



**Randolph Pump Station Improvements Project**  
**Solicitation Number: CO-00459**  
**Job No.: 20-8611**

**ADDENDUM NO. 5**  
**January 13, 2023**

To Respondent of Record:

This addendum, applicable to work referenced above, is an amendment to the bid proposal, plans and specifications and as such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the Addendum number and issue date on the space provided in submitted copies of the Respondent Questionnaire.

<b>RESPONSES TO QUESTIONS</b>
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- 1. Question: Reference Spec 33 11 13.13. 1.01 B. Will you please add Mid-America Pipe to the list of Approved manufacturers? The meet all the requirements in the specifications and have furnished Steel Pipe for SAWS projects for years. Please advise of any additional information needed to add Mid-America Pipe to the specification.**

*Response: No changes are to be made to Section 33 11 13.13, paragraph 1.01.B.*

- 2. Question: Specification Section 46 31 11, 3.07 Progress Payments, details out the payment schedule. Please confirm Owner will pay as described.**

*Response: Yes, the Owner will follow the payment schedule in Section 46 31 11 for the on-site sodium hypochlorite generation system.*

- 3. Question: Contract Drawing CH-1 General Note 1 Indicates coat all concrete surfaces. Contract Drawing CH-16 detail 5 shows containment lining system at Concrete or CMU. Are CMU Structure to receive coatings as indicated on CH-16 and required by CH-1 General Note? If so is the entire CMU Structure to receive the coating systems?**

*Response: Per Note 1 on CH-1, concrete surfaces, including interior CMU walls of the sodium hypochlorite building, should be coated in accordance with Specification 09 96 00.01, which is expressly stated in Note 1. Further details of the coating requirements are described in Specification 09 96 00.01 and details of installation requirements are detailed on Sheet CH-16.*

- 4. Question: Contract Drawing A-4 Note 4 indicates FRP- Fiberglass Reinforced Panel Ceiling. However, we are unable to locate where the FRP Ceiling panels are to be installed. Please advise.**

*Response: None of the proposed buildings will have ceilings. See Item No. 10 in the CHANGES IN THE PLANS section of this addendum.*

- 5. Question: Contract Drawing CH-2 show the Stairs and Platforms at the Brine Tank. There are no details provided in the Structural Drawings for this to be designed and supplied by others. Please confirm this shall be designed by FRP Tank Manufacturer and supplied by the OSHG Manufacturer.**

*Response: The stairs and platforms at the Brine Tank are to be designed and supplied by the FRP Tank Manufacturer as specified by Note 6 on Sheet CH-2. Additional design requirements are specified in Paragraph 2.02, and the Tank Schedule in Sections 44 42 76 and 05 51 00.*

- 6. Question: Contract Drawing CH-3 show the Stairs and Platforms at the Sodium Hypochlorite Tanks. There are no details provided in the Structural Drawings for this to be designed and supplied by others. Please confirm this shall be designed and supplied by FRP Tank Manufacturer.**  
*Response: The stairs and platforms at the Sodium Hypochlorite Tanks are to be designed and supplied by the FRP Tank Manufacturer as specified by Note 6 on Sheet CH-2. Additional design requirements are specified in Paragraph 2.02, and the Tank Schedule in Sections 44 42 76 and 05 51 00.*
- 7. Question: Detail 5 on drawing C-23 indicates that the compacted sandy gravel road base depth will be "as per loading requirements". Please indicated the depth of subgrade to be used or provide the loading requirements for the Porous Pavement.**  
*Response: Detail has been updated to include depth. See Item No. 8 in the CHANGES TO THE PLANS section of this addendum.*
- 8. Question: On a couple of paving sections for curb and joints on C-23 sht 32 the pavement depth is called out as 10” however on the actual pavement detail its called out as 8.” Please advise on what the depth of concrete pavement needs to be.**  
*Response: There are two concrete pavement depths. One for the concrete pad on S. Weidner Road which is 10-inches thick and the other for the driveway and access road which is 8-inches thick. See Item No. 8 in the CHANGES TO THE PLANS section of this addendum.*
- 9. Question: Due to the nature of the bidding process, please consider accepting subcontractor qualifications and information later in the day.**  
*Response: See the CHANGES TO THE SPECIFICATIONS section in Addendum No. 4.*
- 10. Question: Please consider an extension of the subcontractor qualifications on bid day to ensure complete packages.**  
*Response: See response to Question No. 9.*
- 11. Question: When considering scope and size of similar projects will dollar value or scopes be more important?**  
*Response: Both will be equally important.*
- 12. Question: Spec section 099600 paint schedule item # 4 - Calls to paint new or existing exterior electrical panels and equipment with factory coatings. Do you really require new factory finished electrical panels to be field coated? If so we will need drawings of all electrical equipment panels for take offs, we would also need quantities and drawings of all existing electrical equipment panels required to be painted?**  
*Response: Coating system No. 4 specified in Specification 09 96 00.01 is to be removed. See Item No. 1 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 13. Question: On sheet C-7 there is a gravel access road shown but no detail for it on C-12 or C-23. Please provide a detail for depth and subgrade requirements.**  
*Response: Detail for the gravel access road is included on Sheet C-23, Detail 5. See Item No. 8 in the CHANGES TO THE PLANS section of this addendum.*
- 14. Question: Contract Drawing C-7 shows that the proposed chemical analyzer station is on sheet E-21 and the detail on sheet EA-6, which only indicates dimensions not the detail for the Concrete Pad. Can you provide or refer to one.**  
*Response: Detail 6 on Sheet S-18 for Exterior Equipment Pads should be used for structural information alongside the dimensional information provided on EA-6.*

- 15. Question: Spec Section 33 11 13.13 1.01 B - Requirement for single manufacturer is counterproductive to competitive bidding. Please revisit this and consider making it more in line with other SAWS water treatment plant projects currently under construction.**  
*Response: Specification 33 11 13.13, Paragraph 1.01.B lists three acceptable pipe manufacturers, which meets SAWS requirements for competitive bidding. No changes are to be made to Specification 33 11 13.13, paragraph 1.01.B.*
- 16. Question: We respectfully request to be considered as an alternate pipe supplier for this project; Reference Specification 33 11 13.13 STEEL PIPE (AWWA C200) 1.01 B. Based upon the pipe quantities required for the project, the short runs of project pipe lengths are somewhat prohibitive for dedicated helical pipe mill runs. Hallmark inventories spiral welded or rolled and welded steel pipe per C200, from sizes 24” through 102”.**  
*Response: See response to Question No. 15.*
- 17. Question: Please consider extending the deadline for question submissions from December 21, 2022 to January 4, 2023 due to vendor availability for document review coinciding with the end of year / Holiday Season.**  
*Response: Question deadline extended to January 10, 2023. See Addendum No. 1 for the revised dates.*
- 18. Question: Electrical Building Lower Level Plan (EB-3) shows incoming power, control and instrumentation wiring to be via underground cable tray vault. Confirm all cable entering building via cable tray vault is to be Cable Tray rated (Type TC or TC-ER). Provide revised Specification of 26 05 19 “Wires and Cables” referencing Tray Cable as applicable.**  
*Response: All cable entering the proposed Electrical Building via cable tray shall be Cable Tray rated as noted in Section 26 05 13 Medium Voltage Cable, Paragraph 1.05.D, and Section 26 05 19 Wires and Cables (1000 Volt Maximum), Paragraph 3.01.H of the Specifications.*
- 19. Question: Reference drawings EB-3 and EB-4. Please provide cable tray widths for each section.**  
*Response: The referenced cable trays shall be 36-inches in width by 6-inches in height. Notes added to sheet EB-3. See Item No. 18 in the CHANGES TO THE PLANS section of this addendum.*
- 20. Question: Per Section 26 05 19-2, please confirm all wires and cables to be soft drawn tinned copper. Please clarify if multi-conductor power cable (tray cable) is to be used, if conductors are to be tinned copper as well.**  
*Response: All wires and cables are to be soft drawn tinned copper as noted in Section 26 05 19 Wires and Cables (1000 Volt Maximum), Paragraph 2.01.A of the Specifications. Multi-conductor power cable is to be tinned copper.*
- 21. Question: Per Section 26 05 13-7, please confirm Contractor to include costs of medium voltage cable manufacturer on-site representative to witness and certify all medium voltage cable installations according to manufacturers recommendations.**  
*Response: The services of the cable manufacturer to be present during the installation of all medium voltage cable is required as noted in Section 26 05 13 Medium Voltage Cable, Paragraph 3.02.A.7 of the Specifications.*
- 22. Question: Per Section 26 13 26-13, confirm spare parts to be provided as listed, including “complete breaker assembly for each type and size of breaker” for the Medium Voltage Metal-Clad Switchgear.**  
*Response: Spare parts are to be provided as listed, including a complete breaker assembly for each type and size of breaker of the Medium Voltage Metal-Clad Switchgear.*
- 23. Question: Per Section 26 18 39-13, please confirm the 5 KV Well Pump local disconnect switches are to be 316 Stainless Steel NEMA 4X.**  
*Response: 316 stainless steel, NEMA 4X enclosures are required for each Well Pump 5 kV local disconnect switch.*

**24. Question:** Regarding, spec 33 11 13.13, scope of Work 1.01.B states that 3 steel pipe manufacturers are the only suppliers/providers of the pipe, but it allows for a separate manufacturer/fabricator be under the direction of the pipe manufacturer to fabricate the pipe. If the pipe manufacturer is responsible for the specials, or management of a separate fabrication facility, pricing on the project could be far higher than expected. Please note, most pipe manufacturers will not normally fabricate specials for projects with a small pipe footage. They normally supply the pipe that meets the specification and leave the fabrication to a fabricator.

We request that the steel pipe be supplied by one of the (3) listed manufacturers, but production/fabrication can be under the direction of a separate fabricator meeting one of the following: 1. Certification by SPFA, 2. ISO 9001, or 3. LRQA. And will also be responsible for the 4 items listed in Section 1.01.B

1. Certify all pipe, fittings, and specials are being manufactured in full accordance of the contract documents
2. Manage the design and fabrication of the specials (pipe manufacturer will submit their design of the pipe)
3. Prepare and submit all the submittal information and shop drawings
4. Make any corrections that may be required to the submittal information and shop drawings.

*Response: No changes are to be made to Section 33 11 13.13, Paragraph 1.01.B.*

**25. Question:** In section 01 35 56, 1.03, B, 4. States the contractor shall provide a security guard where chemicals are present. If the work is being done in a secure site will the owner still require the contractor to hire a security guard.

*Response: A security guard may not be required so long as the site is kept secure by the contractor per the contract documents.*

**26. Question:** Please provide specifications for metal canopies.

*Response: Section 10 73 16.13 Aluminum Canopy Structures is to be added to the contract documents. See Item No. 2 in CHANGES TO THE SPECIFICATIONS section of this addendum.*

**27. Question:** There are details and specifications for porous flexible paving, but I don't see where this is called out on any other drawing. Please clarify what drawing showing the porous flexible paving.

*Response: The porous pavement is in reference to the gravel paved road. Nomenclature has been updated on the specs and details. See Item No. 10 in the CHANGES TO THE SPECIFICATIONS section of this addendum and Item No. 8 in the CHANGES TO THE PLANS section of this addendum.*

**28. Question:** The Electrical and Sodium Hypochlorite Buildings show Canopies on Architectural Plans. We find no specification for these canopies. Please clarify where they are specified or furnish specifications.

*Response: See response to Question No. 26.*

**29. Question:** Reference Good Faith Effort Plan for Construction SUBCONTRACTS on page GFEP-1. Is all the information listed above the Subcontractors/Suppliers Table 1 to be filled out by the Prime Contractor submitting the Competitive Sealed Proposal?

*Response: Yes, all information listed above Table 1 to be filled out by Prime Contractor.*

**30. Question:** Detail 8/C-23 references Spec 32 13 13 for Moisture Conditioned Subgrade requirements. Within Spec 32 13 13, the only mention of subgrade is paragraph 3.01.A which instructs to "Verify compacted subgrade is acceptable and ready to support paving and imposed loads." We don't find the Moisture Conditioned Subgrade within any spec. Please clarify where Moisture Conditioned Subgrade requirements are specified.

*Response: Sections 31 05 13 and 31 23 23 have been updated to include subgrade requirements. See Item Nos. 4 and 6 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*

- 31. Question: Detail 7/C-23 states to reference Spec 31 05 13 for subgrade requirements. Spec 31 05 13 has no paving subgrade requirements. Please clarify where Subgrade requirements are specified.**  
*Response: Section 31 05 13 has been revised to include pavement subgrade requirements. See Item No. 4 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 32. Question: Spec Section 31 05 13, Soils for Earthwork, Sub section 3.03, Stockpile Cleanup, "Site Preparation" Item B, states Select Fill is imported limestone base. It further states "The Geotechnical Engineer shall provide select fill utilized at this site." Please confirm whether bidders should include any cost for purchasing the Select Fill.**  
*Response: Section 31 05 13 has been updated. See Item No. 4 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 33. Question: Spec Section 31 11 00, Site Clearing and Grubbing, 3.05 Excavation, A, states to excavate subsoils from areas to be re-graded for the entire site. What is the defined subsoil, and depth? D. further states to remove subsoils from site. Is it the intent that all areas that will be graded either cut or fill, to have the undefined subsoils removed from site. Further implying all onsite cut, is not suitable as fill?**  
*Response: Paragraph 3.05 Excavation A has been deleted. Excavate subsoils from areas to be re-graded for the entire site, without mixing with foreign materials. Paragraph 3.05 Excavation D has also been deleted. Remove subsoil from site. It is not the intent for all subsoils in areas graded to be removed from the site. See Item No. 5 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 34. Question: Spec Section 31 23 23-1.01 describes the work types included in the specification section. Parts 2 and 3 of the specification don't describe any of the items mentioned to be included in 1.01. Please clarify where the items described in 1.01 are further specified.**  
*Response: Section 31 23 23 has been updated. See Item No. 6 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 35. Question: Spec Section 31 23 23-3.01.A describes the fills required under slab-on-grade. Please clarify what material is to be used for general site fills.**  
*Response: Section 31 23 23 has been updated. See Item No. 6 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 36. Question: Detail 5/C-23 indicates the thickness of the Compacted Sandy Gravel Road Base "Varies, as per loading requirements." Please clarify the thickness of the compacted sandy gravel base.**  
*Response: Detail has been updated to include depth. See Item No. 8 in the CHANGES TO THE PLANS section of this addendum.*
- 37. Question: Please confirm SAWS will sign the appropriate paperwork designating they are the "generator" of any pre-existing hazardous materials at the site.**  
*Response: Yes, SAWS to sign the appropriate paperwork designating they are the "generator" of any pre-existing hazardous materials at the site. Contractor shall be responsible, after removal/demolition, for disposing any waste in accordance with all applicable local, state and federal laws and regulations, and submitting the proof to the Owner as included in the contract documents.*
- 38. Question: Spec Section 32 12 43-1.04 - Invisible Structures, Inc. (ISI) indicates the specifications describe their Grass Pave 2 system. ISI indicates the Gravel Pave 2 system is more applicable to this project. Please confirm bidders are to price this scope per the specifications.**  
*Response: This section has been removed and replaced. See Item No. 10 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 39. Question: Detail 3/S-12, please confirm the TOS elevation as well as the subgrade requirements.**  
*Response: Top of slab should be the same as the adjacent fluoride building which is 817.50'. The subgrade should also be the same as the adjacent fluoride building which is called out as compacted structural fill. This fill should be at least 4' deep below the underside of the slab.*

- 40. Question: Detail 6/C-23 (Typical Curb & Gutter) calls for Asphalt treated base or asphaltic concrete base under the curb / gutter and HMA. Detail 7/C-23 (Asphalt Replacement) calls for crushed stone base. Please confirm if and where the Asphalt treated base is to be used.**

*Response: Details 6/C-23 and 7/C-23 have been updated. See Item No. 8 in the CHANGES TO THE PLANS section of this addendum.*

- 41. Question: Sheet C-12, Item J under the Legend is identified as new sidewalk and references Detail 9/C-23. Detail 9/C-23 is for a valve box installations. Please confirm whether this "sidewalk" is concrete paving and to be constructed per detail 8/C-23.**

*Response: Sheets and corresponding details have been updated. See Item Nos. 5 and 8 in the CHANGES TO THE PLANS section of this addendum.*

- 42. Question: Sheet G-3, SAWS Standard General Construction Notes (Water) Note 1, lists other standards to comply with in addition to the plans, specifications, and General Conditions. Please confirm whether the General Conditions, specifications and drawings take precedence over the other listed standards noted.**

*Response: Standards listed shall be followed. If Contractor finds a conflict between standards listed and the project documents, Contractor shall report the conflict to the Owner in writing before proceeding with the Work affected, per Paragraph 3.2 of the General Conditions.*

- 43. Question: Sheet 8 indicates the pipe material for Drain Lines A and B is STL. Drawing P-5 indicates these lines DI. Please confirm pipe material type for Drain Lines A and B.**

*Response: There is no reference to Drain Lines A and B in Sheet 8 of the plans. Drain Lines A and B to be ductile iron.*

- 44. Question: Question: Please confirm is a hot is allowed on the 4" Service Water Line tie-in to the 24" CSC Line. Per Spec No 824. DD-824-07, as referenced on drawing P-4, the detail show using a tapping saddle. Spec No. 812.5.5.e and Spec No. 820.3.7.a both indicate "Tapping of CSC pipe is only allowed by CSC Manufacturer of pipe brand being tapped or CSC Manufacturer approved by SAWS." Please confirm whether this connection is intended to be hot tapped, and if so, please indicate the existing pipe manufacturer.**

*Response: A hot tap is allowed for the 4" service water line. The existing CSC line shall be tapped by CSC manufacturer approved by SAWS. The manufacturer of the existing CSC pipe is unknown so the pipe will need to be tapped by a CSC manufacturer approved by SAWS.*

- 45. Question: Spec Section 44 42 56.02 Vertical Turbine Pumping Units has two attachments, A and B. These attachments are Data Sheets for the Pump and Motor. At the bottom of each sheet is a statement "THIS FORM MUST BE RETURNED WITH YOUR BID". There are five approved pump manufacturers, and four for the motors. Bidders won't know until moments before the bid deadline which manufacturers will be utilized for the project. Since the bidders are providing SAWS the "Schedule of manufacturers and supplier for major equipment" at bid time -- can these data sheets for the pumps and motors be submitted at a later date?**

*Response: Yes, these forms can be provided to SAWS up to three business days after proposals are due. See Item No. 13 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*

- 46. Question: Spec Section 46 31 11-3.03.D indicates all chemicals required for the production of sodium hypochlorite (salt) shall be provided by the Contractor through Final Completion of the project. Can SAWS provide a company name and contact information for the chemical supplier the site is using?**

*Response: Chemical supplier information can be provided to the Contractor after award. For bidding purposes, regional chemical suppliers may be used.*

- 47. Question: Is the manufacturer's warranty specified in Section 22 00 01-1.07.A. required to be a 2 year guarantee?**

*Response: Manufacturer's warranty shall be minimum 2 years.*

- 48. Question: Section 26 42 00.01-1.01.A.1. states "The cathodic protection system will be impressed current or both." Please clarify what the alternative to impressed current is.**  
*Response: The cathodic protection system will be impressed current. Section 26 42 00.01, Paragraph 1.01.A.1 has been revised. See Item No. 3 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 49. Question: Section 33 01 03-2.01.B States "All hangers, brackets, clamps, hardware, and supports shall be Type 304 stainless steel unless noted otherwise" The same spec, part 2.01.G.3. states "All anchor bolts shall be 316L Stainless steel. Please confirm 304 stainless steel is acceptable for pipe support hangers, brackets, clamps, hardware, and associated anchor bolts.**  
*Response: Type 304 Stainless Steel components are acceptable. See Item No. 12 in CHANGES TO THE SPECIFICATIONS section of this addendum.*
- 50. Question: Section 33 05 05.31-2.01.B States " If chlorinated water is used, then dechlorinate it before disposal per all regulations." Section 2.01.C mentions water is provided by owner. Will the water provided by the owner be chlorinated?**  
*Response: Yes, water will be chlorinated.*
- 51. Question: Will the water provided by the owner mentioned in Section 2.01.C be on the construction site?**  
*Response: Yes, water will be able to be obtained from the construction site.*
- 52. Question: In reference to shop cement mortar lining of steel pipe, Section 33 11 13.13 3.02.A, please confirm cement mortar lining machines for all approved steel pipe manufacturers will be deemed acceptable.**  
*Response: Per paragraph 3.02.A, lining machines shall be of a type that has been used successfully for similar Work and shall be accepted by SAWS. Steel pipe submittal shall include lining machine information for review.*
- 53. Question: Section 40 41 00 1.09.A. states "Provide a heating system capable of maintaining the specified temperature during the lowest extreme of ambient temperature." Please clarify what the lowest extreme ambient temperature will be.**  
*Response: Based on available public information, 0 degrees Fahrenheit is the lowest ambient temperature recorded in the past 75 years for the city of San Antonio, Texas.*
- 54. Question: Section 46 41 17 3.02.A states " The test shall be conducted in a manner approved by and in the presence of the Engineer." Please elaborate on the anticipated testing procedure.**  
*Response: Testing procedure shall be provided by the selected Manufacturer. At a minimum, hydrostatic testing of the equipment will be necessary and the Manufacturer must submit data demonstrating complete mixing of the specified chemicals within 10 pipe diameters of the mixer at the minimum and maximum specified flowrates as discussed in Paragraph 1.03.4 of Specification 46 41 17.*
- 55. Question: Spec Section 44 42 76 - 1.04 3. a. 1) says ". Design Data: 1). Design computations or complete structural analysis of FRP tanks, and FRP access platform signed and sealed by professional engineer." Section 2.02D. states "Platform: Provide an aluminum access platform in the location(s) shown on the Drawings." DWG CH-2 and -3 have notes that call for aluminum platforms and stairs. Please clarify whether access platform and stairs are to be FRP or aluminum.**  
*Response: Section 44 42 76, Paragraph 1.04.A.3.a.1 has been updated to indicate access platform is to be aluminum as described on Sheets CH-2 and CH-3. See Item No. 14 in the CHANGES TO THE SPECIFICATIONS section of this addendum.*

**56. Question: Reference Request for Competitive Sealed Proposals, Proposals will be received electronically only until 10:00 AM (CST), January 18, 2023. Due to proposal requirements and complexity of the Work Sequence please extend the submission of Proposals a minimum of two (2) weeks.**

*Response: Submission of proposal deadline has been extended to February 1, 2023. See Addendum No. 4.*

**57. Question: On Sheet I-6 Well Pumps P&ID, 24" pipe shown from Well Pumps No. 1, 2 and 3 to Ground Storage Tank are shown as a dark line. Upon review of other sheets, the work at Well Pumps No. 1, 2 and 3 is shown to remove and replace existing motors and re-coat existing above-grade well discharge piping. Please confirm work at Well Pumps No. 1, 2 and 3 is remove and replace existing motors and re-coat existing above-grade well discharge piping.**

*Response: Work at Well Pumps No. 1, 2 and 3 will consist of removing and replacing the existing motors, recoating the above-grade well discharge piping, and removing and replacing the existing flow transmitters. See Item Nos. 1 and 2 in the CHANGES TO THE PLANS section of this addendum.*

**58. Question: On Sheet CP-1 Cathodic Protection System Overall Site Plan, at Well Pump No. 2 is the installation of the Insulating Flange Kit at the above-grade or below-grade existing 24" CSC Water Line flanges? Please confirm.**

*Response: Installation of the insulating flange kit at Well Pump No. 2 will be below-grade.*

**59. Question: On Sheet CP-1 Cathodic Protection System Overall Site Plan, at Well Pump No. 3 is the installation of the Insulating Flange Kit at the above-grade or below-grade existing 24" CSC Water Line flanges? Please confirm.**

*Response: Installation of the insulating flange kit at Well Pump No. 3 will be below-grade.*

**60. Question: On Sheet CP-1 Cathodic Protection System Overall Site Plan, at Well Pump No. 1 is the installation of the Insulating Flange Kit at the above-grade or below-grade existing 24" CSC Water Line flanges? Please confirm.**

*Response: Installation of the insulating flange kit at Well Pump No. 1 will be below-grade.*

**61. Question: Section 33 01 03 2.01.N. States any special suspension with vibration dampeners to minimize transmission shall be used where necessary. Please clarify if vibration dampeners will be required on this project.**

*Response: Vibration dampeners will only be required if excessive vibrations are identified during startup of the associated equipment.*

**62. Question: Would Mid America Pipe Fabricating & Supply, LLC be deemed an acceptable pipe manufacturer per 33 11 13.13 1.01.B?**

*Response: No, Mid America Pipe is not one of the acceptable steel pipe manufacturers. No changes are to be made to Section 33 11 13.13, paragraph 1.01.B.*

**63. Question: Sheet CP-1, Note 6, indicates "bond locations for existing piping will need to be determined by the contractor during construction." Please confirm that additional joint bonding required on existing piping, where no joint bonds are shown on the drawings, will be paid by change order.**

*Response: Proposal should include a cost for an estimated amount of joint bonding that will be needed for this project.*

**64. Question: Spec Section 46 31 11-3.03D indicates "All Chemicals required for the production of sodium hypochlorite(salt) shall be provided by the contractor through final completion." Please clarify the amount of salt/brine water needed per month to produce the required amount of sodium hypochlorite for this project?**

*Response: Under maximum flow conditions, 1 ton of salt is consumed per day for the sodium hypochlorite system.*



- 65. Question:** Reference sheet PL-4, drawing 1&2 show the domestic water line as 4". Reference sheet PL-4, note 11 calls the line 2" and to be routed to the fluoride building; note 12 calls the line 1-1/4" and to be routed to ESE2. Please clarify the correct pipe size and intended destination.  
*Response:* PL-4 has been updated to address discrepancy. See Item No. 11 in the CHANGES TO THE PLANS section in this addendum.
- 66. Question:** Reference sheet PL-6, the drawing title states the details are for the fluoride building. Do these details hold true for the sodium hypochlorite building? If not, please provide detail drawings for the NaClO plumbing.  
*Response:* Details found on PL-6 can be used for the sodium hypochlorite building.
- 67. Question:** Spec Section 33 11 13.13-1.03.7.a Indicates concrete encasement shall be shown on the steel pipe lay schedule. Please confirm whether there is any steel pipe encasement anticipated on this project and if so, where.  
*Response:* There is no concrete encasement for steel pipe on this project. This is standard specification language.
- 68. Question:** Sheet C-10 references Detail 1/C-24 though the limits of installation for this detail aren't clear. Please confirm the length of fencing to be installed per Detail 1/C-24.  
*Response:* Sheet and detail have been updated. See Item No. 4 in the CHANGES TO THE PLANS section in this addendum.
- 69. Question:** Sheet CP-1, please provide as-builts of the existing lines at every location where flange insulating kits are to be installed on the existing piping.  
*Response:* Location of existing lines shown on project documents are based on as-builts. Available as-builts can be provided to Contractor at the start of construction upon written request.
- 70. Question:** Sheet A-3 note 6 indicates "Exposed Structure " on the Reflected Ceiling Plan. Sheet A-4 note 9 on the Finish Schedule indicates an "FRP - Fiberglass Reinforced Panel Ceiling". Please provide clarification on (1) what type of ceiling is intended in the Electrical Building, (2) where, if at all, the FRP Ceiling is to be installed, and (3) a specification for the FRP Ceiling.  
*Response:* There are no FRP ceilings, in either the Electrical Building or Sodium Hypochlorite Building, only the exposed underside of the precast concrete panel. See Item No. 10 in the CHANGES TO THE PLANS section of this addendum.
- 71. Question:** Detail 3 on CH-11 for Chemical Fill Station shows a connection to a drain line. Please providing routing information along with relevant specifications to be used.  
*Response:* No additional drain piping is required for the chemical fill station. Drain line is to remain open-ended with a butterfly valve for isolation purposes.
- 72. Question:** Detail 1 on Drawing I-19 shows "Analyzer Drain Line" and "Condensation Line to Drain." Please providing routing information along with relevant specifications to be used.  
*Response:* Analyzer Drain Line and Condensation Line will connect to the drain lines connected to the existing Chemical Analyzer Station. The existing chemical analyzer station is within 20 feet of the proposed Chemical Analyzer Station. Awarded Contractor shall submit a proposed alignment of the drain lines with the Chemical Analyzer Equipment submittal for Engineer's Approval.
- 73. Question:** For the project forms starting on RFCSP page 51, if our detailed project description expands beyond the three lines given is it acceptable the project table goes onto a second page?  
*Response:* Yes, that is acceptable.

- 74. Question:** There is no underground pipe shown running to the existing fluoride facility. Please confirm the only known buried chemical line on this site is the CLS line running from the existing chlorine system facility to the injection point on the south side of the GST.  
*Response: The only known buried chemical line is the CLS line. Information of the fluoride piping is unknown and shall be field located by the Contractor.*
- 75. Question:** Sheet C-9, please clarify where item 31 is.  
*Response: See sheets C-2 and C-6 for location of existing MCC. See Item No. 3 in CHANGES TO THE PLANS section of this addendum.*
- 76. Question:** Sheet P-3, Line C, from Sta. 1+00 to Sta. 1+50 the proposed line appears to be in conflict with the new line. The existing line appears to feed PZ-1060. Per 01 35 00-1.02.A, PZ-1060 can only be offline for 24 hours. Please confirm the intent of the documents relating to this specific run of pipe and the allowable outage.  
*Response: From Sta. 1+00 to Sta. 1+50, Line C is in conflict with an existing 36" CSC water line that feeds PZ 930, not PZ 1060. See Sheets C-2 and C-9 for more details.*
- 77. Question:** The requirements in the Word version of the Evaluation Criteria Form do not match the requirements in the RFCSP pdf document. In the Word version respondents are to provide five (5) relevant projects completed in the past 5 years where key personnel have participated in at least three (3) of the five (5) projects listed. On page 50 of the RFCSP respondents are to list and describe three (3) completed projects within the last fifteen (15) years where key personnel have participated in a minimum of one (1) of the three (3) projects listed. Please clarify which requirements respondents should use in formulating their response.  
*Response: Both the Word version and the RFCSP pdf document request Respondents to provide three (3) completed projects within the last fifteen (15) years where key personnel have participated in a minimum of one (1) of the three (3) projects listed.*
- 78. Question:** The bollard detail that is referenced on sht. CH-1 as 11/S-18 is not correct. Detail 11/S-18 is a Light Pole Base. I found SAWS bollard detail DD-903-20 on the internet for the 13 ea. bollards at the Pump Station on PS-1, but I don't find another reference to bollard details on the other bollards that are located on C-7.  
*Response: SAWS Detail DD-903-20 shall be used for the Project as noted on Sheet C-7. Call out error on Sheet CH-1 has been revised. See Item No. 9 in the CHANGES TO THE PLANS section of this addendum.*
- 79. Question:** It is also unclear which stairs are included in the Tank manufacturer package. It is my understanding that the tank manufacturers often times do not include the stairs (leaving the General Contractors scrambling at the last minute for pricing from Misc. Metals fabricators.)  
*Response: Stairs associated with chemical tanks are to be supplied by the Tank Manufacturer. Any stair or platform components that would need to be supported by the Tank need to be accounted for in the Tank Manufacturer's structural calculations. See Item No. 14 in the CHANGES TO THE SPECIFICATIONS section in this addendum.*
- 80. Question:** Although you have extended the bid date and the lack of addressing some issues-will you please consider extending the question deadline to at least five days prior to the 01/26/2023 Bid Date?  
*Response: Unfortunately, the question deadline cannot be extended further at this time. However, if a question is received after the deadline, Contracting will forward to the Engineer who will review and provide a response if warranted.*

<b>CHANGES TO THE SPECIFICATIONS</b>
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- 1. Section 09 96 00.01 High-Performance Coatings, Paragraph 3.17**  
Delete Coating System No. 4 "Electrical Equipment – Exterior" in its entirety.

