



**Marbach Pump Station Improvements (Volume I) &
Mission Road Service Center Drainage (Volume II) (RFCSP)
Solicitation Number: CO-00533
Job No(s): 20-6001/21-2501**

**ADDENDUM 6
September 27, 2023**

To Respondent of Record:

This addendum, applicable to work referenced above, is an amendment to the price 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.

RESPONSES TO QUESTIONS

- 1. Question: Table 2.1.A – Require overall pump efficiency to be guaranteed. This will ensure higher quality manufacture of columns/discharge head.**
Response: Requirements are listed in Table 2.1.A of Section 43 24 13.33, Vertical Lineshaft Pumps. No changes are needed.
- 2. Question: Table 2.1.B – Well pumps are described as having VHS motors. Motors are described in Table 2.6.B as being VSS. It is recommended that the Well Motors be VHS as it is easier to adjust due to overall length of the pumps. Please revise references to VSS for the Well Pump Motors only and require VHS.**
Response: Table 2.6.B's reference to Solid Shaft Motor Type to be revised to VHS (Hollow Shaft) Motor Type. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 3. Question: Table 2.1.C – Please add existing well casing ID for the Well Pumps to the table for clarity.**
Response: The well casing ID is approximately 28 inches at the location of the pump bowls. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 4. Question: Table 2.1.C – Add requirement that 20” flange on Well pump columns must be undersized from standard ANSI flange to give adequate clearance in existing well casing. Recommend limiting to 26” OD.**
Response: Maximum OD of column flanges below grade is to be 26". See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

5. **Question: Table 2.1.C – Revise “Number of Stages” to “Max. Number of Stages”**
Response: Table 2.1.C to be revised from "Number of stages" to "Maximum number of stages". See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
6. **Question: Table 2.1.C – Revise Max. Suction Diameter for Well Pumps #1/2/3 from 25” to 26.5”.**
Response: Please see response to Question No. 4 in this addendum.
7. **Question: Table 2.1.C – Please confirm GST max/min level for High Service, and please confirm Aquifer Max Level for Well Pumps.**
Response: GST Max/Min: Low alarm point of 142.5’ TDH and a high alarm point of 202.5’ TDH. Aquifer Level Range for Well Pumps: Historic data also shows that these WPs operate between 90’-310’ TDH depending on the aquifer level. (About 300’ below grade.) See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
8. **Question: Table 2.1.C – Site elevation for Well Pumps says “756-758 See Drawings”. Elevations are not confirmed on drawings. Please confirm floor elevation and target discharge centerline elevations for Well Pumps 1/2/3.**
Response: Contractor is to coordinate well pump discharge elevation with well pump manufacturer and adjust downstream tie in elevation accordingly. For planning purposes, Contractor may assume discharge center line elevation of 18in above the well casing flange. Regarding Target Discharge Centerline Elevations for Well Pumps, per Section 1 - Well Section on Sheet M-04 the underside of the Steel Pipe is to be 3’-0” above the Concrete Well Pad elevation. Contractor to confirm Top of Existing Well Head Slab Elevations prior to construction. Regarding floor elevation, Per Section 2 Sheet S-13 Concrete Well Pad elevation is to be set 4” below Well Head Slab. See Item No.19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
9. **Question: Table 2.3.B - Please add carbon steel suction pipe for the Well Pumps. A 10’ suction pipe should be connected directly to suction case. This is critical for the Well Pumps.**
Response: 10’ suction pipe is not included.
10. **Question: Table 2.3.B – Well Pumps require a conical strainer bolted to the 10’ suction pipe.**
Response: Conical strainer will not be included.
11. **Question: Table 2.3.B – Please add 316SS suction strainer for High Service Pumps. This is clearly shown on plan sheets and should be provided for this equipment. Strainer is referenced in 2.5.D. 316SS suction strainer to be added as material in Table 2.3.B.**
Response: 316SS suction strainer to be added as material in Table 2.3.B. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

- 12. Question: 2.4.A – Add requirement for discharge heads to be machined. Discharge heads must be stress relieved prior to machining, and certification of stress relief should be required in O&M.**
Response: The following requirements will be added: Discharge heads to be machined. Discharge heads must be stress relieved prior to machining, and certification of stress relief should be provided in O&M. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 13. Question: 2.4.B – Add requirement for SS shaft sleeve through seal housing/stuffing box for the Well Pumps. Well pumps are equipped with packing, so sleeve is highly recommended.**
Response: Provide SS shaft sleeve through seal housing/stuffing box for the well pumps. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 14. Question: 2.4.D.5 – Revise shaft straightness tolerance to 0.003” TIR. Specified 0.025” is excessive and believed to be a typo. Any shaft with straightness greater than 0.003” should be rejected.**
Response: Language to be revised to 0.003” TIR. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 15. Question: 2.4.F.3.a –Revise this paragraph to require bearing retainers to be integrally welded into column and machined concentric with registers in column flanges. Retainer method described is not suitable. Retainer should be SS.**
Response: Language to be revised to include the bearing retainers to be integrally welded into the column and machined concentric with registers in column flanges instead. Retainers to be SS. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 16. Question: 2.4.J – Add description of suction pipe required for Well Pumps. Pipe should be carbon steel, minimum 10’ long, should connect directly to suction case, and also be sized to fit conical strainer required for Well Pumps.**
Response: The 10’ suction pipe and conical strainer are not required.
- 17. Question: 2.4.K.2 – Please revise language to say ‘maximum interchangeable sections’. Analysis may require column lengths other than exactly 10ft. The pump manufacturer should confirm in their analyses.**
Response: Language to be revised to: “maximum interchangeable sections”. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
- 18. Question: 2.4.K.3 – Please revise this paragraph. To ensure proper alignment, column flanges are machined with registers for mating. Bearing retainers are integrally welded into column and machined concentric with the registers. Column flanges should be minimum ¾” thick after machining. Add requirement for columns to be stress relieved prior to machining, and certification be provided in O&M.**
Response: Language to be revised to include recommended requirements regarding alignment, welding, flange thickness, stress of materials, and certification. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

19. **Question: 2.4.K.7 – Please remove reference to column gasket and add o-ring.**
Response: Column gasket to be removed and o-ring to be included. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
20. **Question: 2.4.L.5 – Remove reference to gasket. Top flange of barrel should be machined flat with o-ring groove for sealing. Top flange must be stress relieved prior to machining. Top flange assembly is tack welded at factory.**
Response: Language will be updated accordingly. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
21. **Question: 2.4.L.7 – Will one blind flange be required per pump, or one blind flange per pump size?**
Response: Per pump. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
22. **Question: 2.4.M.3 – Please remove factory hydrostatic test requirements for pump cans. This is not recommended as suction pressure is very low, and because barrels will not be completely welded until installed in field. If required, Contractor can hydrostatically test barrels in field using cover plates.**
Response: Language will be revised to remove the requirement for hydrostatic testing at the manufacturer's factory and require hydrostatic testing in the field. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
23. **Question: 2.5.C – Revise ‘Sole Plate’ to ‘Surface Plate’. Surface plate assembly is required for all Well Pumps. Surface plate should be welded to 30” casing extension for field mounting/alignment. Air vent piping should be run from extension.**
Response: Soleplate to remain in language and on plans.
24. **Question: 2.5.D – Revise description to require 304SS plate/vanes, and 316SS screen material for HSP. Add description of Well Pump conical strainer.**
Response: Conical pump strainer will not be included in construction.
25. **Question: Table 2.6.B – Revise Well Pump motors to be vertical hollow shaft. This is recommended for deep well pump application.**
Response: Language to be revised to mention hollow shaft. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.
26. **Question: 2.7.A.1 – Remove this paragraph entirely. Pump bearings are sleeve type, submerged, product lubricated, and under pressure. RTDs and oil switches are not applicable.**
Response: Paragraph 2.7.A.1 is not applicable, as it's not required in Table 2.6.B. No change needed.
27. **Question: 2.7.B – A non-reverse ratchet should be supplied on the Well Pumps to prevent back-spinning due to large column of water above rotating assembly during**

shutdown. For High Service, the backspin switch would be located in Control cabinet if no NRR is required.

Response: Language to be revised to include non-reverse ratchet and remove backspin switch. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

28. Question: 2.7.C.1 – Please add SAWS Detail DD-902-01 to plan sheets.

Response: Callout to reference SAWS Detail DD-902-01 will be added to plan sheet. See Item No. 2 in the CHANGES TO THE PLANS section of this addendum.

29. Question: 2.8.A.1 – Revise language to require (1) mechanical seal or packing set per pump size. Well Pumps are supplied with packing.

Response: Language will be updated accordingly. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

30. Question: 2.9.B – Revising to describe exterior coating of columns, discharge head, barrels. Current paragraph only referenced internal coating.

Response: Primer and Finish Coatings will be provided from manufacture conforming to requirements of Section 09 91 00, Painting. Any above ground materials requiring painting to be painted in accordance with Section 09 91 00 Painting, Paragraph 2.9.G, Surface Preparation.

31. Question: 2.10.B – Please confirm estimated NPSHA available for HSP and Well Pumps at rated condition and low head condition.

Response: The NPSH3 Type 2 Test requirement will be removed. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

32. Question: 2.10.E – Revise language to require separate Witness travel trips for High Service and for the Well Pumps. Testing should not occur on weekends. If testing is not completed in a single week, the second trip must have at least one week break before resuming. Pump supplier is responsible for covering Owner/Engineer expenses during trip, and reimburse for any incidental expenses that Owner/Engineer may incur on their own.

Response: Language to be incorporated. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

33. Question: 3.5.A – Recommend separating field requirements for High Service and Well Pumps: High Service Field Requirements:

- **Barrel Plumb Inspection**
- **Top Flange pre-grout level and weld supervision**
- **Top Flange post-grout level inspection**
- **Pump Installation/alignment**
- **Start-up and Training**

Well Pump Field Requirements:

- **Pre-grout surface plate level inspection**
- **Post-grout surface plate level inspection**

- **Field Assembly/Installation of Well Pumps**
- **Start-up and Training**

Response: Language to be incorporated. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

- 34. Question: D-04 – Demolition plans say surface plate top flange should not be removed. Confirm elevation of surface plates and target discharge elevation of Well Pumps 1/2/3.**

Response: Sheet M-04 Well Piping Sections shows a new soleplate to be installed and that the top flange is to be removed. Elevations to be included in Section 43 24 13.33 Vertical Line Shaft Pumps. See Item No. 19 in the CHANGES TO THE SPECIFICATIONS section of this addendum.

- 35. Question: M-04 – 20” spool piece as shown is not an acceptable design. New surface plate needs to be provided with well casing extension. Casing extension will be welded in the field to the existing 30” well casing after setting surface plate at proper elevation. Foundation will be formed around surface plate extension, and then grouted in place. Air vent would be connected to extension.**

Response: Plans will be revised as recommended. See Item No. 2 in the CHANGES TO THE PLANS section of this addendum.

- 36. Question: M-04 – It does not appear that piping system is anchored in place to resist deflection due to thrust. Recommend adding concrete pipe support beneath a valve and anchoring into place. Tie rod deflection at expansion joints must limit axial stretch to 0.005” or less.**

Response: Restrained flanged couplings shown are to resist horizontal thrust. No changes required.

- 37. Question: 2.2.F – Well Pump motors should be provided with non-reverse ratchet.**

Response: Language to be updated. See item No. 6 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 38. Question: In the process valves spec, page 6, letter F is for gate valve gearing. Please, confirm gate valves 16” and smaller are to be geared.**

Response: Requirements are listed in the specifications under AWWA C500. Gear actuators are to be provided for valves 14in and larger. No changes proposed to specification.

- 39. Question: The valve schedule in spec 40 05 53–2 has the 3 each, well pump flush line gate valves as 16” in size. However, plan sheets G-05, M-03, & M-04 have these valves as 18” in size. Please, clarify.**

Response: Flush line gate valves to be 18” size in accordance with G-05, M-03, and M-04. See item No. 12 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 40. Question: We are requesting additional information be provided regarding Milestones or Key Dates for the referenced electrical equipment to be Provided by**

Others. Please reference electrical drawings E-4A, E-4B, E-4C, and EA-3. There are references in the drawings that the infrastructure associated with this equipment By Other is existing, however it was noticed during the Site Visit that none of the equipment, equipment pads, manholes, or duct banks were existing. According to layout drawing E-4C, it is assumed this equipment needs to be in place prior to work beginning on the New Electrical Building due to the re-feed of utility power to the existing Pump Station and required demolition of primary service duct bank from CPS Yard to Main Switchgear Enclosure. Please provide dates to be incorporated into the Schedule for when this work will be complete and available for use of this Project. This should include: installation of (2) CPS transformers CPS-TXA & CPS-TXB, installation of duct banks from CPS pole to new CPS transformers, installation of equipment and equipment pad referenced by Key Note 10 on E-4C, installation of duct banks between transformers and referenced equipment, installation of manholes EMH-A, EMH-B, and EHH-A, and installation of duct banks between equipment and referenced manholes.

Response: The ductbank and manholes will be installed by a different contractor in the Other Project and will be available for the pump station contractor, it is anticipated that this work will be completed by July 2024. Please see response to Question No. 41 in this addendum. See Item Nos. 7, 8, and 13 in the CHANGES TO THE PLANS section of this addendum.

- 41. Question: Reference drawing E-4A, E-4B, and E-4C. Note the duct bank line indicated from CPS Energy Yard to the existing Pump Station. According to drawing E-4B, this duct bank appears to terminate on the West side of the road near the northernmost pump of the existing pump station. We believe this to be inaccurate as this duct bank would be the utility feeder and should terminate in the existing Medium Voltage Switchgear located East of the road (Main Switchgear Enclosure noted on E-4A). The actual location of this duct bank is important as it is scheduled for demolition due to construction of the New Electrical Building and can impact the schedule of construction as noted in the previous question above. Please provide further information regarding the routing of this existing duct bank if available, and/or provide measures Contractor should take to incorporate the potential impact of the actual location into the Schedule and regarding the previous question above.**

Response: On sheet E-4A, the incoming conduit from CPS yard should terminate in the existing switchgear, this conduit is correctly shown on sheet E-04, E-4A, E-4B and E-4C. It is true that this ductbank will interfere in the construction of the electrical building. Therefore, there are two solutions being provided:

- 1. It is anticipated that as part of the Other Project, the temporary ductbank and power will be available to the existing switchgear and hence the conduit from existing CPS yard will not be in service and therefore will not interfere in the construction of the new building.*
- 2. In case there is a delay in construction of the Other Project, the contractor shall intercept the existing incoming duct bank from CPS yard and reroute. See Item Nos. 7, 8, and 13 in the CHANGES TO THE PLANS section of this addendum. See item No. 1 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.*

- 42. Question: Is the contractor responsible for disposing of fluoride in the existing bulk storage tank? If so, how many gallons should we anticipate?**

Response: Contractor may assume the tank will be emptied by existing operating procedures for estimating purposes. Contractor will need to coordinate fluoride in existing tank with SAWS Operations during construction to ensure HFSA equipment is empty at shutdown.

- 43. Question: On the yard piping drawings, it shows us to replace the asphalt paving area that is overgrown with vegetation. Please advise if this is necessary since this area is overgrown with vegetation.**

Response: All trenching through asphalt and/or asphalt paving area that is overgrown with vegetation shall be restored in accordance with the trench repair detail for asphalt.

- 44. Question: D-01 calls for the irrigation system to be removed. C-21 provides existing layout. Are only the valves, appurtenances, and manholes to be removed and the rest to be abandoned in place?**

Response: The note on Sheet D-01 "Irrigation system valves, appurtenances, and access manholes to be removed" applies only to the existing items in the immediate vicinity. Specific items are shown within the two views that are cross-hatched on Sheet C-21. The overall site layout from the 1976 plans is, as noted, provided for informational purposes only. The purpose of including this layout is to provide a contractor an understanding of where old, abandoned lines might be encountered during any excavations. It is the Contractor's responsibility to locate all belowground utilities.

- 45. Question: Are both the 8ft fence AND all gates to be 1" Diamond mesh?**

Response: Yes, the mesh for the gates (vehicular and pedestrian) and the new security perimeter fencing shall be in 1" Diamond mesh, in accordance with SAWS Specification 845 "Gate, Fencing, and Property Marker Details" and the included DD-903 series of detail drawings.

- 46. Question: Can a spec be provided for door canopies shown on the architectural elevations sheet A-07?**

Response: Additional information has been included in the plans. See Item Nos. 3, and 4 in the CHANGES TO THE PLANS section of this addendum.

- 47. Question: Specification 01 35 53 -2, item 1.3 #4 indicates that the contractor shall provide an armed security guard, for Owner's facilities where chemicals are present, during all times that the work is being performed on site by the Contractor or subcontractors. Please advise if an armed security guard will be required.**

Response: Armed Security Guard is not required if the Contractor is able to secure and control access to the project site at all times. If the Contractor plans to leave the site unsecured or open during the Project, they must provide a SAWS approved security guard to monitor ingress and egress to the SAWS site. Contractor will need to provide an armed security guard when the project site's perimeter fence is not continuous and/or DOES NOT meet TCEQ Chapter 290 Intruder-Resistant fence, 6' or greater with 3 strands of barbed wire extending at a 45 degree angle or 8' Fence without barbed wire. When an armed

security guard is required due to security fence being down coordinate with SAWS security. See item No. 5 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 48. Question: Specification 01 31 00-10 section 1.18 item B, indicates that the contractor will provide all signs, barricades and required off-duty police officers as part of their base bid in regards to traffic control planning. Would a certified company flagman suffice in lieu of having an off-duty police officer? Please advise.**

Response: A certified company flagman can be used in lieu of having an off-duty officer. Due to the project site being in a high traffic area an off-duty officer is recommended but not required. See item No. 3 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 49. Question: In the project docs it is mentioned compatibility with Axis which is ok as we are Official Partners with Axis Communications, the question I have though do you already have the system itself and just need to add cameras? or you need the complete system? meaning all the network equipment + NVR/Recorders + servers?**

Response: The existing NVR is getting replaced by a new Security panel in this project and will be located in the new electrical building. The new Security panel and network will need to connect to the existing Security equipment at the OSHG building and the site.

- 50. Question: The same goes for access control. do you have the management system and just want to add to it or you need the complete system including management software?**

Response: The existing access control system is getting replaced by a new Security panel in this project and will be located in the new electrical building. The new access controller and network will need to connect to the existing access control equipment at the OSHG building and the site.

- 51. Question; Are we required to do wiring for Security Systems (both access control and CCTV) or it can be delegated to another subcontractor (electrical or low voltage)?**

Response: The Section 28 00 05 Security System Integrator (SSI) is not required to wire the system, but deliver per the required scope from 20 00 05 Article 1.1-A.4. Wiring can be provided by other qualified subcontractor.

- 52. Question: Also regarding the Camera model, is there a reason you selected 2 megapixel camera? As we can offer 4 megapixel camera from the same series which will give even higher picture resolution and the price would be only slightly higher or we can give the exact model you requested.**

Response: The Axis Model Q1786-LE for pole/wall mounted cameras will be used. Video resolution will be 2560x1440 (4MP). See item No. 9 in CHANGES TO SPECIFICATION section in this addendum.

- 53. Question: Page C-05 Key Note 6 refers to SAWS Detail DD-852-01 for manhole requirements which calls for proposed manholes to receive epoxy coatings on the interior.**

Response: SAWS Detail DD-852-01 (Sheets 1 and 2 of 2) make no mention of interior coatings. Specification 852 is written to cover multiple situations regarding Manholes –

New, Rehabilitated, and Reconstructed; therefore, review of requirements is needed to determine which apply and which do not. Section 852.4.5, 852.4.6, and 852.4.7 that discuss coatings applies specifically to Rehabilitated Manholes. Section 852.4.5, 852.4.8, and 852.4.9 that discuss coatings applies specifically to Reconstructed Manholes. Those Sections thus do not apply to New Manholes.

- 54. Question: Junction boxes are called to follow COSA Detail 403 however it does not mention the application of any coatings on the interior.**

Response: That is correct, there is no mention of interior coatings on the City of San Antonio (CoSA) January 2005 “4’x4’x4’ Junction Box Standards” detail. The product being conveyed is not sewage, therefore, there is no need to protect the concrete of the junction box (JB).

- 55. Question: Are Proposed JB G1-G3 and A1-A8 including Well Drain Catch Basins on C-05 to receive coatings? Please Advise.**

Response: JB G1 is same as JB A1. G2 is a 6-foot diameter manhole. Neither SAWS 852 or CoSA 403 discuss interior coatings. The primary purpose of the proposed drainage system with the MH, JB, and Catch Basins is to convey Well Flush and Storage Tank Overflow; the system is not a sanitary sewer.

- 56. Question: Page A-03 provides a Fire Resistant Construction/Fireproofing Schedule for Exterior and Interior Walls and indicates 0 for the Required Rating/HR. However on A-04 the interior wall between the Security Room and the Electrical Room is called to be 1 HR rated. Please Advise what is required.**

Response: The exterior walls do not require fire rating, based on the code. The wall between the security room and electrical room will require a 1 hour rated concrete block wall. The interior wall rating is not required per code based on the fire ratings for the occupancy classification of the building but is required for the spaces. The schedule shown is the minimum requirements for construction, however specific design items may exceed the requirements, thus the 1 hour rating is to be included. Fire Resistant Construction/Fireproofing Schedule shown on Sheet A-03 is based on the building construction type which is II-B construction.

- 57. Question: Specification 01 35 53 -1 item 1.3 B.1a indicates that all contractor personnel, including subcontractors, suppliers and others associated with the project shall wear in a visible at all times at the site a durable waterproof badge. Section 1.3 B1.b further states that prior to issuing badge, submit to the Owner copy of background data sheet for each person to whom the badge may be issued for Owner acceptance. Please advise if badging and background checks will be required for this project.**

Response: Badging and background checks will be conducted for this project in accordance with Section 01 35 53, Security Procedures.

- 58. Question: A-05 has a callout for 2 sump pits in the basement. However S-03 only shows 1 sump pit. Please advise how many to account for.**

Response: One sump pit to be provided in accordance with S-03. See Item No. 3 in the CHANGES TO THE PLANS section of this addendum.

59. Question: Detail 1/S-06 calls for CoalTar Epoxy below grade waterproofing at the Electrical Building. Is this same system of below grade waterproofing to apply for all of the Junction Boxes that are shown on C-05 for their exterior walls?

Response: No, the CoalTar Epoxy coating is not required for the exterior of the junction boxes. Per COSA Detail 403, this only applies to sanitary sewer rehabilitation manholes.

60. Question: Detail 5/S-16 details the Precast Plank Support at the CMU walls. On the Bearing end, it looks like 2'-6" of Grout and a C-Channel is detailed. Is this C-Channel to be supplied by a Misc Metals Fabricator? Is this detail to apply for the entire 90' edge on the North and South sides of the Building?

Response: The bearing end detail shows a grout dam to stop the grout (at 2'-6") from flowing into the hollow core cavity. The grout dam material can be foam board or cardboard.

61. Question: Section 46 33 41.33- Hydrofluosilicic Acid Feed System 2.2: We ask that Blue White Peristaltic Metering pumps and skids be approved for the project. They have been used for these type applications throughout the country and SAWS has used Blue White Peristaltic Metering pumps in the past. Blue White meets all the specifications for this project.

Response: Manufacturer will not be considered for approval. See item No. 21 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

62. Question: Section 43 41 00 Polyethylene Storage Tanks 2.2: We ask that Assmann Polyethylene Storage Tanks be approved for the project. They have been used for these type applications throughout the country. Assmann meets all the specification requirements for the project.

Response Manufacturer will not be considered for approval. See item No. 20 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

63. Question: The Electrical Canopies for the Well Pumps on EE-1, EE-3, and EE-5, are these existing or proposed? If proposed, will any type of surface prep/excavation be needed for the concrete slab on grade pads?

Response: Electrical canopies and slabs for well pump equipment are proposed. See Item No. 6 in the CHANGES TO THE PLANS section of this addendum.

64. Question: In regards to 01 35 53 Security Procedures, for Owner's facilities where chemicals are present, please define what chemicals will constitute the need for armed security personnel.

Response: Contractor is not required to provide an armed security guard unless TCEQ Intruder-Resistant fence is not continuous or contractor leaves facility unsecured. See response to Question #47 in this addendum.

65. Question: In regards to 01 35 53 Personnel Identification and Background checks, please advise on the type of background check and data sheet will be required.

Response: Background checks must at a minimum include National Criminal Check and Terrorist Watch List with this information being provided in the Background Screening Letter. Background checks for this project will be conducted for in accordance with Section 01 35 53, Security Procedures. See item No. 4 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 66. Question: Reference drawing E-4B. Please provide duct bank section details for duct bank between EHH-A and Existing Main Switchgear, denoted by Keynote 7.**

Response: See Item No. 7 in the CHANGES TO THE PLANS section of this addendum.

- 67. Question: Reference drawing E-4B and E-4C. Due to schedule constraints and need for temporary duct bank to be installed for temporary utility feeder, can manholes EMH-A, EMH-B and EHH-A be furnished and installed as a part of this project and not by others in reference to Keynote 3.**

Response: These manholes will be provided by others and to be installed as part of Other Project. See Item No. 7, 8 and 13 in the CHANGES TO THE PLANS section of this addendum.

- 68. Question: Reference drawing EA-13 and Spec 26 24 16 (2.3 B). Per the Panel Schedule on EA-13, panelboard LA is to be in a NEMA 1/1A enclosure, although Spec 26 24 16 states NEMA 1/1A enclosures will not be allowed. Please confirm if panelboard to be NEMA 1/1A or NEMA 12.**

Response: The panel shall be NEMA 12. See Item No. 14 in the CHANGES TO THE PLANS section of this addendum.

- 69. Question: Reference drawing EA-3. Please provide cable type and size for MVSG-TEMP-P1 and MVSG-TEMP-P2. In addition, please clarify if aluminum conductors will be allowed for these medium voltage temporary feeders.**

Response: The Cables MVSG-TEMP-1 and MVSG-TEMP-2 will be provided by the Other Project. Aluminum conductors are not acceptable. See Item No. 13 in the CHANGES TO THE PLANS section of this addendum.

- 70. Question: Please confirm conduit and duct bank specifications for temporary power and control feeders (T1, T2, T3) are to be per Project specifications (i.e. PVC 40 with PVC Coated aluminum bends, concrete encased duct banks per EZ-1, etc.). If other materials are allowed for temporary feeders, please provide.**

Response: See Item No. 7 in the CHANGES TO THE PLANS section of this addendum.

- 71. Question; Reference E-07, duct bank section C5. Please provide circuit information for GEN-C – Controls from Generator Switchgear to Plant Switch including conductor size, count and if it is to be furnished and installed under this Contract.**

Response: Conduit 1 is fiber and conduits 2, 3, and 4 are spares. Refer to existing I&C drawings for fiber cable details.

- 72. Question: Reference E-4B and E-18. Please clarify if there is any scope concerning the CPS 13.8 kV transformers CPS-TXA and CPS-TXB to be performed under this Contract.**

Response: Transformer work is not to be done on this project. Drawing E-18 will be deleted. See Item No. 12 in the CHANGES TO THE PLANS section of this addendum.

- 73. Question: Reference EA-7, EA-8 and E-09. Regarding circuits HSA1-A thru HSA5-A, please confirm conduit size. One Line diagram indicates these circuits are to be in a 3” conduit and Duct Bank Section B2 indicates 2” conduit.**

Response: Change the conduits in ductbank to 3”. See Item No. 11 in the CHANGES TO THE PLANS section in this Addendum.

- 74. Question: Regarding Reference project name and solicitation No. CO-00533 we would like to be able to offer either WPII or TEAAC enclosure in lieu of the requested TEFC enclosure on the 600HP 1200RPM 4160V motor spec. Is this something that would be accepted?**

Response: Type TEFC or WPII is acceptable for the Well Pumps. See item No.8 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 75. Question: Information for quantity of tie rod assemblies for restrained flange coupling adapters were not located in the specifications, drawings, or on item 816 Steel Pipe Installation detail from San Antonio Water System Specification for Construction. Please clarify requirements.**

Response: Tie rod assemblies for restrained flange coupling adapters shall be sized in accordance with AWWA M-11 as noted in Section 40 05 06, Couplings, Adapters, and Specials for Process Piping.

- 76. Question: Well Pumps discharge shown on drawings M-04 and M-13 only show one isolation valve below the air release valves. Drawing I-04 show an additional ball valve branching off between the main isolation valve and the air release valve with the same configuration for the High Service air release valves. Please clarify if the Well Pump air release valves should be configured the same way as the High Service air release valves or provided as shown on drawing M-13.**

Response: No updates proposed to well section shown on M-04. Additional ball valve referenced on I-04 is the 2” drain outlet as called out on detail 1/M-04 and detailed on 3/M-10.

- 77. Question: Pressure indicator ranges were not located on the drawings or in the specifications. Please clarify pressure ranges.**

Response: Detailing for pressure gauges can be seen in Section 40 73 00, Pressure Instruments 2.6. Pressure Gauge. Minimum pressure rating shall be in accordance with testing pressure requirements as required in Section 40 05 05, Exposed Piping Installation Table 40 05 05-A, Exposed Piping Schedule.

- 78. Question: Drawing M-04 shows two pressure gauges on the Well Pump discharge lines and drawing I-04 only shows one gauge. Please clarify how many pressure gauges are to be provided for the Well Pump discharge lines.**

Response: One pressure gauge is required on the Well Pump discharge line. Existing Sheet I-04 is correct, to reference one pressure gauge. PI location has been revised for Sheet M-04. See Item No.2 in the CHANGES TO THE PLANS section of this addendum.

- 79. Question: Drawings M-04 call out for 4” vent piping in accordance with SAWS standard DD-902-01. SAWS detail DD-902-01 sheet 2 of 3 calls out for 2” vent piping for well casing sizes 16”-24”. The existing well casing diameter was not located in the specification and is not called out on the drawings. Please confirm the existing well casing diameter and if the vent pipe should be flanged as shown on the mechanical drawings or threaded as shown on the mentioned detail.**

Response: Existing Well Casing Diameter is 24”. Sheet M-04 has been revised to include 2” vent piping in accordance with SAWS standard DD-902-01. See item No. 2 in the CHANGES TO THE PLANS section in this Addendum.

- 80. Question: Medium Voltage Motor Control Centers – 26 18 39 2.1 (A) allows Square D as an approved manufacturer. Square D has informed us they will be proposing Square D Medium Voltage Switchgear but will offer Benshaw for the transition from Switchgear and Medium Voltage MCC, as they have eliminated their Medium Voltage MCC lines. While the offering will be Square D branded, 26 18 39 (1.5 B) states “Equipment that is manufactured by a third party and “brand labeled” shall not be acceptable.” Please advise if this requirement would stand for this case or if Benshaw Medium Voltage MCCs will be allowed.**

Response: The MCC will not be acceptable.

- 81. Question: On Drawings I-03 and IS-01, It shows the Fiber runs from the Electrical Building SCADA panel to the (3) Well Network Panels to be 6-strand. Fiber Spec 40 66 33-1 1.1.A.2 claims these to be 12-strand runs. Please clarify.**

Response: Provide 6-strand OS2 fiber optic cable for these connections. See item Nos. 13, and 14 in the CHANGES TO THE SPECIFICATIONS section in this Addendum.

- 82. Question: Referencing the same spec, Cable ID I-03-01 ‘Security’ Fiber run is shown on DWG IS-01 as separate from the EB PLC to OSHG Master PLC run, while DWG I-03 shows just the one run from EB Control Room to OSHG FOPP. The EB PLC to OSHG PLC run is not listed in the table, but I assume that needs to be accounted for as well? Please advise.**

Response: Correct, there will be two fiber optic cables routed between EB and OSHG for security and SCADA. See item Nos. 13 and 14 in the CHANGES TO THE SPECIFICATIONS section in this Addendum. See item No. 16 in the CHANGES TO THE PLANS section in this Addendum.

- 83. Question: On DWG I-03, there is a new SM run shown (FOC-5) from the Supervisory Control Panel to the SAWS Network Panel (provided by others), is this new run to be provided by others as well? Or should we account for that in the PCIS Scope? If so, please describe what type of cable that needs to be (# of Strands, SM vs MM, etc.).**

Response: Cable FOC-5 will be a 12-strand cable. Provision of this cable is in the PCSI's scope for the project (not by others). The cable must meet the requirements of Specification Section 40 66 33.

