



**E-54 Regional Lift Station - RFCSP
Solicitation Number: CO-00537
Job No.: 22-2502**

**ADDENDUM 2
October 25, 2022**

To Respondent of Record:

This addendum, applicable to project referenced above, is an amendment to the 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

QUESTION 1:

Contract Specification Section 16470 2.03 C.1 calls for Panelboard enclosures to be NEMA 4X SS. The Main Distribution Panel is to be installed inside the Electrical Building. And Panel LP as well as other electrical equipment in the building is to be in NEMA 1 or NEMA 12 Enclosures per specifications and/or Sheet E2.00. Please clarify if DP-1 is to be in NEMA 4X SS enclosure and revise Specification Section 16470 2.03 C.1 as necessary.

RESPONSE: Specification 16470 revised to show NEMA 1 or 12 for interior areas, and NEMA 4X stainless steel for exterior and wet location areas. See Changes to the Specifications #3.

QUESTION 2:

Fixture Schedule on E3.50 shows Type E- Emergency Lighting but the lighting plan on E10.10 does not show any. Please clarify.

RESPONSE: Sheet E10.10 is revised to show the addition of 4 emergency wallpack fixtures, two additional three way switches, and revised light circuits. Interior emergency wallpack fixtures and exit signs are now circuited to LP-2. Refer to Sheet E3.50 for updated panel schedule with new circuits. See Changes to the Plans #8 and #12.

QUESTION 3:

Lighting Plan Sheet E10.10 shows 2 fixtures outside of the electrical building, please confirm that those are the only exterior fixtures required as control Schematic Detail I on Sheet E11.07 shows to have a total of (4) fixtures.

RESPONSE: Sheet E11.07 details I and J combined to show 1 lighting control schematic. The schematic shows 2 circuits, one controlling electrical building lighting and the other controlling area lighting. There are 2 building mounted exterior lights and 3 area lights. Sheet 11.07, detail B revised to read area light instead of yard light. See Changes to the Plans #15.

QUESTION 4:

Site plan shows total of (3) area light poles, control schematic on Sheet E11.07 Detail J only shows 2. Please confirm which is correct.

RESPONSE: Refer to Question #3 response. See Changes to the Plans #15.

QUESTION 5:

Plan drawing E10.00 show (1) Lighting Control Panel in the electrical building keynote #10, shouldn't detail I and detail J on Sheet E11.07 be combined into a single lighting control panel? Please confirm and revise the Control Schematic.

RESPONSE: Refer to Question #3 response. See Changes to the Plans #15.

QUESTION 6:

LP circuit #8 shows to be for the Building Exterior Receptacle, but none are shown on sheet E10.00, please clarify.

RESPONSE: Sheet E10.00 revised to show the addition of exterior receptacles. Sheet E10.00 also shows additional interior receptacles. See Changes to the Plans #11.

QUESTION 7:

Is the antenna orientation correct?

RESPONSE: Revised antenna orientation is shown on revised sheet E8.00, ANTENNA ORIENTATION detail. See Changes to the Plans #10.

QUESTION 8:

Is there an opportunity to schedule a site visit?

RESPONSE: Contractor may access E-54 Regional Lift Station site through the Fox Grove subdivision and park at the Branding Bay Road Cul-de-Sac. Contractor will have to dismount from vehicle to access the site on foot due to a SAWS chain that restricts vehicular access to the site.

QUESTION 9:

Site visit to the existing lift stations for decommissioning?

RESPONSE: The Fossil Ridge and Fischer lift stations can be accessed by the Contractor off Evans Road. Contractor may access the Fox Grove Lift Station site through the Fox Grove subdivision and park at the Branding Bay Road Cul-de-Sac. Contractor will have to dismount from vehicle to access the Fox Grove Lift Station site on foot due to a SAWS chain that restricts vehicular access to the site.

QUESTION 10:

Ref Sheet C4.00. There are several 12" holes in the slab for handholes. Do you have a detail for the cover that would be required for these holes?

RESPONSE: The cover material shall consist of DFW Plastics, Inc. (PO Box 648, Bedford, TX) model number DFW18AMR-1QA-LID. The cover material shall be HDPE. The cover shall sit on a 12-inch diameter PVC sleeve that is embedded within the wetwell top slab. The top of the cover shall be set flush with the top of the wetwell slab so as not to provide a tripping hazard.

QUESTION 11:

Ref Sheet C4.00. The Stainless Steel Aerator Piping poured in the slab. Do you require a wrap or anything around the stainless steel that is poured into the concrete slab?

RESPONSE: No.

QUESTION 12:

Ref Sheet C4.07. Can you provide a specification for the 4" Electric Motor Operated Butterfly Valve? Can you provide a detail of the 4'x4' Junction Box and the required size of the hatch?

RESPONSE: 4'x4' junction box shall be reinforced precast concrete (pedestrian rated). Hatch shall be 3'x3' hinged aluminum hatch (pedestrian rated) with spring assist. Four (4)-inch butterfly valve shall be Valworx Model No. 5670 or 5673. See revised Changes to the Plans #5.

QUESTION 13:

Ref Sheet C4.00 to C4.07. These are all listed as Not to Scale. Can you please add a scale for these drawings?

RESPONSE: No other dimensions or scaling will be provided on sheets C4.00 – C4.07 other than those provided.

QUESTION 14:

Please confirm that there are no domestic material requirements for piping or valves.

RESPONSE: There are no domestic material requirements for this project.

QUESTION 15:

Contract documents does not identify the electrical components to be decommissioned/demolished at the three (3) existing lift stations. Are there existing electrical drawings for the 3 lift stations? Please provide electrical drawings for the sites.

RESPONSE: Available as-builts of the three lift stations to be decommissioned will be provided to the selected contractor upon request.

QUESTION 16:

Specification Section 16660 2.01 D as well as other specification sections call for ground rods to be 3/4" x 10' copper clad, however Sheet E11.00 detail 3 & 5, specifies 3/4" x 10' stainless steel ground rods. Please clarify.

RESPONSE: Replace Specification 16660 with Specification 16451, which states ground rods shall be copper clad. Sheet E11.00 details 3 and 5 revised to show copper clad rods. See Changes to the Plans #14.

QUESTION 17:

Neither Sheet E10.10 cable tray plan nor specification section 16115 addresses the requirements for cable tray barriers to segregate power, control, and instrument cables. Please clarify.

RESPONSE: Sheet E10.10 revised to show a 42 inch wide tray with a barrier dividing a 24 inch wide power section from an 18 inch wide controls/instrumentation section. See Changes to the Plans #12.

QUESTION 18:

There is a discrepancy for the ATS between 1-line diagram stating 1000A rating and notes on Sheet E10.00 stating 1200A. Please clarify.

RESPONSE: Sheet E2.00 revised to show a 1200 amp ATS. See Changes to the Plans #6.

QUESTION 19:

Schedule of Manufacturers and Suppliers show Specification Section 16451 for Surge Protective Devices. Electrical specifications show SPDs are under Section 16289.

RESPONSE: Replace Specification Section 16289 with Specification 16451. Remove Schedule of Manufacturers and Suppliers and replace with revised version attached to this Addendum. See Changes to the Specifications #6.

QUESTION 20:

There are discrepancies between dimensions of Sheet E4.00 as compared to E10.00 as well as other electrical building plans. When scaling the foundation of the electrical building on E4.00, it gives a dimension of 32'x14'. Using the scale provided on E10.10 through E10.20 the foundations show to be 37'8"x15'8", same as shown for architectural plans. Site dimensional control Sheet C2.01 seem to indicate the building foundation is 32'x14'. Same goes for other structures on site having different dimensions between site dimensional control plan and individual structural plans. Please clarify which scales are to be utilized.

RESPONSE: Sheet C2.00, C2.01, Sheet C3.00, and E4.00 are revised to show correct interior electrical building and wetwell dimensions and dimensional controls of 36'x14' and interior wetwell dimensions of 35'x35', respectively. Contractor shall refer to structural drawings for foundation perimeter dimensions for these structures. See Changes to the Plans #1, #2, #3, and #9.

QUESTION 21:

In order to minimize I&I and future liner maintenance would SAWS entertain the use of 15'-6" diameter FRP duplex wet wells in lieu of the large concrete wet well for the four-pump lift station on this project?

RESPONSE: No.

QUESTION 22:

Contract documents refer to Section 16451 for lightning protection. Please provide this specification as pertaining to electrical building lightning protection.

RESPONSE: Refer to Question #19 response. See Changes to the Specifications #2.

QUESTION 23:

Specification Section 11500 3.4 A through D specifies Fence Grounding requirements regarding the installation, bonding methods, and intervals, however, plan sheet E4.00 shows grounding around the complete perimeter of the site with majority of Cad-weld connections on the east half of the project site. Details 9 & 10 on Sheet E11.00 shows details of the gate & fence post grounding but does not address the intervals. Detail 9 & 10 on E11.00 shows ground cables installed 3'-0" below grade; requiring rock saw cutting for the ground cable trenches. Note detail 3 on E11.00 allows ground grid to be minimum of 18" below grade. Please review and advise which details are to be utilized for the project.

RESPONSE: Sheet E11.00, details 9 and 10 revised to an 18 inch minimum ground conductor burial depth. Detail 10 revised to show fence grounding installed at 100 foot intervals. See Changes to the Plans #14.

QUESTION 24:

Sheet E11.08 shows ground moisturizing port for the generator, no other drawings show ground moisturizing port associated with test wells or ground rods. Please clarify if ground moisturizing ports are required for the remainder of the project site.

RESPONSE: Sheet E4.00 is revised to show additional moisturizing ports at the following location: near the meter rack, at the generator and at the electrical building. Sheet E10.20 revised to show an enlarged of the moisturizing port at the electrical building. Sheet E11.00 revised to show new ground moisturizing port and test well detail 6. See Changes to the Plans #9, #13, and #14.

QUESTION 25:

Contract Specification is missing sections 16050, 16921 and 16930 referenced in bid document section 10-c Schedule of Manufacturers and Suppliers. Please provide as needed.

RESPONSE: Specifications 16050, 16921 and APPENDIX A, and 16030 are included in this addendum. See Changes to the Specifications #1, #4, and #5.

QUESTION 26:

Please review conduits shown on plan drawings as compared to the conduit schedules there are several errors. For example, plan drawings show circuit BL01-106 routed to Blower junction box, whereas the circuit schedule show it to be between BL-01 Starter to SCADA Panel utilizing tray cable. Please review and revise.

RESPONSE: Sheet E3.10 revised to show updated circuits. See Changes to the Plans #7.

- *BL01-106 and BL02-106 revised to show wiring from the starter to the junction box.*
- *BL01-107 and BL02-107 revised to show spare conduit from the starter to the junction box.*
- *BL01-110 and BL02-110 added to show control cable from the starter to the SCADA Panel.*

Please note that the field wiring is multi-conductor tray cable (starter to junction box in the field).

CHANGES TO THE SPECIFICATIONS

1. Add Specification Section 16050: Basic Electrical Materials and Methods attached to this addendum.
2. Remove Specification Section 16289: Surge Protection Devices and Specification Section 16660: Grounding System in their entirety and replace with Specification Section 16451: Grounding and Lightning Protection Systems attached to this addendum.
3. Remove Specification Section 16470: Panelboards in its entirety and replace with revised version attached to this addendum.
4. Add Specification Section 162921: Supervisory Control and Data Acquisition (SCADA) System and APPENDIX A attached to this addendum.
5. Add Specification Section 16930: Instrumentation attached to this addendum.
6. Remove Schedule of Manufacturers and Suppliers in its entirety and replace with revised version attached to this addendum.

CHANGES TO THE PLANS

Remove the following sheets in their entirety and replace with revised versions attached to this addendum.

1. Insert Sheet C2.00: Lift Station Site Plan.
2. Insert Sheet C2.01: Lift Station Dimensional Control Plan.
3. Insert Sheet C3.00: Force Main and Sanitary Sewer Plan and Profile Sheet.
4. Insert Sheet C4.00: Wet Well Top Plan Detail.
5. Insert Sheet C4.07: Water Pollution Abatement Plan Batch Detention Basin A.
6. Insert Sheet E2.00: One-Line Diagram.
7. Insert Sheet E3.10: Schedules II
8. Insert Sheet E3.50: Panel Schedules.
9. Insert Sheet E4.00: Electrical Site Layout & Grounding Plan.
10. Insert Sheet E8.00: Communications Details.
11. Insert Sheet E10.00: Electrical Building Power and Controls Plans.
12. Insert Sheet E10.10: Electrical Building Cable Tray Plan.
13. Insert Sheet E10.20: Electrical Building Grounding Plan.
14. Insert Sheet E11.00: Electrical Details I.
15. Insert Sheet E11.07: Electrical Details VIII.

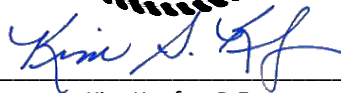
ADDENDUM

This Addendum, including these six (6) pages, is seventy-two (72) pages with attachments in its entirety.

Attachments:

- Section 16050 – Basic Electrical Materials and Methods (13 pages)
- Section 16451 – Grounding and Lightning Protection (5 pages)
- Section 16470 – Panelboards (6 pages)
- Section 16921 – Supervisory Control and Data Acquisition (SCADA) System and Local Station Control and Monitoring (15 pages)
- Section 16921 – APPENDIX A (2 pages)
- Section 16930 – Instrumentation (6 pages)
- Schedule of Manufacturers and Suppliers (4 pages)
- Sheet C2.00 – Lift Station Site Plan (1 page)
- Sheet C2.01 – Lift Station Dimensional Control Plan (1 page)
- Sheet C3.00 – Force Main and Sanitary Sewer Plan and Profile (1 page)
- Sheet C4.00 - Wet Well Top Plan Detail (1 Page)
- Sheet C4.07 – Water Pollution Abatement Plan Batch Detention Basin A (1 page)
- Sheet E2.00 – One-Line Diagram (1 page)
- Sheet E3.10 – Schedules II (1 page)
- Sheet E3.50 – Panel Schedules (1 page)
- Sheet E4.00 – Electrical Site Layout & Grounding Plan (1 page)
- Sheet E8.00 – Communications Detail (1 page)
- Sheet E10.00 – Electrical Building Power & Control Plans (1 page)
- Sheet E10.10 – Electrical Building Cable Tray Plan (1 page)
- Sheet E10.20 – Electrical Building Grounding Plan (1 page)
- Sheet E11.00 – Electrical Details I (1 page)
- Sheet E11.07 – Electrical Details VIII (1 page)





10/25/22

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SECTION 16050**BASIC ELECTRICAL MATERIALS AND METHODS**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings:
 - 1. Junction and pull boxes used at, or below, grade
 - 2. Device box relocation
 - 3. Terminal junction boxes
 - 4. Panelboards and circuit breaker data
 - 5. Fuses
 - 6. Contactors
 - 7. Transformers
 - 8. Lighting fixtures and poles
 - 9. Control cabinet enclosures
 - 10. Control cabinet wiring and terminal blocks
 - 11. Control cabinet devices and nameplates

1.02 QUALITY ASSURANCE

- A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

1.03 SPARE PARTS

- A. Furnish, tag, and box for shipment and storage and deliver prior to 75 percent Project completion the following spare parts:
 - 1. Fuses, 0 to 600 Volts: Six (6) of each type and each current rating installed unless otherwise specified.
 - 2. Lamps for panel lighting: Twelve of each type installed.

PART 2 PRODUCTS

2.01 METERING FACILITIES

- A. Furnish materials as required by electric utility for utility's installation of metering equipment, service conductors, and mounting of utility company equipment.

2.02 OUTLET AND DEVICE BOXES

- A. Sheet Steel: One-piece drawn type, zinc- or cadmium-plated.
- B. Cast Metal: (For use only on electric service pole)
 - 1. Box: Malleable iron
 - 2. Cover: Gasketed, weatherproof, malleable iron, with stainless steel screws.

3. Hubs: Threaded
4. Lugs: Cast Mounting
5. Finish: Corrosion resistance zinc electroplate coated
6. Manufacturers and Products:
 - a. Crouse-Hinds; Type FS or FD
 - b. Appleton; Type FS and FD

C. Aluminum:

1. Material: Die-cast aluminum
2. Hubs: Threaded
3. Cover: Gasketed, weatherproof, aluminum alloy
4. Manufacturers:
 - a. Thomas & Betts Red Dot

2.03 JUNCTION AND PULL BOXES

A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.

B. Large Stainless Steel Box: NEMA 250, Type 4X.

1. Box: 16-gauge, Type 316 stainless steel, with white enamel painted interior mounting panel, and 10 gauge stainless steel flanges.
2. Cover: Hinged with clamps.
3. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
4. Manufacturers:
 - a. Hoffman Enclosures Co.
 - b. Rittal

2.04 WIRING DEVICES

A. Switches:

1. NEMA WD1 and FSW-S-896E.
2. Specification grade, totally enclosed, ac type, with quiet tumbler switches and screw terminals.
3. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.
4. Rating: 20 amps, 120/277 volts
5. Color: Ivory
6. Manufacturers:
 - a. Bryant
 - b. Leviton
 - c. Hubbell
 - d. Pass and Seymour
 - e. Arrow Hart

- B. Receptacle, Single and Duplex:
 - 1. NEMA WD 1 and FS W-C-596.
 - 2. Specification grade, two-pole, three-wire grounding type with screw type wire terminals suitable for No. 10 AWG.
 - 3. High strength, thermoplastic base color.
 - 4. Color: Ivory.
 - 5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
 - 6. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.
 - 7. Manufacturers:
 - a. Bryant
 - b. Leviton
 - c. Hubbell
 - d. Pass and Seymour
 - e. Sierra
 - f. Arrow Hart

- C. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.
 - 1. Color: Ivory.
 - 2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
 - 3. Size: For 2-inch by 4-inch outlet boxes.
 - 4. Feed-Through Model: NEMA WD 1, with No.12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
 - 5. Manufacturers:
 - a. Pass and Seymour
 - b. Bryant
 - c. Leviton
 - d. Hubbell
 - e. Arrow Hart

2.05 DEVICE PLATES

- A. General: Sectional type plates not permitted.

- B. Metal:
 - 1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.
 - 2. Finish: ASTM A167, Type 302/304, satin
 - 3. Mounting Screw: Oval-head, finish matched to plate

- C. Cast Metal:
 - 1. Material: Malleable ferrous metal, with gaskets
 - 2. Screw: Oval-head stainless steel

- D. Weatherproof:
1. For Receptacles: Gasketed, cast metal or stainless steel, with individual cap over each receptacle opening except for the receptacles located in enclosures
 - a. Type: Shall be extra duty, "in-use" type suitable for wet locations as per NEC Article 406.9. Shall be weatherproof whether or not the attachment plug cap/cover is inserted/closed.
 - b. Mounting Screw: Stainless steel.
 - c. Cap Spring: Stainless steel.
 - d. Manufacturers:
 - (i) General Electric
 - (ii) Bryant
 - (iii) Hubbell
 - (iv) Sierra
 - (v) Pass and Seymour
 - (vi) Crouse-Hinds; Type WLRD or WLRS
 - (vii) Bell
 - (viii) Arrow Hart
 - (ix) Appleton; FSK-W
 2. For Switches: Gasketed, cast metal incorporating external operator for internal switch.
 - a. Mounting Screw: Stainless steel
 - b. Manufacturers:
 - (i) Crouse-Hinds; DS-181 or DS-185
 - (ii) Appleton; FSK-1VTS or FSK-1VS

2.06 LIGHTING AND POWER DISTRIBUTION PANELBOARD, 240 VAC

- A. NEMA PB, NFPA 70, and UL 67
- B. Panelboards and Circuit Breakers: Suitable for use with 75° C wire at full NFPA 70, 75° C ampacity.
- C. Short-Circuit Current Equipment Rating: Fully rated 10kA.
- D. Rating: Applicable to a system with available short-circuit current of 10,000 amperes rms symmetrical.
- E. Ground Fault Interrupter: 5-mA trip, 10,000 amps interrupting capacity circuit breakers.
- F. Cabinet: Meet the requirements of NEMA 250. Use NEMA Type 1 Door-in-Door Type with Copper chassis and bolt-on circuit breakers.
 1. Interior:
 - a. Factory assembled, complete with circuit breakers.
 - b. Capable of circuit breaker replacement without disturbing adjacent circuit breakers or without removing main bus.

- c. Spaces: Cover openings with easily removable metal cover.
 2. Door Hinges: Concealed
 3. Locking Device:
 - a. Pad lockable
 - b. Doors Over 30 Inches in Height: Multipoint
 4. Circuit Directory: Metal frame with transparent plastic face and enclosed card on interior of door. Hand-written directories are not acceptable.
 5. Nameplates: Provide for each cabinet. On outdoor equipment the description nameplate shall be on the outer door.
- G. Bus Bar:
1. Material: Tin-plated copper full sized throughout length.
 2. Provide for mounting of future circuit breakers along full length of bus regardless of number of units and spaces shown. Machine, drill, and tap as required for current and future positions.
 3. Neutral: Insulated, rated same as phase bus bars with at least one terminal screw for each branch circuit.
 4. Ground: Copper, installed on panelboard frame, bonded to box, with at least one terminal screw for each circuit.
 5. Lugs and Connection Points:
 - a. Suitable for either copper or aluminum conductors.
 - b. Solderless main lugs for main, neutral, and ground bus bars.
 6. Subfeed or through-feed lugs as shown.
 7. Bolt together and rigidly support bus bars and connection straps on molded insulators.
- H. Circuit Breakers
1. NEMA AB 1 and UL 489.
 2. Thermal-magnetic, quick-make, quick-break, molded case, of the indicating type showing ON/OFF and TRIPPED positions of operating handle.
 3. Noninterchangeable, in accordance with NFPA 70.
 4. Type: Bolt-on circuit breakers in all panelboards.
 5. Multipole circuit breakers designed to automatically open all poles when an overload occurs on one pole.
 6. Do not substitute single-pole circuit breakers with handle ties for multipole breakers.
 7. Do not use tandem or dual circuit breakers in normal single-pole spaces.
 8. Ground Fault Interrupter:
 - a. Equip with conventional thermal-magnetic trip and ground fault sensor rated to trip in 0.025 second for a 5-milliampere ground fault (UL 943, Class A sensitivity).
 - b. Sensor with same rating as circuit breaker and a push-to-test button.
- I. Surge Protective Device:
1. Eaton Model SPD 250 240S 1 J or equal from panelboard manufacturer.

- J. Manufacturers:
 - 1. Eaton
 - 2. Siemens
 - 3. General Electric
 - 4. Square D

2.07 TERMINAL JUNCTION BOX

- A. Cover: Hinged, unless otherwise shown.
- B. Terminal Blocks: Provide separate connection point for each conductor entering or leaving box.
 - 1. Spare Terminal Points: 25 percent.
- C. Interior Finish: Paint with white enamel or lacquer.

2.08 TERMINAL BLOCK (0 TO 600 VOLTS)

- A. UL 486E and UL 1059.
- B. Screw-type for accepting ring-tongue compression lugs.
- C. Terminal blocks should be rated for applied voltage.
- D. Clear safety cover provided to protect power distribution lugs.
- E. Manufacturers:
 - 1. Buchanan
 - 2. General Electric

2.09 SUPPORT AND FRAMING CHANNELS

- A. Material: Type 316 stainless steel.
- B. Type: 1-1/2 minimum strut
- C. Inserts: Continuous
- D. Beam Clamps: Type 316 Stainless Steel.
- E. Manufacturers:
 - 1. B-Line
 - 2. Unistrut
 - 3. Kindorf

2.10 CONTROL CABINETS

- A. All panels shall be UL508A rated.
- B. Refer to Section 16921 for SCADA Panel requirements.

- C. For outdoor locations: All enclosures including all mounting hardware shall be NEMA Type 4X,316 stainless steel, unless otherwise noted. All enclosures shall be provided with top, side, and door sunshield. Enclosures must have a white enamel coating on the exterior.
 - D. For indoor locations: All enclosures including all mounting hardware shall be NEMA Type 12, unless otherwise noted.
 - E. Indoor Panels containing PLC equipment, pump control equipment and pump control cubicle containing soft starts shall be equipped with vents, filters thermostat controlled fan and a thermostat controlled heater with integral fan for circulation.
 - F. Enclosures shall be constructed of 14-gauge steel with powder coat over phosphatized surfaces, unless otherwise specified to be stainless steel for corrosion resistance.
 - G. Enclosures shall have a single swing panel front with continuous hinge, and shall have 3 point latch with provision for padlocking. Hinge pin and panel clamps shall be stainless steel.
 - H. Enclosures shall have an interior back panel. No screws shall penetrate the enclosure. The interior surfaces shall be white baked enamel finish.
 - I. Devices and nameplates shall be furnished and installed as indicated in the Contract Drawings.
 - J. Enclosure Manufacturers:
 - 1. Hoffman Enclosure Co.
 - 2. Rittal
 - 3. Eaton B-Line
 - K. Provide an internal, steel, hinged swing-out panel with white baked enamel finish for mounting devices such as pushbuttons, selector switches, control switches, and indicating lights. All devices shall be mounted inside the control cabinets.
 - L. Devices and nameplates shall be furnished and installed as indicated in the Contract Drawings and elsewhere in the specifications.
 - M. Design and Assembly: Contractor to submit name and qualifications of design and assemble firm for Owner's approval.
- 2.11 NAMEPLATES
- A. Nameplates shall be provided for each enclosure, control and indicating device. On outdoor equipment, the unit description nameplate shall be on the outer door.
 - B. Material: Laminated plastic
 - C. Attachment Screws: Stainless steel
 - D. Color: Black, engraved to a white core

- E. Engraving:
 - 1. Pushbuttons/Selector Switches: Name of drive controlled on one, two, or three lines, as required.
 - 2. Panelboards: Panelboard designation, service voltage, and phases.
- F. Letter Height:
 - 1. Pushbuttons/Selector Switches: 1/8-inch.
 - 2. Panelboards: 1/4-inch.

2.12 LIGHTING

- A. Provide lighting fixtures and poles as shown on the CONTRACT DRAWINGS.
- B. For LED lighting ensure surge protection is included integral within the driver and shall protect the fixture from damage for transient voltages and currents as defined in ANSI/IEEE C64.41 2002 for Location A.

2.13 PUSHBUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES

- A. Refer to Section 16431 for MCC requirements.
- B. All pushbuttons, indicating lights and selector switches shall be LED type, 30mm NEMA rated. IEC-only rated equipment is not acceptable. Pushbuttons shall be located on enclosure swing panel or shall be rated corrosion-resistant type.
- C. Contact Rating: NEMA ICS 2, Type A600, 30mm.
- D. Selector Switch Operating Lever: Standard.
- E. Elapsed Time Meter.
 - 1. Voltage: 120-Vac
 - 2. Non-reset type
- F. Indicating Lights: Heavy-duty LED, oiltight, 120V, push-to-test:
 - 1. Motor On Red
 - 2. Motor Off Green
- G. Pushbutton Color:
 - 1. Red mushroom head without spring return
 - 2. On Red
 - 3. Off Green
- H. Legend Plate:
 - 1. Material: Aluminum.
 - 2. Engraving: 11 character/spaces on one line, 14 character/spaces on each of two lines, as required, indicating specific function.
 - 3. Letter Height: 7/64-inch.

- I. Manufacturers:
 - 1. Heavy-Duty, Oiltight Type:
 - a. General Electric Type CR 104P.
 - b. Square D Type K.
 - c. Eaton Type 10250T.
 - d. Allen-Bradley Type 800T.
 - 2. Heavy-Duty, Watertight, and Corrosion-Resistant Type:
 - a. Square D Type SK.
 - b. General Electric Type CR 104P.
 - c. Eaton Type E34.

2.14 MOLDED CASE CIRCUIT BREAKERS

- A. NEMA AB 1 and UL 489.
- B. Thermal-magnetic, quick-make, quick-break, molded case, of the indicating type showing ON/OFF and TRIPPED positions of operating handle. Where breakers are used in conjunction with starters equipped with thermal overloads, breakers shall be magnetic only (motor circuit protector).
- C. Multipole circuit breakers designed to automatically open all poles when an overload occurs on one pole.
- D. Do not substitute single-pole circuit breakers with handle ties for multipole breakers.
- E. Means for lock open of the circuit breaker shall be permanently installed.
- F. Provide NEMA rated molded case circuit breakers.
- G. Circuit breakers shall have minimum of 42ka symmetrical interrupting capacity.
- H. Circuit breakers shall be designed for continuous operation at rated current in a 40 degree C ambient temperature.
- I. Circuit breakers less than 225 ampere frame rating shall be molded case, 3 Pole, 600 Volt, fixed type, manually operated with stored energy closing mechanism. Circuit breakers shall have inverse time and instantaneous tripping characteristics.
- J. Trip performance for molded case circuit breakers must be analyzed prior to approval of submittal.
- K. Manufacturers:
 - 1. Square D
 - 2. Siemens
 - 3. Eaton
 - 4. General Electric

2.15 DC POWER SUPPLY

- A. 24 Vdc Loop Power for the level transducer shall be provided by a single-output DC Power Supply.
- B. Ratings:
 - 1. Input Voltage: 120 Vac, + 10% voltage adjustment
 - 2. Output Voltage: 24 Vdc single output.
 - 3. Output Current: 1.3 amperes, overload protected.
 - 4. Ambient Operating Temperature: -10-60 degrees C.
- C. UL Compliance: Power Supply shall conform to UL Standards and have an applied UL listing.
- D. Manufacturer: IDEC, Model PS5R-VC24.

2.16 ELAPSED TIME METER

- A. Units: Hours
- B. Analog
- C. Manufacturer:
 - 1. Eaton
 - 2. Honeywell
 - 3. Redington

PART 3 EXECUTION

3.01 GENERAL

- A. Install equipment in accordance with NECA 5055.

3.02 OUTLET AND DEVICE BOXES

- A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.
- B. Install plumb and level.
- C. Support boxes independently of conduit by attachment to building structure or structural member.
- D. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
- E. Open no more knockouts in sheet steel device boxes than are required; seal unused openings.

- F. Box Type (Aluminum Raceway System):
 - 1. Aluminum (die cast)
- G. Box Type (Rigid Galvanized Steel Raceway System, For use only on electric service pole):
 - 1. Exposed Raceways: Cast metal
 - 2. Concealed Raceways: Cast metal

3.03 JUNCTION AND PULL BOXES

- A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.
- B. Install pull boxes where necessary in raceway system to facilitate conductor installation.
- C. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.
- D. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.
- E. Installed boxes shall be accessible.
- F. Install plumb and level.
- G. Support boxes independently of conduit by attachment to building structure or structural member.
- H. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
- I. Boxes embedded in concrete or masonry need not be additionally supported.
- J. At or Below Grade:
 - 1. Install boxes for below grade conduits flush with finished grade in locations outside of paved areas, roadways, or walkways.
 - 2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
 - 3. Boxes shall not be installed in paved areas, roadways, or walkways.
 - 4. Use boxes and covers suitable to support anticipated weights.
- K. Flush Mounted:
 - 1. Install with concealed conduit.
 - 2. Holes in surrounding surface shall be no larger than required to receive box.
 - 3. Make edges of boxes flush with final surface.
- L. Mounting Hardware:
 - 1. Noncorrosive Areas: Galvanized. (For use only on electric service pole)

2. Corrosive Areas: stainless steel.

M. Type:

1. NEMA 4X, 316 stainless steel.

3.04 WIRING DEVICES

A. Switches:

1. Install with switch operation in vertical position.
2. Install single-pole, switches such that toggle is in up position when switch is on.

B. Receptacles:

1. Install with grounding slot down in vertical mounting, and with neutral slot up in horizontal mounting.
2. Weatherproof Receptacles:
 - a. Weather proof covers suitable for use in wet locations per NEC 406.9
 - b. Type: "in-use"
 - c. Install in cast metal box.
 - d. Install such that hinge for protective cover is above receptacle opening.
 - e. Receptacle shall be Ground Fault Circuit Interrupter type.
3. Ground Fault Interrupter: Install feed-through model at locations where ground fault protection is specified for "downstream" conventional receptacles.
4. Special-Purpose Receptacles: Install in accordance with manufacturer's instructions.

3.05 DEVICE PLATES

- A. Securely fasten to wiring device; ensure a tight fit to the box.
- B. Flush Mounted: Install with all four edges in continuous contact with finished wall surfaces without use of mats or similar materials. Plaster fillings will not be acceptable.
- C. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.
- D. Install with alignment tolerance to box of 1/16-inch.
- E. Types (Unless Otherwise Shown):
 1. Weatherproof.

3.06 TERMINAL JUNCTION BOX

- A. Label each block and terminal with permanently attached, nondestructible tag.
- B. Do not install on finished outdoor surfaces.
- C. Location:
 1. NEMA 250, Type 4X, 316 stainless steel.

3.07 LIGHTING AND POWER DISTRIBUTION PANELBOARD

- A. Install securely, plumb, in-line and square with walls.
- B. Install top of cabinet 6 feet above floor unless otherwise shown.
- C. Provide typewritten circuit directory for each panelboard.

3.08 SUPPORT AND FRAMING CHANNEL

- A. Furnish zinc-rich primer; paint cut ends prior to installation.
- B. Install where required for mounting and supporting electrical equipment and raceway systems.

3.09 CONTROL CABINETS

- A. Install securely, plumb, in-line and square with walls or structure.

Cabinets shall be mounted using manufacturer furnished mounting brackets so that no screws or bolts penetrate the cabinet.

END OF SECTION

SECTION 16451**GROUNDING AND LIGHTNING PROTECTION**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings:
 - 1. Product Data:
 - a. Exothermic weld connectors
 - b. Mechanical connectors
 - c. Compression connectors
 - d. Ground Rods
 - e. Surge Protective Device

1.02 UL COMPLIANCE

- A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

1.03 GROUNDING SYSTEM

- A. The grounding system is a solidly grounded neutral system that is multigrounded. The grounding electrode is the grounding rings formed by the conductors encircling the equipment and/or structures.
- B. Ground resistance measure 5 ohms or less. Contractor to add supplemental ground rod where necessary to achieve the resistance required.

PART 2 PRODUCTS

2.01 GROUND RODS

- A. Located as shown on the grounding site plan.
- B. Material: Copper Bonded.
- C. Size: $\frac{3}{4}$ ' x 10'
- D. Ground Enhancement Material (GEM) backfill, if required.
- E. Manufacturers: Erico, Inc.; ground rods and GEM backfill.

2.02 GROUND CONDUCTORS

- A. Conductor size as shown on the grounding site plan.
- B. As specified in Section 16120, CONDUCTORS.

2.03 CONNECTORS

- A. Exothermic Weld Type:
 - 1. Outdoor Weld: Suitable for exposure to elements or direct burial.
 - 2. Indoor Weld: Utilize low-smoke, low-emission process.
 - 3. Manufacturers:
 - a. Erico Products, Inc.; Cadweld and Cadweld Exolon
 - b. Thermoweld
- B. Below Grade Compression Type:
 - 1. Irreversible high strength compression.
 - 2. Pure wrought copper extrusion.
 - 3. Barrels prefilled with oxide-inhibiting and antiseizing compound and sealed.
 - 4. Manufacturers:
 - a. Burndy Corp, hyground compression system
- C. Above Grade Compression Type for Equipment Ground Connection:
 - 1. Single indentation for conductors 6 AWG and smaller.
 - 2. Double indentation with extended barrel for conductors 4 AWG and larger.
 - 3. Barrels prefilled with oxide-inhibiting and antiseizing compound and sealed. Specifically listed four ground connections
 - 4. All mechanical hardware, nuts, bolts and washers shall be high strength copper alloy.
 - 5. Manufacturers:
 - a. Burndy Corp

2.04 LOW-VOLTAGE SURGE/LIGHTNING ARRESTORS SURGE PROTECTIVE DEVICE (MAIN FUSED DISCONNECT SWITCH)

- A. Surge arrestor to be placed in a 304 stainless steel NEMA 4X enclosure at minimum.
- B. IEEE Exposure Category C.
- C. Install with lead lengths not greater than manufacturer requirements.
- D. Manufacturers:
 - 1. Eaton Model SPD 250 480Y 1 Q
 - 2. External Mounted.

2.05 SURGE PROTECTIVE DEVICE (POWER PANELBOARD)

- A. UL 1449 3rd Edition.
- B. IEEE Exposure Category C.
- C. Install with lead lengths not greater than manufacturer requirements.
- D. Manufacturers:

1. Eaton Model SPD 250 208Y 1M

PART 3 EXECUTION

3.01 GENERAL

- A. Grounding shall be in compliance with NEC Article 250, NFPA 70 and ANSI C2.
- B. Neutral to ground connections on the load side of the service entrance equipment shall be made only as permitted per the NFPA 70 in order to avoid parallel paths.
- C. Ground each separately derived system neutral in accordance with NEC 250-30. All connections will be connected to the grounding grid.
- D. Ground elements of the electrical rack as shown on Contract Drawings for dissipation of lightning energy into the earth.
- E. Bond together system neutrals, service equipment enclosures, exposed noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.
- F. Arrestors shall be installed in locations as shown on the Contract Drawings.
- G. Shielded Instrumentation Cables:
 1. Expose shield minimum 1 inch at termination to field instrument and apply heat shrink tube.
 2. Do not ground instrumentation cable shield at more than one point.
- H. Ground grid conductors to be installed not less than 30 inches deep.
- I. Contractor must pay close attention to NEC 250-23 and 250-24 to avoid the creation of parallel paths to ground

3.02 WIRE CONNECTIONS

- A. Ground Conductors: Install in conduit containing low voltage power conductors and control circuits above 50 volts.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to noncurrent carrying grounding bus.
- C. Connect ground conductors to raceway grounding bushings.
- D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.
- E. Connect enclosure of equipment containing ground bus to that bus.
- F. Bolt connections to equipment ground bus.

