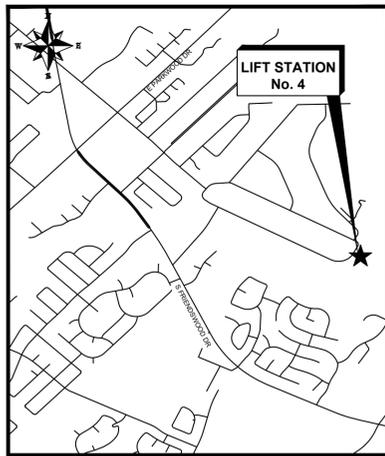
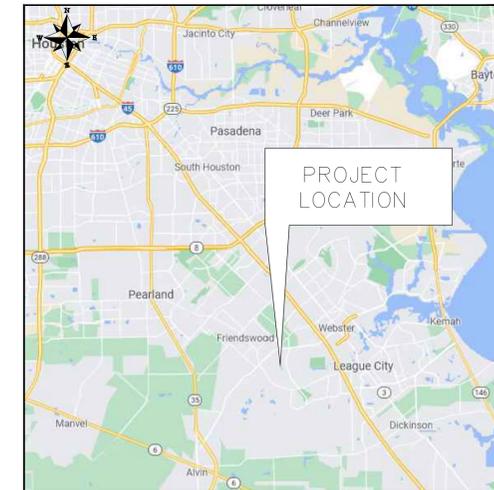


# GALVESTON COUNTY CITY OF FRIENDSWOOD, TEXAS LIFT STATION MITIGATION PROJECT PACKAGE 4 - LIFT STATION No. 4 IMPROVEMENTS



LOCATION MAP  
KEY MAP: 616V  
SCALE: N.T.S.



VICINITY MAP  
KEY MAP: 616V  
SCALE: N.T.S.



SHEET NUMBER	DWG NUMBER	SHEET TITLE
<b>G- GENERAL</b>		
000	G-0	COVER SHEET
001	G-1	GENERAL CONSTRUCTION NOTES 1 OF 2
002	G-2	GENERAL CONSTRUCTION NOTES 2 OF 2
003	G-3	STANDARD DETAILS
<b>D- DEMOLITION</b>		
004	D-1	LIFT STATION No. 4 DEMOLITION PLAN
<b>C- CIVIL</b>		
005	C-1	LIFT STATION No. 4 SITE PLAN
006	C-2	LIFT STATION No. 4 DRAINAGE PLAN
<b>S- STRUCTURAL</b>		
007	S-1	LIFT STATION No. 4 PLATFORM STRUCTURAL PLAN & ELEVATION
008	S-2	LIFT STATION No. 4 PLATFORM STRUCTURAL DETAILS
<b>E- ELECTRICAL</b>		
009	E-1	ELECTRICAL LEGENDS, SYMBOLS & ABBREVIATIONS
010	E-2	GENERAL ELECTRICAL NOTES
011	E-3	ELECTRICAL DETAILS (SHEET 1 OF 4)
012	E-4	ELECTRICAL DETAILS (SHEET 2 OF 4)
013	E-5	ELECTRICAL DETAILS (SHEET 3 OF 4)
014	E-6	ELECTRICAL DETAILS (SHEET 4 OF 4)
015	E-7	LIFT STATION No. 4 EXISTING SITE PLAN
016	E-8	LIFT STATION No. 4 PHOTOGRAPHS
017	E-9	LIFT STATION No. 4 PROPOSED SITE PLAN
018	E-10	LIFT STATION No. 4 ENLARGED PROPOSED SITE PLAN
019	E-11	LIFT STATION No. 4 ONE LINE DIAGRAM
020	E-12	LIFT STATION No. 4 SCHEDULES
021	E-13	LIFT STATION No. 4 ELECTRICAL RACK DETAILS
022	E-14	LIFT STATION No. 4 CONTROL WIRING DIAGRAM (SHEET 1 OF 2)
023	E-15	LIFT STATION No. 4 CONTROL WIRIN
024	E-16	LIFT STATION No. 4 CONTROL PANEL EQUIPMENT LAYOUT
025	E-17	LIFT STATION No. 4 SCADA PANEL EQUIPMENT LAYOUT & SCHEMATIC DIAGRAM

GCCDD Reference No. G250010

Approved by the GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT

 2/11/2025  
 Director Date  
 2/11/2025  
 Director Date

JANUARY 2025

This is to certify that the above was signed based on the recommendation of the District's Engineer having reviewed all sheets provided and found them to be in general compliance with the District's "Drainage Criteria Manual." This approval is only valid for three hundred sixty-five (365) calendar days. Please note, this does not necessarily mean that all the calculations provided in these plans have been completely checked and verified. The plans submitted have been prepared, signed, and sealed by a Professional Engineer licensed to practice engineering in the State of Texas, which conveys the engineer's responsibility and accountability.

CITY OF FRIENDSWOOD  
15355 BLACKHAWK BLVD.  
FRIENDSWOOD, TX 77546  
281-993-3411



11200 WESTHEIMER ROAD, SUITE 353  
HOUSTON, TEXAS 77042  
(832) 800-3483 | www.5engineering.com  
TBPE FIRM NO. F-13748



01/29/2025  
Battistini

REV. NO.	DATE	DESCRIPTION	P.E. APPR.
△			
△			



 4/25/25  
 JILDARDO J. ALVAREZ  
 DIRECTOR OF ENGINEERING & PROJECTS/  
 CITY ENGINEER DATE

 4/28/25  
 STEVE VAVRECKA, CPM  
 DIRECTOR OF PUBLIC WORKS DATE

NOTE:  
THIS IS TO CERTIFY THAT THE ABOVE SIGNED HAVE REVIEWED ALL SHEETS PROVIDED AND FOUND THEM TO BE IN GENERAL COMPLIANCE WITH THE REQUIREMENTS ESTABLISHED BY THE CITY OF FRIENDSWOOD. THIS APPROVAL IS ONLY VALID FOR THREE HUNDRED SIXTY-FIVE (365) CALENDAR DAYS. PLEASE NOTE, THIS DOES NOT NECESSARILY MEAN THAT ALL THE CALCULATIONS PROVIDED IN THE PLANS HAVE BEEN COMPLETELY CHECKED AND VERIFIED. THE PLANS SUBMITTED HAVE BEEN PREPARED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE ENGINEERING IN THE STATE OF TEXAS, WHICH CONVEYS THE ENGINEER'S RESPONSIBILITY AND ACCOUNTABILITY.

EFFECTIVE DATE: APRIL 3RD, 2019

**GENERAL NOTES:**

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISED CITY OF FRIENDSWOOD STANDARD DETAILS AND TECHNICAL SPECIFICATIONS.
- ELEVATION AND CONTOURS SHOWN, UNLESS OTHERWISE DEFINED, ARE BASED ON NAD 83.
- TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATIONS PART 1926, SUBPART F.
- EXISTING UNDERGROUND UTILITIES ARE NOT SHOWN. THE CONTRACTOR SHALL CONTACT THE TEXAS 811 FOR CENTERPOINT, TEXAS-NEW MEXICO POWER, AT&T TELEPHONE, PIPELINES, AND CABLE TV. CONTRACTOR WILL ALSO BE REQUIRED TO LOCATE CITY MAINTAINED UTILITIES VIA EMAIL TO [locates@friendswood.com](mailto:locates@friendswood.com).
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE DEPTH, LOCATION AND EXISTENCE OF ALL EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED CONSTRUCTION.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD BEFORE COMMENCING WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES TO THE OWNER AND THE ENGINEER IN A TIMELY MANNER.
- CONTRACTOR SHALL ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS, OTHER PERMANENT OBJECTS AND ADJOINING PROPERTY.
- NO OPEN EXCAVATIONS SHALL BE LEFT OPEN OVERNIGHT. ALL EXCAVATIONS WHICH CANNOT BE BACKFILLED OVERNIGHT SHALL BE COVERED, AS A MINIMUM, WITH STEEL PLATING WHEN IN PAVED AREAS; 3/4 INCH PLYWOOD, WOOD PLANKING WITH OSHA ORANGE PLASTIC EXPANDED MESH BARRIER AROUND PERIMETER IN UNPAVED AREAS, OR AS APPROVED BY THE CITY OF FRIENDSWOOD.
- EXISTING PAVEMENTS, CURBS, SIDEWALKS AND DRIVEWAYS DAMAGED OR REMOVED DURING CONSTRUCTION BY THE CONTRACTOR FOR THEIR CONVENIENCE SHALL BE REPLACED PER CURRENT TECHNICAL SPECIFICATIONS BY THE CONTRACTOR AT HIS EXPENSE.
- CONTRACTOR SHALL PLAN, SCHEDULE, AND PERFORM HIS WORK SO AS TO PROVIDE AND MAINTAIN SAFE PUBLIC TRAFFIC (INGRESS AND EGRESS) AS WELL AS NON-INCONVENIENCE TO ALL PROPERTY OWNERS ALONG THE PROJECT RIGHT OF WAYS DURING CONSTRUCTION PERIOD.
- FOR LOCATIONS WHERE OPEN CUT CONSTRUCTION IS REQUIRED IN STREETS THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE BARRICADES, WARNING AND DIRECTING SIGNS, FLAGS, AND LIGHTS, NOTIFY CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411.
- ALL SIGNS, BARRICADES, PAVEMENT MARKINGS, TRAFFIC SIGNALS, AND CHANNELIZING DEVICES USED TO HANDLE TRAFFIC SHALL BE SHOWN ON A TRAFFIC CONTROL PLAN (TO BE APPROVED BY THE CITY AND TxDOT IF APPLICABLE) AND SHALL CONFORM TO THE LATEST REVISIONS OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS (TMUTCD), "PART VI-TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS."
- CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 48 HOURS PRIOR TO THE START OF CONSTRUCTION.

**PAVING:**

- PAVEMENT SUBGRADE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD STANDARD DETAILS AND TECHNICAL SPECIFICATIONS, LATEST REVISIONS.
- CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 TWENTY-FOUR (24) HOURS PRIOR TO ALL LIMING AND PAVING OPERATIONS.
- ALL RETURNS SHALL HAVE A TWENTY-FIVE (25) FOOT RADIUS AT BACK OF CURB UNLESS OTHERWISE NOTED.
- GUIDELINES SET FORTH IN THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" SHALL BE OBSERVED.
- ALL FILL IN EXISTING OR PROPOSED RIGHTS-OF WAY, INCLUDING BACKDRESSING BEHIND THE CURB, SHALL BE PLACED IN MAXIMUM LOOSE LIFTS OF EIGHT (8) INCHES OR LESS AND COMPACTED TO NINETY-FIVE PERCENT (95%) STANDARD PROCTOR DENSITY WITH AN OPTIMUM MOISTURE CONTENT OF ± 3%.
- MINIMUM PAVEMENT REINFORCEMENT REQUIREMENT SHALL BE GRADE 60, NO. 4 REBAR, SPACED AT SIXTEEN (16) INCH ON CENTERS EACH WAY.
- PAVING EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM OF FORTY (40) FEET WITH CONTROL JOINTS NO GREATER THAN EVERY TEN (20) FEET.
- ALL CONCRETE USED FOR PAVEMENT SHALL BE CLASS "A" CONCRETE WITH A MINIMUM 50 SACK OF CEMENT PER CUBIC YARDS AND A MINIMUM 3,000 PSI COMPRESSIVE STRENGTH AT TWENTY-EIGHT (28) DAYS.
- CLASS "A" HYDRATED LIME SHALL BE APPLIED FOR SUBGRADE STABILIZATION AT A MINIMUM OF 6%.
- CONTRACTOR SHALL INSTALL STREET SIGNS AND STOP SIGNS PER CITY OF FRIENDSWOOD STANDARD DETAILS AND TECHNICAL SPECIFICATIONS.
- ALIGNMENTS, CENTERLINE CURVE DATA, AND STATIONING FOR ALL CONSTRUCTION SHALL BE DETERMINED FROM SUBDIVISION PLAT.
- FOR ALL CONCRETE TO BE REMOVED, A THREE (3) INCH DEEP SAW CUT SHALL BE PROVIDED PRIOR TO REMOVAL.
- REPRESENTATIVES FROM THE CITY, THE OWNER AND THE TESTING LABORATORY SHALL BE PRESENT FOR ALL DENSITY TESTS, LIME OPERATIONS AND PLACEMENT OF CONCRETE PAVING.
- UNDER NO CIRCUMSTANCES SHALL WATER BE ADDED TO A CONCRETE LOAD AFTER SLUMP TEST AND/OR CONCRETE CYLINDERS HAVE BEEN TAKEN.
- BLUE REFLECTIVE PAVEMENT MARKERS SHALL BE PLACED AT FIRE HYDRANT LOCATIONS AND OFFSET SIX (6) INCHES FROM THE CENTERLINE OF THE ROADWAY. REFLECTORS SHALL FACE FLOW OF TRAFFIC.
- FOR PAVEMENT WIDTHS LESS THAN OR EQUAL TO TWENTY-EIGHT (28) FEET B/B OF CURB:
  - MINIMUM STABILIZED SUBGRADE THICKNESS SHALL BE SIX (6) INCHES.
  - MINIMUM CONCRETE SLAB THICKNESS SHALL BE SIX (6) INCHES.
- FOR PAVEMENT WIDTHS GREATER THAN TWENTY-EIGHT (28) FEET B/B OF CURB AND ALL MAJOR ARTERIAL THOROUGHFARES:
  - MINIMUM STABILIZED SUBGRADE THICKNESS SHALL BE EIGHT (8) INCHES.
  - MINIMUM CONCRETE SLAB THICKNESS SHALL BE SEVEN (7) INCHES.