- 84. Per the Air Valve specification 40 05 86, manufacturers seem to have been pulled from the SAWS approved material standard specifications list 29-01, but did not include the Vent-O-Mat RBX series included on the final pages of the newest version of the materials list. SAWS has worked towards utilizing the RBX in their projects and has a standing annual contract to stock them. Will the Vent-O-Mat RBX series 4 function air valve be allowed for this project?**

Response: The Vent-O-Mat RBX will be evaluated and considered during the submittal process for inclusion in the project, if submitted by the contractor.

- 85. Is there a reason why the insurance requirement provides for an Installation Floater versus the broader coverage provided by Builders Risk insurance, and can Builders Risk insurance be provided in lieu of an Installation Floater?**

Response: Yes, the broader coverage provided by the Builders Risk Policy can be provided in lieu of the installation floater.

- 86. Can you point me in the right direction for a valve schedule for this project that shows pressure rating And required test pressure? Spec 15680 does not note any pressure rating or test information to the valves 15680 calls for valves to be 150 drill patterns yet there is no pressure requirement I can find. The typical SAWS test pressure has been 225 psi which concerns us that a typical 150 valve can't meet this test thus forcing us to change to 250 valve patterns and change the steel flange connections to 250 flanges. This has a cost impact we would just like to be clear on. Page 15680-3 Item d. calls for 250 pressure class flanged. Does this impact all valves?**

Response: Testing Pressure Requirements is 225 psi. Contractor is responsible for selecting valves and flanges that meet Testing Pressure requirement of 225 psi. Refer to Section 33 05 05, Buried Pipe Installation and Section 40 05 05, Exposed Piping Installation for pressure testing requirements.

CHANGES TO THE SPECIFICATIONS

1. Section Price Proposal

Remove Price Proposal in its entirety and **replace with** the revised version attached to this Addendum, to include additional line item 13 for Marbach Pump Station, Temporary Power Improvements. Respondents shall use the revised Price Proposal when submitting a proposal for this RFCSP. Failure to use the revised Price Proposal may result in the bid being found non-responsive.

2. Section 01 29 00 Payment Procedures

Delete: Section 01 29 00 Payment Procedures in its entirety.

Replace with: Revised Section 01 29 00 Payment Procedures.

3. Section 01 31 00 Project Management and Coordination, Paragraph 1.18.B

Delete: “The Contractor will provide all signs, barricades and required off-duty police officers as part of their base bid.”

Replace with: “The Contractor will provide all signs, barricades and required off-duty police officers or a certified company flagman as part of their base bid. A certified company flagman can be used in lieu of having an off-duty officer. Due to the project site being in a high traffic area an off-duty officer is recommended but not required.”

4. Section 01 35 53 Security Procedures, Paragraph 1.3.B.1.b

Delete: “Prior to issuing badge, submit to owner copy of background data sheet for each person to whom badge may be issued for owner acceptance; do not issue badge without owner acceptance of background data for that person.”

Replace with: “Prior to issuing badge, submit to owner copy of background data sheet for each person to whom badge may be issued for owner acceptance; do not issue badge without owner acceptance of background data for that person. Background checks must at a minimum include National Criminal Check and Terrorist Watch List with this information being provided in the Background Screening Letter.”

5. Section 01 35 53 Security Procedures, Paragraph 1.3.B.4.a

Delete: “Contractor shall provide an armed security guard during all times that the work is being performed on the site by the Contractor or his subcontractors.”

Replace with: “Armed Security Guard is not required if the Contractor is able to secure and control access to the project site at all times. Contractor will need to provide an armed security guard when the project site's perimeter fence is not continuous and/or DOES NOT meet TCEQ Chapter 290 Intruder-Resistant fence, 6' or greater with 3 strands of barbed wire extending at a 45 degree angle or 8' Fence without barbed wire. When an armed security guard is required due to security fence being down coordinate with SAWS security.”

6. Section 10 73 16 Steel Canopy

Add: Section 10 73 16 Steel Canopy in its entirety.

7. Section 26 05 51 Large Induction Motors, Paragraph 2.2 General Requirements

Add: Item O: “Provide non-reversing ratchet for Well Pump motors.”

8. Section 26 05 51 Large Induction Motors, Paragraph 2.8 Enclosure

Delete: Item C: “TEFC”

Replace with: Item C “TEFC or WPII”

9. Section 28 00 05 Electronic Security System, Paragraph 2.4.B

Delete: Article 2.4.B

Replace with: Article 2.4.B,

“1. Video Compression: H.264 Baseline and Main Profile (MPEG-4 Part 10/AVC) Motion JPEG

2. Resolution –2560x1440 (4MP).

3. Frame Rate – up to 50/60 fps with power line frequency of 50/60 Hz at H.264.

4. Streaming – Multiple, individually configurable streams in H.264 and Motion JPEG with controllable frame rate and bandwidth.
5. Pan/Tilt/Zoom: Digital PTZ
6. Image settings include: Compression, color, brightness, sharpness, contrast, white balance, exposure control, exposure zones, automatic backlight compensation and suppression, WDR-dynamic contrast, fine tuning of behavior at low light”

10. Section 28 00 05 Electronic Security System, Paragraph 2.4.G

Delete: Article 2.4.G

Replace with: Article 2.4.G,

“1. Axis model Q1786-LE for pole/wall mounted cameras.

2. Axis Fisheye 360 camera M4318-PLVE for indoor.

3. Mounts shall be from the same manufacturer and shall be specifically designed for the model used.”

11. Section 40 05 53 Process Valves, Table 40 05 53-A

Delete: Line size: 16”

Replace with: Line size: 18”

12. Section 40 05 53 Process Valves, Table 40 05 53-A

Delete: Gate valve size: 16”

Replace with: Gate valve size: 18”

13. Section 40 61 00 Process Control Systems General Provisions, Paragraph 1.1.G.10.b

Add the following after the end of Paragraph 1.1.G.10.a, immediately prior to

Paragraph 1.1.G.11: “1.1.G.10.b. The existing touchscreen OIT associated with the Chemical Systems Control Panel is located in its own panel inside the existing OSHG Building Generation Room. Replace the existing OIT panel (MAR-SHB-OIT) in its entirety, including, but not limited to, the enclosure, the OIT and all required internal components, as shown in the Drawings and as specified herein. Connect the new OIT panel with the Ethernet switch in the PLC control panel located in the OSHG Building Electrical Room. Program the new OIT and develop new graphics screens such that all existing functionality associated with the existing OSHG System and all additional existing I/O is retained and all new functionality associated with the new Fluoride System is included.”

14. Section 40 61 00 Process Control Systems General Provisions, Paragraph 1.1.G.11

Delete: Paragraph 1.1.G.11

Replace with: “Coordinate with the Other Project Contractor for the interface with the CPS Control Building equipment. Conduct a minimum of two Coordination Meetings with the PCSI, Engineers, and the Other Project Contractor to facilitate this coordination. Submit written confirmation of required coordination.”

15. Section 40 62 63 Operator Interface Terminal, Paragraph 2.1.A.1.a

Delete: Paragraph 2.1.A.1.a

Replace with: Paragraph 2.1.A.1.a “PanelView Plus 7 or manufacturer-recommended equal compatible with Rockwell Automation PLC hardware being furnished and SAWS current Rockwell Automation versions.”

16. Section 40 62 63 Operator Interface Terminal, Paragraph 2.1.D.1

Delete: Paragraph 2.1. D.1.

Replace with: Paragraph 2.1.D.1. “Size:12”.

17. Section 40 63 00 Programmable Logic Controller

Delete: Section 40 63 00 Programmable Logic Controller in its entirety.

Replace with: Revised Section 40 63 00 Programmable Logic Controller.

18. Section 40 66 33 Fiber Optic Communication Cabling and Connectors, Table 1.1.A.2

Delete: Table 1.1.A.2

Replace with: Revised Table 1.1.A.2

Cable ID Number	Connections	Fiber Type	Notes
I-03-01A	OSHG Building Access Control & Security Panel to EB-ACP Access Control & Security Panel	loose tube, 24-strand singlemode	Provide AFL fiber optic patch panel at each termination location
I-03-01B	OSHG Building Access PLC Panel to EB-PLC Panel	loose tube, 24-strand singlemode	Provide AFL fiber optic patch panel at each termination location
I-03-02	Well No.1 Network Panel to SCADA Room EB-NWK SCADA network Panel	loose tube, 6-strand singlemode	Provide AFL fiber optic patch panel at each termination location
I-03-03	Well No.2 Network Panel to SCADA Room EB-NWK SCADA network Panel	loose tube, 6-strand singlemode	Provide AFL fiber optic patch panel at each termination location
I-03-04	Well No.3 Network Panel to SCADA Room EB-NWK SCADA network Panel	loose tube, 6-strand singlemode	Provide AFL fiber optic patch panel at each termination location
I-03-05A	EB-ACP Access Control & Security Panel to Communications Building	loose tube, 24-strand singlemode	Provide AFL fiber optic patch panel at each termination location
I-03-05B	EB-PLC Panel to Communications Building	loose tube, 24-strand singlemode	Provide AFL fiber optic patch panel at each termination location

19. Section 43 24 13.33 Vertical Lineshaft Pumps

Delete: Section 43 24 13.33 Vertical Lineshaft Pumps in its entirety.

Replace with: Revised Section 43 24 13.33 Vertical Lineshaft Pumps.

20. Section 43 41 00 Polyethylene Storage Tanks, Paragraph 2.2.A.3

Delete: 2.2.A.3 “Or Engineer-approved Equal.”

21. Section 46 33 41.33 Hydrofluorosilicic Acid Feed System, Paragraph 2.2.F.1.c

Delete: 2.2.F.1.c “Or Engineer-Approved Equal.”

CHANGES TO PLANS

- 1. Sheet D-04 Wells 1, 2, and 3 Demolition Sections**
Delete Sheet D-04 in its entirety **and replace with** revised Sheet D-04.
- 2. Sheet M-04 Well Piping Sections**
Delete Sheet M-04 in its entirety **and replace with** revised Sheet M-04.
- 3. Sheet A-05 Electrical Building Lower Plan**
Delete Sheet A-05 in its entirety **and replace with** revised Sheet A-05.
- 4. Sheet A-07 Electrical Building Elevations**
Delete Sheet A-07 in its entirety **and replace with** revised Sheet A-07.
- 5. Sheet A-8 Room Finish Schedule and Door Schedule and Details**
Delete Sheet A-08 in its entirety **and replace with** revised Sheet A-08.
- 6. Sheet S-18 Typical Canopy Foundation and Electrical Equipment Support Detail**
Add: Sheet S-18 Typical Canopy Foundation and Electrical Equipment Support Detail Sheet.
- 7. Sheet E-4B Partial Enlarged Site Plan Temporary Power**
Delete: Sheet E-4B in its entirety
Replace with: Revised Sheet E-4B
- 8. Sheet E-4C Partial Enlarged Site Plan Permanent Power**
Delete: Sheet E-4C in its entirety **and replace with** revised Sheet E-4C.
- 9. Sheet E-07 Electrical Ductbank Sections – I**
 - a. Delete:** Section C5, for conduit numbers 1, under DESCRIPTION CONTROLS FROM GENERATOR SWITCHGEAR
Replace with: “FIBER FROM GENERATOR SWITCHGEAR”.
 - b. Delete:** Section C5, for conduit numbers 2, 3, and 4, under CONDUIT TAG “GEN-C”.
Replace with: “SPARE”
 - c. Delete:** Section C5, for conduit numbers 2, 3, and 4, under DESCRIPTION CONTROLS FROM GENERATOR SWITCHGEAR”
Replace with: “FROM GENERATOR SWITCHGEAR”.
- 10. Sheet E-08 Electrical Ductbank Sections – II**
Delete: Section A9, for conduit numbers 17 and 18, under CONDUIT SIZE

Replace with: “2” with “3”

11. Sheet E-09 Electrical Ductbank Sections – III

Delete: Sheet E-09 in its entirety

Replace with: Revised Sheet E-09

12. Sheet E-18 CPS Energy Transformer Yard

Delete: Sheet E-18 in its entirety

13. Sheet EA-3 Existing Riser Diagram Temporary

Delete: Sheet EA-3 in its entirety

Replace with: Revised Sheet EA-3

14. Sheet EA-13 Panel Schedules

Delete: “NEMA 1/1A” for Panelboard LA ENCLOSURE field.

Replace with: “NEMA 12”

15. Sheet I-13, Chemical Systems PLC Control Panel Modification Details

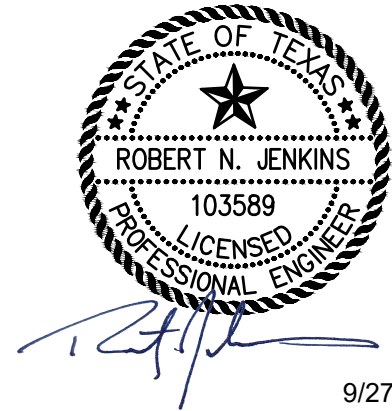
Delete: Drawing I-13 in its entirety

Replace with: Revised Drawing I-13

16. Sheet IS-01, SCADA and Security Network Block Diagram

Delete: Drawing IS-01 in its entirety

Replace with: Revised Drawing IS-01



9/27/23

END OF ADDENDUM 6

This Addendum is eighty-seven (87) pages in its entirety including the attachments.

Attachments:

- 1) Section PP-1 – Price Proposal
- 2) Section 01 29 00 – Payment Procedures
- 3) Section 10 73 16 – Steel Canopy
- 4) Section 40 63 00 – Programmable Logic Controller
- 5) Section 43 24 13.33 – Vertical Lineshaft Pumps
- 6) Sheet D-04 Wells 1, 2, and 3 Demolition Sections
- 7) Sheet M-04 Well Piping Sections
- 8) Sheet A-05 Electrical Building Lower Plan
- 9) Sheet A-07 Electrical Building Elevations
- 10) Sheet A-08 Room Finish Schedule and Door Schedule and Details
- 11) Sheet S-18 Typical Canopy Foundation and Electrical Equipment Support Detail
- 12) Sheet E-4B Partial Enlarged Site Plan Temporary Power
- 13) Sheet E-4C Partial Enlarged Site Plan Permanent Power
- 14) Sheet E-09 Electrical Ductbank Sections - III
- 15) Sheet EA-3 Existing Riser Diagram Temporary
- 16) Sheet I-13 Chemical Systems PLC Control Panel Modification Details
- 17) Sheet IS-01 SCADA and Security Network Block Diagram

PRICE PROPOSAL

PROPOSAL OF _____, a corporation a
partnership consisting of _____
an individual doing business as _____

THE SAN ANTONIO WATER SYSTEM:

Pursuant to Instructions and Invitation to Competitive Sealed Proposals, the undersigned proposes to furnish all labor and materials as specified and perform the work required for the project as specified, in accordance with the Plans and Specifications for the following prices in the Price Proposal to wit:

PLEASE SEE ATTACHED LIST OF PRICE ITEMS.

RESPONDENT'S SIGNATURE & TITLE

FIRM'S NAME (TYPE OR PRINT)

FIRM'S ADDRESS

FIRM'S PHONE NO. /FAX NO.

FIRM'S EMAIL ADDRESS

The Contractor herein acknowledges receipt of the following:
Addendum No(s). _____

OWNER RESERVES THE RIGHT TO ACCEPT THE OVERALL MOST RESPONSIBLE PROPOSAL.

The Respondent offers to construct the Project in accordance with the Contract Documents for the contract price, and to complete the Project within **1280** calendar days after the start date, as set forth in the Authorization to Proceed. **The Respondent understands and accepts the provisions of the contract Documents relating to liquidated damages of the project if not completed on time.**

Complete the additional requirements of the Price Proposal which are included on the following pages.

Statement on President's Executive Orders

Has your firm previously performed work subject to the President's Executive Orders Numbers 11246 and 11375 or any preceding similar executive orders (Numbers 10925 and 11114)? Yes No

PRICE PROPOSAL

Site 1: Marbach Pump Station					
Item No.	Description	Unit	Quantity	Unit Price	Total Price
1	High Service Pumps & Motors, and Aboveground Piping Improvements	LS	1	\$ _____	\$ _____
2	Well Pumps & Motors, and Aboveground Piping Improvements	LS	1	\$ _____	\$ _____
3	Yard Piping	LF	2,800	\$ _____	\$ _____
4	Trench Excavation Safety	LF	2,800	\$ _____	\$ _____
5	Demolition	LS	1	\$ _____	\$ _____
6	Site Civil Improvements, Access Roads, and Drainage	LS	1	\$ _____	\$ _____
7	Site Electrical Improvements, including Duct Banks	LS	1	\$ _____	\$ _____
8	Site Security	LS	1	\$ _____	\$ _____
9	Site Cathodic Protection	LS	1	\$ _____	\$ _____
10	Electrical Building (Architectural, Structural, and HVAC)	LS	1	\$ _____	\$ _____
11	SCADA and Instrumentation	LS	1	\$ _____	\$ _____
12	Hydrofluorosilicic Acid (Fluoride Feed System)	LS	1	\$ _____	\$ _____
13	Temporary Power Improvements	LS	1	\$ _____	\$ _____
SUBTOTAL (ITEMS 1 - 13)				\$	
14	Permitting Allowance	ALW	1	<u>\$20,000</u>	<u>\$20,000</u>
15	Special Inspections Allowance	ALW	1	<u>\$25,000</u>	<u>\$25,000</u>
SUBTOTAL (ITEMS 14 - 15)				<u>\$45,000</u>	
100	Mobilization and Demobilization, Max 7% of Subtotal Line Items 1 - 13	LS	1	\$ _____	\$ _____
102	Intermediate Demobilization / Re-Mobilization	EA	1	\$ _____	\$ _____

PRICE PROPOSAL

Site 2: Mission Road Service Center						
Item No.	Pay Item No.	Description	Unit	Quantity	Unit Price	Total Price
16	105.1	Channel Excavation	CY	1467	\$ _____	\$ _____
17	205	Hot Mix Asphalt Concrete Type D (2" Compacted)	SY	80	\$ _____	\$ _____
18	206	Asphalt Treated Base (10" Compacted Depth)	SY	80	\$ _____	\$ _____
19	500.1	Concrete Curb (CoSA)	LF	825	\$ _____	\$ _____
20	505	24-inch Rock Riprap	SY	322	\$ _____	\$ _____
21	516.1	Sodding	SY	1332	\$ _____	\$ _____
22	540	Temporary Sediment Control Fence (CoSA)	LF	795	\$ _____	\$ _____
23	802	Level IIA Tree Protection	LS	1	\$ _____	\$ _____
24	845	Remove and Replace Fencing (6-ft High Chain Link)	LF	450	\$ _____	\$ _____
25	02621	Geotextile	SY	322	\$ _____	\$ _____
SUBTOTAL (ITEMS 16- 25)					\$	

100	Mobilization and Demobilization, Max 7% of Subtotal Line Items 16 - 25	LS	1	\$ _____	\$ _____
101	Preparing Right-of-Way, Max 5% of Subtotal Line Items 16 - 25	LS	1	\$ _____	\$ _____

Mobilization and demobilization shall be limited to the maximum percentage shown. **If the percentage exceeds the allowable maximum stated for mobilization and demobilization, Owner reserves the right to cap the amount at the percentages shown and adjust the extensions of the bid items accordingly.**

TOTAL PRICE PROPOSAL (LINES 1 - 29)	\$
--	-----------

SECTION 01 29 00

PAYMENT

PROCEDURES

1.00 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section defines the method that will be used to determine the quantities of work performed or materials supplied and establish the basis upon which payment will be made.

1.02 ADMINISTRATIVE SUBMITTALS

- A. Schedule of Values: Submit Schedule of Values on the Contractor's standard form. Refer to Paragraph 1.05 of this Section and Section 01 33 00 Submittal Procedures for additional requirements.
- B. Schedule of Estimated Progress Payments (refer to Paragraph 1.06 of this Section for additional requirements):
 - 1. Submit with initially acceptable Schedule of Values.
 - 2. Submit adjustments thereto with Application for Payment.
- C. Application for Payment.
- D. Final Application for Payment.

1.03 RELATED WORK

- A. Section 01 33 00 Submittal Procedures

1.04 PRICE

- A. Required items of the work and incidentals necessary for the satisfactory completion of the Project shall be considered incidental to the specified work required under this contract and shall be considered as included in the unit prices for the various proposal items. the Contractor shall prepare his bid accordingly to allow for such items:
 - 1. Not specifically listed in the Price Proposal.
 - 2. Not specified in this section to be measured or to be included in one of the items listed in the Price Proposal.
 - 3. To include the Contractor's overhead and profit.
- B. The work includes the furnishing of all labor, materials, equipment, tools, and related items for performing all operations required to complete the Project

San Antonio Water System
Marbach Pump Station Improvements Project

satisfactorily in place and in full operability, as specified by the Contract Documents.

1.05 SCHEDULE OF VALUES

- A. The Contractor shall prepare a Schedule of Values for the Project and submit to the Owner for review and approval.
- B. Use line items in the proposal as line items in the Schedule of Values. Provide adequate detail to allow easy determination of the percentage of the work completed for each item.
- C. Lump sum work
 - 1. Reflect Schedule of Values format included in conformed Bid Proposal form, specified allowances, and equipment selected by the Owner, as applicable.
 - 2. List bonds and insurance premiums, mobilization, demobilization, facility startup, and contract closeout separately.
 - 3. Separate product costs and installation costs. Break down by the applicable divisions for each of the Project facilities.
 - a. Product costs include cost for product, delivery and unloading, royalties and patent fees, taxes, and other cost paid directly to the supplier or vendor.
 - b. Installation costs include cost for the supervision, labor and equipment for field fabrication, erection, installation, start-up, initial operation and the Contractor's overhead and profit.
 - 4. Divide principal subcontract amounts into an adequate number of line items to allow determination of the percentage of the work completed for each item. These line items may be used to establish the value of the work to be added or deleted from the project.
- D. An unbalanced or front-end loaded Schedule of Values will not be acceptable.
- E. Summation of the complete Schedule of Values representing all work shall equal the Contract price.
- F. The Contractor submittals
 - 1. A preliminary Schedule of Values shall be submitted to the Owner prior to or at the Pre-construction Conference. The Schedule of Values shall be a breakdown of each bid item and may be used to verify costs of credits, change orders, etc.
 - 2. The preliminary Schedule of Values will be reviewed by the Owner and Engineer for acceptance. The Schedule of Values shall include sufficient detail, as decided by the Owner and Engineer, to determine if the prices included are "unbalanced" or "front-end loaded." Inflation of prices for those items of the work to be completed in the early stages of the work shall not be acceptable.

San Antonio Water System
Marbach Pump Station Improvements Project

3. Owner and Engineer will provide the Contractor with comments and may request additional information from the Contractor to justify certain item quantities and prices thereof. The Contractor shall revise and resubmit the Schedule of Values addressing all the Owner's and Engineer's comments until final acceptance by the Owner.
4. The final approved Schedule of Values shall become the Schedule of Values used in determining partial payment estimates.
5. No partial payment requests (including the first) shall be approved until the final Schedule of Values has been approved by the Owner.
6. After acceptance of the final Schedule of Values, no modifications will be made to the Schedule of Values, except as required by approved change orders.
7. The Contractor shall provide a copy of the final accepted Schedule of Values as an MS Excel format document and upload it to Owner's CPMS website. This will facilitate the process of contract modifications to implement the Schedule of Values.

G. Partial Payment Request

1. Each payment request submitted by the Contractor shall include the approved Schedule of Values, modified to indicate the total quantity and price of the work completed up to the date of the request, redline drawings, revised construction schedule, and construction progress report with photos of the work done

H. Format

1. In so far as possible, total quantities and unit prices shall be shown for all items of the work, separating for each item the materials and labor and such other sub- items the Contractor may desire.
2. "Lump Sum" and "miscellaneous" and other such general entries in the Schedule of Values shall be avoided whenever possible.
3. Such items as bond premiums, insurance, temporary facilities and equipment storage may be listed separately in the Schedule of Values provided the costs can be substantiated.
4. Overhead and profit shall not be listed as separate items in the Schedule of Values.
5. Breakdown costs to list major products or operations for each line item which has an installed value of more than \$20,000.00.
6. The sum of the items listed on the Schedule of Values shall equal the contract lump sum price. No additional payment will be allowed if the quantities shown on the Schedule of Values are less than those actually required to accomplish the work, unless the quantities are altered by a change order.

I. Forecast of Payments

1. Within 30 days after the award of the Contract, prepare and submit to the Owner a chart forecasting the monthly partial payment amounts that are anticipated for the Project. During progress of the work, mark this chart to

show actual payments to date and revise the forecast of payments as necessary and submit the revised chart to the Owner monthly.

1.06 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract times aggregating the initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract price as reflected by modifications to the Contract Documents.

1.07 APPLICATION FOR PAYMENT

- A. Reference Article VII Contract Payments of the General Conditions.
- B. Preparation:
 - 1. Review with Owner and Engineer quantities and the work proposed for inclusion in each progress payment. Application for Payment shall cover only the work and quantities recommended by the Owner and Engineer.
 - 2. Contractor shall be required to review with Engineer or Owner the status of record documents in connection with Owner's review of each Application for Payment. Failure to maintain record document current shall be just cause for Engineer to recommend a reduction in payment for record documents in accordance with Section 01 29 73 Schedule of Values, and will entitle the Owner to set-offs in accordance with the Contract Documents.
 - 3. Submit to Owner's CPMS system.
 - 4. Engineer will act on request for payment in accordance with the General Conditions and Supplementary Conditions.
 - 5. Round values to nearest dollar.
 - 6. List each Change Order and Written Amendment executed prior to date of submission as separate line item. Totals to equal those shown on the Transmittal Summary Form for each Schedule of Values as applicable.
 - 7. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each Schedule of Values as applicable, a listing of materials on hand for each schedule as applicable and such supporting data as may be requested by Owner.
- C. Include accepted Schedule of Values for each schedule or portion of the work, the unit price breakdown for the work to be paid on unit price basis, a listing of Owner-selected equipment if applicable, and allowances, as appropriate.

1.08 MEASUREMENT – GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for the work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.
- B. Whenever pay quantities of material are determined by weight, the material shall be

San Antonio Water System
 Marbach Pump Station Improvements Project

weighed on scales furnished by the Contractor and certified accurate by the state agency responsible. A weight or load slip shall be obtained from the weigh facility and delivered to the Owner's representative at the point of delivery of the material.

- C. If material is shipped by rail, the car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Owner. Each vehicle shall bear a plainly legible identification mark.
- E. All materials that are specified for measurement by the cubic yard measured in the vehicle shall be hauled in vehicles of such type and size that the actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. All vehicles shall be loaded to at least their water level capacity. Loads hauled in vehicles not meeting the above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- F. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1.0 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities. Quantities will be based on ground profiles shown.
- G. Units of measure shown on the Schedule of Values shall be as follows unless specified otherwise.

Item	Method of Measurement
AC	Acre-Field Measure by Owner
CY	Cubic Yard-Field Measure by Owner within the limits specified or shown CY-VM Cubic Yard-Measured in the Vehicle by Volume
EA	Each-Field Count by Owner
GAL	Gallon-Field Measure by Owner
HR	Hour
LB	Pound(s)-Weight Measure by Scale
LF	Linear Foot-Field Measure by Owner
LS	Lump Sum-Unit is one; no measurement will be made
MFBM	Thousand Foot Board Measure-Delivery Invoice
SF	Square Foot
SY	Square Yard
TON	Ton-Weight Measure by Scale (2,000 pounds)

1.09 PAYMENT

- A. Reference Article VII Contract Payments of the General Conditions.
- B. General:
 - 1. The date for the Contractor's submission of monthly Application for Payment shall be established at the Pre-construction Conference.
- C. Payment for all work shown or specified in the Contract Documents is included in the Contract Price. No measurement or payment will be made for individual items.

1.10 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for the following:
 - 1. Loading, hauling, and disposing of rejected material.
 - 2. Quantities of material wasted or disposed of in manner not called for under the Contract Documents.
 - 3. Rejected loads of material, including material rejected after it has been placed by reason of failure of the Contractor to conform to provisions of the Contract Documents.
 - 4. Material not unloaded from transporting vehicle.
 - 5. Defective work not accepted by the Owner.
 - 6. Material remaining on hand after completion of the work.

1.11 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial payment for stored materials and equipment shall be in accordance with the General Conditions of these Contract Documents and any revisions to said General Conditions as documented in the Supplementary Conditions of the Contract.
 - 1. Payment will be made for materials and equipment materials properly stored and successfully incorporated into the Project less the specified retainage.
 - 2. Provide a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of liens. Provide documentation of payment for materials and equipment with the next Application for Payment. Remove items from the tabulation of materials and equipment if this documentation is not provided with the next Application for Payment.
 - 3. Provide evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest.
 - 4. No payment for vegetation (tree/shrubs, plants, etc.)
 - 5. The work covered by progress payments becomes the property of the Owner at the time of payment. The Contractor's obligations with regard to proper care

and maintenance, insurance, and other requirements are not changed by this transfer of ownership until final acceptance in accordance with the General Conditions.

6. Payment for materials and equipment does not constitute acceptance of the product.
7. No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings or preliminary operation and maintenance manuals are acceptable to the Owner. All partial payments shall be approved by the Owner. Materials that will not be paid for prior to installation include, but are not limited to, bulk quantities such as nails, fasteners, conduits, conductors, concrete steel reinforcement, formwork, sand, and gravel. The Contractor's request for payments for materials stored on the job site shall include copies of paid invoices provided by approved supply sources in accordance with the General Conditions of the Contract. Payment for materials stored on the job site shall be based upon the costs listed in the supplier's paid invoices and shall be in accordance with the General Conditions of the Contract. Material stored off-site must be identified, separated from stock and kept secure.

1.12 FINAL PAYMENT

- A. Final payment will be made only for products incorporated in the work. Remaining products for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from the final payment.

1.13 PRICE PROPOSAL ITEMS – VOLUME I

- A. Bidder will complete the work for the following listed work items for the prices listed on the Price Proposal:

Item No. 1: High Service Pumps and Motors, and Aboveground Piping Improvements

1. Description
 - a. This item includes all work and materials associated furnishing and installing the high service pumps and motors and aboveground piping improvements required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 1 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 2: Well Pumps and Motors and Aboveground Piping Improvements

1. Description
 - a. This item includes all work and materials associated with video surveying the existing wells; four-arm caliper log of well casing; and furnishing and installing well pumps and motors, and aboveground piping improvements required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 2 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 3: Yard Piping

1. Description
 - a. This item includes all work and materials associated with furnishing and installing yard piping required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 3 will be by the linear foot.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 4: Trench Excavation Safety

1. Description
 - a. This item includes all work and materials associated with furnishing and installing trench excavation safety systems required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 4 will be by the linear foot.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 5: Demolition

1. Description
 - a. This item includes all work and materials associated with the demolition required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 5 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 6: Site Civil Improvements, Access Roads, and Drainage

1. Description
 - a. This item includes all work and materials associated with furnishing and installing site civil improvements, access roads, and drainage improvements required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 6 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 7: Site Electrical Improvements, including Duct Banks

1. Description
 - a. This item includes all work and materials associated with furnishing and installing site electrical improvements, including duct banks, required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 7 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 8: Site Security

1. Description
 - a. This item includes all work and materials associated with furnishing and installing site security systems required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 8 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 9: Site Cathodic Protection

1. Description
 - a. This item includes all work and materials associated with furnishing and installing site cathodic protection required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 9 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 10: Electrical Building (Architectural, Structural, and HVAC)

1. Description
 - a. This item includes all work and materials associated with furnishing, constructing, and installing the electrical building required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 10 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

San Antonio Water System
Marbach Pump Station Improvements Project

Item No. 11: SCADA and Instrumentation

1. Description
 - a. This item includes all work and materials associated with furnishing and installing SCADA and Instrumentation improvements required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 11 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 12: Hydrofluosilicic Acid (Fluoride Feed System)

1. Description

This item includes all work and materials associated with furnishing and installing the hydrofluosilicic acid feed system including demo of the existing system and then construction / installation of a new system required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 12 will be lump sum.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item No. 13: Temporary Power Improvements

1. Description
 - a. This item includes all work and materials associated with furnishing and installing temporary site electrical improvements as shown on Sheet E-4B, including handhole, conduit and wire, required by the scope of the project. The work includes providing all materials, labor, supervision, equipment, tools, coordination with the power company and all other incidentals necessary to complete the work in place.
2. Measurement – Measurement of Item No. 13 will be lump sum.

San Antonio Water System
Marbach Pump Station Improvements Project

3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.
4. The temporary incoming power improvements shall be directed by SAWS, only if the temporary power feed from an alternate source, to be installed by Others, is not available.