2. **Section 10 73 16.13 Aluminum Canopy Structures**  
Add Section 10 73 16.13 Aluminum Canopy Structures included in this addendum.
3. **Section 26 42 00.01 Cathodic Protection, Paragraph 1.01.A.1**  
**Delete:** “The cathodic protection system will be impressed current or both.”  
**Replace with:** “The cathodic protection system will be impressed current.”
4. **Section 31 05 13 Soils for Earthwork**  
**Delete** Section 31 05 13 Soils for Earthwork in its entirety and **replace with** the revised Section 31 05 13 Soils for Earthwork included in this addendum.
5. **Section 31 11 00 Site Clearing and Grubbing**
  - a. **Paragraph 1.02**  
**Add:** “B. Section 31 23 16 – Excavation”
  - b. **Paragraph 3.05**  
**Delete:** “A. Excavate subsoils from areas to be re-graded for the entire site, without mixing with foreign materials.”
  - c. **Paragraph 3.05**  
**Delete:** “D. Remove subsoil from site.”
6. **Section 31 23 23 Embankment**  
**Delete** Section 31 23 23 Embankment in its entirety and **replace with** the revised Section 31 23 23 Embankment included in this addendum.
7. **Section 32 11 23 Aggregate Base Course**  
Add Section 32 11 23 Aggregate Base Course included in this addendum.
8. **Section 32 11 24 Geogrid**  
Add Section 32 11 24 Geogrid included in this addendum.
9. **Section 32 12 16 Asphalt Paving**  
Add Section 32 12 16 Asphalt Paving included in this addendum.
10. **Section 32 12 43 Porous Flexible Paving**  
**Delete** Section 32 12 43 Porous Flexible Paving in its entirety and **replace with** the revised Section 32 12 43 Gravel Paving included in this addendum.
11. **Section 32 40 20 Concrete Energy Dissipators**  
Add Section 32 40 20 Concrete Energy Dissipators included in this addendum.
12. **Section 33 01 03 Supports and Hangers, Paragraph 2.01.G.3**  
**Delete:** “All anchor bolts shall be 316L stainless steel.”  
**Replace with:** “All anchor bolts shall be 316L or 304 stainless steel.”
13. **Section 44 42 56.02 Vertical Turbine Pumping Units**
  - a. **Attachment A**  
**Delete:** “THIS FORM MUST BE RETURNED WITH YOUR BID”  
**Replace with:** “THIS FORM MUST BE SUBMITTED WITHIN THREE BUSINESS DAYS AFTER PROPOSAL DEADLINE”
  - b. **Attachment B**  
**Delete:** “THIS FORM MUST BE RETURNED WITH YOUR BID”  
**Replace with:** “THIS FORM MUST BE SUBMITTED WITHIN THREE BUSINESS DAYS AFTER PROPOSAL DEADLINE”

- 14. Section 44 42 76, Fiberglass Reinforced Plastic Chemical Storage Tanks, Paragraph 1.04.A.3.a.1**
- a. Delete:** “1) Design computations or complete structural analysis of FRP tanks, and FRP access platform signed and sealed by professional engineer.”  
**Replace with:** “1) Design computations or complete structural analysis of FRP tanks, and aluminum access platform signed and sealed by professional engineer.”
- b. Add:** “Tank Manufacturer shall be responsible for procuring the associated stair(s) and platform(s) for the tanks specified herein. The Tank Schedule provided within this Section specifies which tanks require stairs and platforms.”

<b>CHANGES TO THE PLANS</b>
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- 1. Sheet C-3 Demolition Details I**  
**Delete** Sheet C-3 in its entirety **and replace with** revised Sheet C-3 included in this addendum.
- 2. Sheet C-4 Demolition Details II**  
**Delete** Sheet C-4 in its entirety **and replace with** revised Sheet C-4 included in this addendum.
- 3. Sheet C-8 Construction Sequencing Plan I**  
**Add:** Note By Symbol 31 call out pointing to existing electrical switchgear.
- 4. Sheet C-10 Site Grading Plan I**  
**Delete** Sheet C-10 in its entirety **and replace with** revised Sheet C-10 included in this addendum.
- 5. Sheet C-12 Horizontal Control Plan I**  
**Delete** Sheet C-12 in its entirety **and replace with** revised Sheet C-12 included in this addendum.
- 6. Sheet C-21A Drainage Miscellaneous Details III**  
**Add** Sheet C-21A Drainage Miscellaneous Details III included in this addendum.
- 7. Sheet C-21B Drainage Miscellaneous Details IV**  
**Add** Sheet C-21B Drainage Miscellaneous Details IV included in this addendum.
- 8. Sheet C-23 Roadway Miscellaneous Details**  
**Delete** Sheet C-23 in its entirety **and replace with** revised Sheet C-23 included in this addendum.
- 9. Sheet CH-1 Sodium Hypochlorite Generation System Overall Plan, Note by Symbol 12**  
**Delete:** “12. BOLLARDS, TYP. SEE DTL. 11/S-18”  
**Replace with:** “12. BOLLARDS, TYP. SEE SAWS DTL. DD-903-20”
- 10. Sheet A-4 Electrical Building Exterior Elevations, Detail 4**  
**Delete:** “9. FRP – FIBERGLASS REINFORCED PANEL CEILING”
- 11. Sheet PL-4 Sodium Hypochlorite Generation Building Floor Plan**  
**Delete** Sheet PL-4 in its entirety **and replace with** revised Sheet PL-4 included in this addendum.
- 12. Sheet E-4 Site Layout – Modification**  
**Delete** Sheet E-4 in its entirety **and replace with** revised Sheet E-4 included in this addendum.
- 13. Sheet E-5, Site Lighting Plan**
  - a. Move** electrical manholes EMH-3 and EMH-6 as modified on Drawing E-4 included in this addendum.
  - b. Move** electrical manholes EMH-9 and EHH-5 as modified on Drawing E-4 included in this addendum.
  - c. Move** electrical manholes EMH-8 and EHH-4 as modified on Drawing E-4 included in this addendum.
  - d. Move** electrical manholes EMH-13 and EHH-9 as modified on Drawing E-4 included in this addendum.

14. **Sheet E-6, Site Security Plan**
  - a. **Move** electrical manholes EMH-3 and EMH-6 as modified on Drawing E-4 included in this addendum.
  - b. **Move** electrical manholes EMH-9 and EHH-5 as modified on Drawing E-4 included in this addendum.
  - c. **Move** electrical manholes EMH-8 and EHH-4 as modified on Drawing E-4 included in this addendum.
  - d. **Move** electrical manholes EMH-13 and EHH-9 as modified on Drawing E-4 included in this addendum.
  
15. **Sheet EA-4 4160V MVMCC-A One-Line Diagram**  
**Delete** Sheet EA-4 in its entirety **and replace with** revised Sheet EA-4 included in this addendum.
  
16. **Sheet EA-5 MVMCC-B One-Line Diagram**  
**Delete** Sheet EA-5 in its entirety **and replace with** revised Sheet EA-5 included in this addendum.
  
17. **Sheet EA-6 Load Summary**  
**Delete** Sheet EA-6 in its entirety **and replace with** revised Sheet EA-6 included in this addendum.
  
18. **Sheet EB-3 Electrical Building Lower Level Cabletray, Lighting & Receptacle Plan, General Notes**
  - a. **Add:** GENERAL NOTE 5. PROVIDE 36" WIDE BY 6" HIGH CABLE TRAY FOR MEDIUM VOLTAGE CONDUCTORS.
  - b. **Add:** GENERAL NOTE 6. PROVIDE 36" WIDE BY 6" HIGH CABLE TRAY FOR LOW VOLTAGE AND CONTROL CONDUCTORS. PARTITION THE CABLE FOR POWER AND CONTROL WIRING PER SPECIFICATON.
  
19. **Drawing EB-9, SCP & PLC Interface Diagram – II**
  - a. For the "POWER METERS" section under the column header "DESCRIPTION:"  
**Delete:** Tag "SWITCHGEAR PM1-A"  
**Replace with:** Tags "FP1-MVSWGR-1A" and "FP1-MVSWGR-1B"
  - b. For the "POWER METERS" section under the column header "DESCRIPTION:"  
**Delete:** Tag "SWITCHGEAR PM1-B"  
**Replace with:** Tags "FP1-SWGR-P1" and "FP1-SWGR-P2"
  - c. For the "MV MCC A&B" block under the column header "FIELD WIRING:"  
**Add** tags "M1" to the right of block "MV MCC A&B" and "SCP-160A" to the right of "CABLE TRAY" block for the device FP1-MVSWGR-1B.
  - d. For the "MV MCC A&B" block under the column header "FIELD WIRING:"  
**Add** tags "M1" to the right of block "MV MCC A&B" and "SCP-161A" to the right of "CABLE TRAY" block for the device FP1-SWGR-P2.
  - e. For the "MOTOR CONTROL CENTER" section under the column header "DESCRIPTION:"  
**Delete:** Tag "PQM1-LEFT MCC-1"  
**Replace with:** Tag "PM1-MCC-1A"
  - f. For the "MOTOR CONTROL CENTER" section under the column header "DESCRIPTION:"  
**Delete:** Tag "PQM1-RIGHT MCC-1"  
**Replace with:** Tag "PM1-MCC-1B"
  
20. **Drawing ED-2, MCC-2 ONE-LINE DIAGRAM**
  - a. For power monitor meter on left side:  
**Delete:** "PM-1 PML-1"  
**Replace with:** "PM-MCC2-ML PM1"
  - b. For power monitor meter on right side:  
**Delete:** "PM-1 PMR-1"  
**Replace with:** "PM-MCC2-MR PM1"
  
21. **Drawing I-3, FACILITY NETWORK DIAGRAM-I, Device Tags:**
  - a. **Delete:** "PM1-A"  
**Replace with:** "PM1-MCC-1A"
  - b. **Delete:** "PM1-B"  
**Replace with:** "PM1-MCC-1B"

- c. **Delete:** “FP1-A”  
**Replace with:** “FP1-MVSWGR-1A”
- d. **Delete:** “FP1-B”  
**Replace with:** “FP1-MVSWGR-1B”
- e. **Add:** Feeder protection relay device block with the tag “FP1-SWGR-P1” under feeder protection relay device block with the tag “FP1-MVSWGR-1B” to be provided under Division 26. Show connected to “ESW-RDPMMAIN” with Category 6 (CAT6) cable.
- f. **Add:** Feeder protection relay device block with the tag “FP1-SWGR-P2” under feeder protection relay device block with the tag “FP1-SWGR-P1” to be provided under Division 26. Show connected to “ESW-RDPMMAIN” with Category 6 (CAT6) cable.

**22. Drawing I-4, FACILITY NETWORK DIAGRAM-II, Device Tags:**

- a. **Delete:** “PM-MCCI-ML”  
**Replace with:** “PM-MCC2-ML”
- b. **Delete:** “PM-MCCI-MR”  
**Replace with:** “PM-MCC2-MR”
- c. **Delete:** “UPS\_RDPCHEM”  
**Replace with:** “UPS-RDPCHEM”

<b>END OF ADDENDUM</b>
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This Addendum is fifty-eight (58) pages in its entirety.

**Attachments:**

- 1) Section 10 73 16.13 Aluminum Canopy Structures
- 2) Section 31 05 13 Soils for Earthwork
- 3) Section 31 23 23 Embankment
- 4) Section 32 11 23 Aggregate Base Course
- 5) Section 32 11 24 Geogrid
- 6) Section 32 12 16 Asphalt Paving
- 7) Section 32 12 43 Gravel Paving
- 8) Section 32 40 20 Concrete Energy Dissipators
- 9) Sheet C-3 Demolition Details I
- 10) Sheet C-4 Demolition Details II
- 11) Sheet C-10 Site Grading Plan I
- 12) Sheet C-12 Horizontal Control Plan I
- 13) Sheet C-21A Drainage Miscellaneous Details III
- 14) Sheet C-21B Drainage Miscellaneous Details IV
- 15) Sheet C-23 Roadway Miscellaneous Details
- 16) Sheet PL-4 Sodium Hypochlorite Generation Building Floor Plan
- 17) Sheet E-4 Site Layout – Modification
- 18) Sheet EA-4 4160V MVMCC-A One-Line Diagram
- 19) Sheet EA-5 MVMCC-B One-Line Diagram
- 20) Sheet EA-6 Load Summary



*Estella Cota Trevino*

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Estella Cota-Trevino, P.E.  
Freese and Nichols, Inc.

## SECTION 10 73 16.13

### ALUMINUM CANOPY STRUCTURES

#### 1.00 GENERAL

#### 1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment and incidentals necessary to design, fabricate and erect all aluminum canopy structures as indicated on the Drawings and specified by these performance specifications.

#### 1.02 QUALITY ASSURANCE

##### A. Acceptable Manufacturers:

1. All products shall be the standard components as manufactured by a company who is in the business of manufacturing pre-engineered aluminum structures. While these performance specifications describe the parameters essential for the structures indicated, each manufacturer is expected to use his building components and design techniques to the best advantage. To this end, Architect will accept minor deviation to specifications to permit manufacturer to furnish standard product.
2. Products that comply with the specifications by the following manufacturers, or approved equal, will be acceptable:
  - a. Avadek Walkway Covers, Houston, Texas 77598
  - b. Dittmer Architectural Aluminum, Winter Springs, Florida 32708.
  - c. Mapes Architectural Canopies, Lincoln, Nebraska 68514.
  - d. Austin Mohawk and Company, Inc., Utica, New York 13501.
  - e. Perfection Architectural Systems, Inc., Orlando, Florida 32807.
  - f. Superior Mason Products, LLC., Birmingham, Alabama 35211.

- B. Design and Certification: Manufacturer shall have a licensed professional engineer design the structural system in regard to the minimum design loads specified herein. The canopy structure shall be certified by the licensed professional engineer by signing and sealing the design calculations and Shop Drawings for this Project.

- C. Experience Requirements: The installer shall be a franchised representative of the manufacturer, otherwise shall be approved in writing by the manufacturer as a qualified and experienced installer of the structures of the type specified. The installer shall be experienced in installations of this type and shall provide documentation of at least five other installations of the same type.

##### D. Design Criteria:

1. Entire canopy design shall comply with the requirements of 2018 International Building Code, ASCE 7-16, and local and state codes and regulations.
2. The canopy system shall consist of a cover and structural system which incorporates an internal drainage system. Canopy/roof structures shall be designed and manufactured for the loads indicated on the Drawings but not less than specified code requirements.
3. Design Load Combinations shall be in accordance with specified codes.



- E. Roof panels shall comply with UL 90 uplift specifications.
- F. The canopy system shall be designed as an unbraced rigid frame. The design shall assume a pin connection between column base plate and the top of foundation slab.

### 1.03 SUBMITTALS

- A. Submittals shall be in accordance with Section 01330 "Submittal Procedures" and shall include:
  - 1. Shop Drawings showing complete dimensions, signed and sealed by a licensed professional engineer.
  - 2. Product Data sheets.
  - 3. Specifications.
  - 4. Installer qualifications.
  - 5. Anchor bolt setting plan.
  - 6. Structural design analysis, signed and sealed by a licensed professional engineer.

### 1.04 REFERENCES AND STANDARDS

- A. The applicable provisions of the following standards shall apply as if written here in their entirety:
  - 1. American Welding Society (AWS) specification:
    - a. AWS D1.2: Structural Welding Code – Aluminum.
  - 2. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) publications:
    - a. Architectural Sheet Metal Manual.
  - 3. Underwriter's Laboratories (UL) publications:
    - a. "Tests for Uplift Resistance of Roof Assemblies."
    - b. "Class 90 Rating for Wind Resistance Construction."
  - 4. International Code Council, Inc. (ICC):
    - a. "International Building Code," referenced edition.
  - 5. The Aluminum Association (AA) publications:
    - a. "Designation System for Aluminum Finishes."

### 1.05 DELIVERY AND STORAGE

- A. All components shall be delivered to the Site inside protective crates. Store on wood runners above grade. Small parts shall be packaged separately in sealed cardboard cartons. Protect aluminum surfaces from damage.

### 1.06 JOB CONDITIONS

- A. Make complete field measurements prior to fabrication of components. Verify bolt setting dimensions. Fabricate all components in regard to field measurements.

## 1.07 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-canopy structure that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes and other materials beyond normal weathering.
    - d. Water penetration through roofing and framing areas.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

## 2.00 PRODUCTS

### 2.01 MATERIALS

- A. Aluminum: Extruded aluminum 6061-T6 and/or 6063-T6 with AA M 10C 22A 31, clear anodized finish.
- B. Deck Screws: Type 18-8 stainless steel, with neoprene washer.
- C. Miscellaneous Fasteners: Type 18-8 stainless steel of the appropriate size and type.
- D. Rivets: Aluminum pop rivets, as appropriate.
- E. Aluminum Deck: Extruded, self-flashing sections which interlock into a positive roll-lock, forming a composite unit, forming a water tight surface.
- F. Beams: Open top, drainage type, extruded aluminum, Type 6063-6, size as required.
- G. Fascia: 0.070-inch (minimum) extruded aluminum side and end fascias, manufacturer's standard configuration.

### 2.02 FABRICATION

- A. Structural elements shall be factory heli-arc welded with neatly formed mitered corners into a one-piece rigid bent. Surfaces in contact with concrete shall be coated with bituminous mastic.
- B. Entire roof system shall be designed for drainage, with water travelling across the roof deck and into open top beams, to downspouts at ends of U Beams. Provide welded end plates at each beam. U beams shall be welded into a complete component to a watertight unit.
- C. Drainage system may consist of drainage from the U Beam structure by means of an outlet leading to a downspout or manufacturer may use a perimeter rain gutter formed by the fascia units.
- D. Size of U beams, and fascia shall be determined by the manufacturer to correspond to the spans and bent spacings noted on the Drawings. Decks shall slope slightly toward open top beams and the beams shall slope from one side toward the gutter side.

**3.00 EXECUTION**

**3.01 INSTALLATION**

- A. Set structural system level and plumb. Attach deck to supporting beams with appropriate fasteners. Attach end and side fascias around perimeter of roof surface.
- B. Coat aluminum exposed to concrete per Section 03300 "Cast-In-Place Concrete."

**END OF SECTION**

## SECTION 31 05 13

### SOILS FOR EARTHWORK

#### PART 1.00 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Subsoil Materials.

##### 1.02 RELATED SECTIONS

- A. Section 31 23 16 – Excavation.
- B. Section 31 23 23 – Embankment.

##### 1.03 REFERENCES

AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft<sup>3</sup>.
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 6,000 ft-lbf/ft<sup>3</sup>.
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

##### 1.04 SUBMITTALS FOR INFORMATION

- A. Materials Source: Submit name of imported materials source.

#### PART 2.00 – PRODUCTS

##### 2.01 SOURCE QUALITY CONTROL

- A. Testing and Analysis of Subsoil Material: Perform in accordance with AASHTO T180, ASTM D698, ASTM D1557, and ASTM D2487.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.
- D. Refer to City of San Antonio Standard Specifications for Construction ITEMS, 515 (topsoil), 516 (sodding).

#### PART 3.00 – EXECUTION

##### 3.01 SOIL REMOVAL

- A. Excavate subsoil and subgrade from areas designated.
- B. Remove lumped soil, boulders, debris, and rock.

- C. All shrubs and trees shall be completely uprooted and relocated to other parts of the site planned to be landscaped or off-site for proper disposal only if indicated on drawings to do so.
- D. Remove and properly dispose excavated material from site.

### 3.02 STOCKPILING

- A. Stockpile materials on site at locations indicated by the field inspector.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials. Protect stockpiled material with storm water pollution prevention measures.

### 3.03 STOCKPILE CLEANUP

- A. Remove stockpile; leave area in a clean and neat condition. Grade site surface to prevent freestanding surface water.
- B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.
- C. Preparation of the Slope: Smoothly and uniformly graded the surface of the slopes and areas to receive grass to the slopes and grades as indicated with a tolerance of plus or minus 2 inched prior to grassing. Lightly scarify, wet, and roll the areas to be grassed prior to placement of the grass.

### 3.04 SITE PREPARATION

- A. Foundation Structures:
  - a. In the foundation footprint areas, vegetation, roots and all objectionable materials shall be stripped from the surface. For a conventional slab-on-grade foundation, all of the fill materials and fat clay subgrade soils be undercut and replaced with select fill to reduce the potential vertical rise to approximately 1-inch.
  - b. The stripping and excavation shall extend approximately 5-feet beyond the perimeter of the foundations and be level at the bottom. The exposed subgrade shall be proof-rolled with a minimum 20-ton rubber tire dump truck or loader under the supervision of the Field Inspector to detect any soft areas prior to select fill placement. If any soft pockets or pumping areas are identified, the soft materials shall be removed to expose firm materials and the excavation replaced with compacted Select Fill.
  - c. Upon completion of the proof rolling, the upper 12-inches of exposed subgrade soils shall be compacted to at least 95-percent of the standard proctor maximum dry density (ASTM D698) and at or above the optimum moisture content. The Geotechnical Engineer must approve the subgrade condition prior to select fill placement.
  - d. Upon completion of the subgrade preparation, compacted select fill soils shall be placed to fill the undercut excavations. Any additional fill required to raise the pads to the final grade elevation shall be select fill. The select fill pads shall extend a minimum of 5-feet outside the perimeter of the proposed structures. Excavation of

beams, footings and utility trenches may proceed after placement of select fill is complete.

- e. Select Fill shall consist of imported crushed limestone base. Imported limestone select fill shall meet the plasticity and gradation requirements set forth in the Texas Department of Transportation (TxDOT) Standard specifications 2014; Item 427, Type A, Grade 1-2. Select fill soils shall be placed in no greater than 8-inch-thick loose lifts and shall be compacted to at least 95 percent of the maximum dry density as determined by the modified Proctor (ASTM D-1557). The moisture content of the select fill shall be maintain within 2 percentage points of the optimum moisture content.

B. Pavement Structures:

a. ASPHALT PAVEMENT

- i. Refer to Section 32 12 16 for asphalt application requirements.
- ii. Refer to Section 32 11 23 for base course application requirements.
- iii. After all surface organics and deleterious materials have been removed and the subgrade elevation as detailed has been achieved, the upper 12-inches of exposed subgrade soils shall be compacted to a minimum density of 95-percent of the maximum dry unit weight of the subgrade soils as determined by a standard Proctor test (ASTM D698) and between optimum and plus 4-percentage points of the optimum moisture content.

b. POROUS GRAVEL PAVEMENT

- i. Refer to Section 32 11 23 for base course application requirements.
- ii. After all surface organics and deleterious materials have been removed and the subgrade elevation as detailed has been achieved, the upper 12-inches of exposed subgrade soils shall be compacted to a minimum density of 95-percent of the maximum dry unit weight of the subgrade soils as determined by a standard Proctor test (ASTM D698) and between optimum and plus 4-percentage points of the optimum moisture content.

**SECTION 31 23 23**  
**EMBANKMENT**

**PART 1.00 - GENERAL**

1.01 SECTION INCLUDES

- A. Backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Fill under slabs and on-grade pavement.
- D. Fill for over-excavation.
- E. Consolidation and compaction as scheduled.

1.02 RELATED SECTIONS

- A. Section 31 05 13 - Soils for Earthwork.
- B. Section 31 23 16 - Excavation.

1.03 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.
- B. ASTM International:
  - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft<sup>3</sup>.
  - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
  - 3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 6,000 ft-lbf/ft<sup>3</sup>.
  - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  - 7. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

**PART 2.00 – PRODUCTS – Not Used**

## **PART 3.00 - EXECUTION**

### **3.01 SITE PREPARATION**

#### **A. Foundation Structures:**

- a. In the foundation footprint areas, vegetation, roots and all objectionable materials shall be stripped from the surface. For a conventional slab-on-grade foundation, all of the fill materials and fat clay subgrade soils be undercut and replaced with select fill to reduce the potential vertical rise to approximately 1-inch.
- b. The stripping and excavation shall extend approximately 5-feet beyond the perimeter of the foundations and be level at the bottom. The exposed subgrade shall be proof-rolled with a minimum 20-ton rubber tire dump truck or loader under the supervision of the Field Inspector to detect any soft areas prior to select fill placement. If any soft pockets or pumping areas are identified, the soft materials shall be removed to expose firm materials and the excavation replaced with compacted Select Fill.
- c. Upon completion of the proof rolling, the upper 12-inches of exposed subgrade soils shall be compacted to at least 95-percent of the standard proctor maximum dry density (ASTM D698) and at or above the optimum moisture content. The Geotechnical Engineer must approve the subgrade condition prior to select fill placement.
- d. Upon completion of the subgrade preparation, compacted select fill soils shall be placed to fill the undercut excavations. Any additional fill required to raise the pads to the final grade elevation shall be select fill. The select fill pads shall extend a minimum of 5-feet outside the perimeter of the proposed structures. Excavation of beams, footings and utility trenches may proceed after placement of select fill is complete.
- e. Select Fill shall consist of imported crushed limestone base. Imported limestone select fill shall meet the plasticity and gradation requirements set forth in the Texas Department of Transportation (TxDOT) Standard specifications 2014; Item 427, Type A, Grade 1-2. Select fill soils shall be placed in no greater than 8-inch-thick loose lifts and shall be compacted to at least 95 percent of the maximum dry density as determined by the modified Proctor (ASTM D-1557). The moisture content of the select fill shall be maintain within 2 percentage points of the optimum moisture content.

#### **B. Pavement Structures:**

- a. After all surface organics and deleterious materials have been removed and the desired subgrade elevation has been achieved, the upper 12-inches of exposed subgrade soils shall be compacted to a minimum density of 95-percent of the maximum dry unit weight of the subgrade soils as determined by a standard Procter test (ASTM D698) and between optimum and plus 4-percentage points of the optimum moisture content.

#### **C. General Site Fill:**

- a. Embankment construction operations for drainage features will comply with TxDOT item 204, item 210, and item 216. Any soft soil identified at the subgrade elevation shall be removed to expose stiff soils and the excavation backfilled with approved material. The upper 12-inches of exposed subgrade soils shall be scarified, moisture conditions, and compacted to the minimum density of 95-percent of the maximum dry unit weight of the subgrade soils as determined by the standard Procter test (TEX 114E) at the required moisture content.
- b. Embankment fill shall consist of onsite soils or imported clayey soils and be places in no greater than 12 inch thick loose lifts, however, equipment type and material compositions may require that the lift thickness be reduced as required to achieve the specific compactions. The slopes shall be



slightly over-built and then bladed to the required grade. Imported embankment fill soils shall have a maximum plasticity index of 35.

### 3.02 BACKFILLING

- A. Select Fill shall consist of imported crushed limestone base. Imported limestone select fill shall meet the plasticity and gradation requirements set forth in the Texas Department of Transportation (TxDOT) as mentioned above.
- B. Native Fill Soils (Existing On-Site Soils) shall consist of gravelly flat clay, sandy lean clay, lean clay, clayey sand fill, lean clay with sand fill, fat clay. Native Fill soils are not considered suitable Select Fill soils unless approved by the Geotechnical Engineer. Native Fill soils are not considered specified Imported Select Fill soils unless they strictly meet the requirements of Select Fill specified the Geotechnical Engineer.
- C. Soils with USCS Classification OL, MH, CH and OH are unsuitable for use as backfill.
- D. Backfill areas to contours and elevations with unfrozen materials.
- E. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- F. Employ a placement method that does not disturb or damage other work.
- G. Slope grade away from improvements.
- H. Make gradual grade changes. Blend slope into level areas.
- I. Remove surplus backfill materials from site.
- J. Leave fill material stockpile areas free of excess fill materials.

### 3.03 TOLERANCES

- A. Top Surface of Backfilling under paved areas: Plus, or minus 1/10 inch from required elevations.
- B. Top Surface of General Backfilling Plus or minus 1/2 inch from required elevations.

### 3.04 FIELD QUALITY CONTROL

- A. Testing will be performed in accordance with ASTM D-2922 or D-1556.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests:
  - 1. As recommended by the testing laboratory and agreed to by the field inspector.

### 3.05 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic.

**- END OF SECTION -**

## SECTION 32 11 23

### AGGREGATE BASE COURSE

#### PART 1 - GENERAL

##### 1.1 SCOPE OF WORK

- A. Furnish all tools, qualified labor, materials, equipment, qualified superintendence and all services, transportation, other incidentals, assurances and guarantees, assumptions of risk, and responsibility for the performance of all aggregate base course work as indicated on the Construction Drawings. Complete work as specified herein.

##### 1.2 SECTION INCLUDES

- A. Aggregate base course.
- B. Aggregate subbase.
- C. Prime coat.

##### 1.3 RELATED SECTIONS

- A. Section 31 05 13 – Soils for Earthwork.
- B. Section 31 23 23 – Embankment.
- C. Section 32 12 16 – Asphalt Paving.
- D. Section 32 13 13 – Concrete Paving.

##### 1.4 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
  - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.
  - 3. AASHTO T210 – Standard Method of Test for Aggregate Durability Index.
- B. American Society of Testing Materials International (ASTM):
  - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>).
  - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
  - 3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>).
  - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 6. ASTM D2940 - Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
  - 7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  - 8. ASTM C88 – Test of Soundness of Aggregate Using Sodium Sulfate or Magnesium Sulfate.

9. ASTM C131 – Standard Test Methods for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

## **1.5 SUBMITTALS**

- A. Product Data: Submit aggregate gradation, prime coat data as specified and herbicide data (if required).
- B. Materials Source: Submit name of aggregate materials suppliers.
- C. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.

## **1.6 QUALITY ASSURANCE**

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with City of San Antonio Standards.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. For asphaltic concrete pavement sections: Flexible base course shall be crushed stone base course Type A, Grade 1-2 conforming to TxDOT Standard Specifications 2014, Item 247 – Flexible Base. Refer to *Section 32 12 16 – Asphalt Paving* for additional information.
- B. For gravel pavement sections: Sandy gravel material. Refer to *Section 32 12 43 – Gravel Paving* for additional information.
- C. Prime coat shall be a MC-30, AE-P, EAP&T, or PCE conforming to TxDOT Standard Specifications 2014, Item 310 – Prime Coat or Item 314 – Emulsified Asphalt Treatment as well as Item 300 – Asphalts, Oils or Emulsions.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify compacted subgrade is dry and ready to support paving and imposed loads.
  1. Remove soft subgrade and replace with compacted select fill as specified in *Section 31 05 13 – Soils for Earthwork*
- B. Verify subgrade has been inspected, gradients and elevations are correct.