**SANITARY SEWERS**

- FINISHED ELEVATION ON SANITARY MANHOLE RIMS SHALL BE THREE (3) INCHES ABOVE FINISHED GRADE WITHIN THE UTILITY EASEMENT. IF MANHOLE IS LOCATED ADJACENT TO A PUBLIC STREET, THE FINAL ELEVATION OF THE MANHOLE RIM SHALL BE TWO (2) INCHES ABOVE THE CURB OR CENTERLINE OF STREET FOR STREETS WITHOUT PERIMETER CURB.
- WATER LINES AND SANITARY SEWERS SHALL BE INSTALLED IN SEPARATE TRENCHES AND BE A MINIMUM SEPARATION OF NINE (9) FEET.
- POLYVINYL CHLORIDE (PVC) SHALL BE IN ACCORDANCE WITH ASTM D3034, SDR 26 FOR ALL DEPTHS.
- ALL PVC PIPES (ALL TYPES AND SDR/DR WALL THICKNESS TO BE USED) SHALL HAVE A RUBBER GASKET EQUIPPED BELL AND SPIGOT JOINTS CONFORMING TO ASTM D3212. THE GASKET MATERIAL SHALL CONFORM TO ASTM F477, SOLVENT WELDED JOINTS WILL NOT BE APPROVED FOR CITY SANITARY SEWER LINES.
- ALL DUCTILE IRON (DI) PIPE SHALL BE ONE HUNDRED FIFTY (150) PSI WITH EIGHT (8) MIL, BLACK VIRGIN POLYETHYLENE WRAP AS SPECIFIED IN ANSI/AWWA A21.5/C105.

**SANITARY SEWERS (CONT.):**

- SANITARY SEWER MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD DESIGN STANDARDS. CONTRACTOR TO FURNISH TEST PLUGS AND RISERS. ALL SANITARY SEWER LINES TO BE AIR TESTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.
- SANITARY SEWER TRENCHES UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR FUTURE PAVEMENT ARE TO BE BACKFILLED WITH CEMENT-STABILIZED SAND BACKFILL, AS SPECIFIED, TO WITHIN ONE (1) FOOT OF SUBGRADE. BEDDING WILL BE CEMENT-STABILIZED SAND BACKFILL (1.1 SACKS CEMENT PER TON OF SAND) FOR ALL SANITARY SEWERS.
- WATER LINE/NEW SEWER LINE SEPARATION. WHEN NEW SANITARY SEWERS ARE INSTALLED, THEY SHALL BE INSTALLED NO CLOSER TO WATER LINES THAN NINE (9) FEET IN ALL DIRECTIONS. SEWERS THAT PARALLEL TO WATER LINES MUST BE INSTALLED IN SEPARATE TRENCHES. WHEN NINE (9) FEET OF SEPARATION CANNOT BE MAINTAINED, THE FOLLOWING GUIDELINES APPLY:
  - WHEN THE SANITARY SEWER PARALLELS A WATER LINE, THE SANITARY SEWER SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC MEETING ASTM SPECIFICATIONS WITH A PRESSURE RATING FOR BOTH THE PIPE AND JOINTS OF 150 PSI. THE VERTICAL SEPARATION SHALL BE A MINIMUM OF TWO (2) FEET BETWEEN OUTSIDE DIAMETERS AND THE HORIZONTAL SEPARATION SHALL BE A MINIMUM OF FOUR (4) FEET BETWEEN OUTSIDE DIAMETERS. THE SANITARY SEWER SHALL BE LOCATED BELOW THE WATER LINE.
  - WHEN A SANITARY SEWER CROSSES A WATER LINE AND THE SEWER IS CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC WITH A MINIMUM PRESSURE RATING OF 150 PSI; AN ABSOLUTE MINIMUM OF SIX (6) INCHES BETWEEN OUTSIDE DIAMETERS SHALL BE MAINTAINED. THE SANITARY SEWER SHALL BE LOCATED BELOW THE WATER LINE WHEN POSSIBLE AND ONE (1) LENGTH OF THE SANITARY SEWER PIPE MUST BE CENTERED ON THE WATER LINE.
  - WHEN A SANITARY SEWER CROSSES UNDER A WATER LINE AND THE SEWER IS CONSTRUCTED OF ABS TRUSS PIPE, SIMILAR SEMI-RIGID PLASTIC COMPOSITE PIPE, CLAY PIPE OR CONCRETE PIPE WITH GASKETED JOINTS, A MINIMUM OF TWO (2) FEET OF SEPARATION SHALL BE MAINTAINED. THE INITIAL BACKFILL SHALL BE CEMENT-STABILIZED SAND (MINIMUM 1.1 SACKS OF CONCRETE PER TON OF SAND) FOR ALL SECTIONS OF SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE. THE INITIAL BACKFILL SHALL BE FROM 1/4 DIAMETER BELOW THE CENTERLINE OF THE PIPE TO ONE PIPE DIAMETER (BUT NOT LESS THAN TWELVE (12) INCHES) ABOVE THE PIPE.
  - WHEN A SANITARY SEWER CROSSES OVER A WATER LINE, ALL PORTIONS OF THE SANITARY SEWER WITHIN NINE (9) FEET OF THE WATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON OR PVC PIPE WITH A PRESSURE RATING OF AT LEAST 150 PSI USING APPROPRIATE ADAPTERS. IN LIEU OF THIS PROCEDURE THE NEW SANITARY SEWER MAY BE ENCASED IN A JOINT OF 150 PSI PRESSURE CLASS PIPE AT LEAST EIGHTEEN (18) FEET LONG AND TWO (2) NOMINAL SIZES LARGER THAN THE NEW SANITARY SEWER. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT INTERVALS OF FIVE (5) FEET WITH SPACERS OR BE FILLED TO THE SPRINGLINE WITH WASHED SAND. THE ENCASEMENT PIPE SHOULD BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH NON-SHRINK CEMENT GROUT OR WITH A MANUFACTURED SEAL.
- ALL PROPOSED SANITARY SEWER LINES SHALL BE DUCTILE IRON OR SDR 26 PVC. DUCTILE IRON PIPE SHALL ONLY BE USED AS APPROVED BY THE CITY OF FRIENDSWOOD.
- FOR ALL PVC PIPE, USE MANHOLE WATER STOP GASKET AND CLAMP ASSEMBLY AT MANHOLE CONNECTIONS.
- SANITARY SEWER MANHOLES SHALL BE STANDARD TYPE, UNLESS OTHERWISE NOTED. ALL SANITARY SEWER MANHOLES SHALL BE AT LEAST THREE (3) INCHES ABOVE FINISHED GRADE OR ABOVE THE 100 YEAR BASE FLOOD ELEVATION (BFE). FOR MANHOLES LOCATED IN THE 100-YEAR FLOOD PLAIN, VENT AND SEAL (BOLTED MANHOLE LID W/ FOUR (4) BOLTS, NO HOLES IN LID) THE MANHOLE TOP AND PROVIDE INFLOW PROTECTOR INSERT UNDER COVER. SECTIONS OF PRECAST MANHOLES SHALL BE JOINED WITH "RAM NEK" IN FLOOD PLAIN.
- SANITARY SEWER LINES IN PIPE ZONE INSIDE LOT EASEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND OR SELECT FILL MATERIAL WITH A PI BETWEEN 20 AND 40.
- IF WET SAND IS ENCOUNTERED IN TRENCH, USE SPECIAL BEDDING. UNDER NO CIRCUMSTANCES IS SAND TO BE ADDED TO A TRENCH UNDER WATER.
- SANITARY SEWERS CROSSING UTILITIES OTHER THAN WATER LINES SHALL HAVE A MINIMUM CLEARANCE OF SIX (6) INCHES.
- ALL PRECAST MANHOLES SHALL HAVE A TOP ADJUSTMENT CONSTRUCTED OF PRECAST PCC RINGS NO GREATER THAN TWENTY-FOUR (24) INCHES IN HEIGHT, SEALED WITH NON-SHRINK GROUT, INSIDE AND OUTSIDE. BRICK AND FIBERGLASS MANHOLES SHALL NOT BE ALLOWED.
- ALL SANITARY SEWER MANHOLE COVERS MUST INCLUDE THE WORD "SANITARY SEWER" AND "CITY OF FRIENDSWOOD". THEY MUST ALSO HAVE THE CITY SEAL.
- SANITARY SEWER MANHOLE COVERS SHALL BE A MINIMUM OF THIRTY-TWO (32) INCHES IN DIAMETER.
- ALL SANITARY SEWER MANHOLES SHALL HAVE AN INFLOW PROTECTOR,

**STORM SEWERS:**

- STORM SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS, LATEST REVISIONS.
- ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP), ASTM C76, CLASS III, TONGUE AND GROOVE, RAM-NEK JOINTS UNLESS OTHERWISE NOTED.
- REINFORCED CONCRETE STORM SEWER (PIPE, BOX, ETC.) SHALL BE INSTALLED, BEDDED AND BACKFILLED IN CONFORMITY WITH CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS. STORM SEWER PIPE INSTALLED UNDER OR WITHIN ONE (1) FOOT OF PROPOSED OR EXISTING PAVEMENT SHALL BE BACKFILLED WITH CEMENT-STABILIZED SAND, (1.1 SACKS OF CEMENT PER TON OF SAND), TO THE BOTTOM OF THE SUBGRADE.
- CONCRETE FOR INLETS AND MANHOLES SHALL BE CLASS "A" AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT TWENTY-EIGHT (28) DAYS.
- ALL MANHOLES SHALL BE ADJUSTED TO FINISHED GRADE BEFORE PAVING IS COMPLETE.
- MINIMUM STORM SEWER SIZE IS TWENTY-FOUR (24) INCH DIAMETER. MINIMUM UPSTREAM ROADSIDE DITCH CULVERT SIZE IS EIGHTEEN (18) INCH DIAMETER.
- ALL STORM SEWER MANHOLE COVERS MUST INCLUDE THE WORDS, "STORM SEWER" AND "CITY OF FRIENDSWOOD" AND HAVE THE "CITY SEAL." MANHOLE COVERS SHALL BE THIRTY-TWO (32) INCHES IN DIAMETER EXCEPT AT CURB INLET COVERS WHICH ARE TWENTY-FOUR (24) INCHES.
- CONTRACTOR SHALL PROVIDE A MINIMUM OF SIX (6) INCHES CLEARANCE AT ALL UTILITY CROSSINGS WITH STORM SEWERS.
- ALL INLETS IN RESIDENTIAL DEVELOPMENTS TO BE TYPE "H-2" OR TYPE "B-B" WITH GRATES. ALL INLETS IN COMMERCIAL DEVELOPMENTS AND ON MAJOR THOROUGHFARES TO BE TYPE "H-2" ONLY, UNLESS OTHERWISE APPROVED BY THE CITY OF FRIENDSWOOD.
- ALL DISTURBED AREAS IN DRAINAGE EASEMENTS OR DETENTION PONDS, SHALL BE HYDROMULCHED AS PER TECHNICAL SPECIFICATIONS SECTION 02910 - HYDROMULCH SEEDING OR APPROVED EQUAL.

**WATER LINES:**

- WATER LINE CONSTRUCTION AND TESTING IS TO BE PERFORMED IN ACCORDANCE WITH CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.