Item No. 14: Permitting Allowance

1. Description – This item shall be for permitting fees associated with the project scope. This shall include furnishing all materials, and incidentals required to obtain all necessary permits including review fees, in accordance with the Contract Documents, complete in place.
2. Measurement – Measurement for the item “Permitting Allowance” will be “by permit” of the actual fees. This allowance shall cover any approved reimbursement of costs related to obtaining permits required to construct the project. Proof of payment of permits fees will be required, and reimbursements will be made on the basis of actual permit fees required by each respective agency paid. The labor associated with obtaining permits is considered incidental to the other items.
3. Payment of the not to exceed allowance price shall be paid for the work. Payment shall constitute full compensation to the Contractor for obtaining all necessary permits for the Project. The Contractor shall provide permit receipts to Owner for reimbursement.

Item No. 15: Special Inspections Allowance

1. Description – This item shall be for special inspection fees associated with the project scope. This shall include furnishing all materials, and incidentals required to obtain all necessary contractor required special inspections, including fees, in accordance with the Contract Documents, complete in place.
2. Measurement – Measurement for the item “Special Inspections Allowance” will be “by payment” of the actual fees. This allowance shall cover any approved reimbursement of costs related to obtaining contractor required special inspections required to construct the project. Proof of payment of special inspection fees will be required, and reimbursements will be made on the basis of actual fees required by each respective agency paid. The labor associated with obtaining special inspections is considered incidental to the other items.
3. Payment of the not to exceed allowance price shall be paid for the work. Payment shall constitute full compensation to the Contractor for obtaining all necessary contractor required special inspections for the Project. The Contractor shall provide receipts to Owner for reimbursement.

Item 100: Mobilization and Demobilization

San Antonio Water System
Marbach Pump Station Improvements Project

1. Description – This item shall include mobilization and demobilization costs associated with the Marbach Pump Station Improvements Project scope. This item shall include project move-in and move-out of personnel and equipment, for all work including furnishing all labor, materials, tools, equipment, and incidentals required to mobilize, demobilize, bond and insure the work for the project in accordance with the Contract Documents, complete in place.
2. Measurement – Measurement of Item 100 will be by lump sum as the work progresses. If the Lump Sum price for Item 100 exceeds the allowable maximum stated for Mobilization and Demobilization, Owner reserves the right to cap the amount at 7% and adjust the extension of the bid item accordingly.
3. Payment – will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in SAWS Item No. 100.

Item 102: Intermediate Demobilization and Re-mobilization – SAWS Spec 102

1. Description – This item shall include Intermediate Demobilization and Remobilization costs associated with the Marbach Pump Station Improvements Project scope. This item shall include project move-in and move-out of personnel and equipment, for all work including furnishing all labor, materials, tools, equipment and incidentals required to mobilize, demobilize, bond and insure the work for the project in accordance with the Contract Documents, complete in place.

This bid item will only be paid for each prior authorization given in writing by Owner. This bid item is limited to delays outside of the Contractor's control that are not otherwise provided for in the General Conditions. Examples of these types of delays include Owner easement acquisition, permitting issues (only those permits not controlled by the Contractor), or other Owner activities. Any other provision contained herein notwithstanding Contractor will not be entitled to compensation under this bid item for work suspended during the 10 cumulative days allowed for by the Contract in the General Conditions, Article IV, Paragraph 4.8 Suspension of Work by Owner.
2. Measurement – Measurement of Item 102 will be per each intermediate demobilization and remobilization, inclusive. If the per each price for Item 14 exceeds the allowable maximum stated for Intermediate Mobilization and Demobilization, Owner reserves the right to cap the amount at 1% and adjust the extension of the bid item accordingly.
3. Payment – Payments of the per each item for Intermediate Demobilization and Remobilization will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in SAWS Item No. 102.

1.14 PRICE PROPOSAL ITEMS – VOLUME II

- A. Bidder will complete the work for the following listed work items for the prices listed on the Price Proposal:

Item 16 - COSA Item 105.1: Channel Excavation

1. Description – This item shall include the excavation and satisfactorily disposal of excavated materials as shown in the Contract Drawings. Work will include but is not limited to construction, compaction, shaping, and finishing earthwork on the entire length of the street, approaches, and/or sidewalk in conformity with the required lines, grades, and typical cross sections shown in the Contract Documents.
2. Measurement – Measurement of CoSA Item 105.1 will be Cubic Yard for each foot of concrete curb removed.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in CoSA Item 105.1

Item 17 - COSA Item 205.4: Hot Mix Asphalt Concrete Type D (2” Compacted)

1. Description – This item shall include a surface course or any combination of courses as shown in the Contract Drawings composed of a compacted mixture of mineral aggregate and asphaltic material.
2. Measurement – Measurement of CoSA Item 205.4 will be for each Square Yard of Hot Mix Asphalt Concrete Type D complete in place.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in CoSA Item 205.4.

Item 18 - COSA Item 206.1: Asphalt Treated Base (10” Compacted Depth)

1. Description – This item shall include the construction of a base or foundation course composed of a compacted mixture of aggregate and asphalt binder mixed as shown in the Contract Drawings.
2. Measurement – Measurement of CoSA Item 206.1 will be measured by the Square Yard of in-place composite hot mix at 10-inch.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in CoSA Item 206.1.

Item 19 - COSA Item 500.1: Concrete Curb

1. Description – This item shall include the construction of hydraulic cement concrete curb, gutter, and combined curb and gutter as shown in the Contract Drawings.
2. Measurement – Measurement of CoSA Item 500.1 will be for each Linear Foot of each concrete curb completed in place.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in CoSA Item 500.1.

Item 20 - COSA Item 505: 24-Inch Rock Riprap

1. Description – This item shall include the provision and installation of cast in place concrete riprap furnished in accordance with the details, sections, lines, and grades as shown in the Contract Drawings.
2. Measurement – Measurement of CoSA Item 103.1 will be for each Square Yard of concrete riprap, complete in place.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in CoSA Item 505.

Item 21 - COSA Item 516.1: Sodding

1. Description – This item shall include the provision and installation of sodding furnished in accordance with the Contract Drawings.
2. Measurement – Measurement of CoSA Item 516.1 will be for each Square Yard of sodding, complete in place.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in CoSA Item 516.1

Item 22 - COSA Item 540: Temporary Sediment Control Fence

1. Description – This item shall include the provision and installation of control measures as shown in the Contract Drawings.
2. Measurement – Measurement of CoSA Item 540 will be for Linear Foot of silt fence provided.
3. Payment – Partial payments will be as follows:
 - a. As shown in the General Conditions.

San Antonio Water System
Marbach Pump Station Improvements Project

- b. As shown in CoSA Item 540.

Item 23 – Pay Item 802: Level IIA Tree Protection

1. Description – This item shall include the provision, installation, maintenance, and removal of tree protection as shown in the Contract Drawings.
2. Measurement – Measurement of Item 802 will be Lump Sum for all tree protection provided.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item 24 - Pay Item 845.1: Remove and Replace Fencing (6-foot High Chain Link)

1. Description – This item shall include the provision, installation, maintenance, and removal of chain link fence as shown in the Contract Drawings.
2. Measurement – Measurement of CoSA Item 845.1 will be for Linear Foot of chain link fence provided.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

Item 25 - Pay Item 02621: 10mil Geotextile Fabric

1. Description – This item shall include the provision, installation, and maintenance of geotextile fabric as shown in the Contract Drawings.
2. Measurement – Measurement of Item 02621 will be for each Square Yard of geotextile fabric provided.
3. Payment of the full price shall be paid for the work performed and in accordance with the Schedule of Values. Payment shall constitute full compensation to the Contractor for furnishing all: labor, equipment, tools, and materials; and for performing all operations required to furnish to the Owner this item, as specified and as indicated on the Contract Drawings and Specifications.

SAWS Item 100: Mobilization and Demobilization

San Antonio Water System
Marbach Pump Station Improvements Project

1. Description – This item shall include mobilization and demobilization costs associated with the Volume II – Mission Road Service Center Drainage Improvements scope. This item shall include project move-in and move-out of personnel and equipment, for all work including furnishing all labor, materials, tools, equipment, and incidentals required to mobilize, demobilize, bond and insure the work for the project in accordance with the Contract Documents, complete in place.
2. Measurement – Measurement of Item 100 will be by lump sum as the work progresses. If the Lump Sum price for Item 100 exceeds the allowable maximum stated for Mobilization and Demobilization, Owner reserves the right to cap the amount at 7% and adjust the extension of the bid item accordingly.
3. Payment – Partial payments for each of the bid for mobilization will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in SAWS Item No. 100.

SAWS Item 101: Preparing Right-of-Way

1. Description – This item shall govern preparing the right-of-way for construction operations by removing and disposing of all obstructions from the right-of-way and from designated easements where removal of such obstructions is not otherwise provided for in the contract documents.
2. Measurement – Measurement of the Item No. 101, Preparing Right of Way, as specified herein, will be by the “Lump Sum,” as the work progresses.
3. Payment – Payment shall be compensation for all work including the furnishing of all materials, equipment, tools, labor, tree pruning, removal, protection, landscape impacts, and incidentals necessary to complete the work. Partial payments will be as follows:
 - a. As shown in the General Conditions.
 - b. As shown in SAWS Item No. 101.

END OF SECTION

SECTION 10 73 16

STEEL CANOPY

PART1 – GENERAL

1.1 SCOPE OF WORK

- A. Furnish all design, labor, materials and equipment required to construct a canopy over a mat foundation for the proposed electrical equipment system in the material grades, sizes, quantities and locations specified.
- B. Canopy shall be provided as single pitched roof design and shall extend a minimum one foot beyond the back of electrical equipment enclosures.

1.2 SUMMARY

- A. Section Includes:
 - 1. General requirements of the steel canopy over electrical equipment concrete foundation.
 - 2. Loading requirements for the canopy.
- B. Related Specification Sections include, but are not necessarily limited to:
 - 1. Section 03 30 00 Cast-in-place Concrete
 - 2. Section 03 60 00 Grouting
 - 3. Section 05 05 33 Anchor Systems
 - 4. Section 05 50 13 Miscellaneous Metal Fabrications

1.4 REFERENCES

- A. Reference Standards:
 - 1. Reference standards cited in this Specification refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification, unless a date is specifically cited.
 - 2. American Institute of Steel Construction (AISC):
 - a. 325 – Steel Construction Manual
 - b. 360 – Specification for Structural Steel Buildings
 - 3. ASTM International (ASTM):

San Antonio Water System
Marbach Pump Station Improvements Project

- a. ASTM A992-Standard Specification for Structural Steel Shapes
 - b. ASTM A36-Standard Specification for Carbon Structural Steel
 - c. ASTM A500-Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - d. ASTM F1554-Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
 - e. ASTM A 325-Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - f. ASTM F3125-Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength
 - g. ASTM C881 Type IV, Grade 3, Class A, B &C.- Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - h. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
4. American Welding Society (AWS).
 - a. D1.1, Structural Welding Code - Steel.
 5. ASCE 7-16 Minimum Design Loads for Buildings and other Structures.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00.
- B. All submittals shall be approved by the Engineer prior to delivery and/or fabrication.

1.6 ACTION SUBMITTALS/INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Shop drawings for structural steel fabrications shall be submitted for review prior to fabrication. Examples include, but are not limited to:
 1. Complete fabrication and erection plans and procedures giving full information on aspects of the erection which will affect alignment, plumb and dimensional accuracy of the structure.
 2. Connections including size and spacing of bolts and welds.
 3. Indicate profiles, sizes, spacing, and locations of structural members, openings, camber and attachments. Indicate welded connections with

San Antonio Water System
Marbach Pump Station Improvements Project

AWS welding symbols. Indicate net weld lengths. Details of welding materials, equipment, sequence and technique to be used. Shop and erection details incorporating any seismic critical welds shall include explicit references to corresponding weld procedure specifications.

4. The Subcontractor shall survey, review and confirm as-built conditions prior to developing shop drawings. Field modifications to suit as-built conditions shall be at the Subcontractor's expense.

B. Certificates:

1. Mill Test Reports: Submit mill test reports indicating structural strength, destructive and nondestructive test analysis and chemical analyses from each heat of steel used in the work.

C. Delegated Design Submittals:

1. Provide signed and sealed Shop Drawings and calculations, which are prepared by a Registered Professional Engineer licensed in the State in which the canopy will be installed. Professional engineer's seal shall be clearly legible, including jurisdiction of registration, registration number, and name on seal.
2. Certification by The Professional Engineer stating that canopy design is performed in accordance with performance and design criteria stated in the Contract Documents, and that design is in accordance with current codes and standards and complies with Laws and Regulations, and meets prevailing standards of practice.

1.7 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC specifications.
- B. Welders shall be qualified in accordance with AWS D1.1 for each process, position and joint configuration.
- C. Survey anchor bolts for location and elevation prior to fabricating steel.
- D. Fabricator Qualifications: The Company shall submit written documentation of experience in performing the work of this Section prior to award of the Subcontract.
- E. Erector Qualifications: Company with a documented experience in performing the work of this Section.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to finalizing any designs and fabrication of any drawings.

1.9 CONTRACTOR'S ENGINEERING SERVICES

- A. General: The Contractor shall retain a Structural Engineer registered in the State of Texas. Documents prepared by the contractor's Engineer shall be stamped and signed.
- B. Shoring: The contractor's Engineer shall design, detail, inspect, and provide scheduled procedures for shoring of composite steel framing, the design shall conform to the applicable Federal, State and local requirements. Drawings shall include detailed procedures and schedules for installation, sequencing and removal of shoring.
- C. Requirements of the steel canopy:
 - 1. Columns shall be located to not encroach on dedicated electrical working space and required clearances of the equipment. Contractor shall provide additional columns as required by the design.
 - 2. Canopy Dimensions:
 - a. Width of the foundation (B): 12.00 ft
 - b. Length of the foundation (L): 16.00 ft
 - c. Center to center distance of perimeter columns:
 - i. Shorter direction: 10.00 ft
 - ii. Longer direction: 14.00 ft
 - d. Minimum Height of the Canopy (H): 10 ft
 - e. Roof Slope (θ): 1-1/2" V : 12" H
- D. Design and Code Requirements:
 - 1. All loadings shall be designed in accordance with ASCE 7-16.
 - 2. Live loads:
 - a. Roof Live Load: 20 psf.
 - b. Slab Live Load: 300 psf.
 - 3. Wind Loads:
 - a. Risk Category: III
 - b. Ultimate Design Wind Speed: 114 mph
 - c. Wind Exposure: C
 - 4. Seismic Loads:
 - a. Spectral Response Acceleration, S_s : 5%
 - b. Spectral Response Acceleration, S_1 : 2.6%

San Antonio Water System
Marbach Pump Station Improvements Project

- c. Site Class: D
 - d. Seismic Design Category: A
 - 5. Snow Loads: 5 psf
 - 6. Ice Loads: N/A.
 - 7. Flood Loads: N/A.
- E. Design structural members and roof panels to withstand Class 90 wind uplift in accordance with UL 580.

PART 2 – PRODUCTS

2.1 PRODUCT TYPES AND MATERIALS

- A. Roof Panels: Ultra-Dek Metal Panel, manufactured by Metallic or equal, 22 gage minimum.
- B. Columns:
 - 1. Structural steel tubing: ASTM A500 Grade B with a minimum yield stress of 46,000 psi.
 - 2. Sized to meet or exceed specific project design load requirements.
- C. Structural Steel Members: A992 for rolled wide flange shapes and for other rolled shapes and plates.
- D. Plates, bars and channels: ASTM A36.
- E. Structural Tubing: ASTM A500, Grade B.
- F. Pipe: ASTM A53, Type E or S, Grade B.
- G. Shear Stud Connectors: ASTM A108 (fu=60 KSI).
- H. Anchor Bolt Rods, Nuts and Washers: SS316
- I. Threaded Stud Connectors: ASTM A36.
- J. Bolts and Nuts: Bolts in structural steel connections shall be provided in accordance with ASTM A325. Nuts shall be provided in accordance with ASTM A563 Grade C or DH.
- K. Welding Materials: Filler metals shall conform to Table 4.1 of AWS D1.1. Electrodes and equipment settings shall be as recommended by the filler metal manufacturer for the position, thickness and conditions of use. Use E-70XX Electrodes.

San Antonio Water System
Marbach Pump Station Improvements Project

- L. Washers shall be flat and either circular, square or rectangular conforming to ASTM F436 Type 1. The finish of washers is to match the nut. A325 bolts shall have washers under the head.

2.2 CONNECTIONS

- A. Shop connections shall be welded and field connections, except moment connections, shall be bolted. Weld only in accordance with approved welding procedures.
- B. Bolted connections shall be 3/4-inch diameter A325-N; connections shall have a minimum of two bolts. Shoulder bolts with hex nut and lock washers shall be used in slotted connections with the washer covering the slot in positions.
- C. Column base plate shall be minimum 3/4-inch thick A36 type.
- D. The Registered Professional Engineer submitting the shop drawings and calculations as stated in Section 1.06.C is responsible for the design of connections.
- E. All elements of a connection shall be designed to resist the loads and moments as described in section 1.09.
- F. All bolted connections shall have a minimum of two bolts.
- G. Gusset plates connecting horizontal and vertical bracing to beams and/or columns shall be connected to both adjacent members. Where this is not practical, provisions shall be made for the moment induced by the eccentricity of the load to the work point of the connection. Gusset plates for horizontal bracing shall be located within the top two rows of bolts of beam connection angles, unless otherwise noted on the drawings. The minimum thickness of gusset plates in single shear shall be 3/8-inch for bolts in single shear and 3/8-inch for bolts in double shear.
- H. Anchor bolts for each column shall be furnished with a 1/8" thick sheet metal template.

2.3 FABRICATION

- A. Fabricate structural steel in accordance with the applicable provisions of the AISC Specifications for Structural Steel Buildings. Where practical, fabricate and assemble before delivery to the Project site.
- B. Obtain field measurements necessary prior to steel fabrication.
- C. Perform high strength shop bolting in accordance with the appropriate ASTM specification. Complete high strength shop bolting before welding.
- D. Dimensional tolerances:
 - 1. Overall length of members with both ends milled may vary by 1/32-inch.

San Antonio Water System
Marbach Pump Station Improvements Project

2. Overall length of members without milled ends may vary by 1/16-inch for lengths less than 30 feet and 1/8-inch for lengths 30 feet and over.
- E. Where structural joints are welded, the detail of the joints, welding technique, weld quality and appearance, and methods for correcting defective welds shall conform to the AISC Code of Standard Practice and AWS D1.1. Welding procedure and sequence shall conform to AWS B2.1. Surfaces to be welded shall be clean and free of rust, paint, or galvanizing. Burned or flame cut edges shall be chipped clean and wire brushed.

2.4 FINISH

- F. All Steel members and connections shall be galvanized in accordance with ASTM A123 and A385 after fabrication. Repair damaged galvanizing in accordance with ASTM A780.
- G. Field paint all welds on Galvanized Steel with “Galvilite” by ZRC or approved equal.

PART 2 – EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Contractor accepts that existing conditions meet the requirements for installation once installation has begun.

3.2 ERECTION

- A. Erect structural steel in accordance with the AISC Specifications for Structural Steel Buildings. Where members cannot be properly assembled due to mis fabrication or deformation due to handling or transportation, the condition shall be reported to the owner with a proposed method of correction for approval.
- B. During erection, beams and vertical bracing are to be secured with at least two bolts prior to releasing the hoisting cable.
- C. Perform high strength bolting in accordance with the appropriate ASTM specification. Complete high strength bolting before field welding.
- D. Grout base plates with non-shrink grout. Clean concrete bearing surfaces from bond-reducing materials and roughen if necessary.

San Antonio Water System
Marbach Pump Station Improvements Project

- E. Clean concrete bearing surfaces from bond-reducing materials, and roughen if necessary, to improve bond to surfaces. Clean the bottom surface of base plate. Set base plate on wedges or other adjustable devices. Use leveling nuts. After the base plate has been positioned and plumbed, tighten the anchor bolts. Pack grout solidly between the bearing surfaces to ensure that no voids remain.

3.3 ERECTION TOLERANCES

- A. Tolerances shall be in accordance with the AISC Code of Standard Practice.

END OF SECTION

SECTION 40 63 00

PROGRAMMABLE LOGIC CONTROLLER

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section of the Specifications describes the requirements for Programmable Logic Controllers (PLCs) to be furnished under other Sections of the Specifications as listed in the Related Work paragraph of this Section.
- B. All equipment described herein shall be submitted and furnished as an integral part of equipment specified elsewhere in these Specifications.

1.2 RELATED WORK

- A. No references are made to any other section which may contain work related to any other section. The Contract Documents shall be taken as a whole with every section related to every other section as required to meet the requirements specified. The organization of the Contract Documents into specification divisions and sections is for organization of the documents themselves and does not relate to the division of suppliers or labor which the Contractor may choose to employ in the execution of the Contract. Where references are made to other Sections and other Divisions of the Specifications, the Contractor shall provide such information or additional work as may be required in those references and include such information or work as may be specified.

1.3 SUBMITTALS

- A. Submittals for equipment specified herein shall be made as a part of equipment furnished under other Sections. Individual submittals for equipment specified herein will not be accepted and will be returned un-reviewed.
- B. Submit catalog data for all items supplied from this specification Section as applicable. Submittal shall include catalog data, functions, ratings, inputs, outputs, displays, etc., sufficient to confirm that the equipment provides every specified requirement. Any options or exceptions shall be clearly indicated.
- C. Submit catalog data sheets for all software licenses provided under this Specification Section.
- D. Operation and Maintenance Manuals.
 - 1. Operation and Maintenance manuals shall include the following information:
 - a. Manufacturer's contact address and telephone number for parts and service.
 - b. Instruction books and/or leaflets
 - c. Recommended renewal parts list
 - d. Record Documents for the information required by the Submittals above.

- e. Copy of the software license data including serial numbers, license key, etc.

1.4 REFERENCE CODES AND STANDARDS

- A. Instrumentation equipment, materials and installation shall comply with the National Electrical Code (NEC and with the latest edition of the following codes and standards:
1. National Electrical Safety Code (NESC)
 2. Occupational Safety and Health Administration (OSHA)
 3. NEMA ICS 1-101 Diagrams, Designations and Symbols
 4. ANSI/ISA-5.06.01-2007 - Functional Requirements Documentation for Control Software Applications.
 5. ISA-TR20.00.01-2001 - Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations Updated with 27 New Specification Forms in 2004-2005.
 6. ISA-5.4-1991 Instrument Loop Diagrams.
 7. ISA-5.5-1985 Graphic Symbols for Process Displays.
 8. ISA-5.1-1984 (R1992) Instrumentation Symbols and Identification.
 9. ISA-5.3-1983 Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems.
 10. ISA-20-1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves.
 11. ISA-5.2-1976 (R1992) Binary Logic Diagrams For Process Operations.
 12. NEMA ICS 6 Enclosures for Industrial Controls and Systems
 13. National Fire Protection Association (NFPA)
 14. National Electrical Manufacturers Association (NEMA)
 15. American National Standards Institute (ANSI)
 16. Insulated Cable Engineers Association (ICEA)
 17. The International Society of Automation (ISA)
 18. Underwriters Laboratories (UL)
 19. UL 508, the Standard of Safety for Industrial Control Equipment
 20. UL 508A, the Standard of Safety for Industrial Control Panels
 21. UL 50, the Standard of Safety for Enclosures for Electrical Equipment.
 22. NFPA 79, Electrical Standard for Industrial Machinery
 23. Factory Mutual (FM)
 24. NFPA 70 National Electrical Code (NEC)
 25. NFPA 70E Standard for Electrical Safety in the Workplace
 26. ANSI C37.90.2 Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
 27. NEMA ICS 4 Terminal Blocks for Industrial Use.
 28. NEMA LS1 Low Voltage Surge Protection Devices.
 29. UL 1283 Standard for Safety-Electromagnetic Interference Filters.
 30. UL 1449 Third Edition Surge Protective Devices
 31. City of San Antonio, TX Electrical Code
 32. All equipment and installations shall conform to applicable Federal, State, and local codes.

San Antonio Water System
Marbach Pump Station Improvements Project

- B. All equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable.
- C. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

1.5 QUALITY ASSURANCE

- A. The manufacturer of this equipment shall have produced similar equipment for a minimum period of five years. When requested by the Owner/Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- B. Equipment submitted shall fit within the space or location shown on the Drawings. Equipment which does not fit within the space or location is not acceptable.
- C. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.6 WARRANTY

- A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship as per the requirements in the General Conditions from date of acceptance of the equipment containing the items specified in this Section. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the Contractor at no expense to the Owner.

1.7 COMMUNICATIONS PROTOCOL REQUIREMENTS

- A. The PLC System shall communicate utilizing Ethernet/IP Protocol with the following as minimum capabilities:
 - 1. Transfer of basic I/O data via User Datagram Protocol (UDP)-based implicit messaging
 - 2. Uploading and downloading parameters, setpoints, programs and recipes via TCP (i.e., explicit messaging.)
 - 3. Polled, cyclic and change-of-state monitoring via UDP, such as RPI and COS in Allen Bradley's ControlLogix control systems.
 - 4. One-to-one (unicast), one-to-many (multicast), and one-to-all (broadcast) communication via TCP
 - 5. Use of well-known TCP port number 44818 for explicit messaging and UDP port number 2222 for implicit messaging.

PART 2 - PRODUCTS

2.1 PROGRAMMABLE LOGIC CONTROLLER SYSTEM

San Antonio Water System
Marbach Pump Station Improvements Project

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Rockwell Automation CompactLogix 5000 Series hardware using Studio 5000 Logix Designer software. Confirm software version in use by SAWS.
- B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.
- C. Include all manufacturer-required and/or –recommended accessory products along with products specified here to provide a complete, operational PLC System to give the functionality depicted in the Drawings and as specified.
- D. Programming Languages
 - 1. Each PLC shall support IEC Standard 61131-3 for all of the following programming languages:
 - a. Function Block Diagram (FBD)
 - b. Ladder (LD)
 - c. Structured Text (ST)
 - d. Sequential Function Chart (SFC)
 - 2. PLC shall support user-defined functions for customization and user-defined tag structures
 - 3. PLC shall have application-specific instructions for process, drive, batch, motion and safety applications built into the controller.
- E. Central Processing Unit (CPU)
 - 1. Furnish CompactLogix 5380 standard Series, 5069-L330ER 3Mb processor.
 - 2. Provide hardware employing identical revisions of software and firmware as applicable.
- F. Physical Construction (Rack)
 - 1. The PLC shall be of modular construction, consisting of a back plane, plug-in modules for the processor, communications modules, I/O modules and expansion modules.
 - 2. Provide the ability to monitor and override I/O.
 - 3. Provide rack type I/O modules in the base bid.
 - 4. Provide the ability to preselect the failure status of each output point in the event of CPU failure.
 - 5. I/O modules shall support wiring interface devices that allow the removal and reinstallation of I/O modules without removing wires from terminals.
- G. Power Supply (PS)
 - 1. The power supply shall be 120 Volt 60 Hz and shall be sized for the total quantity of modules including the power requirement of all spare I/O module slots.
- H. Analog Input and Output Modules (AI and AO)

San Antonio Water System
Marbach Pump Station Improvements Project

1. Furnish current SAWS standard Compact 5000 I/O System 8-channel AI and AO modules with required Removable Terminal Blocks (RTBs).
 2. Analog inputs and outputs shall be 4-20 mA signals and be isolated physically and electronically from each other. Analog inputs shall support HART protocol. Analog outputs shall support up to a 600 ohm load.
- I. Discrete Inputs Modules (DI)
1. Furnish current SAWS standard Compact 5000 I/O System 16-point DI modules with required Removable Terminal Blocks (RTBs).
 2. Discrete inputs shall be 24 VDC and be individually buffered with external relays.
- J. Discrete Output Modules (DO)
1. Furnish current SAWS standard Compact 5000 I/O System 16-point modules with required Removable Terminal Blocks (RTBs).
 2. Discrete outputs shall be of the relay type and individually buffered with external relays
- K. Communications Modules
1. Furnish communications modules as needed to achieve functionality shown in the Drawings. Provide current SAWS standard model(s) for EtherNet/IP network communications.
- L. Communications Ports
1. Processor shall include a minimum of 2 Ethernet ports and 1 USB 2.0 type B port.
- M. PLC Spares
1. Provide a minimum of twenty percent wired spare I/O channels of each type furnished. All provided I/O shall be wired to DIN rail mounted terminals.
 2. Provide 1 spare module of each type furnished including but not limited to CPU, I/O and communications.

2.2 SPARE PARTS

- A. Provide the following spare parts for each control panel in the quantities specified:
1. One box of replacement fuses, all types and sizes used.
 2. One replacement cable of each type used
- B. Spare parts shall be boxed or packaged for long term storage. Identify each item with manufacturer's name, description and part number on the exterior of the package.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All equipment specified herein shall be factory installed, programmed, field adjusted, tested and cleaned as an integral part of equipment specified elsewhere in these Specifications.

++ END OF SECTION ++

San Antonio Water System
Marbach Pump Station Improvements Project

THIS PAGE INTENTIONALLY LEFT BLANK

VERTICAL LINESHAFT PUMPS

PART 1 – GENERAL

1.1 SCOPE

A. Scope:

1. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install vertical lineshaft pumps complete and operational.
2. Included are pump, motor, coupling, pump cans as applicable, sole plates as applicable, drive, pre-lubrication, and anchorage systems and all appurtenances.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that are required with or before vertical lineshaft pump Work.

C. Related Sections:

1. Section 03 60 00 – Grouting
2. Section 05 05 33 – Anchor Systems
3. Section 09 91 00 – Painting
4. Section 26 05 51 – Large Induction Motors

1.2 DEFINITIONS

- A. Submergence: Vertical distance in feet between the pumping water level and the bottom of the suction bell.
- B. Pump Efficiency: Pump efficiency as defined herein shall include all losses from the pump intake suction bell to the pump discharge flange. Losses through blank bowls (if any) for initial conditions shall also be considered.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer shall have minimum of five years of experience producing substantially similar materials and equipment to that required and be able to

San Antonio Water System
Marbach Pump Station Improvements

provide evidence of at least five installations in satisfactory operation for at least five years.

- B. Component supply, compatibility, and coordination responsibility specific to this Section:
1. Obtain all equipment in this Section regardless of the component manufacturer from a single vertical lineshaft pump supplier.
 2. The vertical lineshaft pump manufacturer shall be responsible for reviewing and approving or preparing Shop Drawings and other submittals for all components furnished under this Section.
 3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the centrifugal vertical lineshaft well pumps equipment manufacturer.
 4. To ensure equipment compatibility, the pump equipment manufacturer is responsible for coordination and procurement of the following equipment:
 - a. Electric drive motors per Section 26 05 51 – Large Induction Motors

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Manufacturer's literature, illustrations, specifications, paint certification and engineering data including: dimensions, materials, size, weight, and part lists for all components in sufficient detail to allow an item by item comparison with the Contract Documents.
 - b. Performance data and curves showing overall pump efficiencies, required net positive suction head, allowable suction lift, flow rate, head, brake horsepower, motor horsepower, speed, and shut-off head. Curves shall range from minimum flow to shut-off head at for full speed and all speed curves specified. For variable speed units, curves shall have at least five speeds plotted between maximum and minimum rpm. Provide data on pump head losses to include entrance, bowl, column, and discharge head losses.
 - c. Minimum submergence required over suction bell at minimum head listed in service conditions in Part 2 of this Specification.
 - d. Thrust at rated condition and maximum thrust value for the entire pump curve.
 - e. Upthrust at starting.
 - f. W_r^2 of pump.
 - g. Impeller diameter.
 - h. Motor test reports for furnished motors, including running light current, locked rotor current, winding resistance measurement, bearing inspection, and efficiency at 1/2, 3/4, and full load.
2. Shop Drawings:

San Antonio Water System
Marbach Pump Station Improvements

- a. Drawings of the products, including fabrication methods, assembly, accessories, installation details, dimensions, and wiring diagrams.
 3. Delegated Design Submittals:
 - a. Analysis and calculations by a qualified specialist for critical speed of pump and motor shaft.
 - b. Results of torsional and lateral vibration analyses.
 - c. Calculations of the maximum forces acting on the pump support structure.
 - d. Bearing life and shaft deflection calculations at the design point.
 - e. Calculations of the maximum reverse runaway speed based on maximum total head specified.
 4. Testing Plans, Procedures and Testing Limitations:
 - a. Proposed shop test procedures and field test procedures, and location of the shop tests.
 - b. Location of nearest permanent service headquarters of pump manufacturer to the Site.
- B. Informational Submittals: Submit the Following:
1. Certificates:
 - a. Provide welding certifications.
 2. Source Quality Control Submittals:
 - a. Shop tests. Provide prior to shipment from factory.
 - b. For Project with required efficiency guarantees by pump manufacturer, provide a statement regarding compliance with the specified bowl efficiency and guaranteed wire-to-water efficiency for each pump/motor combination at design point listed in the service conditions in Part 2 of this Section.
 3. Site Quality Control Submittals:
 - a. Field operating tests.
 4. Manufacturer's Instructions: Submit manufacturer's instructions and recommendations for:
 - a. Storage.
 - b. Handling.
 - c. Setting drawings, templates, and directions for installing anchor bolts and other anchorages.
 - d. Installation.
 5. Manufacturer's Reports:
 - a. Submit a written report of the results of each visit by a manufacturer's serviceman, including purpose and time of visit, tasks performed, and results obtained.
 6. Qualifications Statements:

San Antonio Water System
 Marbach Pump Station Improvements

- a. Submit qualifications data as specified in the Quality Assurance section.