- G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.
- H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

3.03 MOTOR GROUNDING

- A. Motor frame shall be connected to the ground grid as indicated on the grounding site plan.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to noncurrent carrying grounding bus.
- C. Motors Less Than 10 hp: Furnish compression, spade-type terminal connected to conduit box mounting screw.
- D. Motors 10 hp and above: Tap motor frame or equipment housing; furnish compression, one-hole, lug type terminal connected with minimum 5/16-inch brass threaded stud with bolt and washer.
- E. Circuits 20 Amps or above: Tap motor frame or equipment housing; install solderless terminal with minimum 5/16-inch diameter bolt.

3.04 GROUND RODS

- A. Install ground rod full length with conductor connection at upper end. The ground rod shall be driven into undisturbed earth.
- B. If soil conditions prevent driving the ground rod to full length, installation shall be accomplished by augering a 3" diameter or larger hole and backfilling with compacted ground enhancement material.
- C. Install top of rod 6 inches below finished grade, unless otherwise shown.

3.05 CONNECTIONS

- A. General:
 - 1. Above Grade Connections: Use either exothermic weld, mechanical, or compression-type connectors.
 - 2. Below Grade Connections: Install exothermic weld or compression type connectors.
 - a. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
 - b. Notify OWNER prior to backfilling ground connections.
- B. Exothermic Weld Type:
 - 1. Wire brush or file contact point to bare metal surface.
 - 2. Use welding cartridges and molds in accordance with manufacturer's recommendations.

3. Do not use badly worn molds.
 4. Mold to be completely filled with metal when making welds.
 5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.
- C. Compression Type:
1. Install in accordance with connector manufacturer's recommendations.
 2. Install connectors of proper size for grounding conductors and ground rods specified.
 3. Install using connector manufacturer's compression tool having proper sized dies.
- D. Mechanical Type:
1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
 2. Install in accordance with connector manufacturer's recommendations.
 3. Do not conceal mechanical connections.
- 3.06 METAL STRUCTURE GROUNDING
- A. Ground metal sheathing and exposed metal vertical structural elements to grounding system.
 - B. Bond electrical equipment supported by metal platforms to the platforms.
 - C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.
- 3.07 HANDHOLE AND MANHOLE GROUNDING
- A. Install one ground electrode inside each where shown on drawing.
 - B. Ground Electrode Floor Protrusion: 4 to 6 inches above floor.
 - C. Make connections of grounding conductors fully visible and accessible.
 - D. Connect all noncurrent-carrying metal parts, and any metallic raceway grounding bushings to ground electrode conductor with No. 6 AWG copper conductor.
- 3.08 TRANSFORMER GROUNDING
- A. Bond neutrals of transformers to grounding grid.
- 3.09 SURGE PROTECTION EQUIPMENT GROUNDING
- A. Connect surge arrester ground terminals to equipment ground bus.

END OF SECTION

SECTION 16470**PANELBOARDS**

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install panelboard(s) as specified herein and as shown on the Drawings.
- B. The provisions of this Section shall apply to all panelboards, except as indicated otherwise.

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of Division 1 – General Provisions, Division 16 – Electrical and as specified herein.
- B. Submittals shall also contain information on related equipment to be furnished under this Specification. Incomplete submittals not containing the required information on the related equipment will be returned without review.
- C. Shop Drawings and Product Data. The following information shall be submitted to the Engineer:
 - 1. Master drawing index
 - 2. Bill of Material
 - 3. Front view elevation with dimensions
 - 4. Top view
 - 5. Nameplate schedule
 - 6. UL Listing
 - 7. Conduit entry/exit locations
 - 8. Assembly ratings including:
 - a. Short-circuit rating
 - b. Voltage
 - c. Continuous current
 - 9. Major component ratings including:
 - a. Voltage
 - b. Continuous current
 - c. Interrupting ratings
 - 10. Descriptive bulletins.
 - 11. Product data sheets.
 - 12. Cable terminal sizes
- 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 paragraph above.
- e. Field Test Reports

1.04 REFERENCE STANDARDS

- A. The low voltage panelboard assembly and all components in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):
 1. UL 67 – Panelboards
 2. UL 50 - Cabinets and Boxes
 3. NEMA PB-1 2006 - Panelboards
 4. NEMA AB1 Molded Case Circuit Breakers and their application
 5. Fed. Spec. W-P-115C
 6. Fed. Spec. W-C-375
- B. Operation and Maintenance Manuals.
 1. Equipment operation and maintenance manuals shall be provided in accordance with Section 16000.
 2. Instruction books and/or leaflets
 3. Recommended renewal parts list
 4. Drawings and information required by the Submittals part of this Section.

1.05 QUALITY ASSURANCE

- A. Manufacturer shall be ISO 9001 2000 or approved equal quality program.
- B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- C. Equipment submitted shall fit within the space shown on the Drawings. Equipment which does not fit within the space is not acceptable.

1.06 SYSTEM DESCRIPTION/DESIGN REQUIREMENTS (NOT USED)

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protect equipment during shipment, handling, and storage by suitable complete enclosures. Protect equipment from exposure to the elements and keep thoroughly dry.
- B. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Repaint damaged painted surfaces to the satisfaction of the Owner/Engineer.

- C. Equipment shall not be stored onsite without written approval of the Owner/Engineer. Equipment must be installed in its permanent location shown on the Drawings within seven (7) calendar days of arriving onsite. If the equipment cannot be installed within seven (7) calendar days, the equipment shall not be delivered to the site, but stored offsite, in an air conditioned, bonded, warehouse of the Contractor's choice and at the Contractor's expense, until such time that the site is ready for permanent installation of the equipment, unless the owner approves on-site storage.
- D. Shipping groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids. Breakers and accessories shall be packaged and shipped separately.
- E. Where space heaters are provided in equipment, provide temporary electrical power and operate space heaters during storage, and after equipment is installed in permanent location, until equipment is placed in service.

1.08 MAINTENANCE/SPARE PARTS (NOT USED)

1.09 WARRANTY/EXTENDED WARRANTY

- A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for a minimum of 2 years beginning after completion of the initial operation period as defined in Division 1 – General Provisions. 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.

PART 2 PRODUCTS

2.01 PRODUCTS

- A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable.
 - 1. ABB
 - 2. Square D
 - 3. Siemens
 - 4. Eaton
- 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.

2.02 GENERAL

- A. Rating
 - 1. Panelboard ratings shall be as shown on the Drawings. All panelboards shall be rated for the intended voltage.

2. Circuit breaker panelboards shall be fully rated for the specified circuit breaker fault current interrupting capacity. Series connected short circuit ratings will not be acceptable.

2.03 MATERIALS

A. Interiors

1. All interiors shall be completely factory assembled with circuit breakers, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for tinned copper wire of the sizes indicated.
2. Interiors shall be so designed that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without machining, drilling or tapping.
3. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.
4. A nameplate shall be provided listing manufacturer's name, panel type and rating. All nameplates shall be laminated plastic, black lettering on a white background, attached with stainless steel screws.

B. Busses.

1. All bus bars shall be tin-plated copper. Full size neutral bars shall be included. Phase bussing shall be full height without reduction. Cross connectors shall be tin plated copper.
2. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection.
3. Spaces for future circuit breakers shall be bussed for the maximum device that can be fitted into them.
4. Equipment ground bars shall be furnished.

C. Enclosure.

1. Interior areas: NEMA 1 or 12.
2. Exterior and Wet Location areas: NEMA 4X, stainless steel

D. Trim.

1. Hinged doors covering all circuit breaker handles shall be included in all panel trims.
2. Doors shall have semi flush type cylinder lock and catch, except that doors over 48 in. in height shall have a vault handle and 3 point catch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Furnish two keys for each lock. All locks shall be keyed alike; directory frame and card having a transparent cover shall be furnished on each door.

2.04 CIRCUIT BREAKERS

- A. Panelboards shall be equipped with circuit breakers with frame size and trip settings as shown on the Drawings.

- B. Circuit breakers shall be fully rated molded case, bolt in type.
- C. Each circuit breaker used in 208Y/120 Volt panelboards shall have an interrupting capacity of not less than 22,000 Amps, RMS symmetrical.
- D. Each circuit breaker used in 480Y/277 Volt and 480 Volt panelboards shall have an interrupting capacity of not less than 65,000 Amps, RMS symmetrical.
- E. Circuit breakers shall be as manufactured by the panelboard manufacturer.
- F. Single pole circuit breakers serving fluorescent lighting loads shall have the SWD marking. Circuit breakers serving air conditioning branch loads shall be U.L. listed as type HACR.

2.05 SURGE PROTECTION DEVICE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Current Technology; a subsidiary of Danahar Corporation.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Liebert Corporation.
- B. Surge Protection Device: IEEE C62.41-compliant, direct bus mounted, wired-in, solid-state, parallel-connected, with sine-wave tracking suppression and filtering modules, UL 1449, third edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:
 - 1. Accessories:
 - a. Fuses rated at 100-kA interrupting capacity.
 - b. Fabrication using bolted compression lugs for internal wiring.
 - c. Redundant suppression circuits.
 - d. Direct mounted to phase buses.
 - e. LED indicator lights for power and protection status.
 - f. Audible alarm, with silencing switch, to indicate when protection has failed.
 - g. Form-C contacts rated at 2 A and 125-V ac, one normally open and one normally closed, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 - h. Six-digit, transient-event counter set to totalize transient surges.
 - 2. Peak Single-Impulse Surge Current Rating: 65 kA per mode/130 kA per phase.
 - 3. Withstand Capabilities: 5,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.
 - 4. The UL assigned Voltage Protection Rating (VPR) shall be tested in accordance with UL 1449, third edition. Where an integral disconnect is provided, the VPR shall be determined with the integral device included. The VPR rating shall not exceed the values of the following Tables:

Voltage Protection Ratings (VPR)					
SPD Voltage Rating	System Configuration	L-N	N-G	L-G	L-L
120/208-240	Wye (or) Single-Split Phase	700	700	700	1200
277/480	Wye	700	700	700	1200

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount boxes for surface mounted panelboards so there is at least 1/2 in air space between the box and the wall.
- B. Connect panelboard branch circuit loads so that the load is distributed as equally as possible between the phase busses.
- C. Type circuit directories giving location and nature of load served. Install circuit directories in each panelboard.
- D. Install the panelboard in accordance with applicable codes at each location indicated on the plans. Provide filler plates for unused spaces in the panelboard.

3.02 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit
 2. Test continuity of each circuit.
- C. Tests and Inspections:
 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.

- b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
- c. Instruments and Equipment:
 - (i) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

END OF SECTION

SPECIFICATION 16921 APPENDIX A

PLC I/O LIST- FEATHERCREST LIFT STATION					
Parameter	Digital Input	Digital Output	Analog Input	Analog Output	Card Location
RACK #1 SLOT #1					
Wet Well Level			X		AI0
Discharge Pressure			X		AI1
SCADA Panel Temperature			X		AI2
Building Temperature			X		AI3
Future/Spare					AI4
Future/Spare					AI5
Future/Spare					AI6
Future/Spare					AI7
Future/Spare					AI8
RACK #1 SLOT #2					
Pump #1 HOA Switch in "Hand"	X				DN-1,IN0
Pump #1 HOA Switch in "Auto"	X				DN-1,IN1
Pump #1 Run Status	X				DN-1,IN2
Pump #1 High Temp	X				DN-1,IN3
Pump #1 Seal Leak	X				DN-1,IN4
Pump #1 Motor Overload	X				DN-1,IN5
Pump #1 Soft Start Fail	X				DN-1,IN6
Pump #1 Bypass Mode	X				DN-1,IN7
Future/Spare					DN-1,IN8
Future/Spare					DN-1,IN9
Future/Spare					DN-1,IN10
Pump #2 HOA Switch in "Hand"	X				DN-1,IN11
Pump #2 HOA Switch in "Auto"	X				DN-1,IN12
Pump #2 Run Status	X				DN-1,IN13
Pump #2 High Temp	X				DN-1,IN14
Pump #2 Seal Leak	X				DN-1,IN15
Pump #2 Motor Overload	X				DN-1,IN16
Pump #2 Soft Start Fail	X				DN-1,IN17
Pump #2 Bypass Mode	X				DN-1,IN18
Future/Spare					DN-1,IN19
Future/Spare					DN-1,IN20
Future/Spare					DN-1,IN21
Future/Spare					DN-1,IN22
Future/Spare					DN-1,IN23
Generator Trouble	X				DN-1,IN24
Generator Low Level Fuel	X				DN-1,IN25
Low Level Alarm	X				DN-1,IN26
High Level Alarm	X				DN-1,IN27
Control Power Fail	X				DN-1,IN28
Utility Power On	X				DN-1,IN29
Generator On	X				DN-1,IN30
Transfer Fail (Failsafe)	X				DN-1,IN31
RACK #1 SLOT #3					
Pump #3 HOA Switch in "Hand"	X				DN-2,IN0
Pump #3 HOA Switch in "Auto"	X				DN-2,IN1
Pump #3 Run Status	X				DN-2,IN2
Pump #3 High Temp	X				DN-2,IN3
Pump #3 Seal Leak	X				DN-2,IN4
Pump #3 Motor Overload	X				DN-2,IN5
Pump #3 Soft Start Fail	X				DN-2,IN6
Pump #3 Bypass Mode	X				DN-2,IN7
Future/Spare					DN-2,IN8
Future/Spare					DN-2,IN9
Future/Spare					DN-2,IN10

PLC I/O LIST- FEATHERCREST LIFT STATION					
Parameter	Digital Input	Digital Output	Analog Input	Analog Output	Card Location
Pump #4 HOA Switch in "Hand"	X				DN-2,IN11
Pump #4 HOA Switch in "Auto"	X				DN-2,IN12
Pump #4 Run Status	X				DN-2,IN13
Pump #4 High Temp	X				DN-2,IN14
Pump #4 Seal Leak	X				DN-2,IN15
Pump #4 Motor Overload	X				DN-2,IN16
Pump #4 Soft Start Fail	X				DN-2,IN17
Pump #4 Bypass Mode	X				DN-2,IN18
Future/Spare					DN-2,IN19
Future/Spare					DN-2,IN20
Future/Spare					DN-2,IN21
Blower #1 Run Status	X				DN-2,IN22
Blower #1 Overload	X				DN-2,IN23
Blower #2 Run Status	X				DN-2,IN24
Blower #2 Overload	X				DN-2,IN25
Future/Spare					DN-2,IN26
Future/Spare					DN-2,IN27
Building Door Open	X				DN-2,IN28
Future/Spare					DN-2,IN29
Future/Spare					DN-2,IN30
Future/Spare					DN-2,IN31
PLC I/O Capacity					
Estimated Point Count	45		4		
Module Capacity	32		8		
Number of Modules Required	2		1		

SECTION 16921**SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM
AND LOCAL STATION CONTROL AND MONITORING**

PART 1 GENERAL

1.01 SCOPE

- A. Contractor shall furnish all labor, materials, and components, and shall provide all design, assembly, licensing and start-up services, as specified herein and as shown on the Contract Drawings.
1. Contractor will be responsible for HMI SCADA System, programming, at the Owner's Production Control Center (PCC).
 2. Contractor will be responsible for programming the Local PLC System.
 3. Contractor to provide latest version of RS Studio 5000 Logix Designer, Standard Edition, Part number 9324-RLD300ENE.
 4. SCADA panel to be designed and certified to UL 508A standards.
- B. Contractor General Qualifications
1. Have a local office within one hundred (100) miles of the City of San Antonio.
 2. Be able to provide resumes, project experience history and references for all employees that will be qualified to work on the SCADA system.
 3. Have a local full time staff of employees that have developed and commissioned a minimum of three new Allen Bradley based systems within the past twelve months. Must have a minimum five years' experience designing, installing and commissioning SCADA systems.
 4. Have a minimum of three local full time employees qualified to perform the SCADA system configuration work.
 5. All proposals submitted to the San Antonio Water System must be accompanied by documentation supporting the qualifications of the Contractor as detailed above. The San Antonio Water System reserves the right to reject any proposal if the above qualifications are not met.
- C. The control, monitoring and SCADA system shall include, but is not limited to, the following component equipment:
1. SCADA PLC Panel to include:
 - a. PLC Processor.
 - b. PLC modules, chassis, and power supplies.

- c. 24Vdc power supply.
 - d. Surge protection.
 - e. UPS
 - f. Heater
 - g. All local indication and local control devices specified herein or indicated on the Contract Drawings.
 2. Raco Verbatim Autodialar
 - a. Autodialer
 - b. All local indication and local control devices specified herein or indicated on the Contract Drawings.
 3. Radio Transceiver and accessories
 4. Communication Panel to include
 - a. Industrial Grade Router
 - b. Radio Transceiver System.
 - c. Cambium POE Injector
 - d. SMA-JE to THCFE adaptor
 - e. All local indication and local control devices specified herein or indicated on the Contract Drawings.
- D. The Application Service Provider (ASP) shall schedule and conduct separate workshops as further defined in this specification section.
- E. The SCADA system shall be furnished in accordance with the requirements stated herein to assure compatibility with Owner's existing facilities and systems. No deviation from specified equipment will be allowed.

1.02 SUBMITTALS

- A. Pre-submittal Conference
 1. Prior to the Submittal Process, the Application Services Provider (ASP) shall hold a workshop, in which the Engineer and Owner may observe the displays and control strategies prior to submitting database, trends, graphics, reports, and control strategies. No display generation, programming, etc. shall begin until standards have been approved.
 2. Prior to commencement of any applications work, the ASP shall submit and receive approval from the Owner and Engineer for all required I/O Lists.
- B. The manuals shall contain all illustrations, detailed drawings, wiring diagrams, and instructions necessary for installing, operating, and maintaining the equipment. The illustrated parts shall be numbered for identification. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable. All such illustrations shall be incorporated within the printing of the page to form a durable and permanent reference book.

- C. If the Process Control Systems Integrator (PCSI's) transmits any documentation or other technical information which he considers proprietary, such information shall be designated. Documentation or technical information which is designated as being proprietary will be used only for the design, construction, operation, or maintenance of the System and, to the extent permitted by law, will not be published or otherwise disclosed.
- D. CONTRACTOR shall submit the following in addition to the information in item A:
 - 1. Bill of Materials
 - 2. Catalog Cuts
 - 3. Component Data Sheets
 - 4. Panel Construction Drawings, including wiring and component layout
 - 5. List of Labels and Tags
 - 6. Include power supplies, network switches, signal isolators and other equipment as listed in this specification.
 - 7. CONTRACTOR shall submit control loop drawings complete with rack, card slot and point configuration.
 - 8. CONTRACTOR shall submit calculations as required.
 - 9. Proposed HMI SCADA System Screens.

1.03 OPERATION AND MAINTENANCE MANUAL

- A. CONTRACTOR shall provide the final O & M manual which shall contain a complete set of as-built control loop and wiring drawings in "11x17" format. Manual shall be submitted to OWNER electronically in PDF format on a CD.
- B. Complete and tested PLC Programs will be provided by CONTRACTOR to be inserted in the final O&M manual.

1.04 PLC INPUT/OUTPUT POINT LIST

- A. The Input/Output (I/O) Point List is attached to this specification as Appendix "A" and indicates nomenclature, and signal functions, and defines the scope of interface requirements for this project. All analog I/O shall be 4-20ma.
- B. The quantity of Input/Output modules furnished shall not be less than shown in the PLC I/O capacity summary in Appendix "A". Input/Output modules shall have the capacity to accommodate for an additional 25% spare I/O points. Otherwise an additional input/output module is required.
- C. Field wiring to complete all interconnections listed in the I/O are included in the Contractor's scope of work whether or not shown on the Contract Drawings.

- D. All spare points to be wired to terminal blocks.

1.05 PLC SYSTEM PROGRAMMING

- A. Programming of the PLC CPU will be provided by CONTRACTOR. CONTRACTOR shall coordinate with SAWS Inspector regarding witnessed SCADA testing.

1.06 HMI SYSTEM PROGRAMMING

- A. Programming of the HMI will be provided by CONTRACTOR. CONTRACTOR shall coordinate with SAWS Inspector regarding witnessed SCADA testing.

1.07 AUTO DIALER INPUT/OUTPUT POINTS

- A. The Input/Output (I/O) Points are shown on contract drawings
- B. Field wiring to complete all interconnections for the I/O shown on plans are included in the Contractor's scope of work whether or not shown on the Contract Drawings.

1.08 AUTO DIALER SYSTEM PROGRAMMING

- A. Programming of the Auto Dialer will be provided by contractor. CONTRACTOR shall provide coordinate with SAWS Inspector regarding witnessed SCADA testing.
- B. Contractor shall provide programmed auto dialer and shall document all I/O terminations. Contractor will provide field tracing for any programmed loop that does not function.

PART 2 PRODUCTS

2.01 SCADA PANEL

1. General:
2. Install PLC, 24Vdc power supply, interposing relays, power supplies and interface wiring terminals.
3. Provide mounting hardware, terminal blocks, circuit breakers, electrical wiring, communications wiring and all other items required for a complete operational system.
4. Panel layout and fabrication shall allow for convenient maintenance and removal of all equipment after installation.
5. Provide switched LED interior panel light and receptacle. Also provide one single non-GFCI receptacle dedicated to UPS.
6. Provide an enclosed thermostat controlled space heater with fan rated at 120Vac and sized to prevent condensation within the SCADA panel. Locate heater to avoid overheating electronic hardware or producing large temperature fluctuations on the hardware. The thermostat shall have an adjustment range of 40 degrees Fahrenheit

to 90 degrees Fahrenheit. Heater shall have circuit breaker as shown on the contract drawings shall be Hoffman type DAH or equal.

- 7. Provide an enclosed thermostat controlled file fan rated at 120Vac. Filter fan to vent the heat out of the SCADA enclosure into the Electrical Building.
- 8. Provide UL508A certification label on panel.

B. Wiring:

- 1. Internal wiring for control and low voltage power circuits shall be flame retardant NFPA 70, Type SIS, single conductor, Class B, stranded copper, rated 600 volts. Minimum wire size shall be #14 AWG.
- 2. Analog signal wiring shall be #16 AWG twisted shielded pairs with drain wire and outer jacket. Refer to section 16120.
- 3. Segregate signal wiring from control wiring, group functionally and arrange to facilitate tracing of circuits.
- 4. Arrange wiring on terminal blocks to segregate field incoming conductors on a common side separate from internal wiring.
- 5. Wire routing and bundling shall utilize wiring duct and plastic wire wrap, secured to the structure and with spare space.
- 6. Color code wiring as follows:
 - a. AC power at line voltageBlack
 - b. AC switched powerRed
 - c. Ground/earth ground..... Green or green w/ yellow tracer
 - d. Ungrounded DC power..... Blue
 - e. DC grounded commonBlue w/ white stripes or white w/ blue stripes
 - f. 4-20mA Twisted shielded pair Red+/Black-

C. Terminal Blocks:

- 1. Provide screw type 600 volt terminal blocks with pressure plate and marking strip. Do not use miniature terminal blocks.
- 2. Provide a minimum of 25 percent spare terminals.
- 3. Group interface terminals together.

D. Grounding:

- 1. Provide a ground bus connected to rack structure ground for grounding shields, cabinet, and components.
- 2. DC signal common shall be ungrounded.

E. Enclosure:

1. Enclosure shall be a NEMA 12 cabinet.
2. Doors shall have three-point latch with lockable hasp, and shall have full length hinges with stainless steel pins. Lock to be keyed for Owner's key.
3. Fabricate using mild steel. Grind and sand welds to a smooth finish. Surfaces shall be free of ridges, nuts, and boltheads.
4. Internal structural framing to provide enclosure bracing and equipment support.
5. Provide removable lifting lugs, with plugs for use after installation is complete.
6. Enclosure shall be complete with interior back panels, as required for component mounting. Interior shall be white.
7. Provide a print pocket on inside of each door.
8. Provide laminated wiring schematics of the entire panel.
9. Provide a foldable lap top table installed inside the SCADA panel door.

F. Devices:

1. Reference is made to Section 16050, BASIC ELECTRICAL MATERIALS AND METHODS, for devices not specified in this Section or on the Contract Drawings.
2. Interposing relays, auxiliary relays, and selector switches shall be as indicated on Contract Drawings. Interposing relays used for isolation purposes only shall be SPDT type.
3. Surge protective device for power main shall be Phoenix contact EMC filter surge protection device mounted using DIN-rail assembly in the SCP, P/N 2856702.
4. Temperature sensor shall be Ultra Electronics model # 753-PC-X4-(0°F to 150°F) transmitter with RTD.

G. Nameplates, Labels and Tags:

1. Furnish face-of-panel mounted nameplates to identify systems and equipment. Use plastic laminate nameplates having white letters on red background for 120V system equipment, and white letter on blue background for 24V system equipment. Center lettering on each line.
2. Use plastic tags with letters on a red (120V) and blue (24V) background in the panel interior to identify each device mounted on the panel exterior and interior. Place the tags adjacent to, but not on, the device. Do not obstruct visibility by wire bundles or other equipment.

2.02 PROGRAMMABLE LOGIC CONTROLLER (PLC) SYSTEM

A. Subject to compliance with the Contract Documents, the following manufacturer is acceptable:

1. Rockwell Automation Allen Bradley CompactLogix 5370 Controller with Studio 5000 Logix software (or latest version currently in use by SAWS).
2. PLC processor
3. PLC modules, chassis, and power supply
4. Connection bases
5. All connection cables
6. 25% spare capacity on all I/O modules

B. Approved Products – NO SUBSTITUTIONS

DESCRIPTION	MANUFACTURER	PART NUMBER
Power Supply Module	Allen Bradley	1769-PA4
CPU	Allen Bradley	1769-L33
Analog Input Cable	Allen Bradley	1492-ACAB025EE69
Digital Input Cable	Allen Bradley	1492-CAB025RTN32I
32 Channel Digital Input Module	Allen Bradley	1769-IQ32
8 Channel Analog Input Module	Allen Bradley	1769-IF8
CPU Battery	Allen Bradley	1769-BA
Right End Cap/Terminator	Allen Bradley	1769-ECR
Left End Cap/Terminator	Allen Bradley	1769-ECL
Right to Right bank interconnection	Allen Bradley	1769-CRR3
Right to Left bank interconnection	Allen Bradley	1769-CRL3

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions.

C. Programming – Local PLC:

1. The PLC shall use Studio 5000 Logix (or latest version) software for programming the CPU.
2. Software license shall be relinquished to SAWS.

3. PLC Programming shall be performed by Process Control Systems Integrator (PCSI).
 4. Recommended PCSIs:
 - a. Prime Controls
Office Park Circle
Lewisville, Texas 75057
Attn: Gary McNeil
Phone: 972.221.4849
 - b. Control Panels USA
16310 Bratton Lane, Suite 100
Austin, Texas 78728
Attn: Martin Salyer
Phone: 512.863.3224
 - c. Richardson Logic Control
8115 Hicks Hollow
McKinney, Texas 75071
Attn: Michael Cunningham
Phone: 972.542.7375
- D. Programming Languages
1. The PLC program shall utilize function blocks that are compatible with Rockwell PlantPAX system.
 2. Shall adhere to SAWS Standards for Tagging, etc.
- E. Programming – Owner’s Production Control Center:
1. Programming of the Rockwell Automation system at the Owner’s Production Control Center (PCC) shall be performed by the Applications Services Provider (ASP). Contractor shall coordinate with SAWS Inspector in order to notify SAWS Programming Manager about the programming of SCADA HMI graphics 15 calendar days prior to submitting the actual construction drawings of the SCADA Panel.
 2. The ASP shall perform all work necessary to configure, customize, debug, install, connect, and place into operation HMI and SCADA software specified within this Division and other related divisions. The PCSI shall coordinate with the ASP all scheduling, installation, and startup services. The PCSI shall be on site at all times when the ASP is working on site.
 3. The ASP shall be the following:
 - a. Recommended PCSI from above.
- F. Programming Languages
1. The PLC program shall be Function Block Diagram (FBD).

2. Refer to SAWS Standards for Tagging, etc.

G. Input / Output Capacity

1. Physical Input / Output capacity shall not be less than the following:
 - a. Analog – 256
 - b. Discrete – 1024

2.03 120 VAC UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. Provide power conditioning during normal power operation.

1. Lightning and surge protection: Tested to ANSI/IEEE C62.41 Category A.
2. RF noise isolation: EMI/RFI suppression.
3. On-Line input range: 100-142 Vac, output 112-128 Vac.

B. Upon loss of feeder power to UPS, maintain power to the load for a minimum of 2 hours with 4 msec transfer time at 125% of constant load. Contractor to submit load calculation of proposed components and indicate the size of UPS needed for a 2 hour run time.

C. Ratings:

1. Volt – Ampere Capacity: UPS to be sized to run devices in SCADA panel including PLC, Radio, Auto Dialer and DC Power Supplies located in the SCADA panel for 2 hour run time.
2. Nominal Input Voltage: 120 Vac.
3. On-Battery Output Voltage: 120 Vac +/- 10%.
4. On-Battery Frequency: 60 Hz. Stepped sine wave.
5. Ambient Operating Temperature: 0-40 degrees C.

D. Battery shall be a sealed maintenance-free lead acid type with 3-year minimum life.

E. UL Compliance: UPS shall conform to UL Standards and have an applied UL listing.

F. UPS shall have Ethernet connectivity. Provide Network Card-MS for communications. UPS memory registers shall be configured by Contractor to work with SCADA system.

G. Manufacturer: Contractor to verify that the UPS will have a minimum runtime capacity of 2 hours at 125% of constant load in watts for the SCADA panel.

1. Powerware 5PX 1000 RT with extended battery module 5PXEBM48R or larger based on VA calculation as specified above. Contractor to verify that the UPS will have a minimum runtime capacity of 2 hours with SCADA panel fully loaded.

2. Tripp Lite SmartOnline SU/*750/1000/1500/2200/3000 XLCD
 - a. UPS shall be provided with an
 - (i) SNMPWEBCARD card
 - (ii) Model BPV2470. Extended Runtime Batteries for 2 hours runtime at 125% of constant load in watts.

*Size determined by contractor based on 2 hour runtime at 125% constant load.

2.04 DC POWER SUPPLY

- A. 24 Vdc Control Power shall be provided by a single-output DC Power Supply.
- B. Ratings:
 1. Input Voltage: 120 Vac, + 10% voltage adjustment
 2. Output Voltage: 24 Vdc single output.
 3. Current range ≥ 8 A, overload protected.
 4. Rated power ≥ 200 W
 5. Voltage adjust range: 22V-26.4V
 6. Frequency range: 47-63 hz
 7. Efficiency: 85%
 8. Ambient Operating Temperature: -10-60 degrees C.
- C. UL Compliance: Power Supply shall conform to UL Standards and have an applied UL listing.
- D. Manufacturer:
 1. IDEC, Model PS5R-SC24
 2. MEAN WELL, Model SP-200-24
 3. POWER-ONE, Model HN24-3.6-A.

2.05 COMMUNICATION PANEL

- A. Panel shall be American Products AM-202822-9RU beige color, NEMA 3R Enclosure. Must have UL 94 compliant bulb gasket. Panel to include the following.
 1. Wall mounting hardware shall be American Products AM-2418-WM.
 2. Backpanel shall be American Products AM-202822-WB.

3. Isolated Ground Bar shall be American Products AM-2X6-RB. Exhaust fan shall be American Products AM-2418-FP-115.
 4. Telecommunication 19" Rack Grounding bus bar shall be Harger TRGBHKIT14119.25 or American Product AM-2X6RB
- B. Provide mounting hardware, terminal blocks, circuit breakers, electrical wiring, communications wiring and all other items required for a complete operational system.
- C. Panel layout and fabrication shall allow for convenient maintenance and removal of all equipment after installation.
- D. Provide switched LED interior panel light. Also provide One duplex receptacle.
- E. Provide UL508A certification label on panel.
- F. Industrial Grade Router (Communications Cabinet)
1. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
 - a. Cisco model IR829GW-LTE-VZ-AK9
- G. 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.
- H. Environmental:
1. Operating temperature in sealed NEMA Cabinet with no air flow: -40°F to 140°F
 2. Operating altitude: 13,800 ft.
 3. Mounting Options: Must be 19" self supporting.
- I. Physical:
1. Enclosure: Fully Modular construction to allow for field upgrades for existing and/or future technologies without requiring a platform replacement. Refer to section 2.1.D for additional requirements.
 2. Provide an enclosed thermostat controlled fan rated at 120Vac. Filter fan to vent the heat out of the enclosure into the Electrical Building.
 3. Power supply: 120VAC from UPS in SCADA Panel.
 4. Microprocessor based managed type.
 5. 19 inch rack mountable where shown in plans.
- J. Options and Accessories Required:

1. Provide twenty (20) percent spare port capacity for each port type.
2. Provide redundant power supply module Cisco PWR-125W-AC
3. WPA Antenna WMMG-7-27-5SP.
4. Female Adapter SMA-TNC.
5. Lighting Arrestor CGR-LA-NF-NF
6. Provide two (2) year extended maintenance: CON-SNT-IR82VZAK

2.06 RADIO TRANSCEIVER SYSTEM

- A. Contractor shall furnish and install the 5GHz broadband type radio system with the following features.
1. Integrated High Gain 5GHz PMP450i Subscriber:
 - a. Manufacturer: Cambium Networks
 - b. Part number: C050045C002C
 2. Tilt Bracket Assembly:
 - a. Manufacturer: Cambium Networks
 - b. Part number: N000045L002A.
 3. Power Injector:
 - a. Midspan DC power 60w
 - b. Manufacturer: Microsemi
 - c. Part number: PD-9501GI/DC
 4. Power cord:
 - a. Manufacturer: Cambium Networks
 - b. Part number: C0000065L007
 5. Lightning Protection:
 - a. Manufacturer: Cambium Networks
 - b. Part number: C000065L007
 6. Pole Mounting Kit:
 - a. Manufacturer: PolyPhaser
 - b. Part number: IX-POLE-KIT
 7. Surge Protection:
 - a. Manufacturer: Transector
 - b. Part number: ALPU-F140
 8. POE Injector:

- a. Manufacturer: Cambium Networks
 - b. Part number: N000065L001B
 - 9. Grounding Kit:
 - a. Manufacturer: Cambium Networks
 - b. Part number: C00006L007
 - B. Feedline:
 - 1. Broadband: TIA/EIA 568B OSP CAT 6, #23 AWG Ethernet Outdoor, UL Listed, 23 AWG with waterproof watertight rated IP67 rated RJ45 connectors at each ends. (Not to exceed 300 feet) cabling will be Superior ESSEX Type BBDGe cable, copper clad cabling, Part number Enduragain OSP Shielded Superior ESSEX 04-001-64, NO SUBSTITUTIONS.
 - C. Waterproof- all connections must be waterproof as per IEC 60529 IP67 2.6 ANTENNA MAST
 - D. Refer to specification 17600, ANTENNA TOWER for details
 - E. Programming:
 - 1. Radio programming shall be performed by contractor. SAWS Information Services will program-Security Risk.
- 2.07 AUTODIALER
- A. Contractor shall provide and install a new complete and operational new autodialer system. Autodialer System to be a Verbatim Gateway Series VPLC Autodialer with an expandable 32 digital input module. The autodialer is to use a standard rotary pulse or touch-tone "dial-up" phone line (installed by contractor) and is to be F.C.C. approved. Connection to the telephone is through 4-pin modular jack (RJ-11).
 - B. Contractor to coordinate with the phone company to get communication lines to the electrical building for the autodialer.
 - C. NEMA 12 Control panel for Autodialer to be mounted to the wall as shown on plans. Refer to section 2.1.D for additional requirements
 - D. Manufacturer:
 - 1. Raco Verbatim Gateway Series VPLC Autodialer with expandable 32 digital input monitoring module.
- PART 3 EXECUTION
- 3.01 COORDINATION MEETING
- A. The ASP shall be responsible to coordinate the work with the PCSI and/or the Contractor. The ASP shall schedule and administer a minimum of two mandatory control system

coordination meetings. The ASP shall make arrangements for meetings and prepare/distribute an agenda a minimum of one week before the scheduled meeting date.

3.02 INSTALLATION

A. General

1. SCADA PLC Panel shall be a freestanding enclosure mounted to a wall with bolts of sufficient size and number for load conditions. Contractor shall install all interconnect wiring from the SCADA PLC Panel to field equipment and devices, except where the field device is future and has no provision for wiring termination.

B. Follow procedures, instructions, and check sheets provided by the manufacturers for proper installation of their equipment.