**WATER LINES (CONT.):**

- ALL WATER MAINS SHALL HAVE A MINIMUM COVER OF FOUR (4) FEET MEASURED FROM CENTERLINE OF STREET OR EXISTING NATURAL GROUND WHICHEVER DEPTH IS GREATER, UNLESS OTHERWISE NOTED.
- PRESSURE TEST OF ALL WATER LINES SHALL BE AT 150 PSI FOR FOUR (4) HOURS AND WITNESSED BY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT, EXCEPT FIRE LINES WHICH SHALL BE TESTED AT 200 PSI FOR TWO (2) HOURS AND WITNESSED BY THE FIRE MARSHAL.
- SINGLE METER SERVICE LINES SHALL BE ONE (1) INCH MINIMUM I.D., C.T.S. POLYETHYLENE, SDR-9.
- CONTRACTOR TO FURNISH AND INSTALL SINGLE SERVICE METER BOXES AT FINISH GRADE.
- FIRE HYDRANT ASSEMBLIES SHALL INCLUDE ONE (1) EACH LINE SIZE BY SIX (6) INCH TEE, ONE (1) EACH SIX (6) INCH GATE VALVE AND BOX, ONE (1) EACH FIRE HYDRANT WITH SIX (6) INCH LEAD PIPING AND TIE BACKS.
- WATER VALVES ON MAIN LINES SHALL BE LOCATED AS CLOSE AS POSSIBLE TO EXTENDED PROPERTY LINE AND SHALL CONFORM TO AWWA C-500, OPEN COUNTER CLOCKWISE LEFT, EQUIPPED WITH TWO (2) INCH SQUARE OPERATING NUT. OPERATING NUT SHALL BE A MAXIMUM OF FIVE (5) FEET BELOW FINISH GRADE.
- WATER LINES FOUR (4) INCH THROUGH TWELVE (12) INCH I.D. SHALL COMPLY THE REQUIREMENTS OF AWWA STANDARD C-900-75, CLASS 150, SDR-18, WITH CAST IRON OUTSIDE DIAMETER AND GASKET BELL END. FITTINGS ARE TO BE MECHANICAL JOINTS IN ACCORDANCE WITH AWWA C-100 OR C-110.
- ALL CONCRETE THRUST BLOCKING SHALL BE PLACED TO FORM A SOLID CONNECTION BETWEEN FITTINGS, VALVES, AND FIRE HYDRANTS AND UNDISTURBED EARTH. CONCRETE FOR THRUST BLOCKING SHALL BE CLASS "C" AND HAVE A MINIMUM OF 2,500 PSI COMPRESSIVE STRENGTH AT TWENTY-EIGHT (28) DAYS AND CONFORM TO CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS AND STANDARD DETAILS.
- GRAY IRON AND DUCTILE IRON FITTINGS SHALL CONFORM TO AWWA C-110 AND END JOINTS OF FITTINGS AND MAIN VALVES SHALL CONFORM TO AWWA C-110. FOR RUBBER GASKETED JOINTS, END JOINTS TO FITTINGS AND MAIN LINE VALVES SHALL CONFORM TO AWWA C-111. GRAY IRON AND DUCTILE IRON FITTINGS SHALL BE CEMENT LINED OR EPOXY COATED.
- MINIMUM BURY FOR ALL FIRE HYDRANTS SHALL BE FOUR (4) FEET UNLESS OTHERWISE NOTED. ALL FIRE HYDRANTS AND VALVE BOXES ARE TO BE ADJUSTED TO FINISH GRADE AFTER PAVING IS COMPLETE. PUMPER SERVICE CONNECTION TO FACE CURB.
- INSTALL CONCRETE BLOCK BENEATH FIRE HYDRANTS BEFORE PLACING CONCRETE THRUST BLOCKING TO INSURE THAT FIRE HYDRANTS ARE INSTALLED LEVEL.
- CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 SEVENTY-TWO (72) HOURS PRIOR TO START OF CONSTRUCTION.
- ALL WATER LINES TO BE BACKFILLED TO ONE (1) FOOT ABOVE TOP OF PIPE WITH BANK SAND. FOR PORTIONS OF PIPE LOCATED UNDER PAVEMENT, BACKFILL FROM INITIAL BACKFILL OF BANK SAND TO ONE (1) FOOT BELOW PROPOSED SUBGRADE UNDER PAVEMENT WITH CEMENT-STABILIZED SAND (1.1 SACKS OF CEMENT PER TON OF SAND).
- ALL FIRE HYDRANTS ARE TO BE LOCATED AS SHOWN ON THE PLANS AND SET THREE (3) FEET BEHIND THE CURB, ONE (1) FOOT FROM PROPERTY LINE FOR STREETS WITH DITCHES OR AT AN APPROVED LOCATION ON RURAL SECTION ROADS. ALL FIRE HYDRANTS SHALL BE AUDITED AND PAINTED AS PER CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS.
- ALL TAPPING SLEEVES SHALL BE STAINLESS STEEL FULL CIRCLE WITH MECHANICAL JOINT TAPPING SLEEVE.
- THE CONTRACTOR SHALL NOT OPERATE EXISTING CITY WATER VALVES. THE CONTRACTOR SHALL NOTIFY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411 TWENTY-FOUR (24) HOURS MINIMUM FOR ANY VALVE OPERATION NECESSARY FOR THE PROJECT. IF ANY VALVE CLOSING RESULTS IN INTERRUPTED SERVICE TO RESIDENTS OR BUSINESSES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER NOTICE TO THE AFFECTED PARTIES TWENTY-FOUR (24) HOURS IN ADVANCE OF THE INTERRUPTION.
- FOR ALL CONSTRUCTION WATER USAGE ON THE PROJECT, A FIRE HYDRANT METER SHALL BE OBTAINED FROM THE CITY PUBLIC WORKS DEPARTMENT AT 15355 BLACKHAWK BLVD (281-996-3380). A DEPOSIT SHALL BE REQUIRED FOR THE METER AND A FEE SHALL BE CHARGED FOR ALL METERED WATER USAGE. THE CONTRACTOR SHALL SUPPLY A BACKFLOW PREVENTER FOR THE FIRE HYDRANT METER.

**TESTING**

ALL TESTING SHALL CONFORM WITH THE CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS SECTION 01470 - TESTING LABORATORY SERVICES AND SECTION 01475 - TESTING PROCEDURES.

- SECTION 02125 - EXCAVATION AND BACKFILL FOR UTILITIES:
  - BACKFILL SHALL BE PLACED IN MAXIMUM LIFTS OF EIGHT (8) INCHES AND COMPACTED TO A DENSITY OF NOT LESS THAN 95% STANDARD PROCTOR WITH OPTIMUM MOISTURE BETWEEN PLUS 3% AND MINUS 3% OR AS OTHERWISE SPECIFIED BY THE SOILS LABORATORY. TEST SHALL BE TAKEN EVERY LIFT, EVERY 500 LINEAR FEET, OR BETWEEN MANHOLES, WHICHEVER RESULTS IN THE GREATEST NUMBER OF DENSITY TESTS.
  - FIELD MOISTURE/DENSITY TEST SHALL BE PERFORMED AT A FREQUENCY OF AT LEAST ONE (1) TEST PER 500 SQUARE YARDS OF COMPACTED LIFT. THE DENSITY SHALL NOT BE LESS THAN 95% OF STANDARD PROCTOR WITH A MOISTURE CONTENT OF BETWEEN PLUS 3% AND MINUS 3% OPTIMUM MOISTURE, OR AS DETERMINED BY SOILS LABORATORY. MAXIMUM LIFT FOR TESTING COMPACTED FILL SHALL NOT EXCEED TWELVE (12) INCHES.
- SECTION 02300 - CAST-IN-PLACE CONCRETE MANHOLES AND SECTION 02305 - PRECAST CONCRETE MANHOLES:
  - EXFILTRATION TEST SHALL BE REQUIRED ON EACH MANHOLE SYSTEM.
    - EACH MANHOLE IS TO BE PLUGGED, FILLED TO THE TOP OF THE RIM WITH WATER FOR THIRTY (30) MINUTES WITH THE ALLOWABLE LEAKAGE OF NOT MORE THAN 1/2 INCH; OR
    - PLUG MANHOLE AND VACUUM TEST AT TEN (10) INCHES OF MERCURY WITH A LOSS OF NO MORE THAN ONE (1) INCH OF MERCURY FOR THE TIME TO BE DETERMINED BY THE WIDTH AND DEPTH OF THE MANHOLE.
- SECTION 02400 - WATER LINES
  - PRESSURE TEST:
    - A TEST, TO BE SUCCESSFUL SHALL BE WITNESSED BY THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT FOR A FOUR (4) HOUR PERIOD, DURING REASONABLE HOURS. THE ALLOWABLE LEAKAGE SHALL BE NO GREATER THAN DETERMINED BY THE FOLLOWING FORMULA:  

$$L = SD\sqrt{P} / 148,000$$
 IN WHICH L IS THE ALLOWABLE LEAKAGE, IN GALLONS PER HOUR OF TESTING; S IS THE LENGTH OF PIPE BEING TESTED, IN FEET; D IS THE NOMINAL INSIDE DIAMETER OF THE PIPE, IN INCHES; AND P IS THE AVERAGE TEST PRESSURE DURING THIS TEST, IN POUNDS PER SQUARE INCH. THE TEST PRESSURE SHALL BE 150 PSI FOR FOUR (4) HOURS. ALL VALVES, FIRE HYDRANTS, AND SERVICES ARE TO BE TESTED TOGETHER.
    - FIRE LINES SHALL BE TESTED AT 200 PSI FOR TWO (2) HOURS AND SHALL BE WITNESSED BY THE FIRE MARSHAL. LEAKAGE SHALL BE CALCULATED AS STATED ABOVE.



01/23/2025

<b>GENERAL CONSTRUCTION NOTES</b>			<b>ENGINEERING DEPARTMENT</b>	
FILE NAME: 2-GCN1-2022.DWG	DATE APPROVED: SEPTEMBER 3, 2022		PROJECT NUMBER:	DATE SUBMITTED:

**TESTING (CONT.)**

- 3.2 BACTERIAL TEST (BAC-T):
- 3.2.1 BACTERIAL SAMPLE IS REQUIRED FOR EACH 1,200 FEET OF WATER MAIN, OR CLOSER DEPENDING ON FIRE HYDRANT LOCATIONS, OR PORTION THEREOF. ALSO BEAD ENDS ARE SUBJECT TO TESTING, SUCH AS CUL-DE-SAC. THE FORM NEEDS TO BE LABELED "CONSTRUCTION" OR "SPECIAL." BOTH FORM AND SAMPLE ARE TESTED AT A LABORATORY APPROVED BY TCEQ. PAYMENT SHALL BE EXPECTED AT TIME OF SAMPLING. SAMPLINGS SHALL ONLY BE CONDUCTED ON TUESDAYS AND THURSDAYS WITH FORTY-EIGHT (48) HOUR NOTIFICATION TO THE CITY OF FRIENDSWOOD ENGINEERING DEPARTMENT AT (281) 993-3411.
- 4. SECTION 02500 - GRAVITY SANITARY SEWERS:
  - 4.1 LOW PRESSURE AIR TEST - THE PIPE SHALL UNDERGO A LOW PRESSURE AIR TEST WHICH SHALL CONFORM TO ASTM C828 AND ASTM C494. THE PRESSURE SHALL BE FIVE (5) PSI FOR A DURATION AS DETERMINED BY THE LENGTH AND NOMINAL I.D. OF THE PIPE BEING TESTED.
  - 4.2 MANDREL DEFLECTION TEST - FLEXIBLE AND SEMI-RIGID PIPE DIAMETER DEFLECTION TEST SHALL BE DONE NO SOONER THAN THIRTY (30) DAYS AFTER FINAL BACKFILL. RUN TEST WITH A MANDREL HAVING A DIAMETER EQUAL TO 95% OF THE INSIDE NOMINAL DIAMETER OF THE PIPE BEING TESTED. MANDREL SHALL BE NINE (9) ARM WITH STEEL PROVING RING 2 1/2 INCH RING WIDTH. TO PASS, MANDREL SHALL PASS FREELY THROUGH THE PIPE, PULLED BY ONE (1) WORKER. NO MECHANICAL MEANS SHALL BE ALLOWED TO PULL THE MANDREL.
- 5. SECTION 02720 - LIME-STABILIZED SUBGRADE:
  - 5.1 LIME
    - 5.1.1 PERCENT LIME DETERMINATION TEST SHALL BE TAKEN BY A CERTIFIED TESTING LABORATORY IN ACCORDANCE WITH ASTM C977-92, BUT SHALL NOT BE LESS THAN 6%.
    - 5.1.2 THE PERCENT LIME USED SHALL BRING THE SOIL TO A P.I. OF NOT MORE THAN 15.
    - 5.1.3 HYDRATED LIME SHALL BE SAMPLED AND TAKEN AT THE DISTRIBUTION AREA OF THE TANKER TRUCK AND TESTED.
  - 5.2. SUBGRADE
    - 5.2.1. ALL SUBGRADE SHALL MEET THE FOLLOWING REQUIREMENTS WHEN TEST DRY BY LABORATORY SIEVES:
      - MINIMUM PASSING 1 1/4 INCH SIEVE - 100%
      - MINIMUM PASSING 3/4 INCH SIEVE - 85%
      - MINIMUM PASSING #4 SIEVE - 60%
    - 5.2.2. ALL SUBGRADE SHALL PASS A DENSITY TEST OF NOT LESS THAN 95% STANDARD PROCTOR. METHOD OF TESTING AS PER ASTM D698. TEST TO BE TAKEN EVERY 200 FEET AS MEASURED ALONG CENTERLINE OF THE ROADWAY AT VARYING DISTANCES FROM CENTERLINE OF THE ROADWAY, OR AS DIRECTED BY THE CITY.
    - 5.2.3. THICKNESS TESTS SHALL BE TAKEN AT EVERY 200 FEET AS MEASURED ALONG THE CENTERLINE OF THE ROADWAY.
    - 5.2.4. IF A SINGLE STORM EVENT PRODUCES ONE (1) INCH OR MORE OF RAINFALL, CONTRACTOR SHALL RETEST THE SUBGRADE FOR DENSITY. THE INTERVAL FOR DENSITY RETESTS SHALL BE NOT LESS THAN 500 FEET AS MEASURED ALONG THE CENTERLINE OF THE ROADWAY.
- 6. SECTION 02805 - CONCRETE PAVING:
  - 6.1 THE CONCRETE PAVEMENT WILL BE TESTED FOR DEPTHS IN ACCORDANCE WITH ASTM C174 TEST. THICKNESS SHALL NOT BE DEFICIENT BY MORE THAN 1/4 INCH.
- 7. SECTION 03300 - STRUCTURAL CONCRETE:
  - 7.1 THE SLUMP, WHEN PLACING CONCRETE, SHALL NOT BE GREATER THAN FIVE (5) INCHES. THIS TEST SHALL BE TAKEN FOR EVERY 100 CUBIC YARDS OF CONCRETE, BUT MAY BE TAKEN MORE FREQUENTLY IF THE CONSISTENCY OF THE CONCRETE APPEARS TO VARY PER THE TESTING LABORATORY TECHNICIAN OR THE CITY PROJECT MANAGER.
  - 7.2 TEMPERATURE OF THE CONCRETE WILL BE TAKEN AS DIRECTED BY THE CITY PROJECT MANAGER AND SHALL BE LESS THAN 90° F.
  - 7.3 THERE SHALL BE CYLINDERS TAKEN BY THE TESTING LABORATORY TECHNICIAN, IN ACCORDANCE WITH ASTM C31 TEST, NUMBERING FOUR (4) CYLINDERS PER 150 CUBIC YARDS OF PAVING OR PART THEREOF FOR EACH DAYS PLACEMENT. TWO (2) CYLINDERS SHALL BE TESTED AT SEVEN (7) DAYS AND TWO (2) CYLINDERS SHALL BE TESTED AT TWENTY-EIGHT (28) DAYS TO ASSURE THE MINIMUM DESIGN STRENGTH IS ACHIEVED.