### **3.2 PREPARATION**

- A. Correct irregularities in subgrade gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place select fill on soft, muddy, or frozen surfaces.

### **3.3 AGGREGATE PLACEMENT**

- A. Flexible base course shall be placed in lifts with a maximum thickness of 8-inches and compacted to a minimum 98 percent of the maximum dry density at a moisture content range 2 percentage

points below and 2 percentage points above the optimum moisture content as determined by ASTM D-1557.

- B. Subbase material shall be placed in loose layers not exceeding 8 inches in thickness and compacted to a minimum of 95 percent of its maximum dry density at a moisture content as determined by ASTM D1557.
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- E. Maintain optimum moisture content of fill materials to attain specified compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

**3.4 PRIME COAT PLACEMENT**

- A. Apply prime coat in accordance with manufacturer’s instructions and in accordance to City of San Antonio Standards.
- B. Prime coat application rates are typically between 0.1 to 0.3 gal/sy and are generally dependent upon the absorption rate of the granular base and other environmental conditions at the time of placement.
- C. Apply primer to contact surfaces of curbs, gutters, and site structures.
- D. Use clean sand to blot excess prime coat.
- E. Prime coat is subsidiary to this item and will not be paid for separately.

**3.5 TOLERANCE**

- A. Maximum Variation from Flat Surface: 1/4 inch measured with 10-foot straight edge.
- B. Maximum Variation from Thickness: 1/4 inch.
- C. Maximum Variation from Elevation: 1/2 inch.

**3.6 FIELD QUALITY CONTROL**

- A. Compaction testing will be performed in accordance with ASTM D1557.
- B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests: One test for every 200 square yards of each layer of compacted aggregate.

**Table 3.6.1 – Quality Control for Aggregate Base Courses**

Test Type	Applicable Standard
At least <b>one (1)</b> Laboratory Compaction Characteristics of Soil using Modified Effort (Proctor) for each type of material encountered or import material used.	ASTM D 1557 and/or ASTM D 698

Test Type	Applicable Standard
<p>At least <b>one (1)</b> Soil Classification (Sieve Analysis and Atterberg Limits Test) for each type of material encountered or import material used.</p> <p><b>NOTE:</b> Additional soil classification shall be requested by the general contractor during the earthwork operations to further evaluate that the fill materials are maintained within the specified requirements for the applicable fill soil material.</p>	<p>ASTM D 6938</p> <p>And/or</p> <p>ASTM D 4318</p>
<p>A minimum of <b>one (1)</b> density test for every 2,500 square feet of each aggregate compacted layer.</p>	<p>ASTM D 1556</p> <p>and/or</p> <p>ASTM D 6938</p>

- END OF SECTION 32 11 23 -

## SECTION 32 11 24

### GEOGRID

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Geogrid

##### 1.2 RELATED SECTIONS

- A. Section 31 11 23 – Aggregate Base Courses.
- B. Section 32 12 16 – Asphalt Paving.

##### 1.3 DESCRIPTION

- A. The geogrid shall be manufactured from a punched polypropylene sheet, which is then oriented in three substantially equilateral directions so that the resulting ribs shall have a high degree of molecular orientation, which continues at least in part through the mass of the integral node.

#### PART 2 PRODUCTS

##### 2.1 GEOGRID PROPERTIES

- A. Geogrid material shall conform to the properties listed on Table 2.1.

**Table 2.1 – Geogrid properties**

Index Properties	Longitudinal (inches)	Diagonal (inches)	Transverse (inches)	General
Rib Pitch	1.60	1.60	-	-
Mid-Rib Depth	-	0.05	0.05	-
Mid-Rib Width	-	0.04	0.05	-
Rib Shape	-	-	-	Rectangular
Aperture Shape	-	-	-	Triangular

#### PART 3 EXECUTION

##### 3.1 DIMENSIONS, DELIVERY AND STORAGE

- A. The geogrid shall be delivered to the jobsite in roll form with each roll individually identified and nominally measuring 9.8-ft and/or 131.1-ft in width and 256-ft in length.
- B. Contractor shall check the geogrid roll labels to verify that the intended product has been received. Contractor shall inspect the geogrid to ensure it is free of flaws or damage that may have occurred during shipping or handling. Confirm that the correct quantities have been delivered.

- C. Store the geogrid rolls in a manner that prevents excessive mud, wet concrete, epoxy or other deleterious materials from coming in contact with and affixing to the geogrid. Store geogrids above -20 F and avoid handling below 14 F. Geogrids may be stored uncovered for up to six months in direct exposure to sunlight without any loss in certifiable structural properties. Contractor shall contact the supplier if longer exposure is anticipated. Geogrids can be stored vertically (rolls stood on end) or horizontally in stacks not exceeding five rolls high.

### **3.2 PREPARATION**

- A. Clear, grub and excavate to the design subgrade elevations, stripping topsoil, deleterious debris and unsuitable material from the site.
- B. Smooth grade and compact the soils using appropriate compaction equipment.
- C. Place the rolls of geogrid in position, cut the roll bands and manually unroll the material over the prepared surface. It is recommended that a representative from the supplier be present to observe the preparation of the soils receiving the placement of the geogrid.

### **3.3 GEOGRID PLACEMENT**

- A. Unroll the geogrid in the direction of travel so that the long axis of the roll is parallel with channelized traffic patterns.
- B. Overlap adjacent rolls along their sides and ends.
- C. Overlap geogrids in the direction the fill placement will be spread to avoid peeling of geogrid at overlaps by the advancing fill. Place rolls at the far end of the coverage area first, and work toward the near end form where the fill will be advanced.
- D. Cut and overlap the geogrid to accommodate curves. Cutting may be done with sharp shears, a knife-like implement or handheld power saw. Cut grid to conform to manhole covers and other immovable protrusions.
- E. Place geogrids in daily work sections so that proper alignment is maintained.
- F. The geogrid in some cases, especially in colder days, will exhibit roll memory where the product may roll back upon cutting or reaching the end of the roll. Contractor must ensure the geogrid lies flat during fill placement. This can be achieved by using sod staples, zip ties or simply adding a shovelful of fill to weigh the product down.

### **3.4 TENSIONING AND PINNING**

- A. Geogrids may be anchored in place to maintain overlaps and alignment over the coverage area. Before fully unrolling the geogrid, anchor the beginning of the roll, in the center and at the corners, to the underlying surface.
- B. Anchor the geogrid with small piles of aggregate fill or a washer and pin.
- C. Unroll the geogrid, align it and pull it taut to remove wrinkles and laydown slack with hand tension, then secure in place.
- D. When aggregate fill is spread by pushing it over the geogrid with heavy equipment, such as bulldozers, the shoving action may create a wave in the sheet of geogrid ahead of the advancing fill. Shoveled fills or pins can trap this wave and force the geogrid up into the aggregate layer

where it can be damaged by spreading equipment. Pulling the geogrid taut will mitigate laydown slack, thereby removing the waving. If significant waving occurs, the pins or shoveled material shall be removed to allow the waves to dissipate at the ends and edges of the roll.

### **3.5 DUMPING AND SPREADING AGGREGATE FILL**

- A. At least 6-inches is required for the initial lift thickness of aggregate fill over the geogrid.
- B. Do not drive tracked equipment directly on the geogrid. Ensure at least 6-inches of aggregate fill is spread between the geogrid and tracked equipment.
- C. Only operate rubber-tired equipment directly on the geogrid if the underlying subsoil is not prone to rutting under limited construction traffic.
- D. Care shall be taken to not catch the dozer blade or other equipment on the geogrid. The dozer blade shall be raised gradually as each lift is pushed over the geogrid.

**END OF SECTION**



## SECTION 32 12 16

### ASPHALT PAVING

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Furnish all tools, qualified labor, materials, equipment, qualified superintendence and all services, transportation, other incidentals, assurances and guarantees, assumptions of risk, and responsibility for the performance of all Asphalt Paving operations as indicated on the Construction Drawings. Complete work as shown and specified herein.

##### 1.2 SECTION INCLUDES

- A. Asphalt materials specifications.
- B. Flexible pavement section.

##### 1.3 RELATED SECTIONS

- A. Section 31 05 13 – Soils for Earthwork
- B. Section 31 23 23 - Select Fill.
- C. Section 32 11 23 – Aggregate Base Courses.

##### 1.4 REFERENCES

- A. American Society of Testing Materials (ASTM International):
  - 1. ASTM D6373-15 – Standard Specification for Performance Graded Asphalt Binder.
  - 2. ASTM D1559-89 – Test Method for Resistance of Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
  - 3. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 4. ASTM D1557-12 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3  - 5. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - 6. ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.</sup>
- B. Texas Department of Transportation (TxDOT):
  - 1. TEX 207-F – Determining Density of Compacted Bituminous Mixtures.

##### 1.5 SUBMITTALS

- A. Submit proposed mix design for each class of mix for review prior to beginning of work.
- B. Materials Source: Submit name of materials source.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with City of San Antonio Standards.
- B. Testing laboratory shall conduct testing of fill materials at the rate of one field density per each lift of fill in accordance with ASTM D-2922 or D-1556. One moisture-density curve shall be obtained for each type of material used in accordance with ASTM D-1557, and one sieve analysis and one plasticity index for each type of imported material used, according to ASTM C-136, and D-4318.
- C. Obtain materials from same source throughout.

## 1.7 REGULATORY REQUIREMENTS

- A. Conform to City of San Antonio Standards for paving work on public property.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees Fahrenheit, or surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 15 degrees Fahrenheit below bitumen supplier's bill of lading and not more than maximum specified temperature.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Hot Mixed Asphalt Concrete (HMAC) to conform to the gradation requirements of a surface course Type D as specified in accordance with TxDOT Item 340 or 341.
- B. HMAC mix shall have a minimum 1500 pounds of Marshall Stability when compacted at 75 blows in accordance with ASTM D 1559.
- C. HMAC shall have a flow between 0.08 and 0.016 inches, with air voids between 3 to 5 percent, and should be placed at a target of 98% of the laboratory Marshall value (ASTM D 1559-89).
- D. Bitumen binder grade should consist of an AC-20 or PG70-22 material.
- E. Tack Coat shall be a CSS-1H, SS-1H or a PG binder with a minimum high-temperature grade of PG 58 for tack coat binder in accordance to TxDOT Standard Specification 2014, Item 300, "Asphalts, Oils, and Emulsions.3
- F. Refer to *Section 32 11 23 – Aggregate Base Courses* for Prime Coat requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that compacted subgrade, subbase and/or base foundation is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of subgrade, subbase and/or base foundation are correct.

**3.2 FLEXIBLE PAVEMENT STRUCTURE**

A. Asphalt paving shall conform to the flexible pavement section below:

**Table 3.2.1 – Flexible Pavement Section**

Street Section <sup>1</sup>	Hot-Mix Asphalt Concrete TxDOT Type C (Inches)	Limestone Base Material (TxDOT Item 247 Grade 1-2) (Inches)	Geogrid	Compacted Subgrade (inches)
Pavement	3	12	TX-5	12

Notes: <sup>1</sup> Refer to Construction Drawings for HMAC pavement limits.

**3.3 PLACING ASPHALT PAVEMENT**

- A. Install Work in accordance with City of San Antonio Standards.
- B. Place HMAC within 24 hours of applying prime coat. Refer to *Section 32 11 23 – Aggregate Base Courses*.
- C. HMAC shall be placed at a target density of at least 98 percent per ASTM D1558.
- D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
- F. A pavement sealer shall be placed on top of the HMAC Type D as specified below.

**3.4 PAVEMENT SEALER**

- A. Pavement sealer shall be applied in two coats over a period of two separate events. After each event, the sealant shall be allowed to cure properly per the manufacturer’s recommended period.
- B. In the event that there is a need to open the areas to traffic where the sealer has been applied and the sealing period is less than the manufacturer’s recommended period (i.e. 24 hours), an additive may be added to the sealer based on the consultation with the manufacturer.
- C. The areas where the sealer shall be applied and the closing-off of specific pavement areas from traffic shall be appropriately coordinated with the owner to allow adequate curing time.
- D. The manufacturer recommended application temperatures of the sealer mix and ambient temperature requirements shall be maintained.
- E. The new sealer mix shall be prepared for each application and shall not be reused if not used within 24 hours. The mix shall be frequently agitated.
- F. In case where graded sand is recommended by the sealer manufacturer, the use shall be maintained within the manufacturer’s requirements and shall be demonstrated to the owner for observation of the finished surface, which typically results in a rough finish and exhibits improved skid resistance.

G. Pavement sealer is subsidiary to this item and will not be paid for separately.

**3.5 TOLERANCES**

A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within 1/2 inch.

**3.6 FIELD QUALITY CONTROL AND TESTING**

A. Pavement specimens, which shall be either cores or sections of asphaltic pavement, will be tested according to Test Method TEX-207-F.

B. Request inspection prior to placing asphalt pavement structure.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Testing on asphalt paving shall be performed to ensure conformance with specified requirements. Testing shall conform with the minimum frequency and in accordance to ASTM as described below:

**Table 3.6.1 – Quality Control for Asphalt Pavement**

Test Type	Applicable Standard
Hot Mixed Asphalt Concrete (HMAC) shall be sampled for each day's production or every 20 tons of material produced and tested for compliance with the approved Marshall Mix Design and to determine laboratory density of the material.	Manufacturer's Recommendations
A minimum of <b>three (3)</b> density tests every 50-linear feet.	ASTM D 1556 and/or ASTM D 6938

**3.7 PROTECTION**

A. Immediately after placement, protect pavement from mechanical injury for 7 days.

**- END OF SECTION -**

## SECTION 32 12 43

### GRAVEL PAVING

#### PART 1.00 – GENERAL

##### 1.01 SECTION INCLUDES

- A. Porous gravel pavement system

##### 1.02 RELATED SECTIONS

- A. Section 31 05 13 – Soils for Earthwork
- B. Section 31 11 00 – Site Clearing and Grubbing
- C. Section 31 23 16 – Excavation
- D. Section 32 23 23 – Embankment

##### 1.03 REFERENCES

- A. ASTM F 1951-08 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.
- B. ASTM D 638-10 Standard Test Method for Tensile Properties of Plastics
- C. ASTM C 33 Standard Specification for Concrete Aggregates
- D. AASHTO M6 Standard Specification for Fine Aggregate for Hydraulic Cement Concrete

##### 1.04 SYSTEM DESCRIPTION

- A. The porous gravel pavement system provides vehicular and pedestrian load support for gravel areas and reduces erosion and rutting.
- B. Major Components of the Complete System
  - a. Flexible units, assembled in rolls.
  - b. Engineered sand and gravel base course.
  - c. Anchor pins and washers.
  - d. Gravel fill aggregate.
- C. The gravel paving units, gravel fill, and base course work together to support imposed loading.
- D. The paving units contain and restrict gravel fill from lateral and vertical movement.

##### 1.05 SUBMITTALS

- A. Submit under provisions of Section 01 33 00
- B. Shop Drawings: Submit design detail showing proper cross-section.
- C. Samples: Submit manufacturer's sample of Porous gravel paving 10" x 10" section for acceptance.

- D. Installation Instructions: Manufacturer's printed installation instructions. Include methods for maintaining installed products.
- E. Certificates:
  - 1. Manufacturer signed certificate stating the product is made in the USA.
  - 2. Submit Material Certificates for base course and sand (or USGA mix) fill materials
  - 3. Product certificates signed by the manufacturer certifying material compliance of polyethylene used to make Porous Flexible Paving units.
  - 4. ISO Certificate certifying manufacturer's quality management system is currently registered to ISO 9001:2008 quality standards.
- F. Manufacturer's Material Certification: Product manufacturers shall provide certification of compliance with all applicable testing procedures and related specifications upon written request. Request for certification shall be submitted by the purchasing agency no later than the date of order placement.
- G. Product manufacturers shall also have a minimum of 30 years' experience producing products for porous gravel pavement systems.
- H. Manufacturer Quality Certification: ISO Certification certifying manufacturer's quality management system for its porous gravel flexible paving system is currently registered to ISO 9001:2008 quality standards.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect porous gravel paving units/rolls from damage during delivery and store rolls upright, under tarp, to protect from sunlight, when time for delivery to installation exceeds one week.
- C. Store anchor pins and washers in a secure location protected from theft and damage.
- D. Handling: Protect materials during handling and installation to prevent damage

#### 1.07 MAINTENANCE SERVICE

- A. Installer responsible for maintenance of porous flexible paving system until site work is complete.

#### 1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not begin installation of porous gravel pavements until all hard surface paving adjacent to porous gravel pavement areas, including concrete walks and asphalt paving, is completed.
- C. In cold weather, do not use frozen materials or materials mixed or coated with ice or frost,

- and do not build on frozen base or wet, saturated or muddy subgrade.
- D. Protect partially completed paving against damage from other construction traffic when work is in progress.
  - E. DO NOT DRIVE, PARK ON, or use porous gravel paving system until system has been properly anchored and fully filled with gravel aggregate fill. Any barricades constructed must still be accessible by emergency and fire equipment during and after installation.

## **PART 2.00 - PRODUCTS**

### **2.01 POROUS GRAVEL PAVING**

#### **A. Composition:**

1. Manufactured in the USA.
2. High density polyethylene (HDPE): 100 percent recycled materials.
3. Geotextile fabric backing injection molded to the grid system.
4. Color: gray.
5. Color Uniformity: Uniform color throughout all unit rolls.
6. Carbon Black for ultraviolet light stabilization.
7. Anchor pins and washers

#### **B. Performance Properties:**

1. Maximum Loading Capability: 15,940 psi when filled with sand.
2. Wheelchair Access testing for ADA Compliance: Passing ASTM F 1951-08.
3. Wheelchair Access testing for ADA Compliance: Passing Rotational Penetrometer testing.
4. Tensile strength, pull-apart testing: 458 lbf/in from ASTM D638 Modified.
5. System Permeability (Porous gravel paving, sand, base course): 2.63 to 38.55 inches of water per hour.
6. Effective Imperviousness (E.I.): 10%.

#### **C. Dimensions (individual units are assembled and distributed into rolls):**

1. Roll area: From 108 sq ft to 538 sq ft, in 108 sq ft increments
2. Roll Widths: From 3.3 ft to 8.2 ft, in 1.6 ft increments.
3. Roll Lengths: From 32.8 ft to 65.6 ft, in 3.3 ft increments.
4. Roll Weights: From 41 lbs to 205 lbs, in 41 lbs increments.
5. Unit Nominal Width by Length: 20 inches by 20 inches or 40 inches by 40 inches.
6. Nominal Depth: 1 inch – for rolls and individual units.
7. Unit Weight: 19 oz or 5 lbs.
8. Volume Solid: 8 percent

## 2.03 SYSTEM MATERIALS

- A. Base Course: Sandy gravel material from local sources commonly used for road base construction (recycled materials such as crushed concrete or crushed asphalt are NOT acceptable).
1. Conforming to the following sieve analysis and requirements:
    - a. 100 percent passing sieve size 1 inch.
    - b. 80-100 percent passing sieve size 3/4 inch.
    - c. 60-80 percent passing sieve size 3/8 inch.
    - d. 40-60 percent passing sieve size #4.
    - e. 25-40 percent passing sieve size #10.
    - f. 5-25 percent passing sieve size #40.
    - g. 0-5 percent passing sieve size #200.
  2. Material may be either "pit run" or "crusher run." Avoid using clay-based crusher run/pit run. Crusher run material will generally require coarse, well-draining sand conforming to AASHTO M6 or ASTM C 33 to be added to mixture (20 to 30 percent by volume) to ensure long-term porosity.
- B. Gravel Fill: Obtain clean, washed, fine decorative gravel, must be sharp and angular (not rounded) stone, granite hardness, to fill the 1" high rings and spaces between the rings, not to be overfilled more than 1/4". Maximum Size of stone should be: 3/16" to 3/8" and uniform in size - not graded.
- C. Anchors: Typical anchors shall be 8" long nails with "fender" type washers 5/16" id x 1.25" od, all galvanized metal. Supplied anchors may vary in size and type based on source and availability.

## **PART 3.00 - EXECUTION**

### 3.01 INSPECTION

- A. Examine subgrade and base course installed conditions. Do not start porous gravel paving installation until unsatisfactory conditions are corrected. Check for improperly compacted trenches, debris, and improper gradients.

### 3.02 PREPARATION

- A. Subgrade Preparation:
1. Prepare subgrade as specified in Section 31 05 13. Verify subgrade in accordance with porous paving system manufacturer's instructions.
  2. Proper subgrade preparation will enable the porous gravel paving rolls/units to connect properly and remain level and stationary after installation.
  3. Excavate area allowing for unit thickness, the engineered base depth and 0.5 inch for 0.25 inch of gravel overfill and slight recession to contain gravel.
  4. Provide adequate drainage from excavated area if area has potential to collect



- water, when working with in-place soils that have poor permeability.
5. Ensure in-place soil is relatively dry and free from standing water.
  6. Uniformly grade base.
  7. Level and clear base of large objects, such as rocks and pieces of wood.

B. Base Preparation:

1. Install Base as specified in *Section 32 11 23 - Aggregate Base Course*. Verify engineered base (if required) is installed in accordance with porous paving system manufacturer's instructions.
2. If required, place a geotextile separation layer between the natural ground and the 'engineered base'.
3. Place engineered base in lifts not to exceed 8 inches, compacting each lift separately to 95 percent Modified Proctor.
4. Leave 1 inch of depth below final grade for porous paver unit and sand fill and 0.5 inch for depth of sod root zone or topsoil germination area (when applicable).

3.03 ON-SITE MANUFACTURER'S FIELD REPRESENTATIVE

- A. Contractor shall have a qualified Manufacturer's field representative be available for a pre-construction meeting via phone or in person and will provide installation videos, design details, installation instructions, and the technical specifications.
- B. The time for on-site observation is subsidiary to this specification and shall be included as part of the bid price.

3.04 POROUS FLEXIBLE PAVING INSTALLATION

- A. Install the porous gravel paving units by placing units with rings facing up, and using snap-fit connectors, pegs, and holes, provided to maintain proper spacing and interlock the units. Units can be easily shaped with pruning shears or knife. Units placed on curves, slopes, and high traffic areas shall be anchored to the base course, using 40d common nails with fender washer, as required to secure units in place. Tops of rings shall be between 0.25" to 0.5" below the surface of adjacent hard-surface pavements.
- B. Install sand in rings as they are laid in sections by "back-dumping" directly from a dump truck, or from buckets mounted on tractors, which then exit the site by driving over rings already filled with sand. The sand is then spread laterally from the pile using flat bottomed shovels and/or wide "asphalt rakes" to fill the rings. A stiff bristled broom shall be used for final "finishing" of the sand. The sand must be "compacted" by using water from hose, irrigation heads, or rainfall, with the finish grade no less than the top of rings and no more than 0.25" above top of rings.

3.05 INSTALLATION OF POROUS FLEXIBLE PAVING

- A. Install the porous gravel paving units by placing units with rings facing up/fabric below, and using small male/female connectors provided along each edge to maintain proper spacing and interlock the units. Cutting can be performed with pruning shears and knife, or portable power

saw. Units shall be anchored to the base course, using anchors described above, as required to secure units in place from movement by traffic, at an average rate of 6 pins per square meter (high speed, heavy vehicles, fast turning movement will require additional anchors). Tops of rings shall be flush with the surface of adjacent hard surfaced pavements.

- B. Smooth the fabric overlaps from one roll or unit to the adjacent unit. Take care to make sure there are no gaps in the fabric exposing base course.
- C. Install gravel into rings after the units are anchored by "backdumping" directly from a dump truck, or from buckets mounted on tractors, with a minimum depth of 6", then exit the site by driving forward over rings already filled. Sharp turning of vehicles on bare rings must be avoided. The gravel is then spread laterally from the pile using power brooms, blades, flat bottomed shovels and/or wide "asphalt rakes" to fill the rings. A stiff bristled broom should be used for final "finishing". The gravel should be "compacted", if necessary, by using a vibrating plate or small roller, with the finish grade no less than the top of rings and no more than 0.25" above top of rings.

### 3.06 PROTECTION

- A. Prohibit traffic on the porous gravel paving system until installation is completed. Any traffic on the unfilled or un-anchored porous flexible paving system is a safety risk and subject to irreparable damage to the product.

### 3.07 FIELD QUALITY CONTROL

- A. Remove and replace segments of porous gravel paving units where three or more adjacent rings are broken or damaged, reinstalling as specified, so no evidence of replacement is apparent.
- B. Perform cleaning during the installation of work and upon completion of the work. Remove all excess materials, debris, and equipment from site. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

### 3.08 MAINTENANCE

- A. Keep area free of and remove organic material such as soil runoff, tree leaves, fruit, and other vegetation debris.
- B. Broom or rake gravel smooth to no more than 0.25" above the rings.
- C. Refill areas with gravel aggregate where walls of the rings are more than 0.125" exposed.
- D. When snow removal is required, keep a metal edged plow blade a minimum of 0.75" above the gravel surface during plowing operations to avoid causing damage to the porous flexible paving units, or
  - 1. Use a plow blade with a flexible rubber edge, or
  - 2. Use a plow blade with skids on the lower outside corners set so the plow blade does not come in

**- END OF SECTION -**

## SECTION 32 40 20

### CONCRETE ENERGY DISSIPATOR

#### PART 1.00 - GENERAL

##### 1.01 SCOPE

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required and perform all operations in connection with the installation of concrete energy dissipating units in accordance with the lines, grades, design and dimensions shown on the Contract Drawings and as specified herein.

##### 1.02 SECTION INCLUDES

- A. Concrete Dissipator Devices

##### 1.03 RELATED SECTIONS

- A. Section 31 05 13 – Soils for Earthwork.
- B. Section 31 11 00 – Site Clearing and Grubbing.
- C. Section 31 23 16 – Excavation.
- D. Section 31 23 23 – Select Fill.

##### 1.04 REFERENCES

- A. American Society for Testing Materials International (ASTM):
  1. ASTM D 6684-04, Standard Specification for Materials and Manufacture of Articulating Concrete Block (ACB) Revetment Systems.
  2. ASTM C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units.
  3. ASTM C 150, Standard Specification for Portland Cement.
  4. ASTM C 595, Standard Specification for Blended Hydraulic Cements.
  5. ASTM C 207, Standard Specification for Hydrated Lime Types.
  6. ASTM C 618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzalans for use in Portland Cement Concrete.
  7. ASTM C 33, Standard Specification for Concrete Aggregates.
  8. ASTM A641, Class III soft temper coating.

##### 1.05 SUBMITTALS

- A. Refer to Section 01 33 00 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - a. Manufacturer's hydraulic testing documentation and calculations supporting the following requirements for the concrete energy dissipating units:
    1. A minimum Dynamic Impact Factor of 1.75.
    2. Completed lateral load testing.
    3. Minimum FoS of 1.5, utilizing the factor of safety method detailed in section E of the specification.

- C. Manufacturer’s Certificate: Certify products meet or exceed specified requirements.
- D. Shop Drawings for the concrete dissipating units, installation, and safety instructions, and any recommendations, if applicable, that are specifically related to the project.

**PART 2.00 - MATERIALS**

**2.01 GENERAL**

- A. The geometry of this concrete energy dissipating unit consists of six arms extending from a central hub. A complete unit is made up of two identical halves, with each half consisting of a central core with three legs radiating outward at equal spacing. On each half, two fillets are located between adjacent arms. These fillets provide additional structural strength and aid in the proper placement of the energy dissipating units.
- B. When the symmetrical halves are interlocked, the resultant unit will have geometry, which exhibits six equally spaced arms, with each arm spaced at 90 degrees from the four adjacent arms. When placed in the most stable configuration, each unit will rest on three of the six arms.
- C. The concrete energy dissipating system shall have the following nominal characteristics:

**TABLE 2. STANDARD SIZES OF CONCRETE ENERGY DISSIPATING UNIT**

Total Length (in)	Arm Length (in)	Fillet Length (in)	Arm Width (in)	Volume (ft <sup>3</sup> )	Weight (lbs)
24	8.30	1.85	4.00	0.59	76-82

**2.02 CONCRETE ENERGY DISSIPATING UNITS**

- a. The 2 ft. concrete energy dissipating units will be produced on a pre-determined concrete block machine and will conform to ASTM D 6684-04, Standard Specification for Materials and Manufacture of Articulating Concrete Block (ACB) Revetment Systems.
- b. Cementitious Materials - Materials shall conform to the following applicable ASTM specifications:
  - i. Portland Cements - Specification C 150, for Portland Cement.
  - ii. Blended Cements - Specification C 595, for Blended Hydraulic Cements.
  - iii. Hydrated Lime Types - Specification C 207, for Hydrated Lime Types.
  - iv. Pozzolans - Specification C 618, for Fly Ash and Raw or Calcined Natural Pozzolans for use in Portland Cement Concrete.
- c. Aggregates shall conform to the following ASTM specifications, except that grading requirements shall not necessarily apply:
- d. Normal Weight – Specification C 33 for Concrete Aggregates

**B. PHYSICAL REQUIREMENTS**

- a. At the time of delivery to the work site, the units shall conform to the physical requirements prescribed in Table 1 below.

- b. Units shall be sampled and tested in accordance with ASTM C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units.

<b>TABLE 1. PHYSICAL REQUIREMENTS</b>			
<b>Compressive Strength Net Area Min. psi</b>		<b>Water Absorption Max., lb/ft<sup>3</sup></b>	
Avg. of 3 units	Individual Unit (min. required)	Avg. of 3 units	Individual Unit
4000	3,500	9.1	11.7

**C. VISUAL INSPECTION**

- a. All units shall be sound and free of defects that would interfere with either the proper placement of the unit or impair the performance of the system. Surface cracks incidental to the usual methods of manufacture, or surface chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.
- b. Cracks exceeding 0.25 inches (.635 cm) in width and/or 1.0 inch (2.54 cm) in depth shall be deemed grounds for rejection.
- c. Chipping resulting in a weight loss exceeding 10% of the average weight of a concrete unit shall be deemed grounds for rejection.
- d. Concrete energy dissipating unit rejected prior to delivery from the point of manufacture shall be replaced at the manufacturer's expense. Concrete energy dissipating units rejected at the job site shall be repaired with structural grout or replaced at the expense of the contractor.

**D. SAMPLING AND TESTING**

- a. The purchaser or their authorized representative shall be accorded proper access to facilities to inspect and sample the units at the place of manufacture from lots ready for delivery.
- b. Field installation procedures shall comply with the procedures utilized during the hydraulic testing procedures of the recommended system. All system restraints and ancillary components (such as synthetic drainage mediums) shall be employed as they were during testing. For example, if the hydraulic testing installations utilize a drainage layer then the field installation must utilize a drainage layer; an installation without the drainage layer would not be permitted.
- c. Additional testing, other than that provided by the manufacturer, shall be borne by the purchaser.

