
Sealed by Driller:	No	Dist to Sep Contam:	
Sealed by Name:	F & F Drilling Inc	Dist to Septic Tk:	
Driller Signed:	Jerry Fronterhouse	Dist to Prop Line:	
Apprentice Signed:		Dist Verifi Method:	
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	1253
Complt by Driller:		Latitude:	31.568055
Pump Type:		Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	34
Pump Depth:		Lat Second:	5
Chemical Analysis:	No	Longitude:	-98.800556
Injurious Water:	No	Long Degree:	98
County:	Mills	Long Minute:	48
Known Loc Error:	No	Long Second:	2
Grid No:	41-26-5		
Company Name:	F & F Drilling Inc.		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=183391&Type=SDR-Well		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
13	N	0.92	4,868.75	1,266.82	SDR WELLS

License No:	2317	Well Address1:	
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	
Well Rpt Track No:	79746	Well Zip:	
Orig Well Rpt Trk No:		Owner Well No:	
Apprentice Reg No:		Owner Name:	david morrow
No of Wells Drill:		Owner Addr1:	11805 wcr56
Date Submitted:	2006-04-02	Owner Addr2:	
Type of Work:	New Well	Owner City:	midland
Typ of Wrk Oth Descr:		Owner State:	TX
Seal Method:	Unknown	Owner Zip:	79707
Seal Mthd Oth Desc:		Owner Country:	
Plugged w/i 48Hrs:	No	Driller Name:	Jerry Glen Fronterhouse
Drilling Start Dt:	2006-03-16	Driller Address1:	301 hwy 2921
Drilling End Dt:	2006-03-16	Driller Addr2:	
Proposed Use:	Domestic	Driller City:	deleon
Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76444

Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	
Sealed by Driller:	No	Dist to Sep Contam:	
Sealed by Name:	f&f drilling	Dist to Septic Tk:	
Driller Signed:	jerry fronterhouse	Dist to Prop Line:	
Apprentice Signed:		Dist Verifi Method:	
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	1219
Complt by Driller:		Latitude:	31.591945
Pump Type:		Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	35
Pump Depth:		Lat Second:	31
Chemical Analysis:	No	Longitude:	-98.823333
Injurious Water:	No	Long Degree:	98
County:	Brown	Long Minute:	49
Known Loc Error:	No	Long Second:	24
Grid No:	41-26-2		
Company Name:	f & f drilling		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=79746&Type=SDR-Well		

Map Key	Direction	Distance (mi)	Distance (ft)	Elevation (ft)	DB
14	SW	0.97	5,135.02	1,397.84	SDR WELLS

License No:	2317	Well Address1:	
PWS No:		Well Addr2:	
Plug Rpt Track No:		Well City:	
Well Rpt Track No:	394296	Well Zip:	
Orig Well Rpt Trk No:		Owner Well No:	
Apprentice Reg No:		Owner Name:	David Williams
No of Wells Drill:		Owner Addr1:	P.O.Box 51
Date Submitted:	2015-05-06	Owner Addr2:	
Type of Work:	New Well	Owner City:	Midland
Typ of Wrk Oth Descr:		Owner State:	TX
Seal Method:	Unknown	Owner Zip:	79702
Seal Mthd Oth Desc:		Owner Country:	
Plugged w/i 48Hrs:	No	Driller Name:	Jerry Glen Fronterhouse
Drilling Start Dt:	2015-03-06	Driller Address1:	P.O.Box 260
Drilling End Dt:	2015-03-06	Driller Addr2:	
Proposed Use:	Irrigation	Driller City:	DeLeon
Prop Use Oth Descr:		Driller State:	TX
TCEQ Approve Plans:		Driller Zip:	76444
Apprve by Variance:		Driller Oth Cntry:	
Loc Vfy by Driller:	No	Driller Country:	

Wells and Additional Sources Detail Report

Sealed by Driller:	Yes	Dist to Sep Contam:	
Sealed by Name:		Dist to Septic Tk:	
Driller Signed:	Jerry Fronterhouse	Dist to Prop Line:	
Apprentice Signed:		Dist Verifi Method:	
Surface Compl:	Surface Sleeve Installed	Horizon Datum Type:	
Surf Comp Oth Desc:		Elevation:	1397
Complt by Driller:		Latitude:	31.553334
Pump Type:		Lat Degree:	31
Pump Type Oth Desc:		Lat Minute:	33
Pump Depth:		Lat Second:	12
Chemical Analysis:	No	Longitude:	-98.843611
Injurious Water:	No	Long Degree:	98
County:	Mills	Long Minute:	50
Known Loc Error:	No	Long Second:	37
Grid No:	41-26-4		
Company Name:	F&F Drilling		
Well Location Description:			
Comments:			
Data Source:	Full SDR Database; SDRDB Well Location (Map)		
Drillers Well Report:	https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=394296&Type=SDR-Well		

Radon Information

This section lists any relevant radon information found for the target property.

Federal EPA Radon Zone for *BROWN* County: **3**
Federal EPA Radon Zone for *MILLS* County: **3**

Zone 1: Counties with predicted average indoor radon screening levels greater than 4 pCi/L
Zone 2: Counties with predicted average indoor radon screening levels from 2 to 4 pCi/L
Zone 3: Counties with predicted average indoor radon screening levels less than 2 pCi/L

Federal Area Radon Information for *BROWN* County

No Measures/Homes:	6
Geometric Mean:	1.3
Arithmetic Mean:	2.6
Median:	0.9
Maximum:	7.8
% >4 pCi/L:	33
% >20 pCi/L:	0
Notes on Data Table:	TABLE 1. Screening indoor radon data from the State/EPA Residential Radon Survey of Texas conducted during 1990-91. Data represent 2-7 day charcoal canister measurements from the lowest level of each home tested.

Appendix

Federal Sources

FEMA National Flood Hazard Layer — **FEMA FLOOD**

The National Flood Hazard Layer (NFHL) data incorporates Flood Insurance Rate Map (FIRM) databases published by the Federal Emergency Management Agency (FEMA), and any Letters Of Map Revision (LOMRs) that have been issued against those databases since their publication date. The FIRM Database is the digital, geospatial version of the flood hazard information shown on the published paper FIRMs. The FIRM Database depicts flood risk information and supporting data used to develop the risk data. The FIRM Database is derived from Flood Insurance Studies (FISs), previously published FIRMs, flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data, where available.

Indoor Radon Data — **INDOOR RADON**

Indoor radon measurements tracked by the Environmental Protection Agency(EPA) and the State Residential Radon Survey.

Public Water Systems Violations and Enforcement Data — **PWSV**

List of drinking water violations and enforcement actions from the Safe Drinking Water Information System (SDWIS) made available by the Drinking Water Protection Division of the US EPA's Office of Groundwater and Drinking Water. Enforcement sensitive actions are not included in the data released by the EPA. Address information provided in SWDIS may correspond either with the physical location of the water system, or with a contact address.

Radon Zone Level — **RADON ZONE**

Areas showing the level of Radon Zones (level 1, 2 or 3) by county. This data is maintained by the Environmental Protection Agency (EPA).

Safe Drinking Water Information System (SDWIS) — **SDWIS**

The Safe Drinking Water Information System (SDWIS) contains information about public water systems as reported to US Environmental Protection Agency (EPA) by the states. Addresses may correspond with the location of the water system, or with a contact address.

Soil Survey Geographic database — **SSURGO**

The Soil Survey Geographic database (SSURGO) contains information about soil as collected by the National Cooperative Soil Survey at the Natural Resources Conservation Service (NRCS). Soil maps outline areas called map units. The map units are linked to soil properties in a database. Each map unit may contain one to three major components and some minor components.

USGS Current Topo — **US TOPO**

US Topo topographic maps are produced by the National Geospatial Program of the U.S. Geological Survey (USGS). The project was launched in late 2009, and the term "US Topo" refers specifically to quadrangle topographic maps published in 2009 and later.

USGS Geology — **US GEOLOGY**

Seamless maps depicting geological information provided by the United States Geological Survey (USGS).

USGS National Water Information System — **FED USGS**

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) is the nation's principal repository of water resources data. This database includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. NWIS database information is obtained through the Water Quality Data Portal (WQP).

Wells from NWIS — **FED USGS**

The U.S. Geological Survey's (USGS) National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This select NWIS Wells dataset contains specific Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well, Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern. Applicable NWIS database information is obtained through the Water Quality Data Portal (WQP).

Appendix

State Sources

Fort Bend Subsidence District Water Wells — **WW FORT BEND**

List of water wells in the Fort Bend Subsidence District, boundaries of which are defined as all the territory within Fort Bend County. The Fort Bend Subsidence District was created by the Texas Legislature in 1989 as a conservation and reclamation district to control land subsidence and manage groundwater resources through regulation, conservation, and coordination with suppliers of alternative water sources to assure an adequate quantity and quality of water for the future. The District's purpose is to provide for the regulation of the withdrawal of groundwater within the District to prevent subsidence that contributes to flooding, inundation or overflow of areas within the District, including rising waters resulting from storms or hurricanes.

Groundwater Database — **GWDB**

The Texas Water Development Board (TWDB) Groundwater Database (GWDB) contains information on selected water wells, springs, oil/gas tests (that were originally intended to be or were converted to water wells), water levels and water quality.

Harris Galveston Subsidence District Water Wells — **WW HARRIS GAL**

List of water wells in the Harris-Galveston Subsidence District (HGSD). The HGSD was created by the 64th Texas Legislature as an underground water conservation district in 1975 to provide regulation of groundwater withdrawal to control subsidence.

High Plains Water Wells — **WW HIGH PLAINS**

Inventory of water wells in the High Plains Underground Water Conservation District No. 1 (HPUWCD), which was created in 1951. As a political subdivision of Texas, HPUWCD is charged with protecting, preserving and conserving aquifers within the District's 16-county service area.

Oil and Gas Wells — **OGW**

Oil and Gas Well Data made available by the Railroad Commission of Texas.

Pipelines — **PIPELINE**

Locations of interstate and intrastate gas and liquids pipelines, made available by the Railroad Commission of Texas (RRC). Data is derived from RRC T-4 Permit applications ("Application for Permit to Operate a Pipeline in Texas"), which facilitate regulatory functions of the Pipeline Safety Section of the RRC. The digital data used to create the files was taken from the forms system within the RRC, from the General Land Office (GLO) county survey maps, and, United States Geological Survey (USGS) quadrangle maps.

Plotted Water Wells — **WATER WELLS**

A list of water wells in Texas that are plotted in Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer. The database provides the best representation of water well driller's reports available to the TCEQ as of the date of records collected. Note: records are plotted using the Texas Land Survey Grid System, identifying the 2.5 minute grid where wells are located but do not contain the offset necessary to pinpoint a specific location. Therefore, plotted locations are accurate to a resolution of 2.5 minute (2-3 miles).

Plugged Water Wells — **PLUGGED WELLS**

A list of plugged water wells from the Submitted Drillers Report (SDR) Database. This list is maintained by the Texas Water Development Board (TWDB).

Public Water Systems Wells and Surface Intakes — **PWSW**

Public Water Supply Water Well Sites and Public Water Supply Surface Water Intake Sites in the State of Texas made available by the Texas Commission on Environmental Quality (TCEQ). The locations for these layers were obtained by the Water Supply Division as recorded from various sources, and the data provider indicates that some locational errors have been identified. As resources allow, TCEQ intends to improve the accuracy of these locations to meet the standards set forth in the agency's Positional Data Policy.

Select Wells from SDR — **SDRW WELLS**

Locations of wells from the Submitted Drillers Report (SDR) Database with select proposed usage: Domestic, Fracking Supply, Industrial, Irrigation, Other, Public Supply, Rig Supply, Stock, Unknown. SDR is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS), a

cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application requiring registered water-well drillers to submit reports. Excludes SDR records with the following proposed usage: Closed-Loop Geothermal, De-watering, Environmental Soil Boring, Extraction, Injection, Monitor, Test Well.

Submitted Drillers Report Database **SDR WELLS**

The Submitted Drillers Report (SDR) Database is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS) which is a cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application that registered water-well drillers use to submit their required reports.

Surveys **SURVEY**

Survey boundaries made available by the Railroad Commission of Texas (RRC). A survey is a certified measured description of a piece of land. In Texas, original surveys were performed as part of the patenting process whereby land was transferred from the public domain. These "patent surveys", recorded at the Texas General Land Office (GLO), constitute an official land grid for the State and are the basis for subsequent land surveys. The digital data used to create surveys were taken from the forms system within the RRC, from the General Land Office (GLO) county survey maps, and United States Geological Survey (USGS) quadrangle maps.

Underground Injection Control **UIC**

List of underground injection control (UIC) permits in the Texas Commission on Environmental Quality (TCEQ) Central Registry database. Includes Class I, Class III, Class IV, Class 5, and non permitted UICs; does not include injection wells regulated by the Railroad Commission of Texas.

Water Utility Database **WUD**

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health.

Well Log Reports from Plotted Water Wells **TCEQ WELL LOGS**

Locations of TCEQ Water Wells as derived from well logs in the Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, which includes unnumbered water wells and those plotted to 2.5 minute grid locations (2-3 miles). In this collection of Well Log Reports, locations have been manually verified.

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APPENDIX F

Aerial Photographs

HISTORICAL AERIALS

Project Property: Chisme Solar
N/A
Early TX

Project No:

Requested By: Stantec Consulting Ltd.

Order No: 23100500123

Date Completed: October 09,2023

Aerial Maps included in this report are produced by the sources listed above and are to be used for research purposes including a phase I report. Maps are not to be resold as commercial property. ERIS provides no warranty of accuracy or liability. The information contained in this report has been produced using aerial photos listed in above sources by ERIS Information Inc. (in the US) and ERIS Information Limited Partnership (in Canada), both doing business as 'ERIS'. The maps contained in this report do not purport to be and do not constitute a guarantee of the accuracy of the information contained herein. Although ERIS has endeavored to present information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Environmental Risk Information Services
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1.866.517.5204 | info@erisinfo.com | erisinfo.com

Date	Source	Scale	Comments
2022	MAXAR TECHNOLOGIES	1" = 1500'	
2018	United States Department of Agriculture	1" = 1500'	
2016	United States Department of Agriculture	1" = 1500'	
2014	United States Department of Agriculture	1" = 1500'	
2012	United States Department of Agriculture	1" = 1500'	
2010	United States Department of Agriculture	1" = 1500'	
2008	United States Department of Agriculture	1" = 1500'	
2006	United States Department of Agriculture	1" = 1500'	
2005	United States Department of Agriculture	1" = 1500'	
2004	United States Department of Agriculture	1" = 1500'	
1995	United States Geological Survey	1" = 1500'	
1989	United States Geological Survey	1" = 1500'	
1983	United States Geological Survey	1" = 1500'	
1975	United States Geological Survey	1" = 1500'	
1966	Agricultural Stabilization & Conserv. Service	1" = 1500'	Photo Index-Best Available
1952	Army Mapping Service	1" = 1500'	
1948	United States Bureau of Reclamation	1" = 1500'	

Year: 2022
Source: MAXAR
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

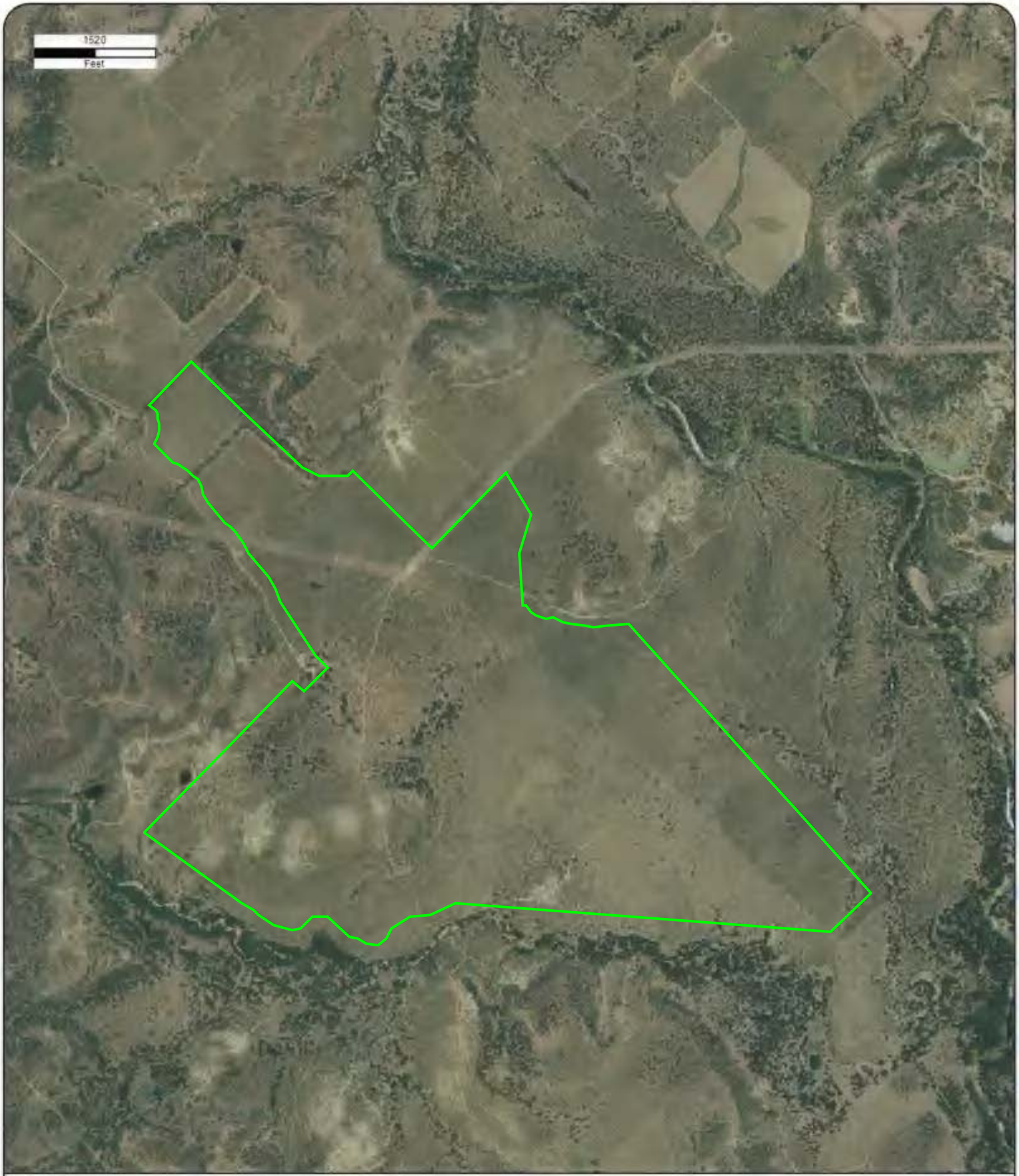
ERIS

Year: 2018
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS



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Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
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Order No: 23100500123

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Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS

Year: 2012
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
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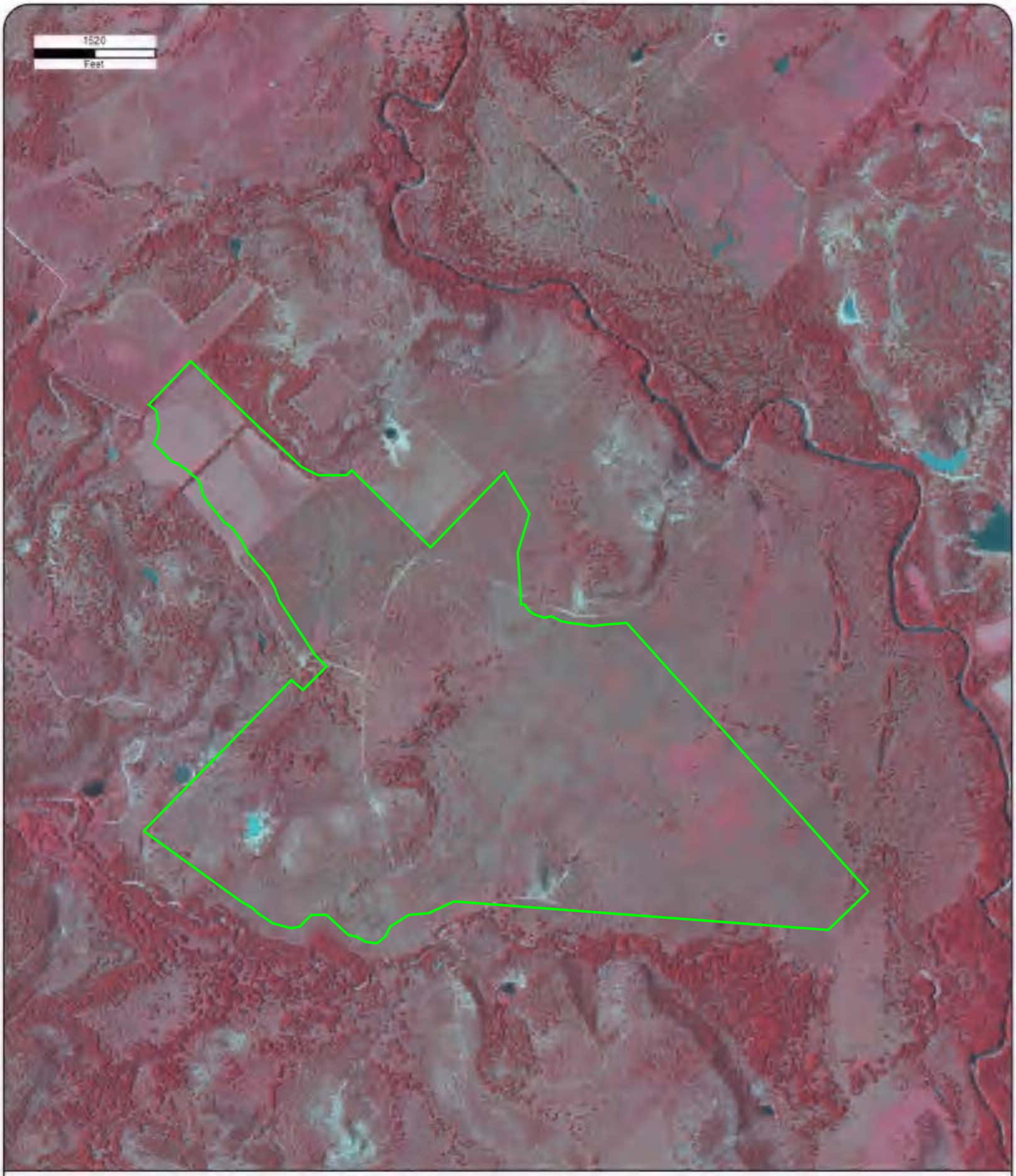
Order No: 23100500123