3.03 FIELD QUALITY CONTROL

A. In accordance with Section 16950 – ELECTRICAL TESTING.FUNCTIONAL TEST

B. PLC program shall be installed on the PLC by CONTRACTOR. Programmers shall provide assistance with testing the I/O from the field to the SAWS SCADA system once the field I/O and the communications systems have been fully checked out

C. Contractor shall be responsible for testing the field I/O to the PLC panel.

3.04 STARTUP AND COMMISSIONING

A. Contractor shall coordinate the startup and commissioning efforts. Contractor shall develop the startup and commissioning plans and the check out forms.

B. Contractor shall coordinate with SAWS (startup and commissioning phases).

3.05 TRAINING

A. Programmable Logic Controller (PLC) Hardware and Software and HMI System Software:

1. Provide 32-40 hours of manufacturer's standard training course for five (5) of the Owner's personnel in the operation, configuration, programming, installation, and maintenance of the HMI System software, SAWS Programmer staff will provide the Rockwell course number at a later date.

2. The hardware and software courses shall not be concurrent.

3. The following hardware training shall be provided as a minimum:

- a. Hardware maintenance for the PLC equipment provided
- b. Test, adjustment, and calibration procedures
- c. Troubleshooting and diagnosis
- d. Component removal and replacement

- e. Periodic maintenance
- 4. The following software training shall be provided as a minimum:
 - a. System configuration
 - b. Application specific program development/programming
 - c. Uploading/downloading programs
 - d. Documenting program/configuration
 - e. System backups and reload procedures
 - f. TCP/IP addressing procedures
 - g. Network communications configuration

END OF SECTION

SECTION 16930
INSTRUMENTATION

PART 1 GENERAL

1.01 SCOPE

- A. Contractor shall furnish, install, calibrate and test instrumentation for monitoring and control, for the following lift station process functions:

1. Discharge Pressure Transmitter
2. Level Controller
3. Submersible Level Transducer with weight
4. Level Float Switch

1.02 RELATED WORK (NOT USED)

1.03 SUBMITTALS

- A. Shop Drawings:

1. Bill of Materials
2. Catalog Cuts
3. Component Data Sheets

1.04 REFERENCE STANDARDS (NOT USED)

1.05 QUALITY ASSURANCE (NOT USED)

1.06 SYSTEM DESCRIPTION/DESIGN REQUIREMENTS (NOT USED)

1.07 DELIVERY, HANDLING AND STORAGE (NOT USED)

1.08 MAINTENANCE/SPARE PARTS (NOT USED)

1.09 WARRANTY/EXTENDED WARRANTY (NOT USED)

PART 2 PRODUCTS

2.01 GENERAL

- A. All devices shall be Factory Mutual (FM) approved.

1. Explosion Proof for Class I Division 1 Group B, C, and D.
2. Dust-Ignition Proof for Class II and Class III, division 1, group E, F and G.

3. Suitable for Indoor and Outdoor Hazardous locations.
 4. Factory Sealed.
- B. Hardware:
1. All hardware used for outdoor instrument mounting shall be Stainless Steel or Double Dipped Galvanized steel.
- C. Instrument Stand:
1. 2" Schedule 80 Double Dipped Galvanized steel pipe.
- D. Process Pipe:
1. All tubing and fitting shall be made of 316 Stainless Steel.
- 2.02 DISCHARGE PRESSURE TRANSMITTER
- A. Electronic Gage Pressure Transmitter:
1. Local and remote indication.
 2. Provide with Ray self-cleaning pressure snubbers.
 3. Local indication LCD meter scaled in PSI (0-150 PSI) and mounted integral to the transmitter. Transmitter operation ranges should operate at bottom 25% of full-scale range of transmitter.
 4. Outdoor application:
 - a. NEMA 4 housing
 - b. View port for local indication
 - c. Stainless steel flanges
 - d. 2" pipe mount
 5. Stainless Steel certification tag for Factory Mutual (FM) Explosion Proof rating.
- B. Ratings:
1. Overpressure Limit without damage: 1500 psi
 2. Input Range: 150 psi
 3. Accuracy: +/- 0.075% of span
 4. Analog Output: 4 – 20 mA
 5. Power Supply: 24 Vdc
 6. Operating Temperature Limits: -4 to 175 degrees F

C. Manufacturer: Rosemount, Model: 2088, Model Number 2088G2S22A1B4E5M4S1.

2.03 LEVEL CONTROLLER

A. Level monitoring controller:

1. Local and remote indication
2. Non-contacting level instrument
3. Mounted in level control panel

B. Ratings:

1. Relays: 4 Form A, 5 Amp, 250 Vac and 2 Form C, 5 Amp, 250 Vac
2. Power Supply: 110-120 Vac
3. Ambient Temperature: -5 to 122° F
4. Outputs: (2) 4-20 mA
5. Inputs: (1) analog, (2) digital
6. Transducer: Refer to 2.4.

C. Manufacturer:

1. Siemens Milltronics HydroRanger 200

2.04 SUBMERSIBLE LEVEL TRANSDUCER

A. Ratings:

1. Output: 4-20 mA
2. Power supply: 13–30 V DC, two-wire system
3. Capacitive 316 Stainless Steel Sensor
4. Contractor shall add a 10 lb weight of 316 stainless steel bolted to instrument.
5. Range 20 psi (46.2 ft wc)
6. Cable: ETFE

B. Manufacturer: Mercoid Model PBLTX-20-60.

2.05 LEVEL FLOAT SWITCH

A. Shall be suitable for wastewater applications.

- B. Shall have non-mercury construction.
- C. Float control junction box must be located on top of the wet well and be made of PVC.
- D. Maximum Applied Voltage: 250 Vac.
- E. Manufacturer:
 - 1. Flygt ENM-10, or equal.

2.06 BUILDING INTRUSION SENSOR

- A. Manufacturer: Interlogix 1076, or equal

PART 3 EXECUTION

3.01 PRESSURE TRANSMITTERS

- A. Shall be installed with heat trace freeze protection around the fluid housing of the instrument and all piping, valves, and fittings.
- B. Installation of the process line:
 - 1. A saddle shall be used per project plans.
 - 2. A 1/2" NPT block (root) valve shall be installed for the isolation of the process from the pressure device.
 - 3. A 1/2" NPT to 1/4" NPT bushing will be installed on the isolation valve to bush down to allow for the installation of 1/4" static or process lines from the process to the pressure measuring device.
 - 4. A 4" expansion loop shall be made after a 1' straight run off the root valve.
 - 5. A 1/4" tubing isolation valve shall be installed and a calibration port shall be installed at the device for bleeding off pressure and calibrations can be performed.

3.02 LEVEL CONTROLLER AND TRANSDUCER

- A. Location to be approved by Owner.
- B. Install transducer in accordance with manufacturer's instructions and recommendations.
- C. Controller shall be installed in a control panel as shown on Contract Drawings and in accordance with Section 16050, Paragraph 2.10.
- D. Programming and set up of the controller shall be done following manufacturer's recommendation and instruction.
 - 1. The Owner will determine the elevations that will activate the relays.

3.03 CONDUIT AND IDENTIFICATION

- A. When the use of flexible conduit is required, a minimum of 18" shall be provided but the flexible conduit shall not exceed 36".
- B. All Instrumentation runs shall be the full length of the conduit. No splices will be allowed.
- C. The following nomenclature shall be used for identification:
 - 1. tag # (0-10) for instrumentation info: tags, devices type and termination point
 - 2. jb# (0-10) for junction box, power panel lighting panel and termination point
 - 3. r# (0-10) for rack location and termination point
 - 4. s# (0-10) for slot location and termination point
 - 5. p# (0-10) for point location and termination point

3.04 TESTING

- A. Full testing (loop check) shall be done on all instrumentation and all SCADA I/O points and will be witnessed by the owner.
- B. A calibration sheet shall be supplied for all the instruments and at the time of any instrument test.
 - 1. Analog device calibration sheet shall include the following:
 - a. Time of calibration
 - b. Date of calibration
 - c. Name of the person performing the calibration
 - d. Name of the witness, Owner
 - e. Test equipment used and their calibration dates
 - f. Device identification S/N, device name and tag number
 - g. As found voltage reading
 - h. As left voltage reading
 - i. As found milliamp reading @ 0%, 25%, 50%, 75%, and 100%
 - j. As left milliamp reading @ 0%, 25%, 50%, 75%, and 100%
 - k. Calibration ranges
 - l. I/O points
 - 2. I/O point data sheet for each I/O analog and discrete through SCADA
 - a. Field point location
 - b. Analog or Discrete
 - c. Software point location
 - d. Point function
 - e. Time of verification

- f. Date of verification
- g. Name of the person verifying the point
- h. Name of the witness, Owner

END OF SECTION

E-54 Regional Lift Station, San Antonio Water System Job No. 22-2502

SCHEDULE OF MANUFACTURERS AND SUPPLIERS

The Contract Documents are based upon the equipment or products available for the manufacturers/suppliers denoted as "a", "b", etc., below. Bidder must indicate which manufacturer/supplier the bid was based upon by circling one of the listed suppliers/manufacturers. If the Bidder circles more than one listed supplier, the bidder must use the first supplier circled (unless an approved equal is authorized following the award of the construction contract). Bidder shall provide this schedule of manufacturers and suppliers with circled items with bid packet (refer also to Bid Packet Checklist).

Specification Number	Equipment	Approved Manufacturer or Supplier
09910	Coating (for exposed equipment outside the wet well)	<ul style="list-style-type: none"> a) Tnemec b) Sherwin-Williams c) PPG d) M.A.B. Paints
09910	Existing Concrete Manhole Coatings *Cementitious products c, d, e,f also require subsequent epoxy coating: g, h, or i	<ul style="list-style-type: none"> a) Kerneos b) Permaform c) Strong-Seal* d) Standard Cement Material, Inc.* e) Quadex* f) ConShield* g) Sherwin Williams* h) Quadex* i) Raven* j) Warren Environmental
09910	Concrete Wet Well Lining	<ul style="list-style-type: none"> a) Warren Environmental b) Sherwin Williams c) Quadex d) SAWS- approved equal
11000	Submersible Pumps	<ul style="list-style-type: none"> a) Xylem, Inc. - Flygt
131200	Electrical Building	<ul style="list-style-type: none"> a) <i>AES Precast Company, Inc.</i> b) <i>Concrete Modular Structures(CMS)</i> c) <i>Crest Precast, Inc.</i> d) <i>EASI-SET™/EASI-SPAN</i> e) <i>Lonestar Prestress Mfg., Inc.</i> f) <i>Modular Connections, LLC</i> g) <i>Oldcastle Precast, Inc.</i> h) <i>Speedfab</i>

E-54 Regional Lift Station, San Antonio Water System Job No. 22-2502

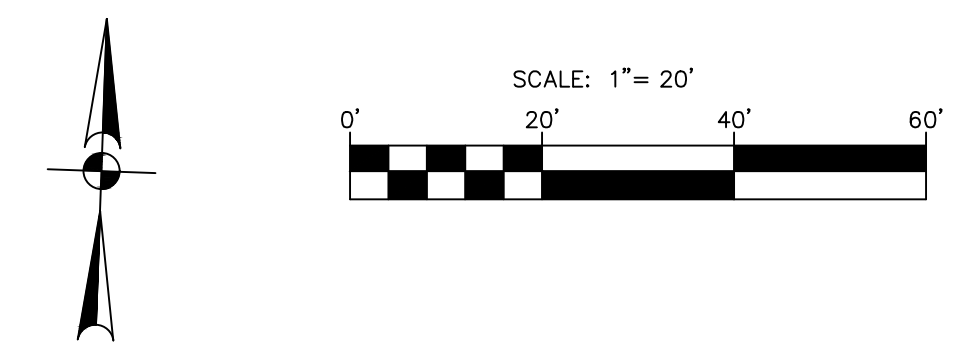
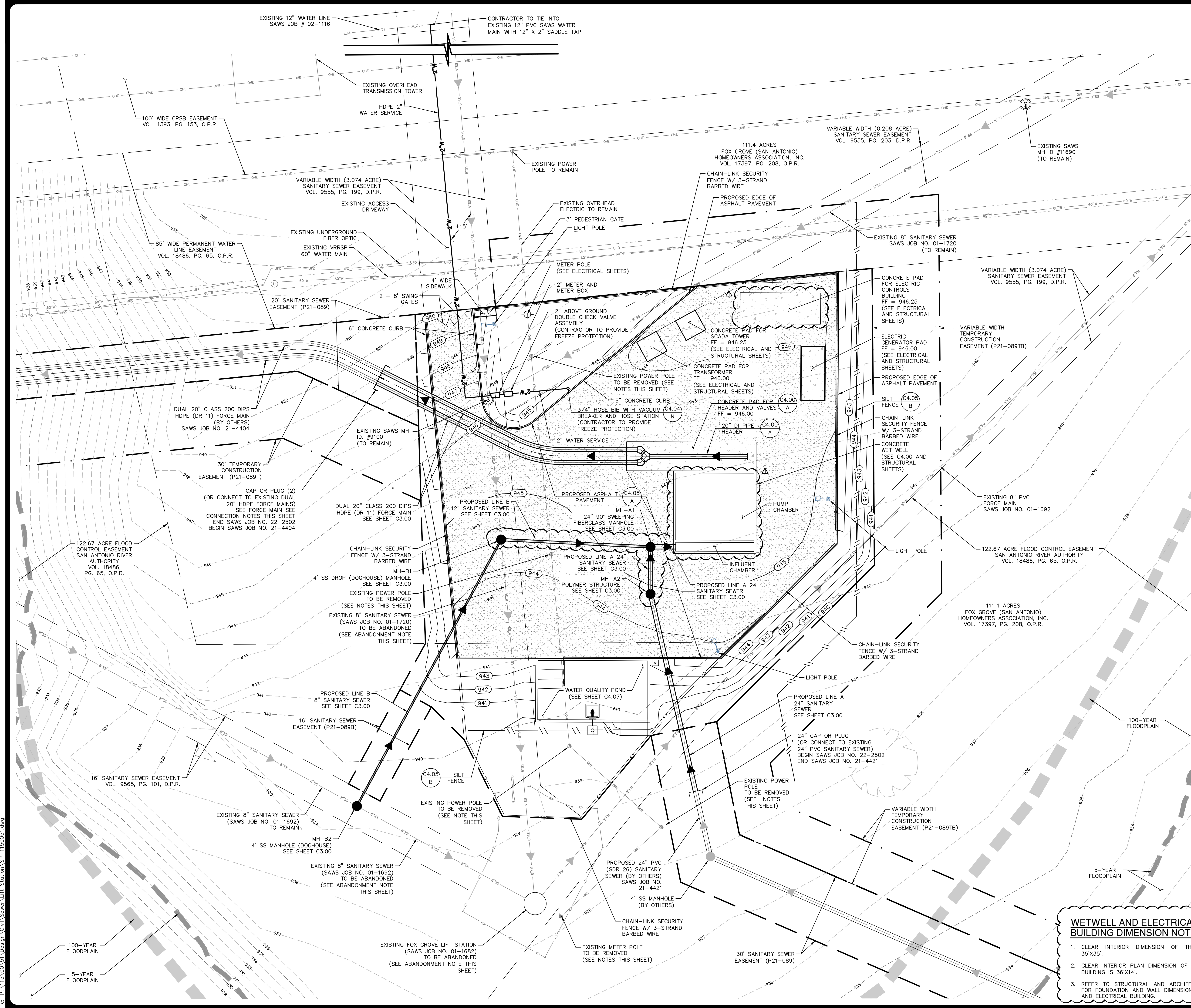
Specification Number	Equipment	Approved Manufacturer or Supplier
15780	Heating, Ventilation, and Air Conditioning (HVAC)	a) Trane b) Mitsubishi c) Carrier d) Lennox e) Daiken
15104	Check Valves	a) Clow Style 106LW b) Mueller #2600-6-01 c) Kennedy IBBM Swing Check Valve d) American "50" Line with Weight and Lever (provided cover is circular and bolt pattern allows for connection of a flange fitting)
15105	Air Release Valves	<u>Combination Air Release Valves</u> a) ARI D-020 (stainless steel 316 type) b) DeZurik APCO ASU (stainless steel 316 type) <u>Air Release Valve (at Header Pipe)</u> a) ARI S-020 b) SAWS-approved equal
15107	Station Isolation Valves	<u>Gate Valves</u> a) Clow F-6102 b) Mueller A-2360 c) Kennedy 4561/4701
16050	Elapsed Time Meters	a) Eaton b) Honeywell c) Redington

E-54 Regional Lift Station, San Antonio Water System Job No. 22-2502

Specification Number	Equipment	Approved Manufacturer or Supplier
16431	Low Voltage Motor Control Center	<ul style="list-style-type: none"> a) Eaton b) Siemens c) Square D d) General Electric e) ABB
16451	Low-Voltage Surge/Lightning Arrestors Surge Protective Device With Encloser and Breaker (Main Fused Disconnect Switch)	<ul style="list-style-type: none"> a) Eaton Model SPD 250 480Y 1 Q
16451	Surge Protective Device (Power Panelboard)	<ul style="list-style-type: none"> a) Eaton Model SPD 250 208Y 1M b) SAWS-approved equal
16461	Transformers-General Purpose 3-Phase	<ul style="list-style-type: none"> a) Eaton b) Siemens c) Square D d) FPT (Federal Pacific) e) ABB
16501	Automatic Transfer Switch	<ul style="list-style-type: none"> a) Asco b) Russelectric c) Zenith d) Onan e) Generac f) Cummins g) Kohler h) Caterpillar i) MTU Onsite Energy (Katolight)
16600	Generator	<ul style="list-style-type: none"> a) Kohler b) Cummins Power Generation c) Caterpillar d) Generac e) MTU Onsite Energy (Katolight)
16921	Autodialer	<ul style="list-style-type: none"> a) Raco Verbatim
16921	SCADA Panel PLC	<ul style="list-style-type: none"> a) Allen Bradley ControlLogix Controller (L33)

E-54 Regional Lift Station, San Antonio Water System Job No. 22-2502

Specification Number	Equipment	Approved Manufacturer or Supplier
16921	SCADA enclosure	<ul style="list-style-type: none"> a) Hoffman Enclosure Co. b) Rittal c) Eaton B-Line
16921	Temperature Transmitter	<ul style="list-style-type: none"> a) Ultra Electronics model #753-PC-X4-(0°F to 150°F) transmitter with RTD
16930	Force main discharge pressure transmitter	<ul style="list-style-type: none"> a) Rosemount model 2088G2S22A1B4E5M4S1
16170	Main Electrical Disconnect	<ul style="list-style-type: none"> a) Square D, Class 3110, 600- volt, Model H36_SS, or equal from other listed manufacturers b) Siemens c) General Electric d) Eaton
16930	Level Control	<ul style="list-style-type: none"> a) Siemens (Milltronics HydroRanger200)
16930	Level Float Switch	<ul style="list-style-type: none"> a) Flygt ENM-10, or equal
16930	Submersible Level Transducer	<ul style="list-style-type: none"> a) Mercoid model PBLT2 orequivalent
853	Fiberglass Reinforced Polyester (FRP) Manhole	<ul style="list-style-type: none"> a) L.F. Manufacturing b) Containment Solutions c) SAW-approved equal
853	Fiberglass Reinforced Polyester (FRP) Manhole Mitered	<ul style="list-style-type: none"> a) Hobas Pipe



LEGEND

PROPOSED SEWER LINE	
PROPOSED SEWER LINE (BY OTHERS)	
PERMANENT SAN SEWER ESMT	
TEMPORARY CONSTRUCTION ESMT	
EXISTING 42\"/>	
EXISTING 8\"/>	
PARCEL BOUNDARY LINE	
EXISTING ESMT	
LIMITS OF 100 YEAR FEMA FLOODPLAIN	
LIMITS OF 5 YEAR FEMA FLOODPLAIN	
EXISTING OVERHEAD ELECTRIC	
EXIST UNDERGROUND FIBER OPTIC	
EXISTING MAJOR CONTOUR	
EXISTING MINOR CONTOUR	
EXISTING BARB WIRE FENCE	

SEWER: EAST SEWERSHED - STEVEN M. CLOUSE W.R.C. E-54 REGIONAL LIFT STATION

Developer's Name: D.R. HORTON
 Address: 211 NORTH LOOP 1604, SUITE 130
 City: SAN ANTONIO, State: TEXAS ZIP: 78232
 Phone# (210)496-2668 FAX#
 SAWS Block Map# 190658 Total Acreage N/A
 Total Linear Footage of Pipe N/A
 Number of Lots N/A SAWS JOB NO. 22-2502

EXISTING POWER POLE NOTE

- EXISTING POWER POLES NOTED FOR REMOVAL (AND THEIR ASSOCIATED OVERHEAD ELECTRIC POWER LINES) SHALL REMAIN IN PLACE UNTIL THE E-54 LIFT STATION AND FORCE MAIN HAS BEEN ACCEPTED BY SAWS TO BE PUT INTO OPERATION AND THE FOX GROVE LIFT STATION IS DECOMMISSIONED.
- CONTRACTOR SHALL COORDINATE WITH CPS ENERGY IF TEMPORARY RELOCATION OF ELECTRICAL POLES AND WIRES ARE REQUIRED.

ABANDONMENT NOTE

FOX GROVE LIFT STATION AND GRAVITY MAIN TO BE ABANDONED SHALL REMAIN OPERATIONAL UNTIL SAWS HAS ACCEPTED CONSTRUCTION OF THE E-54 LIFT STATION AND FORCE MAIN.

FORCE MAIN CONNECTION NOTES

- CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING THE 20" FORCE MAIN CONNECTION(S) TO THE SAWS PROJECT NO. 21-4404 20" FORCE MAINS.
- CONTRACTOR SHALL CONNECT TO SAWS PROJECT NO. 21-4404 20" FORCE MAINS AFTER SUCCESSFUL HYDROSTATIC TESTING OF THE SAWS PROJECT NO. 21-4404 (BY OTHERS) AND SAWS PROJECT NO. 22-2502 20" FORCE MAINS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING HYDROSTATIC TESTS OF THE FORCE MAIN CONNECTIONS. CONTRACTOR COORDINATE WITH SAWS AND THE ENGINEER FOR SAWS PROJECT.
- CONTRACTOR SHALL CAP OR PLUG 20" FORCE MAINS UNTIL THE SAWS PROJECT NO. 21-4402 FORCE MAINS HAVE BEEN SUCCESSFULLY HYDROSTATICALLY TESTED (BY OTHERS).

CAUTION OVERHEAD UTILITIES

CONTRACTOR TO EXERCISE EXTREME CAUTION WHEN WORKING UNDER "HIGH VOLTAGE TRANSMISSION LINES". A WORKING HEIGHT OF 30' FROM GROUND ELEVATION WILL BE OBSERVED WHEN WORKING UNDER THE HIGH VOLTAGE LINE. COORDINATE ALL WORK WITH THE LOCAL UTILITY PROVIDER.

CAUTION UNDERGROUND UTILITIES

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITED TO: WATER, SEWER, TELEPHONE, AND FIBER OPTIC LINES, SITE LIGHTING, ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCT BANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. THE CONTRACTOR MUST CONTACT 1-800-DIG-TESS AND CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION AND/OR START OF CONSTRUCTION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES (WHETHER SHOWN ON PLANS OR NOT) WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTORS SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY, SHALL REVIEW THESE PLANS AND THE ANTICIPATED INSTALLATION SITES WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION PROGRAMS AND/OR PROCEDURES FOR THE PROJECT DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR'S IMPLEMENTATION OF THESE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

WETWELL AND ELECTRICAL BUILDING DIMENSION NOTE

- CLEAR INTERIOR DIMENSION OF THE WETWELL IS 35'X35'.
- CLEAR INTERIOR PLAN DIMENSION OF THE ELECTRICAL BUILDING IS 36'X14'.
- REFER TO STRUCTURAL AND ARCHITECTURAL SHEETS FOR FOUNDATION AND WALL DIMENSIONS FOR WETWELL AND ELECTRICAL BUILDING.

DATE	10/17/22
REVISION	
ADDENDUM #	
NO.	



PAPE-DAWSON ENGINEERS

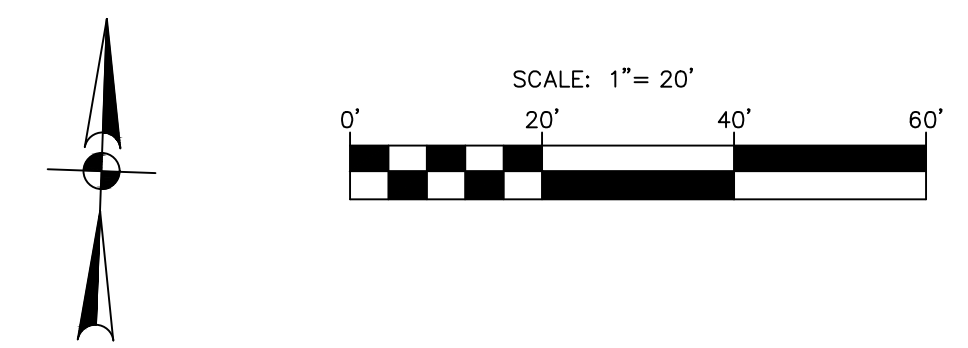
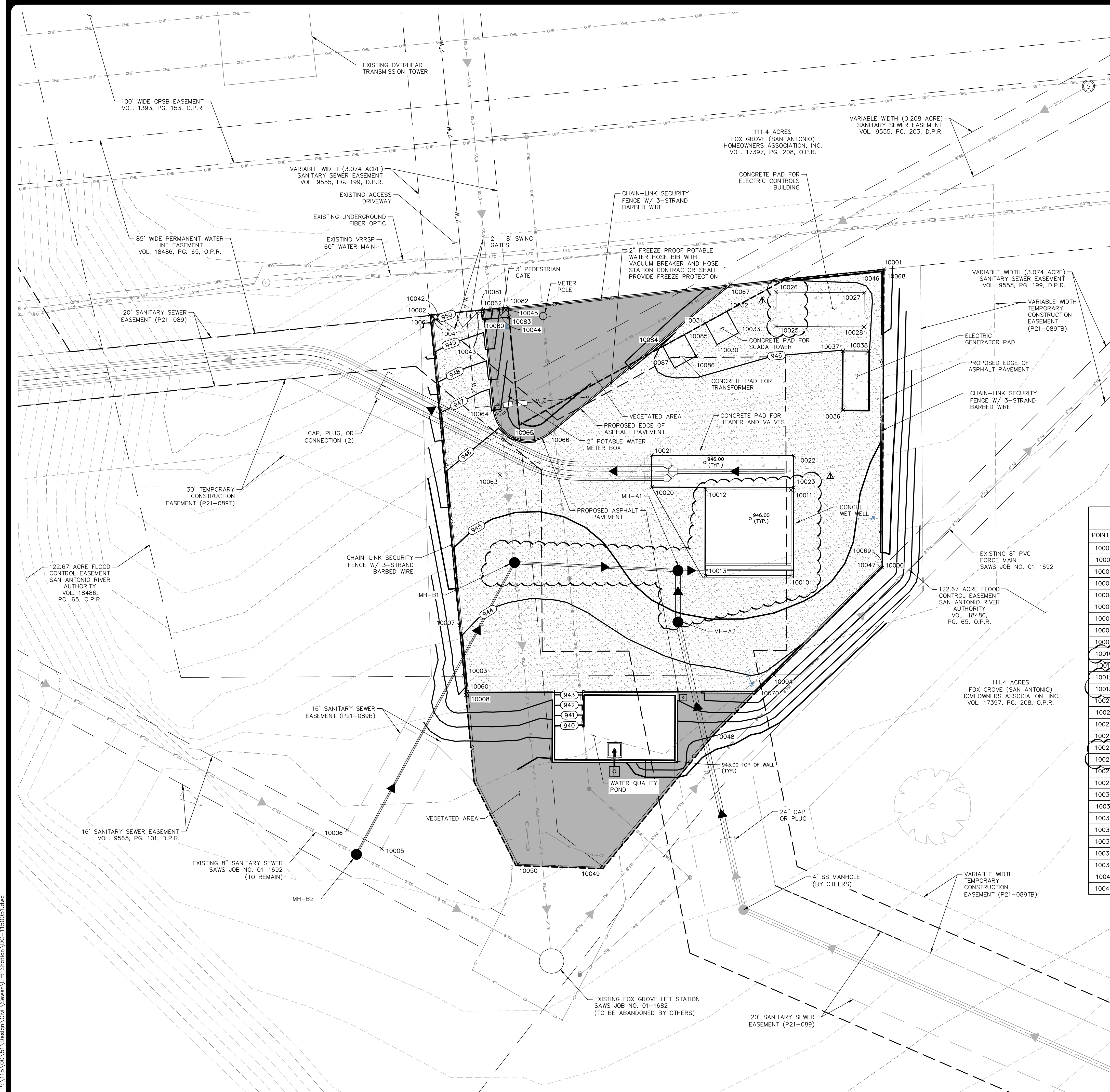
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
 TBPUS FIRM REGISTRATION #270 | TBPUS FIRM REGISTRATION #1008890

E-54 REGIONAL LIFT STATION LIFT STATION SITE PLAN

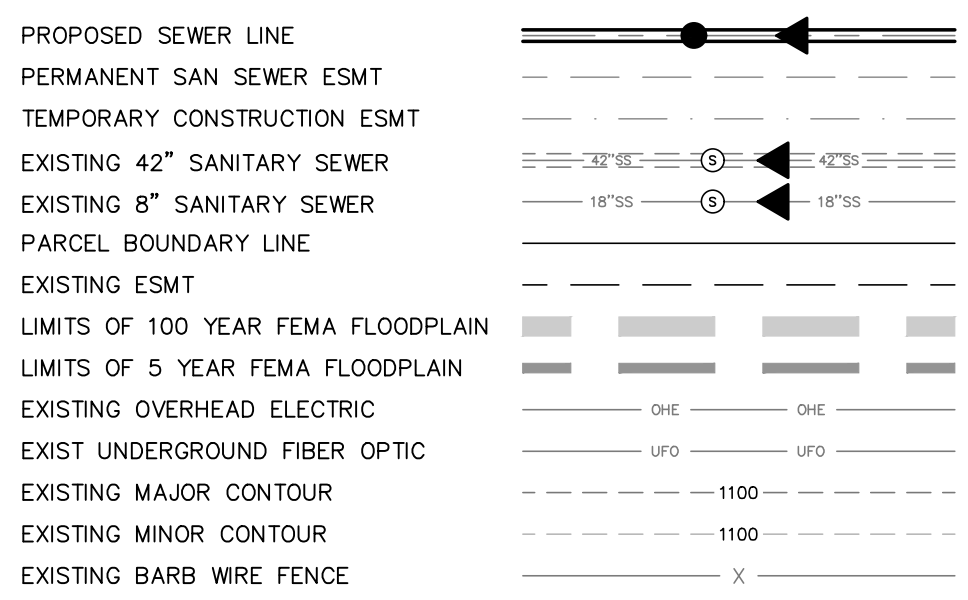
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JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	RM
CHECKED	DRAWN
SHEET	C2.00

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LEGEND



WETWELL AND ELECTRICAL BUILDING DIMENSION NOTE

1. CLEAR INTERIOR DIMENSION OF THE WETWELL IS 35'X35'.
2. CLEAR INTERIOR PLAN DIMENSION OF THE ELECTRICAL BUILDING IS 36'X14'.
3. REFER TO STRUCTURAL AND ARCHITECTURAL SHEETS FOR FOUNDATION AND WALL DIMENSIONS FOR WETWELL AND ELECTRICAL BUILDING.