**PRIVATE UTILITY NOTES:**

AT&T TEXAS/SWBT FACILITIES:

- 1. THE LOCATION OF AT&T TEXAS/SWBT FACILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND UTILITIES.
- 2. THE CONTRACTOR SHALL CALL (800) 344-8377 A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION TO HAVE UNDERGROUND LINES FIELD LOCATED.
- 3. WHEN EXCAVATING WITHIN EIGHTEEN (18) INCHES OF AT&T TEXAS/SWBT FACILITIES, ALL EXCAVATIONS MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES. WHEN BORING THE CONTRACTOR SHALL EXPOSE THE AT&T TEXAS/SWBT FACILITIES.
- 4. WHEN AT&T TEXAS/SWBT FACILITIES ARE EXPOSED, THE CONTRACTOR WILL PROVIDE SUPPORT TO THE CONDUIT DUCTS OR CABLES. WHEN EXCAVATING NEAR TELEPHONE POLES THE CONTRACTOR SHALL BRACE THE POLE FOR SUPPORT.
- 5. THE PRESENCE OR ABSENCE OF AT&T TEXAS/SWBT UNDERGROUND CONDUIT FACILITIES SHOWN ON THESE PLANS DOES NOT MEAN THAT THERE ARE NO DIRECT BURIED CABLES OR OTHER CABLES IN CONDUIT.
- 6. PLEASE CONTACT AT&T TEXAS DAMAGE PREVENTION MANAGER MR. ROOSEVELT LEE JR. AT (713) 567-4452 OR EMAIL HIM AT RL7259@ATT.COM, IF THERE ARE ANY QUESTIONS ABOUT BORING OR EXCAVATING NEAR AT&T TEXAS/SWBT FACILITIES.

CENTERPOINT ENERGY EASEMENT:

NO APPROVAL TO USE, CROSS, OR OCCUPY CENTERPOINT FEE OF EASEMENT PROPERTY IS GIVEN. IF YOU NEED TO USE CENTERPOINT PROPERTY, PLEASE CONTACT CENTERPOINT ENERGY SURVEYING & RIGHT OF WAY DIVISION AT (713) 207-6248 OR (713) 207-5769.

CENTERPOINT ENERGY ELECTRIC FACILITIES:

- 1. **CAUTION - OVERHEAD ELECTRICAL LINES.** OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN DRAWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:
  - 1.1 ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
  - 1.2 OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN TEN (10) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
- 2. PARTIALLY RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

**PRIVATE UTILITY NOTES(CONT.):**

CENTERPOINT ENERGY GAS FACILITIES:

- 1. **CAUTION - UNDERGROUND GAS FACILITIES.** LOCATIONS OF CENTERPOINT ENERGY MAIN LINES (TO INCLUDE CENTERPOINT ENERGY, INTRASTATE PIPELINE, LLC WHERE APPLICABLE) ARE SHOWN IN APPROXIMATE LOCATION ONLY. SERVICE LINES ARE USUALLY NOT SHOWN. OUR SIGNATURE ON THESE PLANS ONLY INDICATES THAT OUR FACILITIES ARE SHOWN IN APPROXIMATE LOCATION. IT DOES NOT IMPLY THAT A CONFLICT ANALYSIS HAS BEEN MADE. THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT (800) 223-545-6001 OR 811 A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.
- 2. WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE CALL (713) 945-8037 (7:00 AM TO 4:30 PM) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.
- 3. WHEN EXCAVATING WITHIN EIGHTEEN (18) INCHES OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
- 4. WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
- 5. FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200.
- 6. THE CONTRACTOR IS FULLY RESPONSIBLE FOR DAMAGES CAUSED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

COMCAST FACILITIES:

- 1. CONTACT MR. BILL LEOPARD AT (281) 802-1679 OR MR. MOHAMMAD VOHEIDY AT (713) 895-1213 BEFORE PROCEEDING WITH CONSTRUCTION WORK IN THE VICINITY OF COMCAST/TIME WARNER CABLE FACILITIES.
- 2. WHEN EXCAVATING WITHIN EIGHTEEN (18) INCHES OF THE INDICATED LOCATION OF UNDERGROUND FACILITY, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.

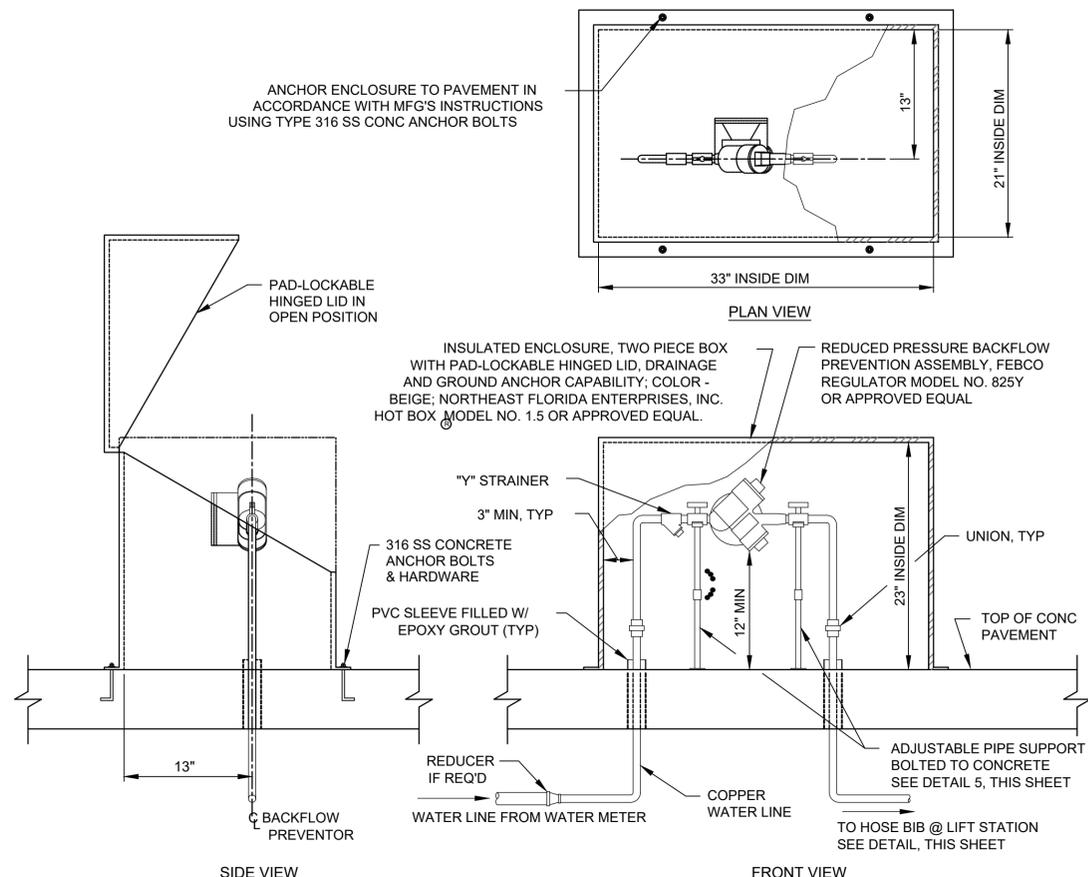
TEXAS-NEW MEXICO POWER COMPANY ELECTRIC FACILITIES:

- 1. **CAUTION - OVERHEAD ELECTRICAL LINES.** TEXAS LAW, ARTICLE 1436C, PROHIBITS ALL ACTIVITIES IN WHICH PERSONS OR EQUIPMENT MAY COME WITHIN SIX (6) FEET OF ENERGIZED OVERHEAD POWER LINES, AND FEDERAL REGULATIONS, TITLE 29, PART 1910.180(C) AND PART 1926.550(A)(15) REQUIRE A MINIMUM CLEARANCE OF TEN (10) FEET FROM THESE FACILITIES. ABOVE LAWS CARRY BOTH CRIMINAL AND CIVIL LIABILITIES. IF THE CONTRACTOR PERFORMS ANY WORK NEAR OVERHEAD POWER LINES THEY MUST CALL (281) 996-0453 FOR THE LINES TO BE DE-ENERGIZED AND/OR MOVED AT THEIR EXPENSE PRIOR TO PERFORMING WORK.
- 2. **NOTE:** LOCATION OF TEXAS-NEW MEXICO POWER COMPANY FACILITIES ARE APPROXIMATE AND HAVE NOT BEEN VERIFIED BY ACTUAL FIELD CHECK.
- 3. OVERHEAD LINES MAY EXIST ON THE PROPERTY. WE HAVE NOT ATTEMPTED TO MARK THOSE LINES HAS SINCE THEY ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING CONSTRUCTION.
- 4. TEXAS LAW, SECTION 752, HEALTH AND SAFETY CODE FORBIDS ACTIVITIES WHICH PERSONS OR THINGS MAY COME WITHIN SIX (6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.
- 5. CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED CALL TEXAS-NEW MEXICO POWER COMPANY AT (281) 996-0453.
- 6. CONTRACTOR TO NOTIFY THE "UNDERGROUND COORDINATING COMMITTEE" TELEPHONE (713) 223-4567 FORTY-EIGHT (48) HOURS BEFORE STARTING WORK IN STREET RIGHTS-OF-WAY OR EASEMENTS.