ERIS



Year: 2010
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

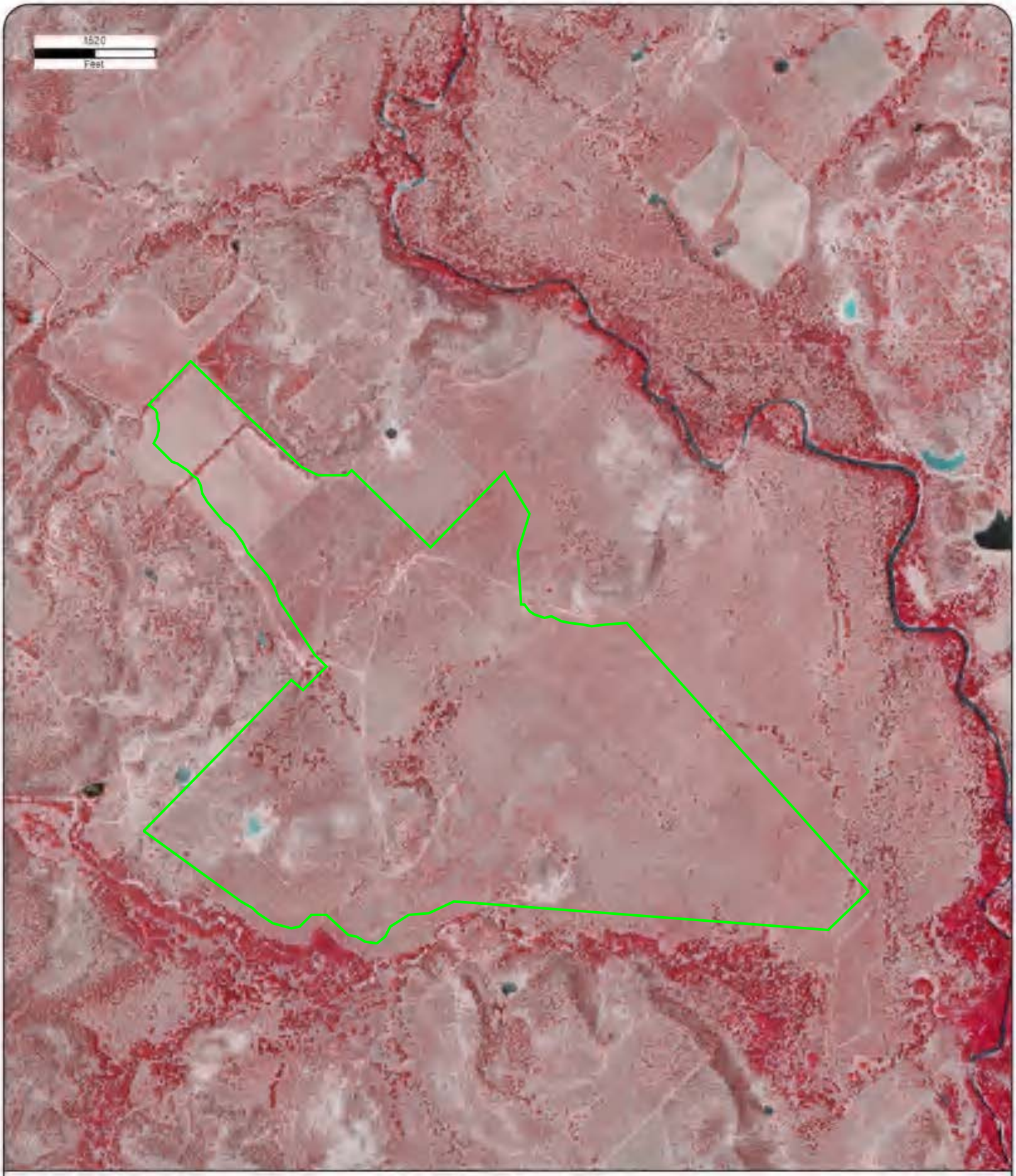
ERIS

Year: 2008
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS



Year: 2006
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

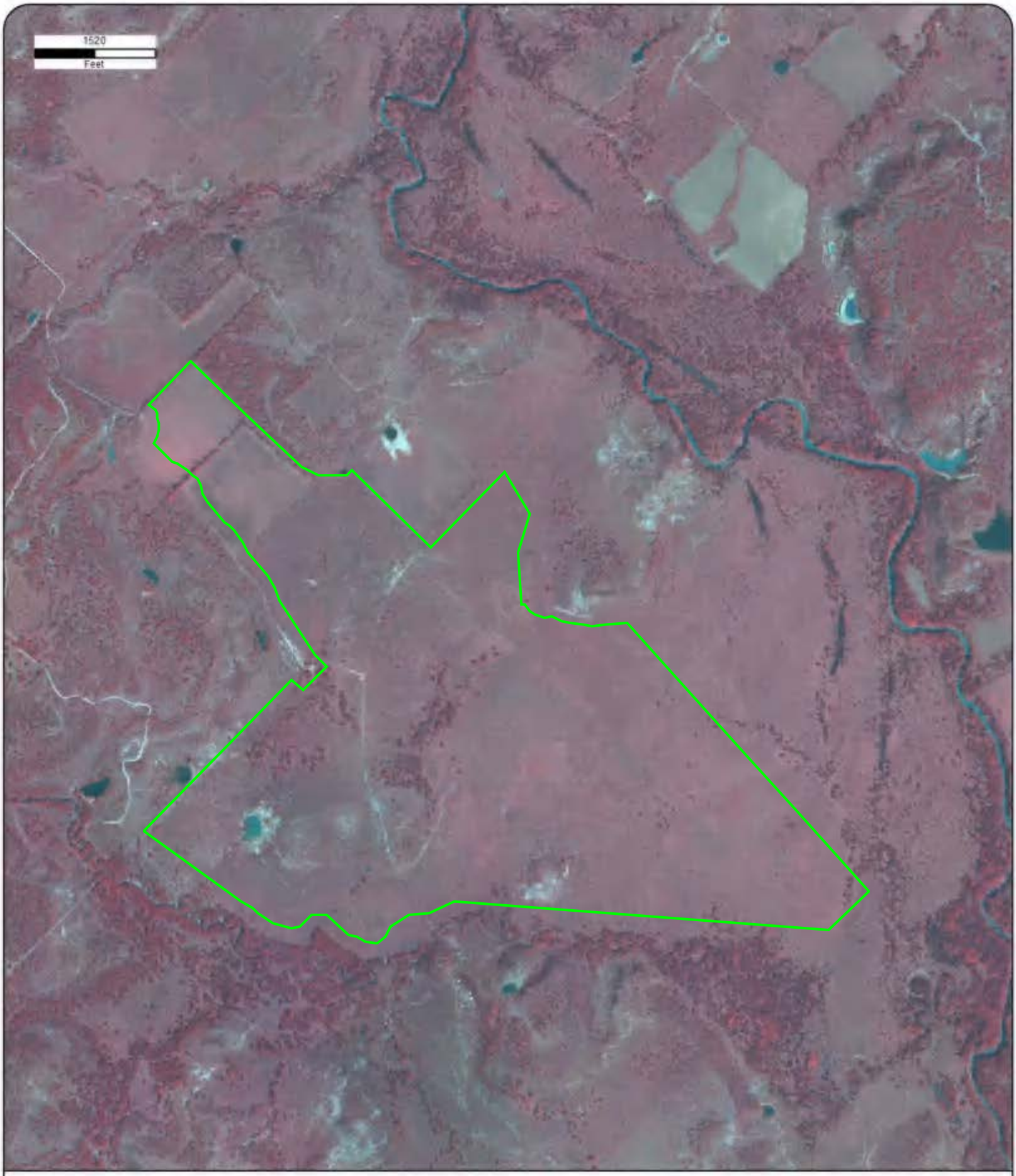
ERIS

Year: 2005
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS



Year: 2004
Source: USDA
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
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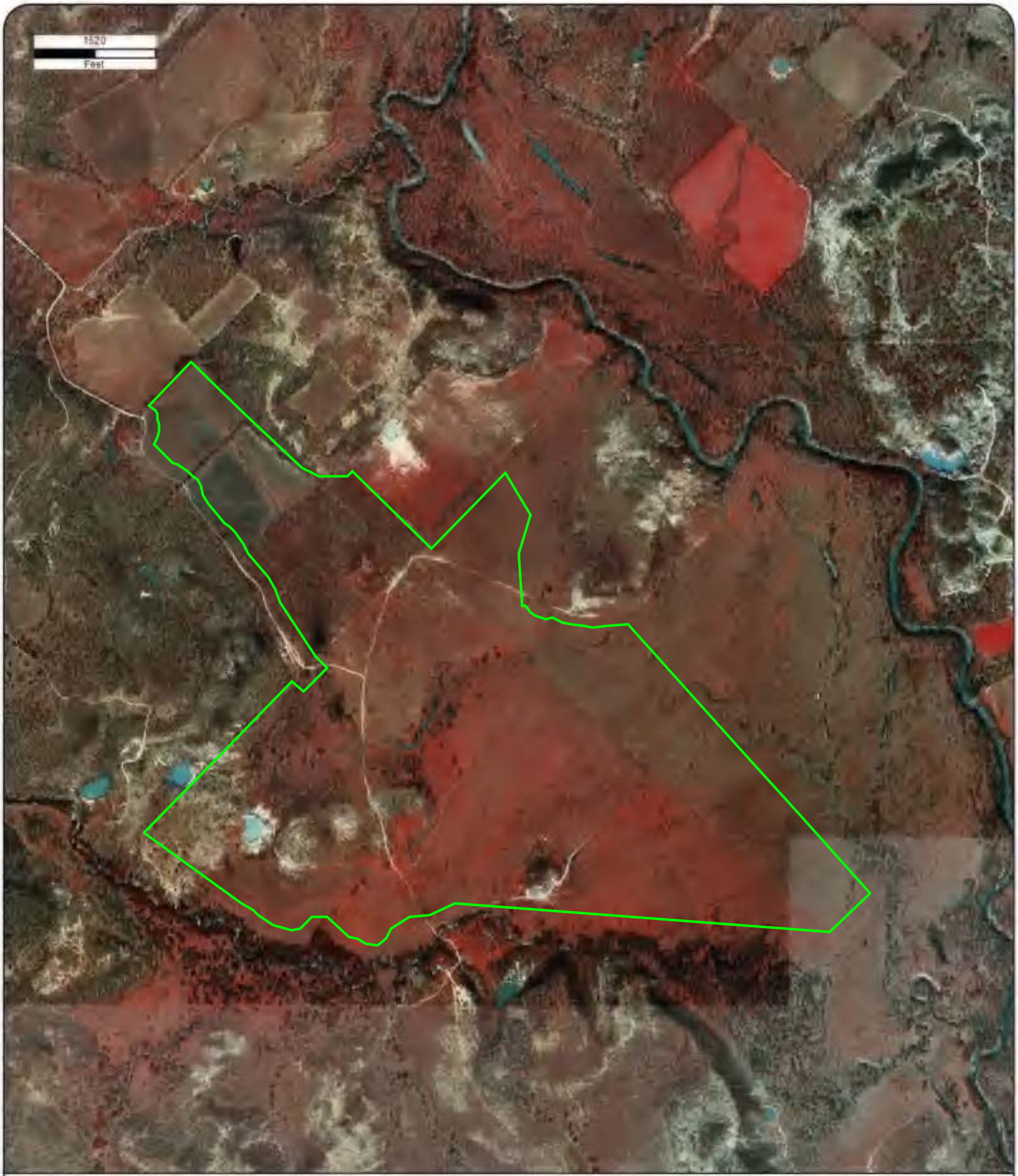
Order No: 23100500123