**2.07 FIELD CABLING**

- A. Termination or transition of the concrete energy dissipating unit, as identified in the submittal and contract drawings will require additional field cabling. Cable type will be minimum 3/16” or 1/4” galvanized steel or polyester, as approved by the Engineer. e. Zinc coating, in accordance with ASTM A641, Class III soft temper coating.
- B. Field cabling is done to mitigate unexpected local toe scour or to add redundancy at the termination and transition points. Cable will be placed around the mid-section of the selected units (recommended 3-unit minimum), hand tightened and connected using standard cable hardware

supplied by the manufacturer.

- C. Cable orientation of the recommended 3-unit minimum (i.e. perpendicular or parallel to a slope) will be identified and agreed upon in the field by the Contractor and Engineer's representative. Ensure practical placement of additional cabling to minimize unreasonable effort by Contractor. Prior to field cabling work means and methods will be discussed to establish a typical configuration for the previously identified areas.

## **PART 3.00 - FOUNDATION, GEOTEXTILE AND CONCRETE DISSIPATION PREPARATION & PLACEMENT**

### **3.02 PLACEMENT OF CONCRETE DISSIPATION SYSTEM**

- A. The proposed Concrete dissipation units, as specified in Part 2A of these specifications, will be constructed within the specified lines and grades shown on the Contract Drawings.
- B. Placement – 24” Concrete dissipation**  
Concrete dissipation can be installed individually or in bundles at the discretion of the Contractor.  
  
Placed individually, Concrete dissipation will be placed with uniform spacing. For a specified area receiving the 24” units, standard spacing between unit center in both the x and y dimension is 12”, which represents a 0.5 packing ratio. Tighter placement tolerances are possible, such as a 0.4 packing ratio, but may become difficult to achieve while placing successive rows in a matrix. Standard installation includes placing the units in a consistent repeatable fashion to aid in efficiency. Recommended in-place orientation of the unit(s) emphasizes pointing exposed projecting unit arm (vertical or horizontal) downstream whenever practical during construction. Subsequent cabling of outer units is common, depending on the system embedment for the project.
- C. Placed in bundles, Concrete dissipation are placed into a pre-determined matrix, spacing them as closely as possible, approximating the maximum packing ratio of 0.4 (9.6” center spacing in x and y directions). Cable will be placed around the pre-determined matrix (around mid-section) with cable; hand tightened and connected using standard cable hardware supplied by the manufacturer. Bundles are to be placed as closely as possible, with recommended tolerance requirement of 4” between bundles. If the bundling method is employed by the Contractor, tolerances between bundles will be discussed and agreed upon prior to commencing work. Spacing will be measured from center of bundle to middle of installed bundle, in the horizontal plane, before additional (stacked) units are placed.
- D. **Consultation.** The manufacturer of the concrete dissipation units will provide construction advice to the Contractor for initial installation phases.

**- END OF SECTION-**





1 - EXISTING WELL NO.3 DEMOLITION



2 - EXISTING HSP 1-6 AND HSP 2-6 DISCHARGE VALVE VAULTS DEMOLITION



3 - EXISTING HSP 1-4 AND HSP 2-4 DISCHARGE VALVE VAULTS DEMOLITION



2 - EXISTING HSP 3-6 AND HSP 3-4 DISCHARGE VALVE VAULTS DEMOLITION

**GENERAL NOTES:**

1. THE OWNER WILL RETAIN SALVAGE RIGHTS TO ALL MATERIALS AND EQUIPMENT. CONTRACTOR SHALL DISPOSE OF ALL MATERIALS AND EQUIPMENT, NOT RETAINED BY THE OWNER, OFF SITE.
2. CONTRACTOR TO NOTIFY OWNER A MINIMUM OF TWO WEEKS BEFORE STARTING DEMOLITION.
3. ALL PHOTOS INCLUDED WITHIN THIS PLAN SET WERE TAKEN IN 2020 AND ARE A GENERAL REPRESENTATION OF THE WORK. ACTUAL CONDITIONS MAY BE DIFFERENT AT THE TIME OF CONSTRUCTION. CONTRACTOR MUST VERIFY ALL SITE CONDITIONS AND MAKE ADJUSTMENTS AS REQUIRED PRIOR TO BID.
4. REFER TO SPECIFICATION 01 35 00 FOR SPECIAL PROCEDURES AND SHEETS C-8 AND C-9 FOR CONSTRUCTION SEQUENCE.
5. REFER TO SPECIFICATION 02 41 00 FOR ADDITIONAL DEMOLITION REQUIREMENTS.
6. REFER TO GENERAL CONSTRUCTION NOTE 37 FOR BACKFILLING AND COMPACTION REQUIREMENTS FOR CAVITIES RESULTING FROM DEMOLITION. UPON COMPLETION OF BACKFILLING, HYDRO-MULCHING SEED TO BE APPLIED TO AREAS DISTURBED PER SPECIFICATION 32 94 01.

**LEGEND:**

 PROPOSED DEMOLITION

**NOTES BY SYMBOLS: "X"**

1. EXISTING MOTOR TO BE REMOVED AND REPLACED.
2. EXISTING ABOVE-GRADE WELL DISCHARGE PIPING TO BE RE-COATED PER SPECIFICATION 09 96 00.01.
3. SEE DETAIL 1/C-5 FOR TYPICAL BELOW-GRADE DISCHARGE VALVE VAULT SECTION VIEW, PER PROJECT RECORD DRAWINGS. EXISTING DISCHARGE VALVE VAULT DETAIL PROVIDED FOR REFERENCE ONLY. CONTRACTOR SHALL REMOVE THE TOP 4-FEET OF EXISTING VAULT AND REMOVE ALL PIPING, CONDUITS, APPURTENANCES, ETC. FOLLOWING THE REMOVAL OF ALL PIPING, CONDUITS, APPURTENANCES, ETC., CONTRACTOR SHALL BREAK THE BOTTOM OF THE VAULT SLAB TO ALLOW GROUNDWATER TO DRAIN. REFER TO GENERAL CONSTRUCTION NOTE 37 FOR BACKFILLING AND COMPACTION REQUIREMENTS FOR CAVITIES RESULTING FROM DEMOLITION.
4. EXISTING FLOW TRANSMITTER TO BE REMOVED AND REPLACED. REFER TO SHEET I-6.

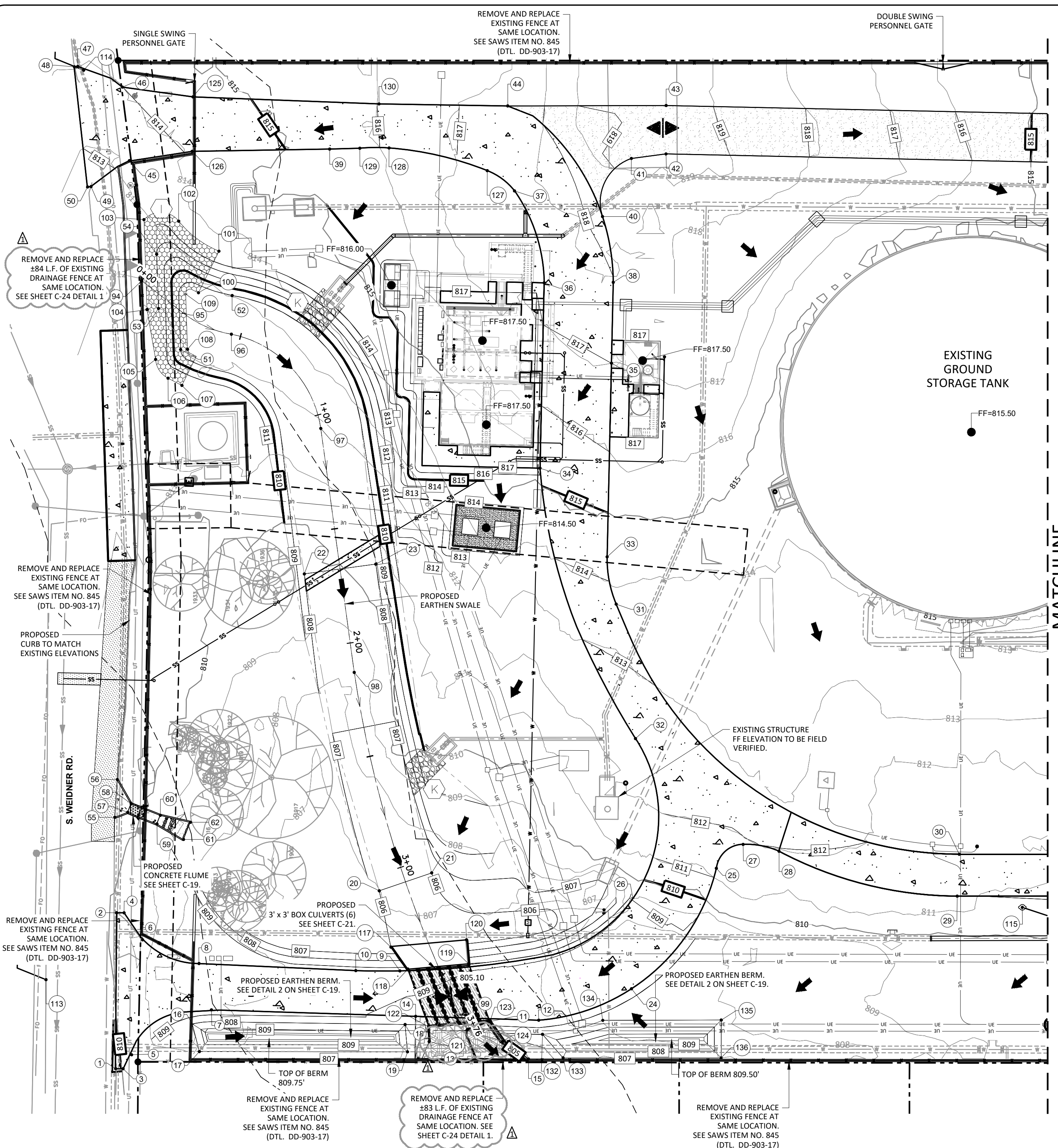


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SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
 CIVIL  
**DEMOLITION DETAILS II**

NO.	ISSUE	BY	DATE	FRN JOB NO.	DATE	DESIGNED	ECT	DRAWN	DDH	REVIS	ECT	REVIS	CHECKED	DTB	FILE NAME
				SWB20457	8/31/2022										WTU-DT-DEMO-02.dwg
ADDENDUM NO. 5 VERIFY SCALE Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.															
SHEET <b>C-4</b>															
SEQ.															





MATCHLINE  
SEE SHEET C-11

POINT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
113	1/2" IRON ROD W/CAP	13743604.91	2166086.08	810.890
114	1/2" IRON ROD W/CAP	13743597.09	2166481.20	814.060
115	BENCHMARK	13743181.81	2166126.62	812.840
116	1/2" IRON ROD W/CAP	13742821.44	2166109.28	805.400

POINT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
117	NEW WING WALL	13743455.49	2166103.45	806.000
118	NEW WING WALL	13743447.90	2166094.08	805.486
119	NEW WING WALL	13743421.58	2166096.93	805.379
120	NEW WING WALL	13743422.74	2166107.33	808.600
121	NEW WING WALL	13743438.02	2166062.81	806.000
122	NEW WING WALL	13743438.17	2166069.08	805.113
123	NEW WING WALL	13743411.80	2166072.06	805.000
124	NEW WING WALL	13743406.16	2166063.54	807.000
125	TOP OF REINFORCED CONCRETE PAVEMENT	13743549.41	2166470.66	814.540
126	TOP OF REINFORCED CONCRETE PAVEMENT	13743549.21	2166447.02	814.286
127	TOP OF REINFORCED CONCRETE PAVEMENT	13743420.96	2166441.38	817.432
128	TOP OF REINFORCED CONCRETE PAVEMENT	13743463.79	2166450.31	816.133
129	TOP OF REINFORCED CONCRETE PAVEMENT	13743476.49	2166449.93	815.720
130	TOP OF REINFORCED CONCRETE PAVEMENT	13743468.56	2166469.34	816.041

POINT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
1	TOP OF REINFORCED CONCRETE PAVEMENT	13743573.82	2166048.11	810.144
2	TOP OF REINFORCED CONCRETE PAVEMENT	13743574.90	2166115.80	809.695
3	TOP OF REINFORCED CONCRETE PAVEMENT	13743570.58	2166048.13	809.969
4	TOP OF REINFORCED CONCRETE PAVEMENT	13743571.64	2166115.83	809.657
5	TOP OF REINFORCED CONCRETE PAVEMENT	13743567.05	2166054.31	809.622
6	TOP OF REINFORCED CONCRETE PAVEMENT	13743563.33	2166104.29	809.301
7	TOP OF REINFORCED CONCRETE PAVEMENT	13743532.79	2166074.53	809.384
8	TOP OF REINFORCED CONCRETE PAVEMENT	13743538.64	2166094.53	809.266
9	TOP OF REINFORCED CONCRETE PAVEMENT	13743451.37	2166093.21	809.156
10	TOP OF REINFORCED CONCRETE PAVEMENT	13743470.52	2166092.92	809.180
11	RIPRAP CHANNEL	13743412.40	2166071.93	807.000
12	TOP OF REINFORCED CONCRETE PAVEMENT	13743390.64	2166073.12	808.747
13	RIPRAP CHANNEL	13743442.59	2166055.65	806.376
14	RIPRAP CHANNEL	13743444.11	2166073.65	808.877
15	RIPRAP CHANNEL	13743394.73	2166056.22	805.107
16	BOTTOM OF EARTHEN BERM	13743540.89	2166068.20	808.000
17	BOTTOM OF EARTHEN BERM	13743537.64	2166056.31	808.000
18	BOTTOM OF EARTHEN BERM	13743448.62	2166069.99	808.000
19	BOTTOM OF EARTHEN BERM	13743447.30	2166058.15	808.000
20	BOTTOM OF EARTHEN SWALE	13743461.08	2166127.81	806.000
21	BOTTOM OF EARTHEN SWALE	13743438.50	2166136.05	806.000
22	BOTTOM OF EARTHEN SWALE	13743496.57	2166264.63	808.000
23	BOTTOM OF EARTHEN SWALE	13743465.65	2166269.55	808.000
24	TOP OF REINFORCED CONCRETE PAVEMENT	13743350.69	2166087.64	808.871
25	TOP OF REINFORCED CONCRETE PAVEMENT	13743314.98	2166140.73	811.251
26	TOP OF REINFORCED CONCRETE PAVEMENT	13743350.97	2166127.05	809.074
27	TOP OF REINFORCED CONCRETE PAVEMENT	13743303.56	2166151.34	811.887
28	TOP OF REINFORCED CONCRETE PAVEMENT	13743287.93	2166148.69	811.949
29	TOP OF REINFORCED CONCRETE PAVEMENT	13743210.17	2166130.89	811.147
30	TOP OF REINFORCED CONCRETE PAVEMENT	13743209.67	2166149.10	811.552
31	TOP OF REINFORCED CONCRETE PAVEMENT	13743360.95	2166254.44	813.675
32	TOP OF REINFORCED CONCRETE PAVEMENT	13743351.29	2166196.27	812.245
33	TOP OF REINFORCED CONCRETE PAVEMENT	13743365.30	2166274.88	814.331
34	TOP OF REINFORCED CONCRETE PAVEMENT	13743395.27	2166312.72	815.248
35	TOP OF REINFORCED CONCRETE PAVEMENT	13743365.25	2166358.97	817.000
36	TOP OF REINFORCED CONCRETE PAVEMENT	13743395.21	2166393.24	817.448
37	TOP OF REINFORCED CONCRETE PAVEMENT	13743408.94	2166432.85	817.669
38	TOP OF REINFORCED CONCRETE PAVEMENT	13743365.22	2166394.08	817.942
39	TOP OF REINFORCED CONCRETE PAVEMENT	13743489.58	2166449.27	815.456
40	TOP OF REINFORCED CONCRETE PAVEMENT	13743370.51	2166422.55	818.177
41	TOP OF GRAVEL LOOP	13743358.52	2166448.03	819.726
42	TOP OF GRAVEL LOOP	13743343.53	2166450.33	819.561
43	TOP OF GRAVEL LOOP	13743343.93	2166471.34	819.720
44	TOP OF GRAVEL LOOP	13743412.69	2166469.66	817.407
45	TOP OF REINFORCED CONCRETE PAVEMENT	13743576.39	2166442.37	813.229
46	TOP OF REINFORCED CONCRETE PAVEMENT	13743580.14	2166474.25	813.992
47	TOP OF REINFORCED CONCRETE PAVEMENT	13743599.65	2166482.78	814.019
48	TOP OF REINFORCED CONCRETE PAVEMENT	13743601.12	2166482.58	814.042
49	TOP OF REINFORCED CONCRETE PAVEMENT	13743592.79	2166430.76	812.525
50	TOP OF REINFORCED CONCRETE PAVEMENT	13743594.27	2166430.56	812.615
51	BOTTOM OF EARTHEN SWALE	13743552.38	2166360.87	809.000
52	BOTTOM OF EARTHEN SWALE	13743530.52	2166384.79	809.000
53	TOP OF EARTHEN SWALE	13743562.37	2166378.50	812.000
54	TOP OF EARTHEN SWALE	13743563.67	2166402.01	812.000
55	BOTTOM OF CONCRETE FLUME	13743576.53	2166157.20	810.517
56	BOTTOM OF CONCRETE FLUME	13743575.80	2166173.62	810.630
57	BOTTOM OF CONCRETE FLUME	13743570.98	2166159.51	810.295
58	BOTTOM OF CONCRETE FLUME	13743569.59	2166163.26	810.261
59	BOTTOM OF CONCRETE FLUME	13743558.20	2166154.75	809.443
60	BOTTOM OF CONCRETE FLUME	13743556.81	2166158.50	809.489
61	BOTTOM OF CONCRETE FLUME	13743546.48	2166148.26	808.606
62	BOTTOM OF CONCRETE FLUME	13743543.89	2166155.75	808.730
94	CHANNEL ALIGNMENT	13743569.91	2166390.37	-
95	CHANNEL ALIGNMENT	13743551.40	2166376.59	-
96	CHANNEL ALIGNMENT	13743530.48	2166368.00	-
97	CHANNEL ALIGNMENT	13743490.80	2166327.93	-
98	CHANNEL ALIGNMENT	13743473.99	2166222.36	-
99	CHANNEL ALIGNMENT	13743421.49	2166068.50	-
100	NEW GABION BASKETS	13743545.17	2166385.68	-
101	NEW GABION BASKETS	13743536.68	2166403.91	-
102	NEW GABION BASKETS	13743554.43	2166416.56	-
103	NEW GABION BASKETS	13743569.50	2166416.92	-
104	NEW GABION BASKETS	13743567.34	2166377.88	-
105	NEW GABION BASKETS	13743563.14	2166356.34	-
106	NEW GABION BASKETS	13743557.57	2166348.31	-
107	NEW GABION BASKETS	13743551.48	2166345.29	-
108	NEW GABION BASKETS	13743549.38	2166361.03	-
109	NEW GABION BASKETS	13743550.71	2166385.01	-
132	BOTTOM OF EARTHEN BERM	13743388.89	2166067.03	807.000
133	BOTTOM OF EARTHEN BERM	13743379.73	2166057.00	807.000
135	BOTTOM OF EARTHEN BERM	13743311.42	2166074.89	807.000
136	BOTTOM OF EARTHEN BERM	13743311.12	2166058.44	807.000

**KEYED LEGEND**

- EXISTING ROW
- - - PROJECT LIMITS/LIMITS OF DEMOLITION
- - - - - PROPERTY LINE
- 3XXX --- PROPOSED MAJOR CONTOUR
- - - 3XXX - - - PROPOSED MINOR CONTOUR
- 3XXX --- EXISTING MAJOR CONTOUR
- - - 3XXX - - - EXISTING MINOR CONTOUR

**LEGEND**

- ▲ HIGH POINT
- ▼ LOW POINT
- NEW CONTROL POINT
- FLOW ARROW

**NOTES**

- ANY DAMAGE/DISTURBANCE OUTSIDE OF PROJECT SCOPE TO BE RESTORED TO EXISTING CONDITIONS OR BETTER AT CONTRACTORS EXPENSE UNLESS APPROVED BY SAWS.
- THE NEW PUMP CONCRETE PAD SLOPES AT 2% FROM BOTH EAST AND WEST TOP EDGES TOWARDS THE DRAINAGE CHANNEL.

**STATE OF TEXAS**  
**MARCOS MEDINA, P.E. (No. 93830)**  
 ON NOVEMBER 30, 2022  
 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT

**FRESE & NICHOLS**  
 9601 McAllister Freeway, Suite 1008  
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 Texas Board of Professional Engineers Registration No. F-006657

SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
**SITE GRADING PLAN I**

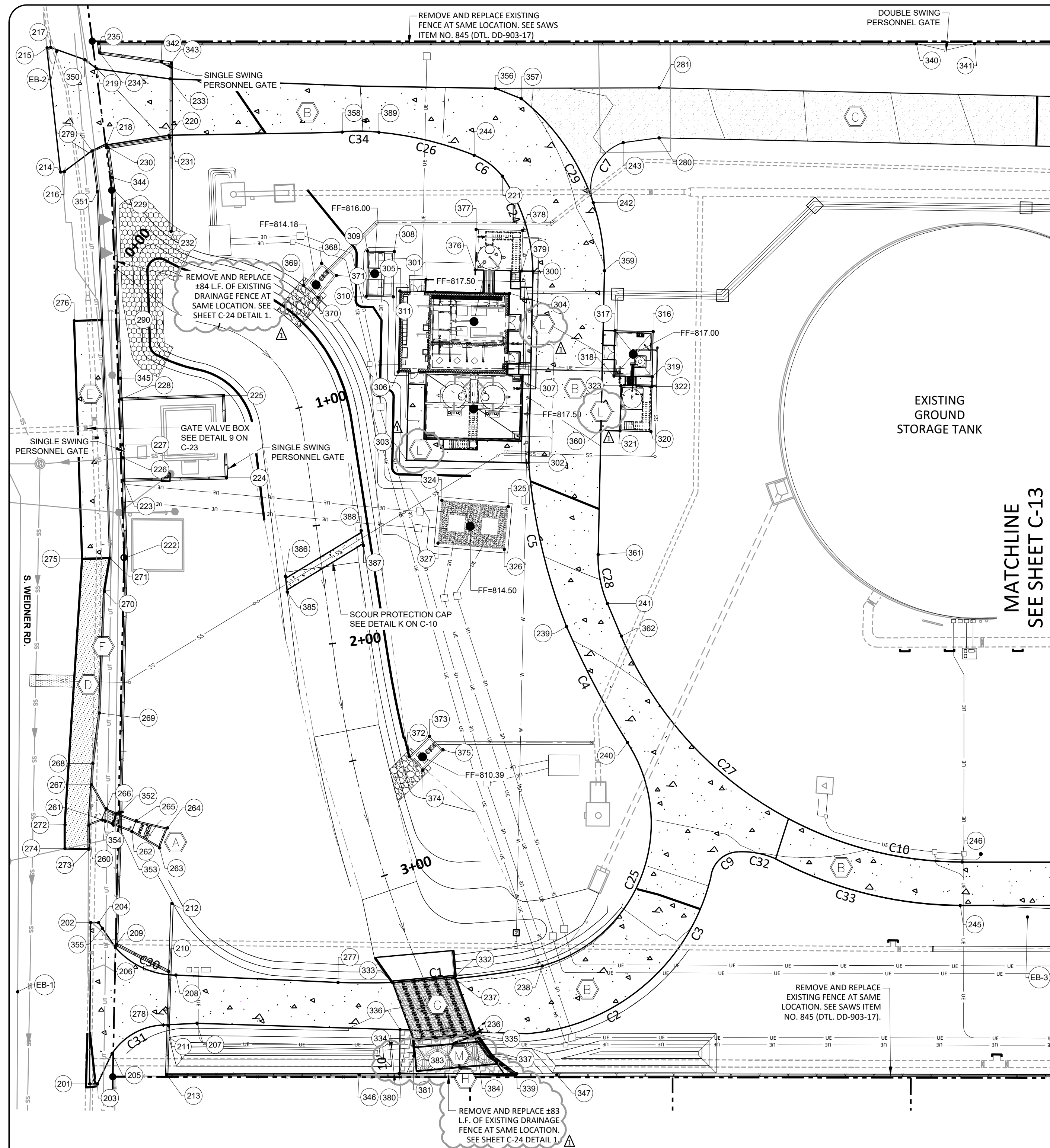
PROJECT NO.	SWB20457	DATE	MAY 3, 2021	DESIGNED	JH/C/C	DRAWN	E.G./A.M.	REVISIONS	CHECKED	M.M.
ISSUE	1/17/2023	BY	EG	FILE NAME	C-9 - Grading Plan.dwg					

SCALE: 1" = 40'  
 VERIFY SCALE: 1" = 40'  
 Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

0 10' 20' 30' 60'

SCALE IN FEET

▲ NORTH



HORIZONTAL CONTROL TABLE			
PNT. NO	DESCRIPTION	NORTHING	EASTING
201	NEW REINFORCED CONCRETE PAVEMENT	13743573.82	2166048.11
202	NEW REINFORCED CONCRETE PAVEMENT	13743574.90	2166115.80
203	NEW REINFORCED CONCRETE PAVEMENT	13743570.58	2166048.13
204	NEW REINFORCED CONCRETE PAVEMENT	13743571.57	2166115.83
205	NEW REINFORCED CONCRETE PAVEMENT	13743564.73	2166080.99
206	NEW REINFORCED CONCRETE PAVEMENT	13743564.25	2166105.57
207	NEW REINFORCED CONCRETE PAVEMENT	13743529.37	2166074.49
208	NEW REINFORCED CONCRETE PAVEMENT	13743538.64	2166094.53
209	NEW CHAINLINK FENCE	13743563.89	2166106.85
210	NEW CHAINLINK FENCE	13743541.73	2166095.97
211	NEW CHAINLINK FENCE	13743541.44	2166073.34
212	NEW CHAINLINK FENCE	13743540.98	2166124.59
213	NEW CHAINLINK FENCE	13743541.63	2166052.72
214	NEW REINFORCED CONCRETE PAVEMENT	13743594.27	2166430.56
215	NEW REINFORCED CONCRETE PAVEMENT	13743601.12	2166482.58
216	NEW REINFORCED CONCRETE PAVEMENT	13743592.79	2166430.76
217	NEW REINFORCED CONCRETE PAVEMENT	13743599.65	2166482.78
218	NEW REINFORCED CONCRETE PAVEMENT	13743575.26	2166442.41
219	NEW REINFORCED CONCRETE PAVEMENT	13743580.14	2166474.25
220	NEW REINFORCED CONCRETE PAVEMENT	13743549.21	2166447.02
221	NEW REINFORCED CONCRETE PAVEMENT	13743408.94	2166432.85
222	NEW CHAINLINK FENCE	13743563.22	2166269.33
223	NEW CHAINLINK FENCE	13743565.02	2166301.85
224	NEW CHAINLINK FENCE	13743522.00	2166303.73
225	NEW CHAINLINK FENCE	13743523.93	2166338.23
226	NEW CHAINLINK GATE	13743565.53	2166311.16
227	NEW CHAINLINK FENCE	13743565.83	2166316.65
228	NEW CHAINLINK FENCE	13743566.90	2166335.82
229	NEW CHAINLINK FENCE	13743571.74	2166423.43
230	NEW CHAINLINK FENCE	13743574.67	2166441.38
231	NEW CHAINLINK FENCE	13743548.76	2166445.92
232	NEW CHAINLINK FENCE	13743547.43	2166406.65
233	NEW REINFORCED CONCRETE PAVEMENT	13743549.26	2166470.66
234	NEW CHAINLINK FENCE	13743578.91	2166480.96
235	NEW CHAINLINK FENCE	13743579.50	2166484.80
236	NEW REINFORCED CONCRETE PAVEMENT	13743412.90	2166073.34
237	NEW REINFORCED CONCRETE PAVEMENT	13743421.57	2166095.57
238	NEW REINFORCED CONCRETE PAVEMENT	13743384.95	2166101.71
239	NEW REINFORCED CONCRETE PAVEMENT	13743377.88	2166244.30
240	NEW REINFORCED CONCRETE PAVEMENT	13743351.29	2166196.27
241	NEW REINFORCED CONCRETE PAVEMENT	13743360.95	2166254.44
242	NEW REINFORCED CONCRETE PAVEMENT	13743370.51	2166422.55
243	NEW GRAVEL LOOP	13743358.52	2166448.03
244	NEW REINFORCED CONCRETE PAVEMENT	13743420.96	2166441.38
245	NEW REINFORCED CONCRETE PAVEMENT	13743210.17	2166130.89
246	NEW REINFORCED CONCRETE PAVEMENT	13743209.78	2166149.14
260	BOTTOM OF CONCRETE FLUME	13743576.55	2166156.65
261	BOTTOM OF CONCRETE FLUME	13743570.97	2166158.97
262	BOTTOM OF CONCRETE FLUME	13743558.41	2166154.30
263	BOTTOM OF CONCRETE FLUME	13743546.66	2166147.78
264	BOTTOM OF CONCRETE FLUME	13743543.52	2166156.23
265	BOTTOM OF CONCRETE FLUME	13743556.67	2166158.98
266	BOTTOM OF CONCRETE FLUME	13743569.25	2166163.67
267	NEW CONCRETE PAD	13743575.80	2166173.62
268	NEW CONCRETE CURB	13743575.41	2166182.59
269	NEW CONCRETE CURB	13743573.17	2166203.84
270	NEW CONCRETE CURB	13743572.19	2166254.96
271	NEW CONCRETE CURB	13743570.22	2166268.98
272	NEW ASPHALT REPLACEMENT	13743586.55	2166156.65
273	NEW ASPHALT REPLACEMENT	13743576.32	2166146.65
274	NEW ASPHALT REPLACEMENT	13743586.37	2166146.65
275	NEW CONCRETE PAD	13743581.72	2166268.37
276	NEW CONCRETE PAD	13743587.23	2166368.22
277	NEW REINFORCED CONCRETE PAVEMENT	13743470.52	2166092.92
278	NEW REINFORCED CONCRETE PAVEMENT	13743543.48	2166073.45
279	NEW CONCRETE CURB	13743581.31	2166439.73
280	NEW GRAVEL LOOP	13743343.51	2166450.34
281	NEW GRAVEL LOOP	13743343.93	2166471.34
290	NEW CONCRETE PAD	13743575.73	2166368.83
300	NEW REINFORCED CONCRETE PAVEMENT	13743395.21	2166393.23
301	NEW CONCRETE SLAB	13743440.02	2166388.73
302	NEW CONCRETE SLAB	13743395.27	2166312.79
303	NEW CONCRETE SLAB	13743446.52	2166312.73
304	NEW OSG BUILDING	13743404.85	2166383.73
305	NEW OSG BUILDING	13743450.85	2166383.73
306	NEW OSG BUILDING	13743450.85	2166349.73
307	NEW OSG BUILDING	13743404.85	2166349.73
308	NEW CONCRETE SLAB	13743453.59	2166400.23
309	NEW CONCRETE SLAB	13743464.84	2166400.23
310	NEW CONCRETE SLAB	13743464.84	2166381.23