C. Closeout Submittals: Submit the following:

- 1. Operation and Maintenance Data:
 - a. Submit complete operation and maintenance manuals, including copies of test reports, maintenance data, and schedules, description of operation, and spare parts information.
 - b. Furnish operation and maintenance manuals per Section 01 78 23, Operations and Maintenance Data.
- 2. Warranty Documentation:
 - a. Provide a copy of the manufacturer’s standard warranty for parts and labor.

D. Maintenance Materials Submittals: Furnish the Following:

- 1. Spare Parts:
 - a. Provide tools and spare parts as specified in the Maintenance article of this Specification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the requirements in specification Section 01 31 00 – Project Management and Coordination for the following:
 - 1. Packing, Shipping, Handling, and Unloading
 - 2. Storage and Protection
 - 3. Acceptance at Site

PART 2 – PRODUCTS

2.1 EQUIPMENT PERFORMANCE AND SIZE REQUIREMENTS

- A. Performance Criteria: Comply with the following minimum performance requirements:

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 & #2	Well Pump #3
Design Flow (1st design point) (gpm):	6,944	8,500	8,500
Design TDH (1st design point) (ft) ¹ :	170	190	220
Min. Bowl Efficiency at Design (1st design point) (%):	83%	83%	83%
Shut-Off Head (ft):	310	310	310

San Antonio Water System
Marbach Pump Station Improvements

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 & #2	Well Pump #3
Maximum Pump Speed (rpm) ¹ :	1,780	1,180	1,180
Max. Motor Horsepower ² :	400	600	600
Notes:			
1. This is the maximum pump speed to meet the specified operating conditions and the speed that the pump is to be tested at in the factory to demonstrate compliance with these specifications			
2. Pump horsepower requirements shall not exceed stated horsepower at all points on pump curve			

B. Pump Construction

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 - #3
Pump Type:	VS6	VS1
Prime Mover:	VSS Electric Motor	VHS Electric Motor
Lineshaft Construction:	Open	Open
Lineshaft Lubrication:	Product Lubricated	Product Lubricated
Shaft Sealing:	Mechanical Seal, see Paragraph 2.4.B	Packing, see Paragraph 2.4.B
Suction Strainer:	N/A	N/A
Impeller Style/Type:	Enclosed	Enclosed
NSF 61 Materials / Coatings	Yes	Yes

C. Size and Service Conditions:

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 - #3
Max. Number of Stages:	1	3
Min. Pump Discharge Nozzle Dia. (in):	18	20
Max. Suction Bell Diameter (D) (in):	24	26
Min. Pump Column Diameter (in):	18	20
Location	As shown on drawings	As shown on drawings
Installation Condition:	Exterior, Exposed to Weather	Exterior, Exposed to Weather
Drive Configuration:	Direct	Direct
Speed/Capacity Control:	N/A	N/A

San Antonio Water System
Marbach Pump Station Improvements

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 - #3
<u>Suction Barrel Data</u>		
Min Dia. of Suction Barrel (in):	36	N/A
Min. Suction Size (in):	30	N/A
Max. OD of Column Flanges (in):	N/A	26
Existing Well Casing ID (in):	N/A	28 (at location of pump bowls)
Suction Inlet Elevation, centerline (ft):	749.00	N/A
Top of Pump Bowl Elevation (ft.):	As required by Manufacturer in accordance with HI.	550
Min. Water Surface Elev at Pump Suction (TDH):	Ground Storage Tank Minimum Level (Low alarm point of 142.5)	90
Max. Water Surface Elev at Pump Suction (TDH):	Ground Storage Tank Maximum Level (High alarm point of 202.5)	Maximum Aquifer Level (310)
Site Elevation Above Sea Level: (See Drawings for additional details)	757	Approximate Top of Existing Well Head Slab Elevations: Well No. 1: +/- 757.89' Well No. 2: +/- 757.21' Well No. 3: +/- 756.83'
Casing Flange Elevations: (See Drawings for additional details)	N/A	Approximate Casing Flange Elevations: Well No. 1: +/- 760.47' Well No. 2: +/- 759.79' Well No. 3: +/- 759.41'

D. Fluid Data:

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 - #3
Fluid Pumped:	Potable Water	Ground Water
Fluid Temperature Range:	50 - 90	50 - 90
Fluid pH:	6.5 – 8.5	6.5 – 8.5
Fluid Specific Gravity:	1.0	1.0
Chemical Concentrations, maximum:	1.6 mg/L Fluoride 3.1 mg/L Chlorine	0.3 mg/L Fluoride (background)

E. Equipment provided shall be suitable for process and service conditions specified in the Contract Documents and shall conform to ANSI/HI 2.3, ANSI/HI 9.8 and

San Antonio Water System
Marbach Pump Station Improvements

ANSI/HI 14.3. Pumps shall be designed, constructed, and installed for the service intended and shall comply with the service conditions listed.

- F. Pump's characteristic curve shall rise continuously from minimum head condition to shut off without dips. Complete pumping unit, consisting of suction/intake, bowl(s), column, pump head, motor, and appurtenances shall be suitable in all respects for continuous, stable performance when operating at each point on pump's characteristic curve between not greater than 25 percent of flow at best efficiency point and minimum head, without cavitation and in accordance with vibration criteria specified herein.
- G. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum turbine run-away speed of the unit due to backflow through the pump with the primary TDH specified available at the pump discharge flange. Maximum reverse run-away speed shall not exceed 130 percent of the design operating speed.
- F. Contractor to confirm Top of Existing Well Head Slab Elevations prior to construction.

2.2 MANUFACTURERS

- A. The naming of a manufacturer in this Section is not an indication that the manufacturer's standard equipment is acceptable in lieu of the specified component features. Naming is only an indication that the manufacturer may have the capability of engineering and supplying the pump(s) specified.
- B. Provide Vertical Lineshaft Pumps from the following manufacturers:
 - 1. Flowserve
 - 2. Patterson Pump Company
 - 3. Pentair Fairbanks Nijhuis
 - 4. Xylem (Goulds)
 - 5. Floway (Trillium Flow Technologies/Weir)
 - 6. Peerless Pumps (Grundfos)
- C. Furnish the pumps with motors in accordance with Section 26 05 51, Large Induction Motors.

2.3 SPECIFIC MATERIALS OF CONSTRUCTION

- A. Special Requirements for pumps handling Potable Water:
 - 1. Components wetted by the water shall not contain more lead than permitted by Annex G of NSF Standard 61 which specifies restrictions for maximum lead content of materials in contact with drinking water.

San Antonio Water System
Marbach Pump Station Improvements

2. All submerged surfaces of the pump, both interior and exterior, or any surfaces exposed to the water being pumped shall be coated with an NSF approved coating.

B. Materials of construction are to conform to the requirements listed below:

Pump ID:	High Service Pumps #1 - #5	Well Service Pumps #1 - #3
Discharge Head:	Carbon Steel, ASTM A36	Carbon Steel, ASTM A36
Sole Plate, Mounting Flange:	N/A	Carbon Steel, ASTM A36
Discharge Column Pipe:	Carbon Steel, ASTM A53, Grade B	Carbon Steel, ASTM A53, Grade B
Pump Bowls, Discharge Case, and Suction Bell:	Cast Iron, ASTM A48, Class 30	Cast Iron, ASTM A48, Class 30
Bowl Liner/Wear Rings:	Nickel-Aluminum-Bronze, ASTM B148, Grade C95800	Nickel-Aluminum-Bronze, ASTM B148, Grade C95800
Impeller Material:	Nickel-Aluminum-Bronze, ASTM B148, Grade C95800	Nickel-Aluminum-Bronze, ASTM B148, Grade C95800
Impeller Wear Rings:	Nickel-Aluminum-Bronze, ASTM B148, Grade C95800	Nickel-Aluminum-Bronze, ASTM B148, Grade C95800
Pump Shaft and Line Shafts:	Stainless steel, ASTM A582, Type 416	Stainless steel, ASTM A582, Type 416
Line Shaft Couplings:	Stainless steel, ASTM A582, Type 416	Stainless steel, ASTM A582, Type 416
Line Shaft Bearing Type:	Self-lubricating abrasion resistant thermoplastic, See Paragraph 2.4.F	Self-lubricating abrasion resistant thermoplastic, See Paragraph 2.4.F
Suction Barrel	Carbon Steel, ASTM A36 and A53, Grade B	N/A
Suction Strainer:	Type 316 SS	N/A
Exterior Bolting and Fastening:	Type 316 SS, ASTM A 193 (Grade B8M) for bolts and ASTM A 194 (Grade 8M) for nuts.	Type 316 SS, ASTM A193 (Grade B8M) for bolts and ASTM A194 (Grade 8M) for nuts.

2.4 DETAILS OF CONSTRUCTION

A. Discharge Head:

1. Materials of construction per the table above in paragraph “Specific Materials of Construction”. Discharge heads to be machined. Discharge heads must be stress relieved prior to machining and certification of stress relief should be provided in O&M.
2. Design the discharge head to mount the driver, support the weight of the suspended pump components, and resist hydrostatic and hydrodynamic heads. Design

San Antonio Water System
Marbach Pump Station Improvements

discharge head for 100% of the pump discharge pressure (suction pressure plus pump differential pressure) at shutoff.

3. Discharge head is to include the following features:
 - a. Provide a bolted, registered or rabbet-fit, at the top of the discharge head for mounting the drive motor.
 - b. Integral discharge elbow for above grade discharge. On fabricated discharge heads 12-inches and larger, provide a minimum 3-segment mitered elbow.
 - c. Provide lifting lugs designed to support the weight of the complete pump assembly less the motor.
 - d. Provide the discharge head with an integral stuffing box or seal chamber. Access to the stuffing box area is to be through extra-large windows placed at 90 degrees from the discharge for pump adjustment and seal maintenance.
 - e. Provide tapped hole, of the size noted above in the "Size and Service Conditions" paragraph, for drainage of seal/flushing water.
 - f. Provide with a mounting flange for connection to the sole plate or suction barrel flange.
4. End Connections:
 - g. Provide end connection type as shown on the Drawings. All end connections shall be flanged.
 - h. Flanged Connections:
 - 1) Fabricated Discharge Heads:
 - i. Shutoff Head less than 250 psi: Provide Class 150 flanges complying with ANSI B16.5
 - ii. Shutoff Head greater than 250 psi: Provide Class 300 flanges complying with ANSI B16.5
5. For pumps mounted on suction barrels, drill and tap hole in mounting flange for installing an air/vacuum valve to purge air that may accumulate in barrel with varying water levels. Hole size as noted above in the table of "Pump Size Limitations". Discharge head shall have NPT connection through base for air relief connection.

B. Seal Chamber:

1. Seal housing shall mount to match bolt pattern on discharge head. Provide SS shaft sleeve through seal housing/stuffing box for the well pumps.
2. Provide a bronze alloy throttle bushing – alloy C89835.
3. Designed to allow use of a standard, commercially available, mechanical seal without special machining.
4. Drill and tap gland for a minimum ¼-inch clean water seal flushing connection.
5. Drill and tap gland area for seal water drain.

San Antonio Water System
Marbach Pump Station Improvements

6. On well pumps with open lineshaft construction, provide a water pre-lubrication connection at the stuffing box/seal chamber, designed to distribute water around the shaft for pre-lubrication of the lineshaft bearings before pump start-up.

C. Shaft Sealing:

1. Mechanical seal as noted in "Pump Construction" table above.
 - a. Mechanical seal shall be NSF 61 compliant and from the following manufacturer:
 - 1) John Crane, Type 1
 - b. Mating Ring:
 - 1) Silicon Carbide
 - c. Cup: EPDM
 - d. Primary Ring:
 - 1) Carbon
 - e. Hardware: 316 SS
 - f. Bellows: EPDM
 - g. O-rings: Parker NSF-61 approved O-ring, EPDM
 - 1) No Equal.
2. Packing as noted in "Pump Construction" table above.
 - h. Packing shall be NSF 61 compliant and in accordance with SAWS Standard Specifications and from the following manufacturer:
 - 1) SEPCO, 100% GFO, Style ML400
 - 2) UTEX, Style 210

D. Lineshafts:

1. Materials of construction per the table above in paragraph "Specific Materials of Construction".
2. Minimum shaft diameter determined by the formulas in AWWA E103.
3. Lengths: Furnish in interchangeable lengths not exceeding the following:
 - a. Open lineshafts: 10 feet
4. Surface Finish: Polished over the entire length to a surface finish of 40 Ra per ASTM B46.1.
5. Straightened to 0.003 inches (total indicator reading) per 10 foot section.
6. Machine ends square to the axis of the shaft and provide a center relief.
7. Total lateral deflection of the shaft above the stuffing box/seal chamber is not to exceed 0.005-inch total indicator reading.

San Antonio Water System
Marbach Pump Station Improvements

E. Lineshaft Couplings:

1. Materials: Machined from solid bar stock that matches the material listed in the table above in the paragraph for “Specific Materials of Construction”.
2. Design couplings in accordance with AWWA E103.
3. Coupling Type:
 - a. For line shafts smaller than 2.5” in diameter: Threaded sleeve-type couplings. Threaded couplings are to be designed to tighten during normal pump operation.
 - b. For line shafts 2.5” and larger: Key and thrust-ring type or other non-threaded design.

F. Lineshaft Bearings:

1. Bearing material type as noted in table above in the paragraph for “Specific Materials of Construction”.
 - i. Lineshaft Bearings: Self-lubricating abrasion resistant thermoplastic
 - 1) Vesconite Hilube
 - 2) No equal
2. Bearing lubrication as noted in table above regarding pump construction.
3. Mounting:
 - a. Open Lineshafts: Bearing retainers (spiders) to be held in position in column couplings by means of integrally welded into the column and machined concentric with registers in column flanges. Retainers to be SS.
4. Spacing: Locate bearings so that no pump operating speed is within 25% of the first critical shaft speed. Maximum spacing:
 - a. Open Lineshafts: 10 feet

G. Pump Shaft:

1. Material as noted in table above in the paragraph for “Specific Materials of Construction”.
2. Pump shaft shall be a single piece extending from the suction case bearing through the discharge case or upper bowl case bearing.
3. Sized for total axial thrust and weight of all rotating parts supported by shaft and horsepower transmitted.
4. Design shaft diameter so that the maximum combined shear stress does not exceed 30 percent of elastic limit in tension or more than 18 percent of ultimate tensile strength of shafting material.

San Antonio Water System
Marbach Pump Station Improvements

5. Shaft is to be heat-treated, ground, and polished over the entire length.
6. Cut impeller keyways for multistage pumps at differing positions and equal angular spacing on the impeller shaft to avoid multiple simultaneous vane passing pulses.

H. Impellers:

1. Single piece castings made from the material option listed in the Table above in the paragraph for “Specific Materials of Construction”.
2. Machined to fit the contour of the bowl, hand filed in the waterways.
3. Securely fasten impeller to shaft with stainless steel lock collets or keys and thrust ring retainers in such a manner that they cannot come loose under any operating condition or under reverse rotation. For pump shafts larger than 2.5 inches, use only keys and thrust ring retainers.
4. Impellers are to be statically and dynamically balanced.
5. Wear Rings: Provide impellers with a renewable wear ring fabricated from the materials listed in the Table above in the paragraph for “Specific Materials of Construction”.
 - a. Provide a radial type wear ring on enclosed impellers of nominal size 8-inches and larger.
 - b. Secure wear rings to impellers to prevent rotation using an interference fit and anaerobic adhesive, pins, or set screws, depending on impeller size.

I. Bowl Assembly:

1. Fabricate the pump bowls from the material listed in the Table above in the paragraph for “Specific Materials of Construction”.
2. Each bowl assembly is to consist of the discharge bowl, impeller, pump shaft, and bowl bearings.
3. Design bowls with sufficient rigidity to prevent adverse changes in bearing alignment and to maintain the running clearances of wear rings.
4. Join bowls to the suction bell and the discharge column with flanged male and female rabbeted joints.
5. Waterways and diffusion vanes are to be smooth and free from nodules, bumps, and dips. Flow passages through the bowl and diffuser vanes shall be polished.
6. Bowl discharge diffuser vanes shall not be a multiple of impeller vanes.
7. Bowl Bearings:
 - a. Bearings shall be located above and below the impeller
 - b. Type: Close tolerance, spiral grooved, sleeve type, pressed into bowl body.

San Antonio Water System
Marbach Pump Station Improvements

- c. Bowl sleeve bearings shall be lubricated by the pumped fluid.
 - 1) Type A Bearings: Bronze-backed cutless nitrile rubber
 - 2) Type B Bearings: Bronze alloy C89835
 - 3) Type C Bearings: Self-lubricating abrasion resistant thermoplastic:
 - i. Vesconite Hilube
 8. Bowl Liner: Axial flow pump bowls are to be machined and lined with a CF3M stainless steel liner hardened to between 200 to 220 Brinell Hardness Number (BHN).
 9. All bowl assembly hardware shall be 316 stainless steel.
 10. Wear Rings:
 - a. Provide the bowls with a renewable wear ring fabricated from the materials listed in the Table above in the paragraph for “Specific Materials of Construction”.
 - b. Provide radial style wear rings on bowl diameters 6-inches in diameter and larger on pumps that utilize enclosed impellers.
 - c. Secure wear rings to bowls to prevent rotation using an interference fit and anaerobic adhesive, pins, or set screws, depending on impeller size.
- J. Suction Bell:
1. The diameter of the suction bell is to be at least the same diameter as the bowl assembly and designed for a maximum entrance velocity of 7 fps.
 2. The contour between the outer edge and the impeller suction eye shall be smooth, continuous, and bell shaped.
 3. When pump is equipped with a suction bearing, provide a streamlined bearing housing with rigid cast vanes supporting and centering the suction bearing central hub below the first stage impeller. The bearing housing and vanes shall be designed to conduct the flow efficiently into the impeller eye.
- K. Discharge Column Pipe:
1. Size and wall thickness as noted in Table above for “Pump Size Limitations”
 2. Furnish in maximum interchangeable sections of nominal 10-foot lengths
 3. To ensure proper alignment, column flanges are machined with registers for mating. Bearing retainers are to be integrally welded into column and machined concentric with the registers. Column flanges should be minimum 3/4” thick after machining. Columns to be stress relieved prior to machining and certification to be provided in O&M.
 4. Furnish column pipes 12-inches and larger with flanged end connections. Threaded column sections shall be connected with threaded, sleeve-type

San Antonio Water System
 Marbach Pump Station Improvements

couplings. Column joints are to be butted to insure perfect column alignment after assembly

5. Column friction losses are not to exceed five feet of head per 100 feet of length, at pump's rated capacity.
6. Provide lifting lugs with lifting eyes 180 degrees apart below each column flanged connection for pump removal.
7. All column hardware shall be 316 stainless steel. Flange/bolt/o-ring design shall be determined by the pump manufacturer based on the pump shut off head.

L. Suction Barrel (High Service Pumps Only):

1. Provide a fabricated pump barrel from the material listed in the Table above in the paragraph for "Specific Materials of Construction".
2. Barrel is to conform to the recommendations in ANSI/HI 9.8 regarding dimensions and baffling.
3. Barrel Wall Thickness: Equivalent to the wall thickness of standard weight pipe for the barrel diameter specified unless noted otherwise. Minimum 3/8".
4. Suction Flange: Class 125 flange complying with ANSI B16.1. Distance from centerline of barrel to face of suction flange shall not be less than radius of barrel plus 12 inches and shall be the same for all sizes of suction barrels.
5. Provide a flange at the top of the pump barrel for bolting the pump discharge head onto the barrel. Provide a suitable o-ring to prevent leakage from the mounting flange. Top flange must be stress relieved prior to machining. Top flange assembly to be tack welded at factory.
6. Provide flange bolts and nuts as specified in the Table above in the paragraph for "Specific Materials of Construction".
7. Provide one blind flange for each pump suction barrel provided to completely seal the pump suction barrel should the pump be removed. Flange shall be of the same material as the suction barrel. Provide two gaskets or O-rings for each blind flange provided.

M. Discharge Head, Barrel, and Column Fabrication:

1. Welding shall conform to the following:
 - a. Welding procedures and performance qualifications shall be in accordance with the ASME Boiler and Pressure Vessel Code.
 - b. The minimum number of passes for welded joints shall be as follows:

Steel Cylinder Thickness (inch)	Minimum Number of Passes for Welds
Less than 0.1875	1
0.1875 through 0.25	2

San Antonio Water System
Marbach Pump Station Improvements

Greater than 0.25	3
-------------------	---

- c. Welds shall be full circumferential
- 2. Beveled ends for butt welding shall conform to ANSI B16.25. Remove slag by chipping or grinding. Surfaces shall be clean of paint, oil, rust, scale, slag, and other material detrimental to welding.
- 3. Hydrostatically test pump cans in the field per the referenced ASTM standards for the pipe.

2.5 PUMP ACCESSORIES AND APPURTENANCES

A. Lubrication System:

- 1. Refer to Paragraph 2.7.C in this specification.

B. Drive Coupling (Solid Shaft Motors):

- 1. Furnish a four-piece adjustable spacer coupling that allows axial adjustment of impeller lift and sized for removal of the complete seal assembly without disturbing the driver.
- 2. Service Factor: 1.5
- 3. Coupling and spacer balanced to AGMA, Class 8, or better.
- 4. Provide coupling with an adjusting nut for changing the axial impeller to wear ring clearance.
- 5. Coupling Manufacturer: Falk, Dodge, or Engineer Approved Equal.

C. Soleplate:

- 1. Material requirements as noted in the Table above in paragraph for “Specific Materials of Construction”.
- 2. Pump manufacturer to design sole plate to:
 - a. Span the opening shown on the Drawings;
 - b. Anchor the pump assembly to the supporting structure; and
 - c. Support the static and dynamic loads from the pump and motor and all attached appurtenances.
- 3. Sole plate anchor bolts are to be sized by the pump manufacturer

D. Vortex Suppression Baskets: When shown on the Drawings, pump manufacturer shall provide the vortex suppression basket for the pumps indicated in the Drawings. Unless noted otherwise, material of construction shall be 304L stainless steel.

E. Provide each pump with the following accessories.

San Antonio Water System
 Marbach Pump Station Improvements

1. Stainless Steel Nameplates:
 - a. Attached to the pump and drive motor giving the manufacturer’s model and serial number, rated capacity, head, speed, and all pertinent data.
 - b. Mount pump nameplate at an accessible location between three and five feet above the pump soleplate.
2. Coupling Guard: All metal construction (stainless steel) bolted to pump. The guard is to be OSHA approved.
3. Lifting lugs on motor and pump to facilitate maintenance activities.
4. Bolting and Anchorage: Provide bolting materials per the Table above in paragraph for “Specific Materials of Construction”.

2.6 ELECTRIC MOTORS

A. General: Unless specifically modified herein, furnish vertical solid shaft motors meeting the requirements of Section 26 05 51 – Large Induction Motors.

B. Specific Motor Requirements

Pump ID:	High Service Pumps #1 - #5	Well Pumps #1 - #3
Motor Type:	Induction	Induction
Shaft Type:	Solid	Hollow
Motor Hp:	400	600
Nominal Speed, (rpm):	1,800	1,200
Voltage – Frequency – Phase:	4160, 3ph, 60 Hz	4160, 3ph, 60 Hz
Enclosure Type:	TEFC	TEFC
Ambient Temperature Rating:	50 C	50 C
Insulation:	F	F
Service Factor (sinewave power):	1.15	1.15
Space Heater:	Y	Y
<u>Thermal Protection</u>		
Motor Winding RTDs:	Y	Y
Bearing RTDs:	Y	Y

2.7 CONTROLS AND ACCESSORIES

A. When noted above in “Pump Construction” table or “Specific Motor Requirements” table, provide the following control sensors in accordance with the following:

1. Pump Sensors:
 - a. Pump bearing RTDs

San Antonio Water System
Marbach Pump Station Improvements

- b. Bearing low oil switch
 - c. Bearing oil temperature thermometer.
2. Motor Sensors:
- a. Stator RTDs
 - b. Motor bearing RTDs
- B. Non-reverse ratchet to be installed.
- C. Pre-lubrication System
- 1. Lubricate open lineshaft pump bearings by a manual system. System shall consist of an adequately sized liquid supply line, gate shutoff valve, and pre-lubrication piping. Pre-lubrication piping shall connect liquid supply to pump pre-lubricating liquid inlet. Opening shutoff valve shall supply pre-lubrication liquid to open lineshaft bearings. Pump shall be started after lineshaft bearings are sufficiently wetted. Refer to SAWS Detail DD-902-01.

2.8 TOOLS, SPARE PARTS, AND MAINTENANCE MATERIALS

- A. Furnish the following spare parts for each size/model of pump(s) furnished:
- 1. One (1) mechanical seal assembly or packing set per pump size.
 - 2. One (1) set of gaskets and O-ring seals.
 - 3. One (1) set of wear rings (impeller and casing).
 - 4. One (1) shaft sleeve.
 - 5. One (1) complete set of bearings.
 - 6. One set of special tools required for normal maintenance or operation.

2.9 SURFACE PREPARATION AND PAINTING

- A. Pumps, motor, drive and appurtenances shall receive shop primer and shop finish coating conforming to requirements of Section 09 91 00, Painting.
- B. Surface preparation and painting shall conform to the requirements of Section 09 91 00, Painting. The interior surfaces of the pump, suction bell and discharge column pipes, and the interior surfaces of the pump head and suction barrel shall be cleaned with a Near White Metal Sandblast (SSPC SP 10). Number of coatings and coatings thickness shall be as recommended by coating system manufacturer for the intended application.
- C. All gears, bearing surfaces, machined surfaces and other surfaces which are to remain unpainted shall receive a heavy application of grease or other rust-resistant coating. This coating shall be maintained during storage and until the

San Antonio Water System
Marbach Pump Station Improvements

equipment is placed into operation.

- D. CONTRACTOR shall certify, in writing, that the shop primer and shop finish coating system conforms to the requirements of Section 09 91 00, Painting.

2.10 FACTORY WITNESS TESTING

- A. Pump columns and discharge heads shall be hydrostatically tested to twice the discharge head or one and a half times the shutoff head, whichever is greater.
- B. NPSH3 Type 2 test is not required.
- C. Perform Hydraulic Performance Testing Grade: 1U in accordance with ANSI/HI-14.6
- D. All tests shall be witnessed by a Registered Professional Engineer, who may be an employee of the manufacturer. The Registered Professional Engineer shall sign and seal all copies of test curves and shall certify that hydrostatic tests were performed. The State of registration, registration number and the name on the seal shall be clearly legible. Conduct tests in conformance with the methods described in Section A6 of AWWA E101. The serial numbers of the pumps shall be on the test curves and hydrostatic tests.
- E. CONTRACTOR shall be responsible for all costs associated with Witnessed Factory Testing for two (2) representatives of the OWNER and one (1) representative of the ENGINEER. This shall include, but is not limited to, all costs associated with airfare, lodging, meals, transportation, and incidentals. Costs shall be reimbursed by CONTRACTOR directly to OWNER and ENGINEER for a minimum of one full day (8 hours) of witness testing. Separate witness travel trips are required for the High Service and for the Well Pumps. Testing should not occur on weekends. If testing is not completed in a single week, the second trip must have at least one week break before resuming. Pump supplier is responsible for covering OWNER/ENGINEER expenses during trip, and reimburse for any incidental expenses that OWNER/ENGINEER may incur on their own.
- F. Pumps shall not be shipped until the ENGINEER has approved the test reports.

PART 3 – EXECUTION

3.1 INSTALLATION – HIGH SERVICE PUMPS

- A. Installation shall be in complete accordance with manufacturer's instructions and recommendations and the approved Shop Drawings.
- B. Barrel shall be installed by Contractor plumb within 0.015"/ft over entire length

San Antonio Water System
Marbach Pump Station Improvements

of barrell. Pump manufacturer must verify plumbness prior to backfill.

- C. Top flange shall be leveled within 0.002”/ft over machined mounting surface. Pump manufacturer must verify level prior to field welding and grouting.
- D. Contractor required to seal weld the top flange to the suction barrel after verifying level. Contractor to provide welder and millwright.
- E. Pumping units shall be installed on suction barrels and grouted as shown.
- F. Installation shall include furnishing and applying an initial supply of grease and oil, recommended by the manufacturer.
- G. Support piping independent of pump.
- H. Check and align pump, motor, and shafting.

3.2 WELL LOG – WELLS

- A. While old well pumps have been removed, and prior to installation of the new well pumps, CONTRACTOR shall perform a color video logging and four-arm caliper log of the well casing, for each of the three wells. Bail out any oil in the well, if present, prior to the video-logging run. Run fresh water into the well for at least 24 hours prior to the run. Only perform video-logging run at least 48 hours after pump removal. Well log shall be GeoCAM or Engineer-approved equal. Provide digital copies of each log.

3.3 INSTALLATION – WELL PUMPS

- A. Pump supplier is responsible for field assembly and installation of well pumps. Pump supplier must supply licensed well installer for duration of the field assembly/installation. Contractor shall not source their own independent well installer.
- B. Pumping units shall be installed on concrete bases and grouted as shown.
- C. Installation shall include furnishing and applying an initial supply of grease and oil, recommended by the manufacturer.
- D. Support piping independent of pump.
- E. Check and align pump, motor, and shafting.

3.4 DISINFECTION

- A. The well pump(s) shall be disinfected by CONTRACTOR conforming to AWWA requirements. To disinfect the pumps, CONTRACTOR shall use a sodium hypochlorite solution to provide a minimum 100 parts per million (ppm)

San Antonio Water System
Marbach Pump Station Improvements

of available chlorine concentration.

- B. After introduction of the disinfectant, the solution shall be thoroughly mixed in the well. The solution shall remain in the well for at least 24 hours during which time the well shall be surged at two-hour intervals. If the chlorine residual in the water supply after 24 hours is found to be less than 10 ppm, additional sodium hypochlorite shall be added as directed by ENGINEER.
- C. CONTRACTOR shall be responsible for obtaining proper disinfection as determined by the bacteriological tests made by the OWNER. If additional disinfection is required, CONTRACTOR shall repeat the above disinfection procedures until satisfactory bacteriological samples are obtained.