DIMENSIONAL CONTROL POINTS

POINT #	NORTHING	EASTING	DESCRIPTION
10000	13782764.76	2160342.44	EASEMENT CORNER
10001	13782886.65	2160338.79	EASEMENT CORNER
10002	13782861.34	2160154.12	EASEMENT CORNER
10003	13782714.28	2160173.24	EASEMENT CORNER
10004	13782719.33	2160299.74	EASEMENT CORNER
10005	13782642.58	2160142.08	EASEMENT CORNER
10006	13782649.74	2160127.77	EASEMENT CORNER
10007	13782735.00	2160170.55	EASEMENT CORNER
10008	13782706.67	2160174.23	EASEMENT CORNER
10010	13782760.20	2160305.31	WET WELL CORNER
10011	13782755.16	2160304.10	WET WELL CORNER
10012	13782793.97	2160269.12	WET WELL CORNER
10013	13782758.99	2160270.33	WET WELL CORNER
10020	13782794.26	2160247.09	PUMP PAD CORNER
10021	13782807.25	2160246.65	PUMP PAD CORNER
10022	13782809.19	2160304.61	PUMP PAD CORNER
10023	13782796.21	2160305.07	PUMP PAD CORNER
10025	13782861.76	2160295.52	ELECTRIC BUILDING PAD CORNER
10026	13782875.76	2160295.10	ELECTRIC BUILDING PAD CORNER
10027	13782876.84	2160331.08	ELECTRIC BUILDING PAD CORNER
10028	13782862.84	2160331.50	ELECTRIC BUILDING PAD CORNER
10030	13782853.47	2160271.72	SCADA TOWER PAD CORNER
10031	13782862.06	2160266.61	SCADA TOWER PAD CORNER
10032	13782867.18	2160275.20	SCADA TOWER PAD CORNER
10033	13782858.58	2160280.31	SCADA TOWER PAD CORNER
10036	13782828.57	2160324.02	GENERATOR PAD CORNER
10037	13782852.72	2160323.30	GENERATOR PAD CORNER
10038	13782853.04	2160333.79	GENERATOR PAD CORNER
10041	13782860.48	2160155.24	FENCE CORNER
10042	13782860.75	2160157.22	FENCE CORNER

DIMENSIONAL CONTROL POINTS

POINT #	NORTHING	EASTING	DESCRIPTION
10043	13782862.93	2160173.07	FENCE CORNER
10044	13782864.15	2160181.99	FENCE CORNER
10045	13782864.56	2160184.96	FENCE CORNER
10046	13782885.50	2160337.82	FENCE CORNER
10047	13782765.14	2160341.43	FENCE CORNER
10048	13782695.10	2160275.59	FENCE CORNER
10049	13782638.25	2160231.82	FENCE CORNER
10050	13782638.25	2160197.93	FENCE CORNER
10060	13782707.75	2160174.09	EDGE OF PAVEMENT PI
10061	13782861.34	2160154.12	EDGE OF PAVEMENT PI
10062	13782864.29	2160175.66	EDGE OF PAVEMENT PI
10063	13782797.12	2160184.87	EDGE OF PAVEMENT PI
10064	13782823.51	2160181.25	EDGE OF PAVEMENT CURVE POINT
10065	13782812.09	2160190.42	EDGE OF PAVEMENT CURVE POINT
10066	13782814.78	2160204.81	EDGE OF PAVEMENT CURVE POINT
10067	13782878.09	2160276.34	EDGE OF PAVEMENT PI
10068	13782886.65	2160338.79	EDGE OF PAVEMENT PI
10069	13782764.76	2160342.44	EDGE OF PAVEMENT PI
10070	13782711.63	2160292.50	EDGE OF PAVEMENT PI
10080	13782860.33	2160176.21	SIDEWALK CORNER POINT
10081	13782864.29	2160175.66	SIDEWALK CORNER POINT
10082	13782865.68	2160185.82	SIDEWALK CORNER POINT
10083	13782861.72	2160186.36	SIDEWALK CORNER POINT
10084	13782851.95	2160249.58	TRANSFORMER PAD CORNER
10085	13782857.06	2160258.18	TRANSFORMER PAD CORNER
10086	13782848.47	2160263.29	TRANSFORMER PAD CORNER
10087	13782843.35	2160254.70	TRANSFORMER PAD CORNER

SEWER: EAST SEWERSHED - STEVEN M. CLOUSE W.R.C. E-54 REGIONAL LIFT STATION

Developer's Name: D.R. HORTON
 Address: 211 NORTH LOOP 1604, SUITE 130
 City: SAN ANTONIO State: TEXAS ZIP: 78232
 Phone# (210) 496-2658 FAX#
 SAWS Block Map# 190658 Total Acreage N/A
 Total Linear Footage of Pipe N/A
 Number of Lots N/A SAWS JOB NO. 22-2502

DATE: 10/17/22
 NO. 1
 REVISION: ADDENDUM #2

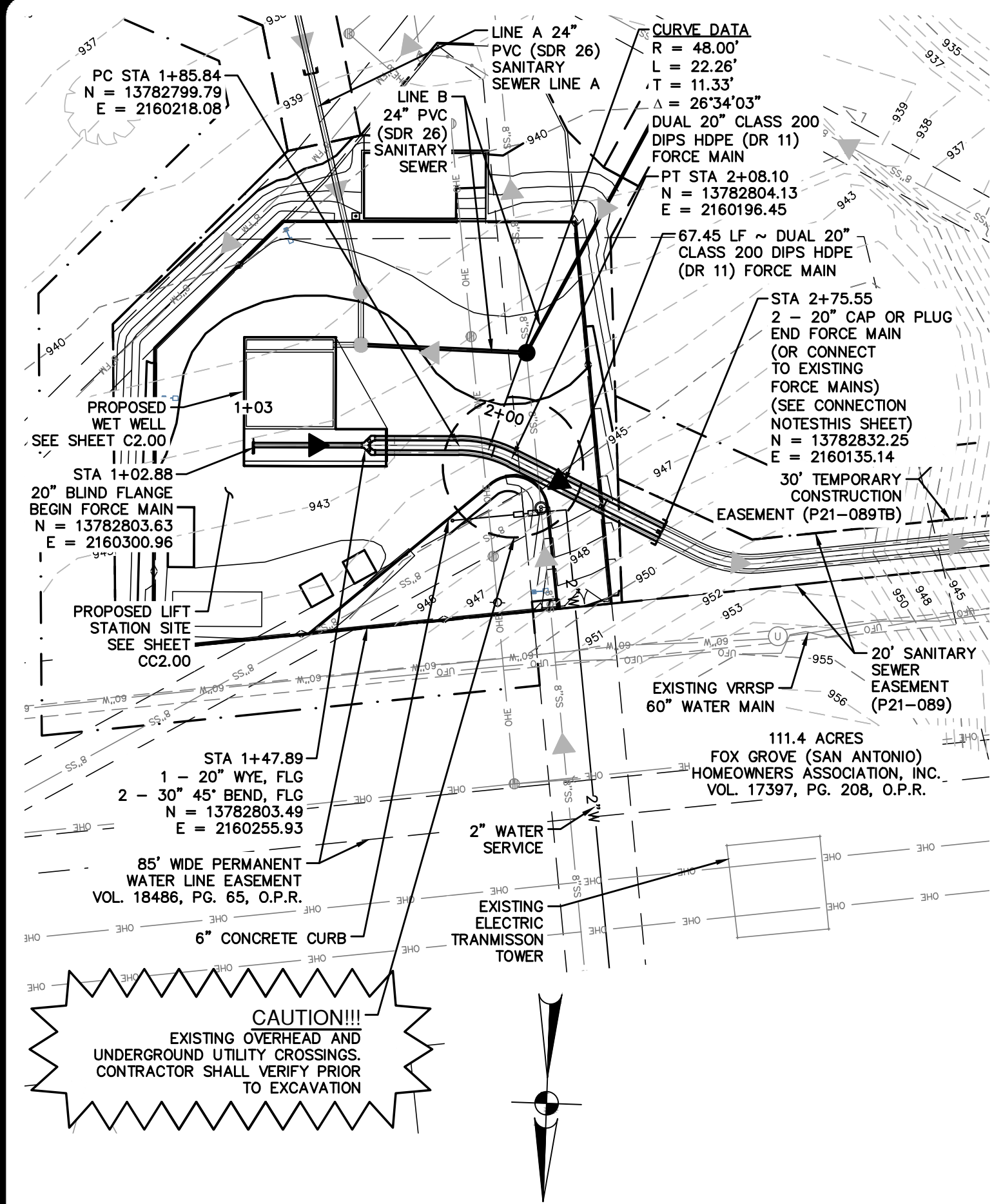


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 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
 TBP# FIRM REGISTRATION #470 | TBP#S FIRM REGISTRATION #1008880

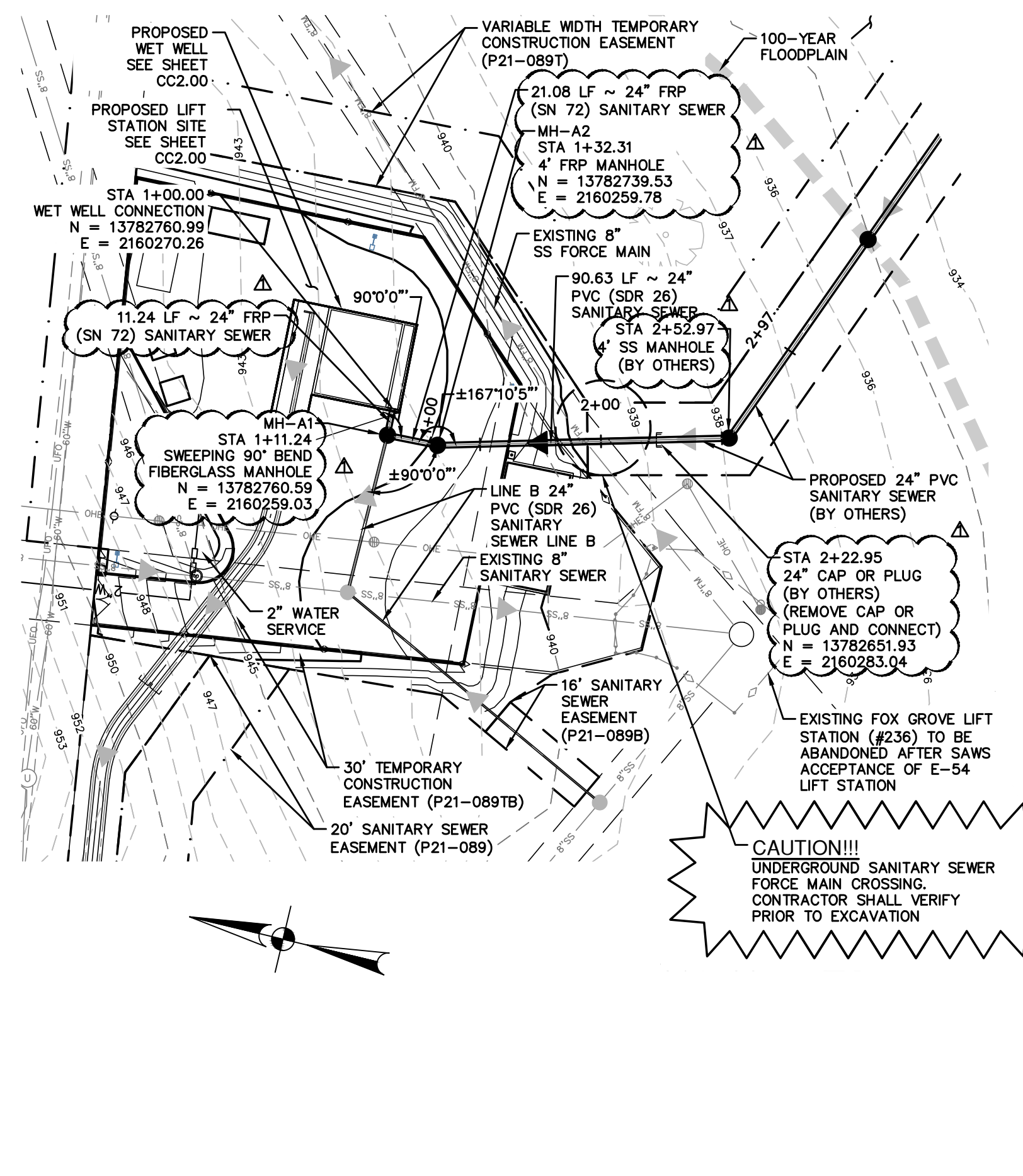
E-54 REGIONAL LIFT STATION
LIFT STATION DIMENSIONAL CONTROL PLAN

SAWS JOB NO. 22-2502
 JOB NO. 11500-51
 DATE SEPTEMBER 2022
 DESIGNER RM
 CHECKED DRAWN
 SHEET C2.01

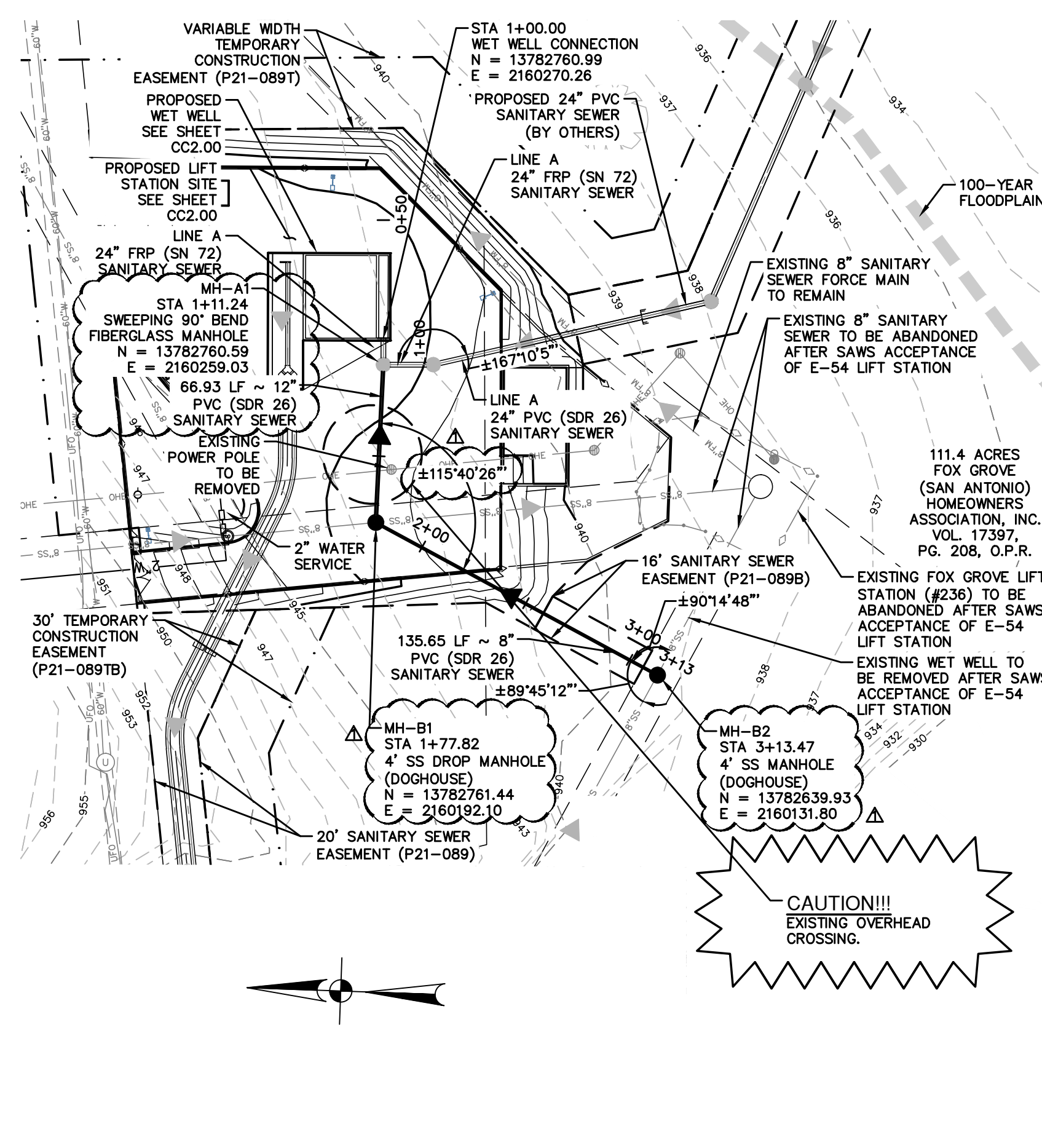
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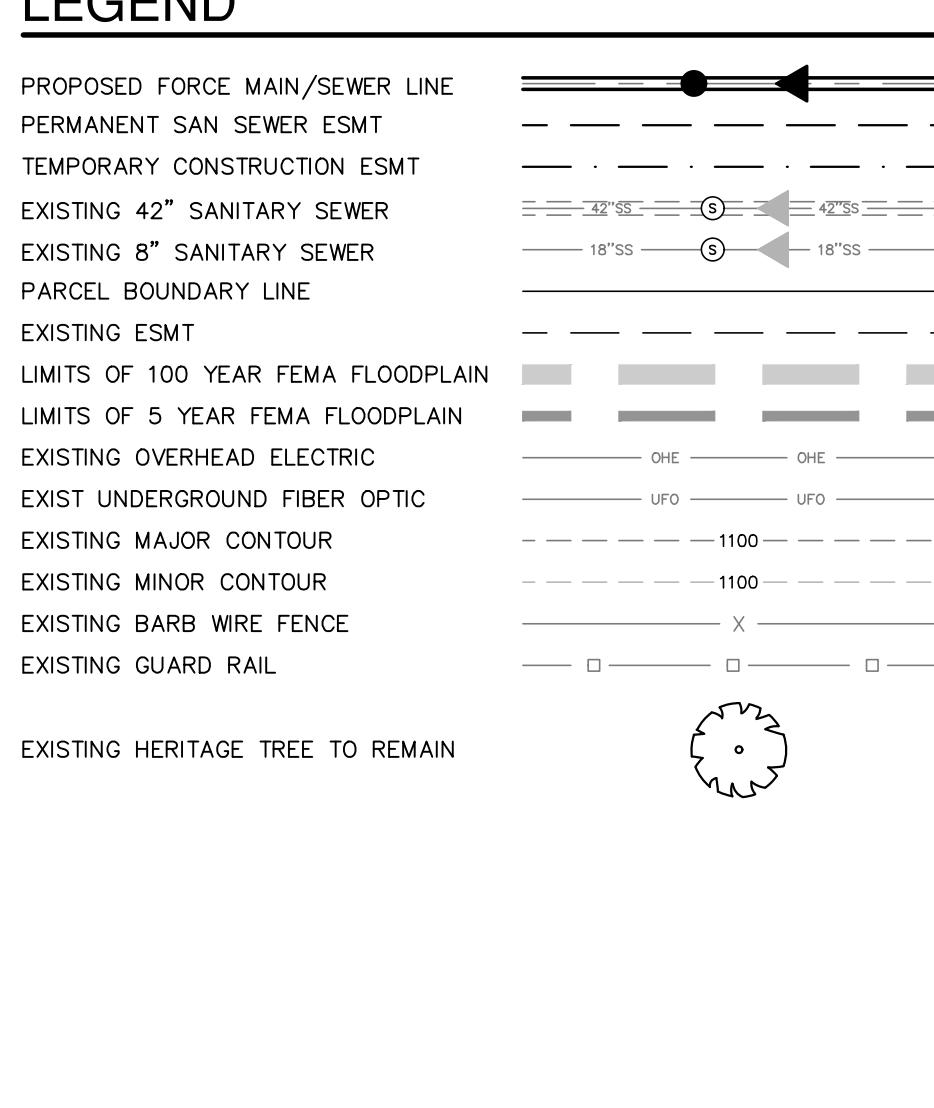
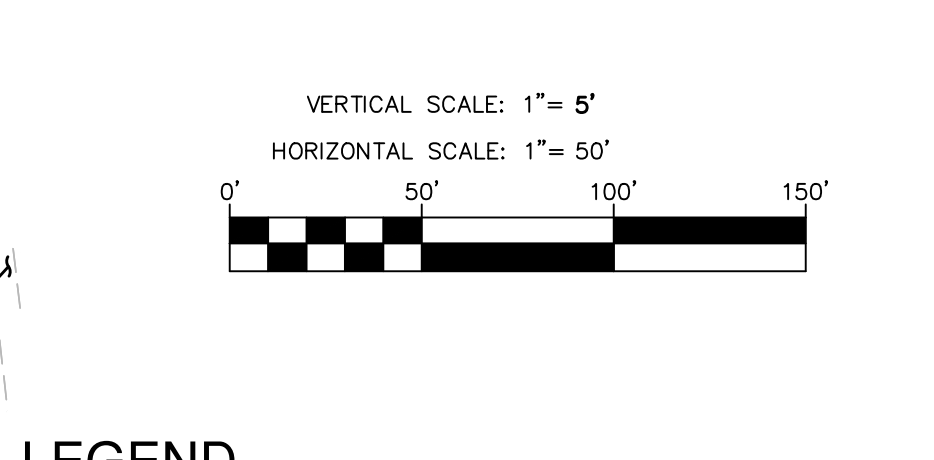
DUAL FORCE MAIN
STA 1+02.82 TO STA 2+75.00



LINE A SANITARY SEWER
STA 1+00 TO STA 2+25.99

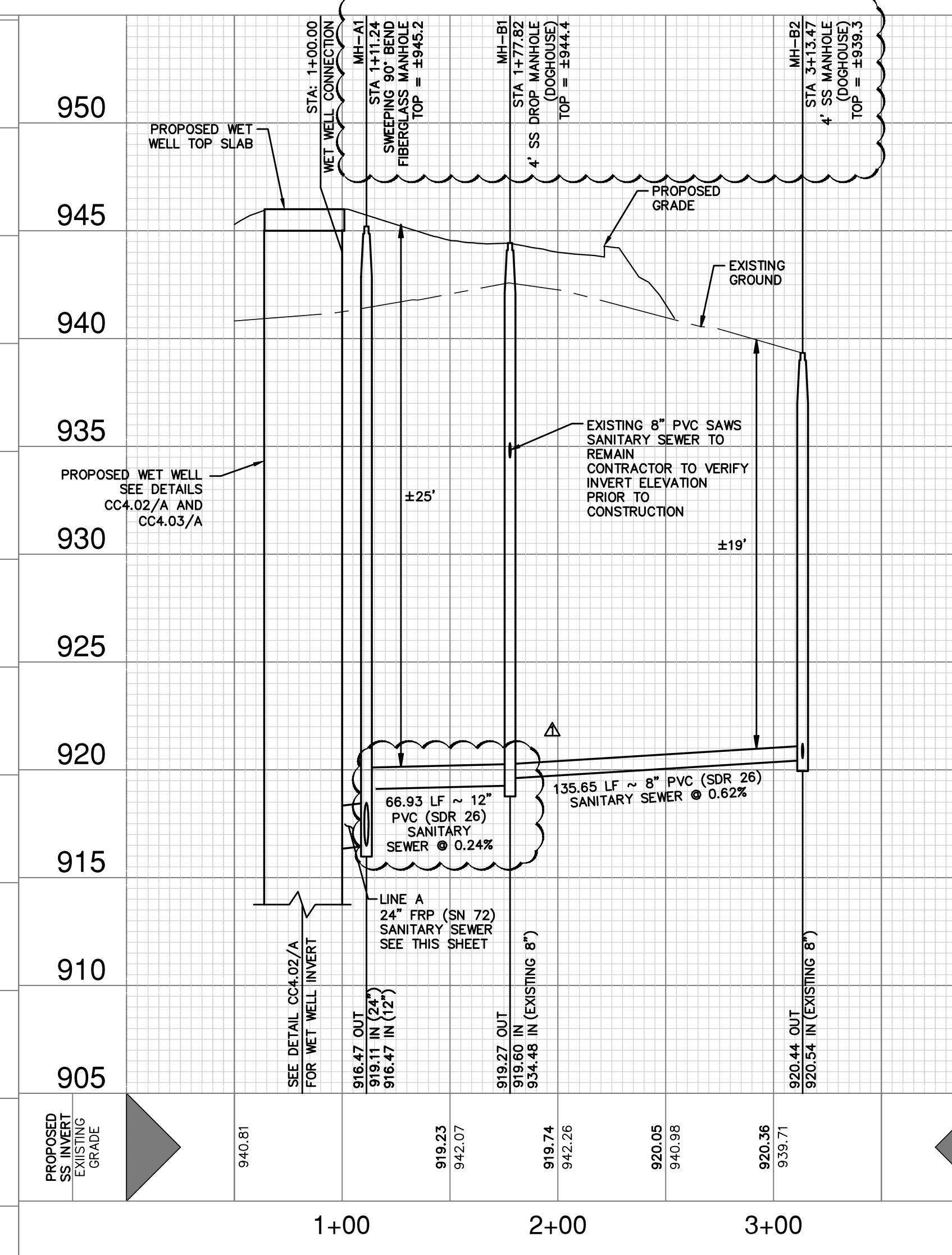
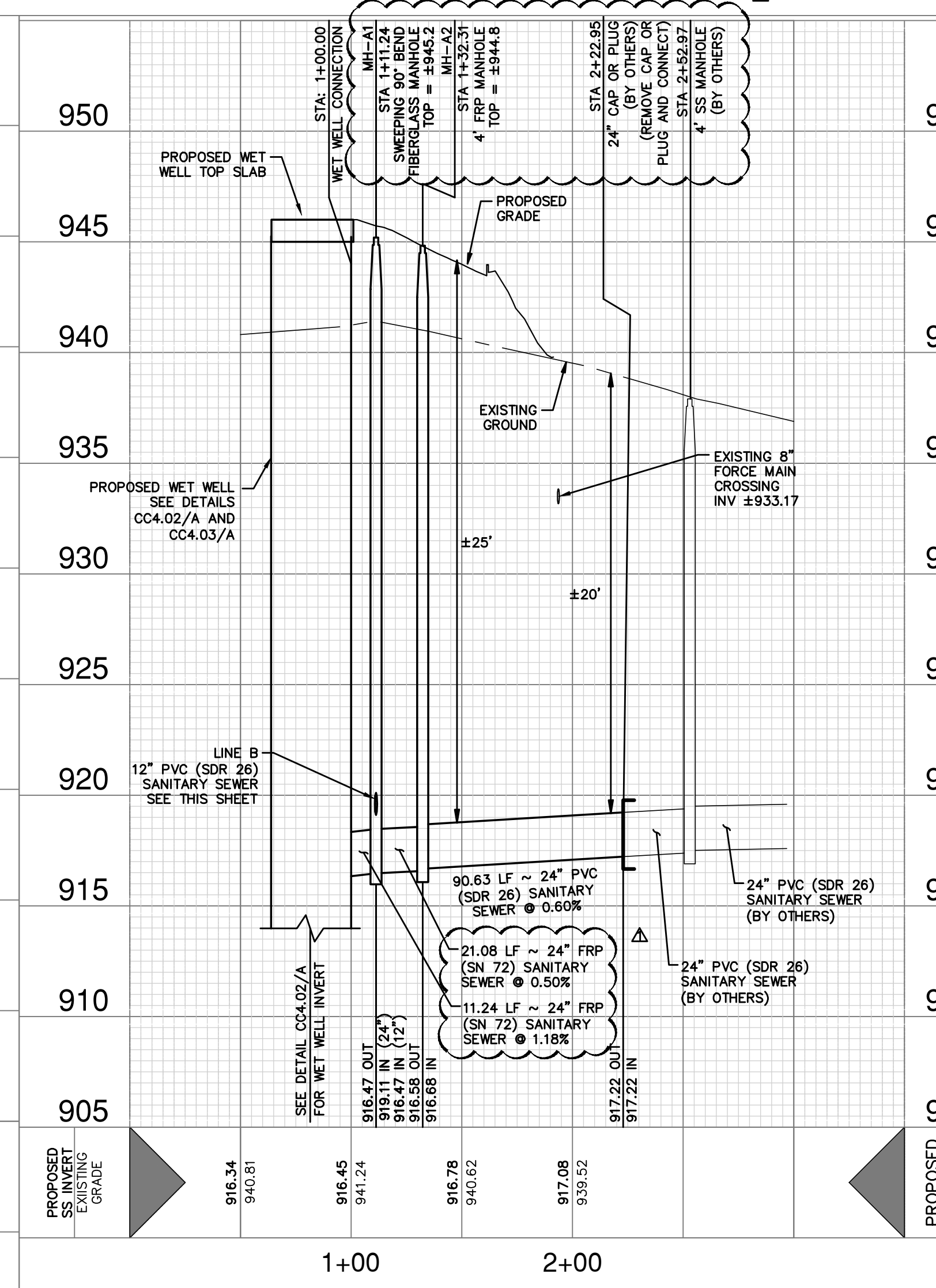
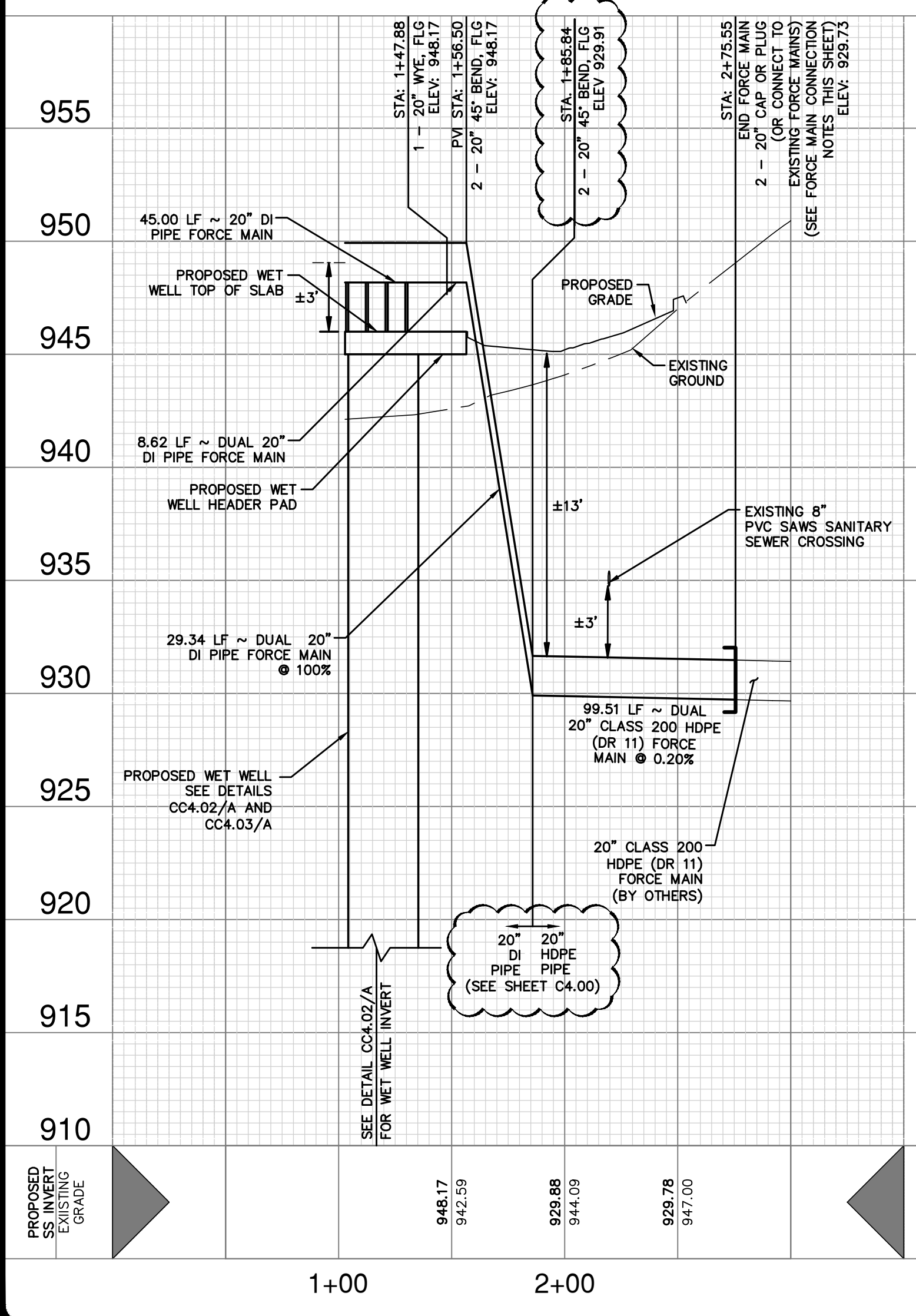


LINE B SANITARY SEWER
STA 1+00 TO STA 3+13.21



SEWER: EAST SEWERSHED - STEVEN M. CLOUSE W.R.C. E-54 REGIONAL LIFT STATION

Developer's Name:	D.R. HORTON
Address:	211 NORTH LOOP 1604, SUITE 130
City:	SAN ANTONIO
State:	TEXAS
ZIP:	78232
Phone#:	(210)496-2668
FAX#:	
SAWS Block Map#:	190658
Total Linear Footage of Pipe:	N/A
Number of Lots:	N/A
SAWS JOB NO.:	22-2502



FORCE MAIN CONNECTION NOTES

- CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING THE 20" FORCE MAIN CONNECTION(S) TO THE SAWS PROJECT NO. 21-4404 20" FORCE MAINS.
- CONTRACTOR SHALL CONNECT TO SAWS PROJECT NO. 21-4404 20" FORCE MAINS AFTER SUCCESSFUL HYDROSTATIC TESTING OF THE SAWS PROJECT NO. 21-4404 (BY OTHERS) AND SAWS PROJECT NO. 22-2502 20" FORCE MAINS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING HYDROSTATIC TESTS OF THE FORCE MAIN CONNECTIONS. CONTRACTOR COORDINATE WITH SAWS AND THE ENGINEER FOR SAWS PROJECT.
- CONTRACTOR SHALL CAP OR PLUG 20" FORCE MAINS UNTIL THE SAWS PROJECT NO. 21-4404 FORCE MAINS HAVE BEEN SUCCESSFULLY HYDROSTATICALLY TESTED (BY OTHERS).

CAUTION OVERHEAD UTILITIES

CONTRACTOR TO EXERCISE EXTREME CAUTION WHEN WORKING UNDER "HIGH VOLTAGE TRANSMISSION LINES". A WORKING HEIGHT OF 30' FROM GROUND ELEVATION WILL BE OBSERVED WHEN WORKING UNDER THE HIGH VOLTAGE LINE. COORDINATE ALL WORK WITH THE LOCAL UTILITY PROVIDER.

CAUTION UNDERGROUND UTILITIES

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING BUT NOT LIMITED TO: WATER, SEWER, TELEPHONE, AND FIBER OPTIC LINES, SITE LIGHTING, ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCT BANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. THE CONTRACTOR MUST CONTACT 1-800-DIG-TESS AND CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION AND/OR START OF CONSTRUCTION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE EXISTING UTILITIES (WHETHER SHOWN ON PLANS OR NOT) WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY AND PRIOR TO CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND THE REPAIR SHALL BE AT CONTRACTOR'S SOLE EXPENSE WHETHER THE UTILITY IS SHOWN ON THESE PLANS OR NOT.

TRENCH EXCAVATION SAFETY PROTECTION

CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL DESIGN/PROCEDURES SHALL ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLY WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. SPECIFICALLY, CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

DATE: 10/17/22
ADDENDUM #2
NO. 1

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TYPE FIRM REGISTRATION #070 | TYPE FIRM REGISTRATION #100880

E-54 REGIONAL LIFT STATION

FORCE MAIN AND SANITARY SEWER PLAN AND PROFILE SHEET

SAWS JOB NO. 22-2502
JOB NO. 11500-51
DATE: SEPTEMBER 2022
DESIGNER: RM
CHECKED: DRAWN
SHEET: C3.00

Date: Oct 17, 2022 9:31am User: dschertlines
File: P:\15\100\51\Design\Chas\Sanitary Lift Station\SSLS-1150051.dwg

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AERATOR HANDHOLE COVER NOTE
 COVER MATERIAL SHALL CONSIST OF MODEL NO. DPW18AMR-10A-LID. THE COVER MATERIAL SHALL BE HDPE. THE COVER SHALL SIT ON A 12 INCH DIAMETER PVC SLEEVE THAT IS EMBEDDED WITHIN THE WETWELL TOP SLAB. THE TOP OF THE COVER SHALL BE SET FLUSH WITH THE TOP SLAB OF THE WETWELL SO AS NOT TO PROVIDE A TRIPPING HAZARD.

RESTRAINED NOTE
 ALL DI FORCE MAIN PIPING SHALL BE FLANGED. ALL HDPE FORCE MAIN PIPING SHALL BE FUSED.

NOTE TO CONTRACTOR
 NO MODIFICATIONS CAN BE MADE TO THE LIFT STATION PRIOR TO APPROVAL BY THE ENGINEER AND SAWS. CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE SAWS INSPECTOR WHEN LIFT STATION CONSTRUCTION HAS PROGRESSED TO THE FOLLOWING MILESTONES.

1. THE CONTRACTOR SHALL NOTIFY THE PROJECT GEOLOGIST AND TCEQ FOR OBSERVATION IF ANY SENSITIVE FEATURES ARE DISCOVERED IN ACCORDANCE WITH 30 TAC 213.5 (f)(2).
2. WHEN LIFT STATION PUMPS ARRIVE AT THE SITE.
3. PRIOR TO PLACEMENT OF HVAC, AND CONCRETE DRIVEWAY.
4. PIPELINE AND WET WELL HYDROSTATIC TESTING, FACILITY STARTUP, ALL FUNCTIONAL TESTING, PROJECT WALKTHROUGH(S), AND FINAL ACCEPTANCE.
5. COMPLETION OF STRUCTURAL STEEL PLACEMENT AND ERECTION OF FORMS, BUT PRIOR TO CONCRETE PLACEMENT OF ALL CONCRETE FOUNDATIONS, AND PADS.
6. UPON COMPLETION OF CONTROL PANEL CANOPY ERECTION.
7. SEE SHEET E.2 FOR ELECTRICAL, AND SCADA CONSTRUCTION OBSERVATION MILESTONES.

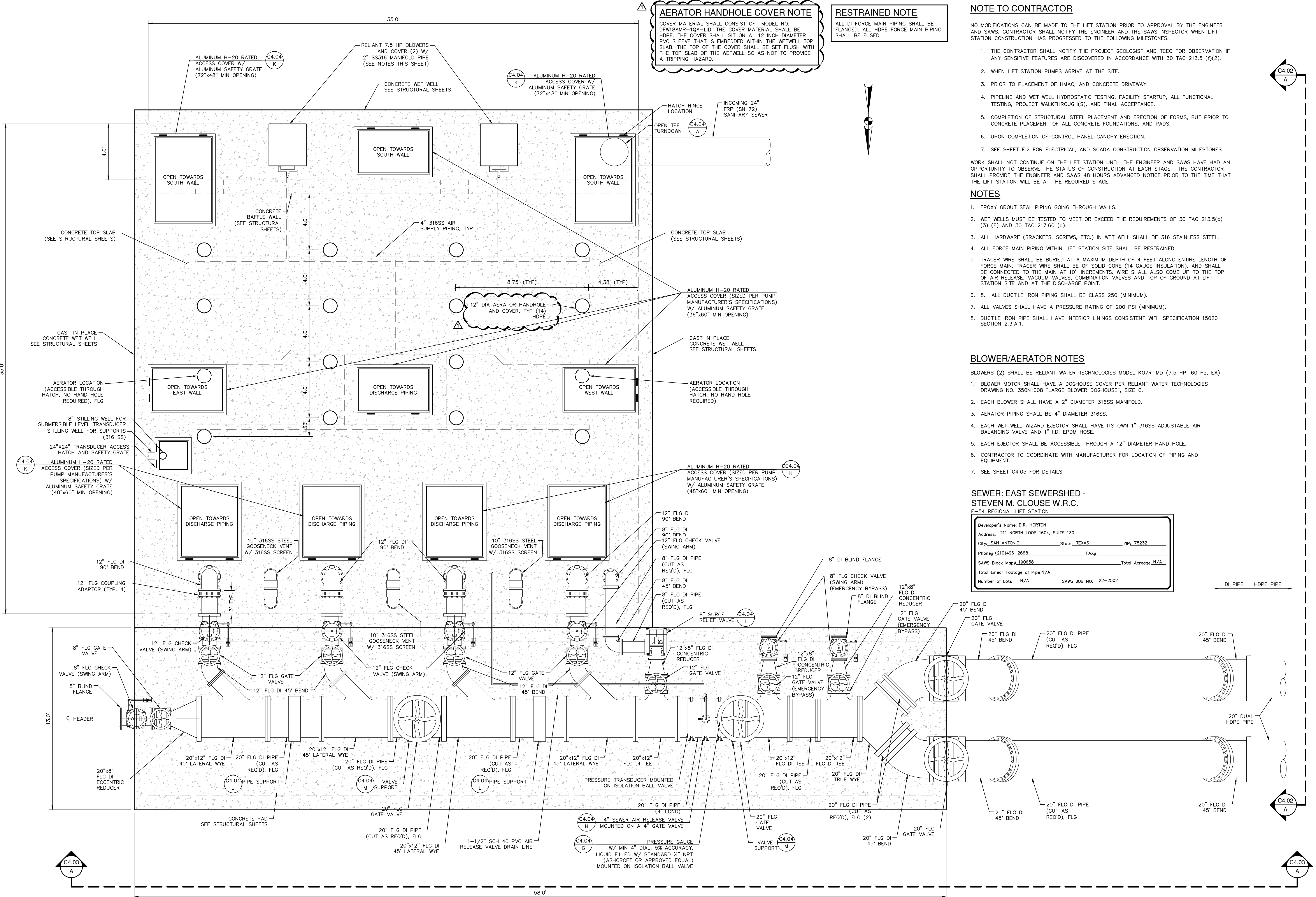
WORK SHALL NOT CONTINUE ON THE LIFT STATION UNTIL THE ENGINEER AND SAWS HAVE HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION AT EACH STAGE. THE CONTRACTOR SHALL PROVIDE THE ENGINEER AND SAWS 48 HOURS ADVANCED NOTICE PRIOR TO THE TIME THAT THE LIFT STATION WILL BE AT THE REQUIRED STAGE.