ERIS

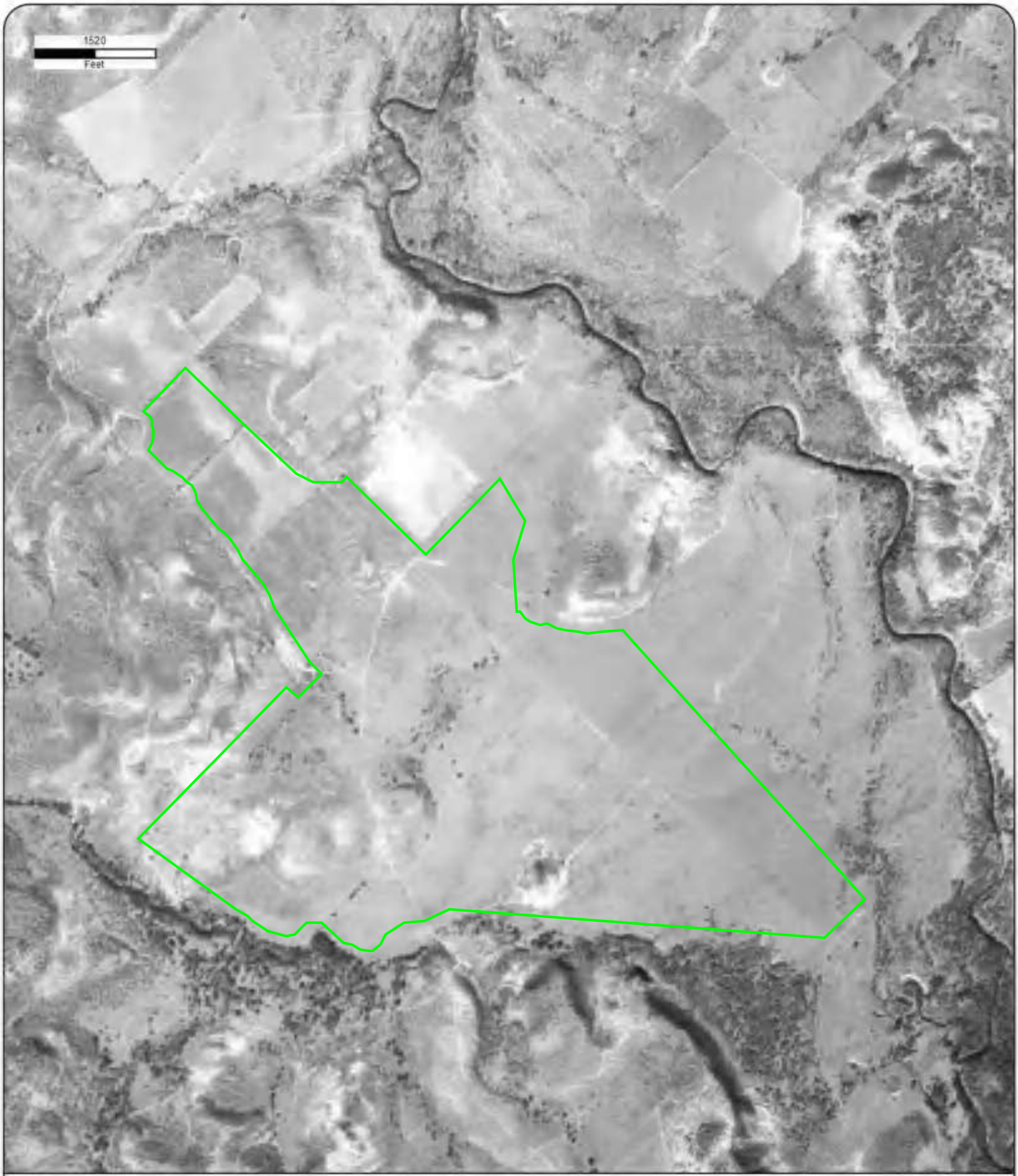


Year: 1995
Source: USGS
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS



Year: 1989
Source: USGS
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

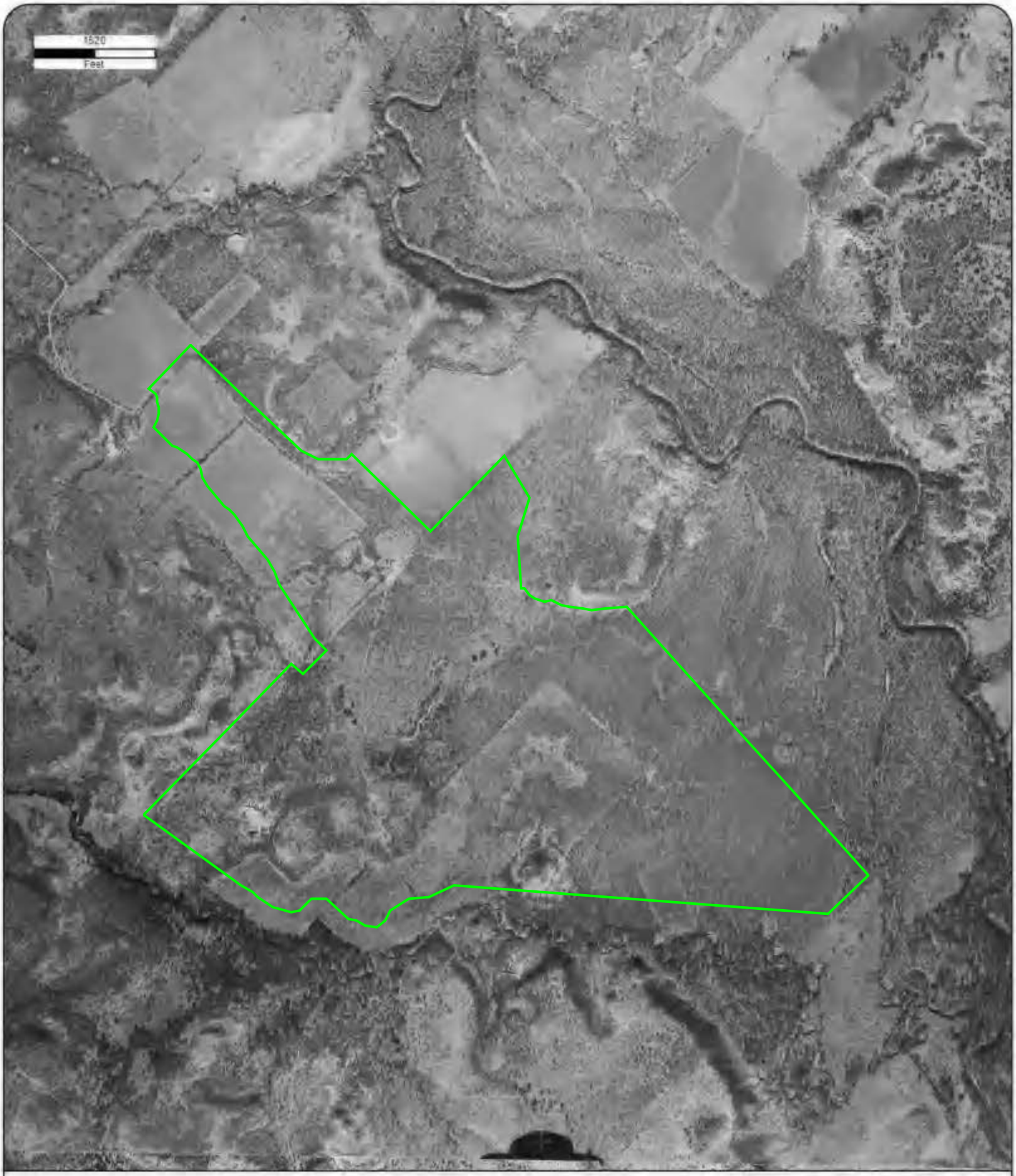
ERIS

Year: 1983
Source: USGS
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS

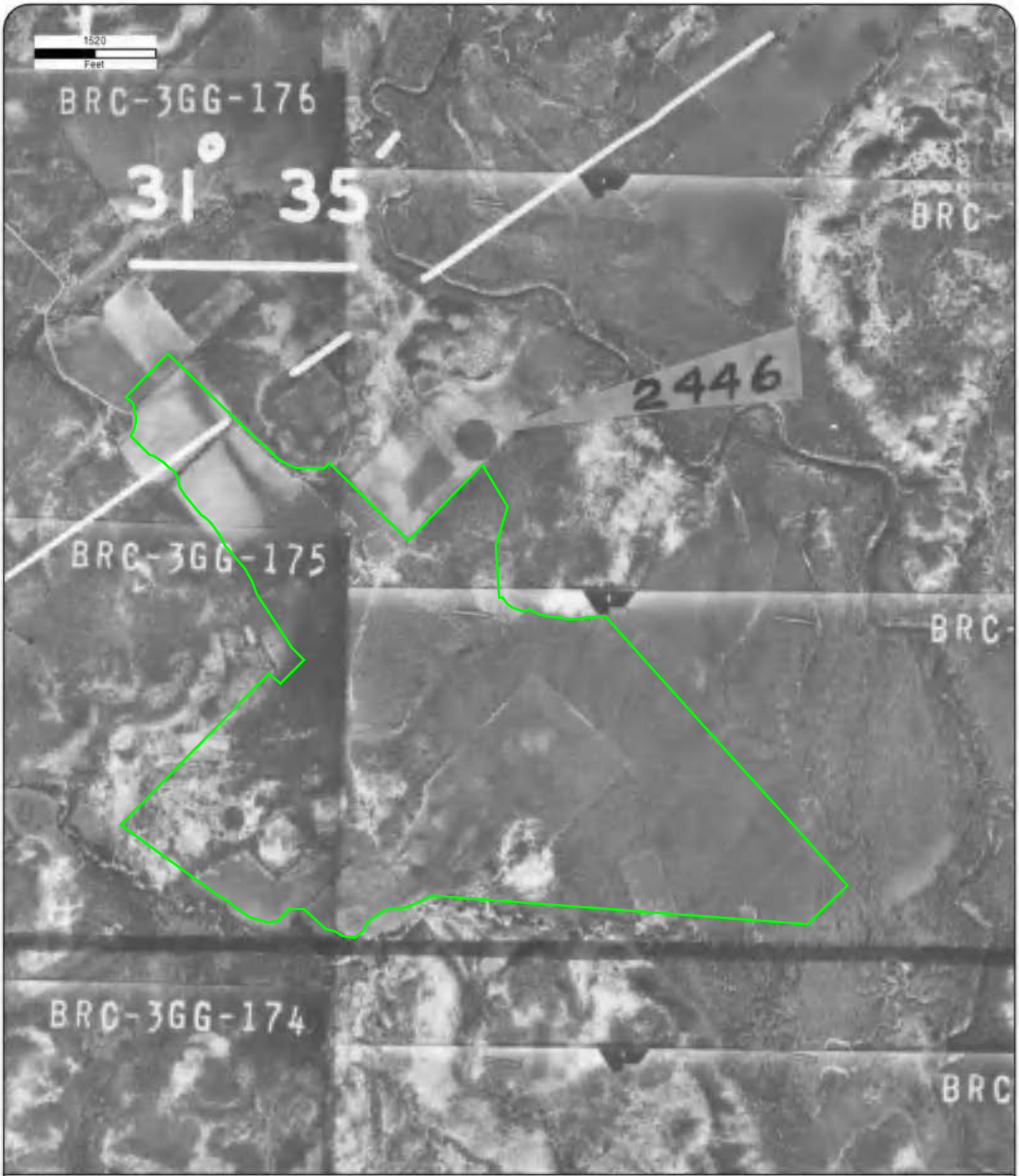


Year: 1975
Source: USGS
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS

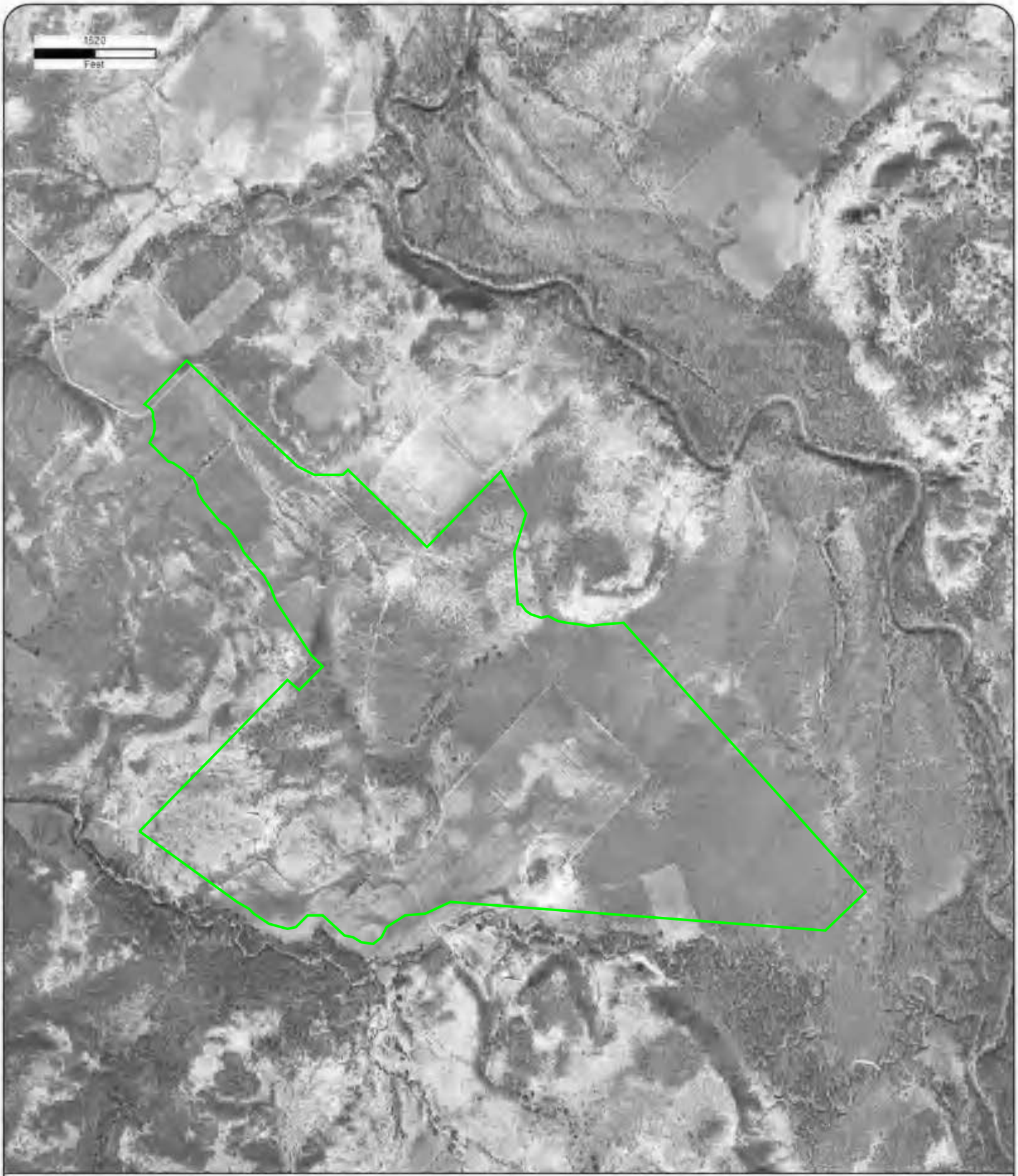


Year: 1966
Source: ASCS
Scale: 1" = 1500'
Comment: Photo Index-Best Available

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS

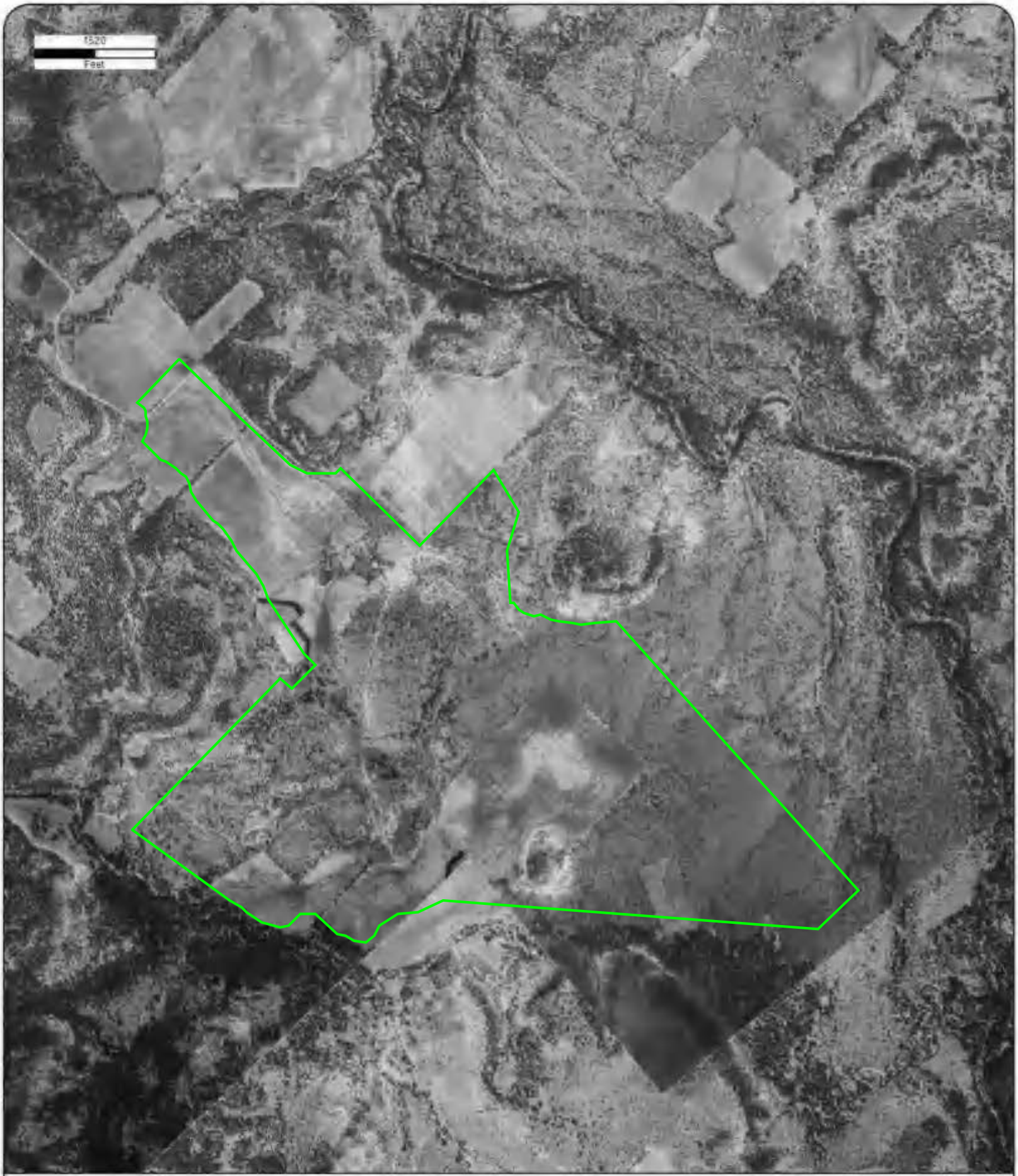


Year: 1952
Source: AMS
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS



Year: 1948
Source: USBR
Scale: 1" = 1500'
Comment:

Address: N/A, Early, TX
Approx Center: -98.82239878,31.56903014

Order No: 23100500123

ERIS

APPENDIX G

Topographic Maps

TOPOGRAPHIC MAPS

Project Property:	Chisme Solar
	N/A
	Early TX None
Project No:	None
Requested By:	Stantec Consulting Ltd.
Order No:	23100500123
Date Completed:	October 05, 2023

Environmental Risk Information Services
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1.866.517.5204 | info@erisinfo.com | erisinfo.com

We have searched USGS collections of current topographic maps and historical topographic maps for the project property. Below is a list of maps found for the project property and adjacent area. Maps are from 7.5 and 15 minute topographic map series, if available.

Year	Map Series
2019	7.5
2016	7.5
1979	7.5
1925	7.5
1950	15
1928	15

Topographic Map Symbology for the maps may be available in the following documents:

Pre-1947

Page 223 of 1918 Topographic Instructions

Page 130 of 1928 Topographic Instructions

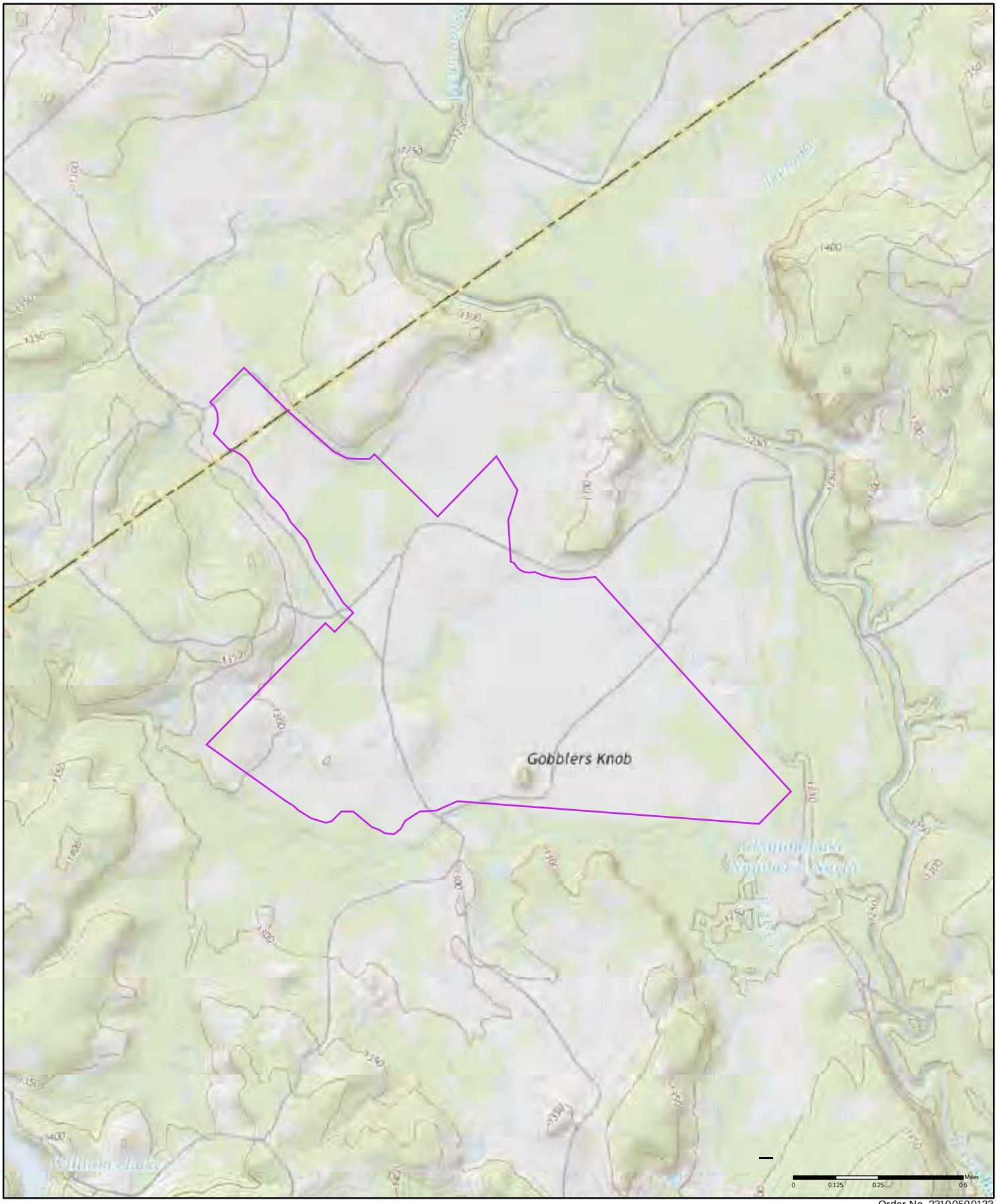
1947-2009

Topographic Map Symbols

2009-present

US Topo Map Symbols

Topographic Maps included in this report are produced by the USGS and are to be used for research purposes including a phase I report. Maps are not to be resold as commercial property.
No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Inc.(in the US) and ERIS Information Limited Partnership (in Canada), both doing business as 'ERIS', using Topographic Maps produced by the USGS. This maps contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

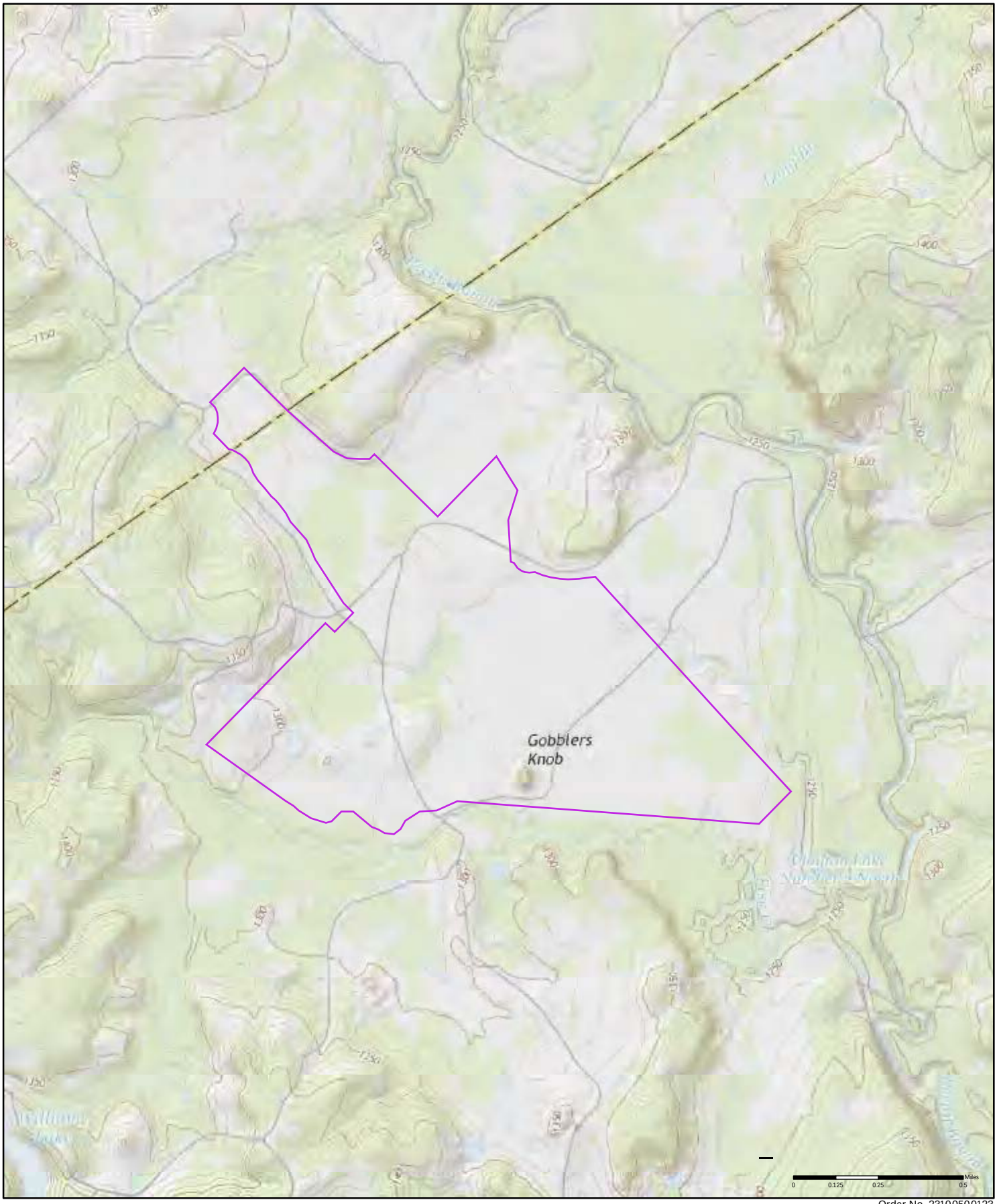


2019

Order No. 23100500123

Available Quadrangle(s): Blanket Springs, TX

Source: USGS 7.5 Minute Topographic Map

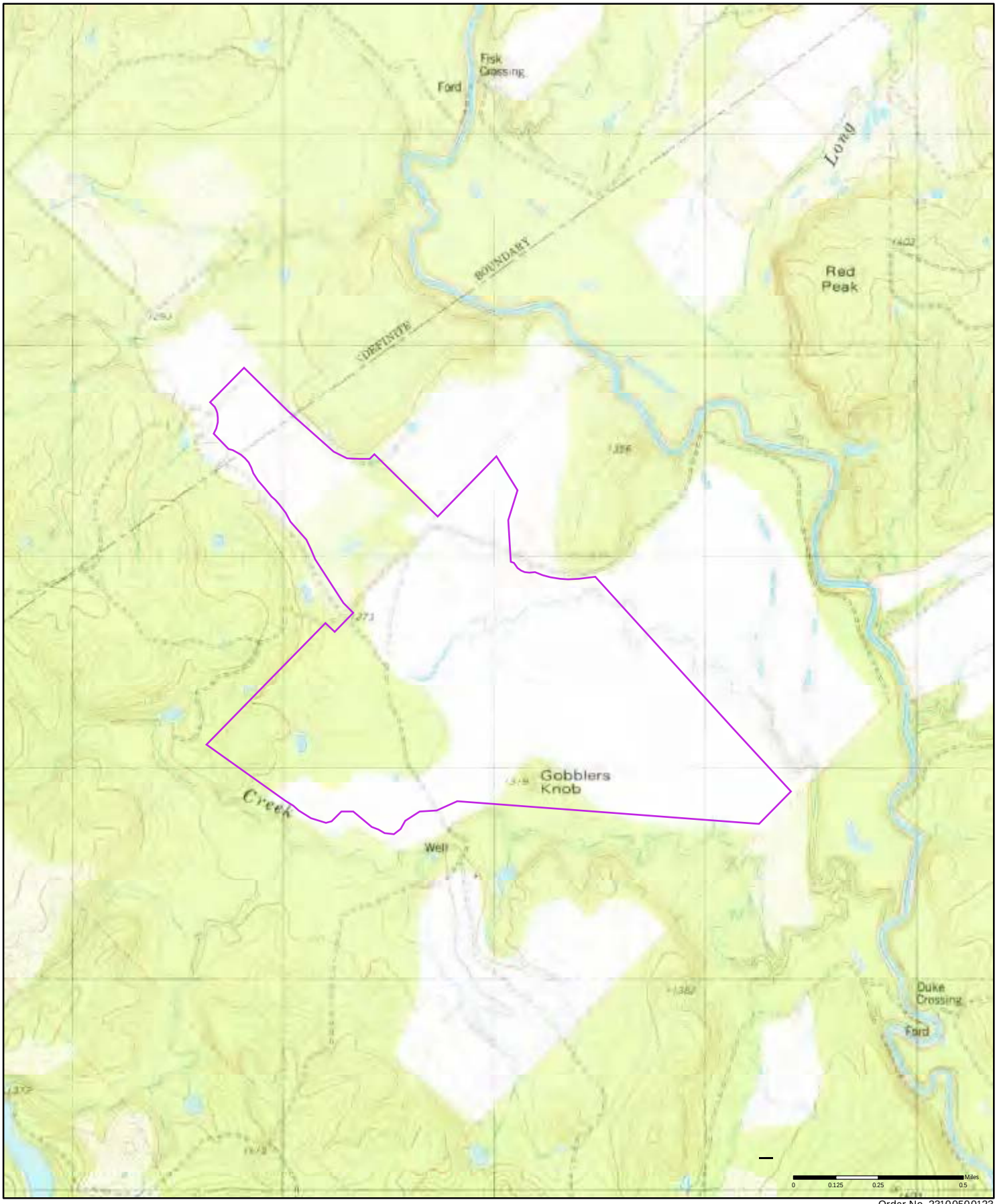


2016

Order No. 23100500123

Available Quadrangle(s): Blanket Springs, TX

Source: USGS 7.5 Minute Topographic Map

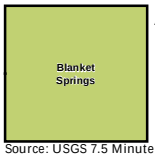


1979 (1-1979)

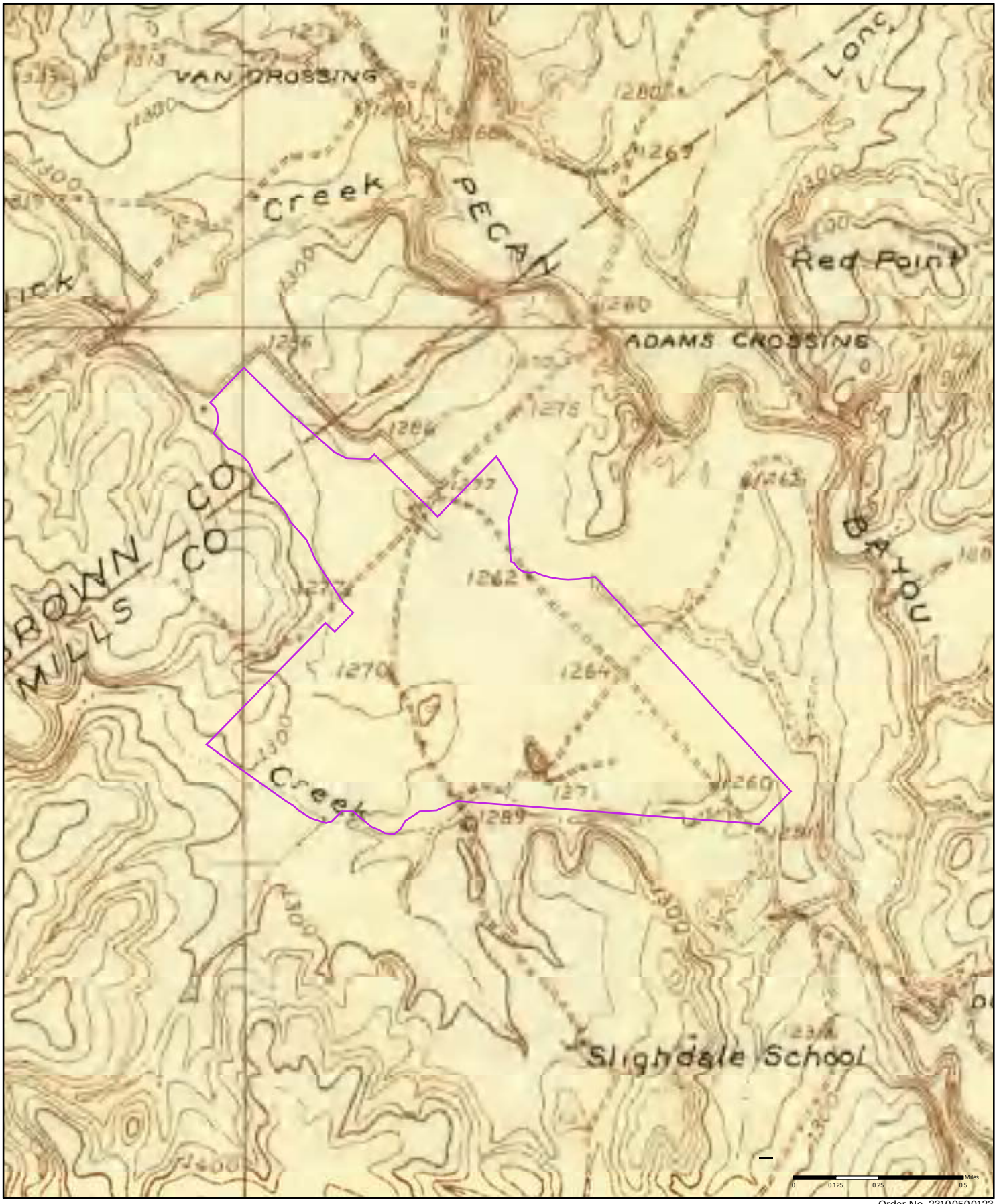
Aerial Photo Year: 1975

Order No. 23100500123

Available Quadrangle(s): Blanket Springs, TX (1-1979)