3.5 START-UP AND FIELD TESTING

- A. A factory trained representative shall be provided for installation supervision, start-up and test services and operation and maintenance personnel training services. Field services are to include the following site visits for each size pump supplied:

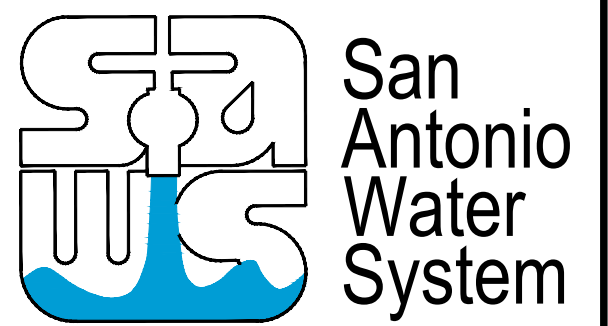
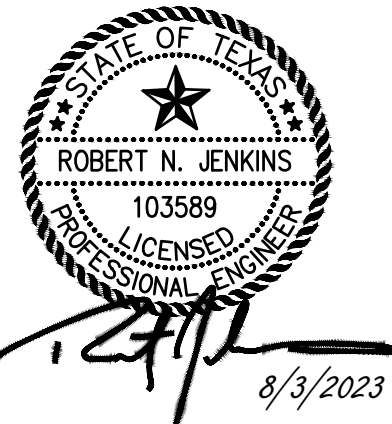
Service	Number of Trips	Number of Days/Trip
Installation and Testing	3	2
Startup and Training	1	2
Services after Startup	1	1

- B. Manufacturer's representative shall test operate the system in the presence of the ENGINEER and verify that the equipment conforms to the requirements. Representative shall revisit the Site as often as necessary until all trouble is corrected and the installation is entirely satisfactory.
- C. All costs, including travel, lodging, meals and incidentals, for additional visits shall be at no additional cost to the OWNER.
- D. Field Requirements include:
 - 1. High Service Field Requirements:
 - A. Barrel Plumb Inspection
 - B. Top Flange pre-grout level and weld supervision
 - C. Top Flange post-grout level inspection
 - D. Pump Installation/alignment
 - E. Start-up and Training
 - 2. Well Pump Field Requirements:
 - A. Pre-grout surface plate level inspection

San Antonio Water System
Marbach Pump Station Improvements

- B. Post-grout surface plate level inspection
- C. Field Assembly/Installation of Well Pumps
- D. Start-up and Training

++ END OF SECTION ++



REVISIONS			
NO.	DATE	ISSUED FOR	BY
1	9/18/23	ADDENDUM NO. 6	CM

STATUS:
BID SET SUBMITTAL

ARCADIS PROJECT NO.: 30041017
 DATE: AUGUST 2023
 DESIGNED BY: R. JENKINS
 DRAWN BY: J. RAY
 CHECKED BY: R. JENKINS

SHEET TITLE:
DEMOLITION

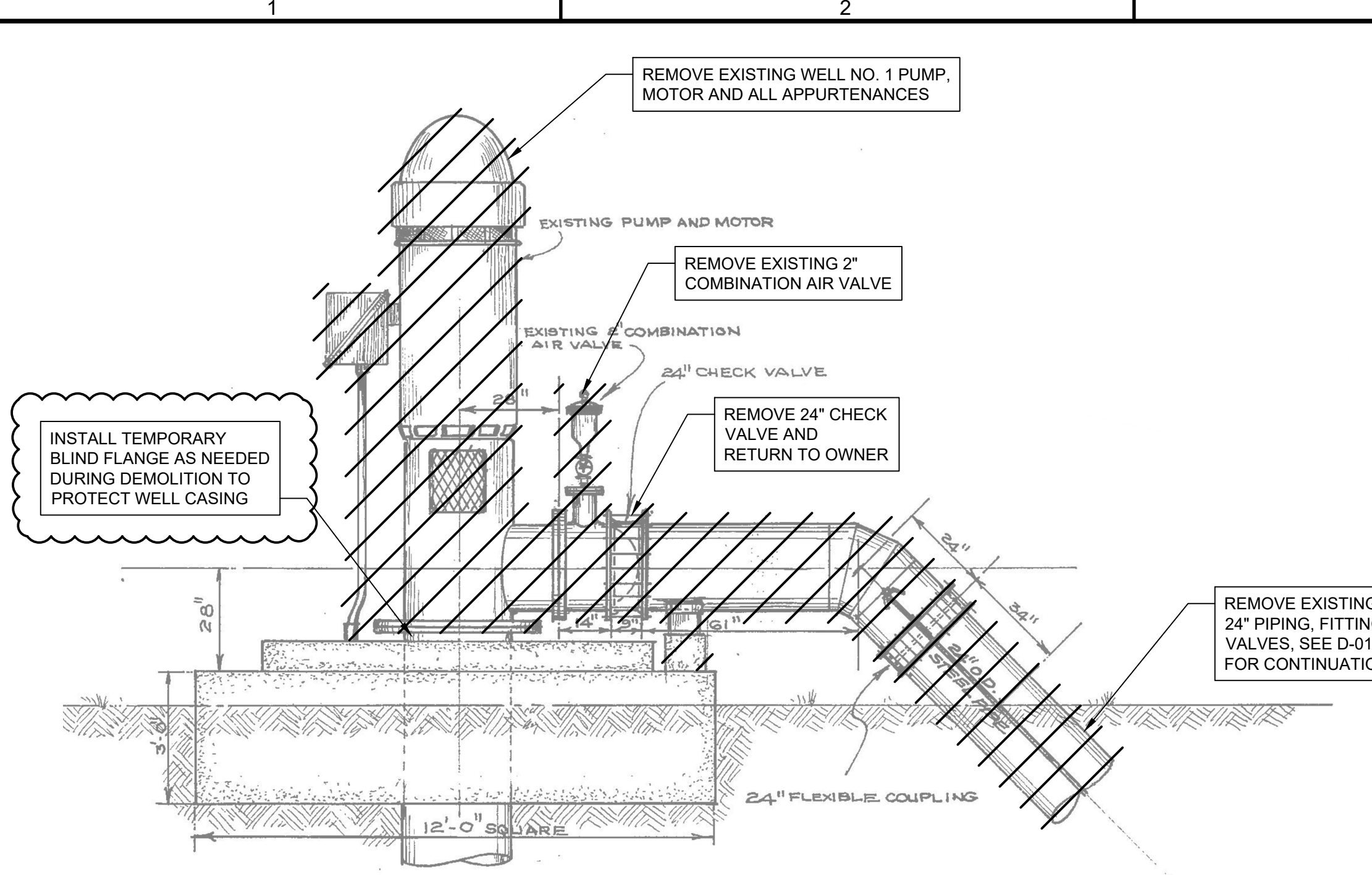
WELLS 1, 2 AND 3
 DEMOLITION SECTIONS

SCALE:
 AS SHOWN

DRAWING NO.: D-04
 SHEET NO.: 10 OF 193

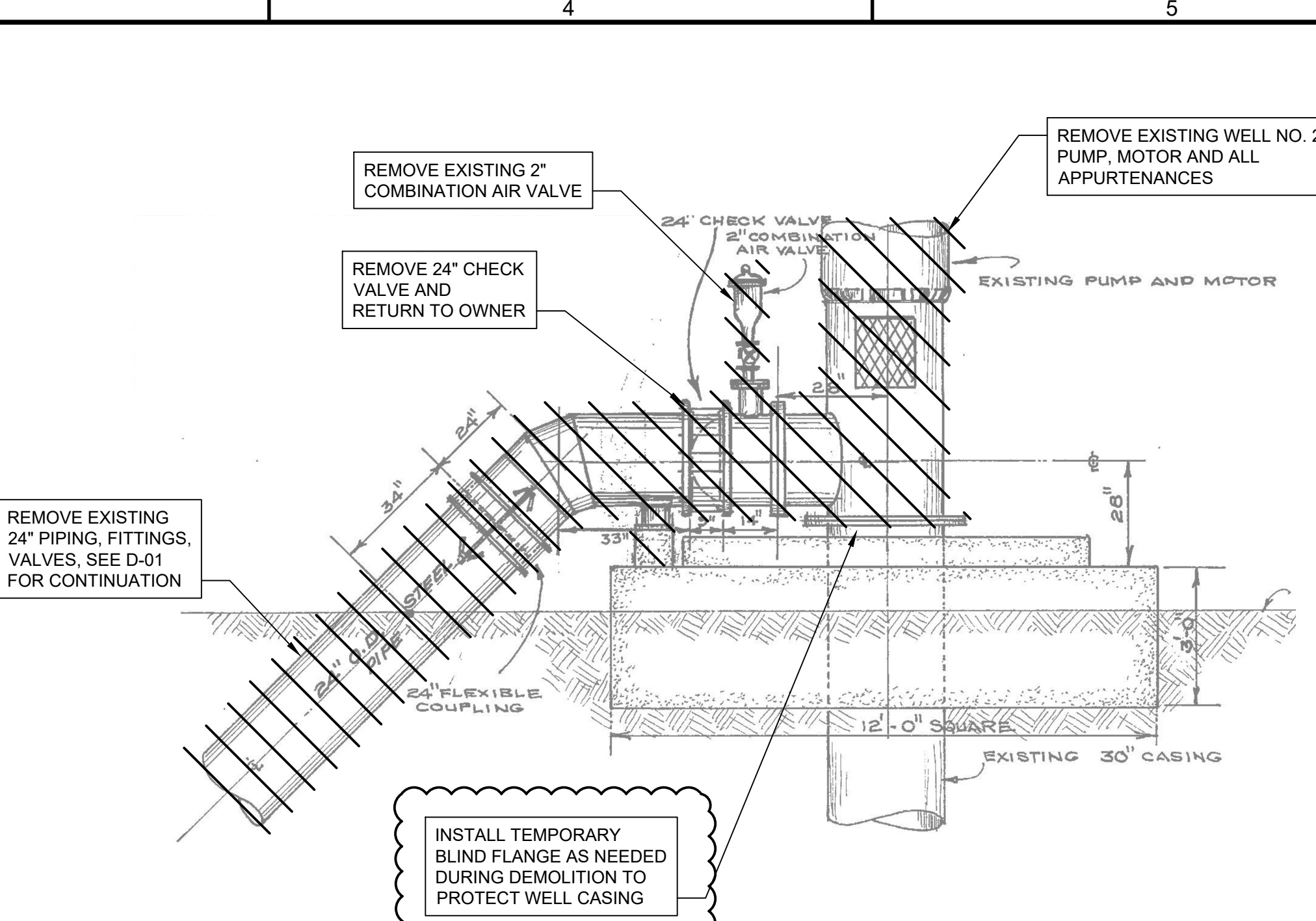
LEGEND:
 TO BE DEMOLISHED AND REMOVED

- GENERAL DEMOLITION NOTES:
1. CONTRACTOR SHALL FIELD VERIFY EXTENTS OF EXISTING FACILITIES FOR DEMOLITION
 2. ALL EQUIPMENT AND MISCELLANEOUS METALS MARKED ON THIS DRAWING TO BE DEMOLISHED. CONTRACTOR SHALL COORDINATE WITH OWNER TO IDENTIFY ITEMS TO SALVAGE.
 3. CONTRACTOR TO TAKE NECESSARY MEASURES TO PROTECT EXISTING UTILITIES DURING EXCAVATION AND DEMOLITION.
 4. REFER TO ELECTRICAL SHEETS FOR ELECTRICAL DEMOLITION WORK.
 5. REFER TO CIVIL SHEETS FOR CIVIL DEMOLITION WORK.
 6. BACKGROUND DRAWING INFORMATION FROM SET "MARBACH PUMP STATION" BY CITY WATER BOARD. THE INFORMATION HAS NOT BEEN CONFIRMED BY ARCADIS OR THE ENGINEER OF RECORD. THE BACKGROUND REPRESENTS AN APPROXIMATION OF FIELD CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR VERIFYING EXISTING FIELD CONDITION.



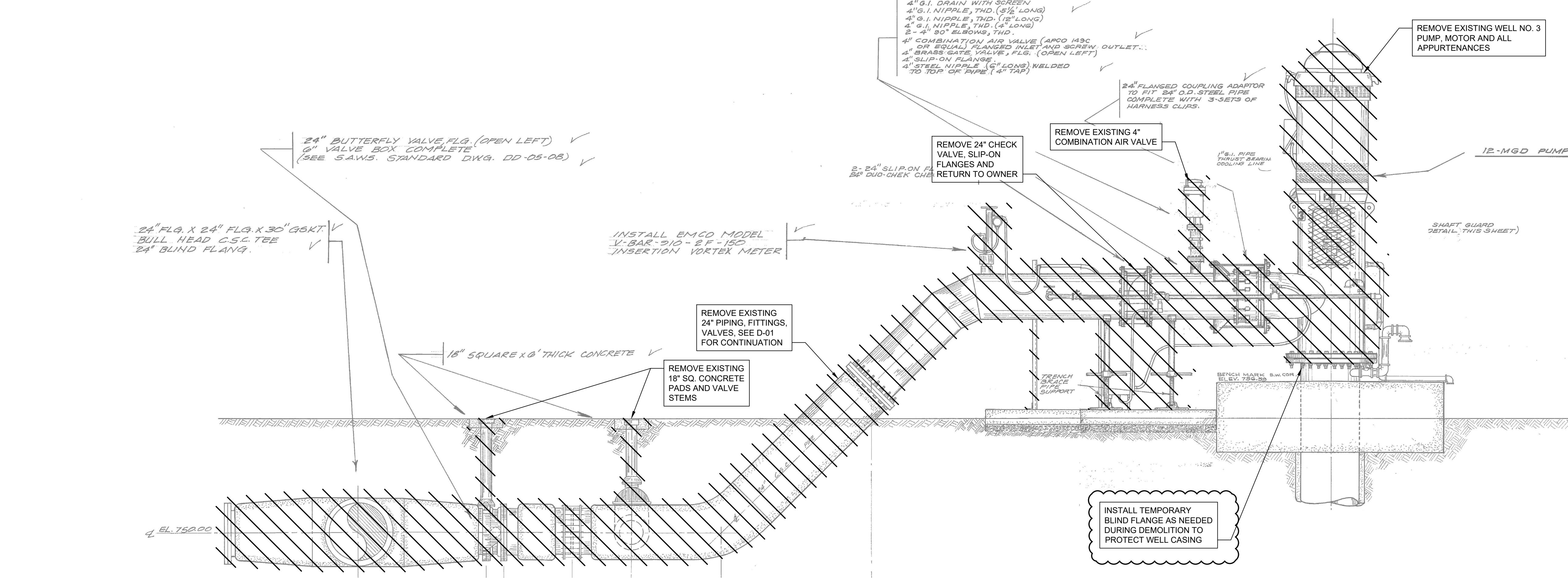
1 WELL NO. 1 DEMOLITION SECTION
 D-04

- NOTES:
 1. REMOVE EXISTING VENT PIPING. NOT SHOWN ON RECORD DRAWINGS.



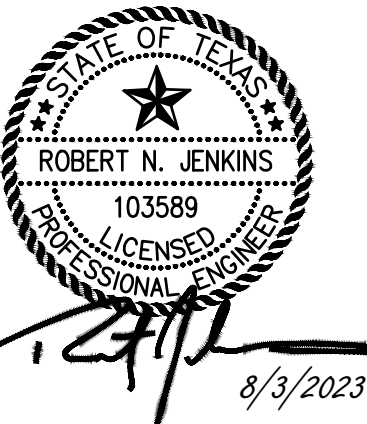
2 WELL NO. 2 DEMOLITION SECTION
 D-04

- NOTES:
 1. REMOVE EXISTING VENT PIPING. NOT SHOWN ON RECORD DRAWINGS.



3 WELL NO. 3 DEMOLITION SECTION
 D-04

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
1	9/18/23	ADDENDUM NO. 6	CM

STATUS:
BID SET SUBMITTAL

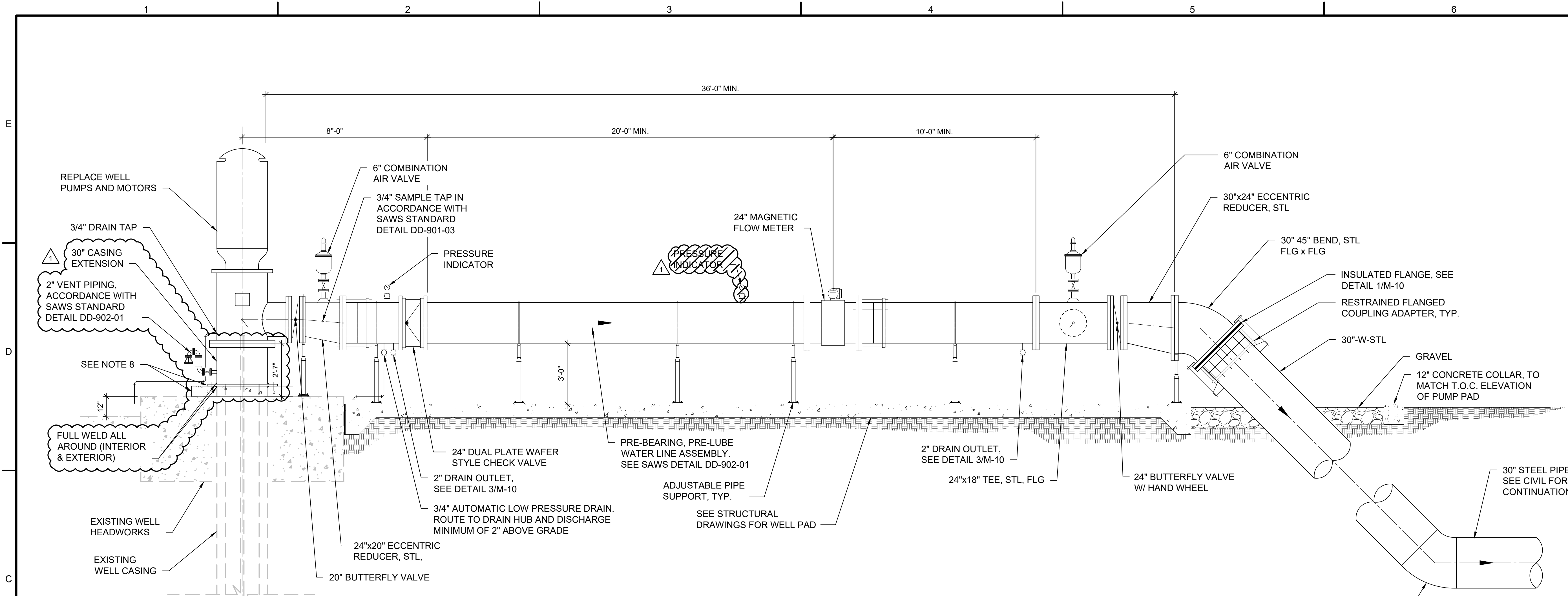
ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: R. JENKINS
DRAWN BY: J. RAY
CHECKED BY: R. JENKINS

SHEET TITLE:
MECHANICAL

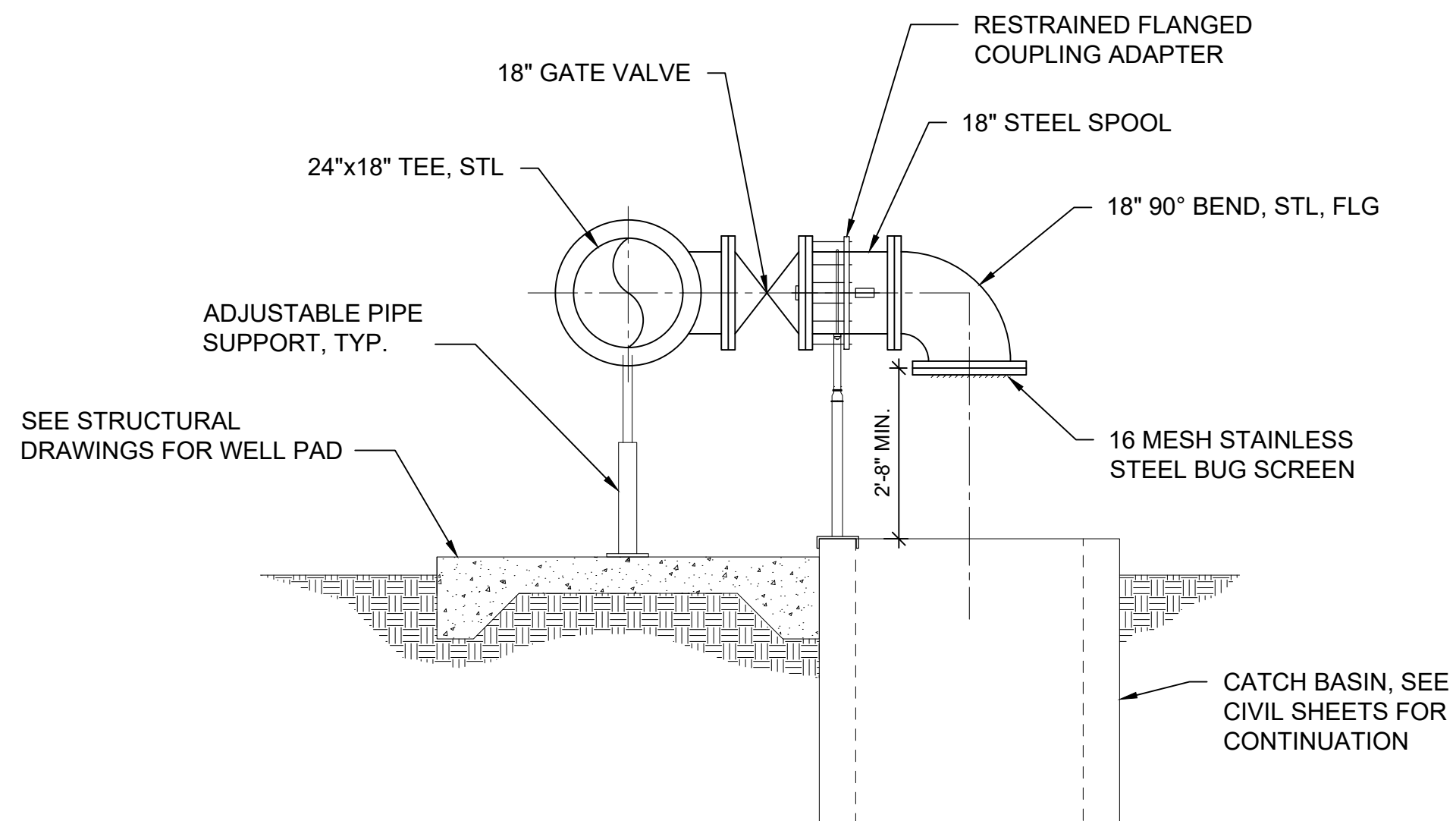
WELL PIPING
SECTIONS

SCALE:
AS SHOWN

DRAWING NO.: **M-04**
SHEET NO.: 40 OF 193



1 WELL SECTION
M-03
SCALE IN FEET



2 WELL FLUSH SECTION
M-03
SCALE IN FEET

- NOTES
- ALL PIPING SHALL BE RESTRAINED.
 - INSULATE ALL PIPING SMALLER THEN 4 INCHES IN ACCORDANCE WITH SPECIFICATIONS.
 - PAINT ALL EXPOSED PIPING BOTH NEW AND EXISTING IN ACCORDANCE WITH SPECIFICATIONS.
 - BLOWOFF PIPING AND CATCH BASIN ORIENTATION VARIES PER SITE LOCATION. REFER TO CIVIL DRAWINGS FOR ORIENTATION.
 - LOCATION AND QUANTITY OF PIPE SUPPORTS TO BE DETERMINED BY CONTRACTOR PER SPECIFICATIONS. PROVIDE PIPE SUPPORT IMMEDIATELY DOWNSTREAM OF PUMP DISCHARGE HEAD.
 - INSTALL WEED BARRIER BELOW GRAVEL COLLAR.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING PUMP BASE DOES NOT OBSTRUCT WELL CASING VENT.
 - PROVIDE NEW SOLEPLATE AND PUMP BASE IN ACCORDANCE WITH SPECIFICATIONS AND MANUFACTURER'S RECOMMENDATION.
 - REFER TO SAWS STANDARD DETAIL DD-902-01 FOR REFERENCE.

SEALS:

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
1	9/18/23	ADDENDUM NO. 6	RS

STATUS:
BID SET SUBMITTAL

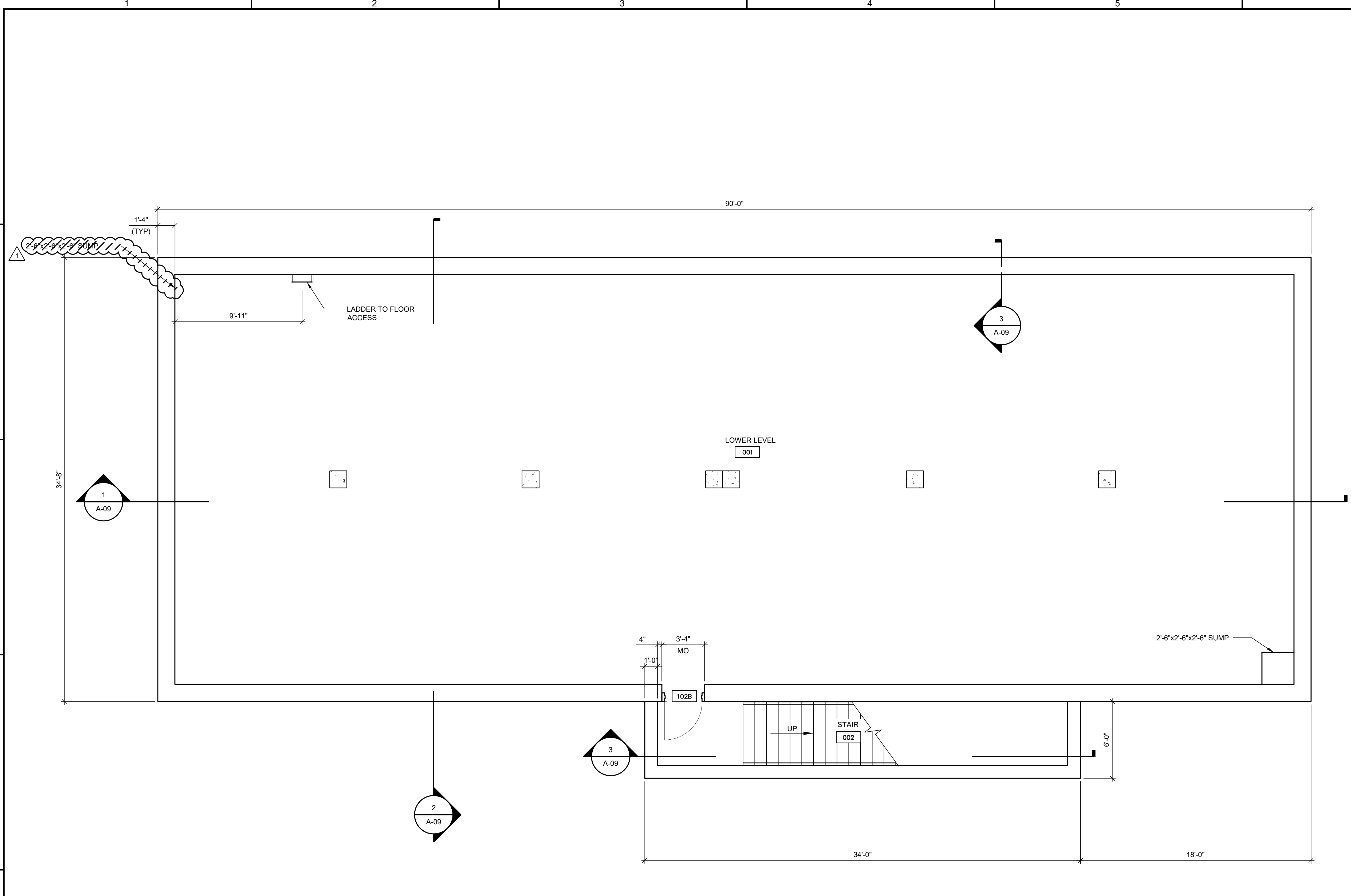
ARCADIS
PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: R. SMALLWOOD
DRAWN BY: J. RAY
CHECKED BY: D. SABLITNY

SHEET TITLE:
ARCHITECTURAL

ELECTRICAL BUILDING
LOWER PLAN

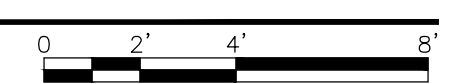
SCALE:
AS SHOWN

DRAWING NO.: A-05
SHEET NO.: 54 OF 193



LOWER FLOOR PLAN

SCALE: 1/4" = 1'-0"



GENERAL ARCHITECTURAL NOTES:

1. ALL ELEVATIONS SHALL BE COORDINATED WITH CIVIL DRAWINGS.
2. REFERENCE A-02 FOR HANDRAIL AND RAILING DETAILS.

SEALS:



SAN ANTONIO WATER SYSTEM



MARBACH PUMP STATION IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
1	9/18/23	ADDENDUM NO. 6	RS

STATUS: **BID SET SUBMITTAL**

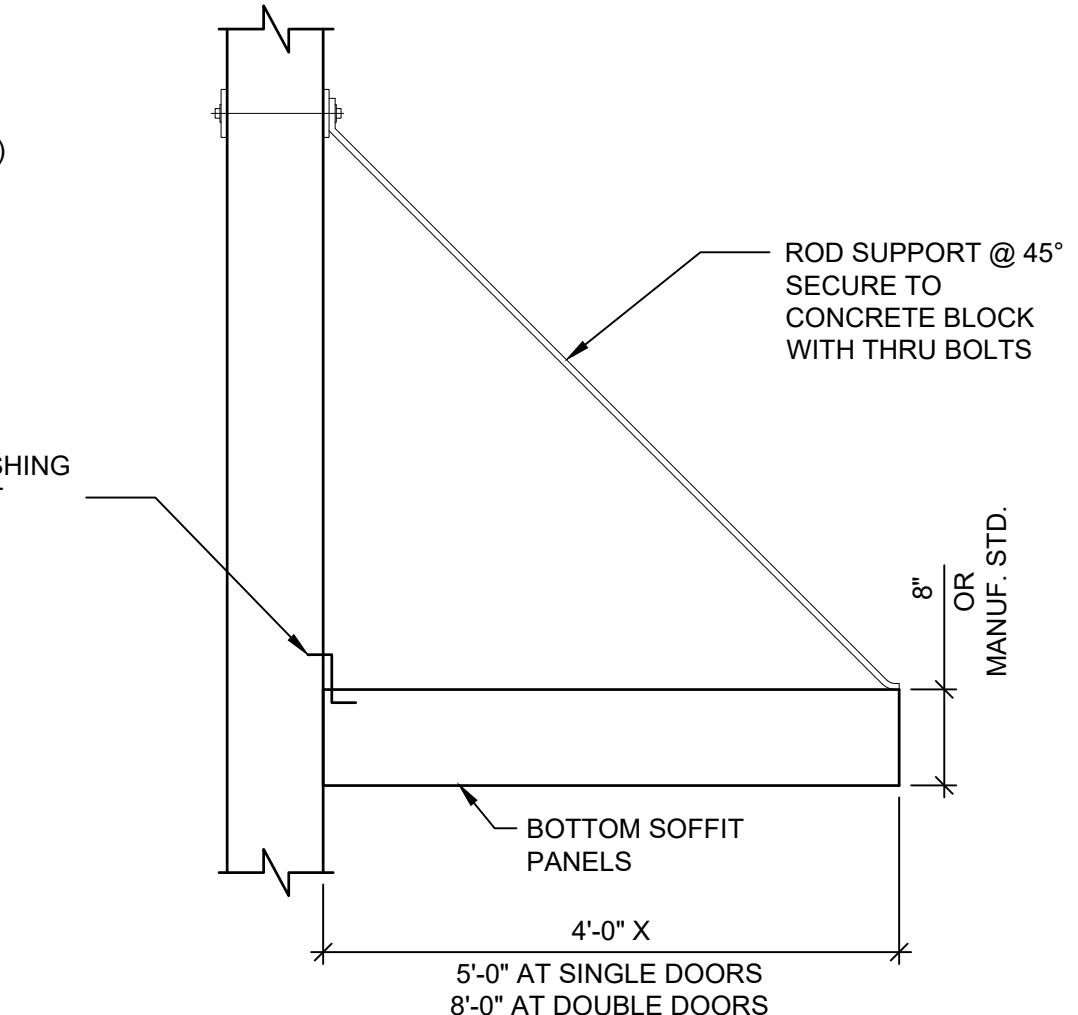
ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: R. SMALLWOOD
DRAWN BY: J. RAY
CHECKED BY: D. SABLOTNY

SHEET TITLE: ARCHITECTURAL

ELECTRICAL BUILDING ELEVATIONS

SCALE: AS SHOWN
1" = 1'-0"