- NOTES**
1. EPOXY GROUT SEAL PIPING GOING THROUGH WALLS.
 2. WET WELLS MUST BE TESTED TO MEET OR EXCEED THE REQUIREMENTS OF 30 TAC 213.5(c) (3) (E) AND 30 TAC 217.60 (b).
 3. ALL HARDWARE (BRACKETS, SCREWS, ETC.) IN WET WELL SHALL BE 316 STAINLESS STEEL.
 4. ALL FORCE MAIN PIPING WITHIN LIFT STATION SITE SHALL BE RESTRAINED.
 5. TRACER WIRE SHALL BE BURIED AT A MAXIMUM DEPTH OF 4 FEET ALONG ENTIRE LENGTH OF FORCE MAIN. TRACER WIRE SHALL BE OF SOLID CORE (14 GAUGE INSULATION), AND SHALL BE CONNECTED TO THE MAIN AT 10' INTERVALS. WIRE SHALL ALSO COME UP TO THE TOP OF AIR RELEASE, VACUUM VALVES, COMBINATION VALVES AND TOP OF GROUND AT LIFT STATION SITE AND AT THE DISCHARGE POINT.
 6. 8. ALL DUCTILE IRON PIPING SHALL BE CLASS 250 (MINIMUM).
 7. ALL VALVES SHALL HAVE A PRESSURE RATING OF 200 PSI (MINIMUM).
 8. DUCTILE IRON PIPE SHALL HAVE INTERIOR LININGS CONSISTENT WITH SPECIFICATION 15020 SECTION 2.3.A.1.

- BLOWER/AERATOR NOTES**
- BLOWERS (2) SHALL BE RELIANT WATER TECHNOLOGIES MODEL K07R-MD (7.5 HP, 60 Hz, EA)
1. BLOWER MOTOR SHALL HAVE A DOGHOUSE COVER PER RELIANT WATER TECHNOLOGIES DRAWING NO. 350N100B "LARGE BLOWER DOGHOUSE", SIZE C.
 2. EACH BLOWER SHALL HAVE A 2" DIAMETER 316SS MANIFOLD.
 3. AERATOR PIPING SHALL BE 4" DIAMETER 316SS.
 4. EACH WET WELL WIZARD EJECTOR SHALL HAVE ITS OWN 1" 316SS ADJUSTABLE AIR BALANCING VALVE AND 1" I.D. EPDM HOSE.
 5. EACH EJECTOR SHALL BE ACCESSIBLE THROUGH A 12" DIAMETER HAND HOLE.
 6. CONTRACTOR TO COORDINATE WITH MANUFACTURER FOR LOCATION OF PIPING AND EQUIPMENT.
 7. SEE SHEET C4.05 FOR DETAILS.

SEWER: EAST SEWERSHED - STEVEN M. CLOUSE W.R.C. E-54 REGIONAL LIFT STATION

Developer's Name: <u>G.B. HORTON</u>
Address: <u>211 NORTH LOOP 1604, SUITE 130</u>
City: <u>SAN ANTONIO</u> State: <u>TEXAS</u> ZIP: <u>78232</u>
Phone# <u>(210)496-2668</u> FAX# _____
SAWS Block Map# <u>190658</u> Total Acreage <u>N/A</u>
Total Linear Footage of Pipe <u>N/A</u>
Number of Lots <u>N/A</u> SAWS JOB NO. <u>22-2502</u>



C4.00 TOP PLAN
 N.T.S.

DATE	10/17/22
REVISION	
ADDENDUM #	
NO.	1



PAPE-DAWSON ENGINEERS
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
 TEXAS FIRM REGISTRATION #071178 PLUS FIRM REGISTRATION #1008890

E-54 REGIONAL LIFT STATION
WET WELL TOP PLAN DETAIL

SAWS JOB NO. 22-2502
 JOB NO. 11500-51
 DATE SEPTEMBER 2022
 DESIGNER RM
 CHECKED DRAWN
 SHEET **C4.00**

Date: Oct 01, 2022, 2:14pm, User: ID: rchert@pines.com, File: P:\151500\54\RegionaLiftStation\WetWellTopPlanDetail.dwg

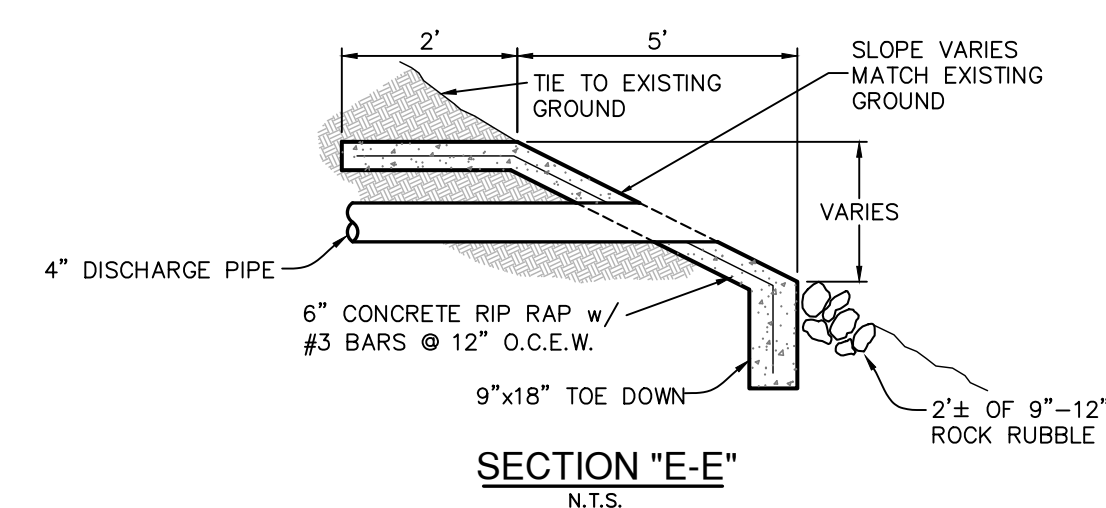
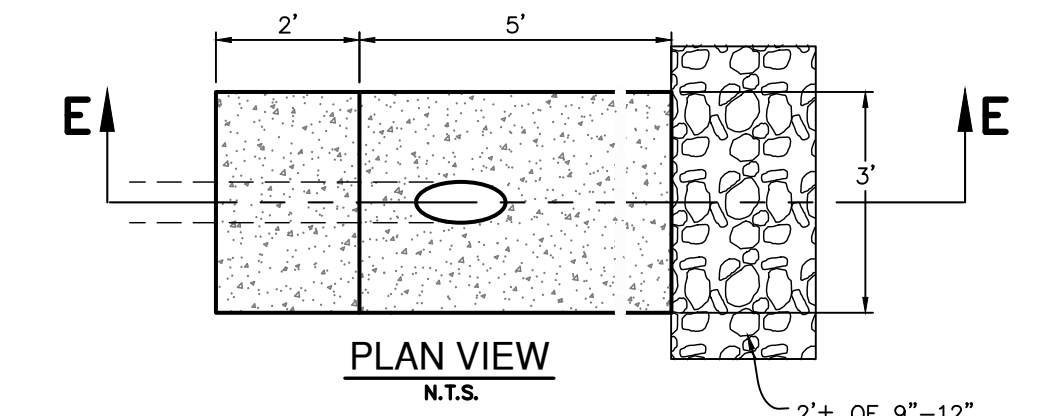
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 2000 HW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
 TBPIS FIRM REGISTRATION #070 | TBPIS FIRM REGISTRATION #1008890

E-54 REGIONAL LIFT STATION
WATER POLLUTION ABATEMENT PLAN
BATCH DETENTION BASIN A

SAWS JOB NO. 22-2502
 JOB NO. 11500-51
 DATE SEPTEMBER 2022
 DESIGNER RM
 CHECKED JD DRAWN RO
 SHEET C4.07



DISCHARGE HEADWALL
 NOT-TO-SCALE

NOTES TO CONTRACTOR
(EACH PHASE OF BASIN CONSTRUCTION)

- CONTRACTOR IS ADVISED THAT TCEQ DOES NOT ALLOW CHANGES TO PERMANENT POLLUTION ABATEMENT MEASURES WITHOUT THEIR PRIOR APPROVAL.
- CONTRACTOR SHALL NOTIFY CERTIFYING ENGINEER WHEN BASIN CONSTRUCTION HAS PROCEEDED TO THE FOLLOWING MILESTONES:
 - UPON SUBSTANTIAL COMPLETION OF CONSTRUCTION OF CONSTRUCTION AT EACH STAGE. CONTRACTOR SHALL PROVIDE ENGINEER A MINIMUM OF 24 HOURS ADVANCE NOTICE PRIOR TO TIME THE BASIN WILL BE AT THE REQUIRED STAGE.
 - UPON SUBSTANTIAL COMPLETION, OR AS REQUESTED BY ENGINEER, CONTRACTOR TO PROVIDE CERTIFYING ENGINEER WITH FIELD SHOTS VERIFYING ELEVATIONS OF THE FOLLOWING:
 - TOP OF BANK/WALL AT EACH CORNER OF BASIN
 - TOE OF SLOPE AT EACH CORNER OF BASIN (INSIDE BASIN TOE)
 - SPLASH PAD/INLET PIPES
 - OVERFLOW WEIRS
- BEFORE FINAL ACCEPTANCE OF CONSTRUCTION BY THE OWNER, THE CONTRACTOR WILL REMOVE ALL TRASH, DEBRIS, AND ACCUMULATED SILT FROM THE BASINS AND REESTABLISH THEM TO THE PROPER OPERATING CONDITION.
- CONTRACTOR TO SET BUTTERFLY VALVE TO FULLY OPEN TO BE CONTROLLED DDC CONTROLLER.

SEQUENCE OF OPERATION

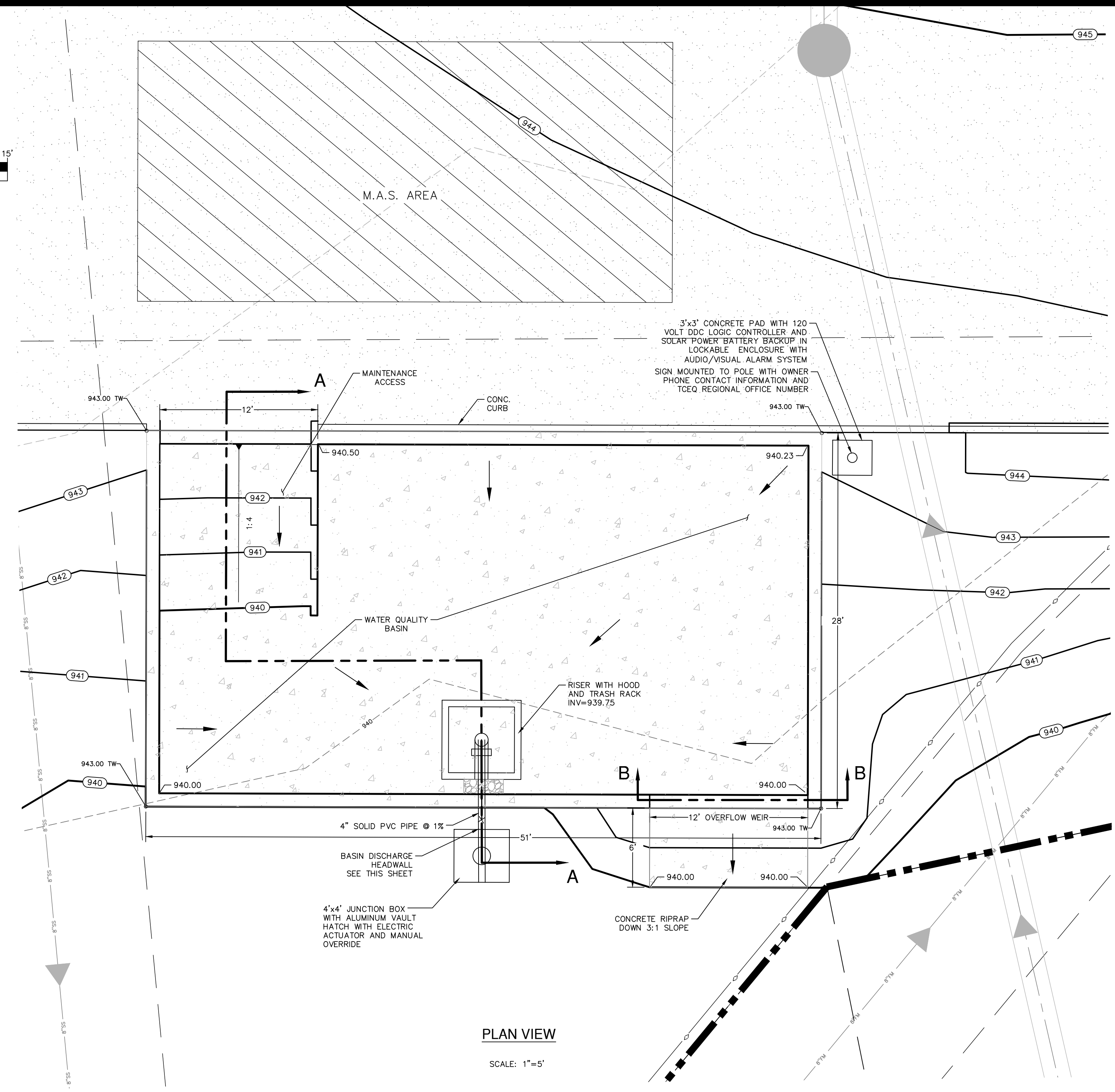
- UPON ACTIVATION OF FLOAT SWITCH, DDC CONTROLLER TO START DETENTION TIMER #1.
- DETENTION TIMER #1 TO BE MANUALLY SET TO 12 HOURS AND TO BE USER ADJUSTABLE VALVE.
- WHEN DETENTION TIMER #1 HAS ELAPSED, A 4" BUTTERFLY VALVE IS TO OPEN AND RELEASE DETAINED WATER BASIN.
- UPON DEACTIVATION OF FLOAT SWITCH, DDC CONTROLLER TO START DETENTION TIMER #2.
- DETENTION TIMER #2 TO BE MANUALLY SET TO 4 HOURS AND TO BE USER ADJUSTABLE.
- WHEN DETENTION TIMER #2 HAS ELAPSED, THE 4" BUTTERFLY VALVE IS TO CLOSE.
- VALVE TO BE ACTUATED PERIODICALLY TO SHOW ACTIVE REGARDLESS OF FLOAT SWITCH OPERATION.

NOTES

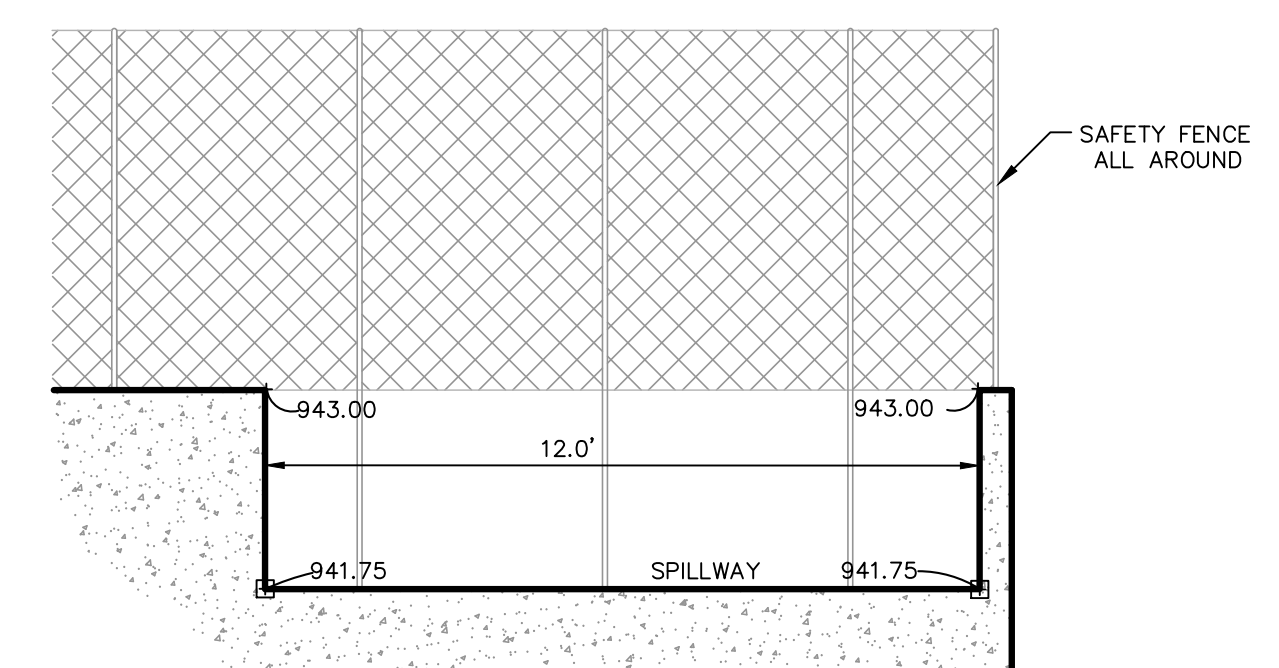
- 4'x4' JUNCTION BOX SHALL BE REINFORCED PRECAST CONCRETE (PEDESTRIAN RATED). HATCH SHALL BE ALUMINUM 3'x3' HINGED ALUMINUM HATCH (PEDESTRIAN RATED) WITH SPRING ASSIST. FOUR(4)-INCH BUTTERFLY VALVE SHALL BE VALWORKS MODEL NO. 5670 OR 5673.
- UPON COMPLETION OF CONSTRUCTION AND IN ACCORDANCE WITH TCEQ REGULATIONS, ALL PERMANENT BMP'S MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
- ALL AREAS DISTURBED AS PART OF CONSTRUCTION OF BASIN SHALL BE REVEGETATED PRIOR TO COMPLETION.
- BASIN HAS BEEN DESIGNED USING TSS REMOVAL AND BMP SIZING CALCULATIONS AS PER THE TCEQ TGM RG-348 (2005).
- BASIN PLAN DEPICTS MINIMUM INTERIOR DIMENSIONS (LENGTH, WIDTH & HEIGHT FOR TCEQ REVIEW & APPROVAL. ACTUAL STRUCTURAL PLANS FOR CONSTRUCTION TO BE DESIGNED BY STRUCTURAL ENGINEER AT A LATER DATE.
- BASIN DRAWDOWN IS CONTROLLED BY THE 4" PVC PIPE. BASIN DRAWDOWN WILL OCCUR IN APPROXIMATELY 2.5 HOURS.

M.A.S. NOTE:
 STAGING AREA REQUIREMENT (800 SQ.FT.) IS SATISFIED BY UTILIZING THE PRIVATE AREA ADJACENT TO THE BASIN AS DESIGNATED IN THE PLAN VIEW ABOVE.

THE ENGINEERING SEAL HAS BEEN AFFIXED TO THIS SHEET ONLY FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH THE POLLUTION ABATEMENT SIZING AND TREATMENT REQUIREMENTS OF THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY'S EDWARDS AQUIFER TECHNICAL GUIDANCE MANUAL.
 THIS SHEET HAS BEEN PREPARED FOR PURPOSES OF POLLUTION ABATEMENT ONLY. ALL OTHER CIVIL ENGINEERING RELATED INFORMATION SHOULD BE ACQUIRED FROM THE APPROPRIATE SHEET IN THE CIVIL IMPROVEMENT PLANS.

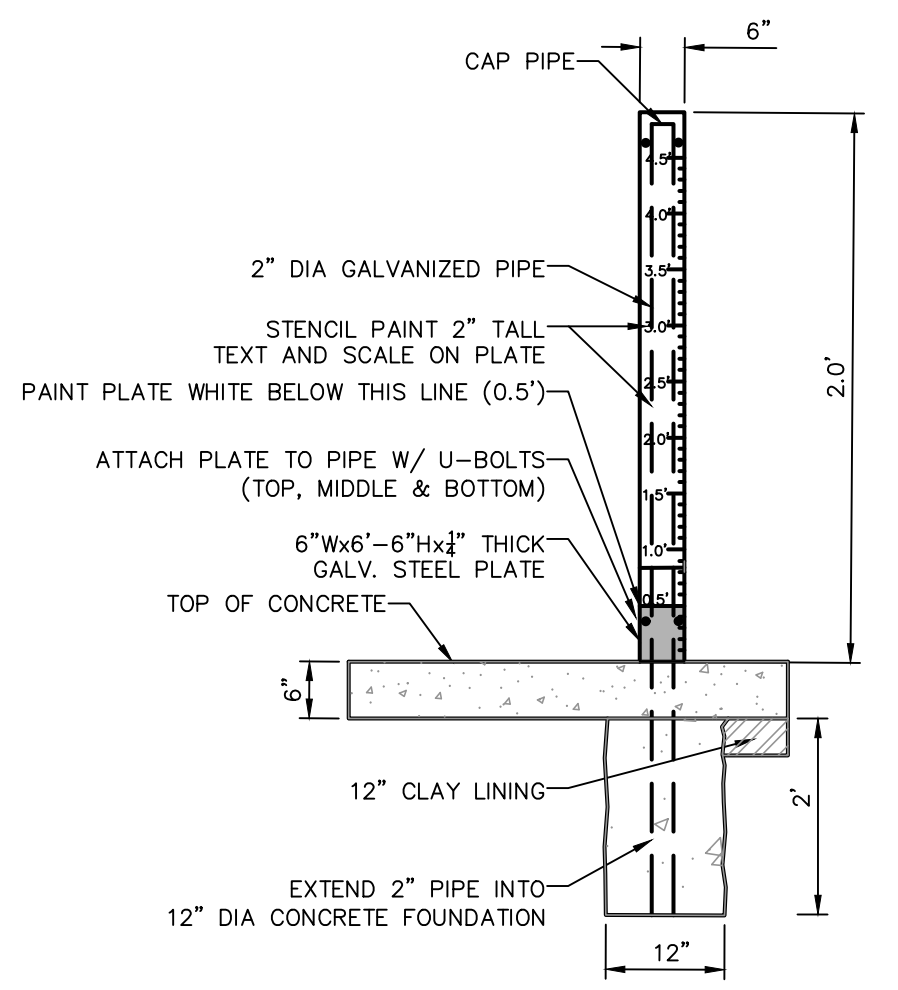


PLAN VIEW
 SCALE: 1"=5"



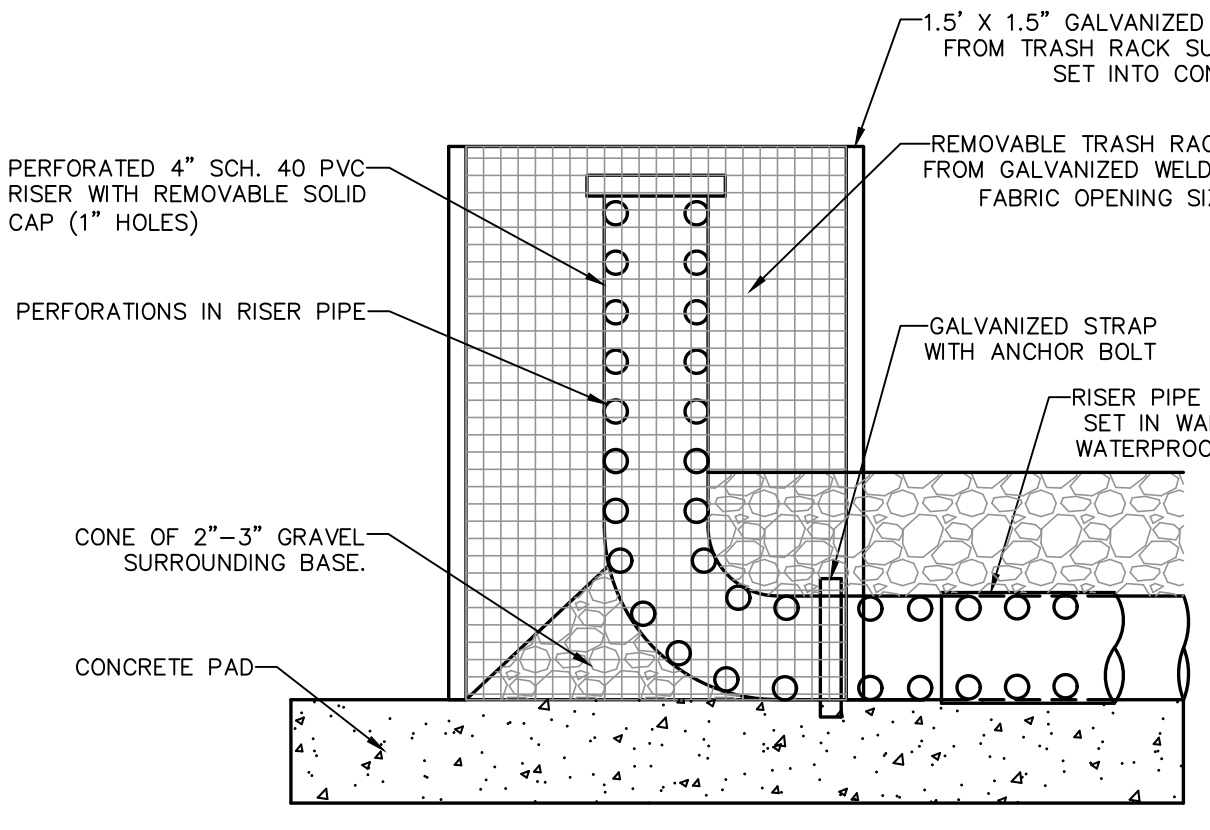
TYPICAL SECTION "B-B"
 N.T.S.

BASIN DESIGN DATA	
BASIN WATERSHED AREA	= 44,867 SF (1.03 AC.)
RUN OFF DEPTH	= 1.32 IN
REQUIRED CAPTURE VOLUME	= 2,281 CF
WQ BASIN WATER STORAGE DEPTH	= 2.0 FT
WQ BASIN CAPTURE VOLUME	= 2,405 CF
OVERFLOW WEIR	= 12 FT X 0.5 FT
BASIN DRAWDOWN IS CONTROLLED BY THE 4" OUTLET PIPE @ 1.0% SLOPE. BASIN DRAWDOWN WILL OCCUR IN APPROXIMATELY 2.5 HOURS.	

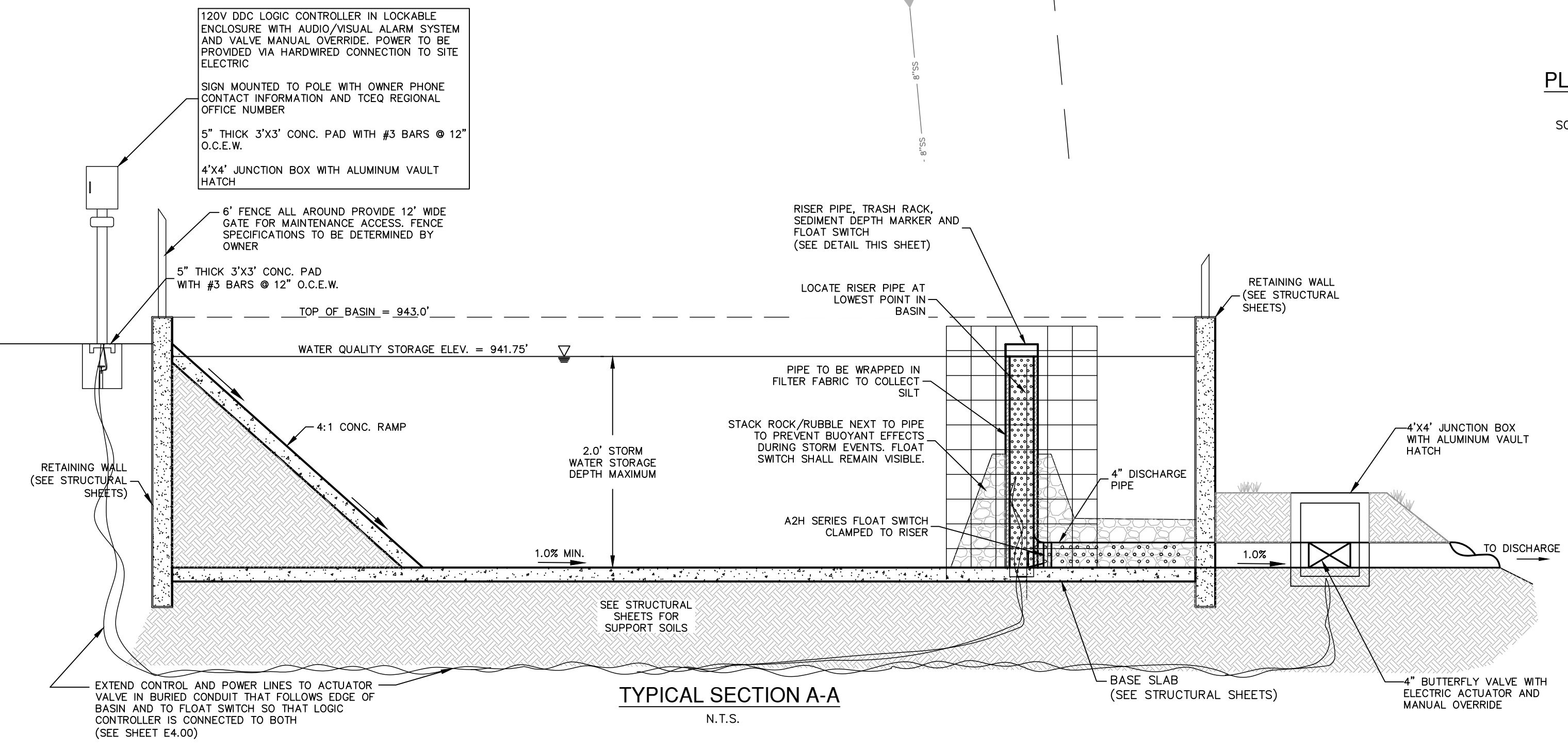


SEDIMENT DEPTH MARKER DETAIL
 NOT TO SCALE

NOTE: ONCE SEDIMENT IS ABOVE THE 6" DESIGNATION, THE BASIN MUST BE CLEANED OUT TO DESIGN ELEVATIONS AND VOLUMES PER PLAN. SEDIMENT MARKER TO BE LOCATED WITHIN 10' OF THE RISER PIPE.



TRASH RACK/RISER PIPE DETAIL
 N.T.S.



TYPICAL SECTION A-A
 N.T.S.

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NOTES BY SYMBOL (X)

1. INCLUDE NORMALLY OPEN CONTACT THAT CLOSURES ON ENERGIZED/ALARM CONDITION.
2. INCLUDE PHASE LOSS/FAIL/RELAY (27/47)

GENERAL NOTES

1. ELECTRICAL SYSTEM IS DESIGNED TO SERVE PHASE 1 AND FUTURE PHASE 2 LOADS.
2. LIFT PUMP FEEDER BREAKERS ARE 400A FRAME ELECTRONIC TRIP CIRCUIT BREAKERS SET TO TRIP AT 200A FOR 90HP PUMPS (PHASE 1). BREAKER SETTINGS AND PLUG CAN BE ADJUSTED TO SERVE PHASE 2 LOADS UP TO 150HP.
3. PUMP FEEDER CONDUITS ARE SIZED TO SERVE PHASE 2 LOADS. CONDUCTORS ARE SIZED TO SERVE PHASE 1 LOADS.
4. THE GENERATOR IS SIZED TO SERVE PHASE 1 LOADS.
5. THE TRANSFER SWITCH, MAIN CIRCUIT BREAKER, AND MAIN DISTRIBUTION PANEL ARE SIZED TO SERVE PHASE 2 LOADS.

- GENERATOR SIZING PARAMETERS
1. MAXIMUM VOLTAGE DROP FOR ANY STEP: 15%
 2. MAXIMUM FREQUENCY DIP FOR EACH STEP: 5%
 3. PUMP STARTING METHOD: FULL VOLTAGE ACROSS THE LINE
 4. START SEQUENCE
 - STEP 1: TRANSFORMER LOADS
 - STEP 2: HVAC LOADS
 - STEP 3: AERATOR BLOWERS
 - STEP 4: PUMP 1
 - STEP 5: PUMP 2
 - STEP 6: PUMP 3
 - STEP 7: PUMP 4
 5. THE KW SHOWN ON THE DRAWING IS THE MINIMUM SIZE. USING A LARGER ALTERNATOR TO REDUCE THE GENERATOR KW IS NOT ALLOWED

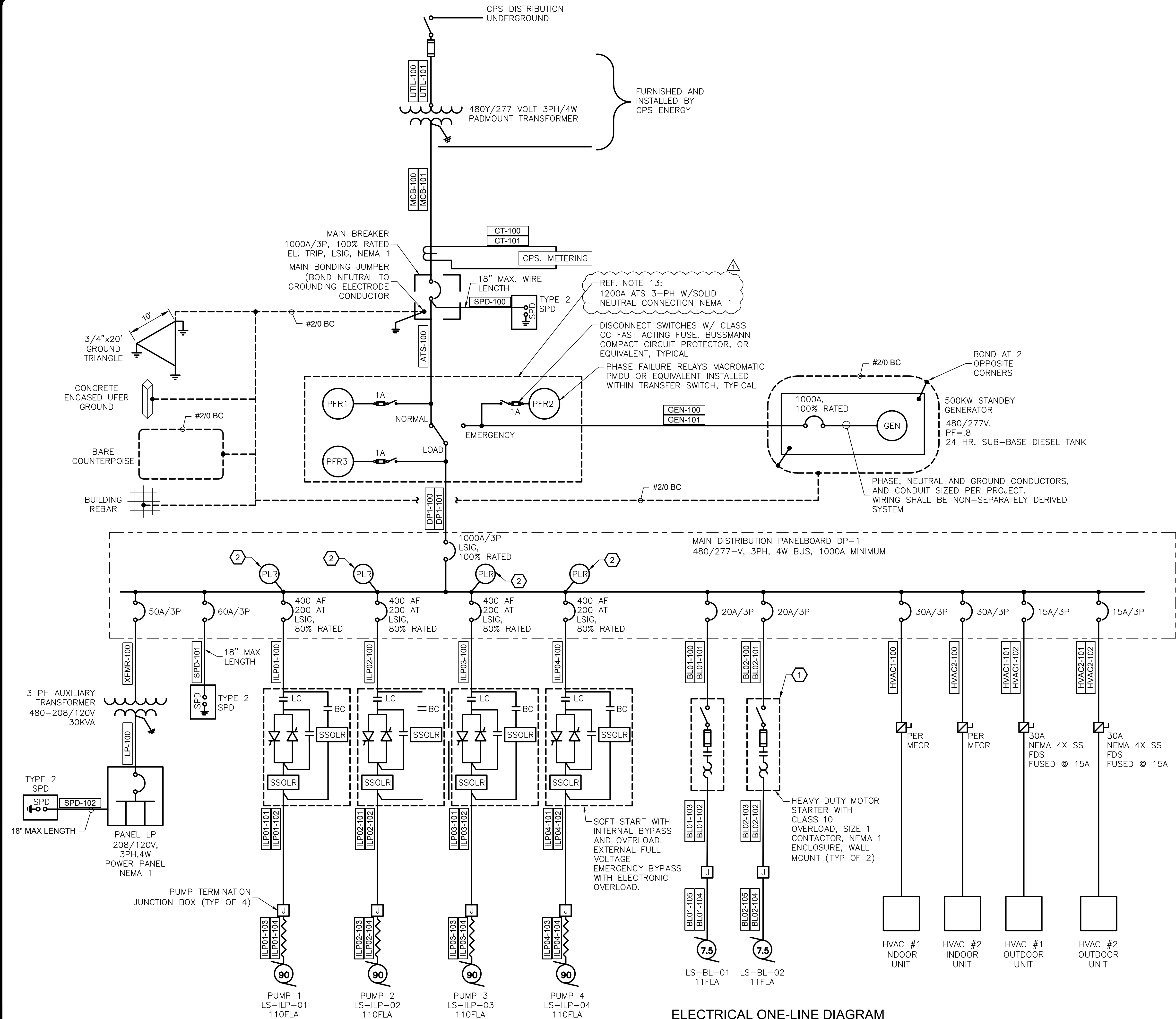
PAPE-DAWSON ENGINEERS

STATE OF TEXAS
 DAVID K. BARNES
 144962
 LICENSED PROFESSIONAL ENGINEER

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH |
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 |
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 WWW.PAPE-DAWSON.COM