HORIZONTAL CONTROL TABLE			
PNT. NO	DESCRIPTION	NORTHING	EASTING
311	NEW CONCRETE SLAB	13743453.59	2166381.23
316	NEW FLOURIDE BUILDING	13743344.24	2166368.98
317	NEW FLOURIDE BUILDING	13743380.24	2166368.98
318	NEW FLOURIDE BUILDING	13743380.24	2166349.98
319	NEW FLOURIDE BUILDING	13743344.24	2166349.98
320	NEW CONCRETE SLAB	13743344.24	2166326.98
321	NEW CONCRETE SLAB	13743357.24	2166326.98
322	NEW CONCRETE SLAB	13743344.24	2166345.98
323	NEW CONCRETE SLAB	13743357.24	2166345.98
324	NEW CONCRETE SLAB	13743431.34	2166296.16
325	NEW CONCRETE SLAB	13743403.42	2166294.19
326	NEW CONCRETE SLAB	13743404.69	2166276.23
327	NEW CONCRETE SLAB	13743432.62	2166278.21
332	LOW WATER CROSSING	13743421.83	2166096.23
333	LOW WATER CROSSING	13743447.65	2166093.78
334	LOW WATER CROSSING	13743438.47	2166069.78
335	LOW WATER CROSSING	13743412.62	2166072.64
336	CONCRETE RIP-RAP	13743444.11	2166073.65
337	CONCRETE RIP-RAP	13743405.75	2166083.84
339	CONCRETE RIP-RAP	13743394.73	2166056.22
340	NEW CHAINLINK FENCE	13743236.35	2166492.22
341	NEW CHAINLINK FENCE	13743211.86	2166492.75
342	NEW CHAINLINK FENCE	13743552.94	2166477.81
343	NEW CHAINLINK FENCE	13743548.90	2166477.27
344	BEGINNING OF DRAINAGE FENCE	13743572.55	2166428.74
345	END OF DRAINAGE FENCE	13743567.38	2166344.59
346	BEGINNING OF DRAINAGE FENCE	13743460.87	2166054.37
347	END OF DRAINAGE FENCE	13743377.88	2166056.06
350	NEW REINFORCED CONCRETE PAVEMENT	13743585.11	2166477.93
351	NEW CONCRETE CURB	13743578.71	2166422.71
352	BOTTOM OF CONCRETE FLUME	13743563.73	2166161.61
353	BOTTOM OF CONCRETE FLUME	13743563.73	2166156.28
354	BOTTOM OF CONCRETE FLUME	13743569.73	2166158.51
355	NEW REINFORCED CONCRETE PAVEMENT	13743569.97	2166113.51
356	NEW REINFORCED CONCRETE PAVEMENT	13743412.69	2166469.66
357	NEW REINFORCED CONCRETE PAVEMENT	13743401.68	2166465.57
358	NEW REINFORCED CONCRETE PAVEMENT	13743476.49	2166449.93
359	NEW REINFORCED CONCRETE PAVEMENT	13743365.22	2166394.08
360	NEW REINFORCED CONCRETE PAVEMENT	13743365.27	2166326.98
361	NEW REINFORCED CONCRETE PAVEMENT	13743365.30	2166274.88
362	NEW REINFORCED CONCRETE PAVEMENT	13743354.79	2166240.89
368	BLOW OFF STRUCTURE	13743483.96	2166394.60
369	BLOW OFF STRUCTURE	13743491.38	2166385.17
370	BLOW OFF STRUCTURE	13743485.09	2166380.23
371	BLOW OFF STRUCTURE	13743477.67	2166389.66
372	BLOW OFF STRUCTURE	13743442.70	2166188.33
373	BLOW OFF STRUCTURE	13743434.42	2166197.01
374	BLOW OFF STRUCTURE	13743436.92	2166182.80
375	BLOW OFF STRUCTURE	13743428.63	2166191.49
376	NEW OSG BUILDING	13743419.43	2166393.23
377	NEW OSG BUILDING	13743419.43	2166410.23
378	NEW OSG BUILDING	13743399.93	2166410.23
379	NEW OSG BUILDING	13743399.93	2166393.23
380	CONCRETE RIP-RAP	13743443.95	2166055.21
381	CONCRETE RIP-RAP	13743438.02	2166062.81
383	CONCRETE RIP-RAP	13743438.22	2166069.13
384	CONCRETE RIP-RAP	13743412.37	2166072.00
385	CONCRETE TRENCH CAP	13743495.40	2166256.37
386	CONCRETE TRENCH CAP	13743496.33	2166262.90
387	CONCRETE TRENCH CAP	13743463.83	2166276.51
388	CONCRETE TRENCH CAP	13743464.94	2166282.78
389	NEW REINFORCED CONCRETE PAVEMENT	13743461.11	2166450.14
391	GATE VALVE BOX	13743581.42	2166332.20
392	GATE VALVE BOX	13743577.50	2166319.39
393	GATE VALVE BOX	13743577.94	2166327.25

**KEYED LEGEND**

- EXISTING ROW
- PROJECT LIMITS/LIMITS OF DEMOLITION
- PROPERTY LINE

**LEGEND**

- EXISTING CONTROL POINT
- NEW CONTROL POINT
- CURVE DATA
- NEW CONCRETE FLUME
- NEW REINFORCED CONCRETE PAVEMENT
- NEW GRAVEL PAVED ACCESS ROAD
- NEW ASPHALT REPLACEMENT
- NEW CONCRETE PAD
- NEW 6" CURB AND GUTTER
- NEW LOW WATER CROSSING
- NEW CONCRETE RIP-RAP
- NEW CONCRETE SIDEWALK
- NEW CONCRETE ENERGY DISSIPATORS

**NOTES**

- ANY DAMAGE/DISTURBANCE OUTSIDE OF PROJECT SCOPE TO BE RESTORED TO EXISTING CONDITIONS OR BETTER AT CONTRACTOR'S EXPENSE UNLESS APPROVED BY SAWS.
- SEE DETAIL 10 ON SHEET C-23 FOR GRAVEL LOOP EDGING.

CURVE DATA TABLE							
CURVE	RADIUS	LENGTH	TANGENT	CHORD	DELTA	(X, Y) COORDINATE	(X, Y) COORDINATE
C1	385.05'	86.20'	43.28'	86.02'	12°49'37"	2166092.92, 13743470.52	2166101.71, 13743384.95
C2	87.81'	59.13'	30.74'	58.02'	38°34'54"	2166073.12, 13743390.64	2166097.79, 13743338.13
C3	88.44'	49.42'	25.38'	48.78'	32°01'10"	2166097.79, 13743338.13	2166140.73, 13743314.98
C4	360.32'	54.95'	27.53'	54.90'	8°44'19"	2166196.27, 13743351.29	2166244.30, 13743377.88
C5	236.31'	70.87'	35.70'	70.60'	17°10'57"	2166244.30, 13743377.88	2166312.72, 13743395.27
C6	28.27'	14.91'	7.63'	14.74'	30°13'22"	2166441.38, 13743420.96	2166432.85, 13743408.94
C7	20.06'	31.21'	19.77'	28.16'	89°10'15"	2166422.55, 13743370.51	2166448.03, 13743358.52
C9	11.81'	17.02'	10.37'	15.99'	82°36'01"	2166140.73, 13743314.98	2166151.34, 13743303.56
C10	155.53'	181.81'	102.90'	171.63'	66°58'39"	2166149.09, 13743209.84	2166240.86, 13743354.87
C24	71.67'	42.54'	21.92'	41.92'	34°00'42"	2166432.85, 13743408.94	2166393.24, 13743395.21
C25	62.09'	116.88'	85.23'	100.37'	107°5'12"	2166101.71, 13743384.95	2166196.27, 13743351.29
C26	144.86'	43.92'	22.13'	43.75'	17°22'16"	2166441.38, 13743420.96	2166450.31, 13743463.79
C27	155.53'	181.81'	102.90'	171.63'	66°58'39"	2166149.09, 13743209.84	2166240.86, 13743354.87
C28	50.00'	21.05'	10.68'	20.90'	24°07'23"	2166274.88, 13743365.30	2166254.44, 13743360.95
C29	93.53'	82.94'	44.42'	80.24'	50°48'26"	2166394.08, 13743365.22	2166485.57, 13743401.68
C30	33.60'	28.76'	15.33'	27.89'	49°03'12"	2166105.57, 13743564.25	2166094.53, 13743538.64

CURVE DATA TABLE							
CURVE	RADIUS	LENGTH	TANGENT	CHORD	DELTA	(X, Y) COORDINATE	(X, Y) COORDINATE
C31	27.00'	26.08'	14.16'	25.08'	55°21'30"	2166056.56, 13743565.00	2166073.45, 13743543.48
C32	34.85'	15.86'	8.07'	15.72'	26°04'19"	2166151.34, 13743303.56	2166148.75, 13743288.06
C33	167.01'	80.69'	41.15'	79.91'	27°41'00"	2166148.75, 13743288.06	2166130.89, 13743210.17
C34	74.79'	12.72'	6.37'	12.70'	9°44'31"	2166450.31, 13743463.79	2166449.93, 13743476.49

EXISTING CONTROL DATA TABLE				
POINT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
EB-1	1/2" IRON ROD W/CAP	13743804.91	2166086.08	810.89
EB-2	1/2" IRON ROD W/CAP	13743597.05	2166481.20	814.06
EB-3	EXISTING BENCHMARK	13743181.81	2166126.62	812.94

**STATE OF TEXAS**  
**MARCOS MEDINA**  
 93830  
 LICENSED PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARCOS MEDINA, P.E. (No. 93830) ON NOVEMBER 30, 2022. ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

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 2506 E. Monument Ave., El Paso, TX 79902 (915) 529-2907  
 From Board of Professional Engineers Registration No. F-00057

**SAN ANTONIO WATER SYSTEM**  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
**HORIZONTAL CONTROL PLAN 1**

NO. 1  
 DATE 1/17/2023  
 BY EG  
 ISSUE  
 APPENDIX NO. 5  
 SHEET  
 SEQ.

FILE NAME: C-11 - Site & HC Plan.dwg

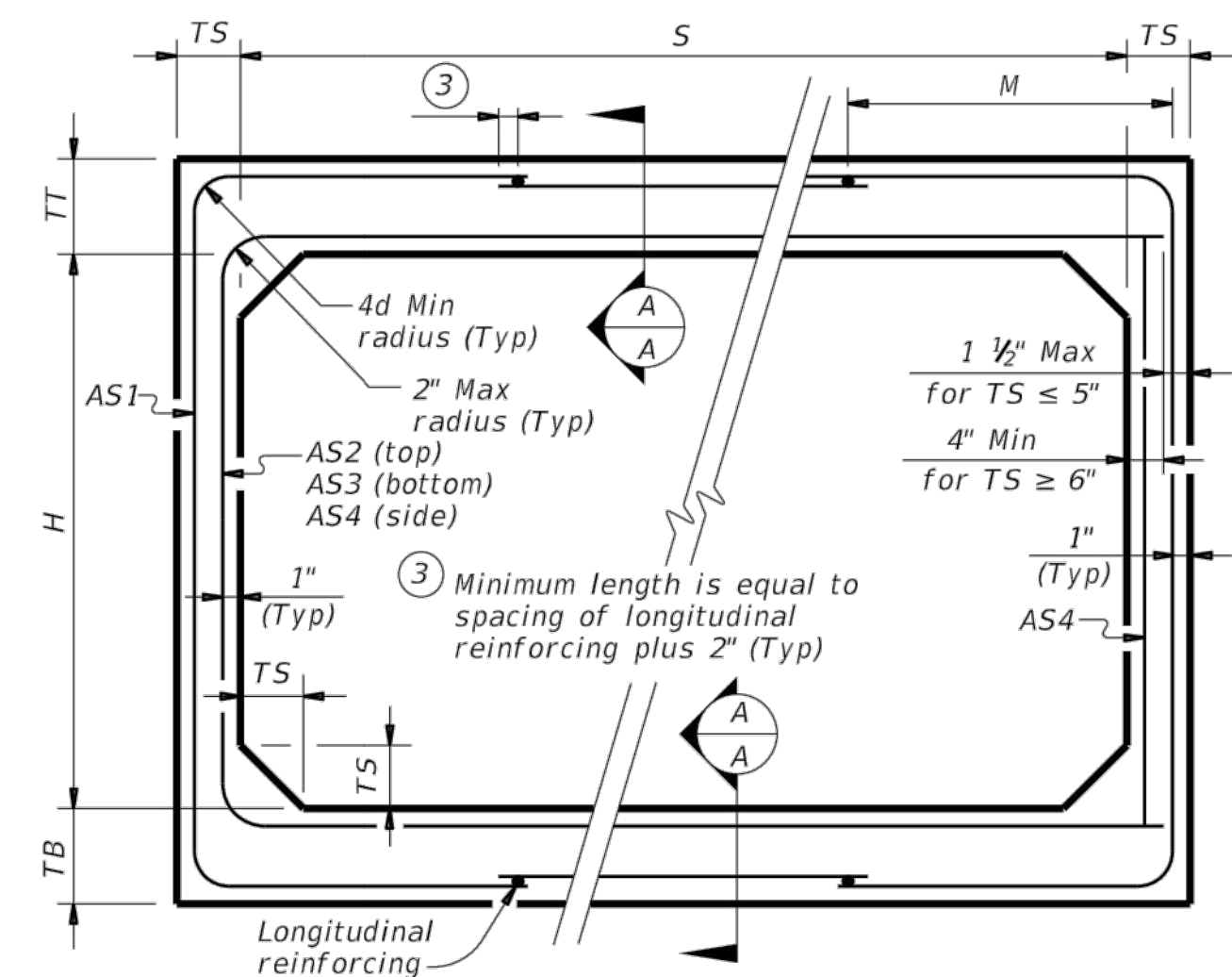
VERIFY SCALE: 1" = 100' (if not one inch on original drawing, if not one inch on this sheet, adjust scale.)

**C-12**

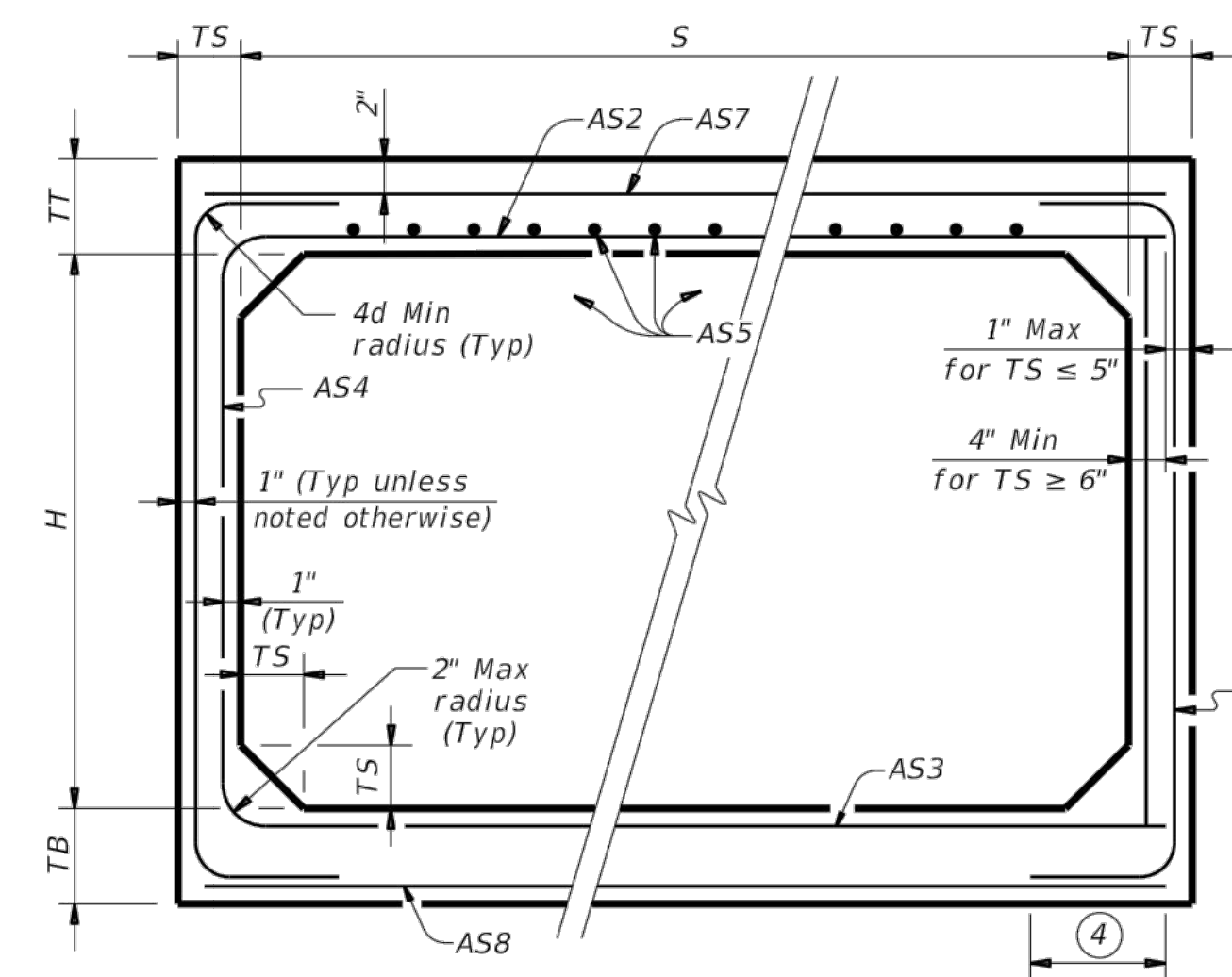
**BOX DATA**

SECTION DIMENSIONS					Fill Height (ft.)	M (Min) (in.)	REINFORCING (sq. in. / ft.) <sup>②</sup>								① Lift Weight (tons)
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)			AS1	AS2	AS3	AS4	AS5	AS7	AS8		
3	2	7	6	4	< 2	-	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3	
3	2	4	4	4	2 < 3	31	0.13	0.19	0.18	0.10	-	-	-	2.4	
3	2	4	4	4	3 - 5	31	0.10	0.11	0.12	0.10	-	-	-	2.4	
3	2	4	4	4	10	31	0.10	0.10	0.10	0.10	-	-	-	2.4	
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	-	-	-	2.4	
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	-	-	-	2.4	
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	-	-	-	2.4	
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	-	-	-	2.4	
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	-	-	-	2.4	
3	3	8	8	5	< 2	-	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7	
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	-	-	-	2.8	
3	3	4	4	4	3 - 5	31	0.10	0.14	0.14	0.10	-	-	-	2.8	
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	-	-	-	2.8	
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	-	-	-	2.8	
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	-	-	-	2.8	
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	-	-	-	2.8	
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	-	-	-	2.8	
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	-	-	-	2.8	

① For box length = 8'-0"  
 ② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



**CORNER OPTION "A"**

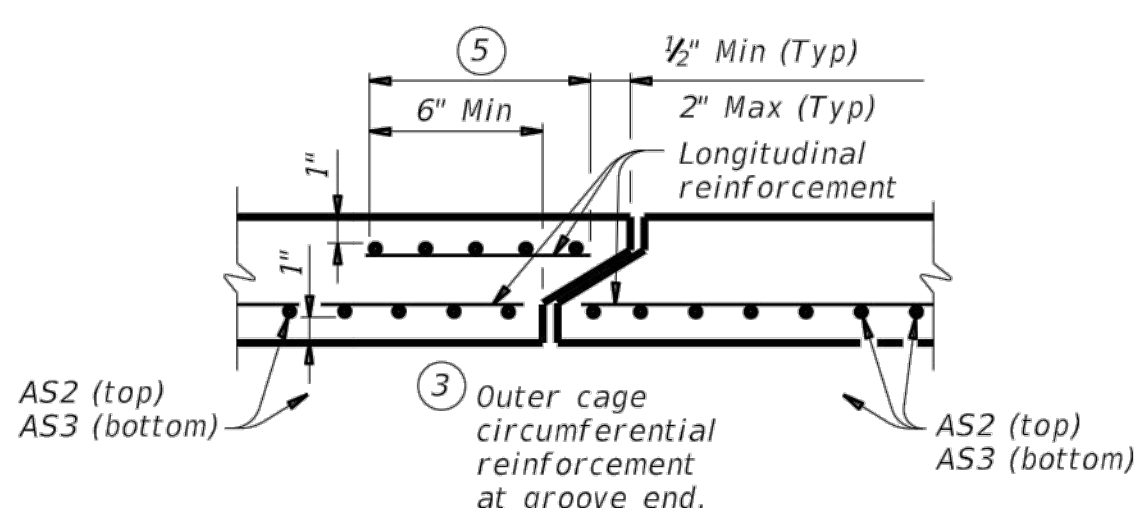


**CORNER OPTION "B"**

**FILL HEIGHT 2 FT AND GREATER**

**FILL HEIGHT LESS THAN 2 FT**

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



**SECTION A-A**

(Showing top and bottom slab joint reinforcement.)

**MATERIAL NOTES:**  
 Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.  
 Provide Class H concrete (f'c = 5,000 psi).

**GENERAL NOTES:**  
 Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.  
 See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.  
 In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

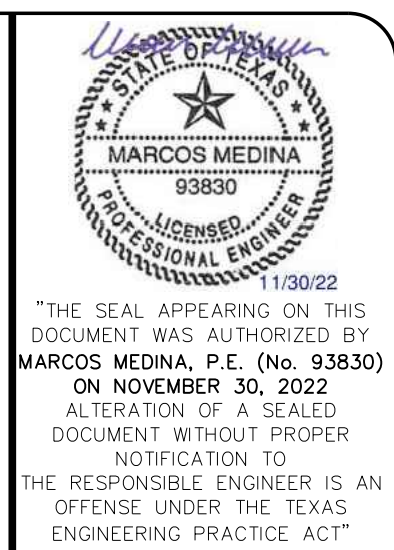
HL93 LOADING

Bridge Division Standard

SINGLE BOX CULVERTS  
PRECAST  
3'-0" SPAN

SCP-3

FILE: scp03sts-20.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST	COUNTY		SHEET NO.	



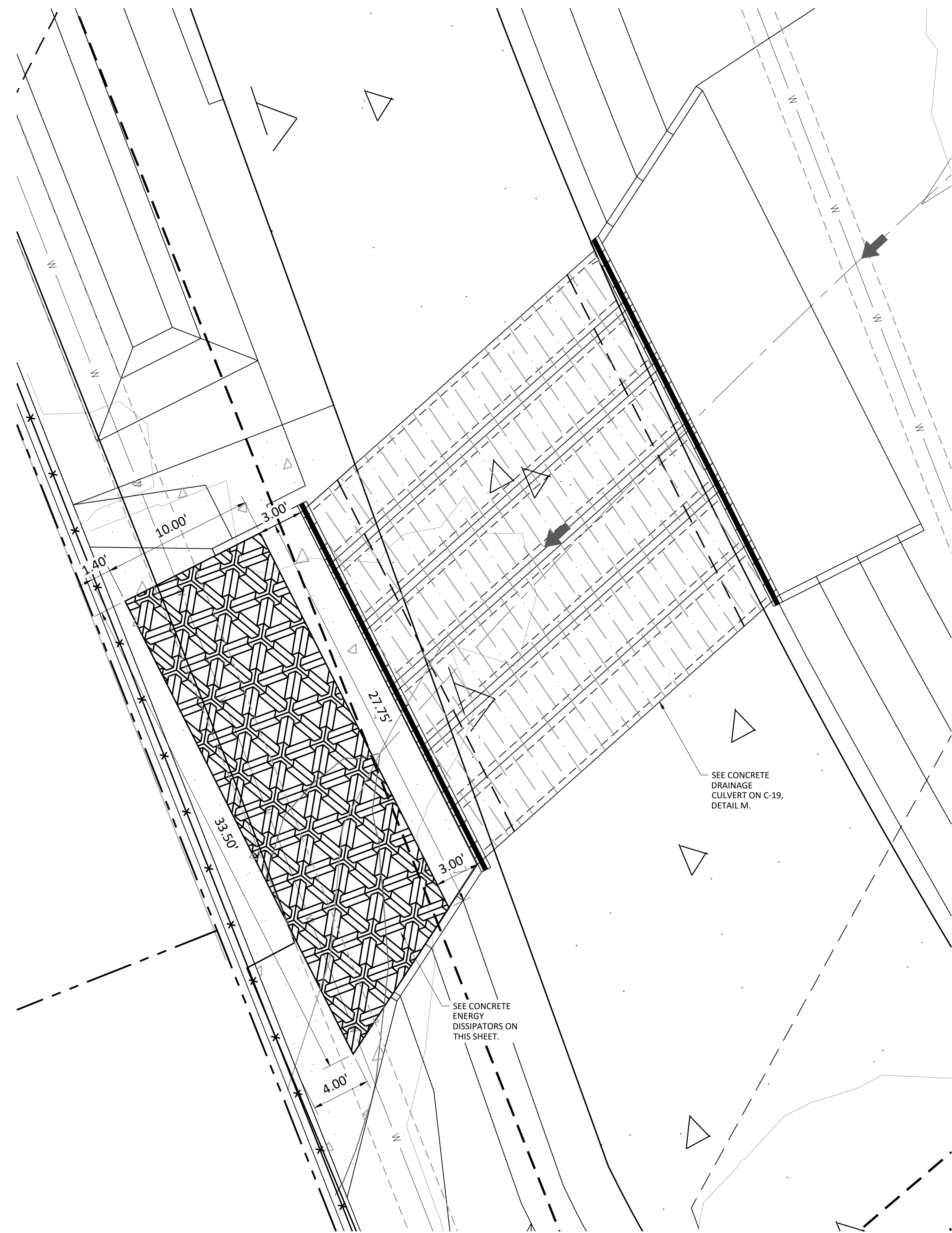
**FREESE & NICHOLS**  
 9601 McAllister Freeway, Suite 1008  
 San Antonio, Texas 78216  
 Phone - (210) 298-3800  
 Web - www.freese.com

PLANNING/CONSTRUCTION/PROJECT MANAGEMENT  
**MCi Cardenas Inc.**  
 2508 E. Monument Ave. / El Paso, TX 79902 / (915) 582-2901  
 From Board of Professional Engineers Registration No. F-240657

SAN ANTONIO WATER SYSTEM  
 RANDOLPH PUMP STATION IMPROVEMENTS  
 DRAINAGE MISCELLANEOUS DETAILS III

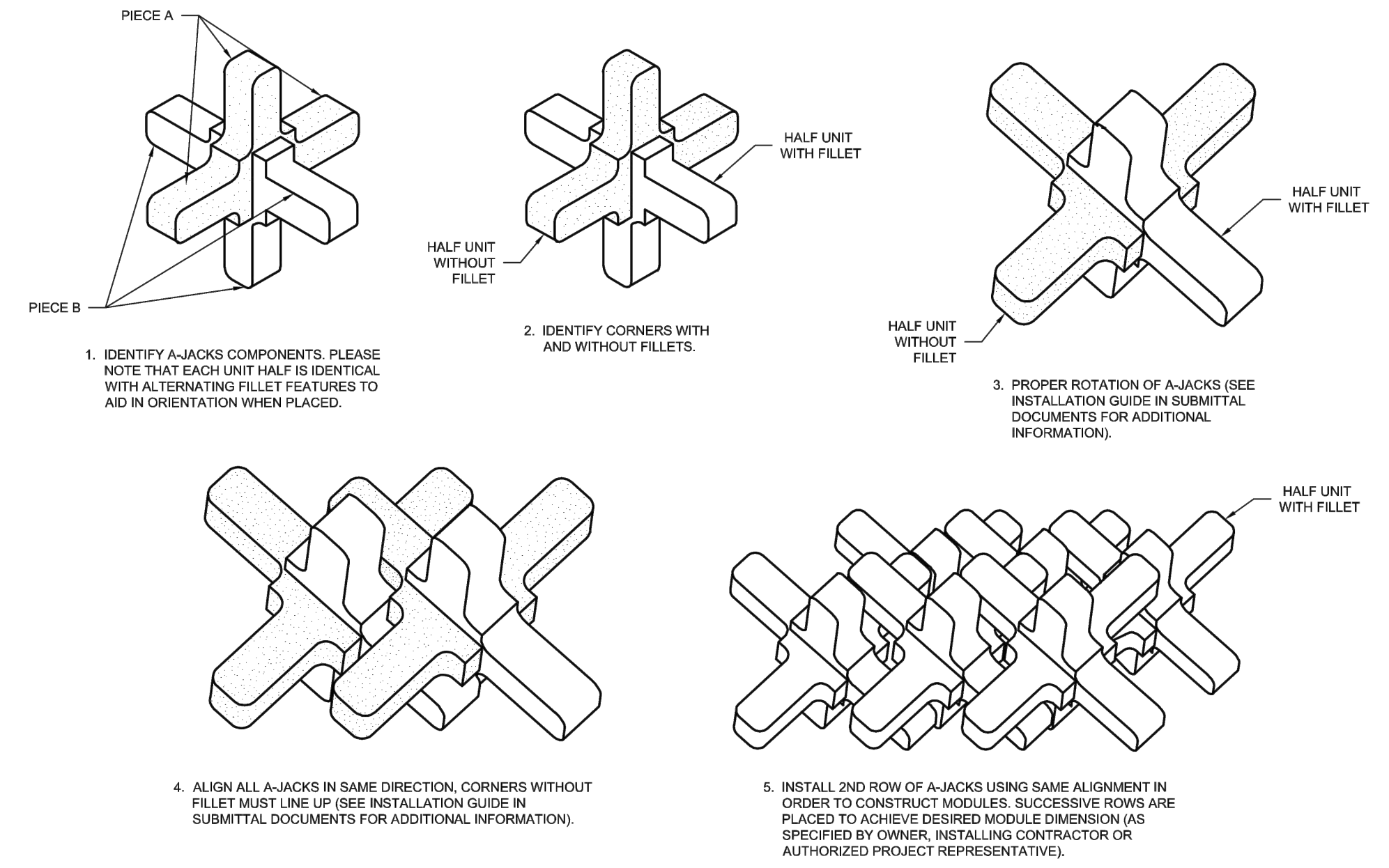
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NO.	ISSUE	APPENDUM NO. 5										
VERIFY SCALE: Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.												