Source: USGS 7.5 Minute Topographic Map



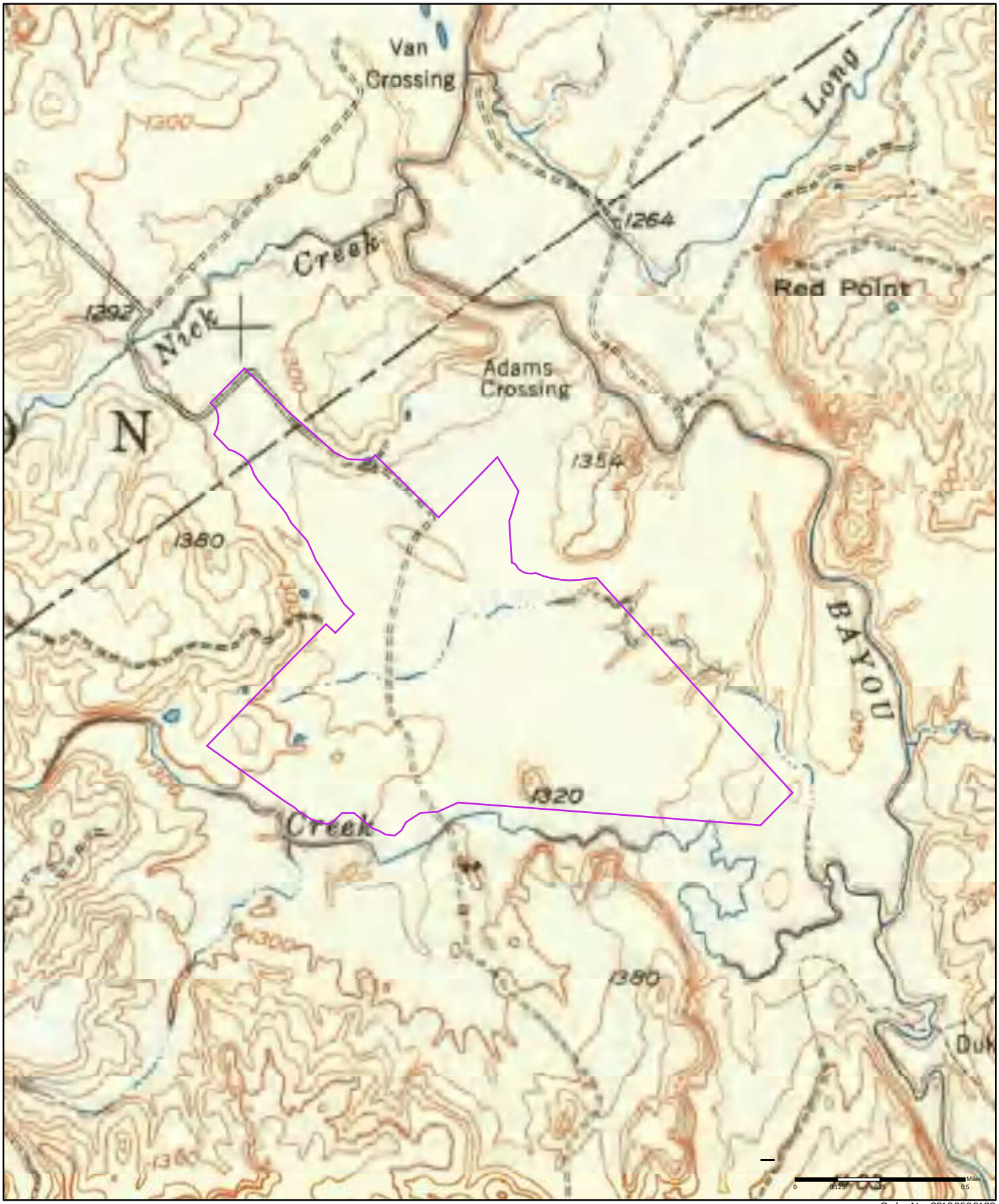
1925

Order No. 23100500123

Available Quadrangle(s): Brownwood 3-d, TX

Blanket Springs

Source: USGS 7.5 Minute Topographic Map



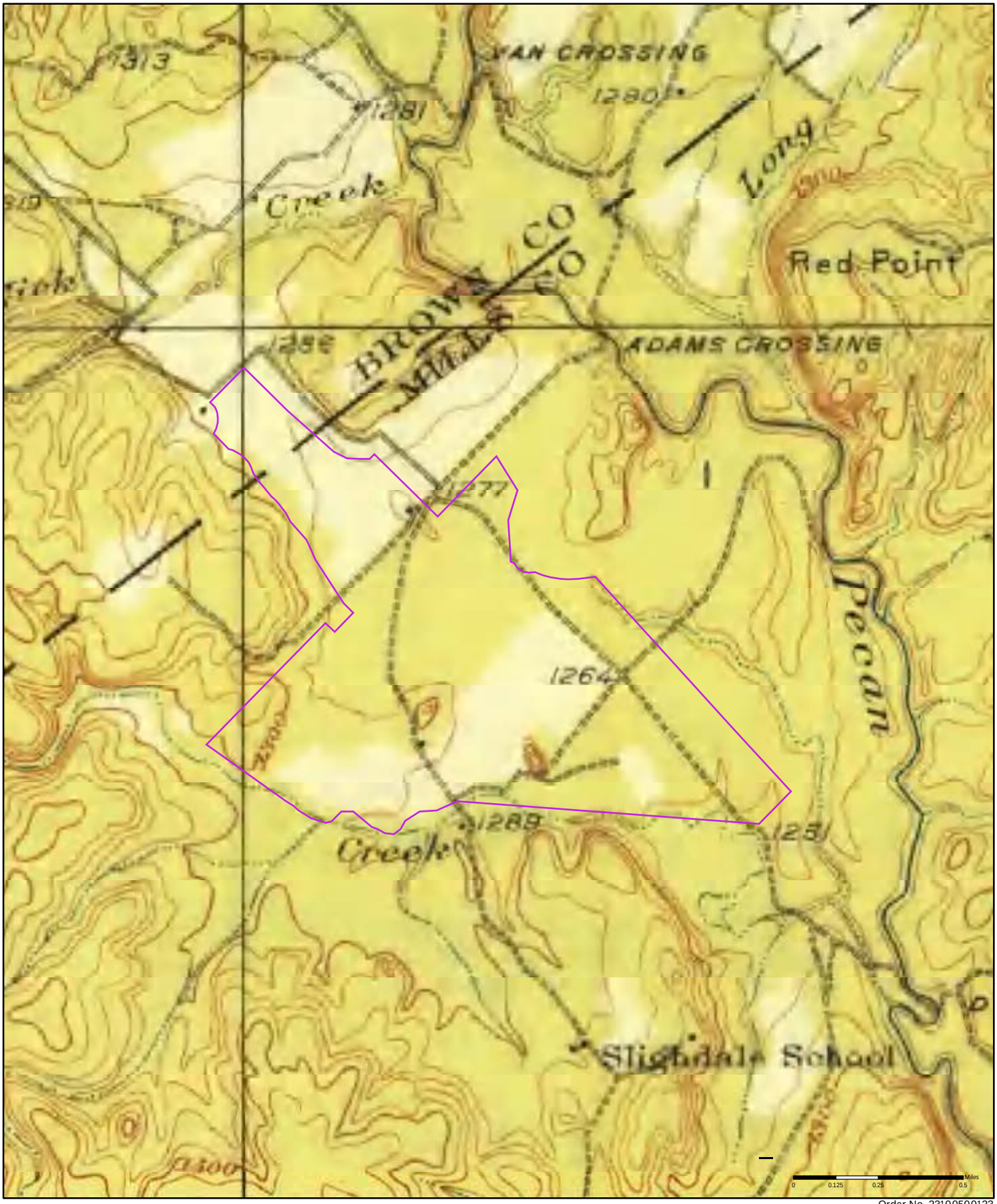
1950 (1-1950)

Aerial Photo Year: 1938

Order No. 23100500123

Available Quadrangle(s): Zephyr, TX (1-1950)

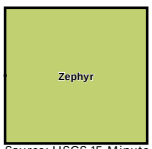
Source: USGS 15 Minute Topographic Map



1928

Order No. 23100500123

Available Quadrangle(s): Zephyr, TX



Source: USGS 15 Minute Topographic Map

APPENDIX H

Fire Insurance Rate Map Statement

FIRE INSURANCE MAPS

Project Property:	Chisme Solar N/A Early TX
Project No:	
Requested By:	Stantec Consulting Ltd.
Order No:	23100500123
Date Completed:	October 05, 2023

Please note that no information was found for your site or adjacent properties.

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APPENDIX I

City Directory

ERIS

CITY DIRECTORY

Project Property:	*Chisme Solar* *N/A* *Early,TX*
Project No:	
Requested By:	*Stantec Consulting Ltd.*
Order No:	*23100500123*
Date Completed:	*October 11, 2023*

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October 11, 2023
RE: CITY DIRECTORY RESEARCH
N/A
Early,TX

Thank you for contacting ERIS for an City Directory Search for the site described above. Our staff has conducted a reverse listing City Directory search to determine prior occupants of the subject site and adjacent properties. We have provided the nearest addresses(s) when adjacent addresses are not listed. If we have searched a range of addresses, all addresses in that range found in the Directory are included.

Note: Reverse Listing Directories generally are focused on more highly developed areas. Newly developed areas may be covered in the more recent years, but the older directories will tend to cover only the "central" parts of the city. To complete the search, we have either utilized the ACPL, Library of Congress, State Archives, and/or a regional library or history center as well as multiple digitized directories. These do not claim to be a complete collection of all reverse listing city directories produced.

ERIS has made every effort to provide accurate and complete information but shall not be held liable for missing, incomplete or inaccurate information. To complete this search we used the general range(s) below to search for relevant findings. If you believe there are additional addresses or streets that require searching please contact us at 866-517-5204.

Search Criteria:
All of CR 267
All of FM 268
Search Notes:
CR 267 is also known as All Elkins Rd in Brownwood.

Search Results Summary

Date	Source	Comment
2022	DIGITAL BUSINESS DIRECTORY	
2020	DIGITAL BUSINESS DIRECTORY	
2016	DIGITAL BUSINESS DIRECTORY	
2012	DIGITAL BUSINESS DIRECTORY	
2008	DIGITAL BUSINESS DIRECTORY	
2003	DIGITAL BUSINESS DIRECTORY	
1999	POLKS	
1990	JOHNSONS	
1986	JOHNSONS	
1968	JOHNSONS	
1964	BUSINESS DIRECTORY PUB CO	
1961	MULLIN KILLE	

2022 CR 267

SOURCE: DIGITAL BUSINESS DIRECTORY

4800 **NANCY DEWBRE**...*RESIDENTIAL*
4900 **VALTON POSEY**...*RESIDENTIAL*
5465 **PATRICIA LOCKS**...*RESIDENTIAL*
5500 **PHILLIP RICHEY**...*RESIDENTIAL*
7251 **ROBERT RIDER**...*RESIDENTIAL*
10101 **PAULA IRLBECK**...*RESIDENTIAL*

2022 FM 268

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2020 CR 267

SOURCE: DIGITAL BUSINESS DIRECTORY

4800 **NANCY DEWBRE**...*RESIDENTIAL*
4900 **DEBORAH POSEY**...*RESIDENTIAL*
5310 **KLARISA POSEY**...*RESIDENTIAL*
5465 **PATRICIA LOCKS**...*RESIDENTIAL*
5475 **DANIEL CLARK**...*RESIDENTIAL*
5475 **MARILYN CLARK**...*RESIDENTIAL*
5500 **JUDY RICHEY**...*RESIDENTIAL*
10101 **PAULA IRLBECK**...*RESIDENTIAL*

2020 FM 268

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2016 CR 267

SOURCE: DIGITAL BUSINESS DIRECTORY

4800 **NANCY DEWBRE**...*RESIDENTIAL*
4900 **DEBORAH POSEY**...*RESIDENTIAL*
4900 **VALTON POSEY**...*RESIDENTIAL*
5310 **KLARISA POSEY**...*RESIDENTIAL*
5465 **PATRICIA LOCKS**...*RESIDENTIAL*
5475 **DANIEL CLARK**...*RESIDENTIAL*
5475 **MARILYN CLARK**...*RESIDENTIAL*
10101 **PAULA IRLBECK**...*RESIDENTIAL*

2016 FM 268

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2012 CR 267

SOURCE: DIGITAL BUSINESS DIRECTORY

4800 **CHRISTOPHER DEWBRE**...*RESIDENTIAL*
4900 **DEBORAH POSEY**...*RESIDENTIAL*
4900 **VALTON POSEY**...*RESIDENTIAL*
5475 **BOBBY CLARK**...*RESIDENTIAL*
5500 **JUDY RICHEY**...*RESIDENTIAL*
5500 **PHILLIP RICHEY**...*RESIDENTIAL*
7251 **BOB RIDER**...*RESIDENTIAL*

2012 FM 268

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2008 CR 267

SOURCE: DIGITAL BUSINESS DIRECTORY

6501 **GREGG E SPECK**...*RESIDENTIAL*
8101 **VIRGINIA & PAUL BUTLER**...*RESIDENTIAL*

2008 FM 268

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2003 CR 267

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

2003 FM 268

SOURCE: DIGITAL BUSINESS DIRECTORY

NO LISTING FOUND

1999 **CR 267**

SOURCE: POLKS

COUNTY ROAD 267 (EARLY)-
- ZIP CODE 76802 CAR-RT R002

8101 Not Verified

HOUSEHO

1999 **FM 268**

SOURCE: POLKS

STREET NOT LISTED

1990 CR 267

SOURCE: JOHNSONS

STREET NOT LISTED

1990 FM 268

SOURCE: JOHNSONS

STREET NOT LISTED

1986 CR 267

SOURCE: JOHNSONS

STREET NOT LISTED

1986 FM 268

SOURCE: JOHNSONS

STREET NOT LISTED

1968 CR 267

SOURCE: JOHNSONS

STREET NOT LISTED

1968 FM 268

SOURCE: JOHNSONS

STREET NOT LISTED

1964 CR 267

SOURCE: BUSINESS DIRECTORY PUB CO

STREET NOT LISTED

1964 FM 268

SOURCE: BUSINESS DIRECTORY PUB CO

STREET NOT LISTED

1961 CR 267

SOURCE: MULLIN KILLE

STREET NOT LISTED

1961 FM 268

SOURCE: MULLIN KILLE

STREET NOT LISTED

Environmental Assessment Report

Mills County Solar Project

Mills County, Texas

Cardno
Shaping the Future

Document Information

Prepared for	CWP USA Inc.
Project Name	Mills County Solar CIA Report
Project Number	E321200301
Project Manager	Chad Martin
Date	February 12, 2021

Prepared for:

CWP USA Inc.
107 Spring Street
Seattle, WA 98104

Prepared by:

Cardno
76 San Marcos Street
Austin, Texas 78702
Tel 512 605 2640 Toll-free 800 368 7511
www.cardno.com

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Appendices

Appendix A Photographic Log

Acronyms

FEMA	Federal Emergency Management Agency
CWA	Clean Water Act
GIS	Geographic information systems
IPaC	Information for Planning and Consultation
NHD	National Hydrography Dataset
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTCHS	National Technical Committee for Hydric Soils
NWP	Nation Wide Permit
NWI	National Wetland Inventory
OHWM	Ordinary High Watermark
PDOP	Position Dilution of Precision
SHPO	State Historic Preservation Officer
SWPPP	Storm Water Pollution Prevention Plan
T&E	Threatened and Endangered
TNW	Traditionally Navigable Water
WAM	Wetland Assessment Method
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WOUS	Waters of the U.S.

1 Executive Summary

Cardno was contracted by CWP USA Inc. to conduct a natural and cultural resources assessment on a tract of land consisting of 2,230 acres, referenced as the Mills County Solar Project (Project). The Project consists of a large parcel in Mills County, Texas that was evaluated for wetland and waterbodies as well as other environmental concerns by Cardno in February 2021. The tasks performed as part of this assessment included a review of threatened and endangered (T&E) species, a cultural resources literature review, and a desktop review of potential waters of the United States (WOUS). The methodology, results, and recommendations of the review as it pertains to the Project are contained within and summarized below.

Cardno conducted a threatened and endangered species review during desktop environmental assessments of the Project area. None of the three bird species listed by U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) database as having the potential to occur within the property has the potential to be affected by the solar Project. Consultation with TPWD revealed a state listed species, the Texas Horned Lizard (*Phrynosoma cornutum*) as also occurring and having the potential to be affected by the Project. These lizards can be found in arid and semiarid habitats in open areas with sparse plant cover. Because horned lizards dig for hibernation, nesting and insulation purposes, they commonly are found in loose sand or loamy soils. The soils found within the Project area are primarily loamy and clayey alluvium, which could potentially provide suitable habitat for the Texas Horned Lizard.

In compliance with Section 404 of the Clean Water Act (CWA), this report contains a preliminary desktop evaluation of potential wetland features that may fall under the jurisdiction of the U.S. Army Corps of Engineers (USACE). Cardno conducted a desktop review of the Project area for sensitive resources that could potentially exist or that are known to exist within the Project area. As part of the desktop investigation, Cardno reviewed the US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Geographic Information System (GIS) data layer to determine the potential for wetlands and waterbodies to exist within the Project area.

Cardno scientists identified **thirteen** ephemeral drainages, **one** intermittent stream (Fisk Creek), and **eight** excavated ponds within the Project area. It is Cardno's determination that the ponds and ephemeral drainages do not possess a significant nexus to WOUS as defined in the Navigable Waters Protection Rule. These water features identified would likely be classified as non-jurisdictional by the USACE. However, Fisk Creek is an intermittent stream that flows into Pecan Bayou (TNW) and does possess a significant nexus to WOUS as defined in the Navigable Waters Protection Rule. This water feature would likely be classified as jurisdictional by the USACE. The FEMA map reveals that there is currently no floodplain data available for Mills County, Texas. Correspondence with the Mills County office revealed that there is no official floodplain regulations for this county.

Coordination with the USACE Fort Worth District Office to obtain an approved jurisdictional determination for the streams and wetlands identified onsite is recommended. There are no regulations or permits that regulate isolated wetlands or non-jurisdictional streams for the state of Texas.

If any streams and/or wetlands are deemed 'jurisdictional' by the USACE, the proposed Project could be completed under a Nationwide Permit (NWP) 51, 14, and/or 57. Additionally, the Project would need to develop a Storm Water Pollution Prevention Plan (SWPPP) and provide Notice of Intent (NOI) prior to Project construction. As stated in the text of the NWPs, the discharge of dredged or fill material into wetlands and non-tidal WOUS must not cause the loss of greater than ½-acre of wetlands and non-tidal WOUS, including the loss of no more than 300 linear feet of stream bed. If impacts from the construction of the energy generation facility and associated infrastructure including roads, parking lots, stormwater management facilities, and pipelines permanently impact less than ½-acre then the Project may proceed

under a NWP. Permanent impacts which exceed the ½-acre threshold for NWPs will require an Individual Permit.

Cardno's cultural resource specialists reviewed information regarding known archeological and historic sites, as well as prior cultural resources studies, available through the Texas Historical Commission's (THC) Archeological Sites Atlas Cardno also reviewed USGS topographic maps as well as current and historic aerial imagery for evidence of historic use within the Project area. Desktop analysis of the Project area identified only three cultural resource surveys recorded within a mile of the Project area. Due to the potentially significant archeological sites within proximity of the Project area, and because no cultural resource surveys have been conducted on the majority of the Project area, it is possible that the Texas State Historic Preservation Officer (SHPO) may request that a Phase I survey be conducted within the Project area, especially along Pecan Bayou and Fisk Creek

2 Introduction

Cardno was contracted by CWP USA Inc. to perform a preliminary desktop review for potential listed species habitat, cultural resources, and potential WOUS that exist within the Project area in Mills County, Texas (**Figure 2-1**). The Project consists of approximately 2,230 acres of land that was reviewed via desktop by Cardno in February of 2021.

This report contains a desktop review of all resources that potentially fall under the jurisdiction of the USACE.

Cardno conducted desktop investigations to:

> Identify potential environmental permits that may be required to construct the Project; and

> Review and document cultural resources that may be located within or in close proximity to the Project area that may be impacted by Project activities.

> Identify the approximate boundaries of potential jurisdictional wetlands and waterbody ordinary high water marks (OHWM) within the Project; and

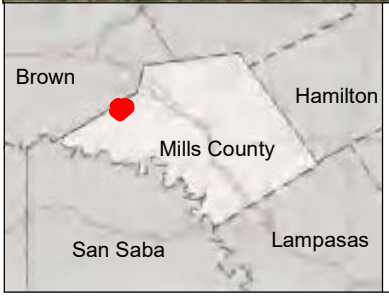
> Document general site conditions; and

> Evaluate the potential for federally listed species habitat.

Cardno scientists conducted field delineations within the entire Project area on February 10, 2021 to

> Conduct site visit and document/photograph general site conditions.

The results of the desktop investigations are provided in this report.



Mills County Solar Project Boundary

0 7001,400 2,800
Feet

N

Figure 2-1: Project Overview

Mills County Solar Project
Childress Ranch
Mills County, Texas

Date:	Project Number:	Page:
February 2021	E321200301	1

Date Created: 2/11/2021 Date Revised: 2/11/2021 File Path: S:\PROJECTS\CWP USA\Mills County_TX\GIS\Figure 2.1_Overview.mxd
GIS Analyst: justin.stelly

Data Source: Basemap: Bing Maps Aerial (2018)

3 Site Location

The Project is located approximately 8 miles south of Zephyr in Mills County, Texas (**Figure 2-1**). According to the United States Environmental Protection Agency (USEPA) Level III and IV Ecoregions of the Texas map accessed February 2021, the Project area falls within the Western Cross Timbers (29c) ecoregion. This ecoregion covers the wooded areas west of the Grand Prairie (29d) on sandstone and shale beds. The landscape has cuesta topography consisting of sandstone ridges with a gentle dip slope on one side and a steeper scarp on the other. The soils are mostly fine sandy loams with clay subsoils that retain water. As in the Eastern Cross Timbers (29b), the dominant trees are post oak and blackjack oak with an understory of greenbriar, little bluestem, and purpletop grasses. Some researchers contend that these woodland areas would be savanna-like if they experienced fire, although one early account described the Cross Timbers as “an immense natural hedge” or belt of thick impenetrable forest. It is likely that there were more prairie openings between the belts of forest. The area has a long history of coal, oil, and natural gas production from the Pennsylvanian sandstone/limestone/shale beds. Deeper soils in the eastern part of this ecoregion support a dairy industry, pastureland, and cultivation of forage sorghum, silage, corn, and peanuts (Griffith et al., 2004).

The Mills County Solar Project is located within the Devils River-Pecan Bayou watershed of the Middle Colorado-Concho River basin. Fisk Creek, running west to east through the center of the property and eventually offsite into Pecan Bayou, is the only named stream within the Project area. FEMA maps however indicate other unnamed streams that flow into Fisk Creek or directly into Pecan Bayou, which borders the Project area to the northeast (**Figure 5-1**).

3.1 Land Use

The property and surrounding areas consists mainly of mixed grasslands for cattle grazing, with some of the land cover converted for agricultural land use and oil/gas production. The entire Project area is located on private land (**Figure 5-1**). There are no public parks, wildlife areas, or critical habitats occurring within or adjacent to the Project area.

3.2 Soil Series

Soils within the Project can be generally described as well drained soils that occur on broad, nearly level land to gently rolling plains. According to the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) website accessed February 2021 the Project is located within 14 soil map units, which are listed and described below (**Figure 3-1**). There were no soils within the Project boundaries that met the criteria as described by the National Technical Committee for Hydric Soils (NTCHS) (**Table 3-1**).

2—Abilene clay loam, moist, 1 to 3 percent slopes

The Abilene, moist component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on dissected plains. The parent material consists of calcareous alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained.

10—Bonti-Callahan association, 1 to 8 percent slopes

The Bonti component makes up 60 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of loamy and/or clayey residuum weathered from sandstone and/or claystone over sandstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained.

The Callahan component makes up 25 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 20 to 40 inches. The natural drainage class is well drained.

11—Bonti-Owens complex, 8 to 30 percent slopes

The Bonti component makes up 50 percent of the map unit. Slopes are 8 to 30 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from sandstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained.

The Owens component makes up 38 percent of the map unit. Slopes are 10 to 30 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 14 to 30 inches. The natural drainage class is well drained.

12—Bosque loam, 0 to 1 percent slopes

The Bosque component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained.

15—Callahan loam, 1 to 3 percent slopes

The Callahan component makes up 80 percent of the map unit. Slopes are 1 to 3 percent. This component is on low ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 20 to 40 inches. The natural drainage class is well drained.