E-54 REGIONAL LIFT STATION PLANS
 REGIONAL LIFT STATION
 ONE-LINE DIAGRAM

SAWS JOB NO. 22-2502
 JOB NO. 11500-51
 DATE SEPTEMBER 2022
 DESIGNER KB
 CHECKED KB DRAWN GL
 SHEET E2.00



Date: Oct 24, 2022, 8:08am User ID: gfranklin
 File: C:\pape\working\2022\22-2502\22-2502-01\22-2502-01-02.dwg
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CONDUIT TAG	CONDUIT SIZE	CONDUCTOR SIZE	ROUTING		COMMENT
			FROM	to	
BL01-100	1-1/2"	3-1/C #8, 1-1/C #8 GROUND	PANEL DP	BL-01 STARTER	POWER
BL01-101	1-1/2"	PULL STRING	PANEL DP	BL-01 STARTER	SPARE CONDUIT
BL01-102	1-1/2"	3-1/C #8, 1-1/C #8 GROUND	BL-01 STARTER	BL-01 JUNCTION BOX	
BL01-103	1-1/2"	PULL STRING	BL-01 STARTER	BL-01 JUNCTION BOX	SPARE CONDUIT
BL01-104	1-1/2"	3-1/C #8, 1-1/C #8 GROUND IN 1-1/2"C	BL-01 JUNCTION BOX	BL-01 ODOR CONTROL BLOWER	
BL01-105	1-1/2"	PULL STRING	BL-01 JUNCTION BOX	BL-01 ODOR CONTROL BLOWER	SPARE CONDUIT
BL01-106	1-1/2"	6-1/C #14, 1-1/C #14 GROUND TC	BL-01 STARTER	BL-01 JUNCTION BOX	
BL01-107	1-1/2"	PULL STRING	BL-01 STARTER	BL-01 JUNCTION BOX	SPARE CONDUIT
BL01-108	1-1/2"	PULL STRING	BL-01 STARTER	BL-01 JUNCTION BOX	SPARE CONDUIT
BL01-109	1-1/2"	PULL STRING	BL-01 JUNCTION BOX	BL-01 ODOR CONTROL BLOWER	SPARE CONDUIT
BL01-110	1-1/2"	6-1/C #14, 1-1/C #14 GROUND TC	BL-01 STARTER	SCADA PANEL	TRAY CABLE
BL02-100	1-1/2"	3-1/C #8, 1-1/C #8 GROUND	PANEL DP	BL-02 STARTER	POWER
BL02-101	1-1/2"	PULL STRING	PANEL DP	BL-02 STARTER	SPARE CONDUIT
BL02-102	1-1/2"	3-1/C #8, 1-1/C #8 GROUND	BL-02 STARTER	BL-02 JUNCTION BOX	
BL02-103	1-1/2"	PULL STRING	BL-02 STARTER	BL-02 JUNCTION BOX	SPARE CONDUIT
BL02-104	1-1/2"	3-1/C #8, 1-1/C #8 GROUND IN 1-1/2"C	BL-02 JUNCTION BOX	BL-02 ODOR CONTROL BLOWER	
BL02-105	1-1/2"	PULL STRING	BL-02 JUNCTION BOX	BL-02 ODOR CONTROL BLOWER	SPARE CONDUIT
BL02-106	1-1/2"	6-1/C #14, 1-1/C #14 GROUND TC	BL-02 STARTER	BL-02 JUNCTION BOX	
BL02-107	1-1/2"	PULL STRING	BL-02 STARTER	BL-02 JUNCTION BOX	SPARE CONDUIT
BL02-108	1-1/2"	PULL STRING	BL-02 STARTER	BL-02 JUNCTION BOX	SPARE CONDUIT
BL02-109	1-1/2"	PULL STRING	BL-02 JUNCTION BOX	BL-02 ODOR CONTROL BLOWER	SPARE CONDUIT
BL02-110	1-1/2"	6-1/C #14, 1-1/C #14 GROUND TC	BL-02 STARTER	SCADA PANEL	TRAY CABLE
HVAC1-100	CABLE TRAY	3-1/C #8, 1-1/C #8 GROUND TC	PANEL DP	HVAC #1 INDOOR UNIT	TRAY CABLE
HVAC1-101	1"	3-1/C #12, 1-1/C #12 GROUND	PANEL DP	HVAC #1 OUTDOOR UNIT	
HVAC1-102	1"	PULL STRING	PANEL DP	HVAC #1 OUTDOOR UNIT	SPARE CONDUIT
HVAC1-103	1"	CONTROL WIRING AS REQUIRED	HVAC #1 INDOOR UNIT	HVAC#1 OUTDOOR UNIT	CONTROL CONDUIT BETWEEN UNITS
HVAC2-100	CABLE TRAY	1-3/C #8, 1-1/C #8 GROUND TC	PANEL DP	HVAC #2 INDOOR UNIT	TRAY CABLE
HVAC2-101	1"	3-1/C #12, 1-1/C #12 GROUND	PANEL DP	HVAC #2 OUTDOOR UNIT	
HVAC2-102	1"	PULL STRING	PANEL DP	HVAC #2 OUTDOOR UNIT	SPARE CONDUIT
HVAC2-103	1"	CONTROL WIRING AS REQUIRED	HVAC #2 INDOOR UNIT	HVAC#2 OUTDOOR UNIT	CONTROL CONDUIT BETWEEN UNITS
TS-100	CABLE TRAY	1-2/C #14, 1-1/C #14 GROUND TC	ROOM TEMP SWITCH POWER	PANEL LP	TRAY CABLE
TS-101	CABLE TRAY	2-1/C #14, 1-1/C #14 GROUND TC	ROOM TEMP SWITCH CONTROL	SCADA PANEL	TRAY CABLE
DS-100	CABLE TRAY	2-1/C #14, 1-1/C #14 GROUND	BUILDING INTRUSION SENSOR	SCADA PANEL	TRAY CABLE
DS-101	CABLE TRAY	2-1/C #14, 1-1/C #14 GROUND	BUILDING INTRUSION SENSOR	SCADA PANEL	TRAY CABLE
ANT-100	1"	2-1/C #14, 1-1/C #14 GROUND	ANTENNA	PANEL LP	
ANT-101	3"	CAT 6	ANTENNA	SCADA PANEL	
ANT-102	3"	COAX	ANTENNA	SCADA PANEL	
ANT-103	3"	PULL STRING	ANTENNA	SCADA PANEL	SPARE CONDUIT
ANT-104	3"	PULL STRING	ANTENNA	PANEL LP	SPARE CONDUIT
PIT-100	1"	2-2#16 TSP + GROUND	PRESSURE TRANSMITTER	SCADA PANEL	
PIT-101	1"	PULL STRING	PRESSURE TRANSMITTER	SCADA PANEL	SPARE CONDUIT
HT-100	1"	2-1/C #12, 1-1/C #12 GROUND	HEAT TRACE	PANEL LP	
HT-101	1"	PULL STRING	HEAT TRACE	PANEL LP	SPARE CONDUIT
FS-100	2"	4-1/C #12, 1-1/C #12 GROUND	SCADA PANEL	LEVEL JUNCTION BOX	FLOAT SIGNALS
FS-101	2"	PULL STRING	SCADA PANEL	LEVEL JUNCTION BOX	SPARE CONDUIT
FS-102	2"	CABLES BY VENDOR	LEVEL JUNCTION BOX	WET WELL	LENGTH AS REQUIRED
FS-103	2"	PULL STRING	LEVEL JUNCTION BOX	WET WELL	SPARE CONDUIT
LIT-100	1"	2-2#16 TSP + GROUND	LEVEL CONTROLLER (SCADA PANEL)	LEVEL JUNCTION BOX	ANALOG, LEVEL
LIT-101	1"	PULL STRING	LEVEL CONTROLLER (SCADA PANEL)	LEVEL JUNCTION BOX	SPARE CONDUIT
LIT-102	2"	CABLE BY VENDOR	LEVEL JUNCTION BOX	ULTRASONIC LEVEL SENSOR	
LIT-103	2"	PULL STRING	LEVEL JUNCTION BOX	ULTRASONIC LEVEL SENSOR	SPARE CONDUIT
PCP-100	CABLE TRAY	1-3/C #10, 1-1/C #10 GROUND TC	PUMP CONTROL PANEL	PANEL LP	TRAY CABLE
PCP-101	CABLE TRAY	32-1/C #14, 1-1/C #14 GROUND TC	PUMP CONTROL PANEL	SCADA PANEL	TRAY CABLE
PCP-102	CABLE TRAY	32-1/C #14, 1-1/C #14 GROUND TC	PUMP CONTROL PANEL	SCADA PANEL	TRAY CABLE
SP-100	CABLE TRAY	2-1/C #10, 1-1/C #10 GROUND TC	SCADA PANEL	PANEL LP	TRAY CABLE
SP-101	CABLE TRAY	CAT6	SCADA PANEL	COMMUNICATIONS PANEL	TRAY CABLE
AD-100	CABLE TRAY	2-1/C #10, 1-1/C #10 GROUND TC	PANEL LP	AUTODIALER	TRAY CABLE
AD-101	CABLE TRAY	1-19C #12, 1-1/C #12 GROUND TC	SCADA PANEL	AUTODIALER	TRAY CABLE
AD-102	CABLE TRAY	1-9/C12, 1-1/C #12 GROUND TC	ATS	AUTODIALER	TRAY CABLE
LCP-100	CABLE TRAY	1-3/C #10, 1-1/C #10 NEUTRAL, 1-1/C #10 GROUND TC	PANEL LP	LIGHTING CONTROL PANEL	TRAY CABLE
COMM-100	CABLE TRAY	1-3/C #10, 1-1/C #10 NEUTRAL, 1-1/C #10 GROUND TC	PANEL LP	COMMUNICATIONS PANEL	TRAY CABLE
AL-100	1-1/2"	2-1/C #10, 1-1/C #10 GROUND	PANEL LP	AREA LIGHTS	
AL-101	1-1/2"	PULL STRING	PANEL LP	AREA LIGHTS	SPARE CONDUIT
AL-102	1-1/2"	2-1/C #10, 1-1/C #10 GROUND	PANEL LP	AREA LIGHTS	
AL-103	1-1/2"	PULL STRING	PANEL LP	AREA LIGHTS	SPARE CONDUIT
WQP-100	1-1/2"	2-1/C #8, 1-1/C #8 GROUND	PANEL LP	WATER QUALITY POND	CONTROLLER PPOWER
WQP-101	1-1/2"	PULL STRING	PANEL LP	WATER QUALITY POND	SPARE CONDUIT
WQP-102	1-1/2"	CONDUCTOIRS AS REQUIRED	SCADA PANEL	WATER QUALITY POND	ALARM AND STATUS AS REQUIRED
WQP-103	1-1/2"	PULL STRING	SCADA PANEL	WATER QUALITY POND	SPARE CONDUIT
ACT-100	1-1/2"	3-1/C #12	WATER QUALITY CONTROLLER	VALVE ACTUAOR	ACTUATOR POWER
ACT-101	1-1/2"	PULL STRING	WATER QUALITY CONTROLLER	VALVE ACTUAOR	SPARE CONDUIT
FS-104	2"	3-1/C #12	WATER QUALITY CONTROLLER	FLOAT SWITCH	POWER
FS-105	2"	CABLE BY VENDOR	WATER QUALITY CONTROLLER	FLOAT SWITCH	CONTROL

DATE	10/19/2022
NO.	1
REVISION	ADDENDUM NO. 2



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E-54 REGIONAL LIFT STATION PLANS
REGIONAL LIFT STATION
SCHEDULES II

SAWS JOB NO.	22-2502
JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	KB
CHECKED	KB
DRAWN	GL
SHEET	E3.10

Printed: Oct 25, 2022, 3:25pm User ID: grawhshwng
 File: C:\Users\grawhshwng\OneDrive\Desktop\22-2502-E3.10 Schedules II.dwg

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PANEL: LP														
3				PH 4		WIRE VOLTAGE		L-L: 208		L-N: 120		MAIN: 125A MCB		
LOCATION: ELECTRICAL ROOM						MOUNTING: SURFACE								
CKT#	WIRE	BKR.	POLE	DESCRIPTION	VA	A	B	C	VA	DESCRIPTION	POLE	BKR.	WIRE	CKT#
1	#10	20	2	GENERATOR BATTERY CHARGER	500	700			200	EMERGENCY LIGHTS/EXIT SIGN	1	20	#10	2
3	#10				500		680		180	ULTRASONIC LEVEL CONTROLLER	1	20	#10	4
5	#10	20	1	GENERATOR BLOCK HEATER	500			1700	1200	WATER QUALITY POND CONTROLLER	1	30	#8	6
7	#10	20	1	GENERATOR ENCLOSURE LIGHTS	500	2320			1820	ELEC BUILDING EXTERIOR REC	1	20	#10	8
9	#10	20	1	ELEC BUILDING INTERIOR REC	540		1140		600	AREA LITS	1	20	#10	10
11	#10	20	1	ELEC BUILDING INTERIOR LTS	400			900	500	BLOWER #1 CONTROLS	1	20	#10	12
13	#10	20	1	ELEC BUILDING EXTERIOR LTS	100	600			500	BLOWER #2 CONTROLS	1	20	#10	14
15	#10	30	1	SCADA PANEL	1200		1200		0	AUTODIALER	1	20	#10	16
17	#10	30	1	PUMP CONTROL PANEL	360			360	0	SPARE	1	20	--	18
19	#10	20	1	ELEC BUILDING INTERIOR LTS	400	400			0	SPARE	1	20	--	20
21	--	20	1	SPARE	0		0		0	SPARE	1	20	--	22
23	--	20	1	SPARE	0			0	0	SPARE	1	20	--	24
25	--	20	1	SPARE	0	0			0	SPARE	1	20	--	26
27	--	20	1	SPARE	0		100		100	TEMPERATURE SWITCH	1	20	--	28
29	--	20	1	SPARE	0			100	100	ELECTRICAL DOOR SWITCH (SECURITY)	1	20	--	30
31	--	20	1	SPARE	0	500			500	COMMUNICATIONS PANEL	1	20	--	32
33	--	20	1	SPARE	0		750		750	HEAT TRACE	1	20	--	34
35	--	20	1	SPARE	0			0	0	SPARE	1	20	--	36
37	--	20	1	SPARE	0	0			0	SPARE	1	20	--	38
39	--	20	1	SPARE	0		0		0	SPARE	1	20	--	40
41	--	20	1	SPARE	0			0	0	SPARE	1	20	--	42
TOTAL LOAD(VA)/PHASE THIS PANEL:					4520	3870	3060							
TOTAL CONNECTED LOAD(VA) THIS PANEL:					11450			TOTAL CONNECTED LOAD (AMPS):		32				
TOTAL DEMAND LOAD(VA) THIS PANEL:					11450			TOTAL DEMAND LOAD (AMPS):		32				

- NOTES:
- 22 K.A.I.C
 - NEMA 12
 - NEUTRAL + GROUND BUS
 - PANEL TO BE PROVIDED WITH MFG. STANDARD INTERNAL SPD
 - (G) DEMOTES GFCI CIRCUIT BREAKER

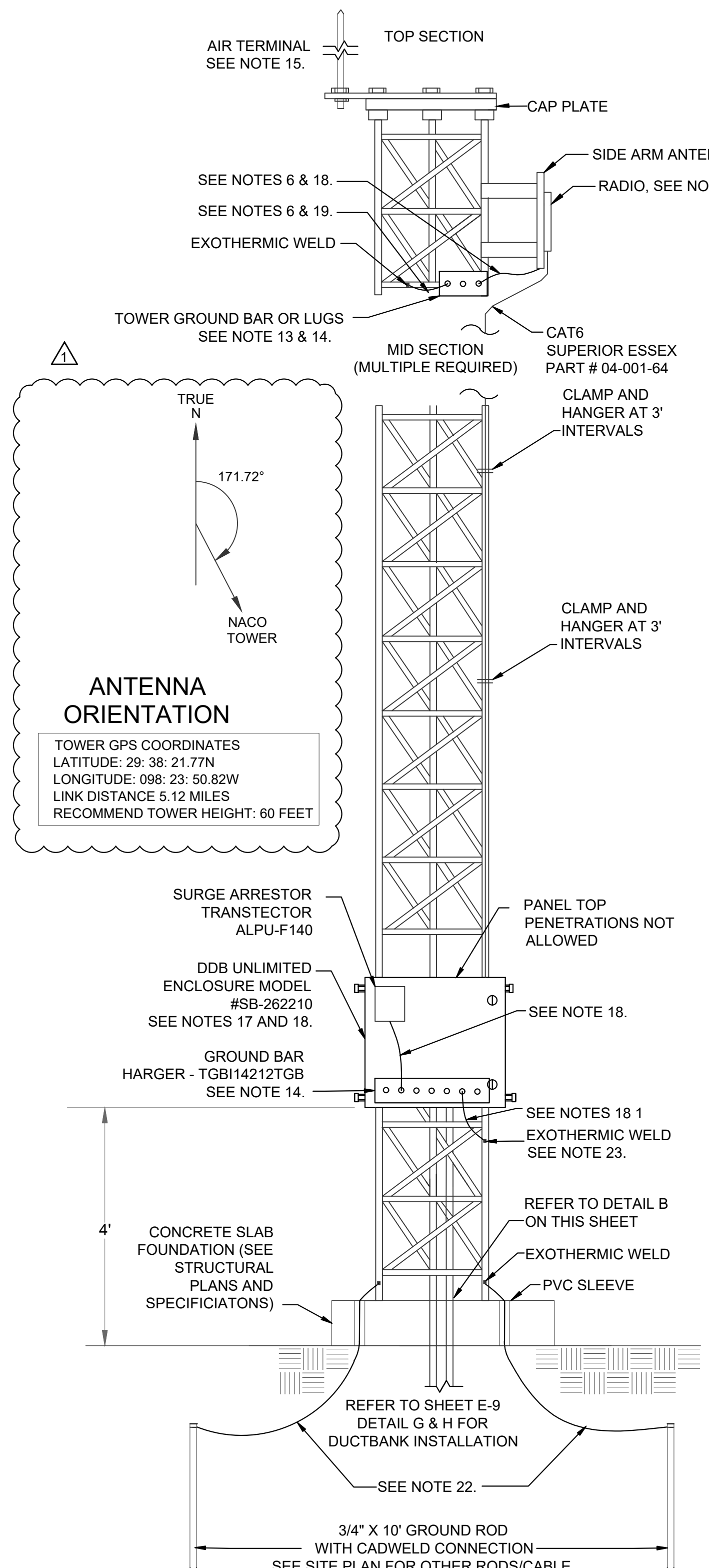
LIGHTING FIXTURE SCHEDULE						
TYPE	LAMPS	MOUNTING	VOLTAGE	MANUFACTURERS	FIXTURE DESCRIPTION	CATALOG
A	LED	SURFACE MOUNT	120	LITHOMIA	INTERIOR LIGHTING	CLX L48 5000LM HEF FDL MVOLT 35K 80CRI CLXRW48 WGLX48 E10WLCP
E	LED	WALL MOUNTED	120	LITHOMIA	EMERGENCY LIGHTING	ELM2LEDSD MOUNT 7.5 AFF OR ABOVE DOOR
WP	LED	WALL MOUNTED	120	LITHOMIA	WALL PACK	OWS-FC-LED-5000L-DIM10-MVOLT-40K-BZ-PHC WITH EMERGENCY BATTERY
EXIT		WALL MOUNTED	120	LITHOMIA	EXIT	LQC1RELN WALL MOUNTED ABOVE DOOR



**Pape-Dawson
Engineers**

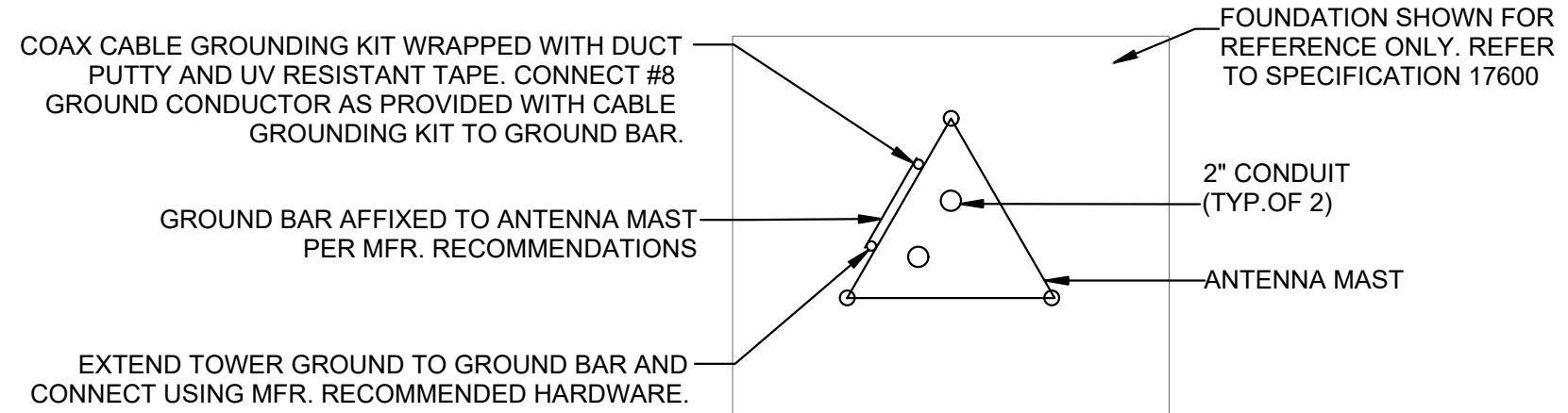
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E-54 REGIONAL LIFT STATION PLANS
REGIONAL LIFT STATION
PANEL SCHEDULES

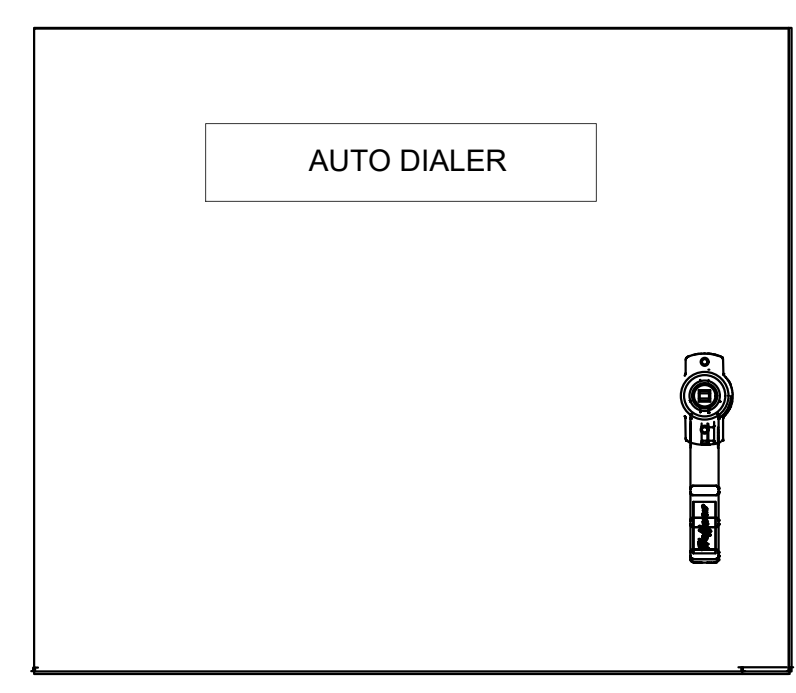


A SIDE VIEW SCADA ANTENNA TOWER & RADIO PANEL
SCALE: N.T.S.

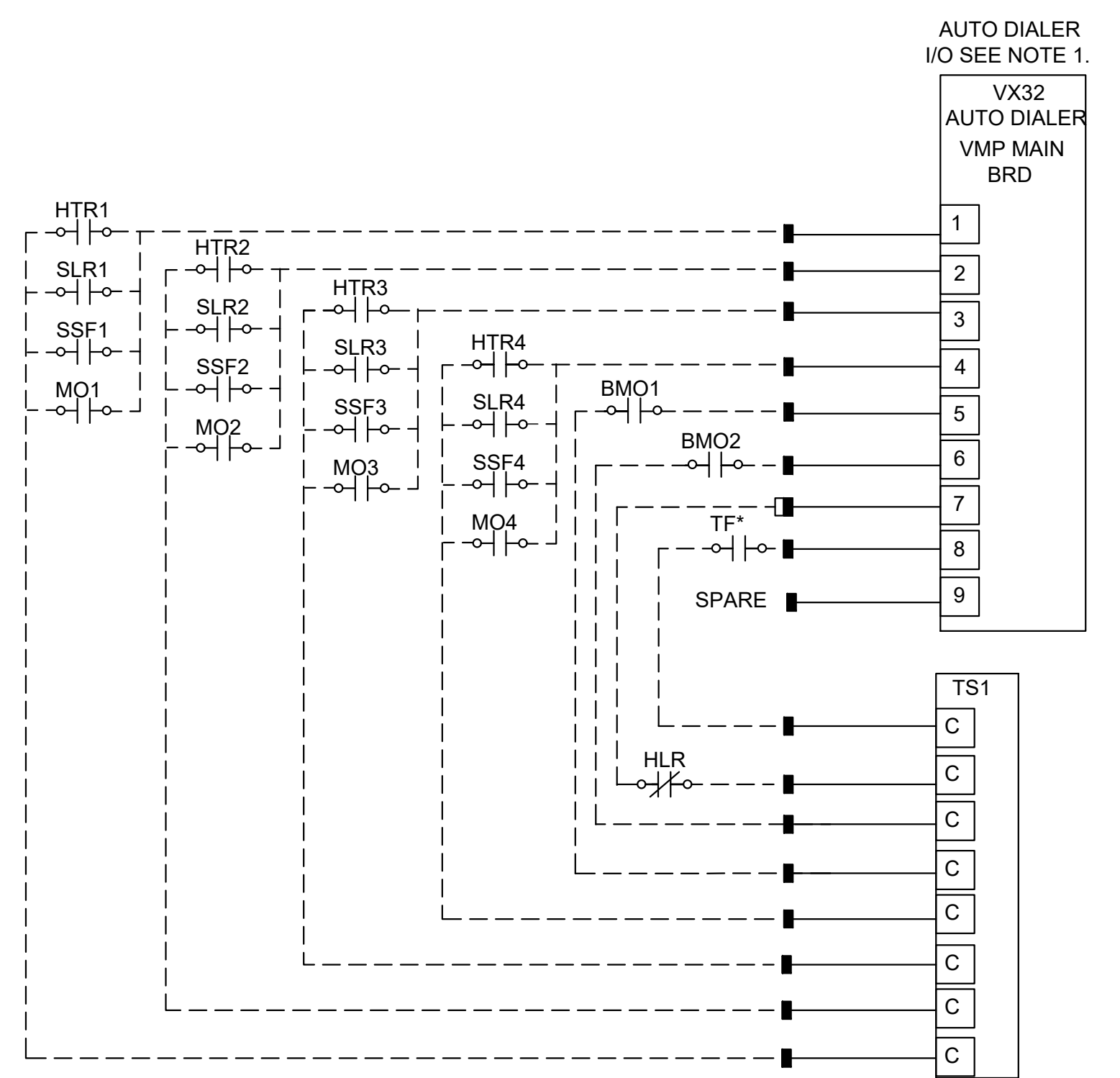
- NOTES:**
- CONTRACTOR SHALL PROVIDE TOWER PER SPECIFICATION 17600.
 - CONTRACTOR TO USE CABLE CLAMPS AND HANGERS BY ANDREW OR EQUAL SUITABLE FOR HANGING COAX CABLE. HOSE CLAMPS AND WIRE TIES ARE NOT ALLOWED.
 - ANTENNA TOWER SHOWN IS FOR DIAGRAMMATIC PURPOSES ONLY. FOR REQUIRED MATERIAL SPECIFICATIONS, EQUIPMENT INSTALLATION, NOTES AND TOLERANCES SEE MANUFACTURER DRAWINGS.
 - AZIMUTH IS BASED ON THE CLOCKWISE ANGLE FROM TRUE NORTH AS SHOWN ABOVE.
 - CONTRACTOR SHALL SUPPLY ALL ASSOCIATED EQUIPMENT FOR TOWERS PER SPECIFICATION 17600.
 - REFER TO SAWS LATEST DESIGN GUIDELINES AS REQUIRED BY SAWS, FOR TOWER GROUNDING DETAIL. COMPLY WITH TOWER GROUNDING REQUIREMENTS PER TOWER MANUFACTURER.
 - TOWER GROUND BAR OR LUG SHALL BE MADE OF TIN PLATED COPPER. DO NOT DRILL TOWER STRUCTURE. USE HARGER P/N TGB14212TGB FOR MOUNTING. USE TWO HOLE LUGS AT BUSBARS.
 - COAX CABLE SHALL BE ROUTED THROUGH PULLBOX AND UP TOWER USING CABLE CLAMPS. CABLE SHALL NOT BE ROUTED THROUGH TOP OF PULLBOX. TOP PENETRATIONS WILL NOT BE ACCEPTED.
 - ALL UNDERGROUND ELECTRIC CONDUIT SHALL BE CONCRETE ENCASED 24 INCHES BELOW GRADE.
 - ALL ENCLOSURES AND DISCONNECTS SHALL BE PAD-LOCKABLE.
 - ALL MOUNTING HARDWARE AND STRUT CHANNEL SHALL BE 316 STAINLESS STEEL. ALL ENCLOSURES SHALL BE NEMA 4X, UNLESS OTHERWISE NOTED.
 - GROUND RESISTANCE SHALL BE AS MINIMUM AS POSSIBLE, BUT IN NO CASE SHALL EXCEED 5 OHMS.
 - CONTRACTOR SHALL PROVIDE ALL ASSOCIATED EQUIPMENT FOR MOUNTING BROADBAND RADIO AND ANTENNA TO THE TOWER AT AN ELEVATION OF 60'.
 - NOTE THAT TOWER SHALL BE EXPANDABLE TO 80' FOR FUTURE PURPOSES. REFER TO NOTE 12. REFER TO SPECIFICATION 16921 FOR ADDITIONAL DETAILS.
 - THE COMPLETED INSTALLATION OF THE LIGHTNING PROTECTION SYSTEM SHALL MEET THE "INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS UL96A OF UNDERWRITERS LABORATORIES CURRENT EDITION AND NFPA 780 CURRENT EDITION. A CERTIFICATE OF COMPLETION FROM AN AUTHORITY HAVING JURISDICTION SHALL BE FURNISHED TO THE OWNER UPON COMPLETION. CONTRACTOR TO REFER TO TOWER MANUFACTURER GUIDELINES FOR INSTALLATION OF LIGHTNING PROTECTION SYSTEM. CONTRACTOR TO REFER TO RADIO MANUFACTURER FOR AIR TERMINAL MOUNTING REQUIREMENTS.
 - CAT-6 CABLE SHALL BE ROUTED THROUGH PULLBOX AND UP TOWER USING CABLE CLAMPS. CABLE SHALL NOT BE ROUTED THROUGH TOP OF PULLBOX. TOP PENETRATIONS WILL NOT BE ACCEPTED.
 - THE LIGHTNING PROTECTION UNIT WILL BE CONTAINED IN AN LPU ENCLOSURE NEMA3R AT THE BASE OF THE TOWER TO INCLUDE A BUS BAR FOR BONDING AND GROUNDING. ONE BUS BAR AND A TOWER LIGHTNING 4 FT COPPER TINNED AIR TERMINAL SHALL BE REQUIRED TO BE BONDED AT TOP OF TOWER. LIGHTNING PROTECTION UNITS, SURGE PROTECTION MODULES, BUS BARS AND AIR TERMINALS WILL BE BONDED AND GROUNDED IN ACCORDANCE WITH MANUFACTURERS' STANDARDS AND MEET OR EXCEED TIA-607D STANDARDS. AS TECHNOLOGY ADVANCES OVER TIME, COORDINATE WITH SAWS STANDARDS ON LIGHTNING PROTECTION DEVICES.
 - CONTRACTOR TO USE #6 AWG 19 STRAND CABLE WITH GREEN INSULATION.
 - CONTRACTOR TO USE #2 AWG SOLID BARE TINNED COPPER. MUST BE EXOTHERMIC WELD ON THE TOWER AND AT THE CENTER OF BUS BAR
 - TELECOMMUNICATIONS BONDING AND GROUNDING OF TOWER MUST COMPLY WITH ANSI/TIA/EIA-607-D AND TIA/EIA-222 LATEST EDITIONS.
 - ALL MECHANICAL CONNECTIONS FOR BONDING AND GROUNDING MUST USE ANTIOXIDANT COMPOUND.
 - CONTRACTOR TO USE #4/0 BARE COPPER TINNED FOR TOWER GROUNDING RING SYSTEM.
 - CONTRACTOR TO USE #4/0 BARE COPPER TINNED BOND TO TOWER GROUND RING. MUST BE EXOTHERMIC WELD AT THE CENTER OF THE BUSBAR AND AT THE TOWER GROUND RING
 - CONTRACTOR SHALL USE CAMBIUM NETWORKS PMP 4501 5GHZ INTEGRATED SUBSCRIBER AND ACCESS POINT LICENSED MODULE RADIOS.
 - CONTRACTOR SHALL REQUEST RADIO PATH STUDY RESULTS FROM THE OWNER.



D ANTENNA CABLE ROUTING AND GROUNDING DETAILS PLAN VIEW
SCALE: N.T.S.

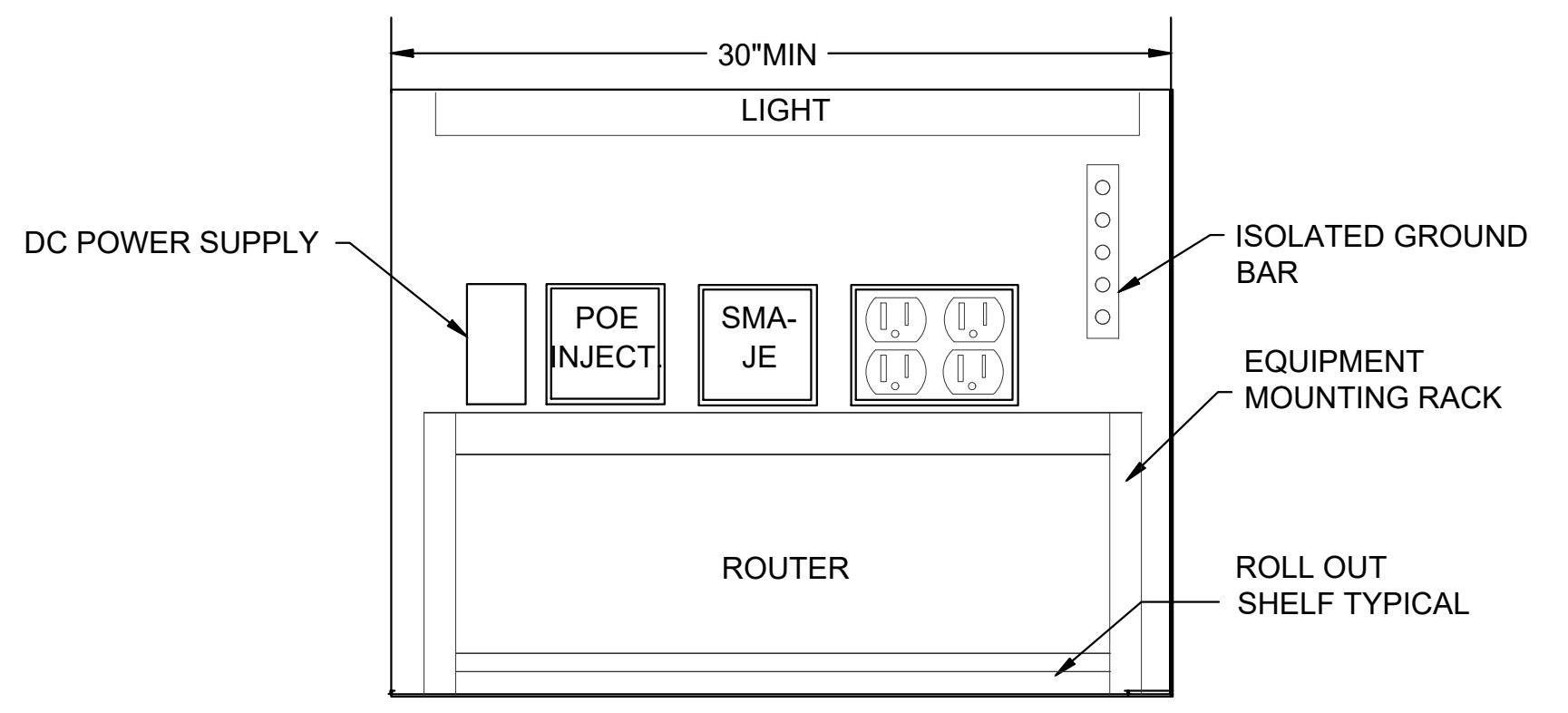


B AUTO DIALER PANEL
SCALE: N.T.S.



- LEGEND**
- SCADA PANEL (DARK SIDE INDICATES CONNECTION INTERNAL TO PANEL)
 - EXTERNAL PANEL WIRING
 - INTERNAL PANEL WIRING
 - * CONTACTORS LOCATED IN ATS
- NOTES:**
- PROVIDE RACO 32 CHANNEL VERBATIM AUTO DIALER. LOCATED INSIDE THE SCADA PANEL
 - CONTRACTOR TO COORDINATE LAND LINE TELEPHONE SERVICE TO SITE FROM TELEPHONE UTILITY.
 - CONTRACTOR SHALL PROGRAM AUTODIALER PER SAWS DIRECTION.
 - USE #12 CABLE FOR I/O POINTS CONNECTION IN SCADA PANEL.

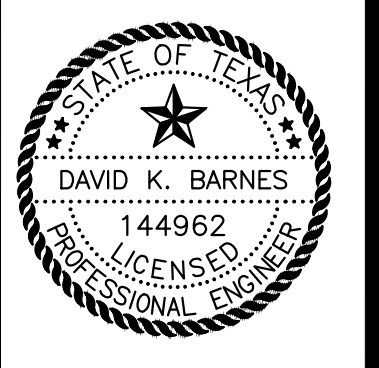
C AUTODIALER SCHEMATIC
SCALE: N.T.S.