1



1  
C-21B  
1"=5'

**CONCRETE ENERGY DISSIPATORS PLAN VIEW**



2  
C-21B  
N.T.S.

**CONCRETE ENERGY DISSIPATORS DETAIL**

STATE OF TEXAS  
MARCOS MEDINA, P.E. (No. 93830)  
PROFESSIONAL ENGINEER  
11/30/22  
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MARCOS MEDINA, P.E. (No. 93830) ON NOVEMBER 30, 2022. ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

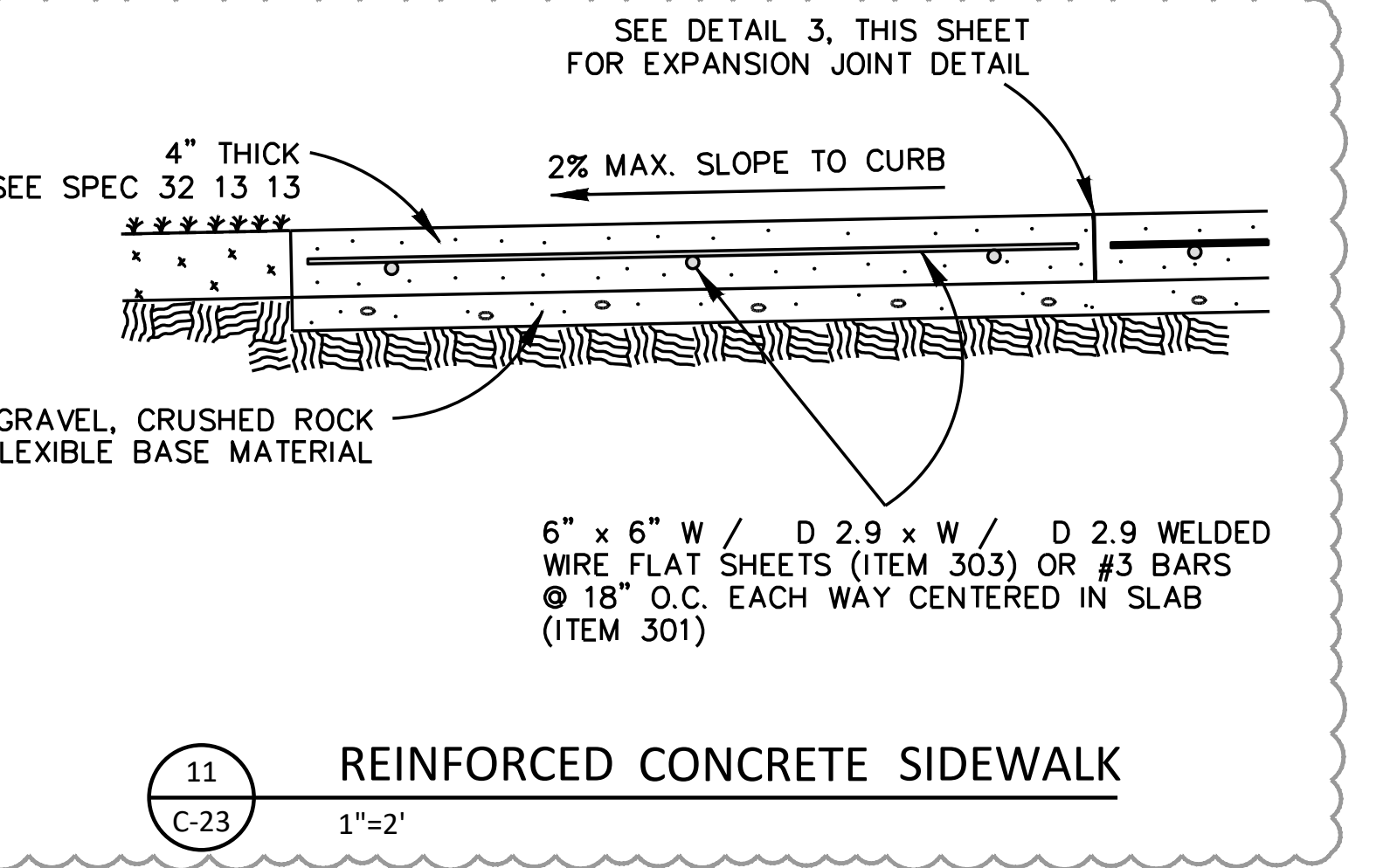
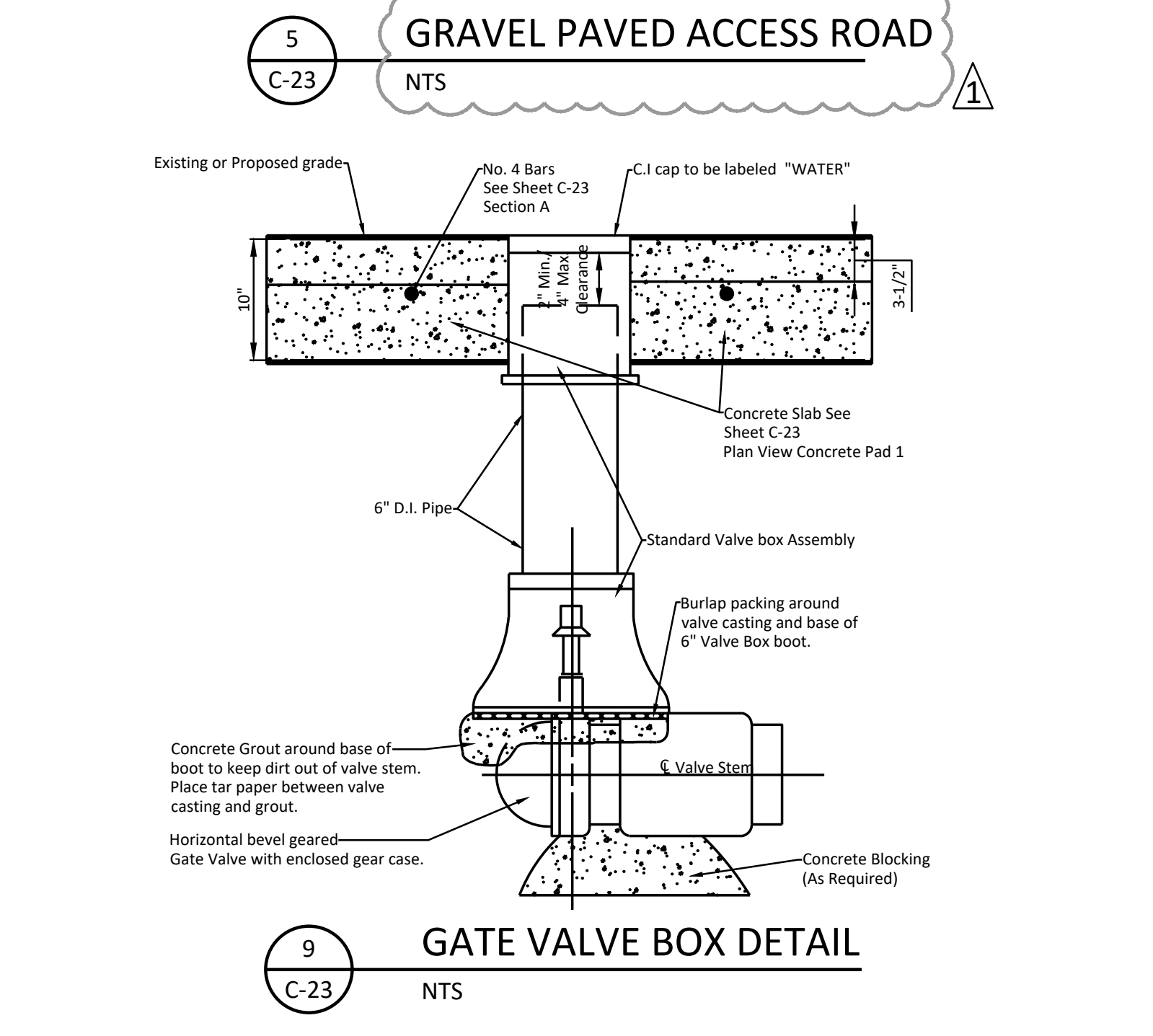
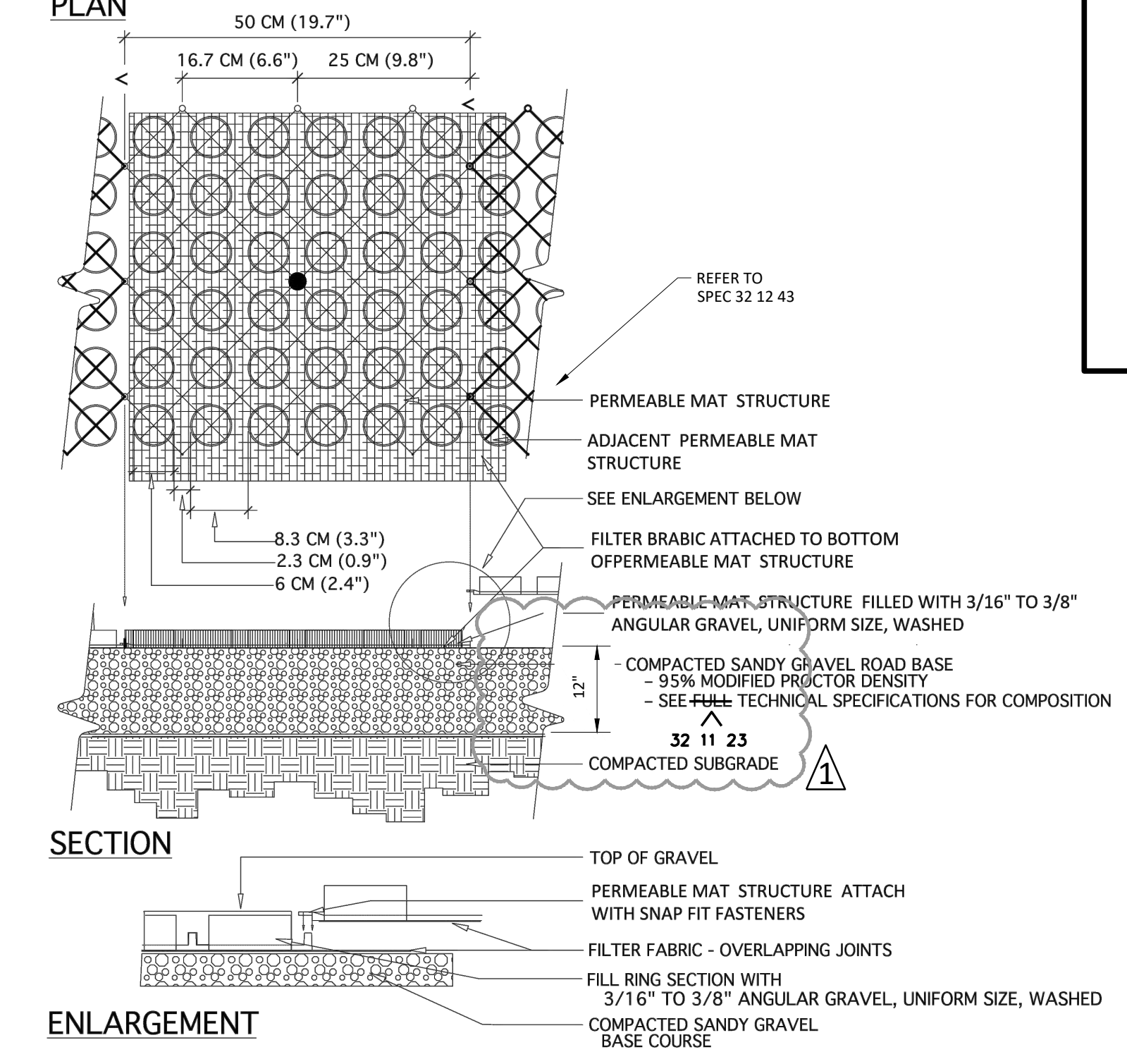
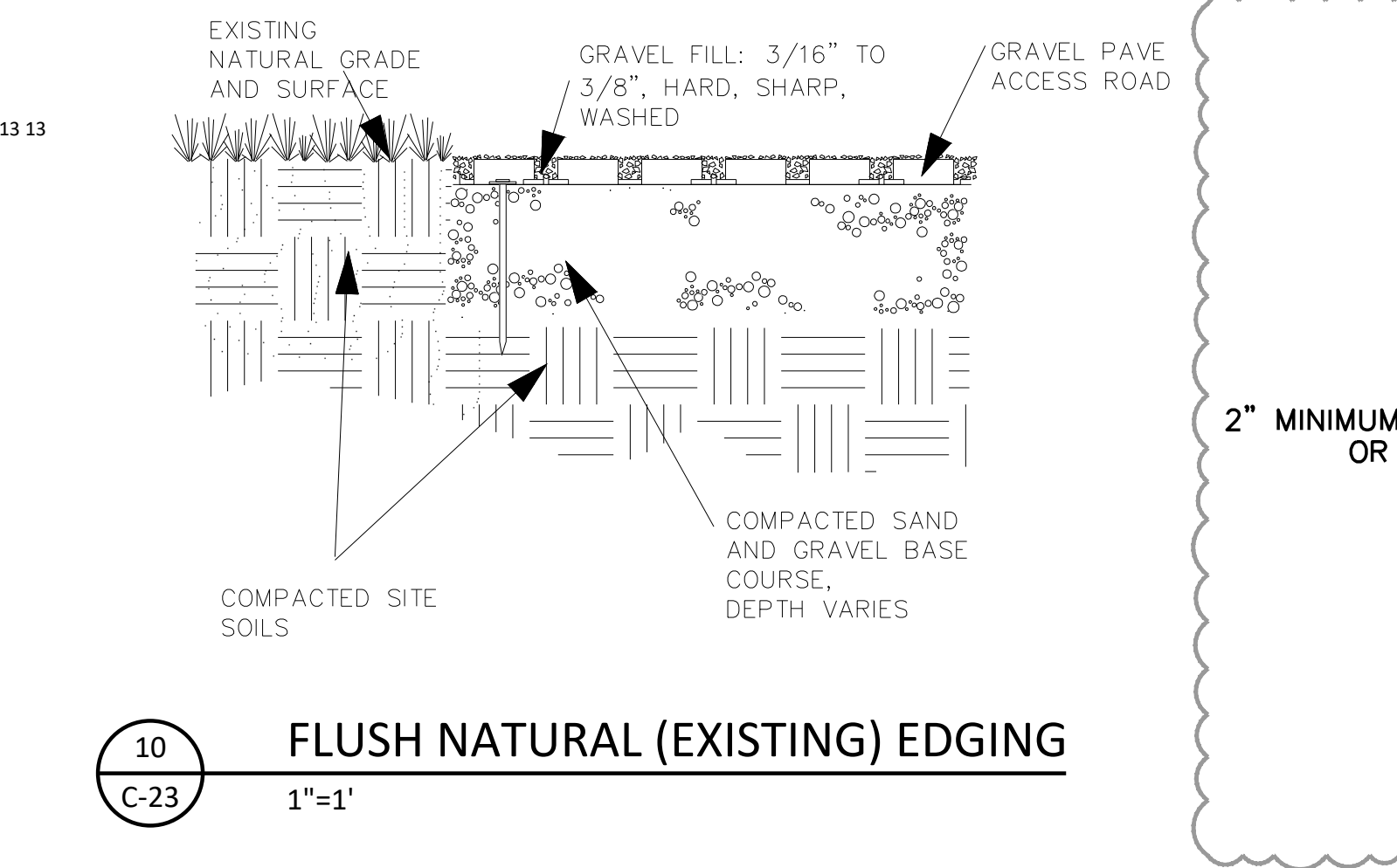
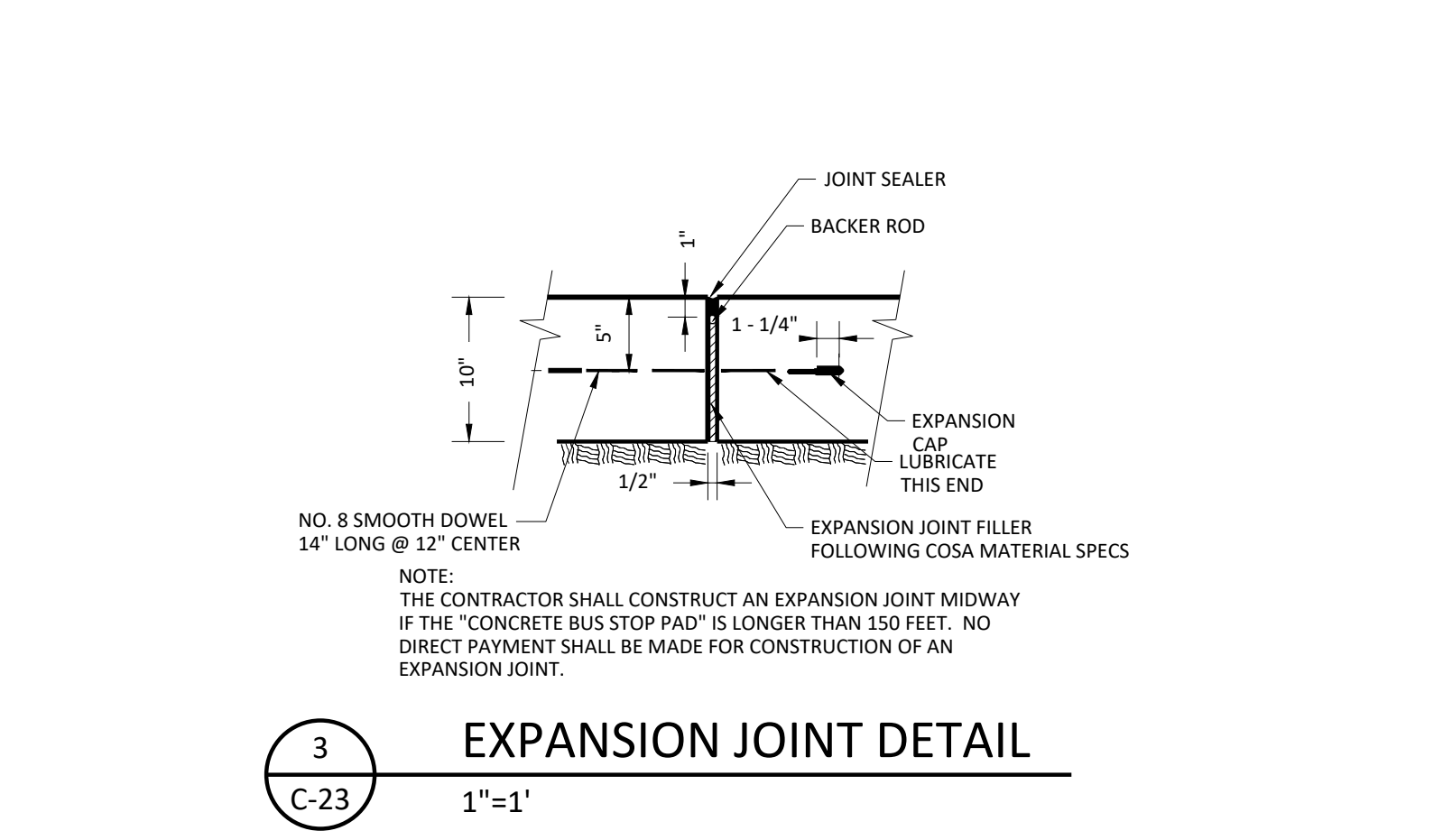
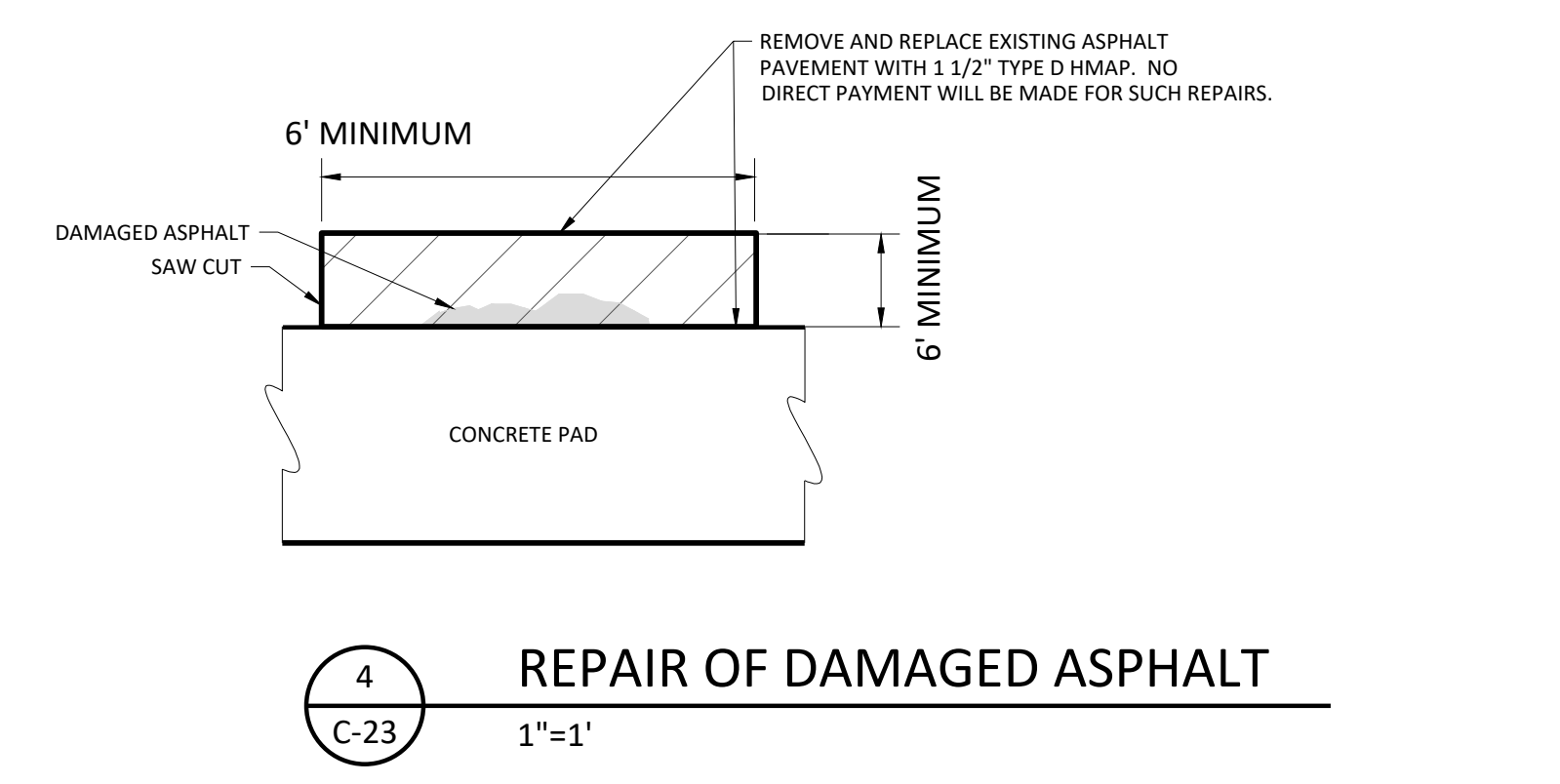
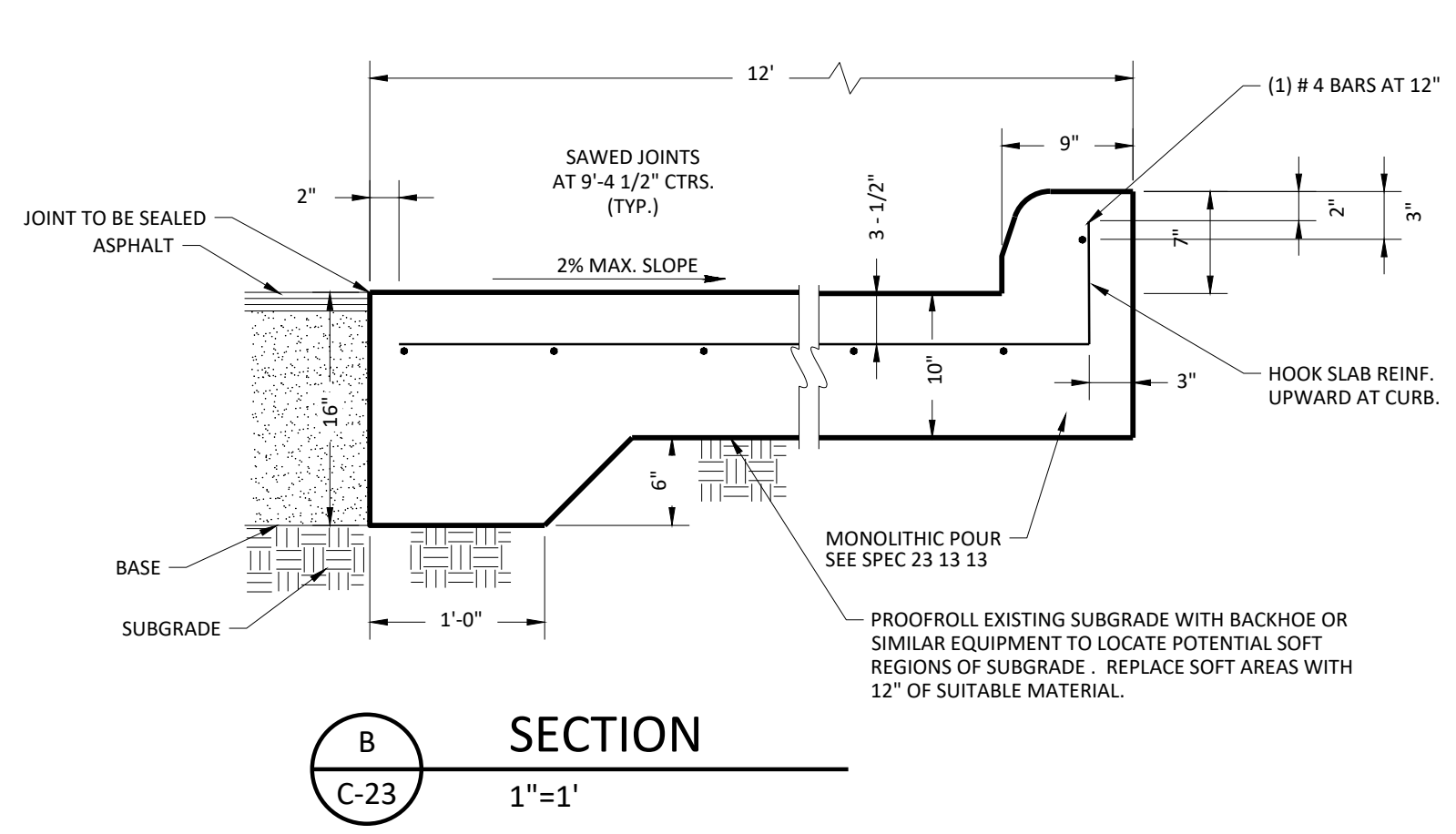
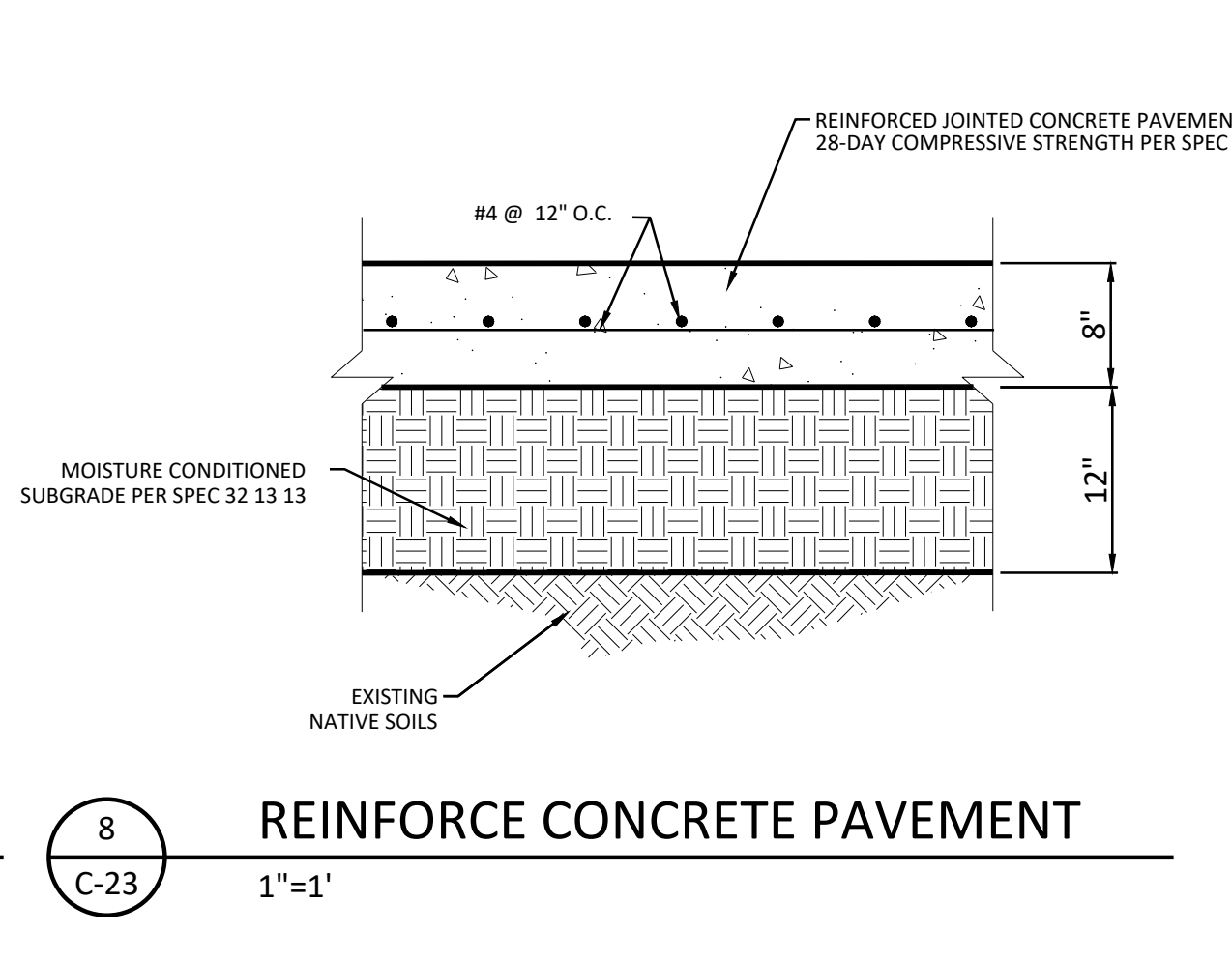
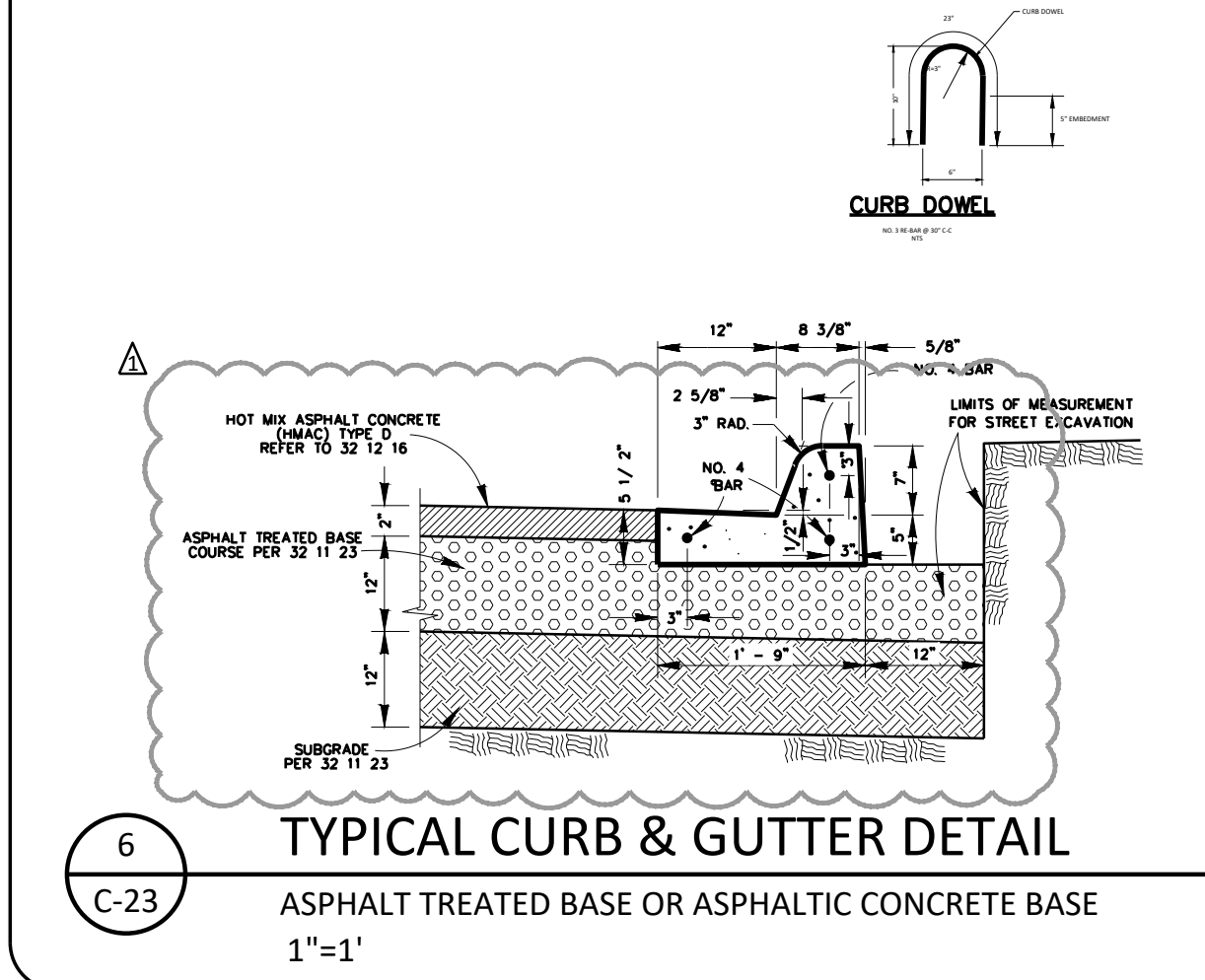
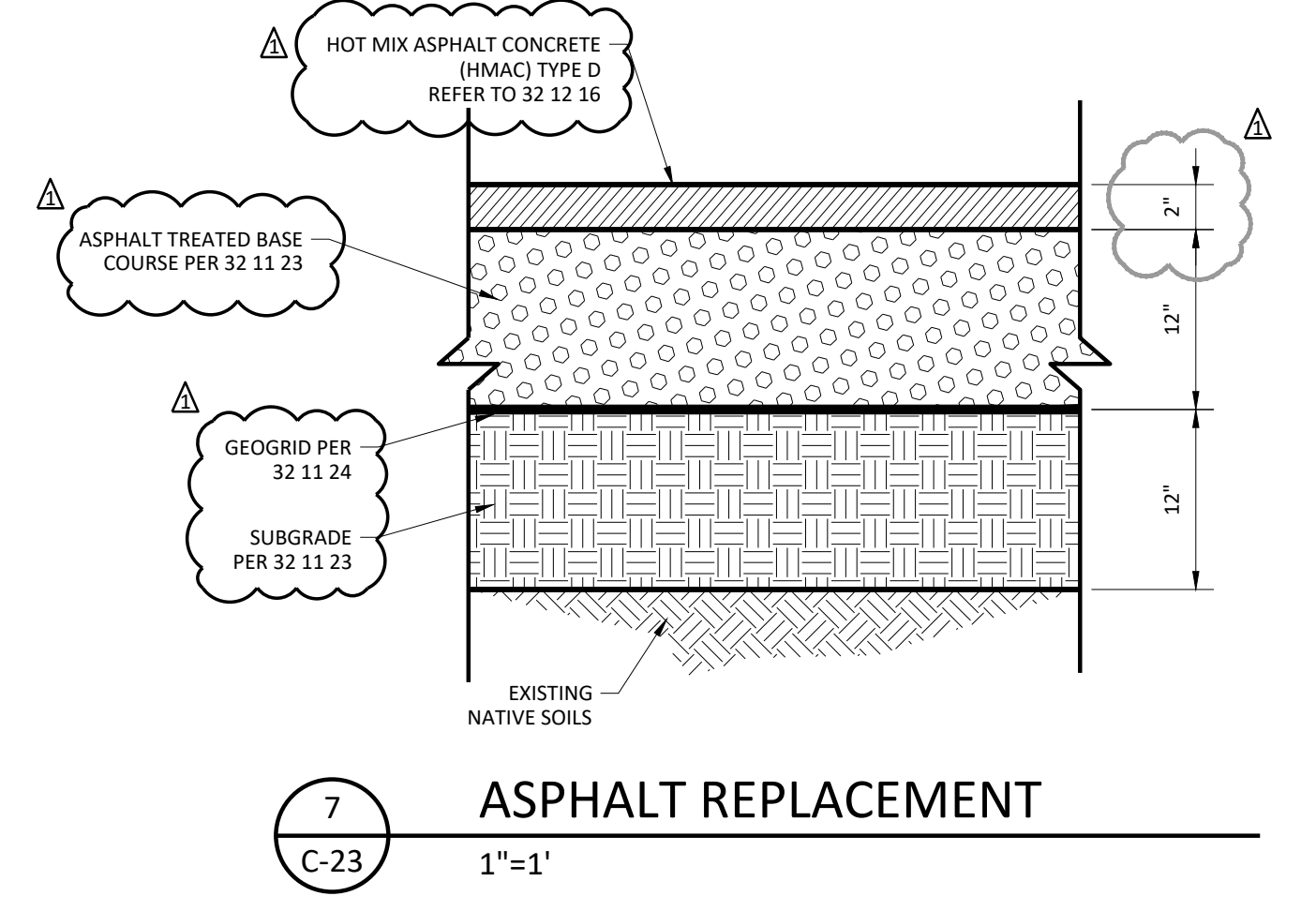
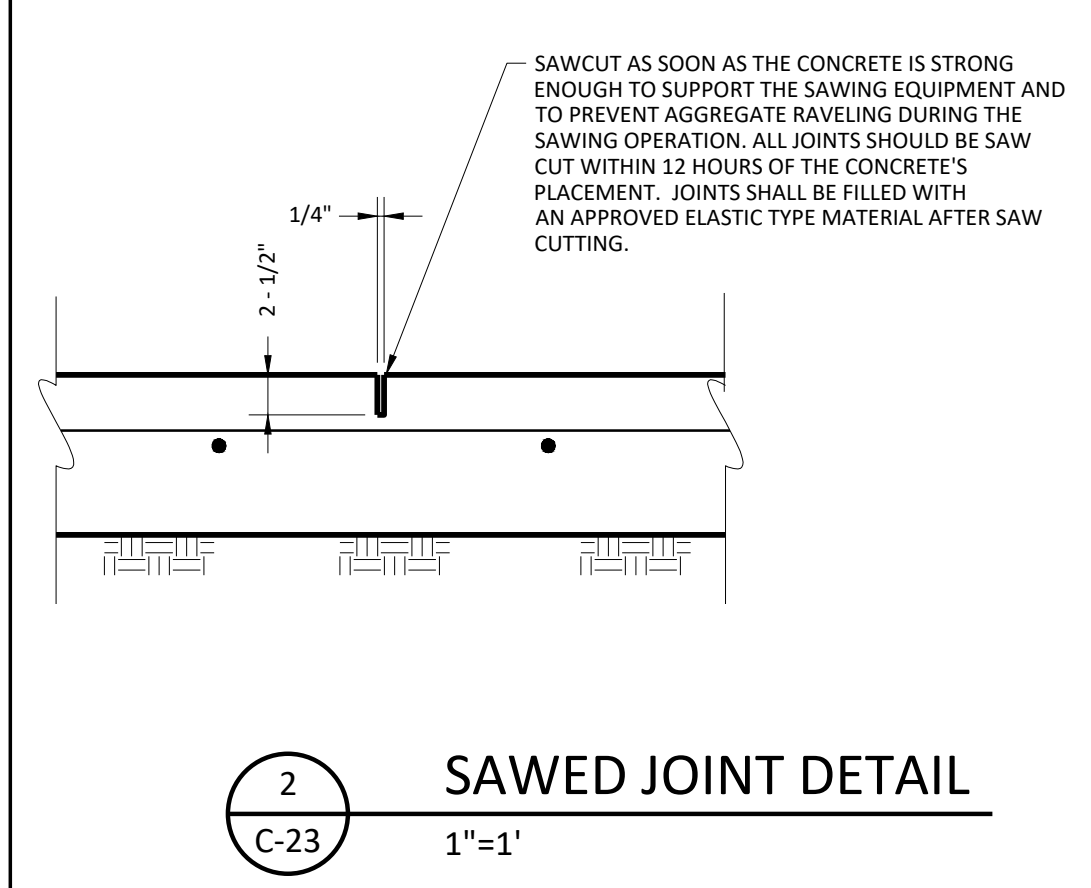
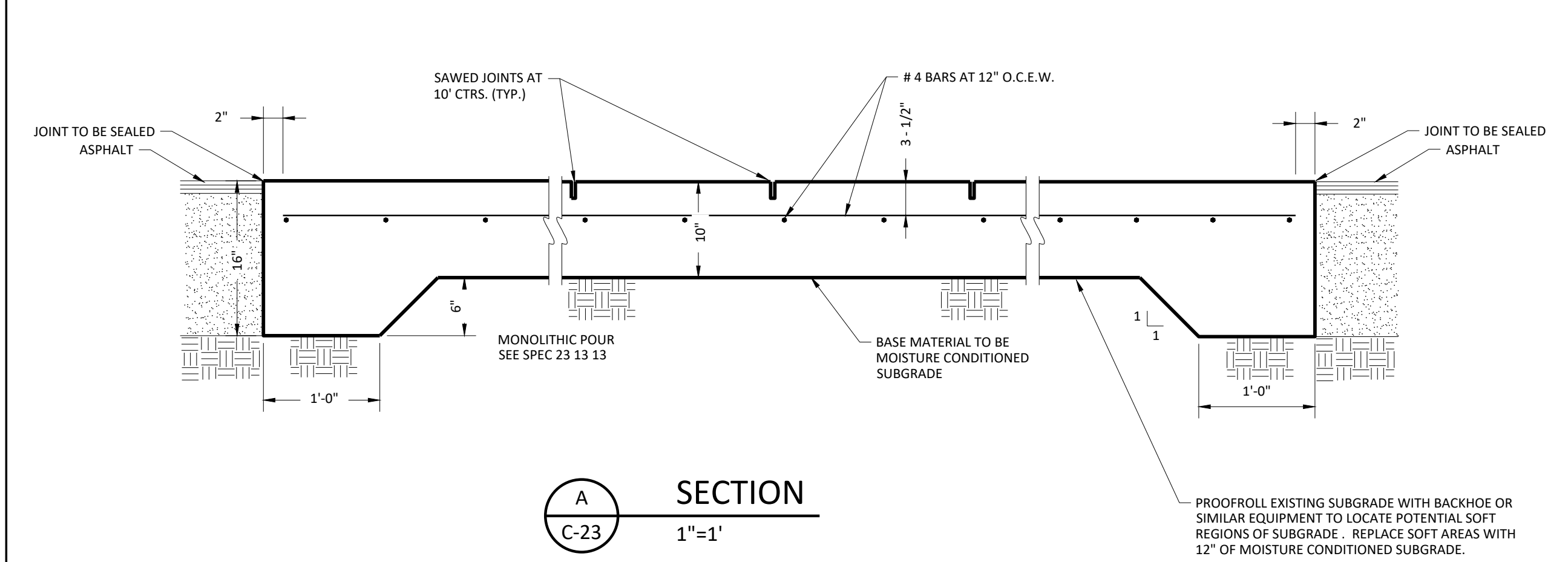
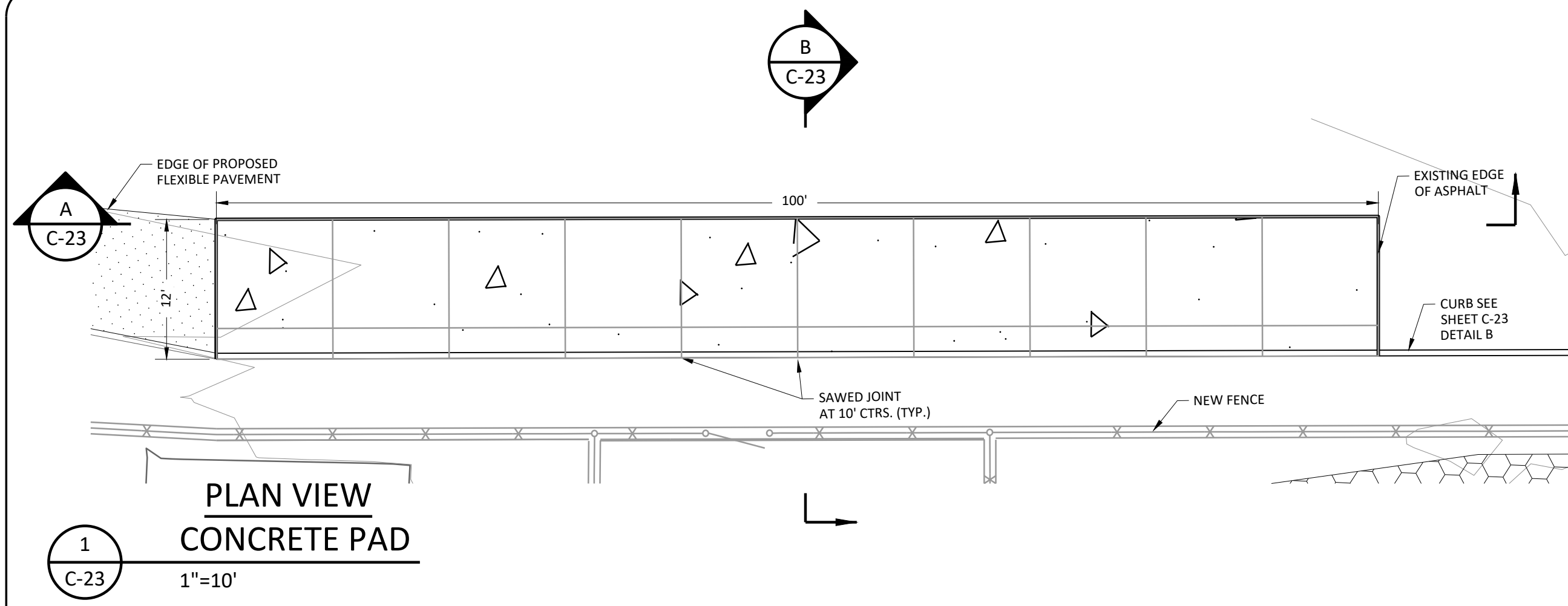
**FREESSE & NICHOLS**  
9601 McAllister Freeway, Suite 1008  
San Antonio, Texas 78216  
Phone - (210) 298-3800  
Web - www.freesse.com