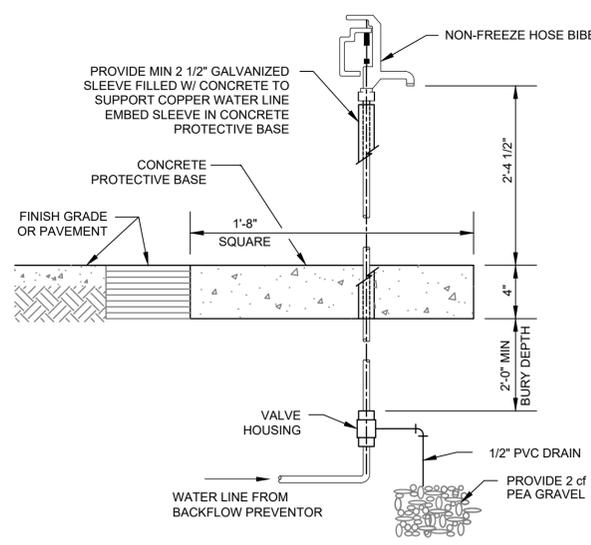
*Battistini* 01/23/2025

<b>GENERAL CONSTRUCTION NOTES (CONTINUED)</b>			<b>ENGINEERING DEPARTMENT</b>	PROJECT NUMBER:	DATE SUBMITTED:	SHEET: 002 OF 025
FILE NAME: 3-GCN2-2022.DWG	DATE APPROVED: MARCH 30, 2022					
SCALE: NTS	REVISED DATE: MARCH 2022					



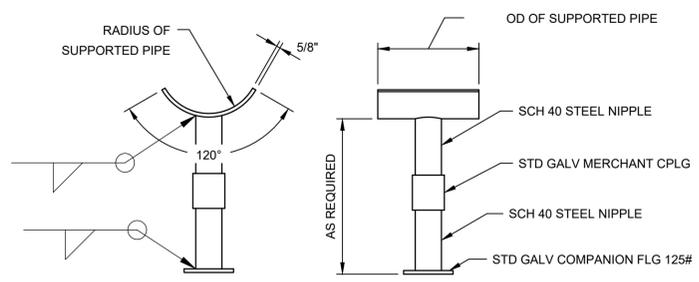
REDUCED PRESSURE BACKFLOW PREVENTOR INSTALLATION

DETAIL 1



TYP NON-FREEZE HOSE BIBB DETAIL

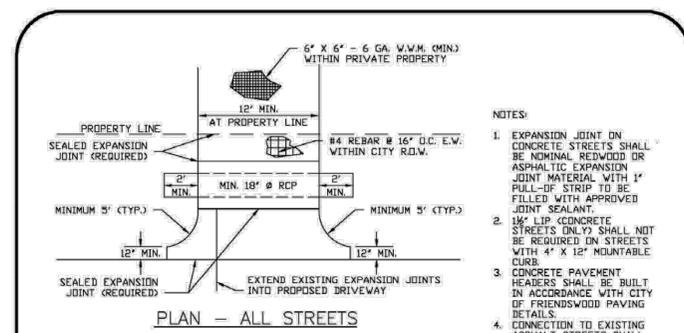
DETAIL 2



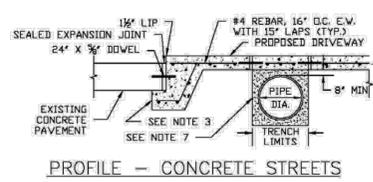
TYP ADJUSTABLE PIPE SUPPORT

(SEE NOTE 1)

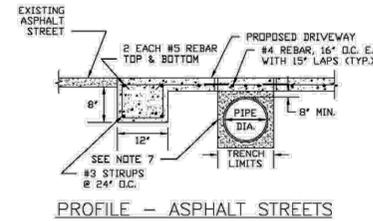
DETAIL 5



PLAN - ALL STREETS

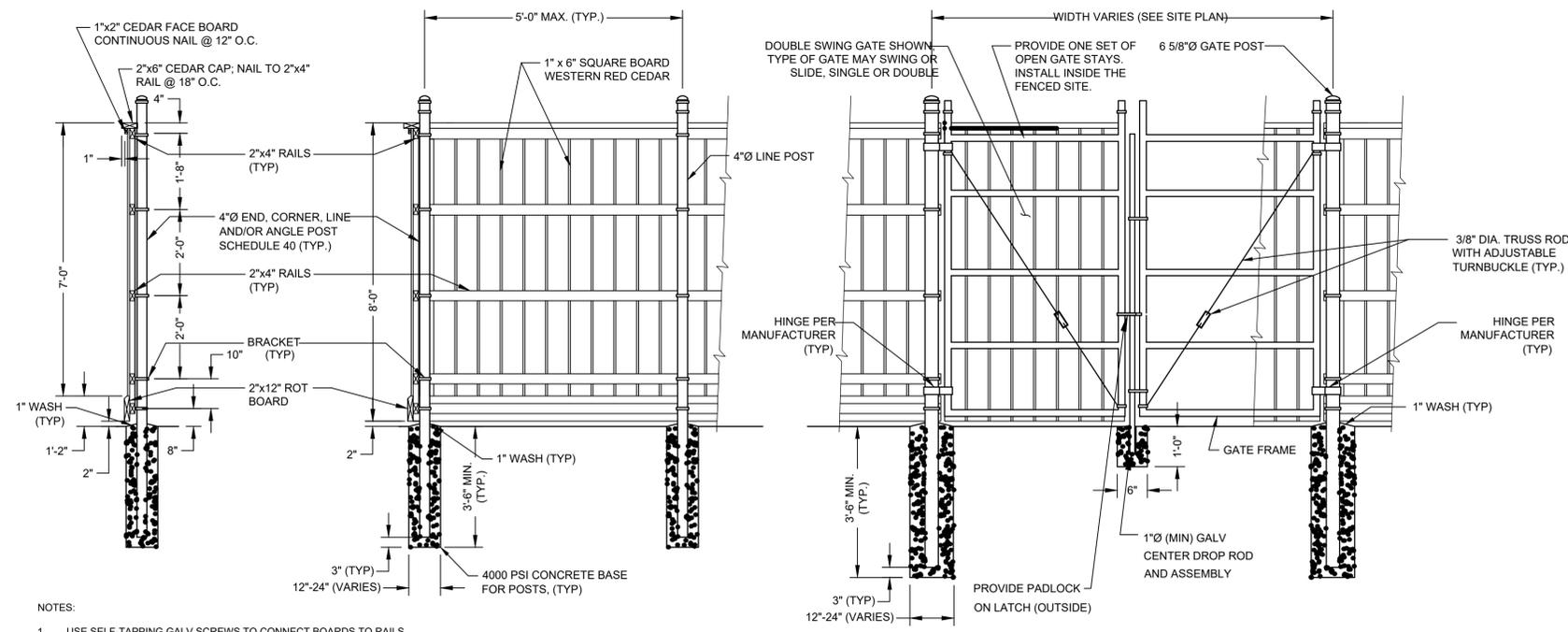


PROFILE - CONCRETE STREETS



PROFILE - ASPHALT STREETS

- NOTES:
1. EXPANSION JOINT ON CONCRETE STREETS SHALL BE NOMINAL REDWOOD OR ASPHALTIC EXPANSION JOINT MATERIAL WITH 1\"/>
  - 2. 1/2\"/>
  - 3. CONCRETE PAVEMENT HEADERS SHALL BE BUILT IN ACCORDANCE WITH CITY OF FRIENDSWOOD PAVING DETAILS.
  - 4. CONNECTION TO EXISTING ASPHALT STREETS SHALL BE MADE BY BLOCKING NEW CONCRETE WITH EDGE OF PAVEMENT. A 6\"/>
  - 5. DAMAGE TO EXISTING ASPHALT STREET AND NEW CONCRETE DRIVEWAY.
  - 6. ALL CONCRETE SHALL BE CLASS \"A\", 3,000 PSI AT TWENTY-EIGHT DAYS. USE MATERIAL AND DIMENSION AS SPECIFIED IN STORM SEWER DETAILS FOR TRENCH WIDTHS AND BACKFILL.
  - 7. NO MORE THAN ONE (1) DRIVEWAY ON LOTS WITH LESS THAN 120' OF FRONTAGE.
  - 8. 24\"/>
  - 9. 24\"/>



- NOTES:
1. USE SELF-TAPPING GALV SCREWS TO CONNECT BOARDS TO RAILS.
  2. FENCE SHALL BE LEVEL ACROSS THE TOP FOR THE ENTIRETY OF THE PROPERTY.

VIEW AT FENCE

VIEW AT DOUBLE SWING GATE

DETAIL 3

**RESIDENTIAL CONCRETE DRIVEWAY (OPEN DITCH STREETS)**  
 DEPARTMENT OF PUBLIC WORKS  
 DRAWN: 12/09 SCALE: N.T.S. DRAWING: B.S. #11

- NOTES:
1. ADJUSTABLE PIPE SUPPORT ASSEMBLY TO BE HOT DIPPED GALVANIZED AFTER FABRICATION. COLD GALVANIZING COMPOUND TO BE USED AS TOUCH UP AFTER INSTALLATION.
  2. AT CONTRACTOR'S OPTION, THE ADJUSTABLE PIPE SUPPORT MAY BE AN EQUAL PURCHASED PRODUCT AS MANUFACTURED BY MATERIAL RESOURCES, GRINNEL, OR OTHER MANUFACTURER.

MK	DESCRIPTION	DATE	DWN.	CHK.

**Battistini** 01/23/2025  
 PIERO G. BATTISTINI  
 104895  
 PROFESSIONAL ENGINEER

**5e Engineering**  
 11200 WESTHEIMER ROAD, SUITE 353  
 HOUSTON, TEXAS 77042  
 (832) 800-3483 | www.5eengineering.com  
 TBPE FIRM NO. F-13748



CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No. 4

**STANDARD DETAILS**

SCALE:	AS SHOWN	DWG. No.	G-4
DATE:	NOVEMBER 2022	DESIGNED:	
DRAWN:		CONSULTANTS	
PROJ. No.:	0101-01	SHEET No.	003 OF 025

P:\0101001\FEMA\_LS04\_Civil\GIS03 SHEETS\03 Civil\Package 4\004 STANDARD DETAILS.dwg - Printed 1/20/2025

# AIRLINE DRIVE

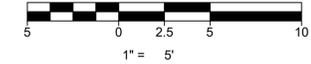
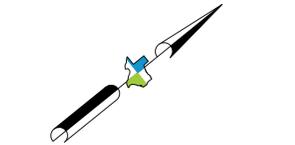
(60' R.O.W., VOL. 18, PG. 971, G.C.M.R.)

**811**  
Know what's below.  
Call before you dig.

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY ALL DAMAGES OCCASIONED BY HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

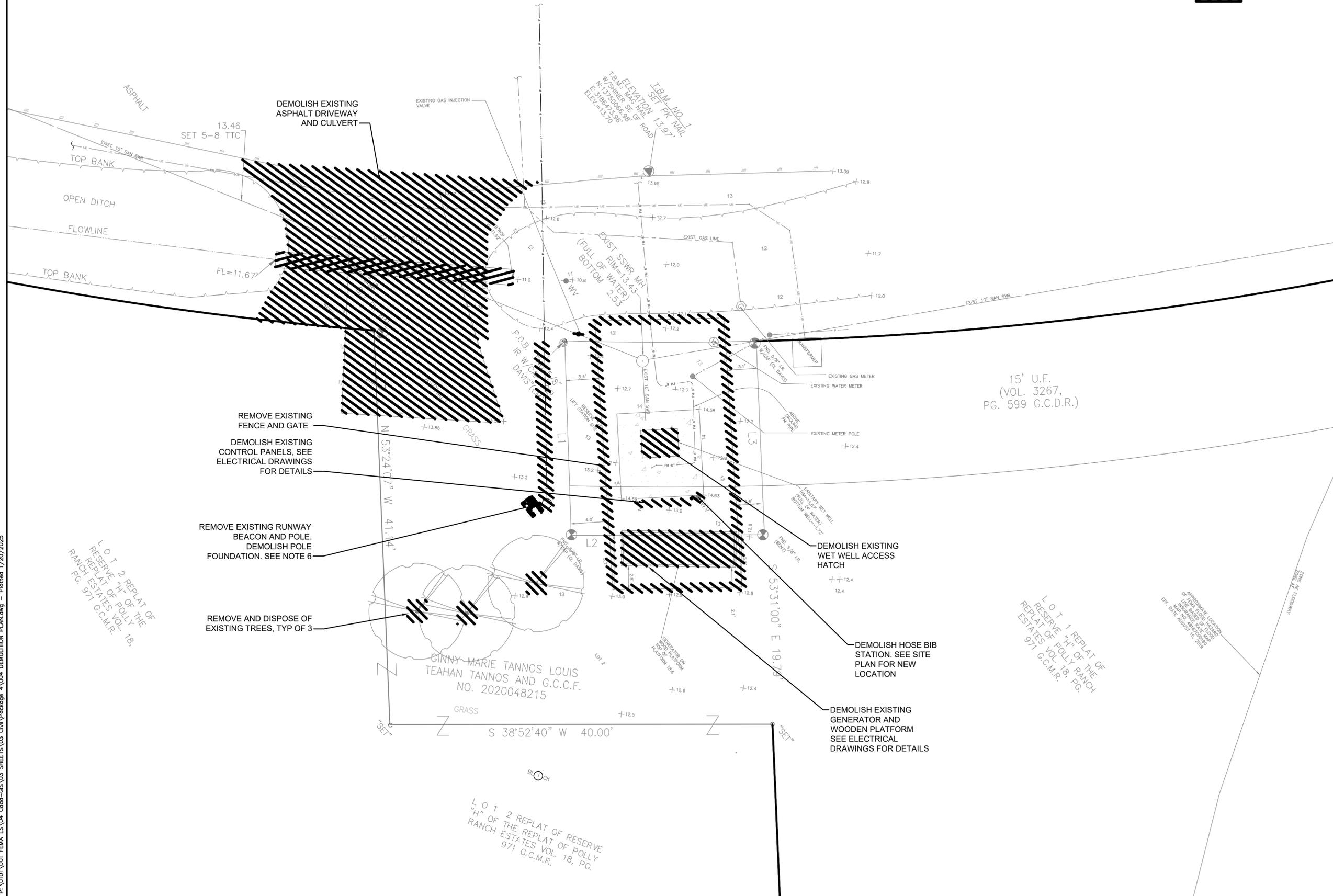
**CAUTION!!!**  
OVERHEAD POWER LINES AND UNDERGROUND UTILITIES IN & AROUND WORK AREA. CONTRACTOR TO LOCATE EX. UTILITIES BEFORE COMMENCING WORK.