18—Callahan-Throck complex, 1 to 8 percent slopes

The Callahan component makes up 52 percent of the map unit. Slopes are 1 to 8 percent. This component is on low ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 20 to 40 inches. The natural drainage class is well drained.

The Throck component makes up 44 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of residuum weathered from claystone and/or residuum weathered from limestone and/or residuum weathered from siltstone. Depth to a root restrictive layer, bedrock, densic, is 30 to 60 inches. The natural drainage class is well drained.

25—Deleon silty clay, 0 to 1 percent slopes

The Deleon component makes up 93 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of clayey and/or loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained.

29—Doudle-Real association, 1 to 8 percent slopes

The Doudle component makes up 56 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from limestone. Depth to a root restrictive layer, bedrock, paralithic, is 22 to 40 inches. The natural drainage class is well drained.

The Real component makes up 34 percent of the map unit. Slopes are 1 to 8 percent. This component is on ridges, hills. The parent material consists of loamy residuum weathered from limestone. Depth to a root restrictive layer, bedrock, paralithic, is 8 to 20 inches. The natural drainage class is well drained.

31—Frio silty clay loam, 0 to 1 percent slopes

The Frio component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of loamy and clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained

58—Pedernales fine sandy loam, 1 to 3 percent slopes

The Pedernales component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained.

61—Real association, 8 to 30 percent slopes

The Real component makes up 78 percent of the map unit. Slopes are 8 to 20 percent. This component is on ridges on hills. The parent material consists of loamy residuum weathered from limestone. Depth to a root restrictive layer, bedrock, paralithic, is 8 to 20 inches. The natural drainage class is well drained.

67—Sagerton clay loam, warm, 1 to 3 percent slopes

The Sagerton, warm component makes up 85 percent of the map unit. Slopes are 1 to 3 percent. This component is on terraces on alluvial plains. The parent material consists of calcareous loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained.

76—Owens-Harpersville complex, 8 to 45 percent slopes

The Owens, extremely bouldery component makes up 55 percent of the map unit. Slopes are 8 to 35 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 14 to 30 inches. The natural drainage class is well drained.

The Harpersville, extremely bouldery component makes up 30 percent of the map unit. Slopes are 8 to 45 percent. This component is on ridges on hills. The parent material consists of clayey residuum weathered from claystone. Depth to a root restrictive layer, bedrock, densic, is 3 to 14 inches. The natural drainage class is well drained.

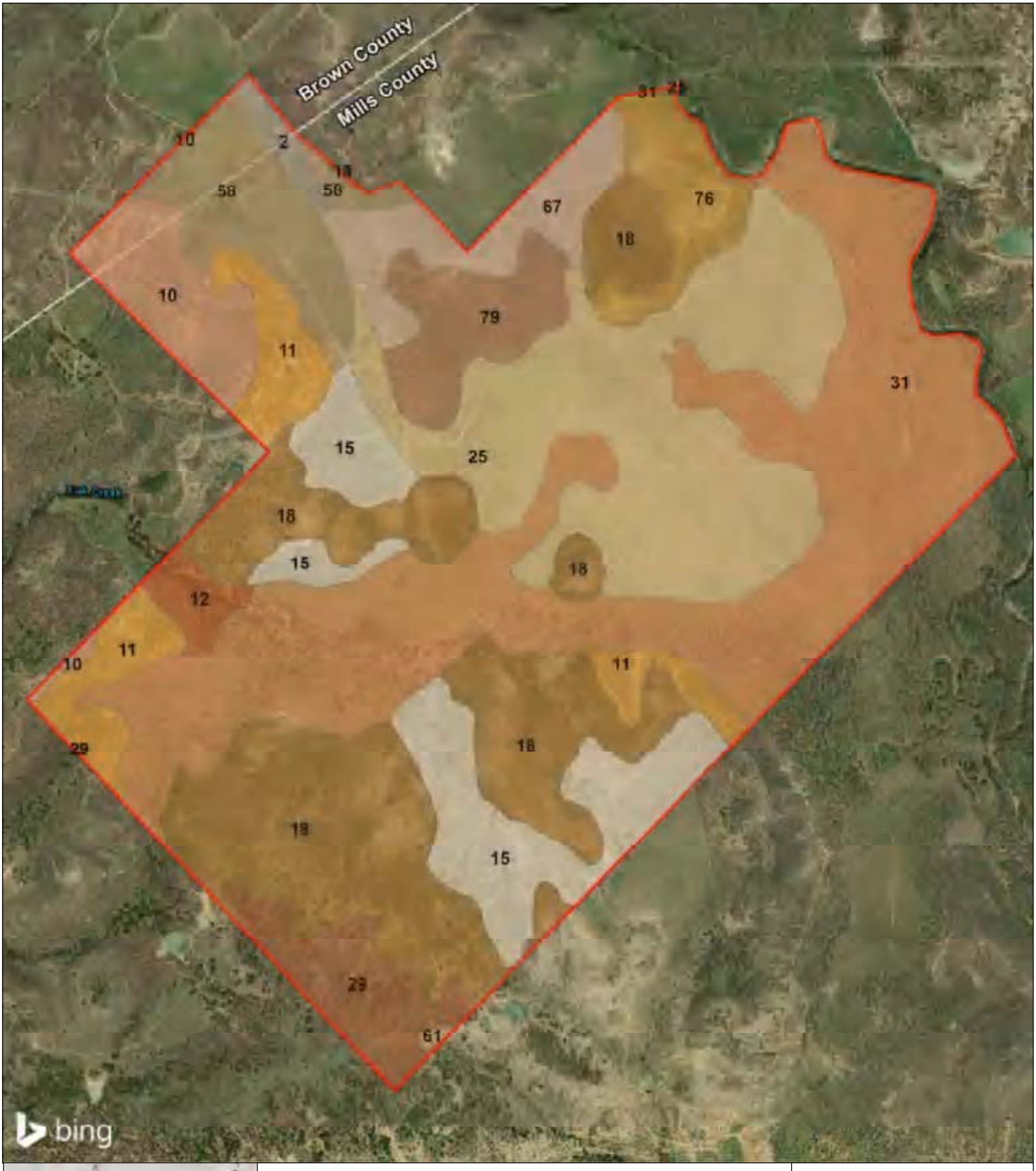
79—Winters fine sandy loam, 1 to 3 percent slopes

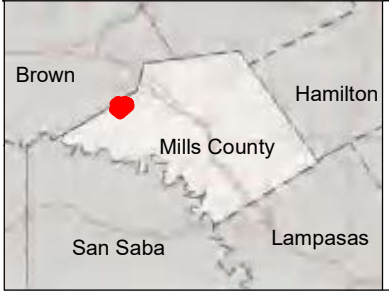
The Winters component makes up 93 percent of the map unit. Slopes are 1 to 3 percent. This component is on plains on alluvial plain remnants. The parent material consists of mixed loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained.

Table 3-1 Characteristics of Soil Mapping Units within the Project Area

Soil Name	Soil Symbol	Drainage Class	Permeability	Surface Runoff	Meets Hydric Criteria	% of Project Area
Abilene clay loam, moist, 1 to 3 percent slopes	2	Well drained	Moderately Low	Low	No	0.6
Bonti-Callahan association, 1 to 8 percent	10	Well drained	Moderately Low	Low	No	3.5
Bonti-Owens complex, 8 to 30 percent	11	Well drained	Moderately High	Low	No	5.2
Bosque loam, 0 to 1 percent	12	Well drained	Moderately High	Low	No	1.0
Callahan loam, 1 to 3 percent	15	Well drained	Moderately Low	Low	No	8.4
Callahan-Throck complex, 1 to 8 percent	18	Well drained	Moderately Low	Low	No	20.1
Deleon silty clay, 0 to 1 percent	25	Well drained	Moderately Low	Low	No	16.8

Doudle-Real association, 1 to 8 percent	29	Well drained	Moderately Low	Low	No	3.2
Frio silty clay loam, 0 to 1 percent	31	Well drained	Moderately High	Low	No	26.3
Pedernales fine sandy loam, 1 to 3 percent slopes	58	Well drained	Moderately High	Low	No	4.7
Real association, 8 to 30 percent	61	Well drained	Moderately High	Low	No	0.1
Sagerton clay loam, warm, 1 to 3 percent	67	Well drained	Moderately High	Low	No	3.6
Owens-Harpersville complex, 8 to 45 percent	76	Well drained	Low	Low	No	2.9
Winters fine sandy loam, 1 to 3 percent	79	Well drained	Moderately high	Low	No	3.6
Source: Soil Survey Staff, 2021						





Project Boundary

Soil Map Units

10	2	25	76
11	25	29	79
12	29	31	
15	31	58	
18	58	61	
	61	67	
	67		

0 330 660 1,320

Feet

N

Figure 3-1: Soils Map

Mills County Solar Project
Childress Ranch
Mills County, Texas

Date:	Project Number:	Page:
February 2021	E321200301	1

Date Created: 2/11/2021 Date Revised: 2/11/2021 File Path: S:\PROJECTS\CWP USA\Mills County_TX\GIS\Figure 3.1_Soils Map.mxd

GIS Analyst: justin.stelly

Data Source: Basemap: Bing Maps Aerial (2018)

4 Assessment Methodology

Cardno conducted desktop reviews of the Project area utilizing local and federal GIS data to identify potential habitat for listed species, wetlands, hydric soils, floodplains, and cultural resources that could affect the Project development process.

Federal and state resources were reviewed to identify potential habitat that may be found for listed species in the Project area. Results of the threatened and endangered species review are provided in **Section 5.1.**

Cardno's cultural resource specialists reviewed information regarding known archaeological and historic sites, as well as prior cultural resources studies, available at the Texas Historical Commission's (THC) Archeological Sites Atlas. Cardno also reviewed USGS topographic maps, and current and historic aerial photographs for evidence of historic use of the proposed Project area. The results of this literature review are provided in **Section 5.5.**

5 Results of Findings

5.1 Threatened and Endangered Species Review

Cardno conducted desktop environmental assessments for listed species within the Project area. **Table 5-1** lists the federal species that were identified by the USFWS IPaC database as having the potential to occur within or be affected by the Project. **Table 5-2** lists the state listed threatened and endangered species for Mills County, Texas provided by the Texas Natural Diversity Database (TXNDD 2021).

Table 5-1 IPaC Federally Listed Species Potentially Affected by Project

Group	Common Name	Scientific Name	Federal Status	Potential to be Affected
Bird	Whooping Crane	*Grus americana*	Endangered	None
Bird	Piping Plover	*Charadrius melodus*	Threatened	None
Bird	Red Knot	*Calidris canutus rufa*	Threatened	None

Source: USFWS IPaC, 2021

Table 5-2 TXNDD Online Data Search. State Listed Species Potentially Affected by Project

Group	Common Name	Scientific Name	State Status	Potential to be Affected
Mussel	Texas Pimpleback	*Cyclonaias petrina*	Threatened	None
Reptile	Texas Horned Lizard	*Phrynosoma cornutum*	Threatened	Low

Source: Texas Natural Diversity Database, 2021

The whooping crane (*Grus americana*) is North America's tallest bird. There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes in Texas at Aransas. The whooping crane breeds, migrates, winters, and forages in a variety of wetland and other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields. No such features were identified within or near the Project area and therefore impacts to whooping crane habitat due to the Project are highly unlikely.

The piping plover *(Charadrium melodius)* are known to winter at Laguna Madre, Texas on sand flats. This habitat includes beach, bayside mud, and salt flats that are not found anywhere within the Project boundaries.

The red knot (*Calidris canutus rufa*) habitat ranges from beaches and tidal flats to herbaceous wetlands. The proposed Project site is located entirely within dry mesquite and cacti shrubland, and does not occur in the potential habitat as described for this species.

Consultation with TPWD revealed a state listed species, the Texas Horned Lizard (*Phrynosoma cornutum*) as also occurring and having the potential to be affected by the Project. These lizards can be found in arid and semiarid habitats in open areas with sparse plant cover. Because horned lizards dig for hibernation, nesting and insulation purposes, they commonly are found in loose sand or loamy soils. The soils found within the Project area are primarily loamy and clayey alluvium, which could potentially provide suitable habitat for the Texas Horned Lizard.

No critical habitat for listed species was identified within the Project area by the IPaC database.

5.2 Wetlands

Potential Waters of the U.S. (WOUS) were identified from the USFWS NWI GIS data layer (USFWS 2021). Cardno's desktop investigations identified **eight** ponds (**Table 5-3**) totaling **4.08** acres. Only PUB(x) wetlands (stock tanks) were identified within the Project **(Figure 5-1)**.

Table 5-3 Identified Wetlands Mills County Property

Wetland ID	Type	Acreage	Jurisdictional
WET-1	PUB(x)	0.75	No
WET-2	PUB(x)	0.31	No
WET-3	PUB(x)	0.16	No
WET-4	PUB(x)	0.15	No
WET-5	PUB(x)	1.06	No
WET-6	PUB(x)	0.68	No
WET-7	PUB(x)	0.55	No
WET-8	PUB(x)	0.42	No
Total Non-jurisdictional		**4.08**	

Vegetation Community Types

Cardno scientists identified eight PUB(x) excavated pond wetlands within the Project area. All of the property is active cattle ranch land and likely consisting of the common rangeland shrubs and grasses of the Western Cross Timbers ecoregion. The dominant trees are post oak *(Quercus stellata)* and blackjack oak *(Quercus marilandica)* with an understory of greenbriar *(Smilax spp.)*, little bluestem *(Schizachyrium scoparium)*, and purpletop grass *(Tridens flavus)* (Griffith et al., 2004).

Hydrology

The majority of the Project area is relatively well drained by overland flow, natural ephemeral drainages or washes lead to excavated ponded areas created to hold water for cattle. These ephemeral channels flow during rain events and eventually drain into Fisk Creek or Pecan Bayou (TNW).

Soils

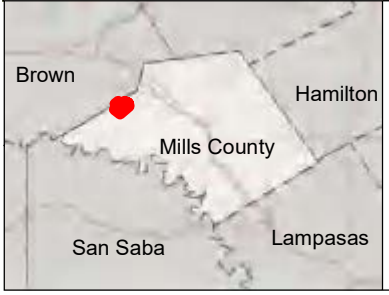
Soils data was obtained through the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) website accessed February 2021. The Project is located within 14 soil map units, which are listed and described previously in this report (**Figure 3-1**). There were no soils within the Project boundaries that met the criteria as described by the National Technical Committee for Hydric Soils (NTCHS) (**Table 3-1**).

5.3 Waterbodies

Fourteen ephemeral drainages, **one** intermittent stream, and **eight** ponds (recorded as PUB(x) wetlands above) were identified to be located within the Project boundary **(Figure 5-1).**

Table 5-4 Identified Streams

Stream ID	Flow Type	Stream Length (feet)	Water Depth (Inches)	Estimated Width at Bankfull (feet)	Substrate	Jurisdictional
S-1 (Fisk Creek)	Intermittent	14,978.28	0	18	Sandy silt & rock	Yes
S-2	Ephemeral	3,684.94	0	8	Sandy silt & rock	No
S-3	Ephemeral	4,408.33	0	7	Sandy silt & rock	No
S-4	Ephemeral	516.62	0	7	Sandy silt & rock	No
S-5	Ephemeral	5,380.93	0	8	Sandy silt & rock	No
S-6	Ephemeral	2,626.37	0	6	Sandy silt & rock	No
S-7	Ephemeral	7,531.29	0	5	Sandy silt & rock	No
S-8	Ephemeral	4,336.44	0	8	Sandy silt & rock	No
S-9	Ephemeral	2,457.29	0	7	Sandy silt & rock	No
S-10	Ephemeral	359.4	0	5	Sandy silt & rock	No
S-11	Ephemeral	12,095.16	0	7	Sandy silt & rock	No
S-12	Ephemeral	1,592.4	0	7	Sandy silt & rock	No
S-13	Ephemeral	1,982.99	0	6	Sandy silt & rock	No
S-14	Ephemeral	688.02	0	7	Sandy silt & rock	No
S-15	Ephemeral	1,674.98	0	5	Sandy silt & rock	No
Total Non-Jurisdictional		**49,335.16**				
Total Jurisdictional		**14,978.28**				



Project Boundary
Ephemeral
Intermittent
PEM Wetland
PUB(x) Pond

0 335 670 1,340
Feet

N

Figure 5-1: Wetlands and Waterbodies

Mills County Solar Project
Childress Ranch
Mills County, Texas

Date:	Project Number:	Page:
February 2021	E321200301	1

Date Created: 2/11/2021 Date Revised: 2/11/2021 File Path: S:\PROJECTS\CWP USA\Mills County_TX\GIS\Figure 5.1_Wetlands and Waterbodies.mxd
GIS Analyst: justin.stelly

Data Source: Basemap: Bing Maps Aerial (2018)

5.4 Jurisdictional Summary

Cardno scientists identified **Fourteen** ephemeral drainages, **one** intermittent stream (Fisk Creek) and **eight** excavated ponded areas within the identified streams. It is Cardno's determination that the ponds and ephemeral drainages do not possess a significant nexus to WOUS as defined in the Navigable Waters Protection Rule. These water features identified would likely be classified as non-jurisdictional by the USACE. However, Fisk Creek is an intermittent stream that flows into Pecan Bayou (TNW) and does possess a significant nexus to WOUS as defined in the Navigable Waters Protection Rule. This water feature would likely be classified as jurisdictional by the USACE.

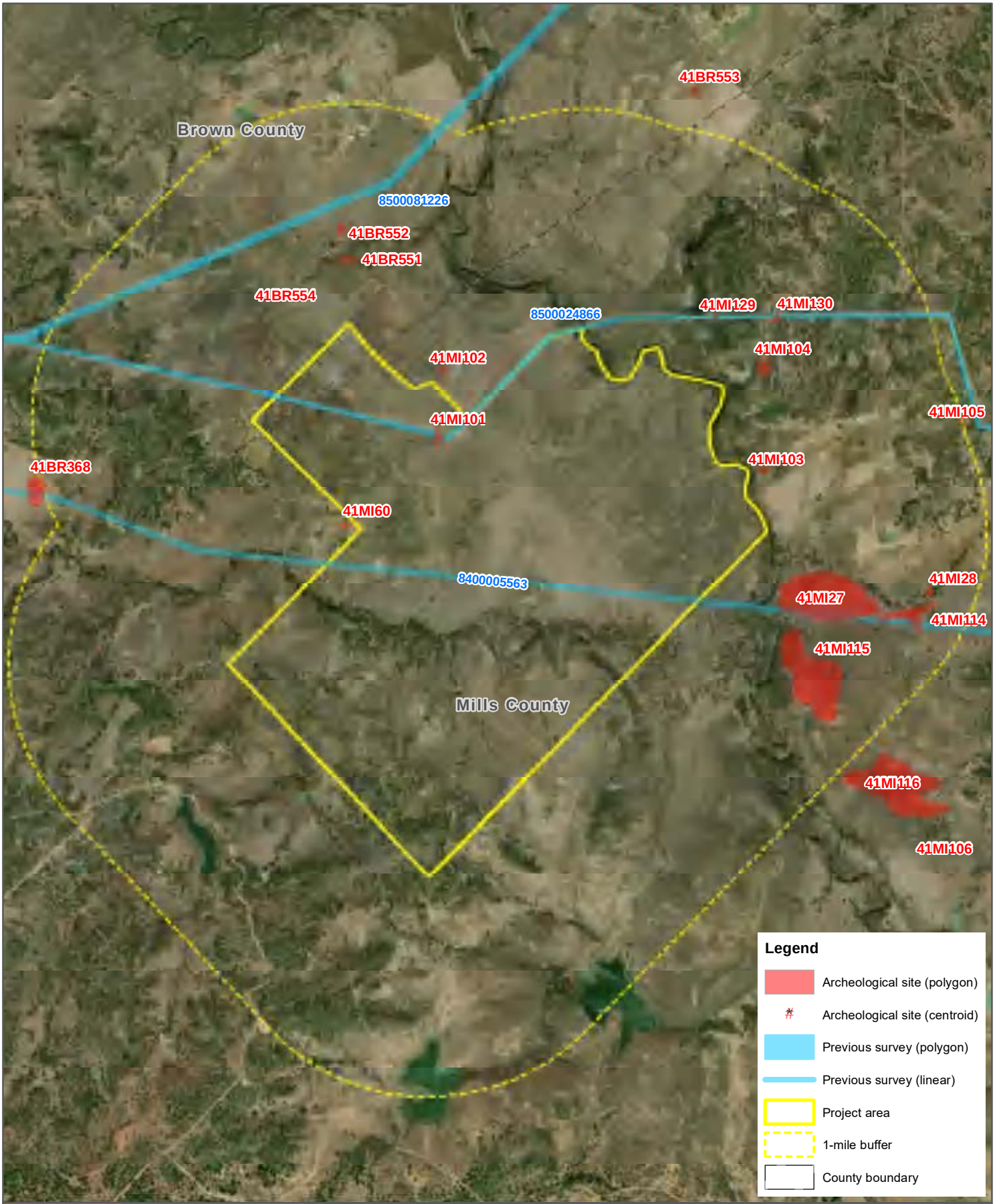
5.5 Cultural Resources

A desktop review of the area of the Childress Ranch Solar Farm Project in Mills and Brown counties, Texas was completed in order to fulfill due diligence. A search of the Texas Historical Commission's (THC) Archeological Sites Atlas revealed that three cultural resource surveys **(Figures 5-2 and 5-3, Table 5-5)** have been conducted and recorded in the Atlas within one mile of the Project area and 16 archeological sites **(Table 5-6)** have been recorded within one mile of the Project area. The surveys were completed between 1988 and 2012, and were sponsored by the Public Utilities Commission of Texas.

Of the 16 archeological sites, ten (41BR368, 41BR552, 41BR554, 41MI28, 41MI60, 41MI101, 41MI102, 41MI105, 41MI129, and 41MI130) were recommended as ineligible for the National Register of Historic Places (NRHP). Sites 41BR551 and 41MI103 were recorded as undifferentiated prehistoric open campsites and were recommended for further testing. Site 41MI27 was recorded as a Late Archaic open campsite with a burned rock midden and was recommended as potentially eligible for the NRHP. Site 41MI104 was recorded as a Middle to Late Archaic open campsite with burned rock midden and hearths and was recommended as potentially eligible for the NRHP. Finally, site 41MI114 was recorded as an Archaic to Late Prehistoric burned rock midden and site 41MI115 was recorded as an Early Archaic to Late Prehistoric burned rock midden with bedrock mortars. These were both recommended for further testing.

A 1928 historic topographic map **(Figure 5-4)** indicates the presence of structures and roads that no longer exist on the property. In addition, a school is shown directly to the southeast of the project area. It is probable that archeological sites associated with these structures exist within the Project area.

Due to the number of archaeological sites within the vicinity of the project area, six of which were recommended for further testing or as potentially eligible, combined with the presence of structures on the 1928 topographic map, it is likely that archeological sites are present within the project area. As a result, the Texas State Historic Preservation Officer (SHPO) may request that a Phase I survey be conducted within the project area.