- NOTES:**
- REFER TO SPECIFICATION 16950 AND SHEET E-6.
 - INSTALL TAG LABELED "COMMUNICATION PANEL" ON FRONT EXTERIOR OF PANEL.
 - CONTRACTOR SHALL PROVIDE ADEQUATE SPACE FOR COMPONENTS FROM ENCLOSURE EDGES.
 - PANEL SHALL BE AMERICAN PRODUCTS AM-202822-9RU BEIGE COLOR.
 - WALL MOUNTING HARDWARE SHALL BE AMERICAN PRODUCTS AM-2418-WM.
 - BACKPANEL SHALL BE AMERICAN PRODUCTS AM-202822-WB.
 - ISOLATED GROUND BAR SHALL BE AMERICAN PRODUCTS AM-2X6-RB.
 - EXHAUST FAN SHALL BE AMERICAN PRODUCTS AM-2418-FP-115.
 - FURNISH AND INSTALL TELECOMMUNICATIONS 19" RACK GROUNDING BUS BAR - HARGER RGBH14119.25 OR AM-2X6RB.
 - SHELVING SHALL BE USED TO MOUNT EQUIPMENT. DIN RAIL IS NOT ALLOWED.

E COMMUNICATION PANEL INNER LAYOUT
SCALE: N.T.S.

DATE	10/19/2022
NO.	1
REVISION	
ADDENDUM NO.	2



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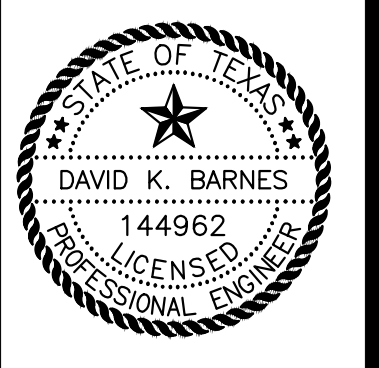
E-54 REGIONAL LIFT STATION PLANS
 REGIONAL LIFT STATION
 COMMUNICATIONS DETAILS

SAWS JOB NO.	22-2502
JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	KB
CHECKED	KB DRAWN
SHEET	E8.00

NOTES BY SYMBOL (X)

1. SQUARE D QED2 MAIN BREAKER SECTION 1000A, 100%, 36"Wx36"D.
2. ASCO 7000 SERIES ATS 1200A, 38"Wx24"D.
3. SQUARE D IN-LINE PANEL 45"Wx12"D.
4. 30KVA TRANSFORMER, 24"Wx24"D. LV PANEL, 20"Wx8"D.
5. PUMP CONTROL PANEL, 36"Wx12".
6. SCADA PANEL, 48"Wx18"D.
7. AERATOR STARTER, 24"Wx12"D.
8. PUMP SOFT START, 36"Wx18"D.
9. LIGHTING CONTROL PANEL AUTODIALER
10. COMMUNICATIONS PANEL AND RADIO
11. HVAC #1 INDOOR UNIT
12. HVAC #2 INDOOR UNIT
13. HVAC #1 OUTDOOR UNIT
14. HVAC #2 OUTDOOR UNIT

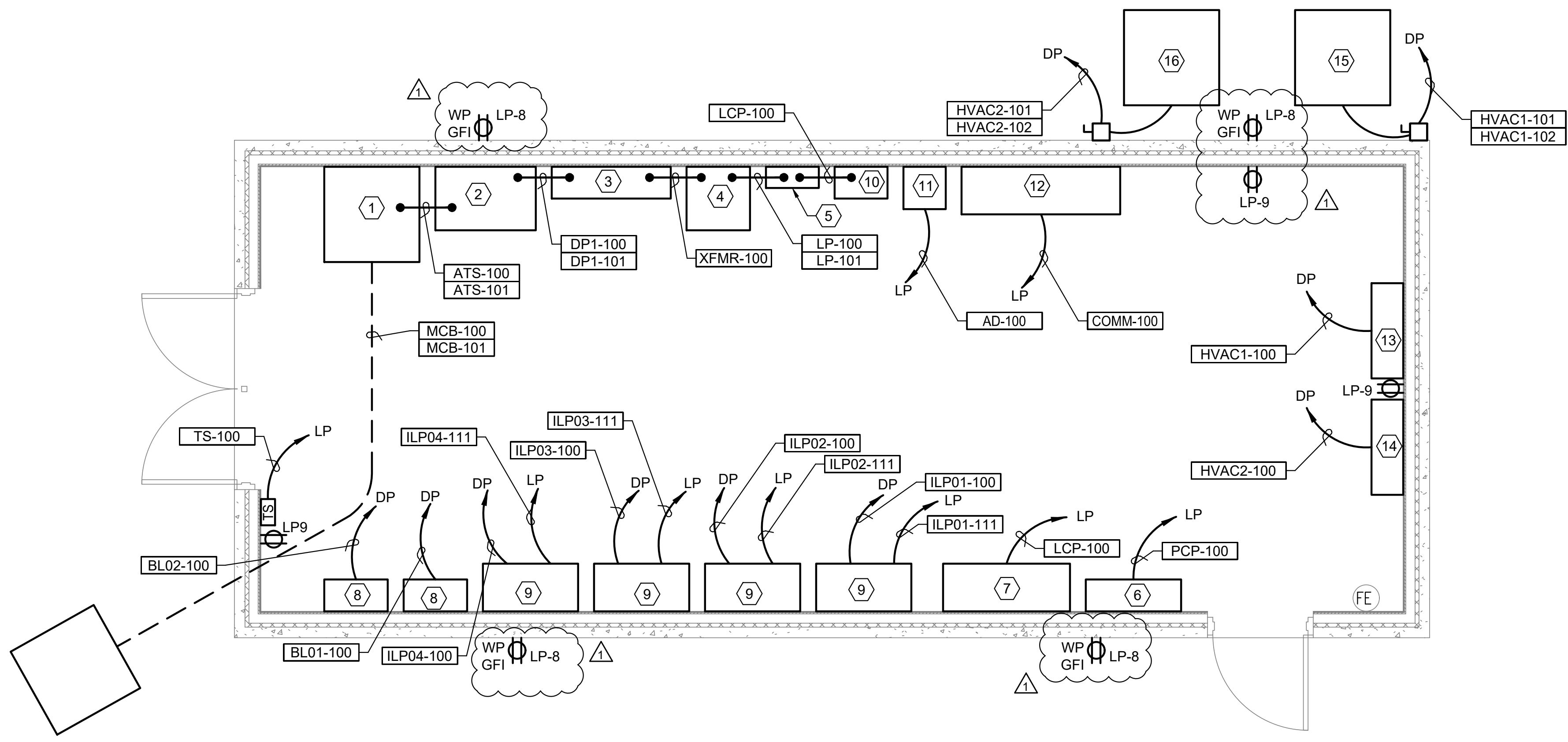
DATE	10/19/2022
NO.	1
REVISION	ADDENDUM NO. 2



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 P E P E F I R M R E G I S T R A T I O N # 470 P T E P L S # 8 4 8 5 1 0 0 0 0

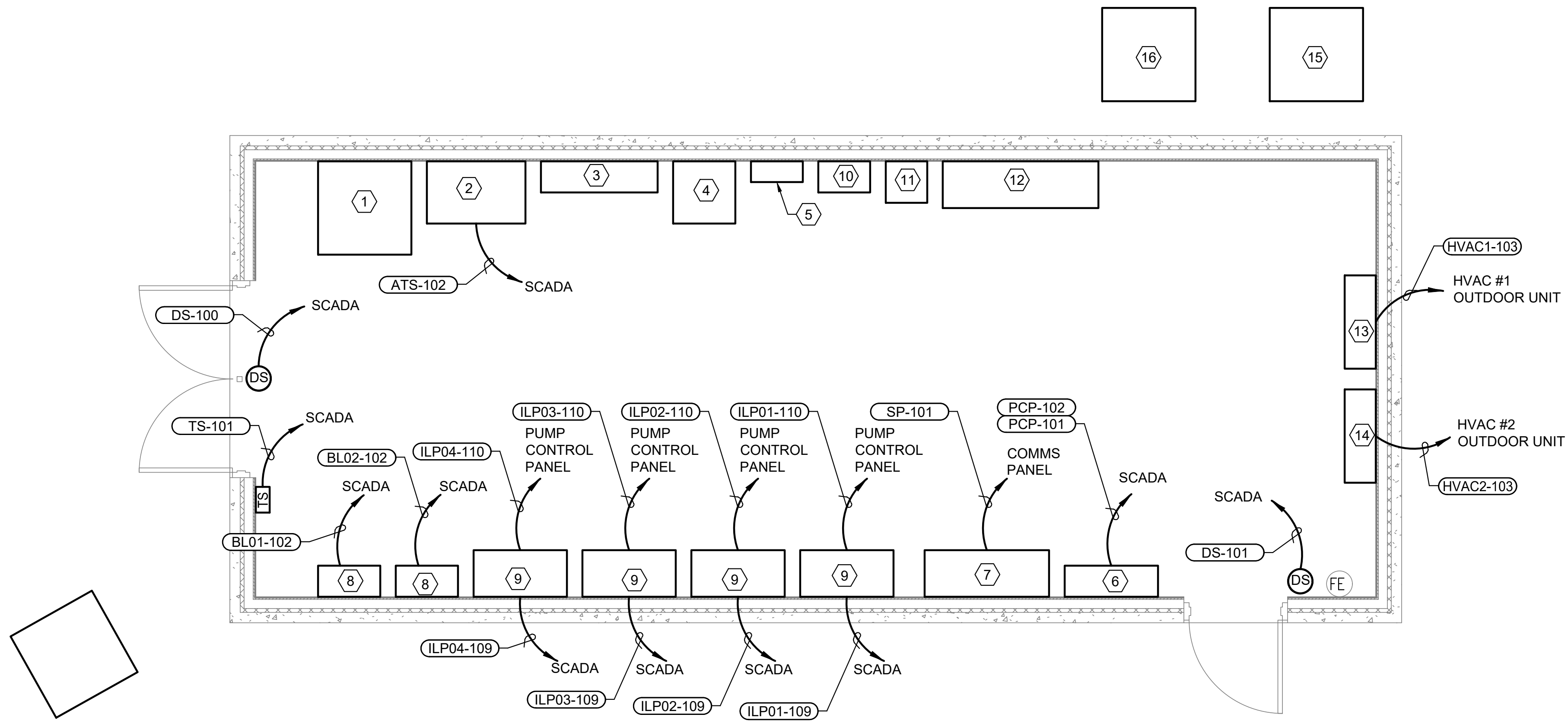
E-54 REGIONAL LIFT STATION PLANS
 REGIONAL LIFT STATION
ELECTRICAL BUILDING POWER AND CONTROLS PLANS

SAWS JOB NO.	22-2502
JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	KB
CHECKED	KB DRAWN GL
SHEET	E10.00



ELECTRICAL BUILDING POWER PLAN

0 2 4
SCALE IN FEET



ELECTRICAL BUILDING CONTROLS PLAN

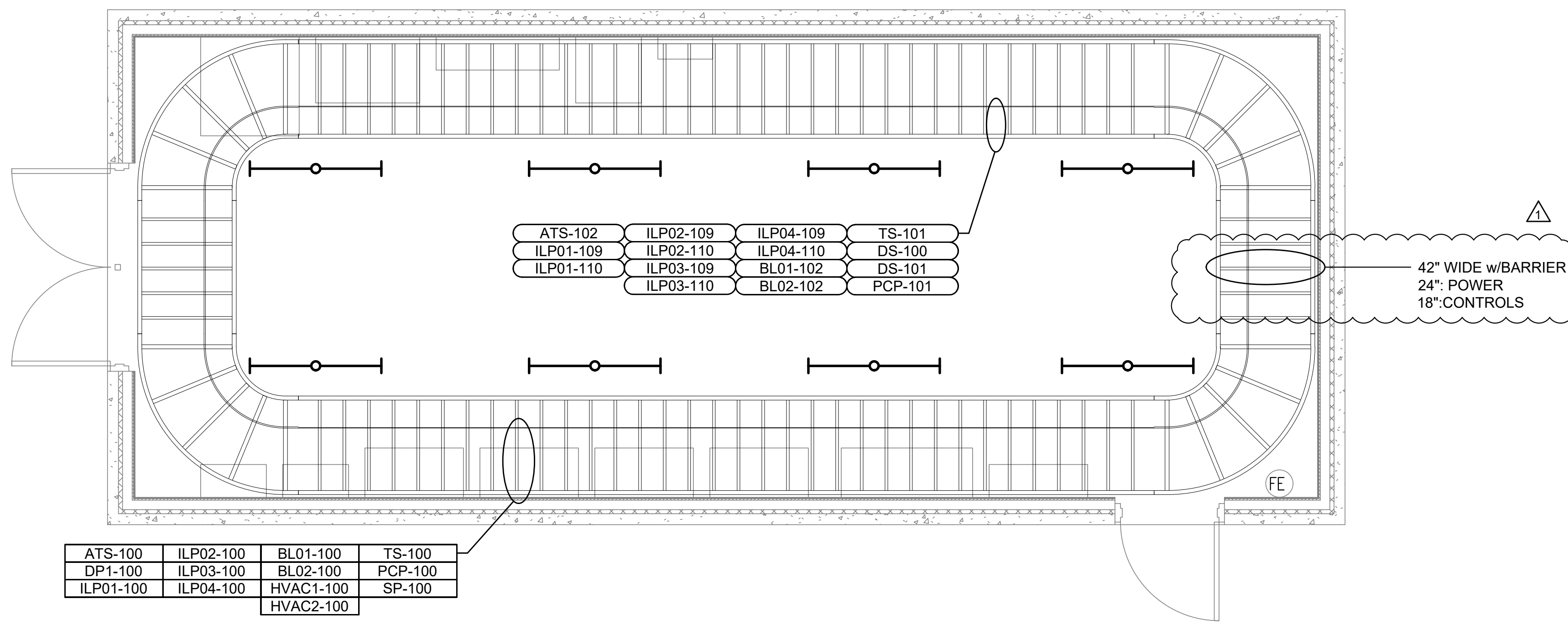
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Date: Oct 24, 2022, 8:17am User ID: gfmehamberger
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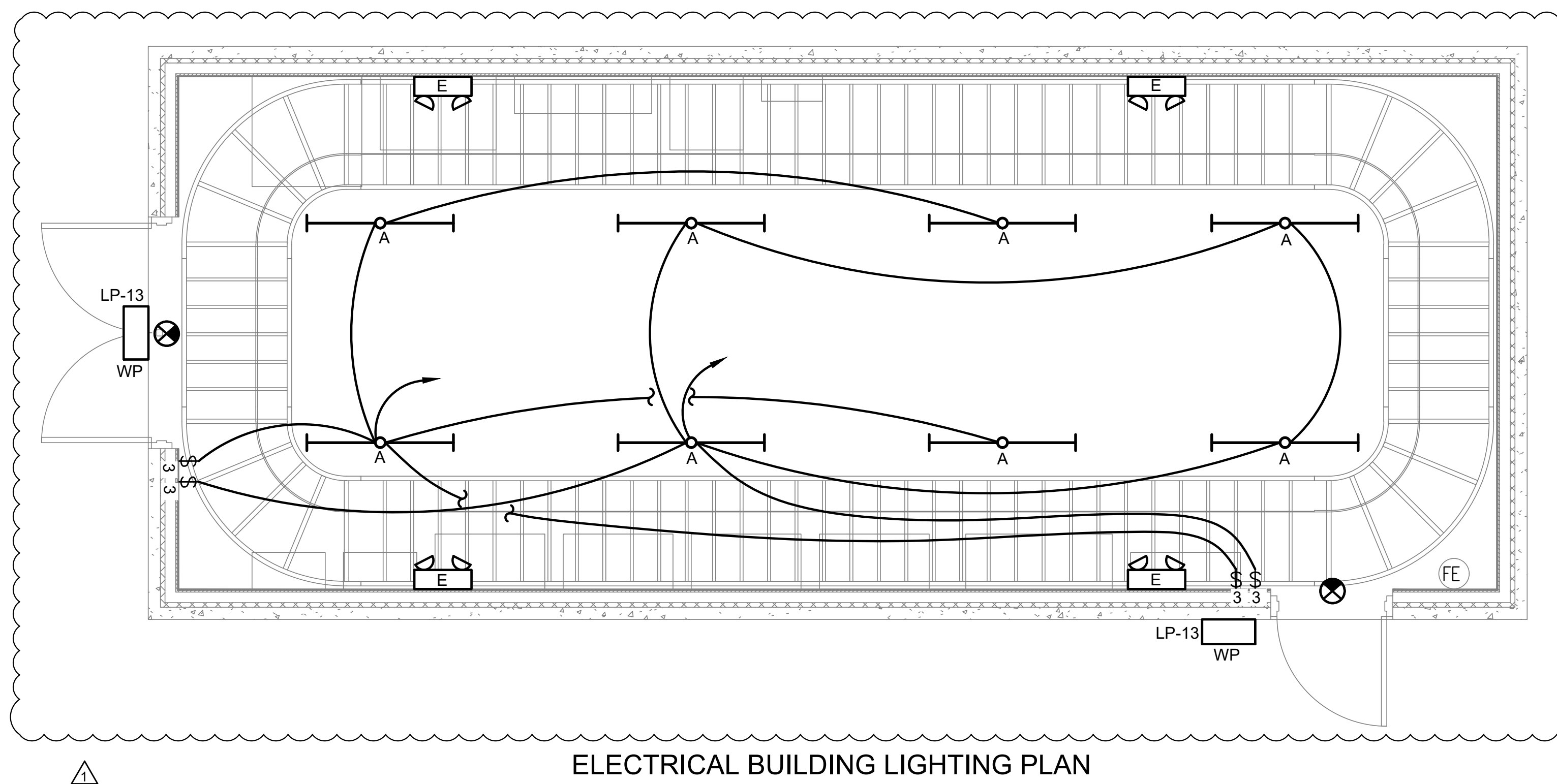
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ATS-100	ILP02-100	BL01-100	TS-100
DP1-100	ILP03-100	BL02-100	PCP-100
ILP01-100	ILP04-100	HVAC1-100	SP-100
		HVAC2-100	

ELECTRICAL BUILDING CABLE TRAY PLAN

0 2 4
SCALE IN FEET



ELECTRICAL BUILDING LIGHTING PLAN

0 2 4
SCALE IN FEET



NO.	REVISION	DATE
1	ADDENDUM NO. 2	10/19/2022



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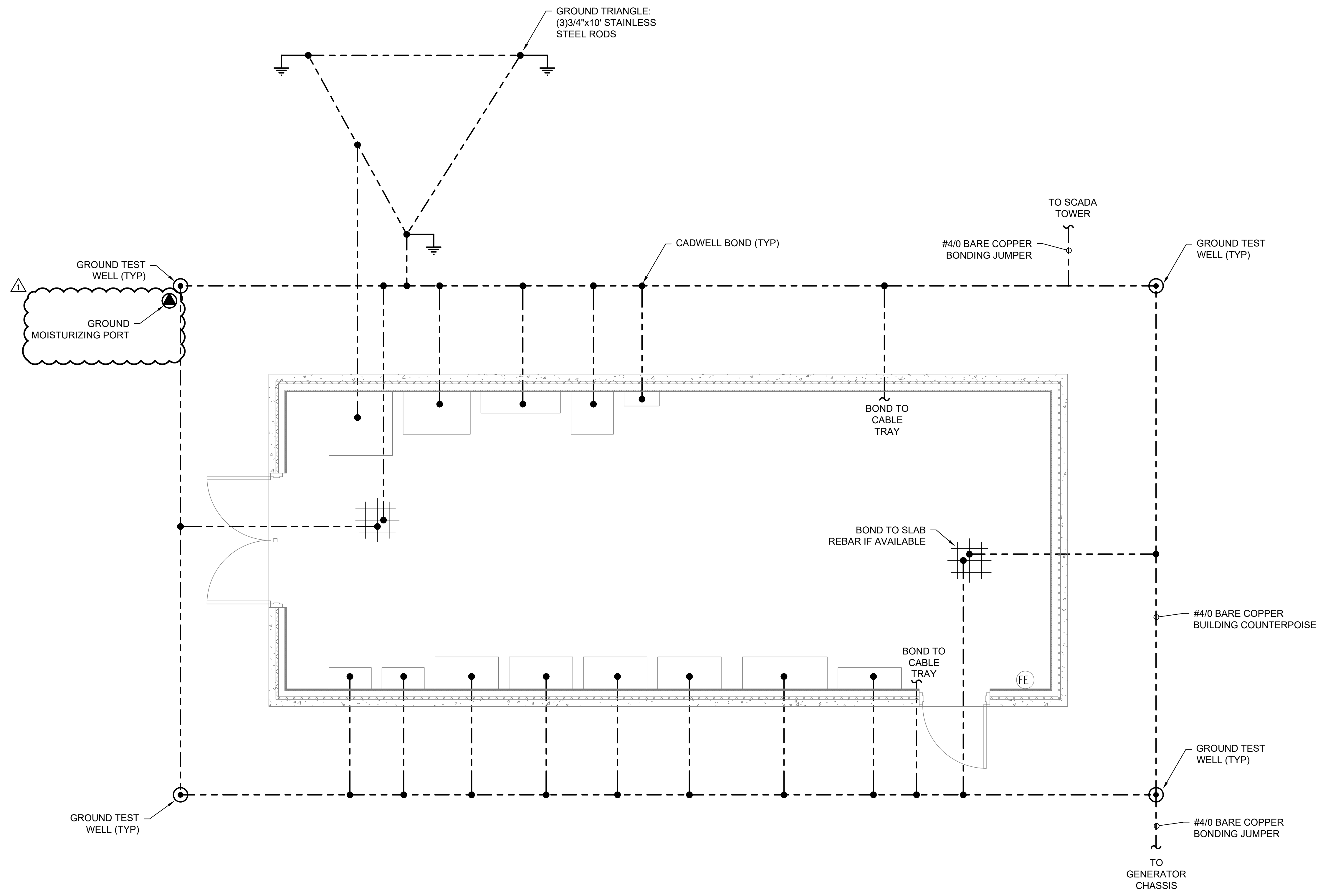
E-54 REGIONAL LIFT STATION PLANS
 REGIONAL LIFT STATION

ELECTRICAL BUILDING CABLE TRAY & LIGHTING PLAN

SAWS JOB NO.	22-2502
JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	KB
CHECKED	KB
DRAWN	GL
SHEET	E10.10

Plot: Oct 24, 2022, 12:36pm User: JD, g:\members\j...
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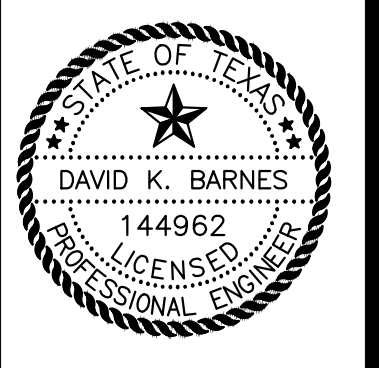
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ELECTRICAL BUILDING GROUNDING PLAN

0 2 4
SCALE IN FEET

NO.	REVISION	DATE
1	ADDENDUM NO. 2	10/19/2022

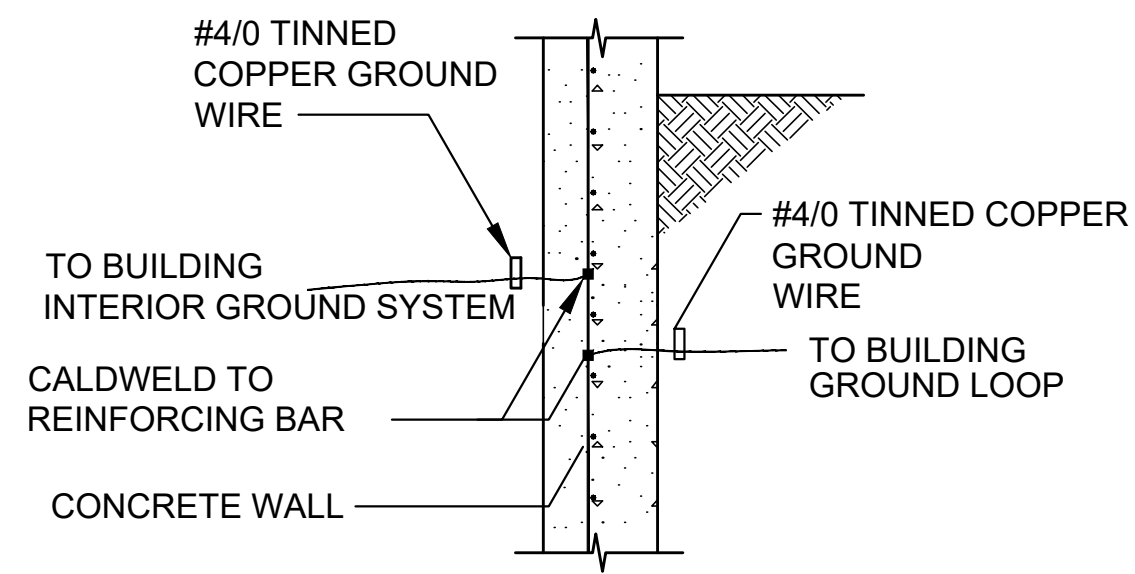


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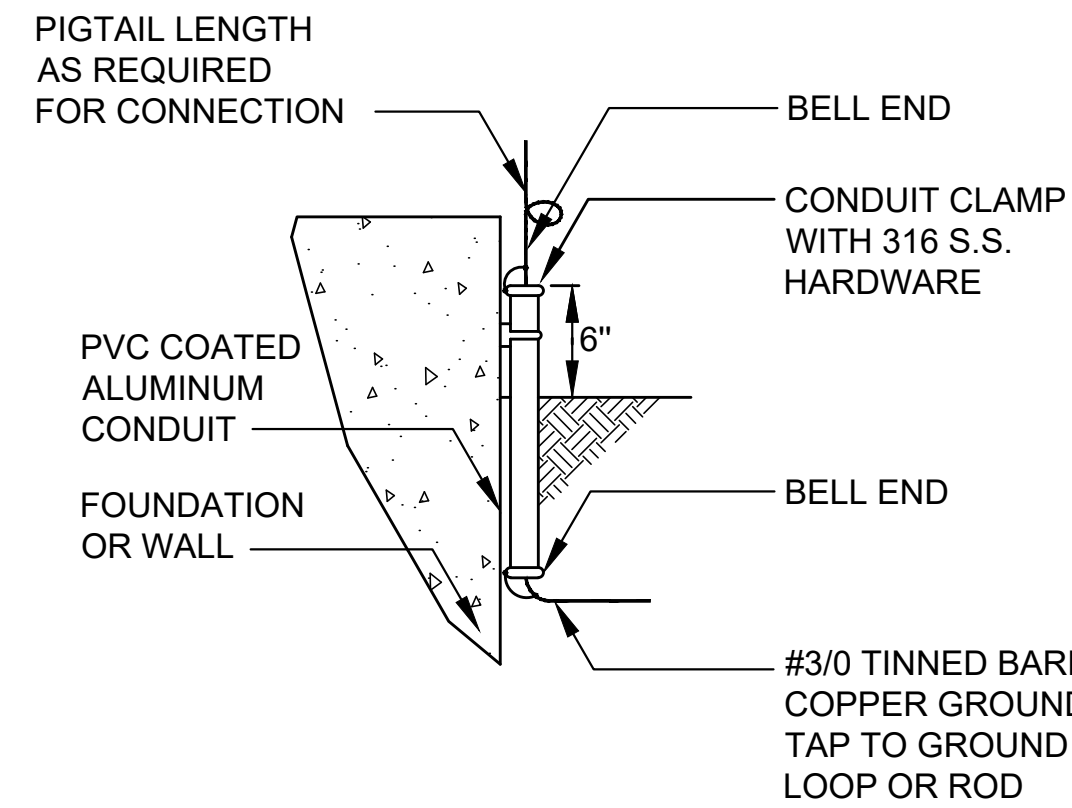
E-54 REGIONAL LIFT STATION PLANS
REGIONAL LIFT STATION
ELECTRICAL BUILDING GROUNDING PLAN

SAWS JOB NO. 22-2502
 JOB NO. 11500-51
 DATE SEPTEMBER 2022
 DESIGNER KB
 CHECKED KB DRAWN GL
 SHEET **E10.20**

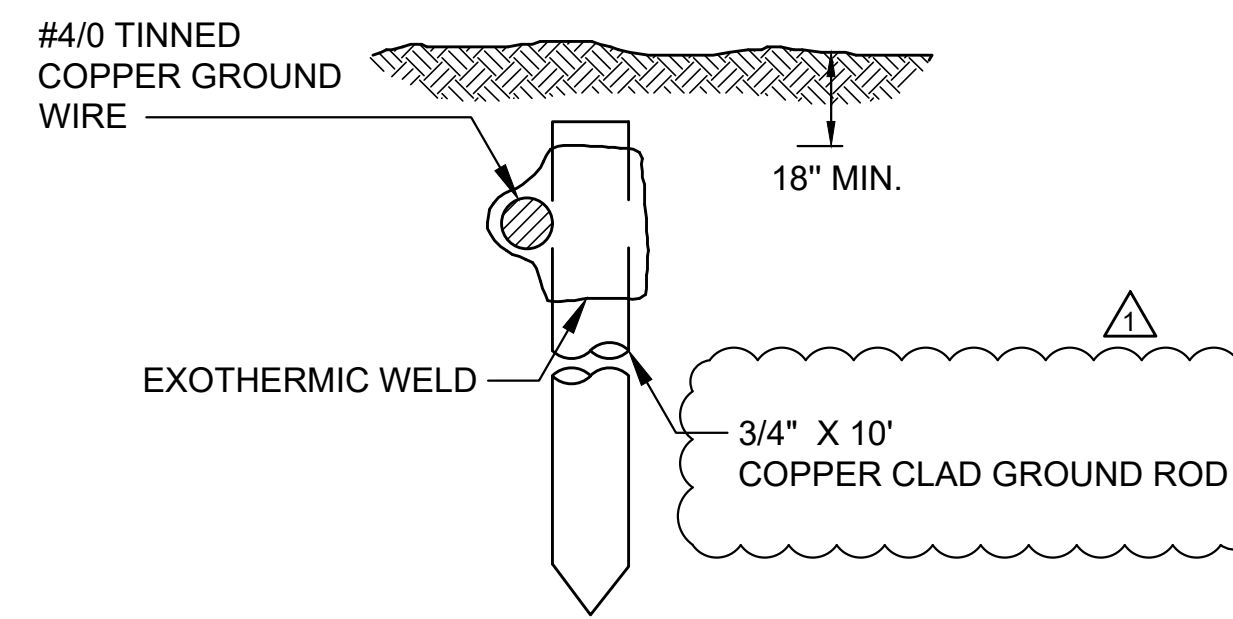
THIS DETAIL IS APPLICABLE FOR ALL GROUND CONDUCTORS ENTERING BUILDING THROUGH WALLS AND/OR FLOORS



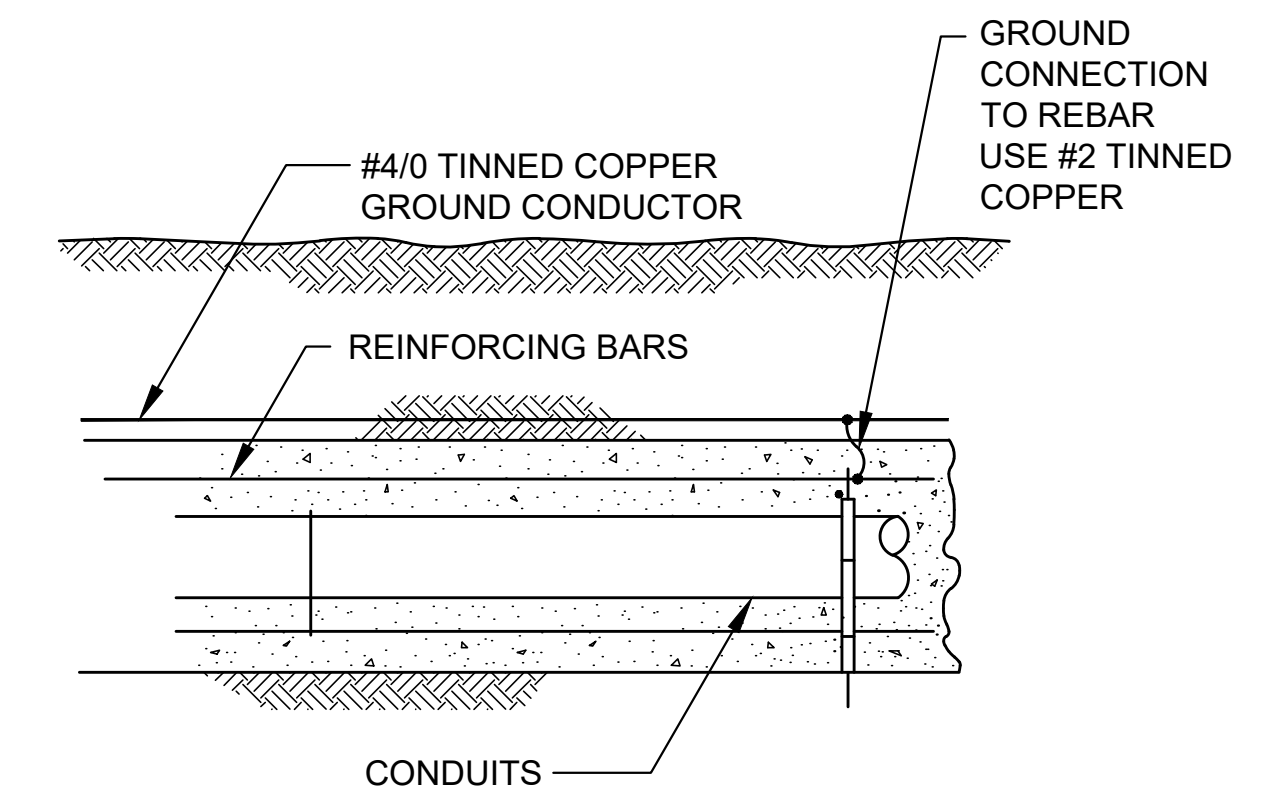
1 **GROUNDING STEEL GROUND**
N.T.S.



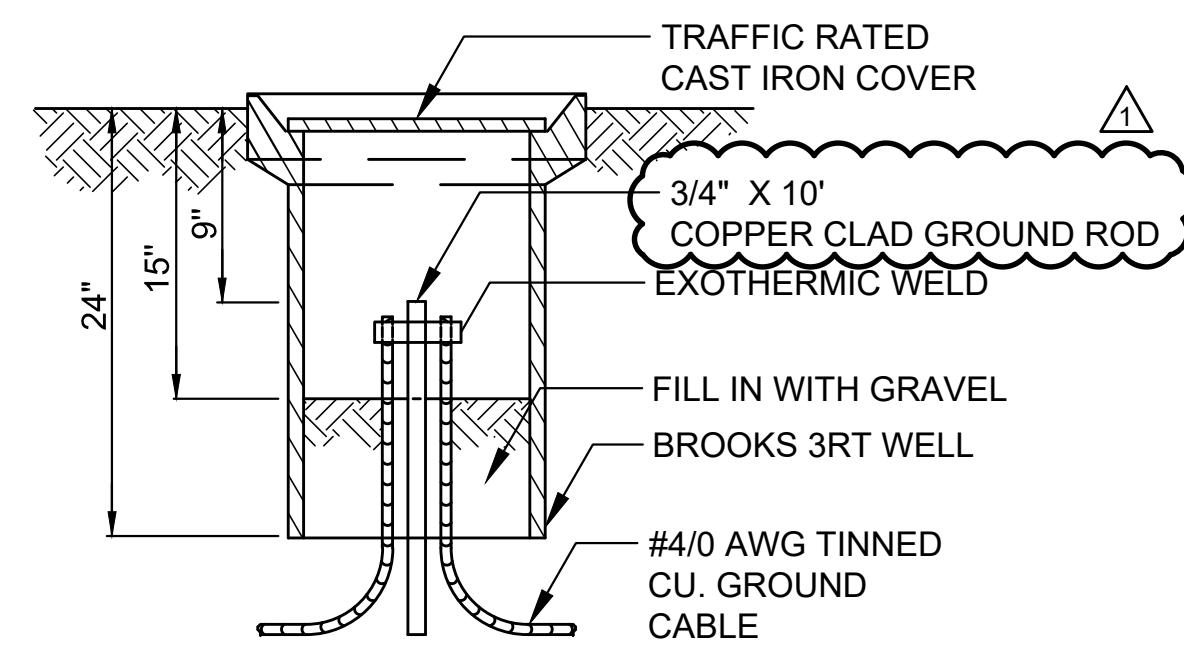
2 **GROUNDING STUB AT WALL**
N.T.S.