**LEGEND:**  
[Hatched Box] DEMOLITION



**NOTES:**

1. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UNDERGROUND UTILITY LINES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONTACT ALL PERTINENT UTILITY COMPANIES AND LINE LOCATOR SERVICES 48 HOURS (MINIMUM) PRIOR TO EXCAVATION IN THE AREA.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE DEPTH, LOCATION AND EXISTENCE OF ALL EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED WORK PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD BEFORE COMMENCING WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES TO THE OWNER IN A TIMELY MANNER.
4. CONTRACTOR SHALL ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS AND OTHER PERMANENT OBJECTS AND SHALL REPLACE AND/OR REPAIR DAMAGE TO SUCH EXISTING ITEMS AT NO ADDITIONAL COST TO THE OWNER.
5. THE DRAWINGS SHOW INFORMATION OBTAINED FROM ON THE GROUND OBSERVATIONS, SURVEY, AND EXISTING CONSTRUCTION DRAWINGS REGARDING THE TOPOGRAPHIC FEATURES AND ELEVATIONS AS WELL AS THE LOCATION AND NATURE OF PIPELINES, NATURAL GAS PIPELINES, UNDERGROUND CABLES, UTILITIES, ETC.; HOWEVER, THE ACCURACY OF OR COMPLETENESS OF SUCH INFORMATION IS NOT GUARANTEED. THE PLANS DO NOT SHOW ALL LANDSCAPING AND IRRIGATION SYSTEMS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO THOROUGHLY VISIT THE SITE AND INCLUDE COSTS AND REPAIR FOR DAMAGE WHICH MAY OCCUR ON THESE SYSTEMS. NO ADDITIONAL PAYMENT WILL BE MADE.
6. CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING RUNWAY BEACON, UNBOLT POLE FROM CONCRETE FOUNDATION FOR SALVAGING. DELIVER POLE ACROSS THE STREET TO HOA'S PROPERTY. CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH MR. ERNIE BUTCHER AT (713) 823-9509.



15' U.E.  
(VOL. 3267,  
PG. 599 G.C.D.R.)

L O T 2 REPLAT OF RESERVE "H" OF THE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

L O T 1 REPLAT OF RESERVE "H" OF THE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

GINNY MARIE TANNOS LOUIS  
TEAHAN TANNOS AND G.C.C.F.  
NO. 2020048215

L O T 2 REPLAT OF RESERVE "H" OF THE REPLAT OF POLLY RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

MK	DESCRIPTION	DATE	DWN.	CHK.



**5e Engineering**  
11200 WESTHEIMER ROAD, SUITE 353  
HOUSTON, TEXAS 77042  
(832) 800-3483 | www.5eengineering.com  
TBPE FIRM NO. F-13748



City of Friendswood, Texas  
CONSTRUCTION PLANS FOR:  
LIFT STATION MITIGATION PROJECT  
PACKAGE 4 - LIFT STATION No. 4

**DEMOLITION PLAN**

SCALE: AS SHOWN	DWG. No. D-1
DATE: NOVEMBER 2022	SHEET NO. 004 OF 025
DRAWN:	
CONSULTANT'S PROJ. No.: 0101-01	

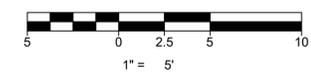
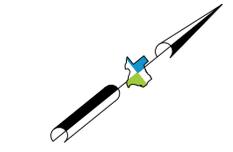
# AIRLINE DRIVE

(60' R.O.W., VOL. 18, PG. 971, G.C.M.R.)



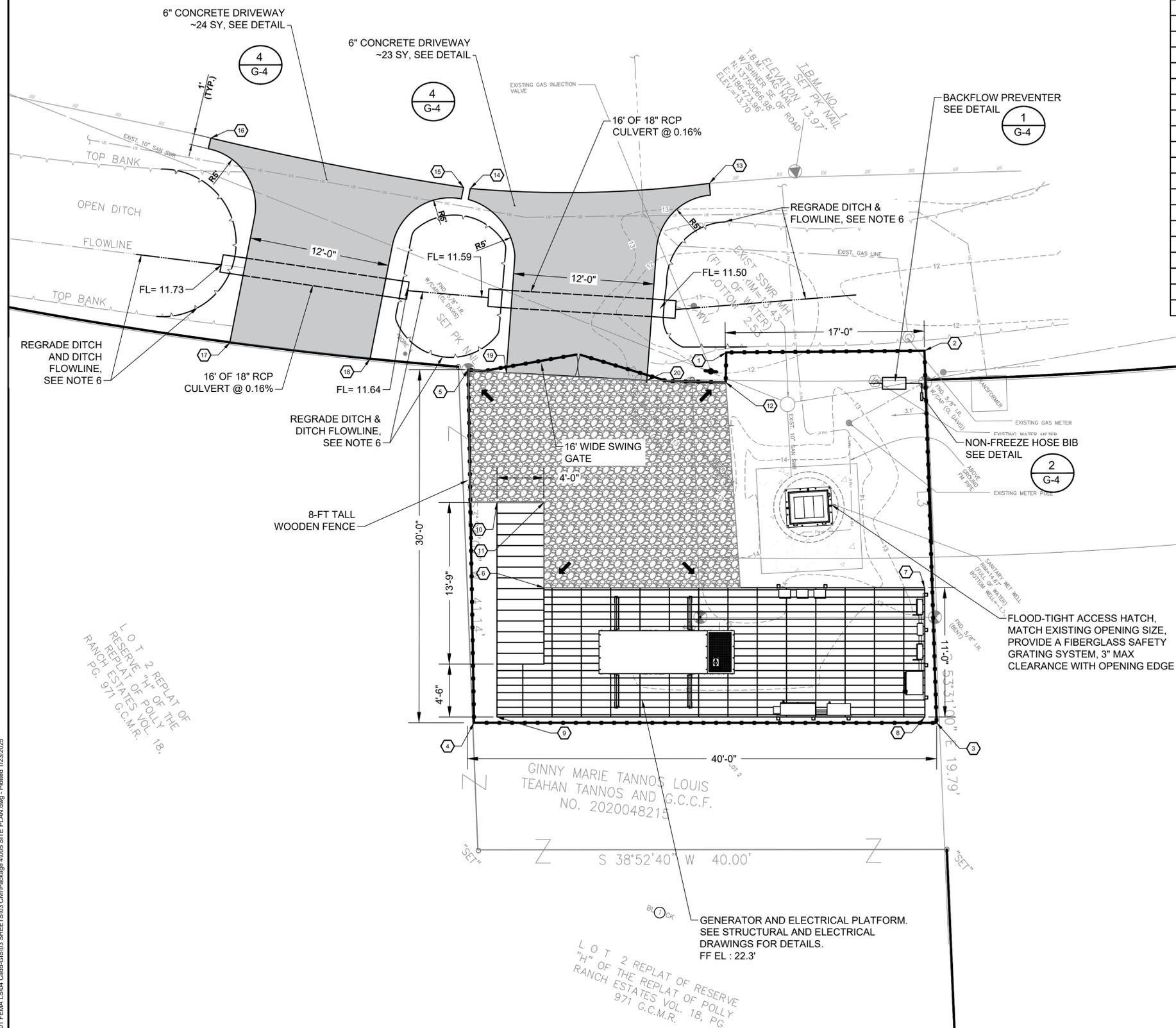
THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY ALL DAMAGES OCCASIONED BY HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

**CAUTION!!!**  
OVERHEAD POWER LINES AND UNDERGROUND UTILITIES IN & AROUND WORK AREA. CONTRACTOR TO LOCATE EX. UTILITIES BEFORE COMMENCING WORK.



HORIZONTAL CONTROL POINTS				
PT #	EASTING	NORTHING	ELEV	DESC
1	3186482.25	13750052.74	±12.5	GR
2	3186492.77	13750065.98	±12.5	GR
3	3186518.05	13750046.91	±12.5	GR
4	3186493.25	13750016.21	±12.5	GR
5	3186469.59	13750034.68	±13.0	GR
6	3186488.06	13750028.07	22.3	TP
7	3186508.46	13750053.33	22.3	TP
8	3186517.03	13750046.44	22.3	TP
9	3186494.1	13750018.04	22.3	TP
10	3186479.9	13750029.51	±13.0	GR
11	3186482.42	13750032.62	±13.0	GR
12	3186484.21	13750051.11	±13.0	GR
13	3186470.16	13750060.66	MATCH EXIST	TOC
14	3186457.69	13750044.52	MATCH EXIST	TOC
15	3186457.25	13750044.13	MATCH EXIST	TOC
16	3186440.45	13750030	MATCH EXIST	TOC
17	3186455.01	13750020.36	MATCH EXIST	TOC
18	3186463.58	13750028.77	MATCH EXIST	TOC
19	3186471.81	13750037.07	±13.0	TOC
20	3186479.85	13750045.98	±13.0	TOC

- NOTES:**
- CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UNDERGROUND UTILITY LINES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CONTACT ALL PERTINENT UTILITY COMPANIES AND LINE LOCATOR SERVICES 48 HOURS (MINIMUM) PRIOR TO EXCAVATION IN THE AREA.
  - IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE DEPTH, LOCATION AND EXISTENCE OF ALL EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED WORK PRIOR TO CONSTRUCTION.
  - CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD BEFORE COMMENCING WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES TO THE OWNER IN A TIMELY MANNER.
  - CONTRACTOR SHALL ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS AND OTHER PERMANENT OBJECTS AND SHALL REPLACE AND/OR REPAIR DAMAGE TO SUCH EXISTING ITEMS AT NO ADDITIONAL COST TO THE OWNER.
  - THE DRAWINGS SHOW INFORMATION OBTAINED FROM ON THE GROUND OBSERVATIONS, SURVEY, AND EXISTING CONSTRUCTION DRAWINGS REGARDING THE TOPOGRAPHIC FEATURES AND ELEVATIONS AS WELL AS THE LOCATION AND NATURE OF PIPELINES, NATURAL GAS PIPELINES, UNDERGROUND CABLES, UTILITIES, ETC.; HOWEVER, THE ACCURACY OF OR COMPLETENESS OF SUCH INFORMATION IS NOT GUARANTEED. THE PLANS DO NOT SHOW ALL LANDSCAPING AND IRRIGATION SYSTEMS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO THOROUGHLY VISIT THE SITE AND INCLUDE COSTS AND REPAIR FOR DAMAGE WHICH MAY OCCUR ON THESE SYSTEMS. NO ADDITIONAL PAYMENT WILL BE MADE.
  - CONTRACTOR SHALL REGRADE DITCH SIDE SLOPES AND FLOWLINE AS NEEDED TO PROVIDE POSITIVE DRAINAGE THROUGH DRIVEWAY CULVERTS



**LEGEND:**

- 8" MIN. WELL-GRADED GRANULAR FILL & GRAVEL WITH GEOTEXTILE FULL WIDTH A&L LENGTH
- CONCRETE
- DIRECTION OF PROPOSED DRAINAGE FLOW

15' U.E.  
(VOL. 3267,  
PG. 599 G.C.D.R.)