Images: 2019

Data Source: ESRI, THC

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Previous Surveys and Cultural Resources

Childress Ranch Solar
Mills and Brown Counties, Texas

Figure 5-2

0 2,100 4,200 Feet

0 700 1,400 Meters

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Phone (+1) 813-664-4500 Fax (+1) 813-664-0440
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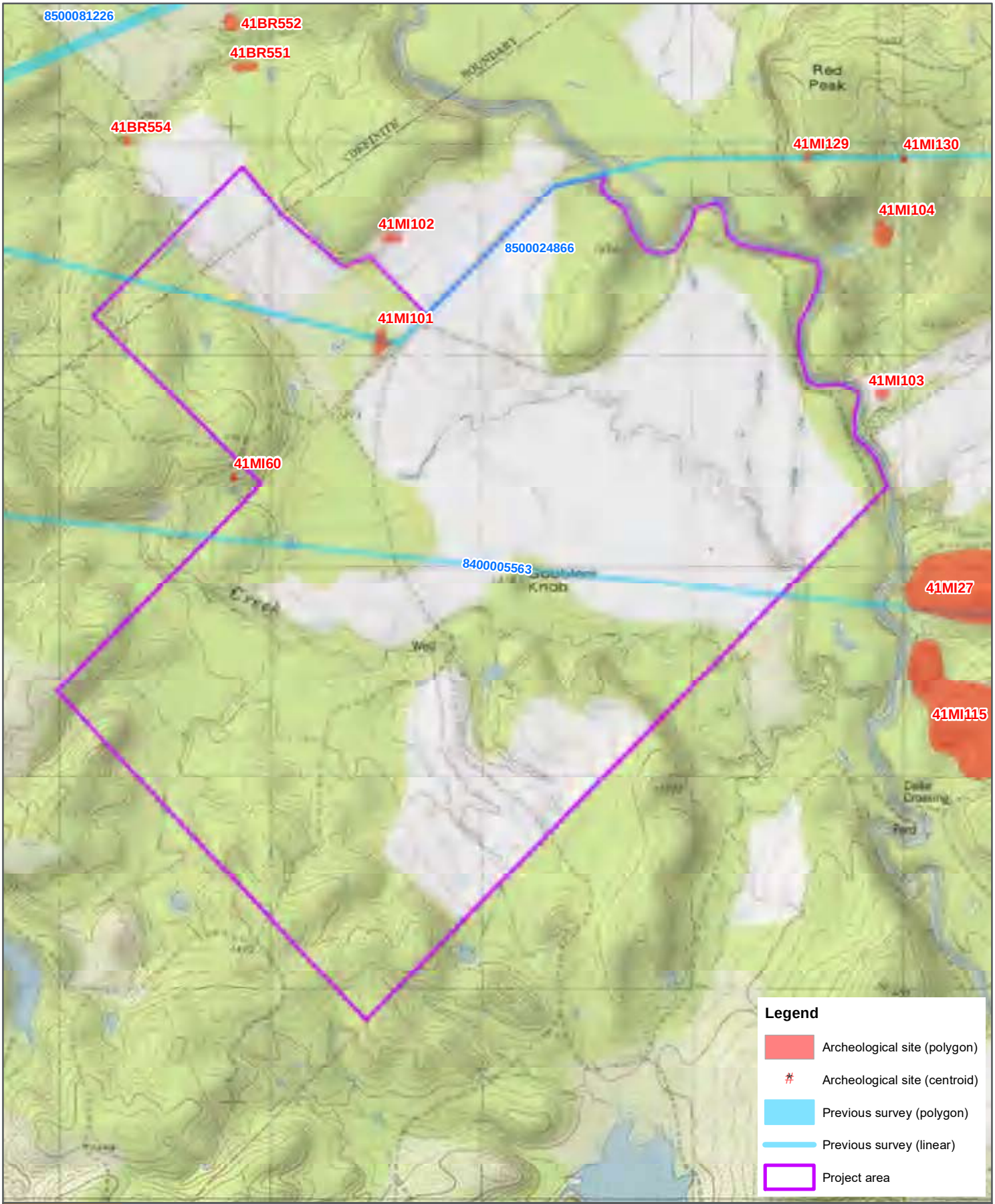
Date Created: 2/12/2021 Date Revised: 2/12/2021 File Path: C:\Users\jim.ambrosino\Documents\Projects\Desktops\TX Childress Ranch Solar\GIS\arcmap\ChildressR_prevCR_aerial.mxd
GIS Analyst: jim.ambrosino



Quad: 1980 Blanket Springs

Data Source: ESRI, THC

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Previous Surveys and Cultural Resources

Childress Ranch Solar
Mills and Brown Counties, Texas

Figure 5-3

0 1,300 2,600 Feet

0 460 920 Meters

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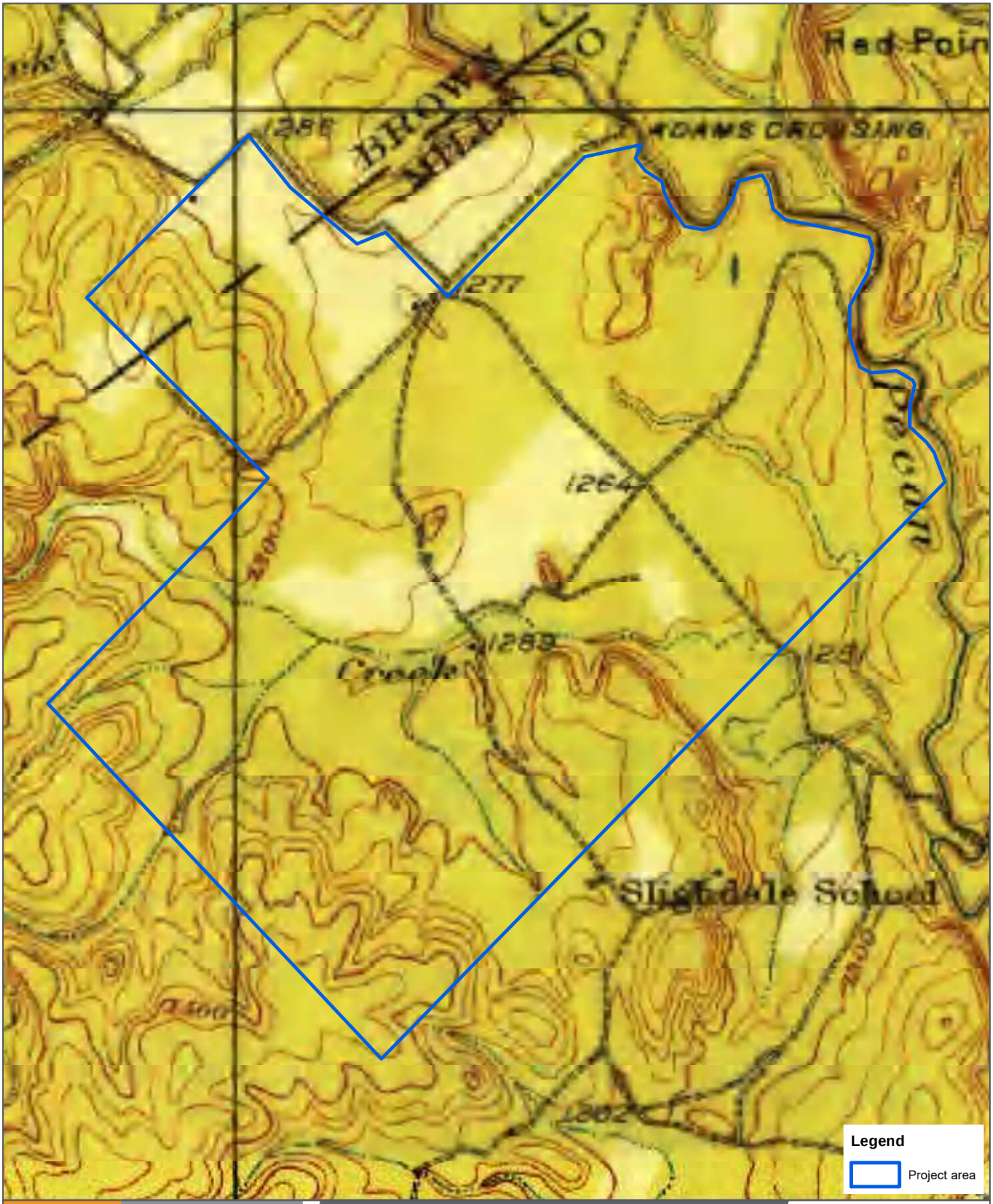
GIS Analyst: jim.ambrosino

Table 5-5 Previous Cultural Resource Surveys within One Mile of the Project Area

Atlas Number	Investigating Firm	Year	Sponsor
8400005563	Unknown	1988	Unknown
8500024866	URS	2012	Public Utilities Commission
8500081226	Atkins	2001	Public Utilities Commission of Texas: Antiquities Code

Table 5-6 Archeological Sites Previously Recorded within One Mile of the Project Area

Site Number	Name	Type	Time Period	Recommendation
41BR368	Unnamed	Lithic procurement	Undifferentiated prehistoric	Ineligible
41BR551	D8-1	Open campsite	Undifferentiated prehistoric	Further testing
41BR552	D8-2	Farmstead	Early 20th century	Ineligible
41BR554	D10-3	Isolated well	Undifferentiated historic	Ineligible
41MI27	Unnamed	Open campsite with burned rock midden	Late Archaic, Late Prehistoric	Potentially eligible
41MI28	Unnamed	Open campsite	Middle Archaic, Late Archaic	Ineligible
41MI60	Unnamed	Open campsite	Late Archaic	Ineligible
41MI101	D10-1	Ranching complex (stone corral)	Early 20th century	Ineligible
41MI102	D10-2	Agricultural dump site	Early 20th century	Ineligible
41MI103	D11-1	Open campsite	Undifferentiated prehistoric	Further testing
41MI104	D11-2	Open campsite with burned rock midden and hearths	Middle or Late Archaic	Potentially eligible
41MI105	D11-3	Isolated find (dart point)	Middle Archaic	Ineligible
41MI114	Mankin Ranch #1	Burned rock midden	Archaic to early Late Prehistoric	Further testing
41MI115	Mankin Ranch #2	Burned rock midden; bedrock mortars	Early Archaic, Late Prehistoric	Further testing
41MI129	Red Peak 1	Lithic scatter	Middle Archaic	Ineligible
41MI130	Red Peak 2	Open campsite	Late Archaic	Ineligible



Quad: 1928 Zephyr (1:48K)

Data Source: USGS

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Project Area on 1928 Topographic Map

Childress Ranch Solar
Mills and Brown Counties, Texas

Figure 5-4

0 1,250 2,500 Feet

0 425 850 Meters

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GIS Analyst: jim.ambrosino

6 Conclusion and Recommendations

Cardno reviewed current and historic mapping, as well as local, state, and federal GIS data layers as part of a desktop investigation during its natural and cultural resources assessment.

Cardno conducted a threatened and endangered species review during desktop environmental assessments as well as onsite habitat surveys of the Project area. None of the three bird species listed by USFWS IPaC database as having the potential to occur within the county has the potential to be affected by the solar Project. Consultation with TPWD revealed a state listed species, the Texas Horned Lizard (*Phrynosoma cornutum*) as also occurring and having the potential to be affected by the Project. These lizards can be found in arid and semiarid habitats in open areas with sparse plant cover. Because horned lizards dig for hibernation, nesting and insulation purposes, they commonly are found in loose sand or loamy soils. The soils found within the Project area are primarily loamy and clayey alluvium, which could potentially provide suitable habitat for the Texas Horned Lizard.

Cardno scientists identified **fourteen** ephemeral drainages, **one** intermittent stream (Fisk Creek), and **eight** excavated ponded areas within the identified streams. It is Cardno's determination that the ponds and ephemeral drainages do not possess a significant nexus to WOUS as defined in the Navigable Waters Protection Rule. These water features identified would likely be classified as non-jurisdictional by the USACE. However, Fisk Creek is an intermittent stream that flows into Pecan Bayou (TNW) and does possess a significant nexus to WOUS as defined in the Navigable Waters Protection Rule. This water feature would likely be classified as jurisdictional by the USACE.

Only the USACE may issue determinations on the jurisdictional status of the streams and wetlands identified within the Project. If any of the identified streams or wetlands are deemed jurisdictional by the USACE, the Project may proceed under a NWP 51, 14 and/or 57. Nationwide 51 requires a pre-construction notification to the USACE and allows for construction, expansion or modification of land-based renewable energy production facilities, including attendant features. For Electric Utility Line and Telecommunications Activities, each separate and distant crossing of waters of the United States may be covered by its own NWP authorization. If the only activity requiring USACE authorization is the construction, maintenance, repair, and removal of electrical utility lines, then a NWP 57 may be used. As stated in the text of the NWPs, the discharge of dredged or fill material into wetlands and non-tidal WOUS must not cause the loss of greater than ½-acre of wetlands and non-tidal WOUS, including the loss of no more than 300 linear feet of stream bed. Permanent impacts which exceed the ½-acre threshold for NWPs will require an Individual Permit.

Cardno's cultural resource specialists reviewed information regarding known archeological and historic sites, as well as prior cultural resources studies, available through the Texas Historical Commission's (THC) Archeological Sites Atlas Cardno also reviewed USGS topographic maps as well as current and historic aerial imagery for evidence of historic use within the Project area. Desktop analysis of the project area identified only three cultural resource surveys recorded within a mile of the Project area. Due to the potentially significant archeological sites within proximity of the Project area, and because no cultural resource surveys have been conducted on the majority of the Project area, it is possible that the Texas State Historic Preservation Officer (SHPO) may request that a Phase I survey be conducted within the Project area, especially along Pecan Bayou and Fisk Creek.

7 References

Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Federal Register. 1980. 40 CFR Part 230: Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, Vol. 45, No. 249, pp. 85352-85353, U.S. Government Printing Office.

Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D., 2004, Ecoregions of Texas (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,500,000).

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Soil Survey Staff, 2021. Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed February 2021

Texas Natural Diversity Database Report (generated February 2021)

Texas Parks and Wildlife. Management Guidelines for Black-Capped Vireo. Available online at https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_w7000_0013_black_capped_vireo_mgmt.pdf.Accessed February 2021

U.S. Army Corps of Engineers (USACE). 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plains Region Version 2.0, ed. J. F. Berkowitz, J. S. Wakeley, R. W. Lichvar, C. V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Fish & Wildlife Service IPaC Trust Resources Report (generated February 2021)

Mills County Solar
CIA Report

A

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Property Name:	County/State:	Project No.
Mills County Solar Project	Mills County, Texas	E321200301

Photo No.	Date:
1	02/9/2021

Coordinates:
31.573499, -98.819218

Photo Direction:
North

Description:

S-6. Ephemeral drain.

PHOTOGRAPHIC LOG

Property Name:	County/State:	Project No.
Mills County Solar Project	Mills County, Texas	E321200301

Photo No.	Date:
2	02/9/2021

Coordinates:
31.578911, -98.810943

Photo Direction:
North

Description:
Pecan Bayou north of the property.

PHOTOGRAPHIC LOG

Property Name:	County/State:	Project No.
Mills County Solar Project	Mills County, Texas	E321200301

Photo No.	Date:
3	02/9/2021

Coordinates:
31.572687, -98.805319

Photo Direction:
North

Description:

S-9. Ephemeral drain.

PHOTOGRAPHIC LOG

Property Name:	County/State:	Project No.
Mills County Solar Project	Mills County, Texas	E321200301

Photo No.	Date:
4	02/9/2021

Coordinates:
31.562014, -98.823361

Photo Direction:
Southwest

Description:
S-1 (Fisk Creek).
Intermittent stream.

PHOTOGRAPHIC LOG

Property Name:	County/State:	Project No.
Mills County Solar Project	Mills County, Texas	E321200301

Photo No.	Date:
5	02/9/2021

Coordinates:
31.568534, -98.826402

Photo Direction:
Southeast

Description:

S-11. Ephemeral drain.

Exhibit W

Milestone Completion Schedule

Milestone	Responsibility	Completion Date
Limited Notice To Proceed (LNTP)	Owner	10/14/2025
Owner Approval of Submittals for Vacuum Circuit Breakers, Substation Control Building and Substation Fused Disconnect Switches	Owner	10/24/2025
Full Notice To Proceed (NTP)	Owner	12/12/2025
Owner Permits Issued	Owner	Completed
Contractor Permits Issued	Contractor	1/1/2026
Site Mobilization	Contractor	1/5/2026
Substation Mobilization	Contractor	4/18/2026
Complete Switchyard prep, access road and access road grading (per SGIA)	Contractor	3/20/2026
WSL Metering Equipment installation complete (per SGIA)	Contractor	10/2/2026
Install 4-Hole Pad at POI (per SGIA)	Contractor	10/8/2026
Communications Facilities Complete (per SGIA)	Contractor	10/22/2026
Contractor ready to receive PV Modules	Contractor	5/25/2026
Contractor ready to receive PV Inverters	Contractor	7/13/2026
Contractor ready to receive BESS	Contractor	7/24/2026
Contractor ready to receive MPTs	Contractor	9/4/2026
Racking installation Completion	Contractor	1/5/2027
Module Installation Completion	Contractor	1/30/2027
Guaranteed Project Substation Completion Date	Contractor	11/3/2026
Guaranteed Mechanical Completion Date	Contractor	1/17/2027
Guaranteed Project Substantial Completion Date	Contractor	3/16/2027
Final Acceptance Date	Contractor	7/16/2027

EXHIBIT X TO PROCUREMENT AND CONSTRUCTION AGREEMENT

CONTRACTOR PREVAILING WAGES AND APPRENTICESHIP REQUIREMENTS

Section 1. **Defined Terms**. The terms below shall have the meanings ascribed thereto for purposes of this Exhibit X. Any term used in this Exhibit X but not specifically defined herein shall have the meaning ascribed thereto in the Agreement.

"***Additional Classifications and Rates***" shall have the meaning set forth in Treasury Regulations Section 1.45-7(b)(3).

"***Apprenticeship Requirements***" means the requirements set forth in Section 45(b)(8) of the Code and Treasury Regulations Section 1.45-8 and shall include the requirements set forth in Section 4 of this Exhibit X.

"***Code***" means the Internal Revenue Code of 1986, as amended.

"***Construction, Alteration or Repair Work***" means construction, alteration or repair work within the meaning of Treasury Regulations Section 1.45-7(d)(3)).

"***Contractor***" shall have the meaning set forth in Treasury Regulations Section 1.45-7(d)(4).

"***Geographic Area***" means, relative to establishing that area of operation of a registered apprenticeship program, what is defined as "locality" in Treasury Regulations Section 1.45-7(d)(7).

"***Good Faith Effort Exception***" means the exception to the Apprenticeship Requirements provided in Section45(b)(8)(D)(ii) of the Code and Treasury Regulations Section 1.45-8(f)(1).

"***IRS***" means the U.S. Internal Revenue Service, or any successor agency.

"***Job Classification***" means the applicable labor classification of Laborers and Mechanics at a PWA Site which, as of the Effective Date, are the classifications set forth in the table on Schedule 1 of this Exhibit X.

"***Journeyworker***" means an individual who has attained a level of skill, abilities and competencies generally recognized within an industry as having mastered the skills and competencies required for that occupation. Use of this term may also refer to a mentor, technician, specialist or other skilled individual who has documented sufficient skills and knowledge of an occupation, either through a formal apprenticeship or through practical on-the-job experience and other formal training.

"***Labor Hours***" means the total number of hours devoted to the performance of Construction, Alteration, or Repair Work by all individuals employed by Contractor or any Subcontractor (regardless of whether the individual would be characterized as an employee or an independent contractor for other U.S. federal tax purposes) with respect to each Qualified Facility prior to it being placed in service for U.S. federal income tax purposes.

"***Labor Hours Requirement***" means the requirements set forth in Section 45(b)(8)(A) of the Code and Treasury Regulations Section 1.45-8(b) and shall include the requirements set forth in Section 4(a) of this Exhibit X.

"***Laborers and Mechanics***" means individuals employed by Contractor or any Subcontractor (regardless of whether any such individual would be considered an employee or independent contractor for other federal tax purposes) whose duties are manual or physical in nature (including those individuals who use tools or who are performing the work of a trade), and includes apprentices, helpers, watchpersons and guards, and working forepersons who (i) do not meet the criteria of 29 CFR 541 and (ii) devote more than 20% of their time during a work week to mechanic or laborer duties (to the extent of time so spent).

"***Participation Requirement***" means the requirements set forth in Section 45(b)(8)(C) of the Code and Treasury Regulations Section 1.45-8(d) and shall include the requirements set forth in Section 4(c) of this Exhibit X.

"***Prevailing Wage Rates***" means wages at rates not less than those set forth in the applicable wage determination issued by the Secretary of Labor for the specified type of construction in the geographic area (as defined in Treasury Regulations Section 1.45-7(d)(7)) in which a PWA Site is located, which as of the Effective Date are the rates set forth in Schedule 1 of this Exhibit X, and which shall be updated as of the date the Agreement is changed to (i) include additional, substantial Construction, Alteration, or Repair Work not within the scope of work of the original contract, or (ii) to require work to be performed for an additional time period not originally obligated, as applicable.

"***Prevailing Wage Requirements***" means the requirements set forth in Section 45(b)(7) and Section 48(a)(10) of the Code, as applicable , and Treasury Regulations Section 1.45-7 and shall include the requirements set forth in Section 3 of this Exhibit X.

"***PWA Benefit***" means the increased amount of the federal income tax credit provided under Sections 45, 45Y, 48, or 48E of the Code, as applicable, which is, upon the satisfaction of the PWA Requirements, equal to five times (5x) the amount that would otherwise be available (without regard to any other increases, adders, or bonuses).

"***PWA Cure Payment***" means any amounts, as set forth in Section 45(b)(7)(B) and 45(b)(8)(D) of the Code and Treasury Regulations Sections 1.45-7(c) and 1.45-8(f)(2), required to be paid for a Qualified Facility to be deemed to have satisfied the PWA Requirements and maintain entitlement to the PWA Benefit. For the avoidance of doubt, PWA Cure Payments include the increased penalty amount for intentional disregard of the PWA Requirements provided in Sections 45(b)(7)(B)(iii) and 45(B)(8)(D)(iii) of the Code and described in Treasury Regulations Sections 1.45-7(c)(3)(ii) and 1.45-8(f)(2)(ii)(B)).

"***PWA Guidance***" means any and all IRS or U.S. Treasury Department guidance, notices, announcements, Treasury Regulations, or other forms of tax law interpreting or applying the prevailing wage and apprenticeship requirements described in Code Sections 45(b)(7), (8) or 48(a)(10), (11), and IRS Notice 2022-61, and the Treasury Regulations, in each case to the extent applicable to this Agreement.

"***PWA Requirements***" means collectively, the Prevailing Wage Requirements, Apprenticeship Requirements, and the provisions set forth in this Exhibit X.

"***Qualified Apprentice***" means an individual who is employed (regardless of whether such individual would be considered an employee or independent contractor for other federal tax purposes) by Contractor or by any Subcontractor and who is participating in a Registered Apprenticeship Program, as defined in Treasury Regulation Section 1.45-8(g)(8). The phrase "participating in a Registered Apprenticeship Program" means the apprentice has entered into a written agreement with a Registered Apprenticeship Program containing the terms and conditions of the employment and training of the apprentice and has been registered as an apprentice with the U.S. Department of Labor's Office of Apprenticeship or a State apprenticeship agency during the time period in which work is performed by the apprentice for the taxpayer, contractor, or subcontractor.

"***Qualified Facility***" shall have the meaning set forth in Section 45Y / 48E of the Code and the Treasury Regulations thereunder (including any "energy storage technology" as defined in Section 48E(c)(2)).

"***Ratio Requirement***" means the requirements set forth in Section 45(b)(8)(B) of the Code and Treasury Regulations Section 1.45-8(c) and shall include the requirements set forth in Section 4(b) of this Exhibit X.

"***Recordkeeping Requirement***" means the requirements set forth in Treasury Regulations Section 1.45-12 and shall include the requirements set forth in section 5 of this Exhibit X.

"***Registered Apprenticeship Program***" means a program that has been registered by the U.S. Department of Labor's Office of Apprenticeship or a recognized State apprenticeship agency within the meaning of Treasury Regulations Section 1.45-8(g)(10).