DRAWING NO.: A-07
SHEET NO.: 56 OF 193

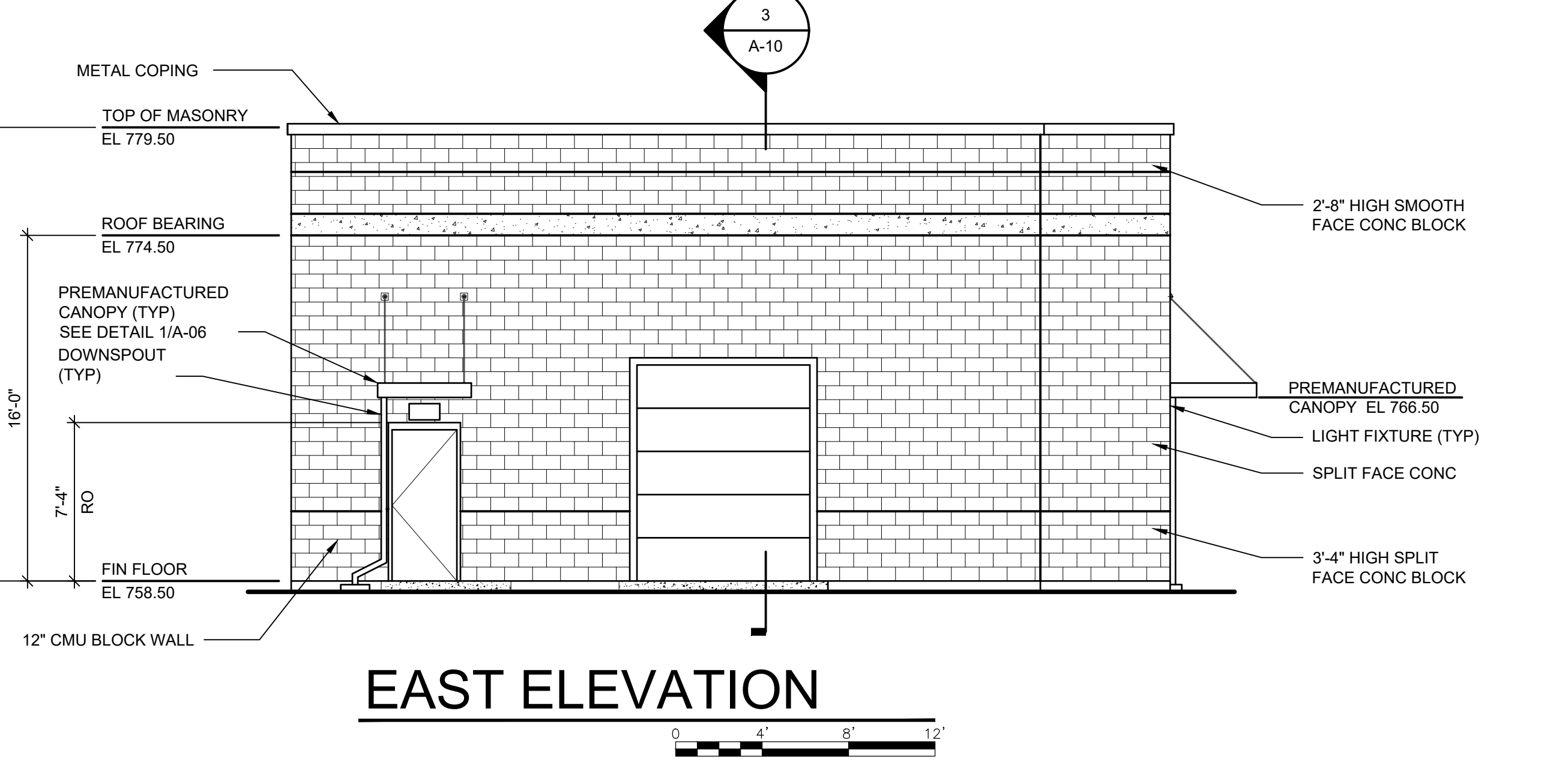
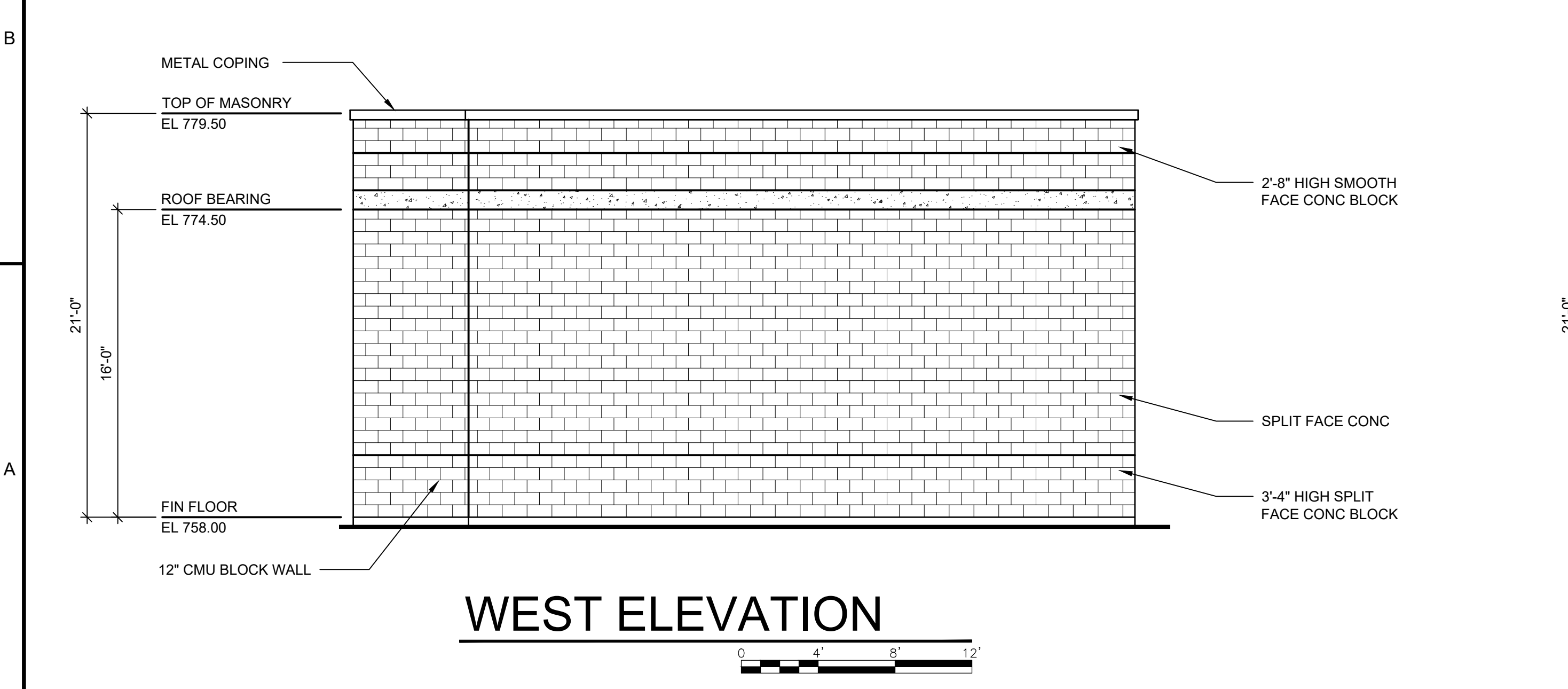
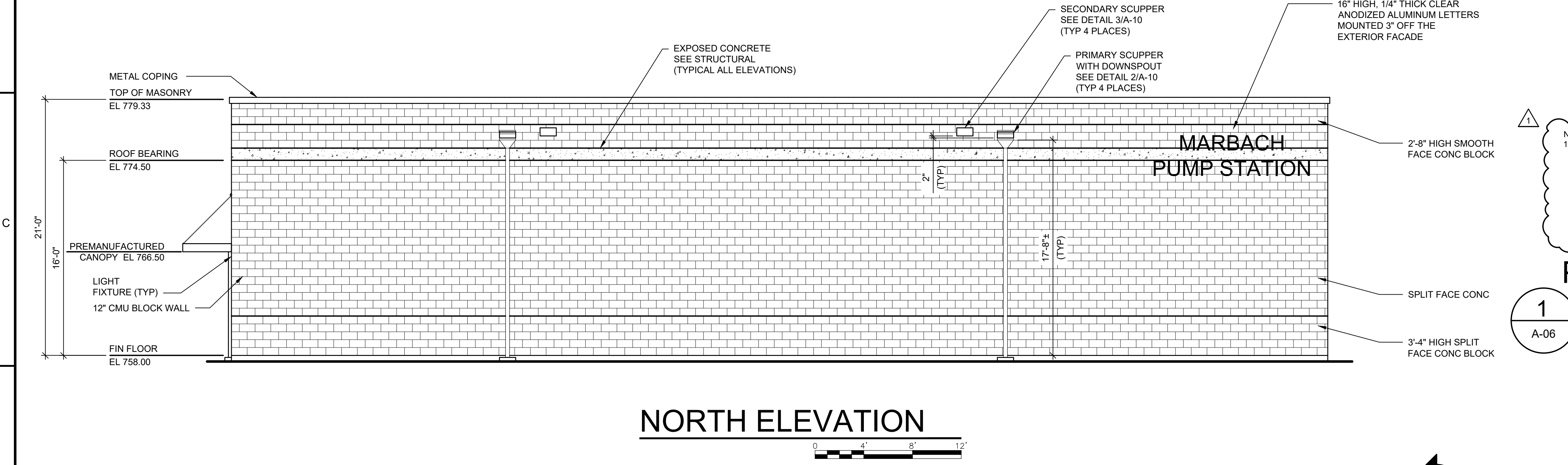
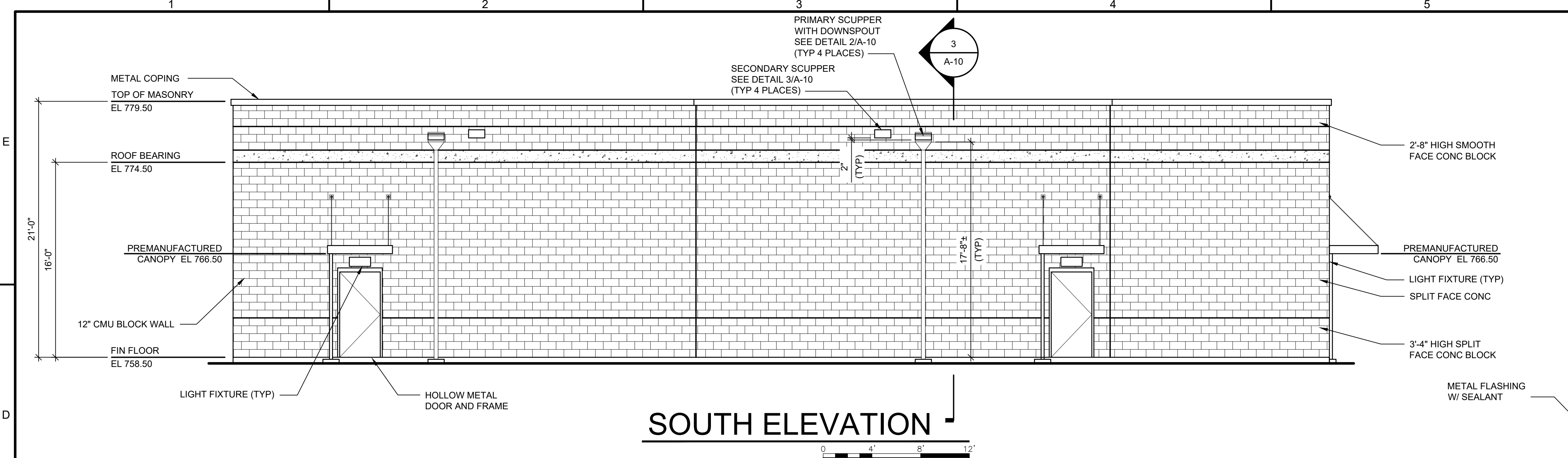


NOTE:
1. CANOPY SHALL BE BY MITCHELL METALS WWW.MITCHELLMETALS.NET. CANOPY SHALL BE ALUMINUM OVERHEAD SUPPORTED WITH ROUND RODS ATTACHED TO THE BUILDING. CANOPY SHALL USE PERIMETER EXTRUDED GUTTER AND EXTRUDED DECKING RUNNING PERPENDICULAR TO THE BUILDING. CANOPY SHALL BE SECURED TO THE WALL USING ROUND (3/4" MIN) RODS. CANOPY SHALL DRAIN FROM THE DECKING TO THE PERIMETER GUTTER AND DISCHARGE FROM THE BOTTOM OF THE GUTTER OUT OF A DRAIN SCUPPER.

PREMANUFACTURED CANOPY

1
A-06

SCALE: 3/4" = 1'-0"



ROOM FINISH SCHEDULE																				
ROOM NO	ROOM NAME	FLOOR	BASE	WALLS												CEILING		NOTES		
				N			S			E			W			MATL	FIN		CLR	HEIGHT
				MATL	FIN	CLR	MATL	FIN	CLR	MATL	FIN	CLR	MATL	FIN	CLR					
101	ELECTRICAL ROOM	A	CONC BLCK	C	P2	1	C	P2	1	C	P2	1	C	P2	1	D	P0	-	16'-0"	
102	STAIRS	A	CONC BLCK	C	P2	1	C	P2	1	C	P2	1	C	P2	1	D	P0	-	16'-0"	
103	SECURITY ROOM	A	CONC BLCK	C	P2	1	C	P2	1	C	P2	1	C	P2	1	D	P0	-	16'-0"	
001	LOWER LEVEL	A	CONC	B	P0	-	B	-	-	B	-	-	B	-	-	B	P0	-	10'-4"	
002	STAIRS	A	CONC	B	P0	-	C	-	-	C	-	-	C	-	-	D	P0	-	16'-0"	CMU IN STAIRS UPPER LEVEL TO BE PAINTED-SEE 3/A-04

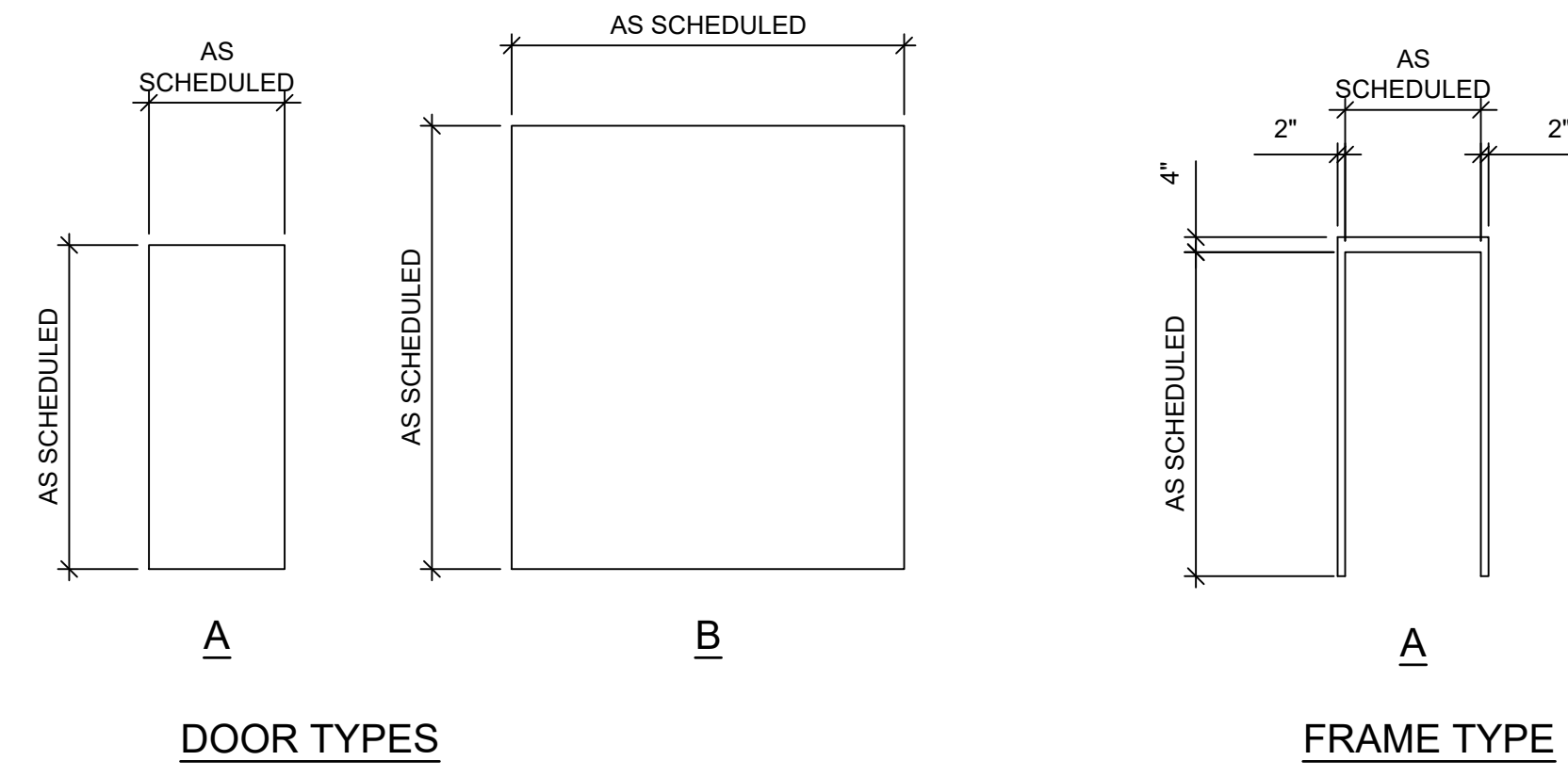
MATERIAL KEY	
A	CONCRETE WITH HARDENER
B	CONCRETE
C	CONCRETE BLOCK
D	PRECAST CONCRETE PLANK
E	CHEMICAL RESISTANT CONC TOPPING

FINISH KEY	
P0	NOT PAINTED
P1	PAINTED, SEMI-GLOSS
P2	PAINTED, FLAT
P4	PAINTED, GLOSS

COLOR KEY	
1	"SW 4013 - "BALLAST BEIGE"
2	TO BE SELECTED AFTER AWARD OF CONTRACT BY OWNER
3	NO COLOR

* THIS COLOR ON INTERIOR ONLY. SEE A-06, TYPICAL ELEVATION, FOR EXTERIOR COLORS.

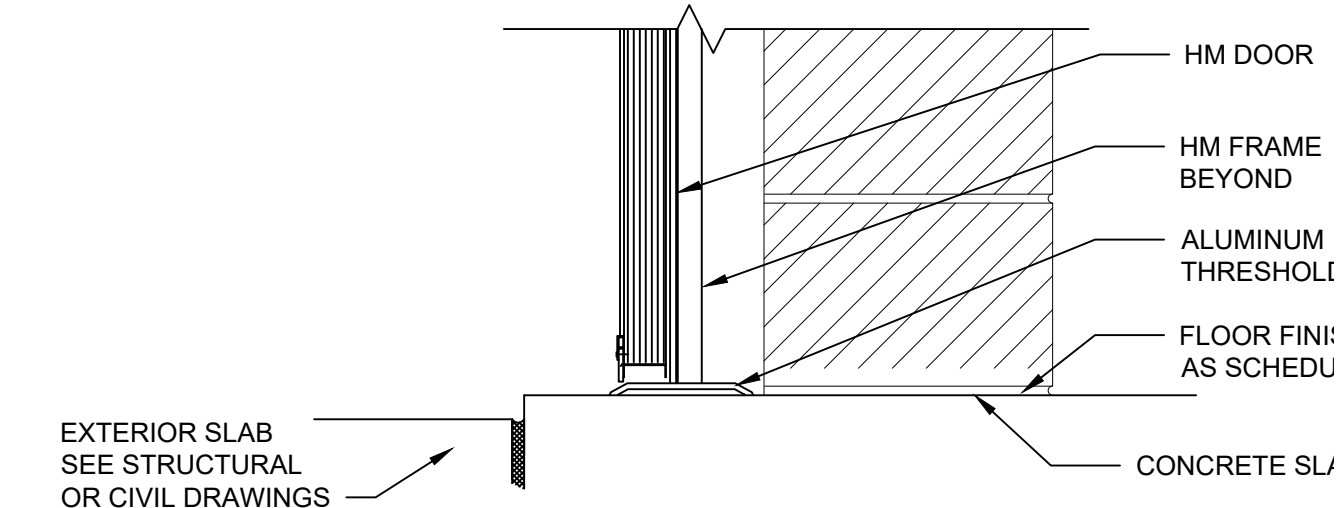
NOTES:
1. INTERIOR WALLS TO BE STANDARD CONCRETE BLOCK WITH NO INTEGRAL COLOR AND WILL BE PAINTED.



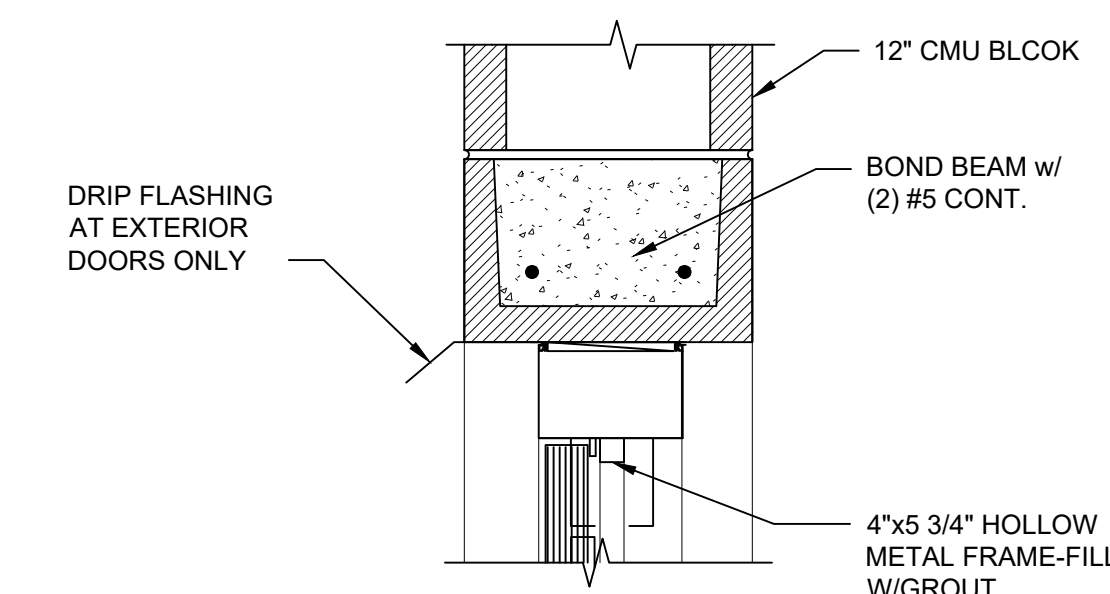
DOOR SCHEDULE															
ROOM NO.	DOOR NO.	SIZE			MATL	FRAME		DETAIL			DOOR TYPE	HDW SET	HDW SET	FIRE RATING	REMARKS
		WDT	HT	THK		MATL	FINISH	HEAD	JAMB	SILL					
101	101A	3'-0"	7'-0"	1 3/4"	HM	HM	P	H2	J2		A	A	1		
101	101B	8'-0"	10'-0"	---	STL	STL	P	H3	J2	S1	B	---	---		
101	101C	3'-0"	7'-0"	1 3/4"	HM	HM	P	H1	J1		A	A	2	45 MIN	
102	102A	3'-0"	7'-0"	1 3/4"	HM	HM	P	H2	J2	S1	A	A	1		
103	103A	3'-0"	7'-0"	1 3/4"	HM	HM	P	H1	J1		A	A	2	45 MIN	
103	103B	3'-0"	7'-0"	1 3/4"	HM	HM	P	H2	J2	S1	A	A	1		
002	102B	3'-0"	7'-0"	1 3/4"	HM	HM	P	H1	J1		A	A	1	45 MIN	

NOTES:
DOOR AND DOOR FRAME PAINT COLOR TO BE SW 4003 "PALLET TAN"

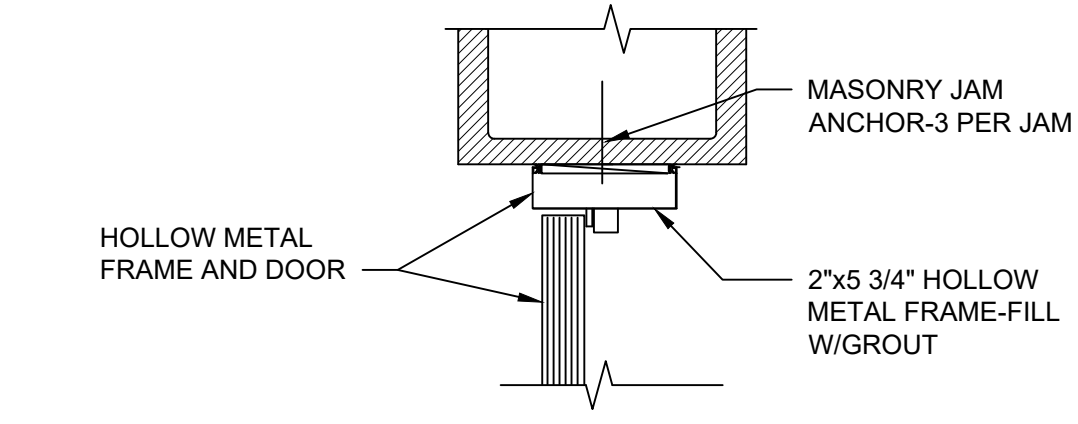
* REFERENCE SPECIFICATION SECTION 08 71 00, DOOR HARDWARE FOR HDW SET SPECIFICS.



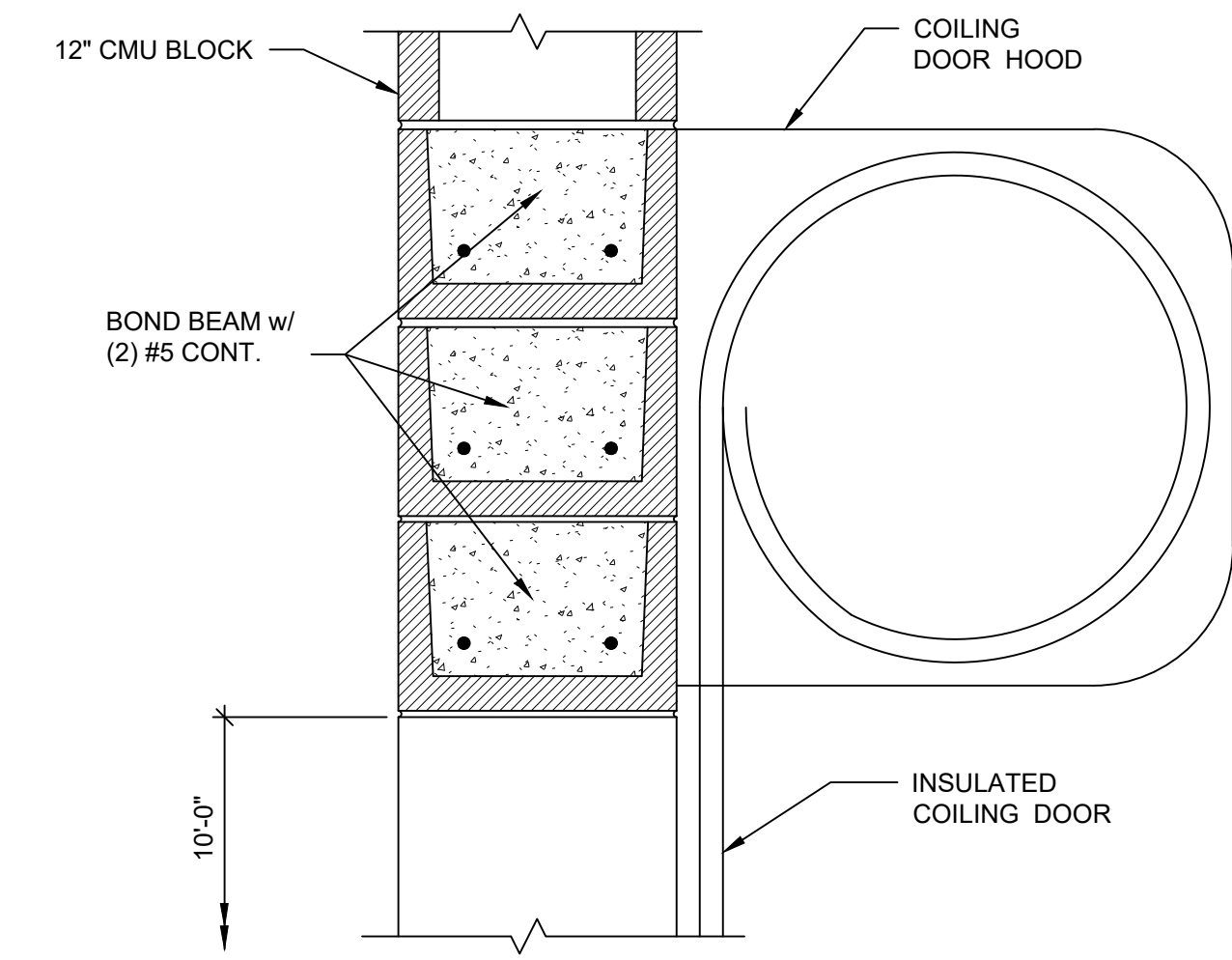
SILL DETAIL S1
SCALE: 1 1/2" = 1'-0"



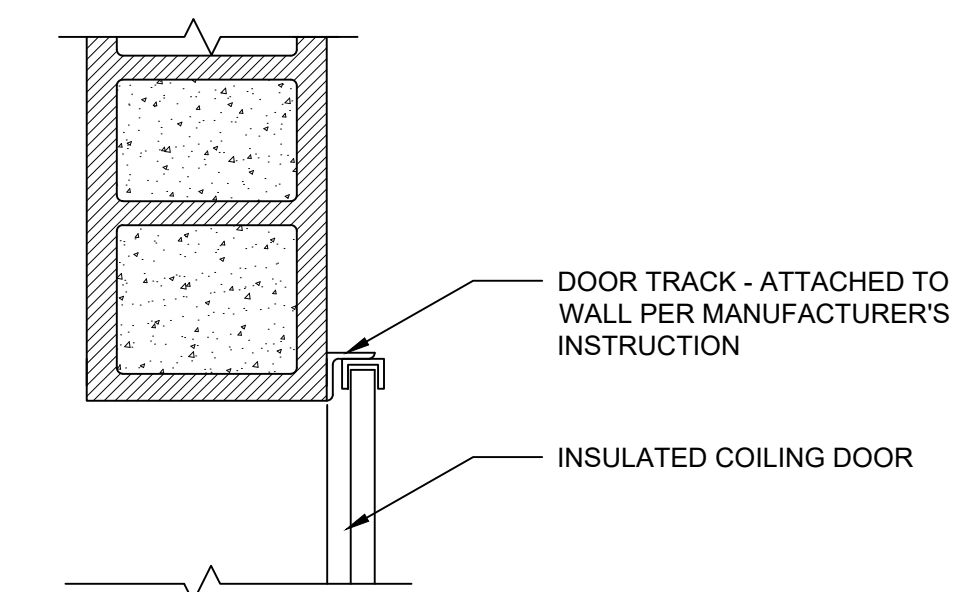
HEAD DETAIL H1
SCALE: 1 1/2" = 1'-0"



JAMB DETAIL J1
SCALE: 1 1/2" = 1'-0"



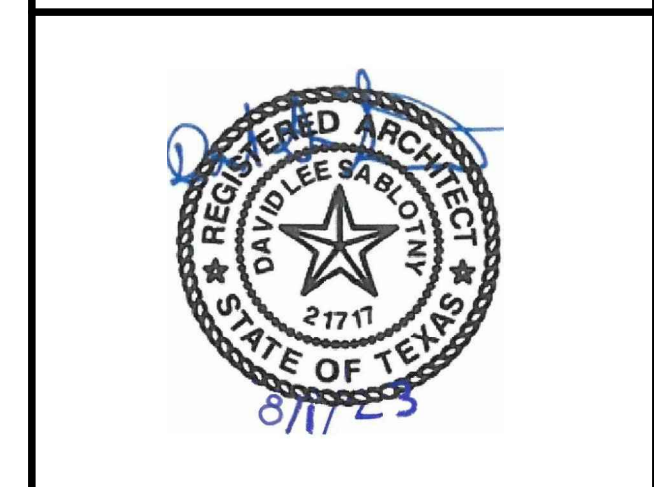
HEAD DETAIL H3
SCALE: 1 1/2" = 1'-0"



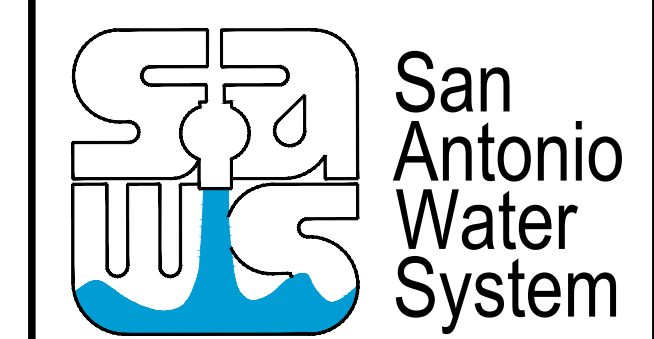
JAMB DETAIL J3
SCALE: 1 1/2" = 1'-0"