L O T 2 REPLAT OF RESERVE "H" OF THE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

L O T 1 REPLAT OF RESERVE "H" OF THE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

GINNY MARIE TANNOS LOUIS  
TEAHAN TANNOS AND G.C.C.F.  
NO. 2020048215

L O T 2 REPLAT OF RESERVE "H" OF THE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

MK	DESCRIPTION	DATE	DWN.	CHK.



**5e Engineering**  
11200 WESTHEIMER ROAD, SUITE 353  
HOUSTON, TEXAS 77042  
(832) 800-3483 | www.5eengineering.com  
TBPE FIRM NO. F-13748



CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
PACKAGE 4 - LIFT STATION No. 4

**SITE PLAN**

SCALE: AS SHOWN  
DATE: NOVEMBER 2022  
DESIGNED:  
DRAWN:  
CONSULTANT'S PROJ. No.: 0101-01

DWG. No.  
**C-1**  
SHEET No. 005 OF 025

# AIRLINE DRIVE

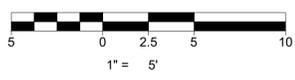
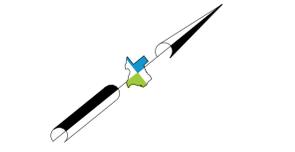
(60' R.O.W., VOL. 18, PG. 971, G.C.M.R.)

**811**  
Know what's below.  
Call before you dig.

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING WORK. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY ALL DAMAGES OCCASIONED BY HIS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

**CAUTION!!!**  
OVERHEAD POWER LINES AND UNDERGROUND UTILITIES IN & AROUND WORK AREA.  
CONTRACTOR TO LOCATE EX. UTILITIES BEFORE COMMENCING WORK.

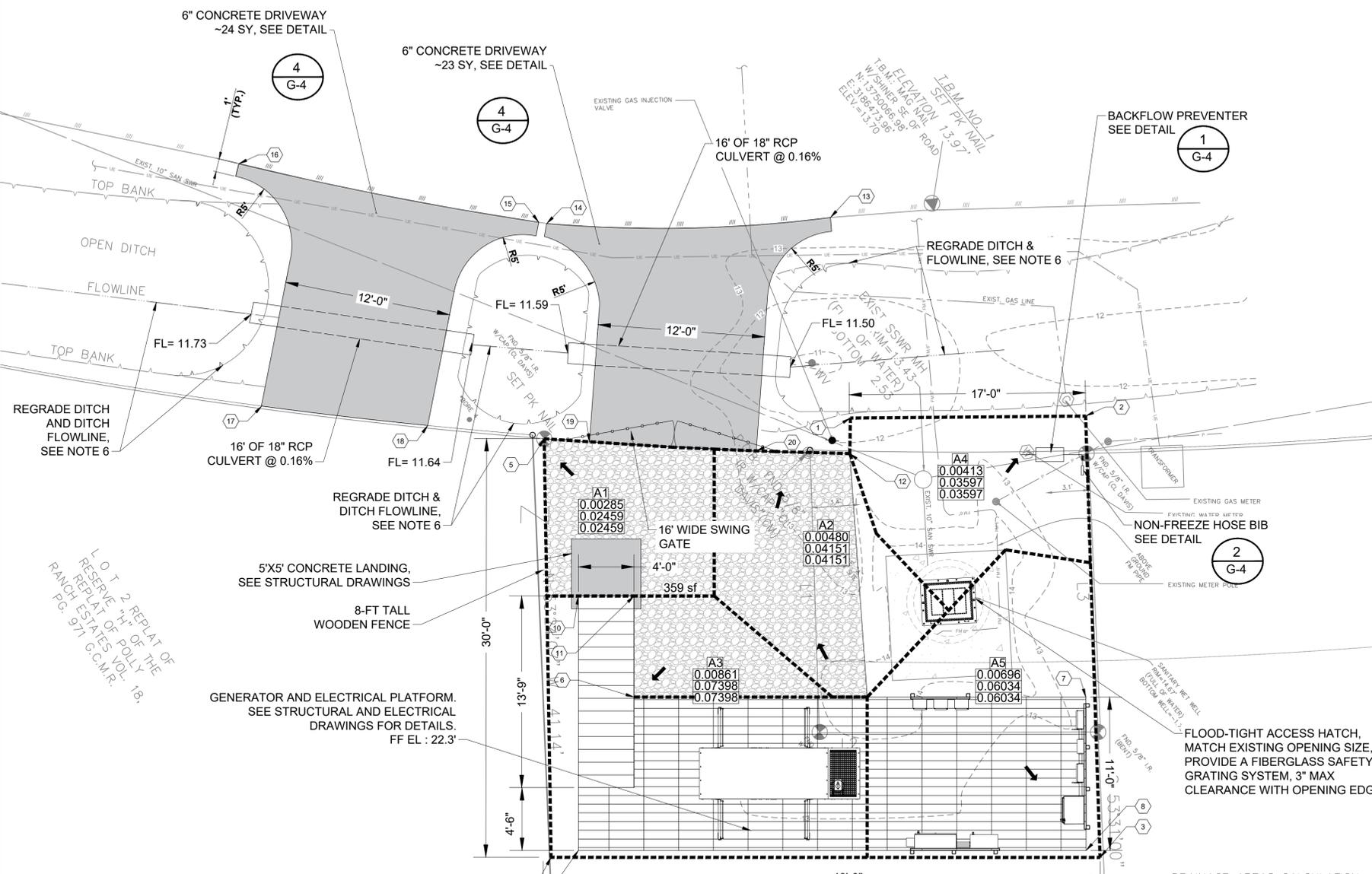
BENCHMARK  
HARRIS GALVESTON COASTAL SUBSIDENCE DISTRICT  
MONUMENT NO. 54 (NGS PID AW5596):  
FOUND STAINLESS STEEL ROD IN SLEEVE STAMPED "HGCSD 54-1986" AT THE NORTHEAST CORNER OF THE INTERSECTION OF FM 528 AND WHITAKER DR. AT THE SOUTHWEST EDGE OF THE FIRST 2 PARKING SPACES TO THE SOUTHWEST OF MAIN DRIVEWAY.  
ELEVATION 29.40' (NAVD 1988, 2012 ADJ.)



**GALVESTON COUNTY CONSOLIDATED DRAINAGE DISTRICT NOTES**

- Contact the District 48 hours prior to commencing construction and upon completion for the final inspection.
- Buildings, fences, or other permanent improvements shall not be erected in the District rights-of-way or drainage easements.
- The detention and drainage facilities are to be maintained by the property owner unless all requirements mentioned in Note # 4 have been satisfied and the District has accepted the facility for maintenance.
- The detention facility is to be maintained by the District provided that the District has approved the construction of the facility, the developer has paid the required fee, the site and access have been deeded to the District in fee, and subject to approval by the Board.
- All drainage facilities shall have erosion control established upon completion. Contractor shall provide the District with proposed grass type, application rate, and method for approval prior to commencing. Grass shall be 95% germinated prior to acceptance of the facility.
- Plantings, flowerbeds, or other landscaping are not permitted within side lot drainage or detention easements.
- No building permit shall be applied for until all drainage and detention facilities are constructed, inspected, and approved by the District.
- District Personnel shall have the right to enter upon the property and conduct interim inspections as required.
- No permanent improvements including, landscaping, paving, trees, sprinklers, utilities, playground equipment, park benches, tables, sport fields, piers, or sidewalks shall be constructed within the detention facility (including maintenance berms) without specific, prior approval of the District.

HORIZONTAL CONTROL POINTS				
PT #	EASTING	NORTHING	ELEV	DESC
1	3186482.25	13750052.74	±12.2	GR
2	3186492.77	13750065.98	±12.2	GR
3	3186518.05	13750046.91	±12.8	GR
4	3186493.25	13750016.21	±12.9	GR
5	3186469.59	13750034.68	±13.5	GR
6	3186488.06	13750028.07	22.3	TP
7	3186508.46	13750053.33	22.3	TP
8	3186517.03	13750046.44	22.3	TP
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12	3186484.21	13750051.11	±12.5	GR
13	3186470.16	13750060.66	MATCH EXIST	TOC
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19	3186471.81	13750037.07	±13.5	TOC
20	3186479.85	13750045.98	±13.0	TOC



**LEGEND:**

- 8" MIN. WELL-GRADED GRANULAR FILL & GRAVEL WITH GEOTEXTILE FULL WIDTH & LENGTH
- CONCRETE
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA NAME: A1, AREA FLOW RATE 100-YR CUMULATIVE FLOW RATE 100-YR: 0.00285, 0.02459, 0.02459
- DIRECTION OF PROPOSED DRAINAGE FLOW

15' U.E.  
(VOL. 3267,  
PG. 599 G.C.D.R.)

L.O.T. 2 REPLAT OF RESERVE "H" OF THE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

GENERATOR AND ELECTRICAL PLATFORM. SEE STRUCTURAL AND ELECTRICAL DRAWINGS FOR DETAILS. FF EL : 22.3'

FLOOD-TIGHT ACCESS HATCH, MATCH EXISTING OPENING SIZE, PROVIDE A FIBERGLASS SAFETY GRATING SYSTEM, 3" MAX CLEARANCE WITH OPENING EDGE

EXP-DRAINAGE DISTRICT NO. 8 PROPERTY ID 729307

PHASE	DRAINAGE AREA NAME	DRAINAGE AREA (AC)	"C" RUNOFF COEFFICIENT	TIME OF CONCENTRATION (Tc) (MIN)	DRAINAGE AREAS CALCULATION - RATIONAL METHOD											
					3-YEAR INTENSITY (i) (IN/HR)	5-YEAR INTENSITY (i) (IN/HR)	10-YEAR INTENSITY (i) (IN/HR)	25-YEAR INTENSITY (i) (IN/HR)	50-YEAR INTENSITY (i) (IN/HR)	100-YEAR INTENSITY (i) (IN/HR)	8-YEAR FLOW RATE (Q) (CFS)	5-YEAR FLOW RATE (Q) (CFS)	10-YEAR FLOW RATE (Q) (CFS)	25-YEAR FLOW RATE (Q) (CFS)	50-YEAR FLOW RATE (Q) (CFS)	100-YEAR FLOW RATE (Q) (CFS)
EXISTING	A1	0.00285	0.30	0.1778	11.6	12.8	15.2	18.3	21.0	23.2	0.00989	0.01092	0.01297	0.01717	0.02103	0.02480
	A2	0.00480	0.30	0.2500	11.5	12.7	15.1	18.2	20.8	23.1	0.01657	0.01829	0.02172	0.02874	0.03518	0.04151
	A3	0.00861	0.30	0.3167	11.4	12.6	15.0	18.0	20.7	22.9	0.02957	0.03262	0.03872	0.05124	0.06270	0.07398
	A4	0.00413	0.30	0.1889	11.6	12.8	15.2	18.3	20.9	23.2	0.01435	0.01584	0.01881	0.02490	0.03049	0.03597
	A5	0.00696	0.30	0.2222	11.5	12.7	15.1	18.2	20.9	23.1	0.02408	0.02658	0.03157	0.04178	0.05115	0.06034
PROPOSED	A1	0.00285	0.30	0.2667	11.5	12.7	15.1	18.1	20.8	23.0	0.00982	0.01083	0.01286	0.01703	0.02084	0.02459
	A2	0.00480	0.30	0.2500	11.5	12.7	15.1	18.2	20.8	23.1	0.01657	0.01829	0.02172	0.02874	0.03518	0.04151
	A3	0.00861	0.30	0.3167	11.4	12.6	15.0	18.0	20.7	22.9	0.02957	0.03262	0.03872	0.05124	0.06270	0.07398
	A4	0.00413	0.30	0.1889	11.6	12.8	15.2	18.3	20.9	23.2	0.01435	0.01584	0.01881	0.02490	0.03049	0.03597
	A5	0.00696	0.30	0.2222	11.5	12.7	15.1	18.2	20.9	23.1	0.02408	0.02658	0.03157	0.04178	0.05115	0.06034
NET INCREASE / DECREASE FLOW =											-0.00009	-0.00011	-0.00015	-0.00019	-0.00022	

FLOODPLAIN MITIGATION CALCULATIONS

CUT VOLUME (ASPHALT PAVEMENT REMOVAL)	=	90.712	CF
CUT VOLUME (GRASS AREA REMOVAL)	=	171.419	CF
TOTAL VOLUME CUT	=	262.131	CF
FILL VOLUME (GRAVEL AREA)	=	239.453	CF
FILL VOLUME (STAIRS CONCRETE LANDING)	=	4	CF
FILL VOLUME (PLATFORM COLUMNS)	=	8.75	CF
TOTAL VOLUME FILL	=	252.203	CF
CHANGE IN STORAGE VOLUME	=	+9.928	CF