"***PWA Site***" means (i) the physical place(s) where the Project / and each Qualified Facility will be placed in service and remain, and (ii) any secondary location (A) where a significant portion of the Project or any Qualified Facility is or shall be constructed, altered, or repaired and (B) which is established specifically for or dedicated

exclusively for a specific period of time to perform Construction, Alteration, or Repair Work, in each case consistent with Treasury Regulations Section 1.45-7(d)(7).

"***State Apprenticeship Agency***" means an agency of state government that has the responsibility and accountability for apprenticeship within the jurisdiction of that state, and further, has been authorized by the U.S. Department of Labor's Office of Apprenticeship to register and oversee apprenticeship programs and agreement for federal purposes.

"***Subcontractor***" shall have the same meaning as set forth in Treasury Regulations Section 1.45-7(d)(9).

"***Supplemental Wage Determination***" shall have the meaning set forth in Treasury Regulations Section 1.45-7(b)(3).

"***Treasury Regulations***" means the regulations, including temporary regulations, promulgated under the Code by the U.S. Department of the Treasury.

Section 2. **Prevailing Wage Requirements and Apprenticeship Requirements**. Contractor acknowledges that Owner intends to qualify for and claim the PWA Benefit in connection with the Project. Notwithstanding anything to the contrary in the Agreement, Contractor agrees to comply with the PWA Requirements in connection with the performance of the Work.

Section 3. **Prevailing Wage Requirements**. Contractor will and will cause its Subcontractors to:

a. Determine the extent of Construction, Alteration, or Repair Work included in its Scope of Work to be performed at a PWA Site;

b. Determine the Prevailing Wage Rates and Job Classifications for Laborers and Mechanics performing Construction, Alteration, or Repair Work by (i) consulting www.sam.gov for a general wage determination applicable to a PWA Site, or (ii) if a general wage determination is not available for the PWA Site or does not include Job Classifications for all Laborers and Mechanics performing Work: (A) requesting from the U.S. Department of Labor's Wage and Hour Division, a Supplemental Wage Determination or Additional Classification and Rate as set forth in Treasury Regulations Section 1.45-7(b)(3)(ii)(A)-(D); and (B) applying the labor classifications and wages provided by the U.S. Department of Labor's Wage and Hour Division retroactively to the Effective Date, and which Prevailing Wage Rates and Job Classifications will be specified and included in all subcontracts with Subcontractors; and

c. Pay to Laborers and Mechanics wages at rates not less than the Prevailing Wage Rates for Construction, Alteration, or Repair Work performed on any portion of the Project or any Qualified Facility.

Updates to any of the Prevailing Wage Requirements (including the issuance of any new PWA Guidance) that increase Contractor's cost of compliance or delay Contractor's performance with the foregoing after the Effective Date will be deemed caused by a Change in Law for purposes of the Agreement.

Section 4. **Apprenticeship Requirements**. Subject to Owner's waiver by prior written consent, at least forty-five (45) days before commencing Work at a PWA Site, Contractor will (or will require Subcontractors to) request (as set forth in Treasury Regulations Section 1.45-8(f)(1)(i)(A)) Qualified Apprentices from at least one Registered Apprenticeship Program that (i) has a geographic area of operation that includes the location of a PWA Site, (ii) trains Qualified Apprentices in the occupation(s) needed to perform Construction, Alteration, or Repair Work, and (iii) has a usual and customary business practice of entering into agreements with employers for the placement of Qualified Apprentices in the occupation for which they are training.

a. Labor Hours Requirement. Contractor will ensure that, with respect to performance of Work (including work performed by a Subcontractor), not less than 15% of the total Labor Hours of the Construction, Alteration, or Repair Work will be performed by Qualified Apprentices.

b. Ratio Requirement. Contractor will (and will require all Subcontractors to) ensure that the allowable ratio of apprentices to Journeyworkers on the PWA Site in any occupation and its corresponding classification on any day complies with the applicable apprentice-to-Journeyworker ratio of the Registered Apprenticeship Program in accordance with 29 CFR Part 29. If Contractor of any Subcontractor(s) employ apprentices enrolled in an apprenticeship program that is registered in a Geographic Area other than the Geographic Area where the Construction, Alteration or Repair Work is being performed, Contractor will (and require all Subcontractors to) comply with the apprentice-to-Journeyworkers ratios applicable within the Geographic Area in which the Construction, Alteration or Repair Work is being performed. If there is no applicable ratio for the Geographic Area of the Qualified Facility, the ratio specified in the Registered Apprenticeship Program will be observed.

c. Participation Requirement. Contractor will ensure that Contractor and each Subcontractor who employs four or more individuals to perform Construction, Alteration, or Repair Work at the PWA Site employs at least one (1) Qualified Apprentice for such Work.

d. Good Faith Effort Exception. Contractor and Subcontractors will have the right (without derogation of any other rights or defenses they may have) to use the Good Faith Effort Exception to comply with the Apprenticeship Requirements to the extent Contractor or such Subcontractors meet the requirements for such exception.

Section 5. **Recordkeeping**. No later than the fifth (5th) day after the close of each calendar quarter following the Effective Date, Contractor shall (and shall cause each Subcontractor to) submit to Owner a Compliance Report that includes information on the following (each, a "***Compliance Report***"):

a. Prevailing Wage Requirements Documentation. Each Compliance Report will include information on the wages paid to, the hours worked by, the identifying information , and the Job Classification(s) of, any Laborers and Mechanics and Qualified Apprentices employed by the Contractor or any Subcontractor, including copies of certified payroll and information showing the minimum Prevailing Wage Rate applicable to each such Laborer and Mechanic and the basis on which such minimum Prevailing Wage Rate was determined (including whether determined by reference to www.sam.gov), in accordance with the form and manner prescribed in IRS forms and instructions or in publications or guidance published in the Internal Revenue Bulletin, as applicable.

b. Apprentice Requirements Documentation. Each Compliance Report will include information on compliance with the Apprenticeship Requirements for the Work, including:

i. Labor Hours Requirement Documentation. Records showing the cumulative total Labor Hours performed by any individual employed by Contractor or any Subcontractor, the identifying information of any such individuals who are Qualified Apprentices, and showing the cumulative amount of such Labor Hours performed by each such Qualified Apprentice in compliance with the Ratio Requirement, records identifying any applicable Registered Apprenticeship Programs, and relevant correspondence to and from each such Registered Apprenticeship Program (including information related to the applicability of Labor Hours covered by the Good Faith Effort Exception), including any written requests for the employment of apprentices from any such Registered Apprenticeship Program, any response or acknowledgement of receipt or denial from any such Registered Apprenticeship Program, any contacts with the U.S. Department of Labor's Office of Apprenticeship or a State apprenticeship agency regarding requests for apprentices from a Registered Apprenticeship Program, agreements entered into with any Registered Apprenticeship Programs with respect to the Construction, Alteration, or Repair Work of the Project, and documents reflecting the standards and requirements of the applicable Registered Apprenticeship Program, including the applicable ratio requirement prescribed by each such Registered Apprenticeship Program;

ii. Participation Requirement Documentation. Records supporting Contractor's or its Subcontractor's assertions that the Participation Requirement was met, including identifying which of Contractor and which of each Subcontractor employed four or more individuals in the Construction, Alteration, or Repair Work of the Project, and the identifying information of such individuals who are Qualified Apprentices; and

iii. Ratio Requirement Documentation. Records supporting Contractor's or its Subcontractor's assertions that the Ratio Requirement was met for each day during Construction, Alteration, or Repair Work of the Project, including showing the daily ratio of apprentices to journeyworkers for each applicable Job Classification and the applicable maximum apprentice-to-journeyworker ratio for each applicable Job Classification.

iv. Good Faith Exception Documentation. To the extent Contractor or such Subcontractors rely on the Good Faith Effort Exception, Contractor or such Subcontractor shall provide reasonable documentary evidence concerning such efforts and activities relative to the Good Faith Effort Exception in a manner consistent with Treasury Regulations § 1.45-8(f)(1).

Section 6. **Audits**. In the event of (a) an IRS audit, (b) or to the extent required by a Governmental Authority pursuant to Applicable Law, and in either case involving Contractor's performance of work subject to the PWA Requirements, if Owner notifies Contractor of such audit or legal requirement (which notice will include reasonable evidence of such audit or other requirement) and includes with such notice a request for information from Contractor regarding such Contractor performance and the payment specified in Section 5 above, Contractor will, and will cause the Subcontractors to, provide to the IRS or Governmental Authority the applicable Compliance Reports. If Owner requests additional information from Contractor beyond what is required in the Compliance Reports, Owner will pay Contractor mutually agreed compensation for the preparation and provision of a report containing the information agreed by the parties in light of Owner's request. Contractor's receipt of payment of such agreed compensation will be a condition precedent to its obligation to provide any such additional information. Notwithstanding anything to the contrary, Contractor will in no event be required by Owner to share or disclose confidential information, including tax returns, with Owner or any party other than the IRS.

Section 7. **Record Retention**. Contractor will retain in accordance with its standard practices (a) all records included within the Compliance Report and (b) all records in its possession or control concerning Contractor's performance of its obligations under Section 3 and Section 4 of this Exhibit X (the "***Retained Records***") for nine (9) years after the Final Completion Date; provided, however, that if Owner notifies Contractor of an audit or examination that commences prior to the expiration of such period and where Contractor's support is reasonably required by Owner relative to such audit or examination, Contractor will, and will include similar requirements in its subcontracts with the Subcontractors, retain such records through the final determination (within the meaning of Section 1313(a) of the Code) with respect to such audit or examination as required by Applicable Law; to the extent required by a Governmental Authority pursuant to Applicable Law. The Retained Records will include but are not limited to: the applicable wage determination, classification of work performed, hourly and weekly wage rates and fringes worked in each classification, and payroll records for all Laborers and Mechanics and, as may be required, Qualified Apprentices who performed construction, repair or alteration work, as well as Contractor's or the Subcontractor's request of Qualified Apprentices from a Registered Apprenticeship Program and the program's denial of such request or non-response to such request, as applicable.

Section 8. **Determination of Non-Compliance**. Owner must notify Contractor in writing promptly after Owner receives any determination by the IRS of non-compliance with the PWA Requirements under the Agreement (which notice will include reasonable evidence of such determination). The Parties will reasonably cooperate in connection with any audits or examinations undertaken by the IRS in connection with the payment of Prevailing Wage Rates by Contractor or the Subcontractors for the Construction, Alteration, or Repair Work of the Project, and the hiring and utilization (within the meaning of Treasury Regulations Section 1.45-7(d)(3)) by Contractor or Subcontractors of Qualified Apprentices. Owner will provide Contractor with a reasonable opportunity to review and comment on any submissions made to the IRS or other relevant Government Authority in respect of such audit or examinations including any determinations by the IRS and will use reasonable efforts to take such comments into account when formulating Owner's responses to the IRS.

Section 9. **Cure Payment**. If it is determined, either by Owner, Contractor, or any Subcontractor (after due inquiry and prompt written notice to the Owner or Contractor), or by the IRS, that either Contractor or any of its Subcontractors has failed to comply with the PWA Requirements, Contractor will use best efforts to promptly pay, or cause its Subcontractors to pay, any required "Correction Payments" (consisting of back wages and applicable interest) directly to each affected worker. Such Correction Payment shall be completed no later than the last day of the first month that follows the end of the calendar quarter in which such failure occurred, consistent with Treasury Regulations

Section 1.45-7(c)(6). To the extent required, and subject to Section 9(a), the Owner (as taxpayer) shall be responsible for remitting any related penalty payments to the IRS in accordance with Treasury Regulations Section 1.45-7(c)(1)(ii), Contractor shall provide Owner with documentation made to workers so that Owner may determine whether conditions for exception under Treasury Regulations Section 1.45-7(c)(5) or waiver of penalties under Treasury Regulations Section 1.45-7(c)(6) are satisfied. Contractor shall concurrently provide Owner with documentary evidence of such Correction Payments, and upon Owner's request, Contractor will provide Owner with reasonable evidence of any such corrections undertaken by Contractor and its Subcontractors. Any cure or penalty payments to the IRS should be completed on or before the earliest of: (i) the date Owner files its U.S. federal income tax return claiming the PWA Benefit; (ii) before Owner receives any notice of an examination from the IRS with respect to a claim for the PWA Benefit; or (iii) within 180 days after Owner receives notice of a final determination by the IRS that a Qualified Facility failed to satisfy the PWA Requirements.

a. If Contractor fails to satisfy the PWA Requirements (including due to a failure to comply with the Recordkeeping Requirements), Contractor will indemnify Owner for such failure as required under the Agreement. In connection with such indemnification claim, Contractor will provide Owner with reasonable documentation of such failure to pay Prevailing Wage Rates or meet the Apprenticeship Requirements and the payment of the PWA Cure Payments to underpaid Laborers and Mechanics or Qualified Apprentices or the IRS, as applicable.

b. Owner will provide Contractor with an invoice documenting any such costs incurred (including any payments made) by Owner for which Owner seeks recovery as part of its indemnification claim, including any PWA Cure Payments made by Owner.

c. Upon Owner's request where Contractor or Subcontractors have paid curative amounts relative to initial failures to comply with the PWA Requirements, Contractor will provide Owner with reasonable evidence of such corrective payments paid by Contractor and the Subcontractors pursuant to this Exhibit X.

Schedule 1 to Exhibit X

[*to be updated as applicable*]

Job Classification	General Decision Number	Issuance Date	Prevailing Wage Rate
[Electrician]			*Rates: $_____/hour* *Fringes: $____/hour*
[laborer]			*Rates: $_____/hour* *Fringes: $____/hour*
[Commissioning Technician]			*Rates: $_____/hour* *Fringes: $____/hour*
[pipe fitter]			*Rates: $_____/hour* *Fringes: $____/hour*
[Crane Operator]			*Rates: $_____/hour* *Fringes: $____/hour*
[other]			*Rates: $_____/hour* *Fringes: $____/hour*

Exhibit Y

October 9, 2025

Project: Chisme Solar and Storage

Subcontractors/Suppliers

Substation - Saber Power
SCADA - Merit SI
Fiber Terminations - RFIP
Electrical Testing - RESA
Performance Testing - McHale
Compaction/Construction Testing – Terracon
Nick Donegan drilling
Fence – TBD

Other subcontractors to be added once confirmed

Exhibit Z

Form of Notice Regarding Back Feed Power and Synchronization

[DATE]

[Contractor Name]
[Address]
[Address]
Attn:

RE: Notice Regarding Back Feed Power and Synchronization

_____Solar and Storage Project

In accordance with the Procurement and Construction Agreement by and between Red River Clean Energy, LLC ("Owner") and _____ ("Contractor"), dated _____ (the "Agreement"), Owner hereby notifies Contractor, in accordance with Section 10.3 of the Agreement, that the synchronization of the Project with the Participating TO's transmission system has occurred, and Contractor is able to obtain back feed power from the Participating TO's Interconnection Facilities.

Please countersign this letter in the space below to acknowledge receipt of this notice.

Sincerely,

Red River Clean Energy, LLC

_____,
Authorized Signatory

Acknowledgment of receipt of this notice is provided with the signature below.

[Contractor]

By: _____

EXHIBIT AA

GENERAL INFORMATION SECURITY REQUIREMENTS FOR CONTRACTOR

The following information security requirements ("Requirements") are generally applicable to Contractor's Work with Owner. For the avoidance of doubt, security industry terms used herein which are undefined in the Agreement have the meaning described in information security guidance issued by the National Institute of Standards and Technology (NIST), or similarly regulatory bodies that issue industry accepted standards governing information security.

A. Contractor Requirements

1. Access Control

1.1. Contractor will limit Owner's information system access to authorized users, authorized processes acting on behalf of authorized users, or authorized devices (including other information systems), and such access will be limited to only those types of transactions and functions authorized user or device are permitted to exercise.

1.2. Additionally, Contractor will:

a. Create, enable, modify, disable, and remove information system accounts in accordance with documented Contractor procedures.

b. Monitor the use of information system accounts.

c. Review, on a at least a quarterly basis at minimum, user accounts to determine if each user's access is still the minimum necessary to perform his or her assigned duties, and that access is still needed (i.e., least privilege principles are followed).

d. Enforce, document and define information system access authorizations to support separation of duties so as to limit the potential for a single individual to cause excessive harm.

e. Require personnel with access to administrator or privileged accounts to use non-privileged accounts or roles when performing non-privileged functions.

f. Audit the execution of Privileged Users actions and functions.

g. Prohibit non-privileged users from executing privileged functions, including, but not limited to, disabling, circumventing, or altering implemented security safeguards/ countermeasures.

h. On a quarterly basis, review privileged and administrator accounts with access to systems, applications, or databases containing Owner Highly Confidential data.

i. Implement a remote access policy and authorize remote access to information systems prior to allowing such connections.

j. Establish usage restrictions, configuration/connection requirements, and implementation guidance for organization-controlled mobile devices, the connection of mobile devices to information systems, wireless network access, and authorize wireless access to the information

system according to Contractor's documented processes and procedures prior to allowing such connections.

k. Establish terms and conditions for authorized individuals working at Contractor's third-parties who will access Contractor's information systems to:

i. Securely access the Contractor information systems from Contractor's third parties' information systems; and

ii. Securely process, store or transmit organization-controlled information using Contractor's third parties' information systems.

2. Awareness and Training

Contractor will:

a. Ensure that managers and users of Owner information systems are periodically made aware of the security risks associated with their activities and of the applicable laws, Executive Orders, directives, policies, standards, instructions, regulations, or procedures related to the security of information systems.

b. Ensure that Contractor personnel are reasonably and periodically trained to carry out their assigned information security-related duties and responsibilities.

c. Ensure that all personnel (including subcontractor personnel) who are involved in the management, use, or operation of IT systems or have access to Owner Confidential Information, receive annual training in privacy, security awareness and accepted security practices (to include recognizing and reporting suspicious activities that can introduce malicious software). New hire initial training will be conducted within 30 Days of hire with refresher training occurring annually.

d. Ensure that all personnel (including subcontractor personnel) with significant IT security responsibilities receive specialized annual training tailored to their specific security responsibilities.

e. Track completion of all training and ensure that all personnel (including subcontractor personnel) acknowledge receipt of training.

3. Logging, Audit and Accountability

Contractor will:

a. Create, protect, and retain information system audit records to the extent needed to maintain integrity and enable the monitoring, analysis, investigation, and reporting of unlawful, unauthorized, or inappropriate information system activity. For the avoidance of doubt, "audit" is used interchangeably with the term "log" in this Exhibit.

b. Ensure that the actions of individual information system users can be uniquely traced to those users so they can be held accountable for their actions.

c. Log the following events at a minimum on information systems:

i. Successful login attempts;
ii. Unsuccessful login attempts;

iii. All logoffs;
iv. Additions, deletions and modifications to User and system accounts/privileges;
v. Users switching IDs during an online session;
vi. Attempts to perform unauthorized functions;
vii. Activity performed by privileged accounts;
viii. Modifications to system settings (parameters) and
ix. Modifications to audit log parameters;

d. Event Logs will include at a minimum:

i. Host name;
ii. User account;
iii. Date and time stamp;
iv. Description of the activity performed;
v. Event ID or event type;
vi. Reason for logging event (e.g., access failure); and
vii. Source and destination network addresses (e.g., IP address).

e. Review and analyze information system audit records on a regular basis sufficient to detect significant unauthorized activity with respect to information systems that either (i) contain Owner Confidential Information or (ii), if compromised, would prevent Contractor from providing Services to Owner pursuant to the Agreement.

f. Notify Owner within 24 hours if unauthorized activity is detected on systems processing or storing Owner Confidential Information.

g. Ensure that the audit record is sufficient to reconstruct any activity requiring investigation.

h. Ensure controls are in place to protect audit information and audit tools from unauthorized access, modification and deletion.

i. Synchronize information system time to an authoritative time source.

j. Retain audit records for a minimum of 6 months and restrict access to logs to prevent modification.

4. Configuration Management

Contractor will:

a. Establish and maintain baseline configurations and inventories of information systems throughout the respective system development life cycles.

b. Establish and enforce security configuration settings for information technology products employed in information systems.

c. Identify, document and approve any deviations from established configuration settings.

d. Review the information system(s) annually, at minimum, to identify unnecessary and/or insecure functions, ports, protocols, and services.

e. Disable unnecessary and/or insecure functions, ports, protocols, and services.

f. Develop and document an inventory of information system components, including "open source" code incorporated in, or used to derive, any deliverable provided to Owner, which will be provided to Owner upon request.

g. Establish policies governing the installation of software by users, enforce software installation restrictions, and monitor policy compliance.

5. Identification and Authentication

Contractor will:

a. Identify information system users, processes acting on behalf of users, and devices.

b. Require Authentication for users, processes, and devices as a prerequisite to allowing access to information systems.

c. Ensure the information system uniquely identifies and Authenticates users (or processes acting on behalf of users).

d. Implement Strong Authentication for network access to privileged accounts.

e. Implement Strong Authentication for remote access to privileged and non-privileged accounts.

f. Implement an Identification and Authentication policy consistent with and or more secure than the current NIST 800-63 Digital Identity Guidelines publication.

g. Ensure information systems store and transmit only cryptographically-protected Authenticators.

6. Incident Response

Contractor will:

a. Establish an operational incident handling capability for information systems that includes reasonable preparation, detection, analysis, containment, recovery, and user response activities.

b. Periodically, but no less than annually, test the incident handling capability.

c. Track, document, and report incidents to appropriate Contractor personnel.

d. Notify Owner of any incident materially affecting systems supporting Owner services or data, including, but not limited to, any loss, acquisition or use of Owner Confidential Information without authorization, as follows:

i. Contractor will provide notification via electronic mail to: CNE Operations at operations@concordnewenergy.com as soon as practical, but no later than twenty-four (24) hours, following awareness of the security incident.
ii. Upon Owner request, Contractor will provide status updates of the incident mitigation to a point of contact designated by Owner.
iii. Contractor will cooperate with Owner in its efforts to investigate any security incidents.

iv. Upon Owner request, Contractor will provide a written report which describes the incident, the actions taken by Contractor during the incident response and future actions to prevent a similar incident from reoccurring.

7. Media Protection

Contractor will, as applicable to the Work provided:

a. Protect information system media, both paper and digital, including encrypting data at rest stored on portable media (e.g. USB drives, removable hard drives).

b. Restrict access to media related to Owner services performed under this Agreement. Access to such media will be granted in accordance with these Requirements.

c. Label media containing Owner data commensurate with the highest confidentiality level of data contained.

d. When (a) directed by Owner, or (b) unless specifically otherwise required by law or directed by Owner, upon conclusion or termination of Contractor's work for Owner or when no longer required for the performance of work under an Agreement, Contractor will Sanitize (or at Owner's election return to Owner) all copies of all Owner Confidential Information, including all backup and archival copies, in any electronic or non-electronic form.

e. All hardcopy documents will be cross-cut shredded.

f. Maintain records for all media that have been destroyed, sanitized or returned to Owner. Records will be maintained for a minimum of four (4) years and made available to Owner for inspection upon request.

8. Security Governance

Contractor will:

a. Develop, document, periodically update, and implement security plans for information systems that describe the security controls in place or planned for the information systems and the rules of behavior for individuals accessing the information systems.

b. Maintain an information security governance policy or set of policies that conform to all applicable data protection laws and regulations and that verifiably addresses these Requirements along with purpose, scope, roles, responsibilities, management commitment, coordination among Contractor's entities, and compliance. Failure to comply with policies will be addressed through appropriate discipline.

c. Ensure that the information security program is approved/endorsed by Contractor's executive management.

d. Regularly review its information security program plan and update the plan to address organizational changes, material changes in business practices or issues identified in risk assessments.

e. Implement a risk management strategy consistently across the organization.

f. Ensure all permitted third-parties that will perform services in support of this Agreement on behalf of Contractor (e.g. subcontractors), including cloud service providers, comply in writing with materially similar Requirements to those outlined in this Exhibit.

g. Monitor security control compliance by external service providers on an ongoing basis.