ARCADIS U.S., INC.
TBPE FIRM REGISTRATION NO.: F-533



SAN ANTONIO WATER SYSTEM



MARBACH PUMP STATION IMPROVEMENTS PROJECT

REVISIONS			
NO.	DATE	ISSUED FOR	BY
1	9/18/23	ADDENDUM NO. 6	RS

STATUS:
BID SET SUBMITTAL

ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: R. SMALLWOOD
DRAWN BY: J. RAY
CHECKED BY: D. SABLTONY

SHEET TITLE:
ARCHITECTURAL

ROOM FINISH SCHEDULE AND DOOR SCHEDULE AND DETAILS

SCALE:
AS SHOWN
1" BAR IS ONE INCH ON UNREDUCED DRAWING

DRAWING NO.: A-08
SHEET NO.: 57 OF 193

SEALS:

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
1	8/2023	ADDENDUM 6	SH

STATUS:

BID SET SUBMITTAL

ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: H. HOBI
DRAWN BY: J. RAY
CHECKED BY: C. GALLO

SHEET TITLE:

STRUCTURAL

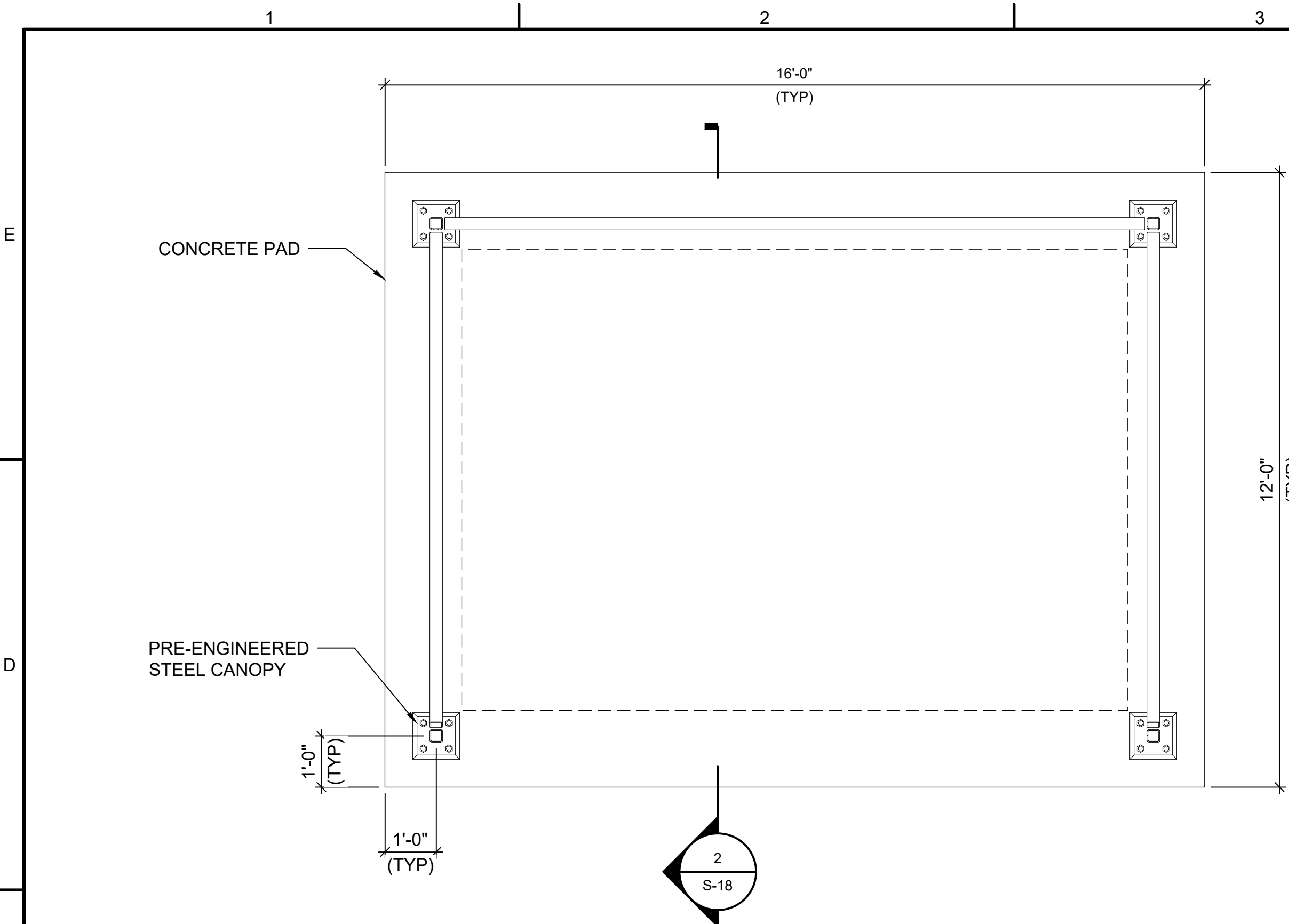
TYPICAL CANOPY
FOUNDATION AND
ELECTRICAL EQUIPMENT
SUPPORT DETAIL

SCALE: AS SHOWN
1" BAR IS ONE INCH ON UNREDUCED DRAWING

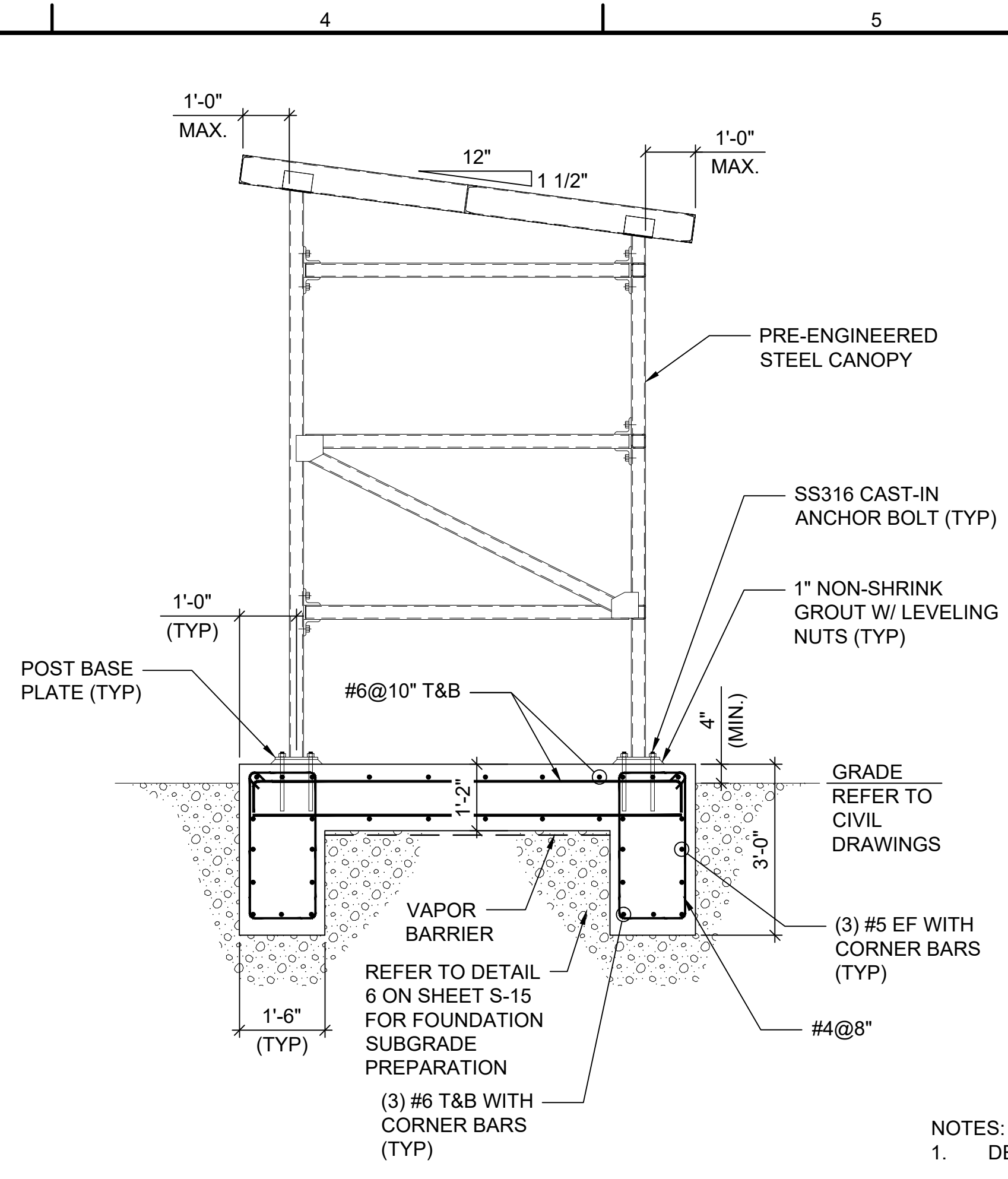
DRAWING NO. S-18
SHEET NO. 33 OF 193

NOTES:

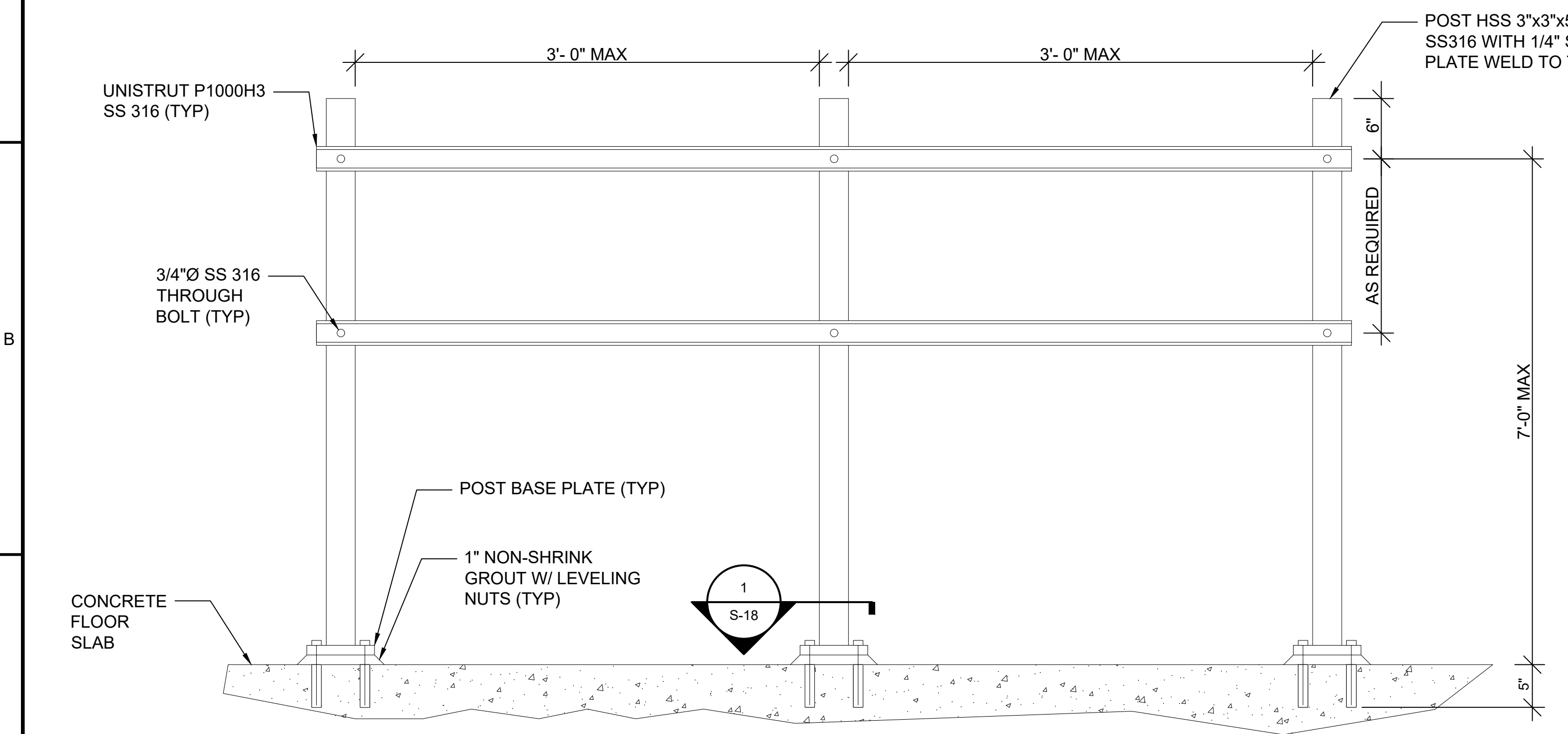
- DESIGN LIVE LOAD: 300 PSF
- ALLOWABLE SOIL BEARING CAPACITY: 2500 PSF.
- REFER TO CIVIL DRAWING FOR LOCATION AND ELEVATION OF PAD.
- FOR OVER EXCAVATION AND FOUNDATION PREPARATION REFER TO SHEET S-15 DETAIL 6.
- EQUIPMENT ANCHORAGE DESIGN IS THE RESPONSIBILITY OF THE CONTRACTOR. PROVIDE REQUIRED EDGE DISTANCE FOR ANCHORAGE. EDGE DISTANCE SHALL BE SUFFICIENT TO RESIST SHEAR AND UPLIFT ON ANCHOR BOLTS.
- CONTRACTOR SHALL PROVIDE EQUIPMENT ANCHORAGE SHOP DRAWINGS AND DESIGN CALCULATIONS SIGNED AND SEALED BY PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TEXAS.
- REFERENCE SPECIFICATION 10 73 16 STEEL CANOPY FOR ADDITIONAL CANOPY INFORMATION.
- REFERENCE ELECTRICAL DRAWINGS FOR ELECTRICAL EQUIPMENT LOCATION.



**OUTDOOR ELECTRICAL EQUIPMENT
STEEL CANOPY FOUNDATION PLAN**
SCALE: 1/2" = 1'-0"

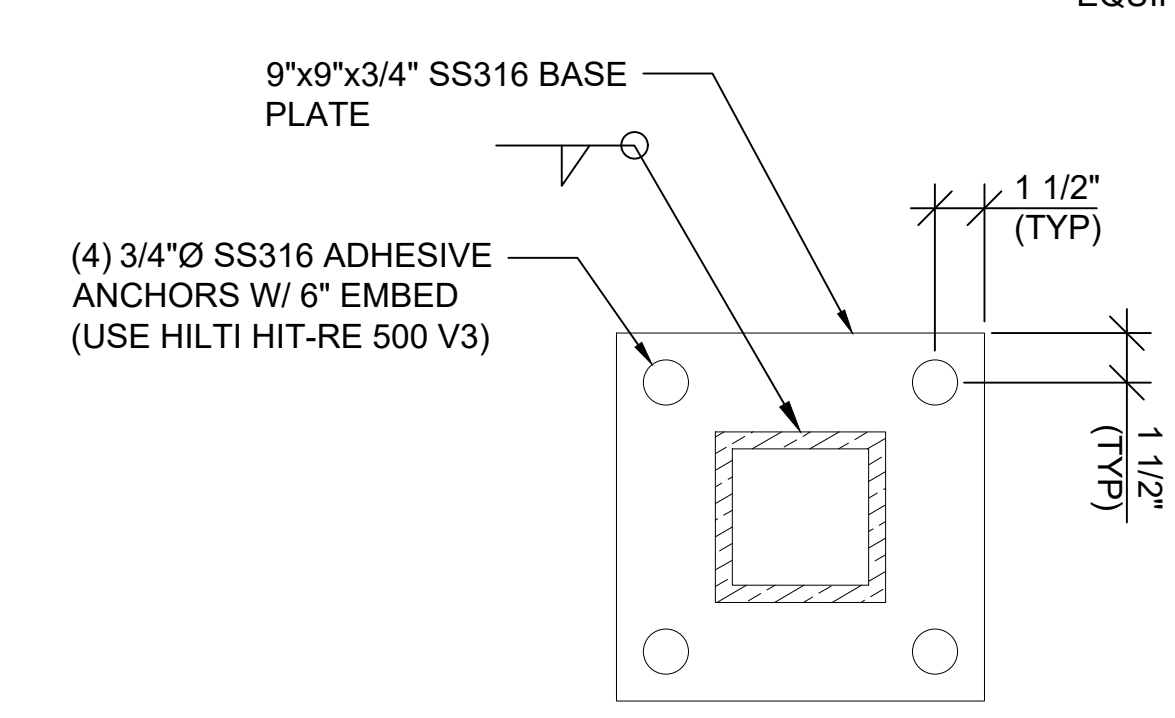


2 SECTION
S-18 NOT TO SCALE



ELECTRICAL RACK SUPPORT DETAIL
NOT TO SCALE

NOTE: ADDITIONAL POSTS CAN BE ADDED AS NEEDED TO INCREASE THE LENGTH OF THE EQUIPMENT RACK.



1 SECTION
S-18 NOT TO SCALE

SEALS:

GAI

CONSULTING ENGINEERING
Registration No. F-2593
13117 Neatons Road
Dallas, Texas 75244
Tel: 972-490-7661
Fax: 972-490-7125
email: vkg@gaiconsulting.com

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
1	09/22/23	ADDENDUM NO.6	VKG

STATUS:

BID SET SUBMITTAL

ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: M. AGGARWAL
DRAWN BY: E. MCCLEARY
CHECKED BY: V.K. GUPTA

SHEET TITLE:

ELECTRICAL

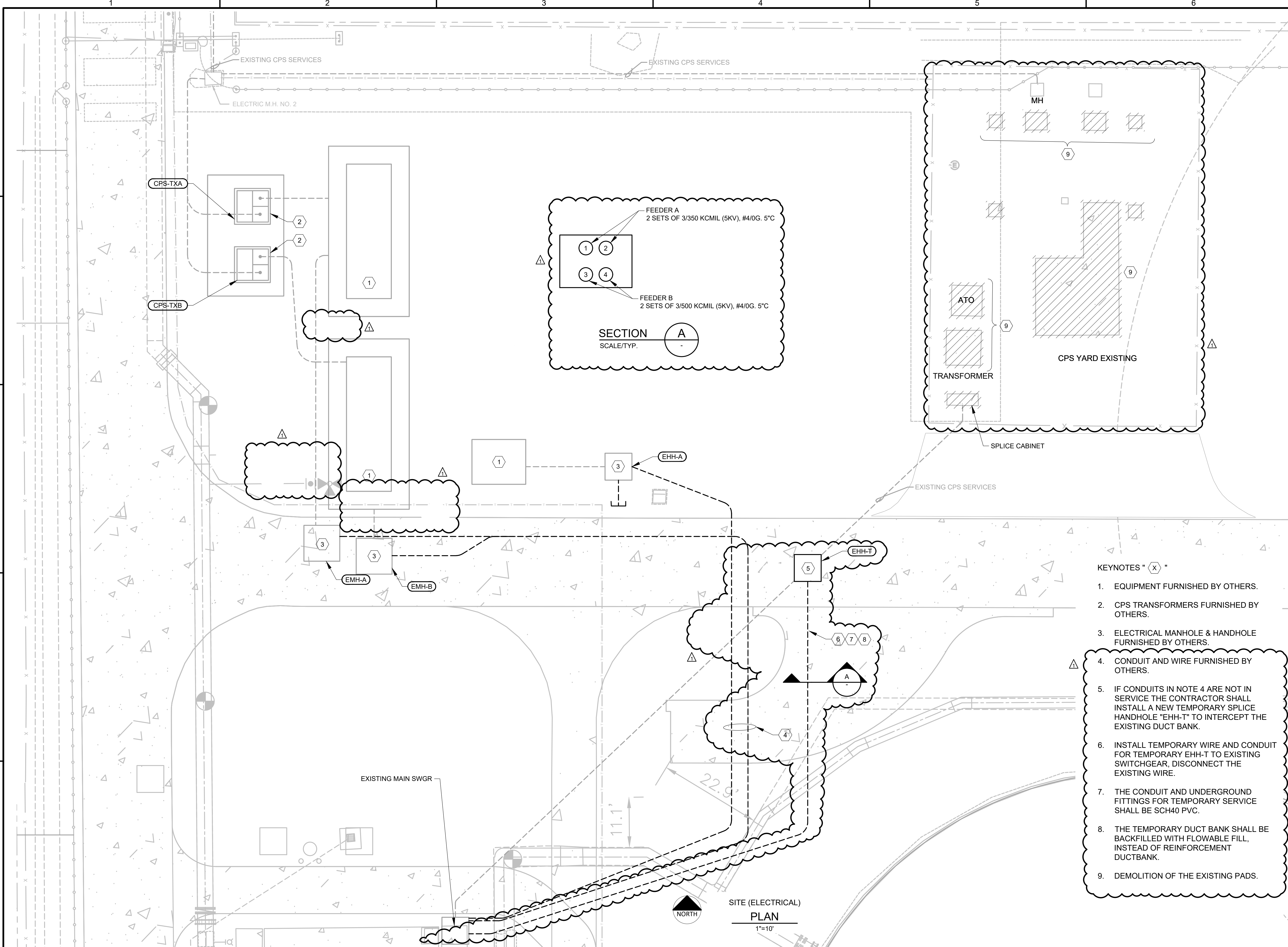
PARTIAL ENLARGED
SITE PLAN
TEMPORARY POWER

SCALE:
AS SHOWN

BAR IS ONE INCH ON UNREDUCED DRAWING

DRAWING NO.: E-4B

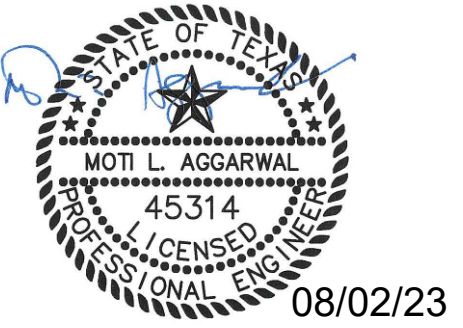
SHEET NO.: 90 OF 193



- KEYNOTES " (X) "
- EQUIPMENT FURNISHED BY OTHERS.
 - CPS TRANSFORMERS FURNISHED BY OTHERS.
 - ELECTRICAL MANHOLE & HANDHOLE FURNISHED BY OTHERS.
 - CONDUIT AND WIRE FURNISHED BY OTHERS.
 - IF CONDUITS IN NOTE 4 ARE NOT IN SERVICE THE CONTRACTOR SHALL INSTALL A NEW TEMPORARY SPLICE HANDHOLE "EHH-T" TO INTERCEPT THE EXISTING DUCT BANK.
 - INSTALL TEMPORARY WIRE AND CONDUIT FOR TEMPORARY EHH-T TO EXISTING SWITCHGEAR, DISCONNECT THE EXISTING WIRE.
 - THE CONDUIT AND UNDERGROUND FITTINGS FOR TEMPORARY SERVICE SHALL BE SCH40 PVC.
 - THE TEMPORARY DUCT BANK SHALL BE BACKFILLED WITH FLOWABLE FILL, INSTEAD OF REINFORCEMENT DUCTBANK.
 - DEMOLITION OF THE EXISTING PADS.

GAI

CONSULTING ENGINEERING
Registration No. F-2593
13717 Neutron Road
Dallas, Texas 75244
Tel: 972-490-7661
Fax: 972-490-7125
email: vkg@gaiconsulting.com



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS			
NO.	DATE	ISSUED FOR	BY
1	09/22/23	ADDENDUM NO.6	VKG

STATUS:
BID SET SUBMITTAL

ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: M. AGGARWAL
DRAWN BY: E. MCCLEARY
CHECKED BY: V.K. GUPTA

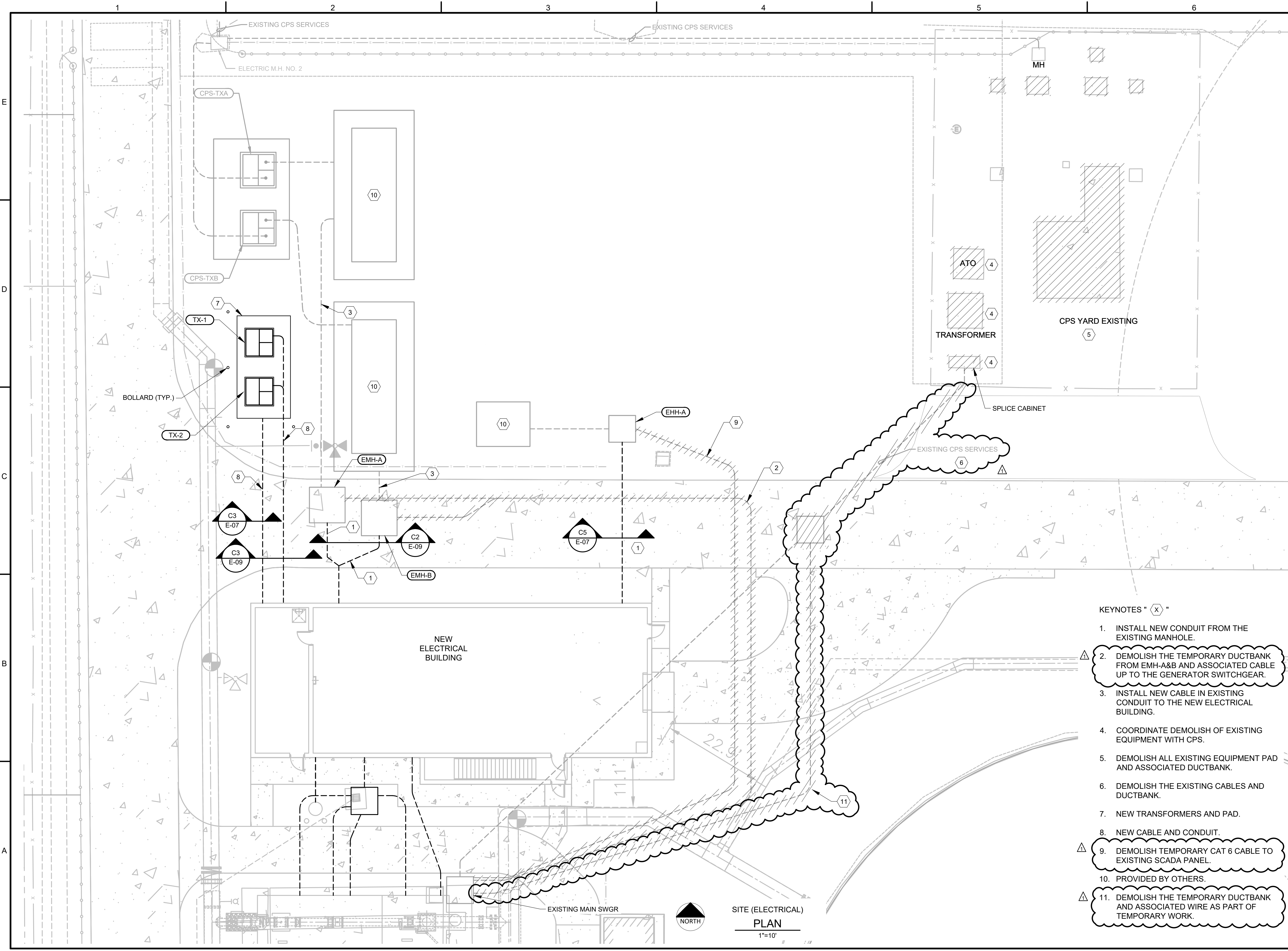
SHEET TITLE:
ELECTRICAL

PARTIAL ENLARGED
SITE PLAN
PERMANENT POWER

SCALE:
AS SHOWN

DRAWING NO.: E-4C

SHEET NO.: 91 OF 193



- KEYNOTES " X "
- INSTALL NEW CONDUIT FROM THE EXISTING MANHOLE.
 - DEMOLISH THE TEMPORARY DUCTBANK FROM EMH-A&B AND ASSOCIATED CABLE UP TO THE GENERATOR SWITCHGEAR.
 - INSTALL NEW CABLE IN EXISTING CONDUIT TO THE NEW ELECTRICAL BUILDING.
 - COORDINATE DEMOLISH OF EXISTING EQUIPMENT WITH CPS.
 - DEMOLISH ALL EXISTING EQUIPMENT PAD AND ASSOCIATED DUCTBANK.
 - DEMOLISH THE EXISTING CABLES AND DUCTBANK.
 - NEW TRANSFORMERS AND PAD.
 - NEW CABLE AND CONDUIT.
 - DEMOLISH TEMPORARY CAT 6 CABLE TO EXISTING SCADA PANEL.
 - PROVIDED BY OTHERS.
 - DEMOLISH THE TEMPORARY DUCTBANK AND ASSOCIATED WIRE AS PART OF TEMPORARY WORK.