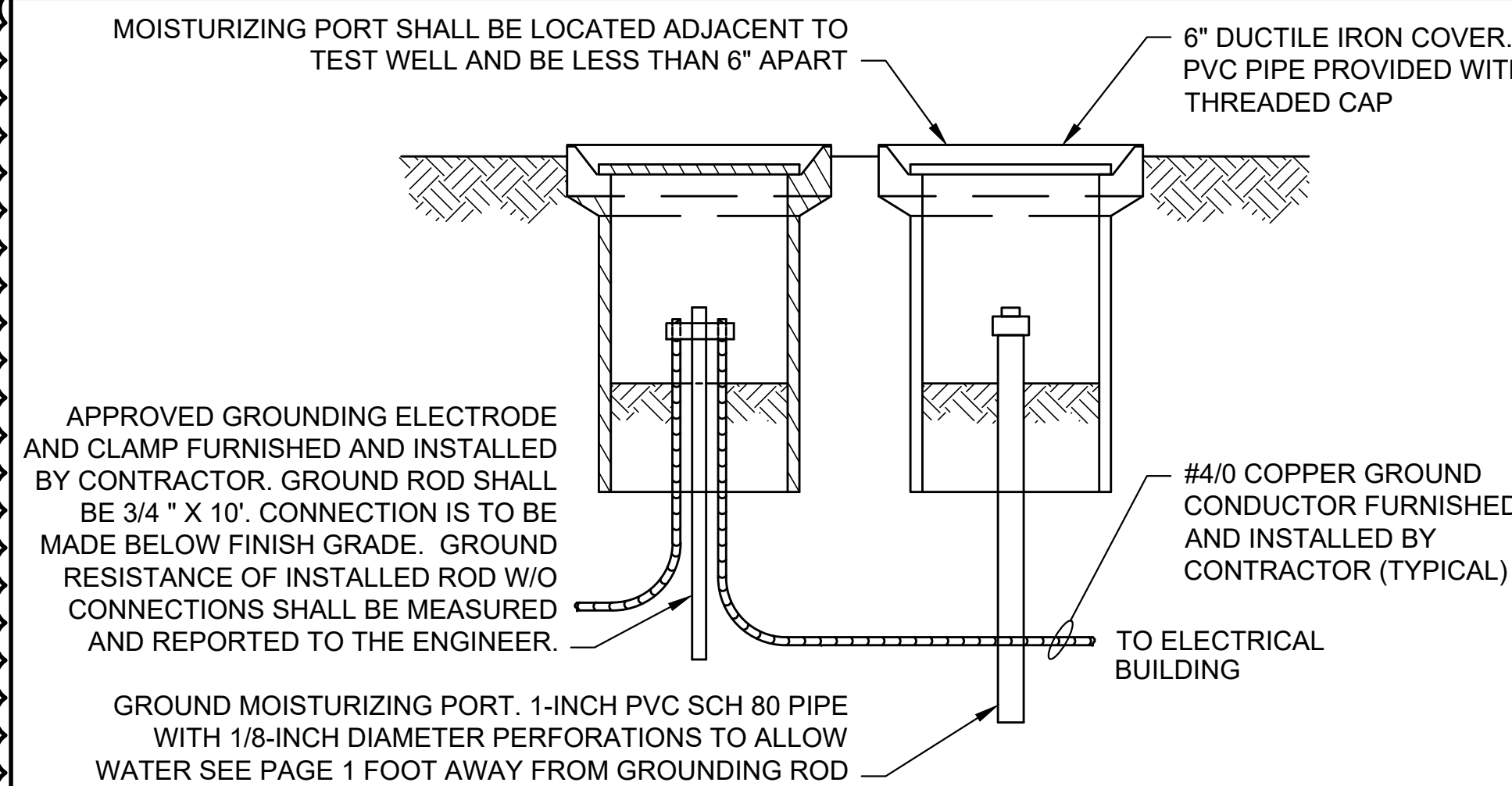
3 **GROUND ROD**
N.T.S.



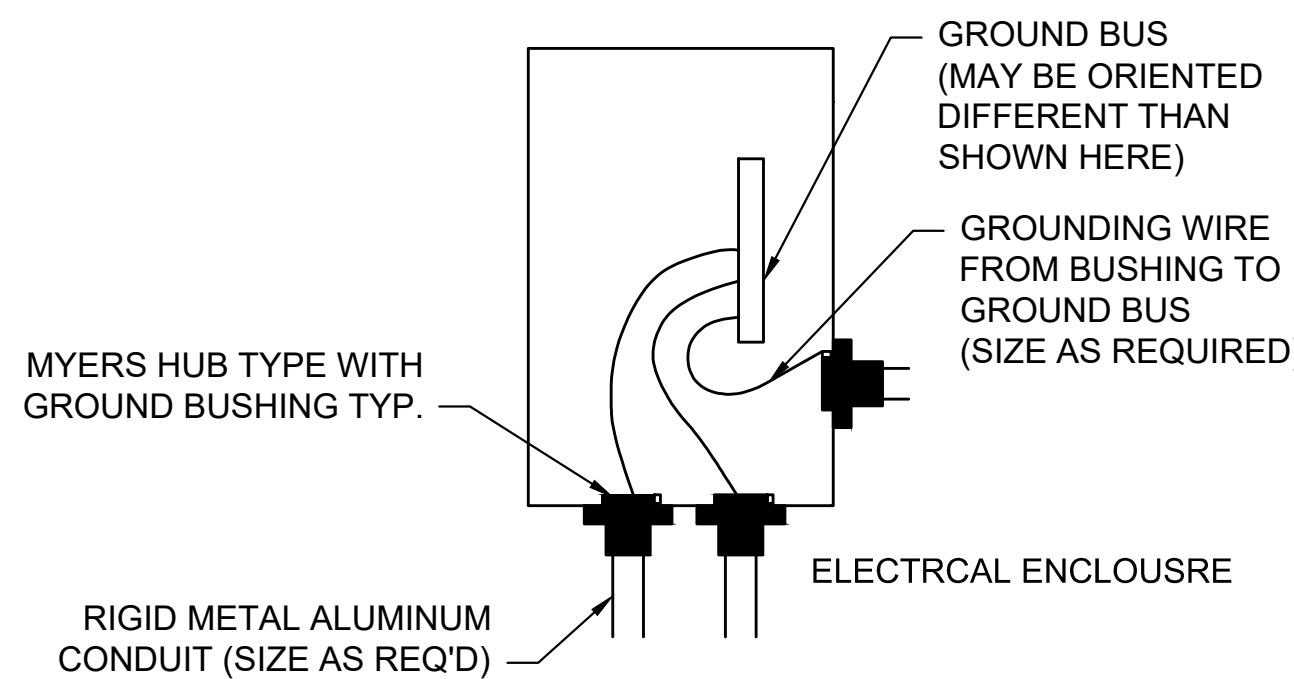
4 **DUCT BANK GROUNDING**
N.T.S.



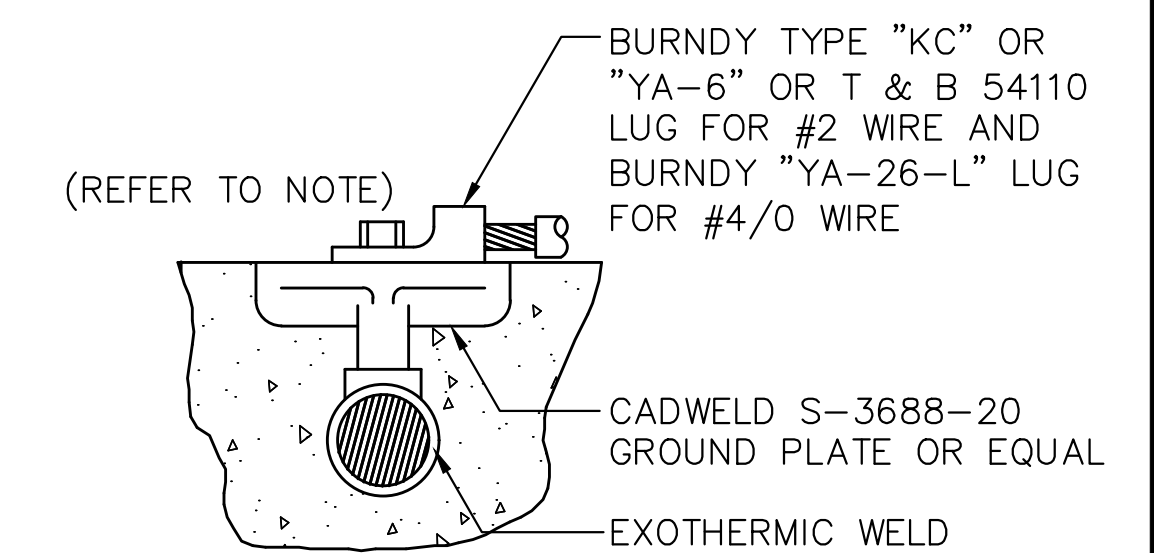
5 **GROUND TEST WELL**
N.T.S.



6 **GROUND TEST WELL & MOISTURIZING PORT DETAIL**
N.T.S.



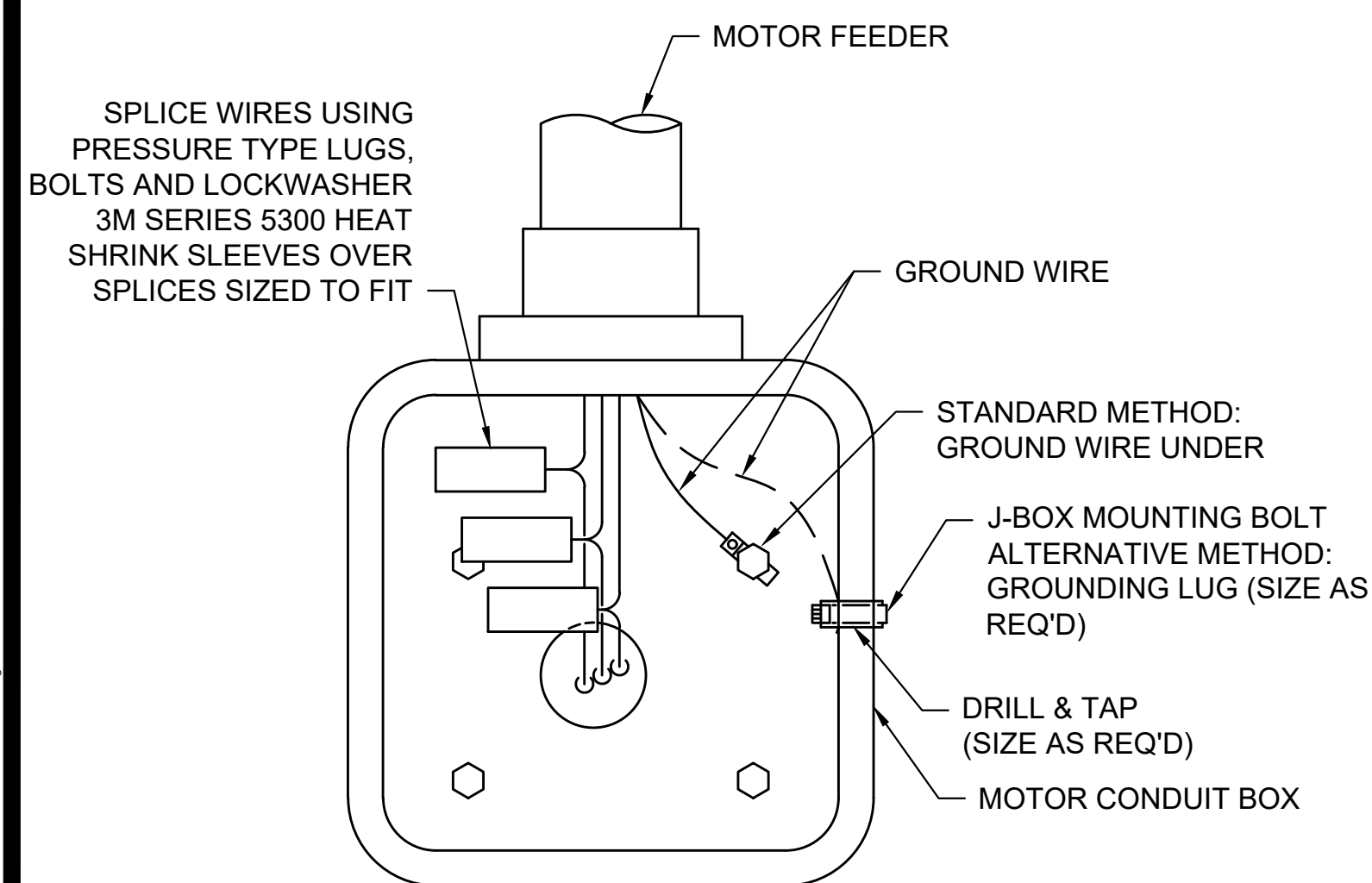
7 **ENCLOSURE / CONDUIT DETAIL**
N.T.S.



NOTE:

1. PROVIDE PROTECTION SHIELD DURING CONCRETE PLACEMENT.

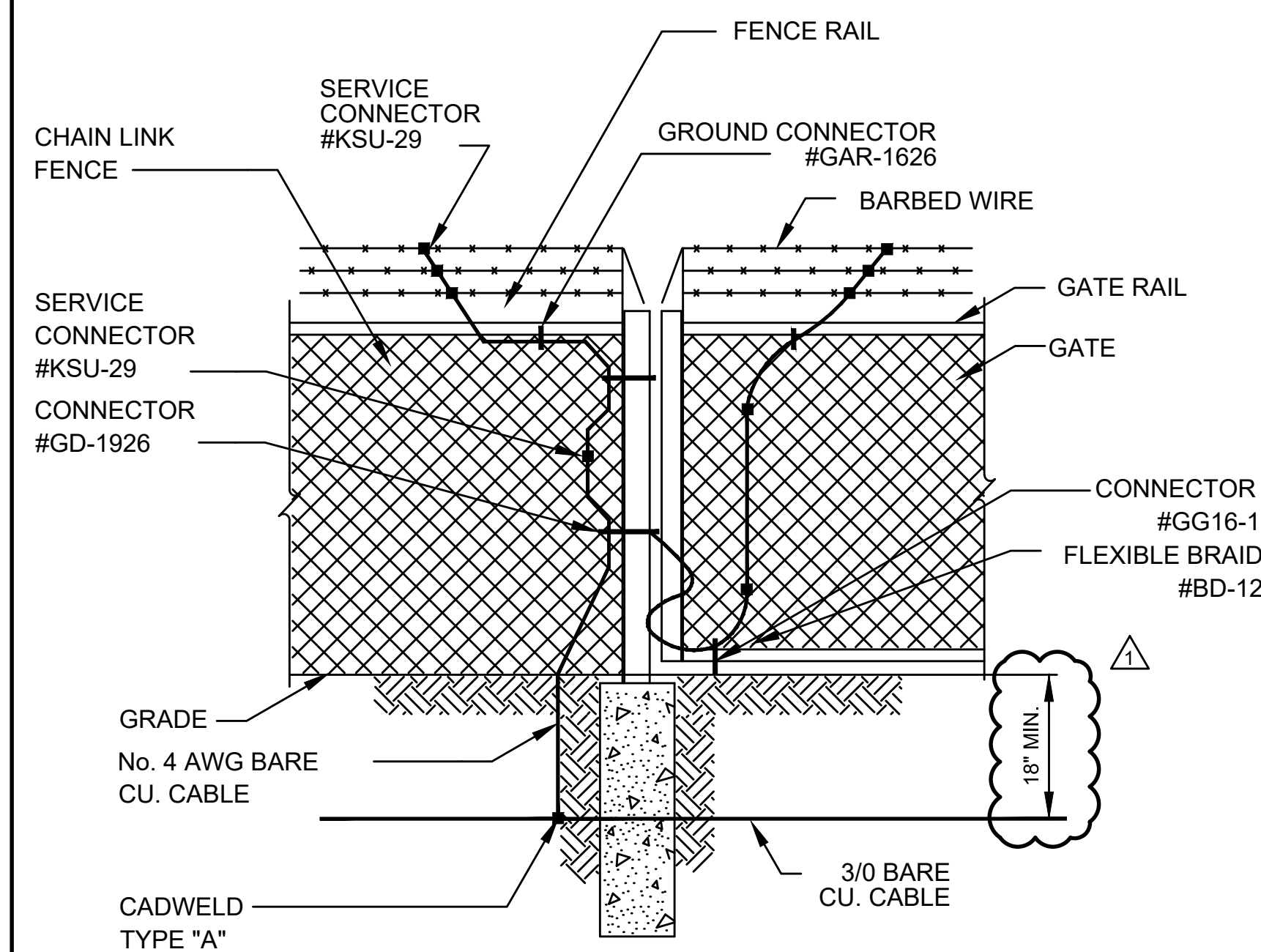
8 **GROUNDING PAD IN SLAB**
N.T.S.



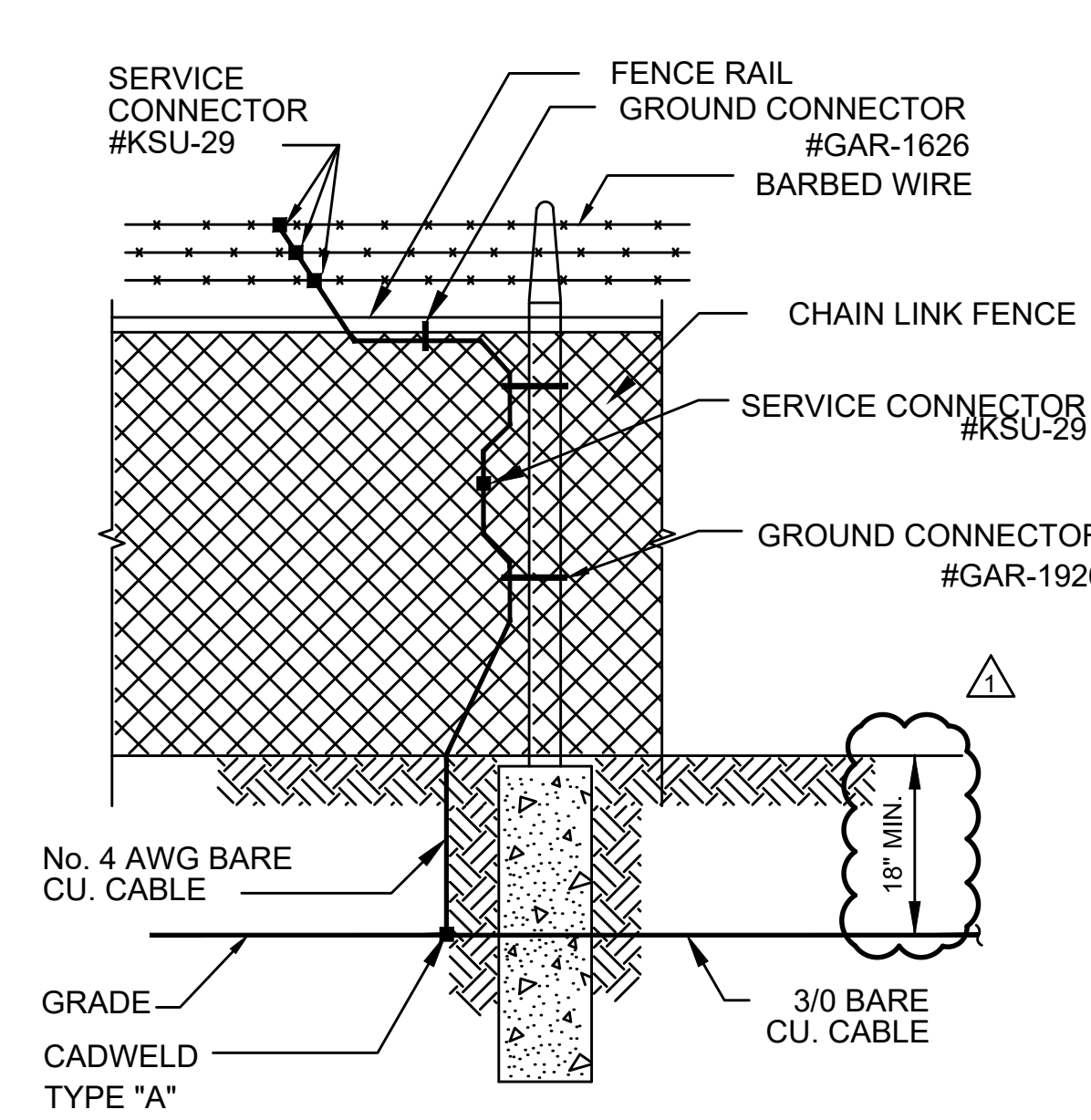
NOTES:

1. STANDARD GROUNDING METHOD IS TO USE A PRESSURE TYPE LUG (SIZE AS REQUIRED) ON GROUND WIRE INSTALLED UNDER JUNCTION BOX MOUNTING BOLT.
2. ALTERNATIVE GROUNDING METHOD FOR NON-EXPLOSION PROOF MOTORS WITHOUT JUNCTION BOX MOUNTING BOLTS IS TO DRILL AND TAP THE SIDE WALL OF THE MOTOR JUNCTION BOX AND INSTALL A GROUNDING LUG (SIZE AS REQUIRED).

9 **MOTOR CONDUIT BOX CONNECTION DETAIL**
N.T.S.



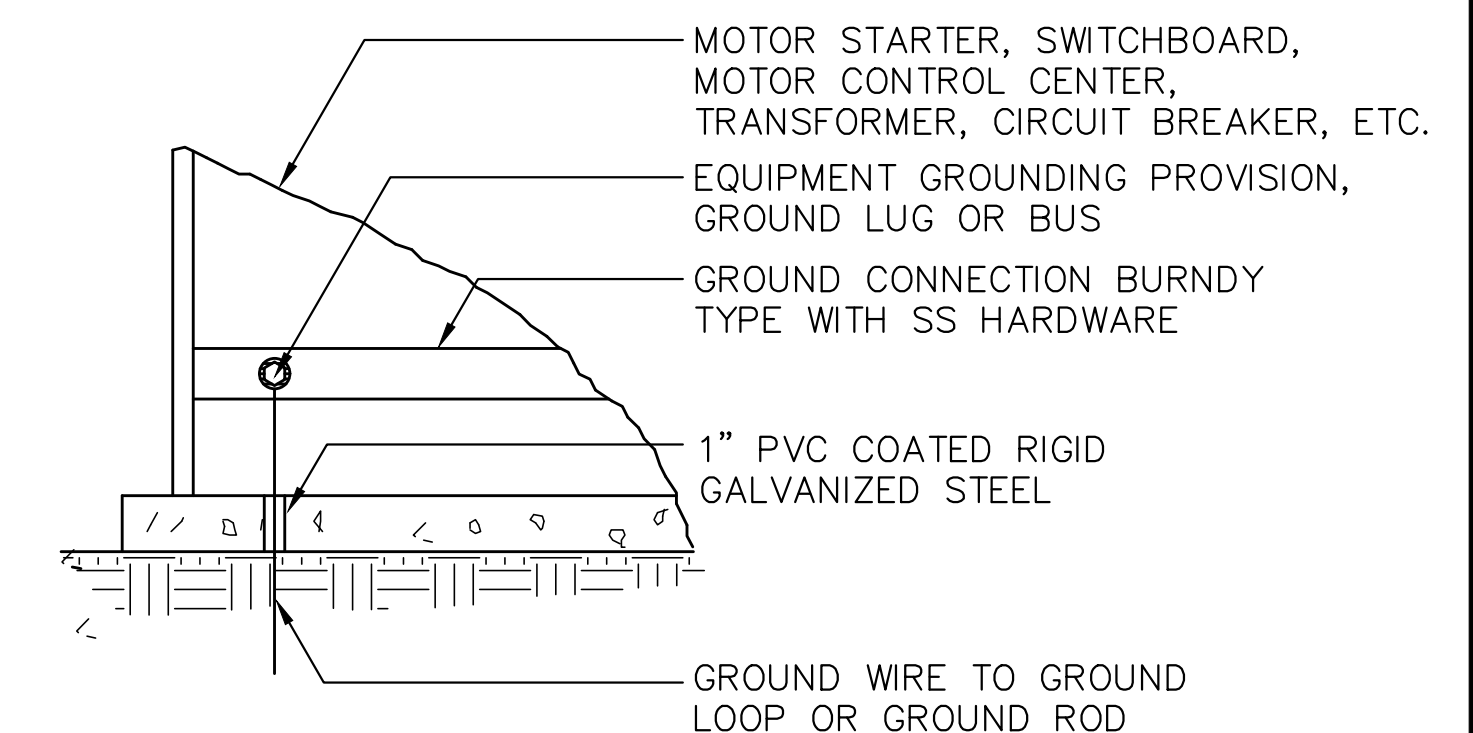
10 **GATE POST - GROUNDING**
N.T.S.



NOTES:

1. INSTALL FENCE GROUNDING AT 100' INTERVALS

11 **FENCE POST - GROUNDING**
N.T.S.



TYPICAL EQUIPMENT GROUNDING

NOTE:

1. PROVIDE INSULATED GROUNDING CONDUCTORS TO TERMINATION FOR ALL ABOVE GROUND OR EXPOSED TO THE ATMOSPHERE INCLUDING WHEN INSIDE A CONDUIT, TYPICAL FOR ALL GROUNDING APPLICATIONS.

12 **EQUIPMENT GROUNDING DETAIL**
N.T.S.

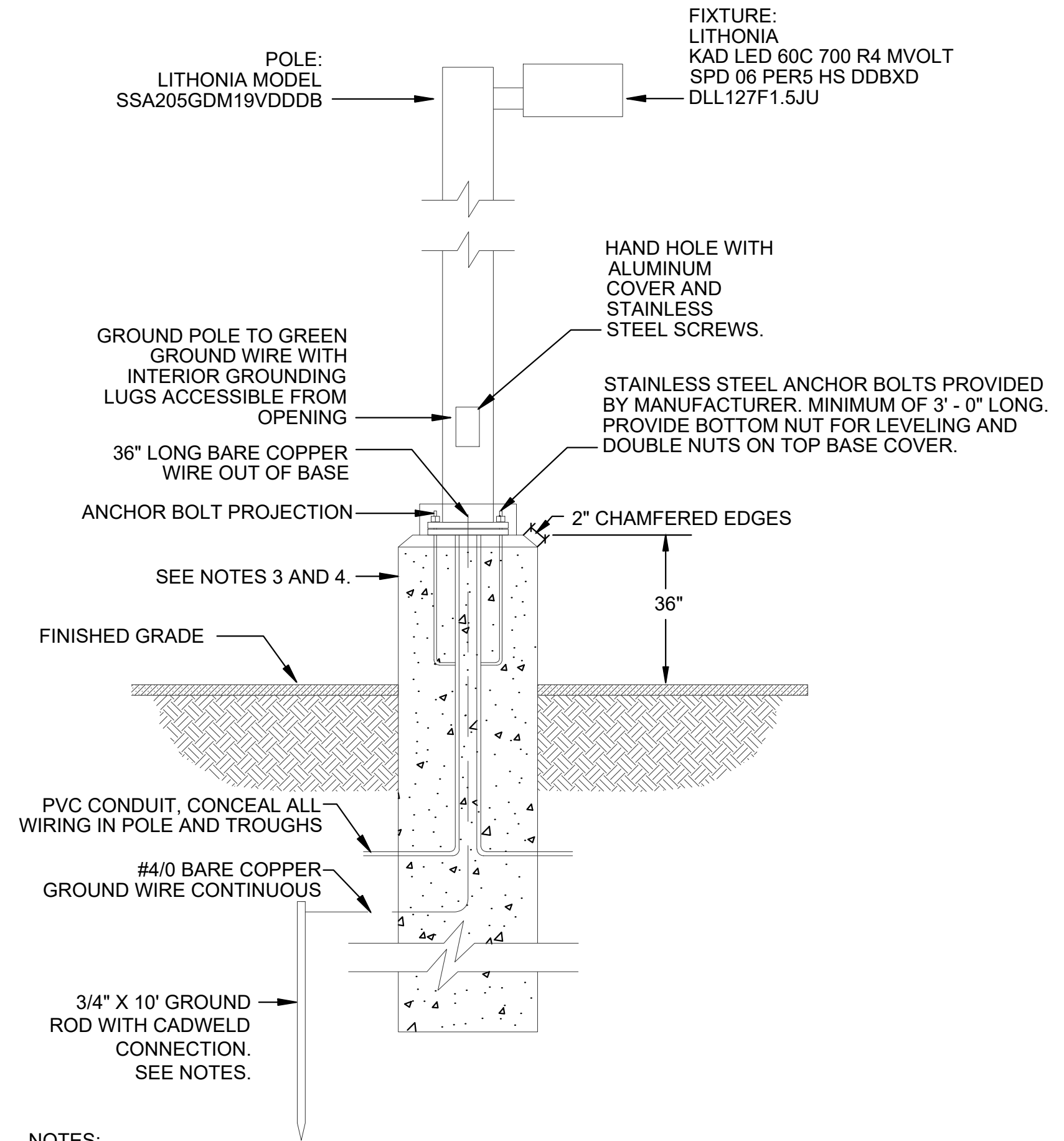
DATE	10/18/2022
NO.	1
REVISION	ADDENDUM NO. 2



PAPE-DAWSON ENGINEERS
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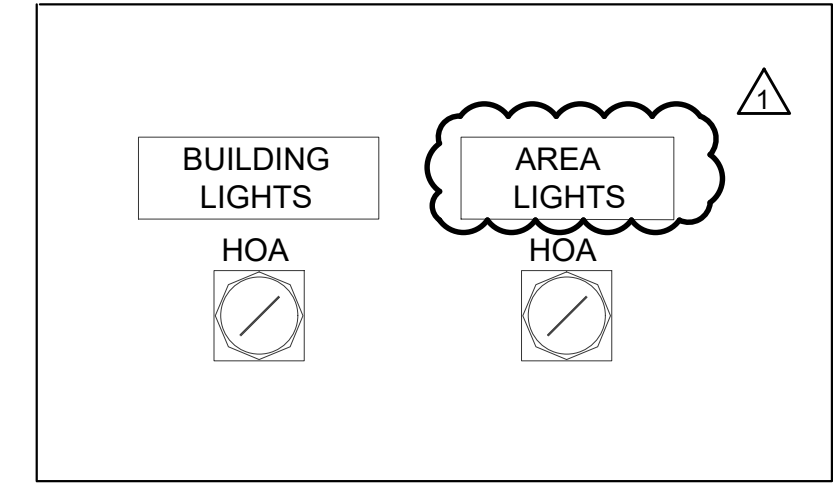
E-54 REGIONAL LIFT STATION PLANS
REGIONAL LIFT STATION
ELECTRICAL DETAILS I

SAWS JOB NO.	22-2502
JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	KB
CHECKED	KB
DRAWN	GL
SHEET	E11.00



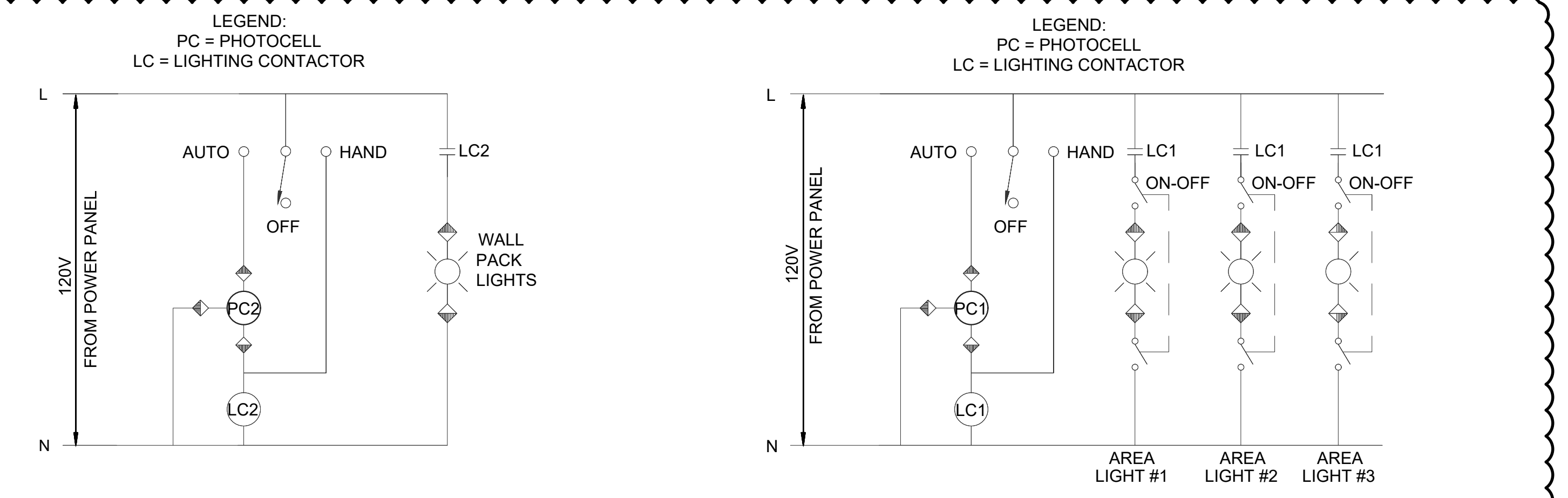
- NOTES:
1. REFER TO SPECIFICATION 16050 FOR SWITCH AND NAMEPLATE REQUIREMENTS.
 2. LIGHT FIXTURE TO BE MOUNTED TWENTY-THREE FEET ABOVE GRADE, WHICH INCLUDES THE 3' BASE.3. SEE STRUCTURAL PLAN DRAWINGS FOR FOUNDATION.
 4. TO REMOVE IRREGULARITIES AND TO PROVIDE SMOOTH FINISH, PAINT EXPOSED AREA SAFETY YELLOW.
 5. GROUND ROD SHALL BE BONDED TO SITE GROUNDING SYSTEM.6.

A LIGHT POLE FOUNDATION (TYP.)
SCALE: N.T.S.



- NOTES:
1. REFER TO DETAILS I & J OF THIS SHEET.
 2. INSTALL TAG LABELED "LIGHT SWITCH" ON FRONT EXTERIOR OF PANEL.
 3. CONTRACTOR SHALL PROVIDE ADEQUATE SPACE FOR COMPONENTS FROM ENCLOSURE EDGES.
 4. INDUSTRIAL-RATED SPDT SWITCH WITH CENTER OFF.

B LIGHT SWITCH OUTLET BOX
SCALE: N.T.S.



ELECTRICAL BUILDING LIGHTING

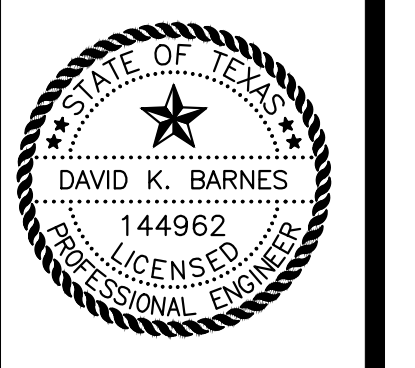
AREA LIGHTING

- NOTES:
1. REFER TO SPECIFICATION 16050 FOR SWITCH AND NAMEPLATE REQUIREMENTS.
 2. ALL ON/OFF SWITCHES SHALL BE TWO-POLE TYPE.
 3. ALL SWITCHES NEED TO HAVE A MEANS OF LOCKOUT FOR SAFETY PURPOSES AND SHALL BE PROVIDED WITH MEANS FOR LOCKOUT DEVICE PER NFPA 70E.
 4. INSTALL TAG LABELED "LIGHTING CONTACTOR PANEL" ON FRONT EXTERIOR OF PANEL.
 5. INSTALL PHOTOCELL ON ELECTRICAL BUILDING SOUTH EXTERIOR WALL.

- NOTES:
1. REFER TO SPECIFICATION 16050 FOR SWITCH AND NAMEPLATE REQUIREMENTS.
 2. ALL ON/OFF SWITCHES SHALL BE TWO-POLE TYPE.
 3. ALL SWITCHES NEED TO HAVE A MEANS OF LOCKOUT FOR SAFETY PURPOSES AND SHALL BE PROVIDED WITH MEANS FOR LOCKOUT DEVICE PER NFPA 70E.
 4. INSTALL TAG LABELED "LIGHTING CONTACTOR PANEL" ON FRONT EXTERIOR OF PANEL.
 5. INSTALL PHOTOCELL ON ELECTRICAL BUILDING SOUTH EXTERIOR WALL.

I ELECTRICAL BUILDING LIGHTING AND AREA LIGHTING CONTROL DIAGRAMS
SCALE: N.T.S.

DATE	10/19/2022
NO.	1
REVISION	ADDENDUM NO. 2



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E-54 REGIONAL LIFT STATION PLANS
REGIONAL LIFT STATION
ELECTRICAL DETAILS VIII

SAWS JOB NO.	22-2502
JOB NO.	11500-51
DATE	SEPTEMBER 2022
DESIGNER	KB
CHECKED	KB DRAWN GL
SHEET	E11.07

Date: Oct 24, 2022, 1:38pm User ID: gfrank@pape-d.com File: C:\working\2022\22-2502\22-2502-51\22-2502-51-E11.07-Electrical-Details-VIII.dwg

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