PLANNING/CONSTRUCTION/PROJECT MANAGEMENT  
**MCI Moreno Cardenas Inc.**  
SAN ANTONIO, TEXAS  
3500 McAllister Freeway, Suite 1008, San Antonio, TX 78216  
From Board of Professional Engineers Registration No. F-08057

SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
**DRAINAGE MISCELLANEOUS DETAILS IV**

NO.	ISSUE	DATE	BY	DESIGNED	DRAWN	REVISIONS	CHECKED	FILE NAME
1	ADDENDUM NO. 5	01/13/2023	EG	JH/C/C	E.G./A.M.		M.M.	C-18 - Drainage Details.dwg
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SHEET  
C-21B



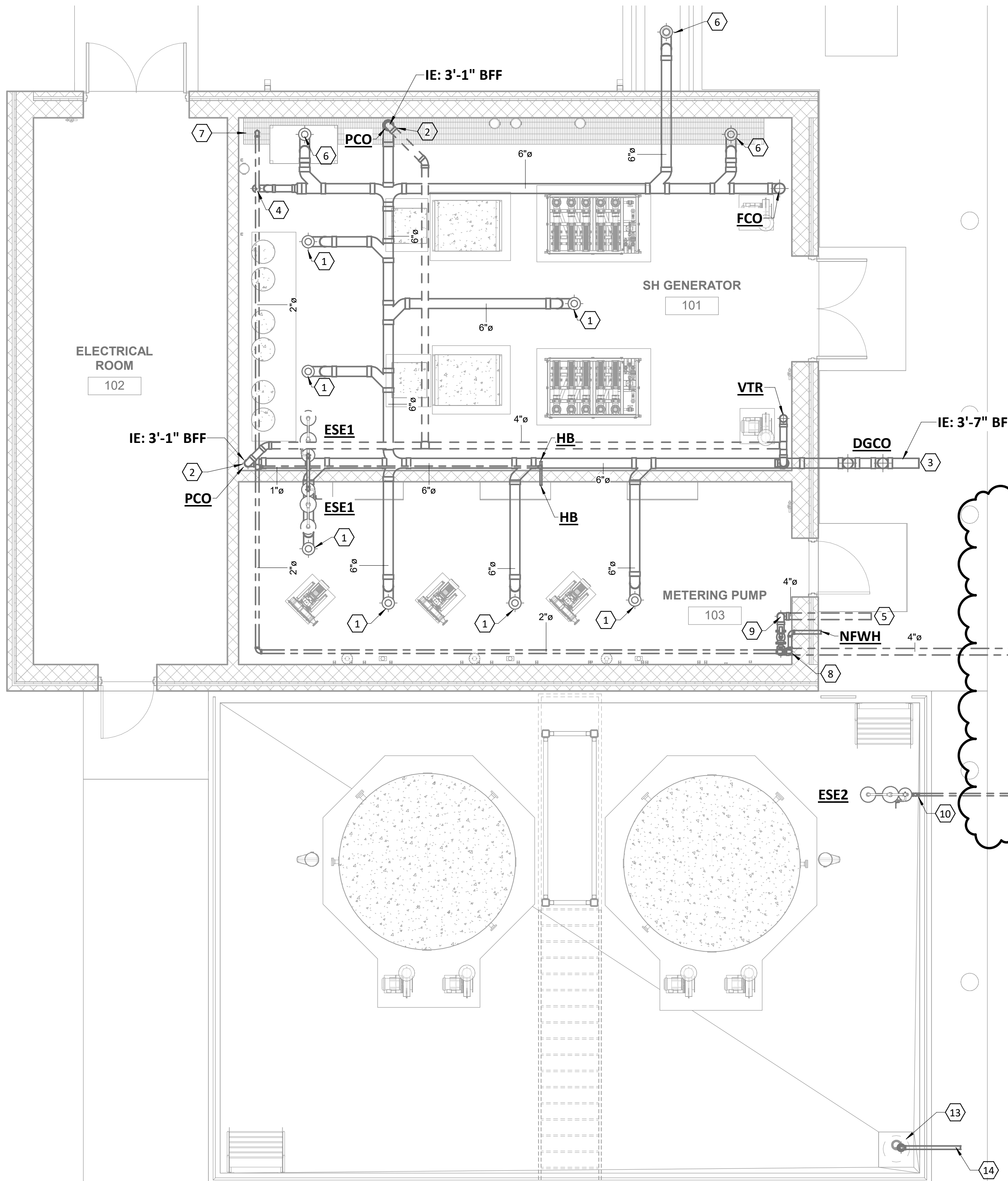
STATE OF TEXAS  
MARCO MEDINA, P.E. (No. 93830)  
ON NOVEMBER 30, 2022  
ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION TO THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT

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**McCardenas Inc.**  
3208 E. Monument Ave. #1100  
San Antonio, Texas 78204  
Phone - (210) 520-2991  
From Board of Professional Engineers Registration No. 240657

SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
ROADWAY MISCELLANEOUS DETAILS

PROJ. JOB NO.	SWB20457	DATE	01/11/2023	DESIGNED	JH/C/C	DRAWN	E.G./A.M.	REVISIONS		FILE NAME	C-21 - Roadway Details.dwg
NO.	ISSUE	ADDENDUM NO.		CHECKED						VERIFY SCALE	0
SHEET										Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.	1
SEQ.										C-23	



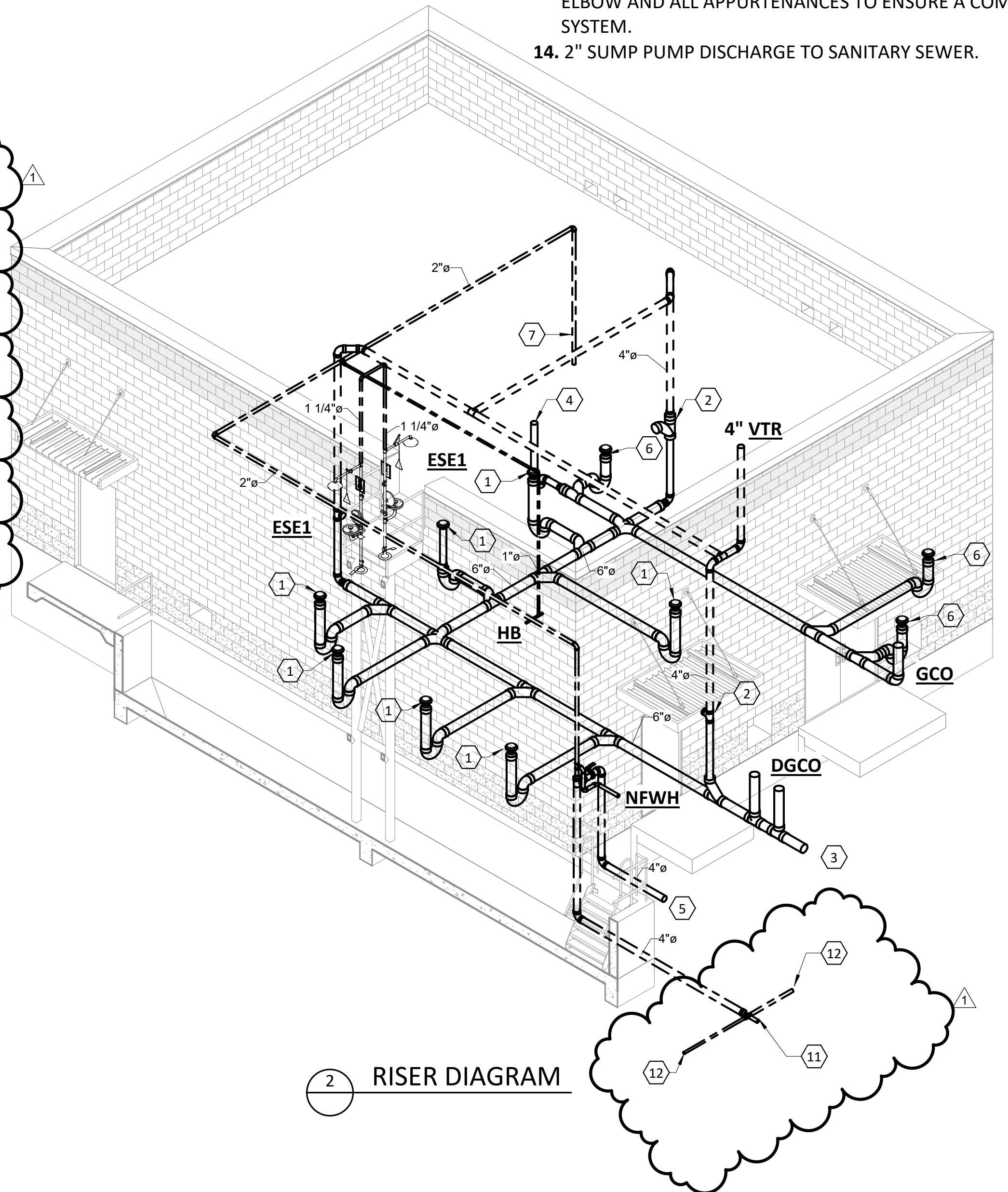
1 PLUMBING FLOOR PLAN  
1/4" = 1'-0"

**GENERAL NOTES**

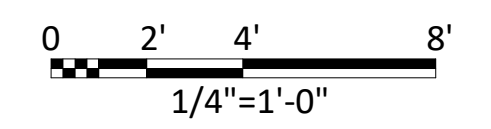
REFER TO SHEET PL-1 FOR LEGEND, GENERAL NOTES AND SCHEDULES.

**NOTES BY SYMBOL "⬡"**

1. 6" FLOOR DRAIN WITH TRAP SEAL DEVICE.
2. 6" SS UP TO PCO AT 2'-0" AFF AND CONTINUE 4" VENT UP ON WALL TO 4" VTR. OFFSET VENT PIPE IN JOIST SPACE TO VTR TO 4'-0" FROM ROOF EDGE.
3. 6" SANITARY SEWER PIPE. REFER TO CIVIL DRAWINGS FOR CONTINUATION.
4. 3" HUB DRAIN WITH TRAP GUARD DEVICE INSERT AND AIR GAP FITTING TO CONNECT CONDENSATE DRAIN PIPE FROM HVAC EQUIPMENT.
5. 4" DOMESTIC WATER SERVICE INTO BUILDING. IE: 3'-8" BFF.
6. 6" FLOOR DRAIN IN TRENCH WITH TRAP SEAL DEVICE.
7. DROP TO WATER SOFTENER CONNECTION.
8. DROP BELOW FLOOR AND ROUTE TO ESE2 AND FLUORIDE BUILDING.
9. DOMESTIC WATER RISER WITH SHOUT OFF VALVE AT 2'-0" AFF.
10. 1-1/4" & 3/4" CW CONNECTION UNDERGROUND TO SELF-DRAINING VALVES. PROVIDE WITH NFWH.
11. 2" DOMESTIC WATER TO FLUORIDE BUILDING.
12. 2" DOMESTIC WATER TO ESE2. REFER TO 1/PL-6 FOR CONTINUATION.
13. NEW SUBMERSIBLE SUMP PUMP (SR-1) IN SUMP PIT. PROVIDE WITH DISCHARGE ELBOW AND ALL APPURTENANCES TO ENSURE A COMPLETE OPERATIONAL SYSTEM.
14. 2" SUMP PUMP DISCHARGE TO SANITARY SEWER.



2 RISER DIAGRAM



Freese and Nichols, Inc.  
Texas Registered Engineering Firm F-2144



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9601 McAllister Freeway, Suite 1008  
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Phone - (210) 298-3800  
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SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
PLUMBING  
**SODIUM HYPOCHLORITE GENERATION BUILDING**  
FLOOR PLAN

F&N JOB NO.	SWBZ0457
DATE	1/10/23
DESIGNED	MRB
DRAWN	MRB
REUSED	
CHECKED	STV
FILE NAME	PL-SWBZ0457-ELB-R21.RVT
ISSUE NO.	1
VERIFY SCALE	Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.
NO.	0
ADDENDUM NO.	5
BY	
DATE	1/10/2023
SHEET	PL-4
SEQ.	

**GENERAL NOTES:**

1. ALL EMH SHALL BE MINIMUM 6'X6' XH AND SHALL BE LABELED AS ELECTRICAL.
2. ALL EHH SHALL BE A MINIMUM OF 4'X4'XH AND SHALL BE LABELED AS CONTROLS
3. ALL CHH SHALL BE A MINIMUM OF 4'X4'XH AND SHALL BE LABELED AS COMMUNICATIONS
4. THE DUCTBANK ROUTING AND MANHOLE/HANDHOLE LOCATION AS SHOWN IS APPROXIMATE, CONTRACTOR SHALL ADJUST THE EXACT LOCATION TO AVOID ANY CONFLICTS OR FACILITATE CONSTRUCTION WITH OWNERS' APPROVAL AND NO ADDITIONAL COST.
5. ALL ELECTRICAL WORK SHALL BE DONE AS PER THE CONSTRUCTION OF SEQUENCE.
6. REFER TO MECHANICAL/CIVIL DRAWINGS FOR EXACT LOCATION OF EQUIPMENT AND STRUCTURES.
7. ALL MEDIUM VOLTAGE EMH SHALL BE 7'X7'XD.
8. ALL EHH SHALL BE 6'X6'XD.
9. ALL CHH AND FHH SHALL BE 4'X4'XD.