SITE (ELECTRICAL)
PLAN
1"=10'

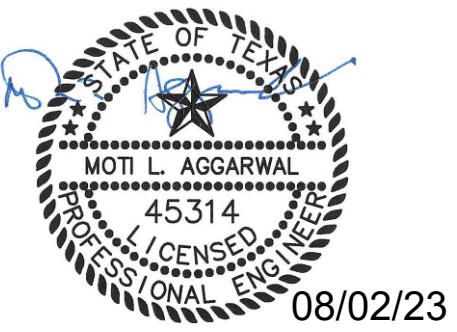


SEALS:

GAI

CONSULTING ENGINEERING
 Registration No. F-2593
 13717 Neutrom Road
 Dallas, Texas 75244
 Tel: 972-490-7661
 Fax: 972-490-7125
 email: vkg@gaiconsulting.com

SEALS:



SAN ANTONIO
 WATER SYSTEM



MARBACH PUMP STATION
 IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
Δ	09/22/23	ADDENDUM NO.6	VKG

STATUS:

BID SET SUBMITTAL

ARCADIS
 PROJECT NO.: 30041017
 DATE: AUGUST 2023
 DESIGNED BY: M. AGGARWAL
 DRAWN BY: E. MCCLEARY
 CHECKED BY: V.K. GUPTA

SHEET TITLE:

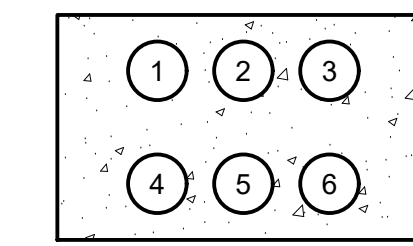
ELECTRICAL

**ELECTRICAL DUCTBANK
 SECTIONS - III**

SCALE:
 AS SHOWN
 1" = 1' (1" BAR IS ONE INCH ON UNREDUCED DRAWING)

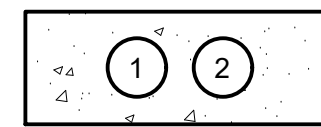
DRAWING NO.: **E-09**

SHEET NO.: 97 OF 193



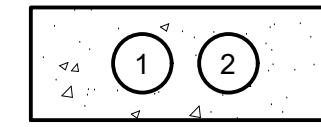
DUCTBANK
SECTION C4
 E-4C

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	TX1-P	4"C	480V POWER TO MCC-1
2	TX1-P	4"C	480V POWER TO MCC-1
3	TX2-P	4"C	480V POWER TO MCC-1
4	TX2-P	4"C	480V POWER TO MCC-1
5	SPARE	4"C	SPARE
6	SPARE	4"C	SPARE



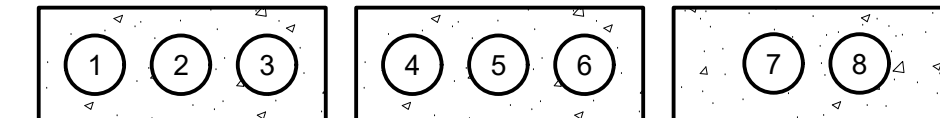
DUCTBANK
SECTION B4
 E-14

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	HSP4-P	4"C	4160V POWER TO HSP4
2	HSP5-P	4"C	4160V PWOER TO HSP5



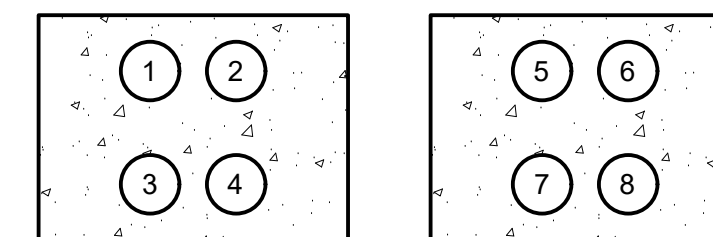
DUCTBANK
SECTION B5
 E-14

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	HSP4-A	3"C	RTD SIGNAL TO HSP4
2	HSP5-A	3"C	RTD SIGNAL TO HSP5



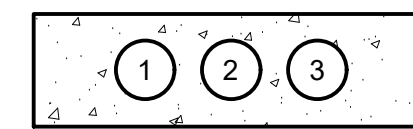
DUCTBANK
SECTION B6
 E-14

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	MC1-7BP, LA-70,72,74	2"C	480 AND 120V TO HSP4
2	MC1-6AP, LA-44,46,48	2"C	480 AND 120V TO HSP5
3	SPARE	2"C	SPARE
4	HSP4-C, HSP4-C1, SCP-132	2"C	CONTROL WIRES FROM HSP4 & VALVE
5	HSP5-C, HSP5-C1, SCP-135, SCP-142	2"C	CONTROL WIRES FROM HSP5 & VALVE
6	SPARE	2"C	SPARE
7	SCP-133, 143	2"C	FLOW FOR HSP4 & 5
8	SPARE	2"C	SPARE



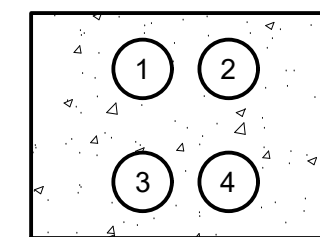
DUCTBANK
SECTION C2
 E-4C

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	SWGR-P1	5"C	4160V POWER FROM GEN. SWITCHGEAR
2	SWGR-P1	5"C	4160V POWER FROM GEN. SWITCHGEAR
3	SWGR-P1	5"C	SPARE
4	SWGR-P1	5"C	SPARE
5	SWGR-P2	5"C	4160V POWER FROM GEN. SWITCHGEAR
6	SWGR-P2	5"C	4160V POWER FROM GEN. SWITCHGEAR
7	SWGR-P2	5"C	SPARE
8	SWGR-P2	5"C	SPARE



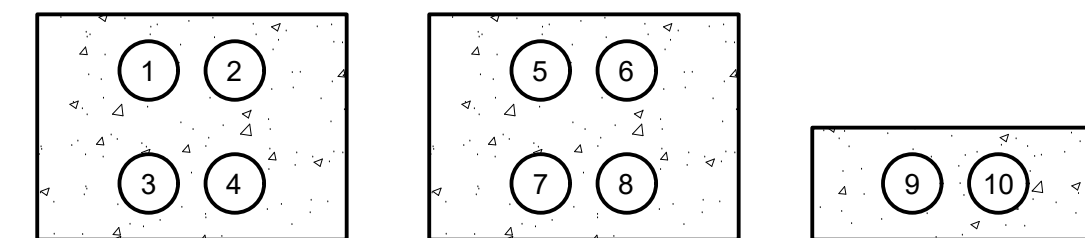
DUCTBANK
SECTION B1
 E-14

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	HSP1-P	4"C	4160V POWER TO HSP1
2	HSP2-P	4"C	4160V PWOER TO HSP2
3	HSP3-P	4"C	4160V PWOER TO HSP3



DUCTBANK
SECTION B2
 E-14

CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	HSP1-A	3"C	RTD SIGNAL TO HSP1
2	HSP2-A	3"C	RTD SIGNAL TO HSP2
3	HSP3-A	3"C	RTD SIGNAL TO HSP3



DUCTBANK
SECTION B3
 E-14

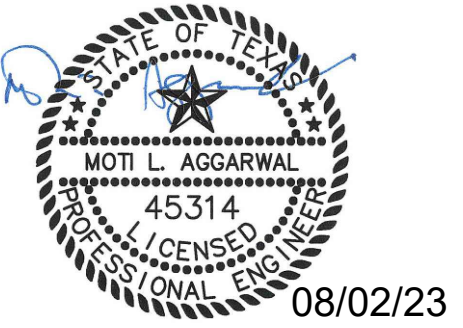
CONDUIT NO.	CONDUIT TAG	CONDUIT SIZE	DESCRIPTION
1	MC1-5AP, LA-61,63,65	2"C	480 AND 120V TO HSP1
2	MC1-4BP, LA-67,69,71	2"C	480 AND 120V TO HSP2
3	MC1-5BP, LA-64,66,68	2"C	480 AND 120V TO HSP3
4	SPARE	2"C	SPARE
5	HSP1-C, HSP1-C1, SCP-102	2"C	CONTROL WIRES FROM HSP1 & VALVE
6	HSP2-C, HSP2-C1, SCP-112	2"C	CONTROL WIRES FROM HSP2 & VALVE
7	HSP3-C, HSP3-C1, SCP-122	2"C	CONTROL WIRES FROM HSP3 & VALVE
8	SPARE	2"C	SPARE
9	SCP-103,113,123,134	2"C	FLOW FOR HSP1,2 & 3 AND PRESSURE
10	SPARE	2"C	SPARE

SEALS:

GAI

CONSULTING ENGINEERING
Registration No. F-2593
13117 Neatons Road
Dallas, Texas 75244
Tel: 972-490-7661
Fax: 972-490-7125
email: vkg@gaiconsulting.com

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS				
NO.	DATE	ISSUED FOR	BY	
Δ	09/22/23	ADDENDUM NO.6	VKG	

STATUS:
BID SET SUBMITTAL

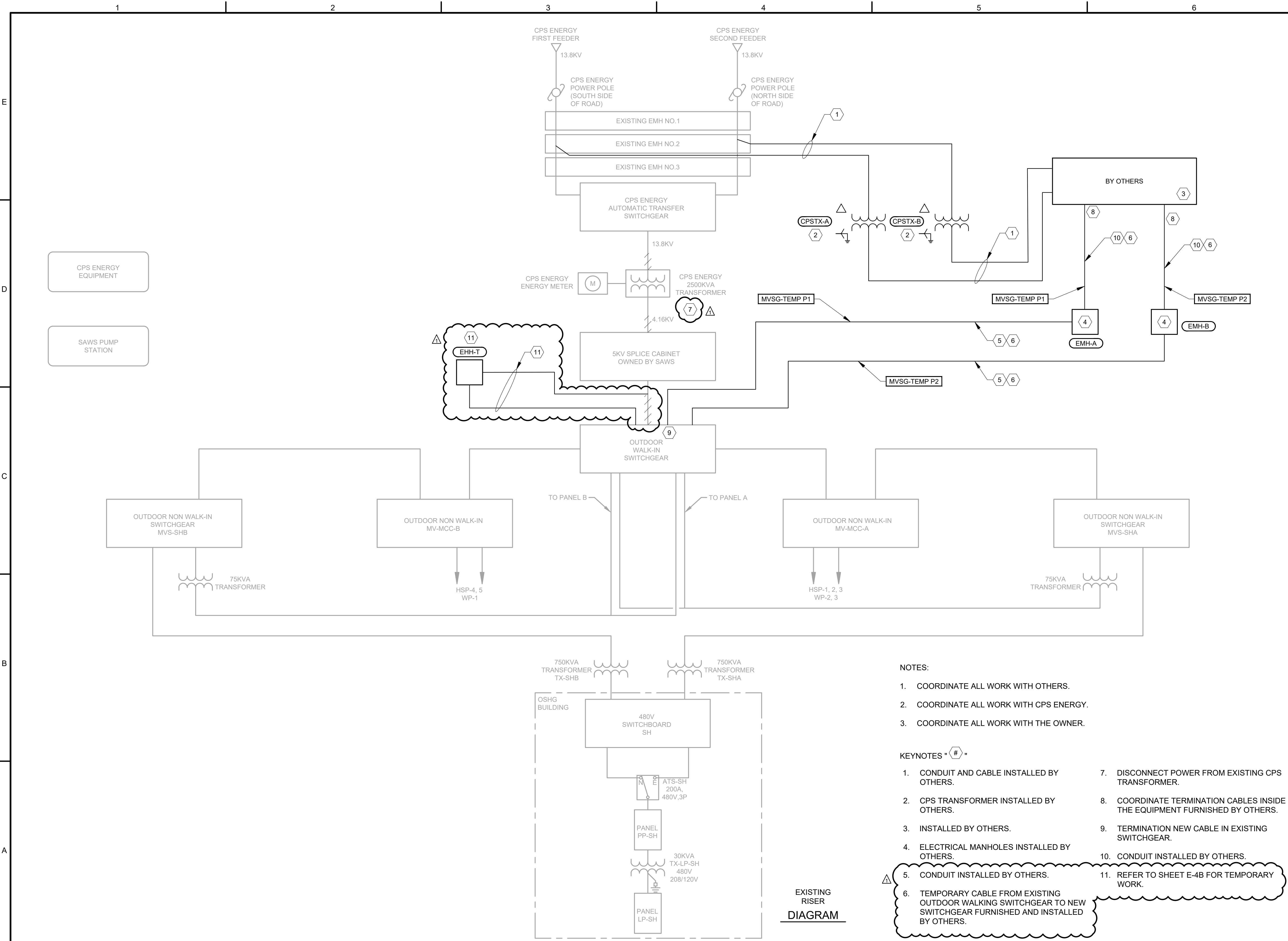
ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: M. AGGARWAL
DRAWN BY: E. MCCLEARY
CHECKED BY: V.K. GUPTA

SHEET TITLE:
ELECTRICAL

**EXISTING RISER DIAGRAM
TEMPORARY**

SCALE:
NO SCALE

DRAWING NO.: EA-3
SHEET NO.: 110 OF 193



- NOTES:**
- COORDINATE ALL WORK WITH OTHERS.
 - COORDINATE ALL WORK WITH CPS ENERGY.
 - COORDINATE ALL WORK WITH THE OWNER.
- KEYNOTES " # "**
- | | |
|--|--|
| 1. CONDUIT AND CABLE INSTALLED BY OTHERS. | 7. DISCONNECT POWER FROM EXISTING CPS TRANSFORMER. |
| 2. CPS TRANSFORMER INSTALLED BY OTHERS. | 8. COORDINATE TERMINATION CABLES INSIDE THE EQUIPMENT FURNISHED BY OTHERS. |
| 3. INSTALLED BY OTHERS. | 9. TERMINATION NEW CABLE IN EXISTING SWITCHGEAR. |
| 4. ELECTRICAL MANHOLES INSTALLED BY OTHERS. | 10. CONDUIT INSTALLED BY OTHERS. |
| 5. CONDUIT INSTALLED BY OTHERS. | 11. REFER TO SHEET E-4B FOR TEMPORARY WORK. |
| 6. TEMPORARY CABLE FROM EXISTING OUTDOOR WALKING SWITCHGEAR TO NEW SWITCHGEAR FURNISHED AND INSTALLED BY OTHERS. | |

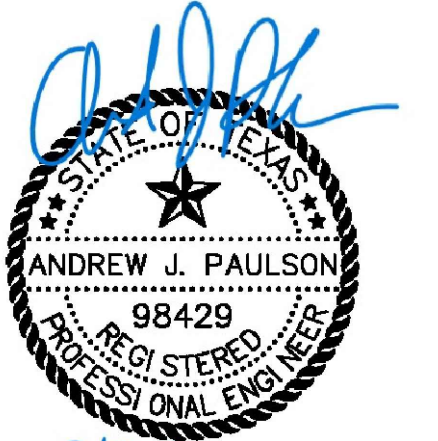
**EXISTING
RISER
DIAGRAM**

SEALS:



17950 Preston Road, Suite 300
Dallas, Texas 75252
TBPELS Firm Registration No. F-14711
www.signature-automation.com
Phone 469-619-1241
Fax 469-619-1242

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS			
NO.	DATE	ISSUED FOR	BY
1	9/22/23	ADDENDUM NO.6	AJP

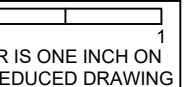
STATUS:
BID SET SUBMITTAL

ARCADIS
PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: C. CAVA
DRAWN BY: C. CAVA
CHECKED BY: A. PAULSON

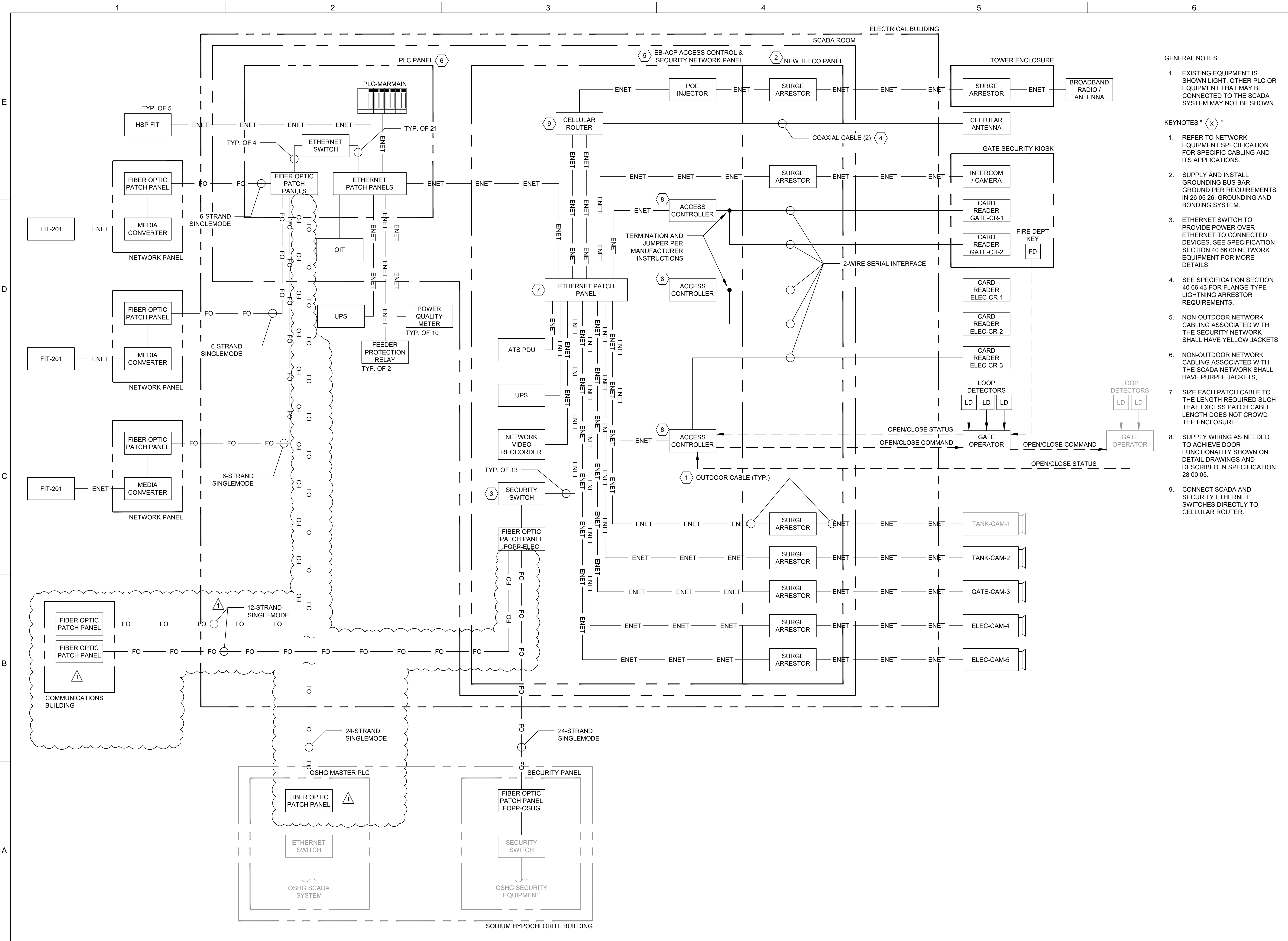
SHEET TITLE:
SECURITY

**SCADA AND SECURITY
NETWORK BLOCK DIAGRAM**

SCALE:
AS SHOWN



DRAWING NO.: IS-01
SHEET NO.: 178 OF 184



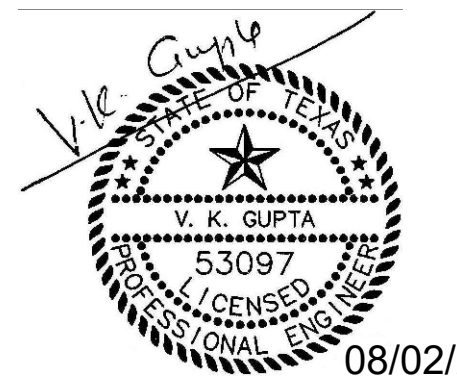
- GENERAL NOTES
- EXISTING EQUIPMENT IS SHOWN LIGHT. OTHER PLC OR EQUIPMENT THAT MAY BE CONNECTED TO THE SCADA SYSTEM MAY NOT BE SHOWN.
- KEYNOTES "X"
- REFER TO NETWORK EQUIPMENT SPECIFICATION FOR SPECIFIC CABLING AND ITS APPLICATIONS.
 - SUPPLY AND INSTALL GROUNDING BUS BAR. GROUND PER REQUIREMENTS IN 26 05 26, GROUNDING AND BONDING SYSTEM.
 - ETHERNET SWITCH TO PROVIDE POWER OVER ETHERNET TO CONNECTED DEVICES. SEE SPECIFICATION SECTION 40 66 00 NETWORK EQUIPMENT FOR MORE DETAILS.
 - SEE SPECIFICATION SECTION 40 66 43 FOR FLANGE-TYPE LIGHTNING ARRESTOR REQUIREMENTS.
 - NON-OUTDOOR NETWORK CABLING ASSOCIATED WITH THE SECURITY NETWORK SHALL HAVE YELLOW JACKETS.
 - NON-OUTDOOR NETWORK CABLING ASSOCIATED WITH THE SCADA NETWORK SHALL HAVE PURPLE JACKETS.
 - SIZE EACH PATCH CABLE TO THE LENGTH REQUIRED SUCH THAT EXCESS PATCH CABLE LENGTH DOES NOT CROWD THE ENCLOSURE.
 - SUPPLY WIRING AS NEEDED TO ACHIEVE DOOR FUNCTIONALITY SHOWN ON DETAIL DRAWINGS AND DESCRIBED IN SPECIFICATION 28 00 05.
 - CONNECT SCADA AND SECURITY ETHERNET SWITCHES DIRECTLY TO CELLULAR ROUTER.

SEALS:

GAI

CONSULTING ENGINEERING
Registration No. F-2593
13117 Neutron Road
Dallas, Texas 75244
Tel: 972-490-7661
Fax: 972-490-7125
email: vkg@gaiconsulting.com

SEALS:



SAN ANTONIO
WATER SYSTEM



MARBACH PUMP STATION
IMPROVEMENTS PROJECT

REVISIONS

NO.	DATE	ISSUED FOR	BY
1	09/22/23	ADDENDUM NO.6	HNO

STATUS:

BID SET SUBMITTAL

ARCADIS PROJECT NO.: 30041017
DATE: AUGUST 2023
DESIGNED BY: W. NILSSON
DRAWN BY: E. MCCLEARY
CHECKED BY: V.K. GUPTA

SHEET TITLE:

INSTRUMENTATION

CHEMICAL SYSTEMS
PLC CONTROL
PANEL MODIFICATION
DETAILS

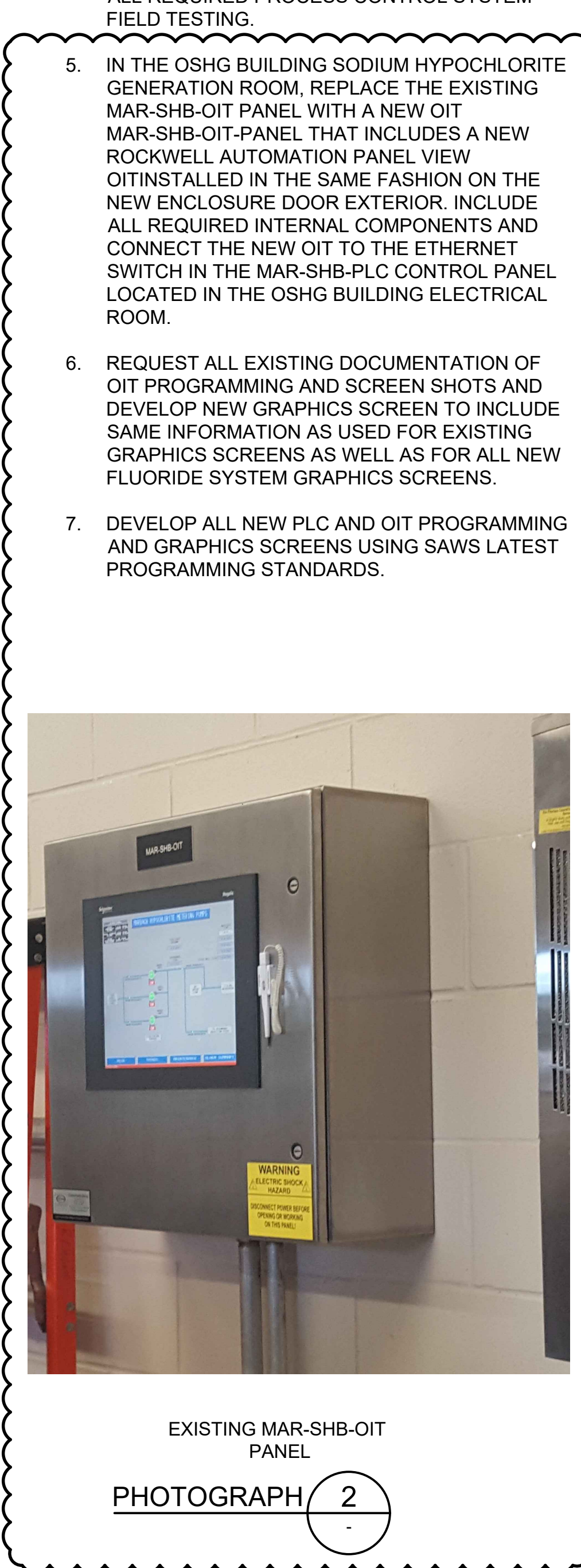
SCALE: AS SHOWN
1" = 1'-0"
BAR IS ONE INCH ON UNREDUCED DRAWING

DRAWING NO.: I-13

SHEET NO.: 185 OF 193

NOTES:

- REPLACE EXISTING MODICON PLC WITH ROCKWELL AUTOMATION COMPACT LOGIX PLC. NEW PLC TO INCLUDE ALL MODULES CURRENTLY IN USE BY SAWS.
- MODIFY EXISTING CONTROL PANEL TO ACCOMMODATE ALL NEW AND EXISTING I/O AS LISTED HERE AND AS SHOWN ELSEWHERE IN THE PLANS. FURNISH ALL COMPONENTS, SIDE PANEL ADDITIONS ETC, AS NEEDED, TO COMPLY WITH PLC, CONTROL PANEL AND PANEL-MOUNTED CONTROL PANEL COMPONENT SPECIFICATION REQUIREMENTS.
- REQUEST EXISTING PLC PROGRAM AND IMPLEMENT SAME FUNCTIONALITY IN NEW PLC PROGRAM. NEW PLC TO ALSO INCLUDE NEW FUNCTIONALITY ASSOCIATED WITH NEW FLUORIDE SYSTEM I/O AS REQUIRED IN CONTROL DESCRIPTIONS.
- INCLUDE NEW PLC PROGRAM IN SOFTWARE PORTION OF FACTORY TESTING AS REQUIRED IN PROCESS CONTROL SYSTEMS TESTING SPECIFICATION SECTION. INCLUDE COMPLETE MODIFIED MAR-SHB-PLC CONTROL PANEL IN ALL REQUIRED PROCESS CONTROL SYSTEM FIELD TESTING.
- IN THE OSHG BUILDING SODIUM HYPOCHLORITE GENERATION ROOM, REPLACE THE EXISTING MAR-SHB-OIT PANEL WITH A NEW OIT MAR-SHB-OIT-PANEL THAT INCLUDES A NEW ROCKWELL AUTOMATION PANEL VIEW OIT INSTALLED IN THE SAME FASHION ON THE NEW ENCLOSURE DOOR EXTERIOR. INCLUDE ALL REQUIRED INTERNAL COMPONENTS AND CONNECT THE NEW OIT TO THE ETHERNET SWITCH IN THE MAR-SHB-PLC CONTROL PANEL LOCATED IN THE OSHG BUILDING ELECTRICAL ROOM.
- REQUEST ALL EXISTING DOCUMENTATION OF OIT PROGRAMMING AND SCREEN SHOTS AND DEVELOP NEW GRAPHICS SCREEN TO INCLUDE SAME INFORMATION AS USED FOR EXISTING GRAPHICS SCREENS AS WELL AS FOR ALL NEW FLUORIDE SYSTEM GRAPHICS SCREENS.
- DEVELOP ALL NEW PLC AND OIT PROGRAMMING AND GRAPHICS SCREENS USING SAWS LATEST PROGRAMMING STANDARDS.



EXISTING MAR-SHB-OIT
PANEL
PHOTOGRAPH 2

	TAG	TYPE	DESCRIPTION
1	LIR-600	AI	FLUORIDE BULK STORAGE TANK LEVEL
2	LIR-605	AI	FLUORIDE DAY TANK LEVEL
3	T1058_OSG_ROOM_TEMP	AI	MARBACH OSHG SYSTEM ROOM TEMPERATURE
4		AI	MARBACH PRIMARY SH INJECTION POINT RESIDUAL CHLORINE
5	SI410_NAOCL_PMP1_SPEED	AI	MARBACH SH METERING PUMP #1 SPEED
6	SI420_NAOCL_PMP2_SPEED	AI	MARBACH SH METERING PUMP #2 SPEED
7	SI430_NAOCL_PMP3_SPEED	AI	MARBACH SH METERING PUMP #3 SPEED
8	FI410_NAOCL_PMP_FLOW	AI	MARBACH SH METERING PUMPS DISCHARGE FLOW TO PRIMARY INJECTION #1
9	SI410_NAOCL_PMP1_SPEED_OUT	AO	MARBACH SH METERING PUMP #1 SPEED SETPOINT
10	SI420_NAOCL_PMP2_SPEED_OUT	AO	MARBACH SH METERING PUMP #2 SPEED SETPOINT
11	SI430_NAOCL_PMP3_SPEED_OUT	AO	MARBACH SH METERING PUMP #3 SPEED SETPOINT
12	XA-650	DI	FLUORIDE BUILDING EMERGENCY SHOWER/EYEWASH IN USE
13	XA-600	DI	FLUORIDE BUILDING EXTERIOR EMERGENCY SHOWER/EYEWASH IN USE
14	LAH-600	DI	FLUORIDE BULK STORAGE TANK LEAK
15	LAH-605	DI	FLUORIDE DAY TANK LEAK
16	POWER_SUPPLY_FAIL	DI	MARBACH 24VDC POWER FAILURE
17	LA302_CONTAINMENT_AREA_HI_LEVEL	DI	MARBACH CONTAINMENT AREA HIGH LEVEL
18	YN301_SUMP_PMP_AUTO	DI	MARBACH CONTAINMENT AREA SUMP PUMP AUTO
19	MX301_SUMP_PMP_FAIL	DI	MARBACH CONTAINMENT AREA SUMP PUMP FAIL
20	MN301_SUMP_PMP_RUN	DI	MARBACH CONTAINMENT AREA SUMP PUMP RUN
21	MX059_ELECT_ROOM_SMOKE_ALARM	DI	MARBACH ELECTRICAL ROOM SMOKE ALARM
22	MX104_HARMONIC_FILTER1_ALARM	DI	MARBACH HARMONIC FILTER #1 FAIL
23	MX204_HARMONIC_FILTER2_ALARM	DI	MARBACH HARMONIC FILTER #2 FAIL
24	MX057_HVAC_COMMON_ALARM	DI	MARBACH HVAC SYSTEM COMMON ALARM
25	MX059_PMP_ROOM_SMOKE_ALARM	DI	MARBACH METERING PUMP ROOM SMOKE ALARM
26	MX059_OSHG_ROOM_SMOKE_ALARM	DI	MARBACH OSHG ROOM SMOKE ALARM
27	YN410_NAOCL_PMP1_RESET	DI	MARBACH SH METERING PUMP #1 ALARM RESET
28	MX410_NAOCL_PMP1_DIAPHRAM_FAIL	DI	MARBACH SH METERING PUMP #1 DIAPHRAM FAIL
29	MX410_NAOCL_PMP1_HI_PRESSURE	DI	MARBACH SH METERING PUMP #1 HIGH PRESSURE
30	MX410_NAOCL_PMP1_OVERLOAD	DI	MARBACH SH METERING PUMP #1 O/L
31	YN410_NAOCL_PMP1_AUTO	DI	MARBACH SH METERING PUMP #1 REMOTE
32	MN410_NAOCL_PMP1_RUN	DI	MARBACH SH METERING PUMP #1 RUNNING
33	MX410_NAOCL_PMP1_VFD_FAIL	DI	MARBACH SH METERING PUMP #1 VFD FAIL
34	YN420_NAOCL_PMP2_RESET	DI	MARBACH SH METERING PUMP #2 ALARM RESET
35	MX420_NAOCL_PMP2_DIAPHRAM_FAIL	DI	MARBACH SH METERING PUMP #2 DIAPHRAM FAIL
36	MX420_NAOCL_PMP2_HI_PRESSURE	DI	MARBACH SH METERING PUMP #2 HIGH PRESSURE
37	MX420_NAOCL_PMP2_OVERLOAD	DI	MARBACH SH METERING PUMP #2 O/L
38	YN420_NAOCL_PMP2_AUTO	DI	MARBACH SH METERING PUMP #2 REMOTE
39	MN420_NAOCL_PMP2_RUN	DI	MARBACH SH METERING PUMP #2 RUNNING
40	MX420_NAOCL_PMP2_VFD_FAIL	DI	MARBACH SH METERING PUMP #2 VFD FAIL
41	YN430_NAOCL_PMP3_RESET	DI	MARBACH SH METERING PUMP #3 ALARM RESET
42	MX430_NAOCL_PMP3_DIAPHRAM_FAIL	DI	MARBACH SH METERING PUMP #3 DIAPHRAM FAIL
43	MX430_NAOCL_PMP3_HI_PRESSURE	DI	MARBACH SH METERING PUMP #3 HIGH PRESSURE
44	MX430_NAOCL_PMP3_OVERLOAD	DI	MARBACH SH METERING PUMP #3 O/L
45	YN430_NAOCL_PMP3_AUTO	DI	MARBACH SH METERING PUMP #3 REMOTE
46	MN430_NAOCL_PMP3_RUN	DI	MARBACH SH METERING PUMP #3 RUNNING
47	MX430_NAOCL_PMP3_VFD_FAIL	DI	MARBACH SH METERING PUMP #3 VFD FAIL
48	UPS_FAIL	DI	MARBACH UPS FAILURE
49	INTRUSION_ALARM	DI	MATLS INTRUSION ALARM
50	MD401_NAOCL_PMP1_COMMAND	DO	MARBACH SH METERING PUMP #1 START/STOP
51	MD402_NAOCL_PMP2_COMMAND	DO	MARBACH SH METERING PUMP #2 START/STOP
52	MD403_NAOCL_PMP3_COMMAND	DO	MARBACH SH METERING PUMP #3 START/STOP
53	LAH-605	DI	FLUORIDE DATE TANK LEAK
54	XA-610A	DI	FLUORIDE METERING PUMP NO. 1 FAILED
55	PAH-610	DI	FLUORIDE METERING PUMP NO. 1 HIGH DISCHARGE PRESSURE
56	XA-610B	DI	FLUORIDE METERING PUMP NO. 1 LEAK
57	YL-610A	DI	FLUORIDE METERING PUMP NO. 1 LOCAL/REMOTE
58	YL-610B	DI	FLUORIDE METERING PUMP NO. 1 RUNNING
59	SC-610	AO	FLUORIDE METERING PUMP NO. 1 SPEED COMMAND
60	SIR-610	AI	FLUORIDE METERING PUMP NO. 1 SPEED COMMAND
61	HSR-610	DO	FLUORIDE METERING PUMP NO. 1 START/STOP
62	XA-620A	DI	FLUORIDE METERING PUMP NO. 2 FAILED
63	PAH-620	DI	FLUORIDE METERING PUMP NO. 2 HIGH DISCHARGE PRESSURE
64	XA-620B	DI	FLUORIDE METERING PUMP NO. 2 LEAK
65	YL-620A	DI	FLUORIDE METERING PUMP NO. 2 LOCAL/REMOTE
66	YL-620B	DI	FLUORIDE METERING PUMP NO. 2 RUNNING
67	SC-620	AO	FLUORIDE METERING PUMP NO. 2 SPEED COMMAND
68	SIR-620	AI	FLUORIDE METERING PUMP NO. 2 SPEED COMMAND
69	HSR-620	DO	FLUORIDE METERING PUMP NO. 2 START/STOP

MAR-SHB-PLC INPUT/OUTPUT LIST
 • ITALIC: EXISTING I/O
 • BOLD: NON-ITALIC: NEW I/O



EXISTING MAR-SHB-PLC
ENCLOSURE INTERIOR
PHOTOGRAPH 1