9. Personnel Security

Contractor will:

a. Have established screening criteria for individuals with access to Owner systems or data.

b. Ensure that upon termination of employment:

i. Information system and application access is disabled immediately;
ii. Retrieval of all Owner information and information system related property of the terminated employee (including, but not limited to, mobile phones, tablets, laptops, and security tokens).

c. Deploy and manage a mobile device management program for all personnel who use company-issued and or personal devices in their normal course of work with Owner that provides for technical controls designed to secure Owner Confidential Information accessed on mobile devices.

d. Upon a personnel role transfer:

i. Review and confirm ongoing operational need for current logical and physical access; and
ii. Make changes to logical and physical access as needed

e. Prohibit and take reasonable measures to prevent the use of external personal email accounts, personal websites and social media when handling Owner Confidential Information.

10. Vulnerability & Patch Management

Contractor will, as applicable to the Services provided:

a. Conduct periodic vulnerability scanning and penetration tests on information systems and applications to identify security vulnerabilities.

b. Subscribe to an industry standard vulnerability service (e.g. Common Vulnerabilities and Exposures) and maintain alert status regarding any vulnerabilities contained in Contractor's information systems and products.

c. Maintain procedures to evaluate, prioritize, and track the vulnerabilities based on a variety of factors such as:

i. The severity rating assigned to the vulnerability by an industry standards body;
ii. The criticality of the assets impacted by the vulnerability and their likelihood of exploitation; and
iii. The classification and quantity of information which the vulnerability places at risk.

d. Patch or take other corrective actions to remediate known or discovered vulnerabilities in a commercially reasonable timeframe, giving greater priority to vulnerabilities with a higher severity rating based on the criteria outlined in Section 11(c).

11. System and Communications Protection

Contractor will:

a. Encrypt (in Transit and at Rest) Owner Highly Confidential information.

b. Employ reasonable controls to secure source code, including version control, segregation of source code repositories, and least privilege access principles.

c. Incorporate security vulnerability and malicious code assessments throughout the software development life cycle.

d. Ensure the information system separates user functionality (including user interface services) from information system management functionality.

e. Implement denial of service (DoS) detection and mitigation controls.

f. Monitor and control communications at the external boundary of the system and at key internal boundaries within the system.

g. Implement subnetworks for publicly accessible system components that are either physically or logically separated from internal, trusted Contractor networks.

h. Connect to and allow connections from external networks only through managed interfaces consisting of boundary protection devices and security gateways.

i. Implement appropriate cryptographic mechanisms to prevent unauthorized disclosure of information and detect changes to information during transmission.

j. Establish and manage cryptographic keys in accordance with established and industry accepted key management procedures for systems encrypting and or decrypting Owner data.

k. Ensure retention and restoral of electronic mail when directed by Owner in connection with actual or anticipated legal proceedings.

l. Adhere to the following requirements when connecting to an Owner network:

i. Assets used to connect to an Owner network will either be provided by Owner or will be owned/leased by the Contractor or permitted subcontractors.
ii. Personally owned assets may not be used to perform work for Owner.

12. System and Information Integrity

Contractor will:

a. Identify, report, update, and correct information and information system vulnerabilities in a timely manner, as required by Section 11.

b. Provide protection from malicious code (e.g., viruses or malware) at appropriate locations within information systems.

c. Monitor information system security alerts and advisories and take appropriate actions in response.

d. Implement appropriate controls to ensure Owner Confidential Information is used only for permitted business purposes authorized under the Agreement, and not for Contractor's own or other purposes.

e. Monitor the information system to detect attacks and indicators of potential attacks in accordance with Contractor monitoring objectives.

f. Implements security safeguards to protect information system memory from unauthorized code execution.

g. Maintain logical and/or physical separation between production and non-production environments (e.g., development, testing), sufficient to prevent unauthorized access between them.

h. Prohibit the use of Owner Confidential data in a non-production environment (i.e. test or development) unless approved by Owner.

i. Develop backup plans and schedules to protect against malicious destruction of information.

j. Mask or truncate Owner Highly Confidential Information in display to prevent disclosure when unnecessary to perform a required business function and when required by law.

13. Proof of Compliance

a. Contractor will reasonably cooperate with Owner's efforts to verify Contractor's compliance with these Requirements, which efforts may include periodic audits of Contractor's operations by Owner or a third party at Owner request and on reasonable notice. Contractor will reasonably cooperate with security assessment activities that Owner may undertake from time to time in connection with Contractor's performance under any Agreement, and will address in a timely manner, security issues that are uncovered in such assessments.

b. In the event Owner discovers that Contractor is non-compliant with these Requirements, Contractor will implement corrective action as soon as practicable, but in no event more than (30) days after Owner's initial notification to Contractor of the non-compliance.

These Requirements supplement security requirements set forth in any Agreement(s).

These Requirements specify minimum expectations of Owner for Contractor engagements. Additional safeguards and controls may be required in an Agreement, statement of work or other engagement document between Contractor and Owner, and if such safeguards and/or controls exceed those set forth in these Requirements, those obligations will continue to apply.

B. General Definitions

1.	Authentication/Strong Authentication	means the process by which a person, process or system is verified as a particular person, process or system or a member of a class of persons, processes or systems, typically for access to data or another right or privilege. Strong Authentication means Authenticating using at least two different verification factors, known as two-factor or multi-factor authentication as follows: (i) something known (e.g., a password or PIN); (ii) something possessed (e.g., a smart card or OTP token); or (iii) something uniquely physical (e.g., a fingerprint).
2.	Authenticator(s)	means the credentials or other mechanisms used to authenticate a person, process or system, including, but not limited to, passwords and biometric credentials such as fingerprints, digital identities, voice prints, and retinal scans.
3.	Days	means calendar days unless otherwise specified.
4.	Encryption at Rest	means static data which is encrypted using Strong Cryptography.
5.	Encryption at Rest in Transit	means transmitted data which is encrypted using Strong Cryptography and a current industry standard mechanism (e.g. SFTP, VPN, TLS and etc.)
6.	Privileged User	means a user with increased administrative permissions and/or access greater than that of a general user. Privileged User controls are applicable regardless of the environment those right are granted in (i.e. production, development, or test and internal or external to the private network.)
7.	Sanitization	means the process of securely deleting data such that it cannot be recovered; Contractor will use NIST SP 800-88, Guidelines for Media Sanitization for guidance.
8.	Strong Cryptography	means the use of cryptography based on industry tested and accepted cipher algorithms with minimum key lengths of 256-bits for symmetric algorithms and 2048-bits for asymmetric algorithms. This includes a documented key management standard, which stipulates the secure retirement and replacement of keys (i.e. key rotation).
9.	Contractor	means Contractor, its affiliates, and its/their subcontractors.
10.	Owner Confidential Information	means non-public information received from Owner and non-public information generated for Owner in connection with any agreement between Owner and Contractor (an "Agreement") under which Contractor provides products or services to Owner

or to others at Owner's request or direction, as well as any other information defined as "Confidential Information" under such agreement. Some Confidential Information has increased sensitivity and is categorized as "Highly Confidential Information," further described below. For avoidance of doubt, "Highly Confidential" should also be considered "Confidential Information" in these Requirements.

Owner Highly Confidential Information

means Owner Confidential Information that also fits the following criteria:

- any state, federal or other national identification number (e.g. SSN, FIN, TIN, state driver's license or state non-driver ID card, work visa, passport, tribal ID, military ID, Alien ID and similar identifiers) identifiable to an individual,
- last four (4) digits of SSN;
- date of birth, (identifiable to an individual),
- mother's maiden name (identifiable to an individual),
- bank account and routing number,
- credit/debit card primary account number (PAN), validation/verification codes, PIN/PIN Block, magnetic stripe data,
- Passwords, Challenge Response (including biometric), PINs and other similar Authenticators,
- health or medical information concerning an individual's medical history, mental or physical condition, or medical treatment or diagnosis by a health care professional, as well as an individual's health insurance policy number or any unique identifier used to identify the individual for health/medical care purposes, claims history, including any appeals records,
- Owner employee or former employee information, such as compensation and performance review information; background and drug testing results; work limitations (involves physical limitations or mental health issues); disciplinary information; Ethics/Equal Employment Opportunity case information; Rehire/No Rehire flags; Net Credited Service Date; marital/domestic partner status;

C. ACRONYMS

CALEA	Communications Assistance for Law Enforcement Act
ESN	Electronic Serial Number
EUIMID	Expanded User Identity Module Identifier
FIN	Federal Identification Number
OTP	One Time Password
PAN	Primary Account Number
PIN	Personal Identification Number
SFTP	Secure File Transfer Protocol
SSN	Social Security Number
TIN	Taxpayer Identification Number
TLS	Transport Layer Security
VPN	Virtual Private Network

Exhibit BB - NERC Standards

Standard	Req	Text of Requirement	Applicability	Pre/Post Commission	Policy	Procedure	ERCOT Protocols	PUC	RSAW	Diagrams/Workflow	Re-Occurring Tasks	Internal Control	RACI Matrix (To be completed)			
													Responsible	Accountable	Consulted	Informed
BAL-001-TRE-2		Primary Frequency Response in the ERCOT Region	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
EOP-004-4		Event Reporting	GO	Post-Commission	Yes	Yes	Yes	Yes	Yes	TBD	Yes	Yes				
EOP-012-2		Extreme Cold Weather Preparedness and Operations	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	Yes	Yes	TBD	Yes	Yes				
FAC-001-4		Facility Interconnection Requirements	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
FAC-002-4		Facility Interconnection Studies	GO	Pre-Commission	Yes	Yes	Yes	No	Yes	TBD	No	No				
FAC-003-5		Transmission Vegetation Management	GO	Post-Commission	Yes	Yes	No	No	Yes	TBD	Yes	Yes				
FAC-008-5		Facility Ratings	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
IRO-010-5		Reliability Coordinator Data Specification and Collection	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	No	No				
MOD-025-2		Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
MOD-026-1		Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
MOD-027-1		Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
MOD-032-1		Data for Power System Modeling and Analysis	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
NUC-001-4		Nuclear Plant Interface Coordination	GO	Pre-Commission & Post-Commission	Yes	Yes	No	No	Yes	TBD	No	No				
PRC-002-5		Disturbance Monitoring and Reporting Requirements	GO	Pre-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-004-6		Protection System Misoperation Identification and Correction	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-005-6		Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	No				
PRC-012-2		Remedial Action Schemes	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-017-1		Remedial Action Scheme Maintenance and Testing	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-019-2		Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-023-6		Transmission Relay Loadability	GO	Pre-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-024-3		Frequency and Voltage Protection Settings for Generating Resources	GO	Pre-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-025-2		Generator Relay Loadability	GO	Pre-Commission	Yes	Yes	Yes	No	Yes	TBD	No	No				
PRC-026-2		Relay Performance During Stable Power Swings	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-027-1		Coordination of Protection Systems for Performance During Faults	GO	Pre-Commission & Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
PRC-028-1		Disturbance Monitoring and Reporting Requirements for Inverter-Based Resources	GO	Pre-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				
TOP-003-6.1 July-2025		Transmission Operator and Balancing Authority Data and Information Specification and Collection	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	No	No				
TPL-007-4		Transmission System Planned Performance for Geomagnetic Disturbance	GO	Post-Commission	Yes	Yes	No	No	Yes	TBD	Yes	Yes				
VAR-002-4.1		Generator Operation for Maintaining Network Voltage Schedules	GO	Post-Commission	Yes	Yes	Yes	No	Yes	TBD	Yes	Yes				

Exhibit CC

Site Rules for Chisme Solar + Storage Project (EPC)

1. Purpose and Scope

These Site Rules establish the minimum standards of conduct, safety, and compliance required of all contractors, subcontractors, vendors, visitors, and personnel engaged in the construction of the Chisme Solar + BESS Project (the "Project").

These rules are issued by the Project Owner/Developer ("Owner") and supplement:

- The Project Lease Agreement,
- The EPC Contract and related agreements, and
- Applicable federal, state, and local laws, codes, and regulations.

In the event of a conflict, the stricter requirement shall apply. The EPC Contractor is responsible for ensuring that all subcontractors and personnel always comply with these rules.

The Owner reserves the right to inspect compliance, enforce penalties, and restrict or revoke access to individuals or entities violating these rules. Repeated violations, or a single violation of rules **(c)(i), (iv), (v), or (vi)**, will result in immediate removal and permanent denial of access.

2. Access and Gate Control

- All exterior access gates shall always remain padlocked. Keys for gates installed by the Owner shall be provided to the Owner.
- Gates may be staffed by a gatekeeper during construction but must remain closed when not in active use.
- The EPC Contractor shall maintain a complete log of all personnel and vehicles entering and exiting the Real Property. Logs shall be submitted to the Owner upon request.
- Unauthorized visitors are prohibited. All site access must be approved in advance.

3. Fire Prevention and Smoking

- Smoking is strictly prohibited except in designated Owner-approved areas or within personal vehicles.
- EPC Contractor shall implement fire prevention measures, including removal of dry vegetation and flammable debris from work areas.
- If a fire occurs due to EPC Contractor personnel, subcontractors, or agents:
    - Immediate notification to Owner and local authorities is required.
    - The EPC Contractor shall pay the Owner a minimum of **$15.00 per acre** for pasture land damaged, due within 60 days. This fee does not limit additional claims for damage to livestock, equipment, structures, or other property.

4. Property Maintenance and Prohibited Items

- The Real Property shall be maintained in a clean and orderly condition. EPC Contractor must promptly remove debris, waste, and unused materials.
- Storage is limited to materials, equipment, and vehicles directly required for Project construction.
- Willful or negligent damage to vegetation, soil, or infrastructure is prohibited. Required erosion control measures (e.g., silt fencing, sediment basins) shall be implemented.

Strictly Prohibited Items and Activities:

i. Weapons of any kind (guns, bows, slingshots, etc.);
ii. Animal calling devices;
iii. Fishing equipment or nets;
iv. Pets or animals (dogs, cats, livestock, etc.);
v. Alcoholic beverages;
vi. Illegal drugs or related paraphernalia.

5. Designated Access Routes

- All personnel, subcontractors, and equipment must remain on designated access routes and construction areas.
- Unauthorized access to other areas of the Real Property is prohibited.

6. Resource Protection

- No plants, animals (alive or dead), artifacts, military equipment, Native American cultural items, or other materials shall be removed from the Real Property.
- Brush clearing, burning, or related activities require prior written Owner approval.

7. Speed Limits

- Maximum speed limit: **25 mph** during daylight; **15 mph** at night.
- Dust suppression measures shall be implemented where necessary.

8. No Hunting or Fishing

- No rights to hunting, fishing, or recreational use are granted under this Project. All such rights remain exclusively with the Owner.

9. Waste and Hazardous Materials Management

- All waste must be handled per federal, state, and local regulations.

- Hazardous materials (e.g., fuels, lubricants, batteries) require approved handling, storage, and disposal practices.
- A Waste Management Plan must be submitted to and approved by the Owner before construction start.
- Any spills or releases must be immediately reported to the Owner and fully remediated at EPC Contractor's expense.

10. Coordination with Owner

- EPC Contractor shall appoint a Site Manager to serve as the primary contact with the Owner.
- Weekly written updates must be provided, summarizing:
    - Construction progress,
    - Incidents or violations, and
    - Corrective actions taken.

11. Liability and Enforcement

- EPC Contractor is fully liable for any damage to the Real Property, infrastructure, or operations caused by its activities or those of its subcontractors.
- The Owner reserves the right to inspect the Real Property at any time.
- Violations may result in corrective action, removal of personnel, financial penalties, or contractual remedies as provided in the EPC Agreement.

12. Acknowledgment

- All contractors, subcontractors, and personnel must sign an acknowledgment confirming they have read and will comply with these Site Rules.

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Payment Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:

Amount:

Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: ☐ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

Signature: _____
Name and Title:

SURETY
Company: *(Corporate Seal)*

Signature: _____
Name and Title:

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

Sample

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

Sample

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§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- **.1** the name of the Claimant;
- **.2** the name of the person for whom the labor was done, or materials or equipment furnished;
- **.3** a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- **.4** a brief description of the labor, materials or equipment furnished;
- **.5** the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- **.6** the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- **.7** the total amount of previous payments received by the Claimant; and
- **.8** the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

Sample

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§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

Sample

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address		Address	

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AIA® Document A312® – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:

Amount:

Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: ☐ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

Sample

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

Sample

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§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

Sample

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§ 16 Modifications to this bond are as follows:

Sample

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address		Address	

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Texas Chisme

Equipment	Daily Rate	
Pile Driver	$ 800.00	
Skid Steer	$ 195.00	
12K Telehandler	$ 215.00	
Pickup Truck	$ 98.00	
Flat Bed Trailer	$ 40.00	
Buggy	$ 75.00	
Excavator	$ 800.00	

Staff	ST	OT	Per Diem Daily
Staff Rates:			
Construction Manager	$ 125.00		$ 175.00
Superintendent	$ 95.00		$ 175.00
General Foreman	$ 85.00		$ 175.00
Project Engineer	$ 75.00		$ 175.00
Project Manager	$ 100.00		$ 175.00
Mechanical Rates:			
Laborer Common	$ 38.00	$ 57.00	$ 100.00
Labor Foreman	$ 45.00	$ 67.50	$ 125.00
Pile Operator	$ 45.00	$ 67.50	$ 100.00
Equipment Operator -Backhoe	$ 45.00	$ 67.50	$ 100.00
Crane Operator	$ 74.00	$ 111.00	$ 100.00
Rigger	$ 43.00	$ 64.50	$ 100.00
Mechanic	$ 110.00	$ 165.00	$ 100.00
Electrical Rates:			
Electrical Apprentice	$ 37.00	$ 55.50	$ 100.00
Electrical Journeymen	$ 48.00	$ 72.00	$ 100.00
Electrical Foreman	$ 50.00	$ 75.00	$ 100.00

Red River Clean Energy Hail Stow Protocol

Version 2 – April 14, 2025

Introduction

Hailstorms represent a significant risk to utility-scale solar projects, potentially causing damage to solar modules, trackers, and other systems. This protocol outlines the minimum standards for hail stow procedures, and while specific technologies may vary, the focus is on ensuring timely and reliable protection against hail-related damage to solar infrastructure.

I. Hail Stow Hierarchy

A structured and reliable response system is critical to minimize storm damage. The following hierarchy prioritizes early defensive posturing, with automated and manual systems as backups:

1. Primary Defense: Early Defensive Stow (Alert-Based) STOW EARLY, STOW OFTEN

   The primary defense is to stow trackers early based on county-by-county weather alerts monitored 24/7 by the Remote-Operations Control Center (ROCC). Upon receiving an alert for severe hail (≥3/4-inch) or a hail warning in proximity, trackers must be positioned to a defensive stow angle (full-tilt, typically ±52° or higher, facing away from prevailing winds) at least 3 hours prior to the forecasted storm. Trackers will remain in stow until a clearance is issued by the ROCC, confirming the storm risk has passed.

- Opportunistic Stowing

  To maximize efficiency, trackers may be stowed earlier than the 3-hour minimum under specific conditions, such as low irradiance or nighttime forecasts. For example, if a hailstorm is forecasted for 4 AM, trackers should be stowed at the end of the production day (e.g., evening) rather than waiting until 1 AM. This ensures protection without sacrificing significant energy production.

2. Secondary Defense: Automated Hail Stow

   Automated hail stow serves as a backup, triggered by real-time weather data indicating a reasonable likelihood of a damaging storm. This system positions trackers to the full-tilt angle, facing away from prevailing winds. It is particularly effective for unexpected storms or when initial weather data is inaccurate, ensuring protection if the primary defense is not initiated. Trackers will remain in stow until a clearance is issued by the ROCC, confirming the storm risk has passed.

3. Tertiary Defense: Manual On-Site Stow

   In the unlikely event that both primary and secondary defenses fail, site personnel must manually adjust trackers to a safe stow position using local control systems. Trackers will remain in stow until a clearance is issued by the ROCC, confirming the storm risk has passed.

II. General Hail Stow Procedure

The hail stow process is designed for efficiency and clarity:

- Storm Alert & Activation
  The ROCC continuously monitors county-by-county weather alerts for hail risks, including severe hail (≥3/4-inch) or nearby hail warnings. Upon meeting these criteria, the ROCC initiates defensive stow at least 3 hours before the forecasted storm, unless opportunistic stowing (see Section VI) applies.

- Execution of Stow
  Trackers are repositioned to the full-tilt angle (typically ±52° or higher), facing away from prevailing winds, as early as practical.

- Post-Storm Assessment
  Trackers remain in the stowed position until the ROCC issues clearance, confirming no further storm risk (minimum 1 hour after the storm passes). A comprehensive inspection follows, checking for module or tracker damage and evaluating the hail stow system's performance.

III. Communication & Documentation

Clear, real-time communication and record-keeping are critical:

- Alerts
  Automated notifications should be sent to key personnel (e.g., Asset Manager, Site Manager) whenever hail stow is initiated. This ensures that all parties involved are aware of the storm status and action taken.
- Documentation
  A detailed log of all hail stow actions must be maintained, including timestamps, storm data, alert triggers, and any operational issues. This ensures traceability for analysis and protocol improvements.

IV. Returning to Normal Operations

Once the ROCC issues a clearance and it is safe to resume operations, trackers return to normal positioning. If damage is detected, affected systems must be repaired or replaced before reactivation.

V. Stow Functionality Testing

To ensure the hail stow system is reliable, regular testing is required:

The entire hail stow protocol must undergo a live, functional test once per month, simulating a full hail stow event. This is not only a visual inspection but a complete system exercise, tracker drives and motors, cables, controllers, communication links (wired and wireless), and SCADA. The test must also validate the responsiveness of weather detection inputs (e.g., hail alerts via API or local weather stations) and confirm successful command execution and status feedback across the system

- Month 1: Test manual stow to verify on-site functionality.
- Month 2: Test automated stow using a simulated weather signal to confirm real-time responsiveness.
- Subsequent Months: Alternate between manual and automated tests to ensure all components are operational.
- Pre-Hail Season Inspection: At least one month before the hail season, perform a comprehensive system audit, including stress-testing motors and validating communication pathways, to confirm readiness for high-risk periods. Verifying mechanical and electrical components for wear, corrosion, or connectivity issues.

VI. Hail Stow During Construction

During construction, trackers must be manually positioned to the full tilt stow angle, facing away from the prevailing winds, immediately after PV module installation. In most cases this will be with the front of the module facing to the East, but this should be verified with the Owner during construction kickoff. They must remain in this position until the tracker can operate fully per this protocol. Site personnel must be trained to act swiftly to mitigate risks. All procedures must comply with the tracker manufacturer's installation manual.

VII. Chain of Command for Decision-Making

During a hailstorm event, the ROCC is responsible for initiating the stow procedure based on weather alerts. Key personnel will approve and execute actions per operational priorities. Specific roles will be finalized once the O&M contract is in place.

VIII. Post-Storm Analysis

After each storm, the performance of the hail stow system should be evaluated. This includes reviewing the decision-making timeline, system functionality, and communication efficiency. Any necessary updates to the protocol should be made to ensure continued protection.

Exhibit GG – Tariff Rate Information

Material	Country of Origin	Tariff Rate as of Contract Signing
Cable (MV and DC)	Mexico	25% IEEPA
ATI Tracker	China	50%
	India	50%
	Mexico	25%
	Vietnam	45%
Wiring Harnesses	Vietnam/Thailand	45%
	Morocco	10%
IPC (Insulating Piercing Connector)	Spain	15%
Load Break Disconnect	Spain	15%
ATI Piles	India	25% Russia Oil 25% IEEPA 50% 232 Steel Products

Any other materials not listed here will be provided by Owner with tariff rates and this Exhibit GG will be amended.