**NOTES BY SYMBOL "⬡"**

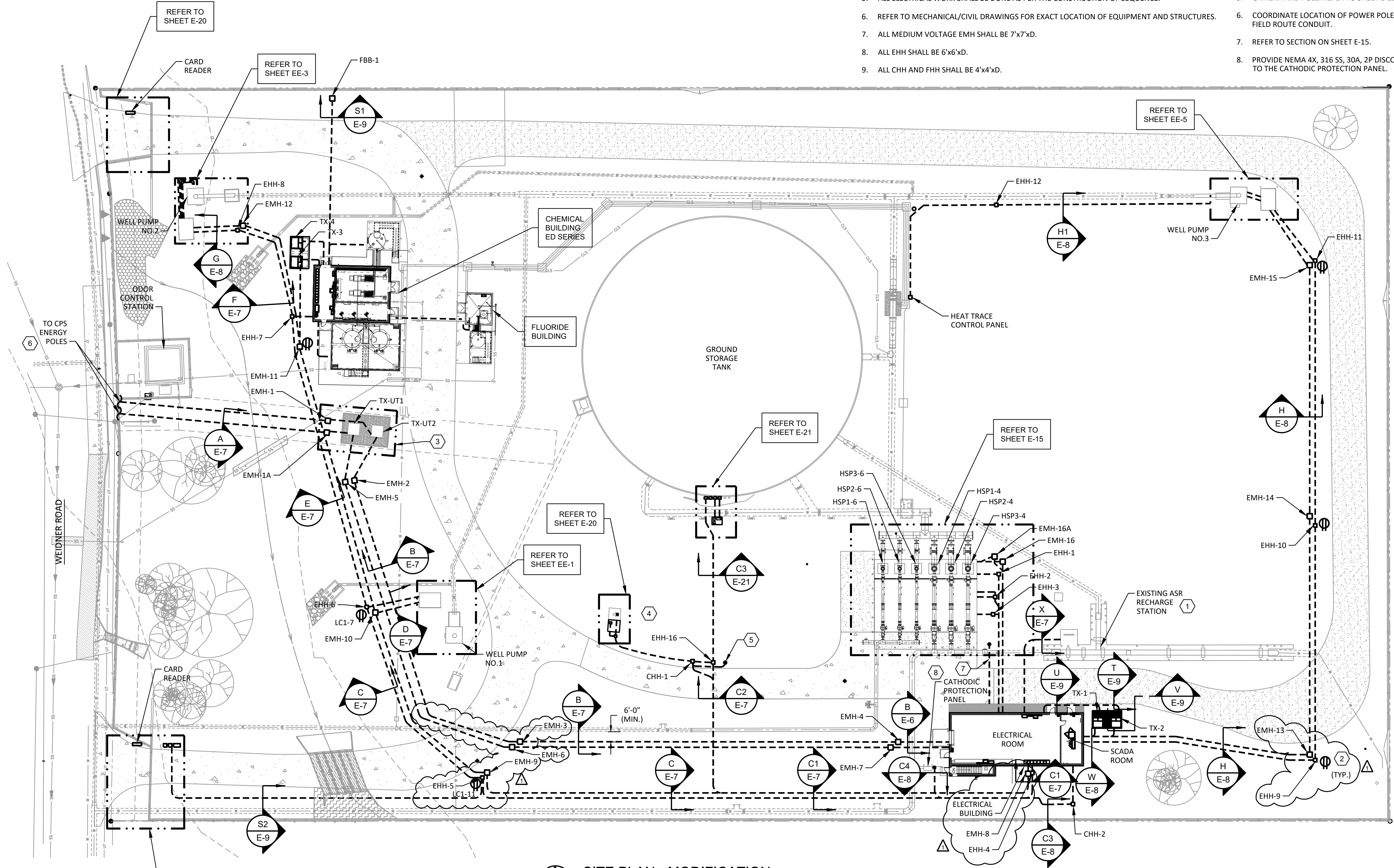
1. REFER TO RISER DIAGRAM ON SHEET EB-8.
2. INSTALL RECEPTACLE NEXT TO THE HANDHOLES. WEATHERPROOF WITH IN USE COVER.
3. POWER COMPANY TRANSFORMERS. REFER TO SHEET E-19 FOR DETAIL.
4. EXISTING ANTENNA TOWER.
5. CAMERA AND POLE. REFER TO SHEET E-11.
6. COORDINATE LOCATION OF POWER POLE WITH CPS. FIELD ROUTE CONDUIT.
7. REFER TO SECTION ON SHEET E-15.
8. PROVIDE NEMA 4X, 316 SS, 30A, 2P DISCONNECT NEXT TO THE CATHODIC PROTECTION PANEL.

**GAI**  
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Registration No. E-2593

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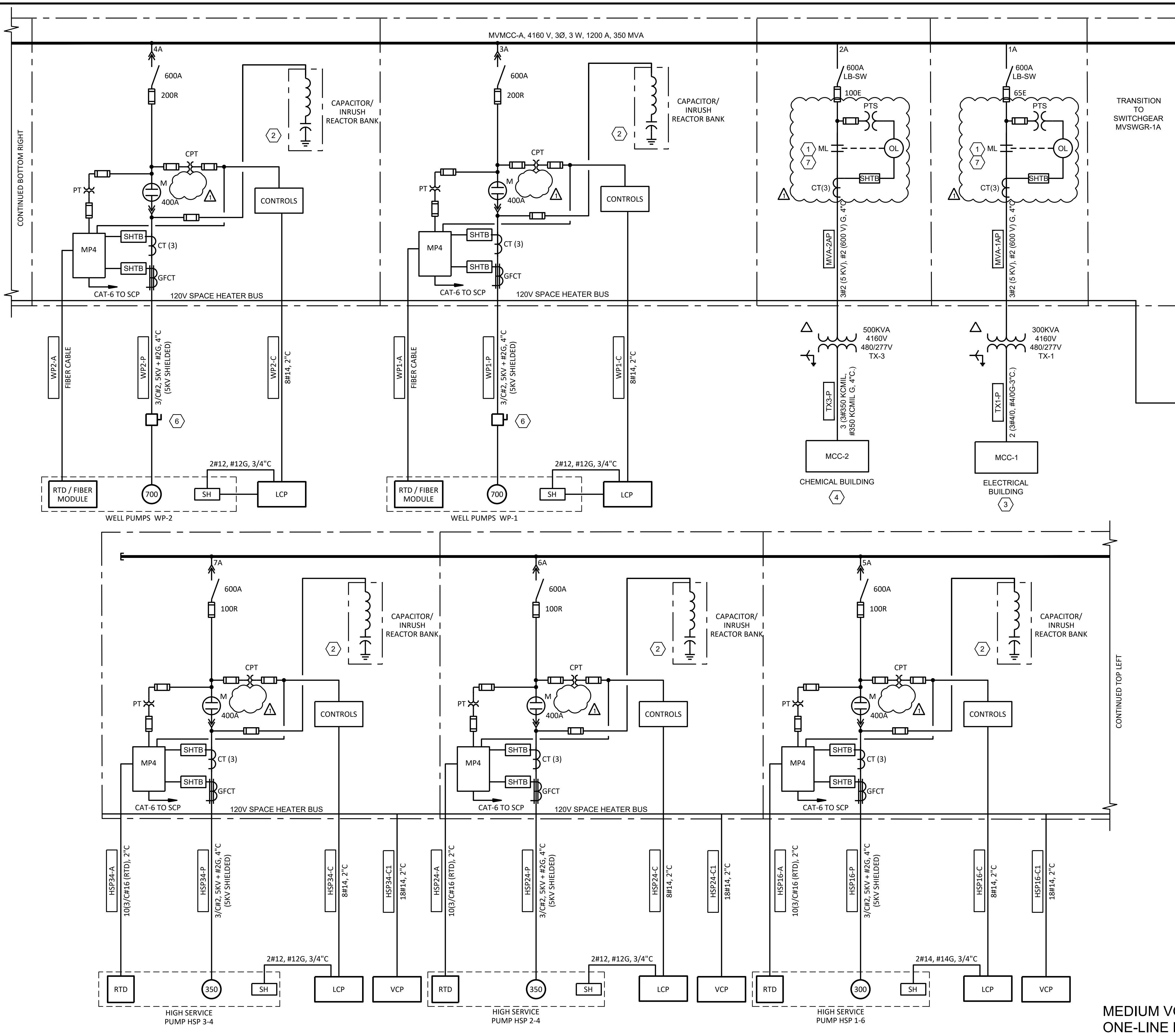


**SITE PLAN - MODIFICATION**  
1"=30"  
SCALE: 1" = 30'

SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
ELECTRICAL  
**SITE LAYOUT - MODIFICATION**

NO.	ISSUE	BY	DATE	FRN JOB NO.	SWB20457
1	ADDENDUM NO. 5	CEM	01-05-2023	DATE	11-30-2022
0	VERIFY SCALE			DESIGNED	MA
				DRAWN	EM
				REVISD	VKG
				CHECKED	
				FILE NAME	1976_E-04.dwg

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.



REFER TO SHEET EA-3

**GENERAL NOTES:**

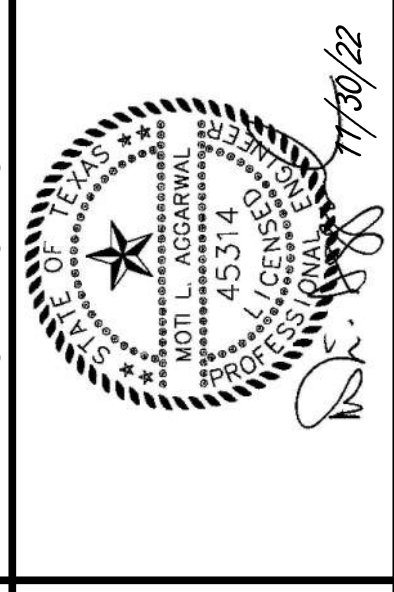
1. THE CONTRACTOR SHALL COORDINATE WITH MANUFACTURER FOR TERMINATION.
2. THE RELAYS SHALL BE SET BASED ON THE COORDINATION STUDY.
3. CABLE INSTALLED IN CABLE TRAY SHALL BE RATED FOR CABLE TRAY USE.
4. ALL MEDIUM VOLTAGE CABLE SHALL BE MV-105, 133% INSULATION.

**NOTES BY SYMBOL "□"**

1. CONTACTORS SHALL BE MECHANICALLY LATCHED (ML)
2. PFCC SHALL INCLUDE INRUSH REACTOR AND BLOWN FUSE INDICATOR. THE BLOWN FUSE INDICATION CONTACT SHALL BE CONNECTED TO THE RESPECTIVE MULTILIN.
3. REFER TO SHEET EA-8 & 9 FOR ONE LINE DIAGRAM.
4. REFER TO SHEET ED-2 & 3 FOR ONE LINE DIAGRAM.
5. MOTOR PROVIDER SHALL SIZE AND PROVIDE PFCC.
6. THE DISCONNECT SWITCH IS RATED AT 5KV.
7. REFER TO SCHEMATIC ON SHEET EA-6.

**MEDIUM VOLTAGE MVMCC-A (MVA) ONE-LINE DIAGRAM**

**GAI**  
 Gupta & Associates, Inc.  
 13717 Neutron Road  
 San Antonio, Texas 78241  
 Tel: 972-498-7661  
 Fax: 972-498-7125  
 Registration No. F-2593  
 Email: gai@gaiconsulting.com

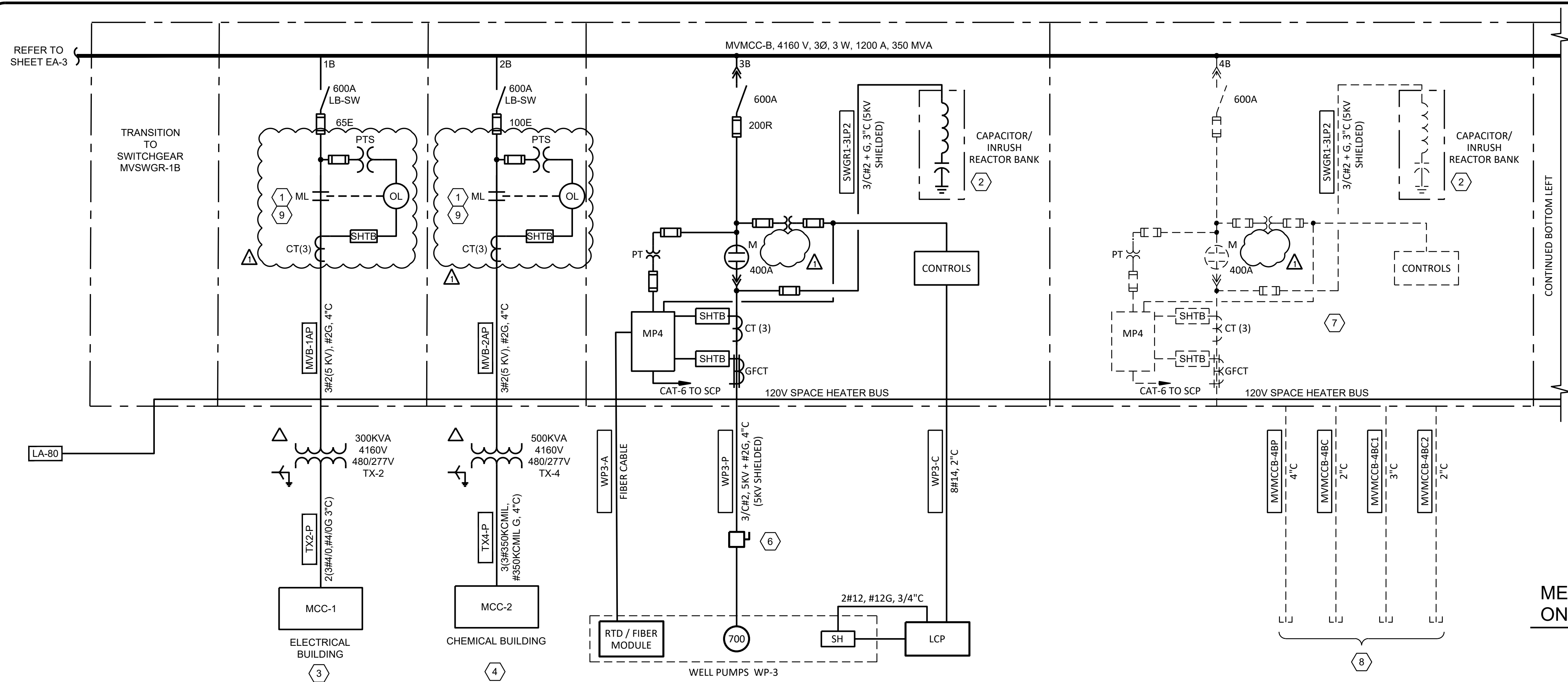


**FREES NICHOLS**  
 9601 McAllister Freeway, Suite 1008  
 San Antonio, Texas 78216  
 Phone - (210) 298-3800  
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**RANDOLPH PUMP STATION IMPROVEMENTS**  
 ELECTRICAL  
**4160V MVMCC-A ONE-LINE DIAGRAM**

NO.	ISSUE	BY	DATE	FRN JOB NO.	SWB20457
1	ADDITIONAL NO. 5	CEM	01-05-2023	DATE	11-30-2022
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				REVISED	VKG
				CHECKED	
				FILE NAME	1976_EA-04.dwg





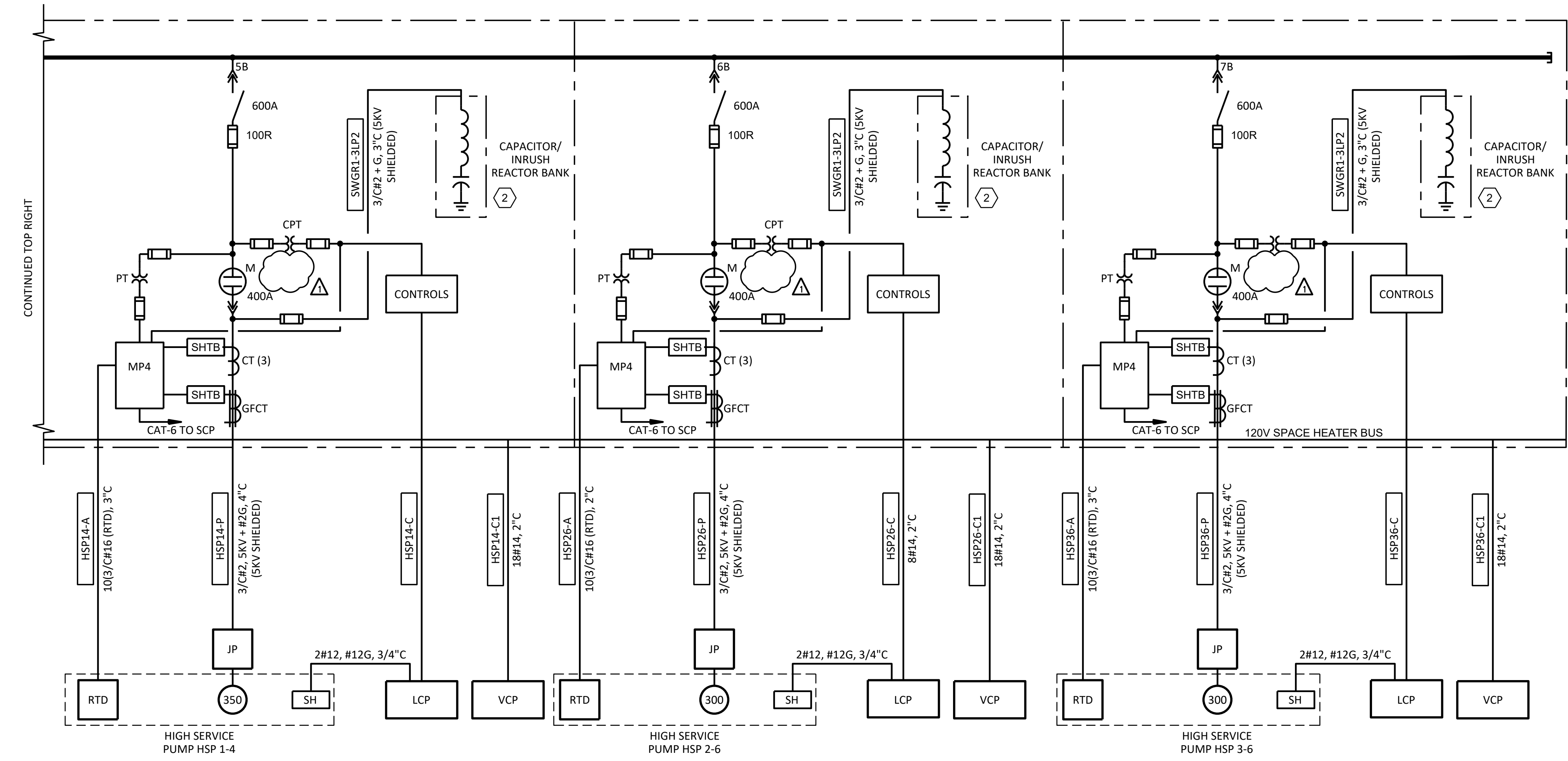
**GENERAL NOTES:**

1. THE CONTRACTOR SHALL COORDINATE WITH MANUFACTURER FOR TERMINATION.
2. THE RELAYS SHALL BE SET BASED ON THE COORDINATION STUDY.
3. CABLE INSTALLED IN CABLE TRAY SHALL BE RATED FOR CABLE TRAY USE.
4. ALL MEDIUM VOLTAGE CABLE SHALL BE MV-105, 133% INSULATION.

**NOTES BY SYMBOL "⬡"**

1. CONTACTORS WILL BE MECHANICALLY LATCHED (ML)
2. PFCC SHALL INCLUDE INRUSH REACTOR AND BLOWN FUSE INDICATOR. THE BLOWN FUSE INDICATION CONTACT SHALL BE CONNECTED TO THE RESPECTIVE MULTILIN.
3. REFER TO SHEET EA-8 & 9 FOR ONE LINE DIAGRAM.
4. REFER TO SHEET ED-2 & 3 FOR ONE LINE DIAGRAM.
5. MOTOR PROVIDER SHALL SIZE AND PROVIDE PFCC.
6. THE DISCONNECT SWITCH IS RATED AT 5KV.
7. PROVIDE EQUIPPED SPACE FOR FUTURE USE.
8. STUB AND CAP FOR FUTURE USE.
9. REFER TO SCHEMATIC SHEET EA-6.

**MEDIUM VOLTAGE MVMCC-B (MVB) ONE-LINE DIAGRAM**



**GAI**  
 Gupta & Associates, Inc.  
 CONSULTING ENGINEERING  
 Registration No. F-2593

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 Email: gai@gaiconsulting.com

Freeze and Nichols, Inc.  
 Texas Registered Engineering Firm F-3144

**FREEZE & NICHOLS**  
 9601 McAllister Freeway, Suite 1008  
 San Antonio, Texas 78216  
 Phone - (210) 298-3800  
 Web - www.freeze.com

SAN ANTONIO WATER SYSTEM

**RANDOLPH PUMP STATION IMPROVEMENTS**

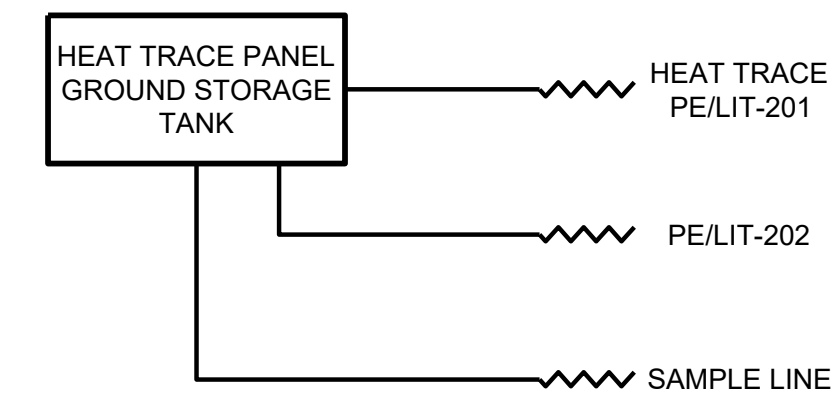
ELECTRICAL  
**MVMCC-B ONE-LINE DIAGRAM**

NO.	ISSUE	BY	DATE	DESCRIPTION
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0	VERIFY SCALE			CHECKED
1				VKGG

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

ELECTRICAL LOAD SUMMARY (ASSUMED 1HP = 1KVA)	
MEDIUM VOLTAGE (MV-MCCA)	CONNECTED LOAD (KVA)
1. ELECTRICAL BUILDING (MCC-1)	300
2. CHEMICAL BUILDING (MCC-2)	500
3. WELL PUMP NO.1	700
4. WELL PUMP NO.2	700
5. HIGH SERVICE PUMP (1-6)	300
6. HIGH SERVICE PUMP (2-4)	350
7. HIGH SERVICE PUMP (3-4)	350
<b>TOTAL CONNECTED LOAD</b>	<b>3200 KVA</b>
CPS TRANSFORMER SIZE	5000 KVA
MEDIUM VOLTAGE (MV-MCCB)	CONNECTED LOAD (KVA)
1. ELECTRICAL BUILDING (MCC-1)	300
2. CHEMICAL BUILDING (MCC-2)	500
3. WELL PUMP NO.3	700
4. HIGH SERVICE PUMP (FUTURE)	300
5. HIGH SERVICE PUMP (1-4)	350
6. HIGH SERVICE PUMP (2-6)	300
7. HIGH SERVICE PUMP (3-6)	300
<b>TOTAL CONNECTED LOAD</b>	<b>2750 KVA</b>
CPS TRANSFORMER SIZE	5000 KVA

MEDIUM VOLTAGE MAIN SWITCHGEAR (MV-SWGR-1)	
LOAD SERVED	CONNECTED LOAD
MV - MCC A	3200 KVA
MV - MCC B	2750 KVA
<b>TOTAL CONNECTED LOAD</b>	<b>5950 KVA</b>
REDUNDANT LOADS MCC-1, MCC-2	800 KVA
MAXIMUM LOAD	5150 KVA
DIVERSITY FACTOR 70%	3605 KVA



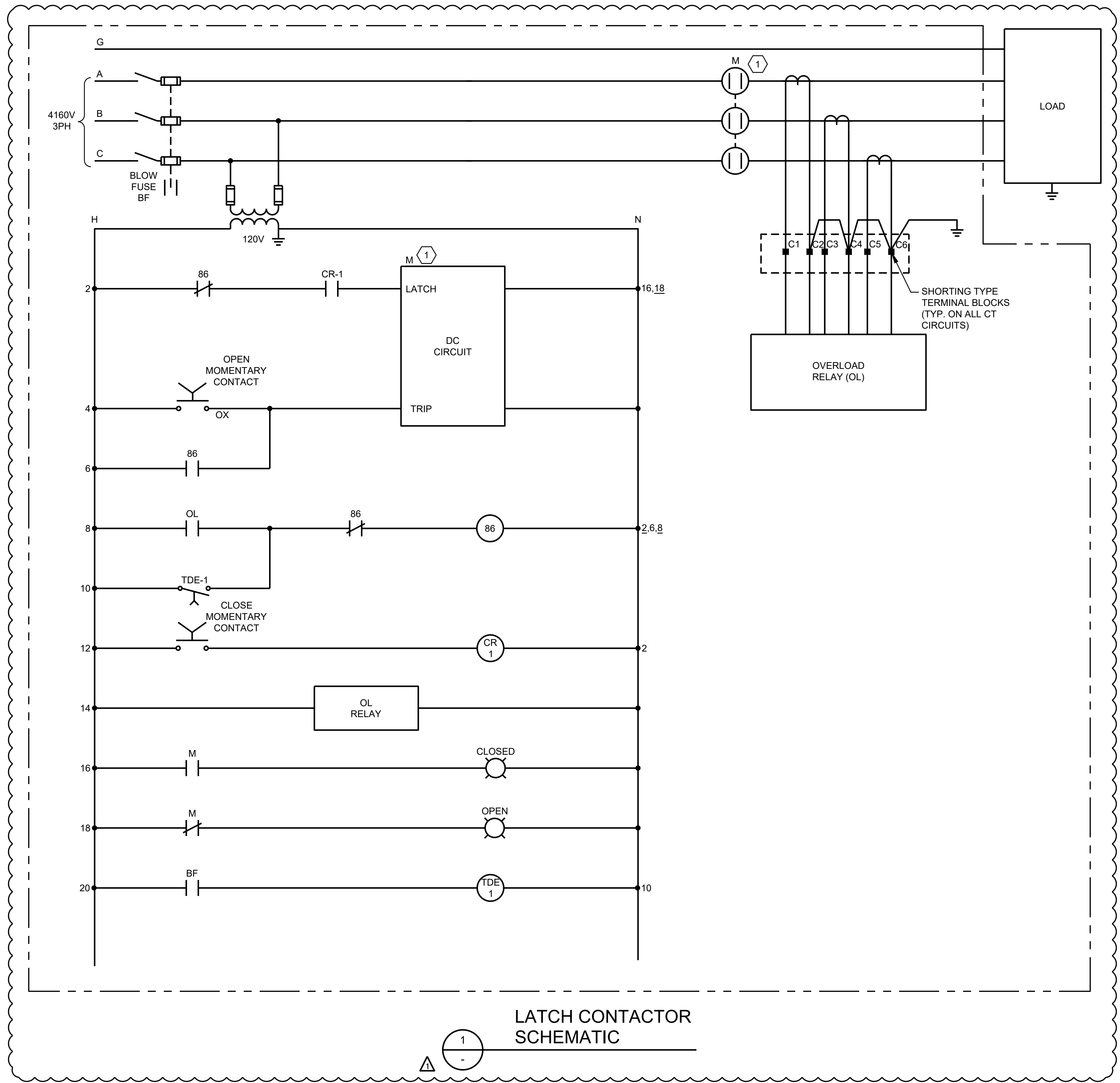
2  
-  
RISER DIAGRAM

NOTES BY SYMBOL "⬡"  
1. MECHANICALLY LATCHED, NORMALLY CLOSED, ELECTRICALLY ACTUATED CONTRACTOR WITH ADDITIONAL MECHANICAL LEVER TO OPEN THE CONTRACTOR.

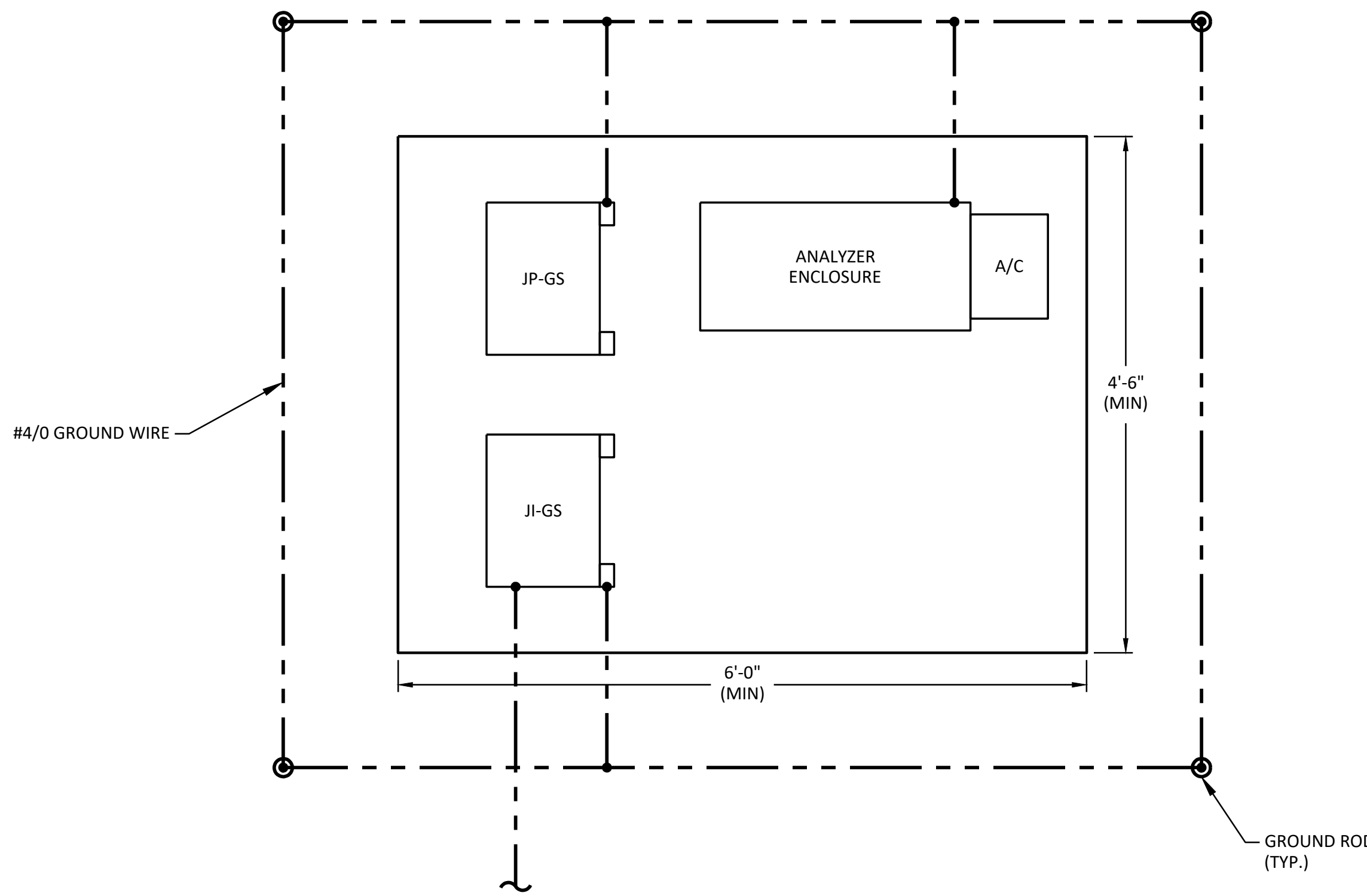
**GAI**  
Gupta & Associates, Inc.  
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Registration No. E-2993

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Email: gai@gaiconsulting.com

Freese and Nichols, Inc.  
Texas Registered Engineering Firm F-3144



1  
-  
LATCH CONTACTOR SCHEMATIC



1  
E-21  
-  
ANALYZER PAD DETAIL  
NTS

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Web - www.freese.com

SAN ANTONIO WATER SYSTEM  
**RANDOLPH PUMP STATION IMPROVEMENTS**  
ELECTRICAL  
**LOAD SUMMARY**

NO.	ISSUE	DATE	BY	DATE	DESIGNED	DRAWN	REVISIONS	CHECKED	VKGS
1		01-05-2023	CEM		SWBZ0457	11-30-2022	MA	EM	
0									

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

VERIFY SCALE 1

FILE NAME 1975\_EA-06.dwg

SHEET EA-6

SEQ.