NO FLOODPLAIN MITIGATION REQUIRED

1	GCCDD SUBMITTAL NO. 1	1/30/25	CD	PB
MK	DESCRIPTION	DATE	DWN.	CHK.

**Piero G. Battistin**  
Professional Engineer  
No. 104895  
State of Texas  
01/30/2025

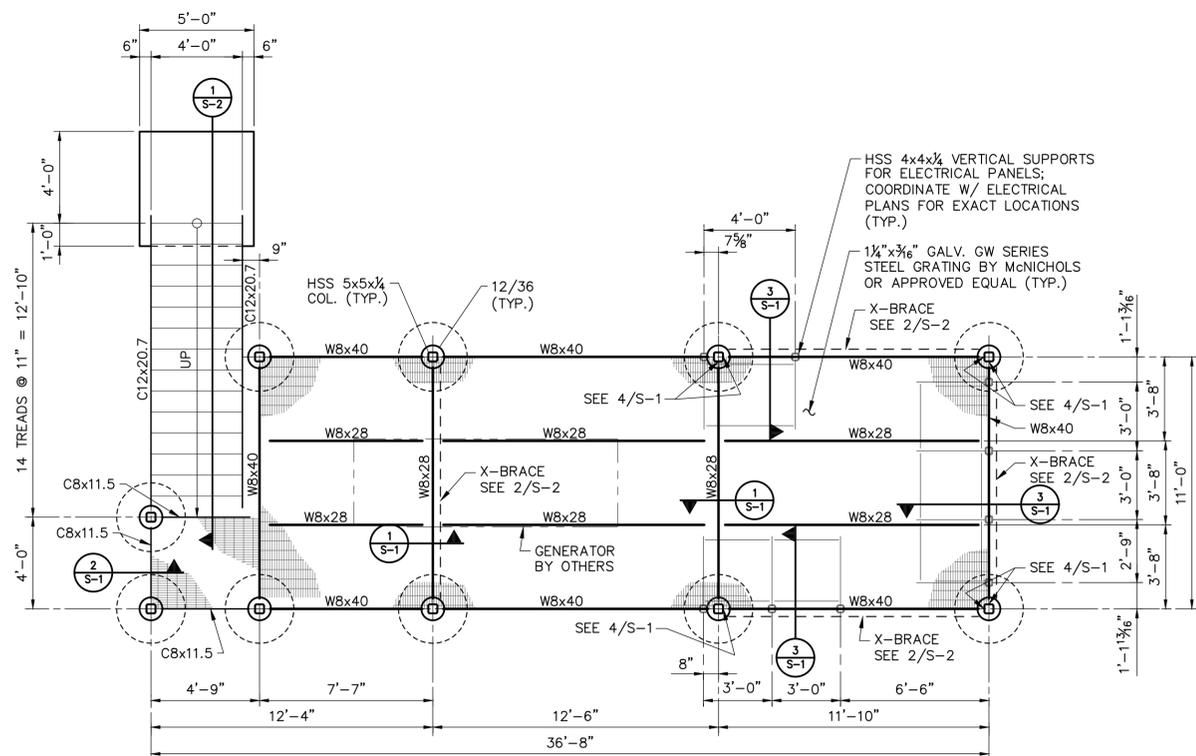
**5e Engineering**  
11200 WESTHEIMER ROAD, SUITE 353  
HOUSTON, TEXAS 77042  
(832) 800-5483 | www.5eengineering.com  
TSP# FIRM NO. F-13748

**City of Friendswood, Texas**  
CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT PACKAGE 4 - LIFT STATION No. 4**

**DRAINAGE PLAN**

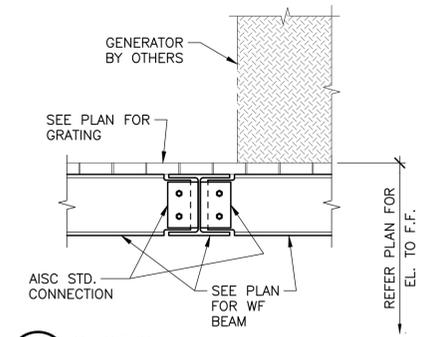
SCALE:	AS SHOWN	DWG. No.
DATE:	NOVEMBER 2022	<b>C-2</b>
DESIGNED:		
DRAWN:		
CONSULTANT'S PROJ. No.:	0101-01	SHEET NO. 006 OF 025

P:\101001\FEMA\_L504\_C444-GIS\03 SHEETS\03 Civil\Package 4\006 DRAINAGE PLAN.dwg - Plot# 1/30/2025

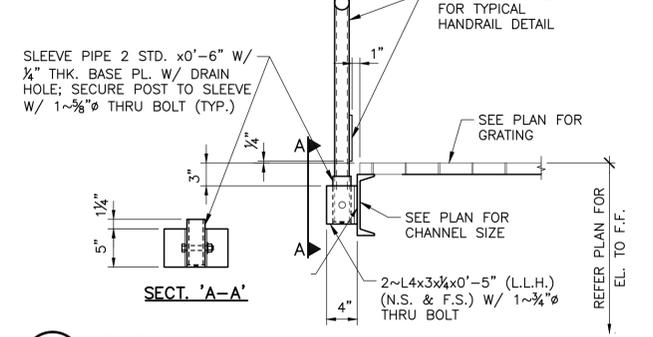


**ELEVATED GENERATOR PLATFORM PLAN**  
SCALE: 1/4"=1'-0"

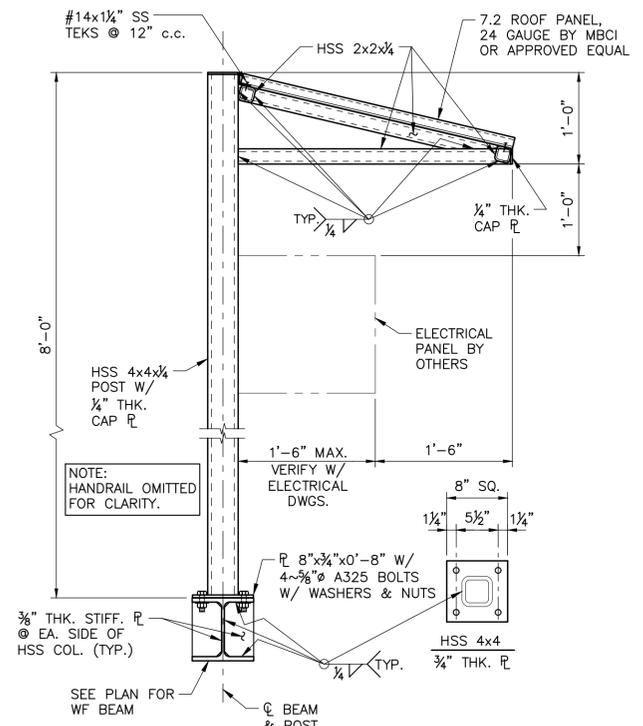
**FABRICATION NOTE:**  
PRIOR TO FABRICATION CONTRACTOR AND METAL FABRICATOR TO COORDINATE DIMENSIONS AND ELEVATIONS FOR PLATFORM TO FIT PROPOSED GENERATOR.



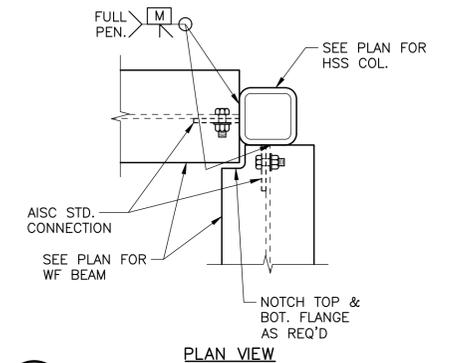
**1 SECTION**  
SCALE: 1"=1'-0"



**2 SECTION**  
SCALE: 1"=1'-0"



**3 SECTION**  
SCALE: 1"=1'-0"



**4 SECTION**  
SCALE: 1 1/2"=1'-0"

DESIGN CRITERIA	
WIND LOAD:	152 MPH (ULTIMATE, AMENDED 2018 IBC, ASCE 7-16)
ELEVATED WALK LIVE LOAD:	100 PSF

**GEOTECHNICAL NOTE:**  
REFER TO GEOTECHNICAL INVESTIGATION BY AVILES ENGINEERING CORPORATION, REPORT No. G139-20 (REVISION 1), DATED APRIL 2021 FOR SITE PREPARATION AND REQUIREMENTS.

STAIRS & HANDRAILS, POSTS, LANDINGS, BALCONY RAILINGS, & GUARDS TO MEET IBC 2018 CHAPTER 16 LOAD REQUIREMENTS:	
STAIRS:	100 PSF
TREAD:	300 LBS CONCENTRATED LOAD, ON SQ. IN. AREA
STRINGER:	100 PSF
HANDRAIL:	50 PLF OR 200 LBS CONCENTRATED LOAD IN ANY DIRECTION AT ANY POINT ALONG THE TOP
LANDINGS & BALCONY RAILS:	50 PLF OR 200 LBS CONCENTRATED LOAD IN ANY DIRECTION AT ANY POINT ALONG THE TOP
GUARDS TOP:	50 LBS HORIZONTALLY ON AN AREA EQUAL TO ONE SQUARE FOOT
INTERMEDIATE RAILS, BALUSTERS AND PANEL FILLERS:	50 LBS HORIZONTALLY ON AN AREA EQUAL TO ONE SQUARE FOOT
CONTRACTOR TO USE CONNECTIONS FOR VARIOUS 250 LB. LOADS REQUIRED BY TEXAS ARCHITECTURAL BARRIERS ACT STANDARDS FOR DISABLED.	

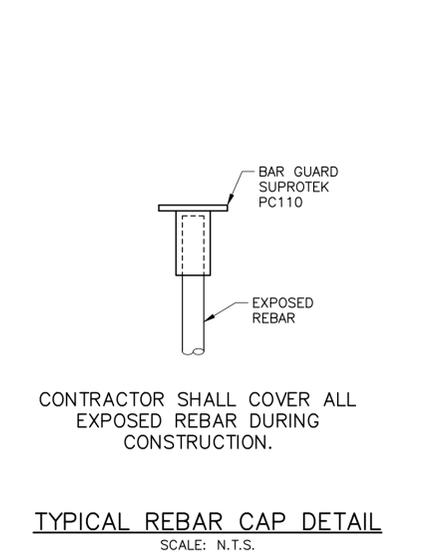
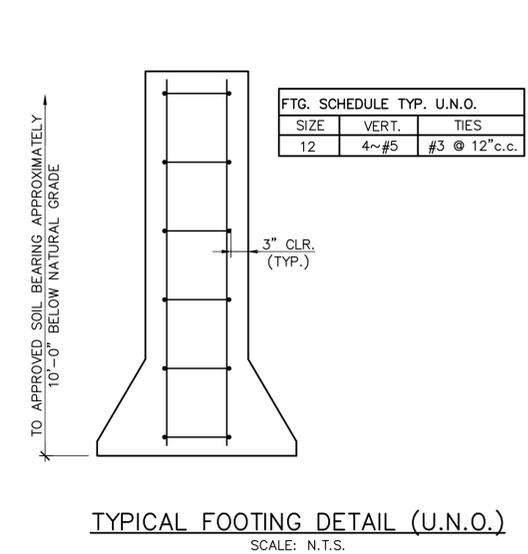
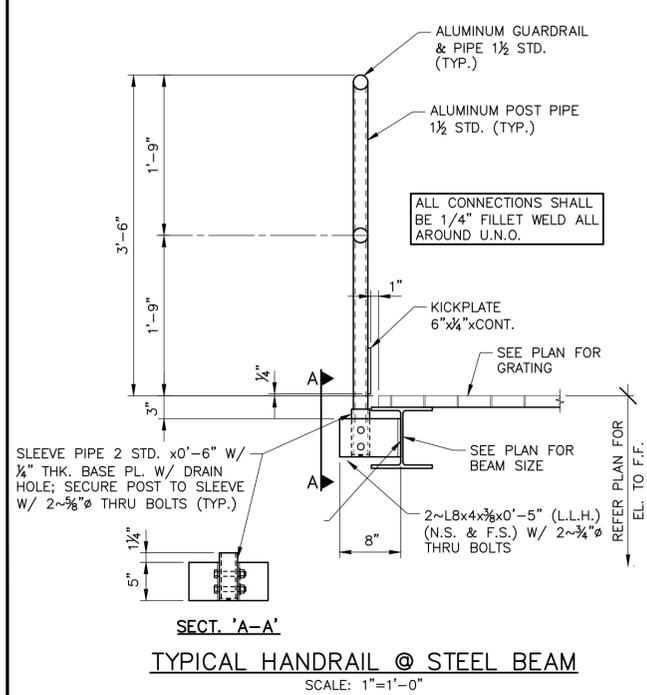
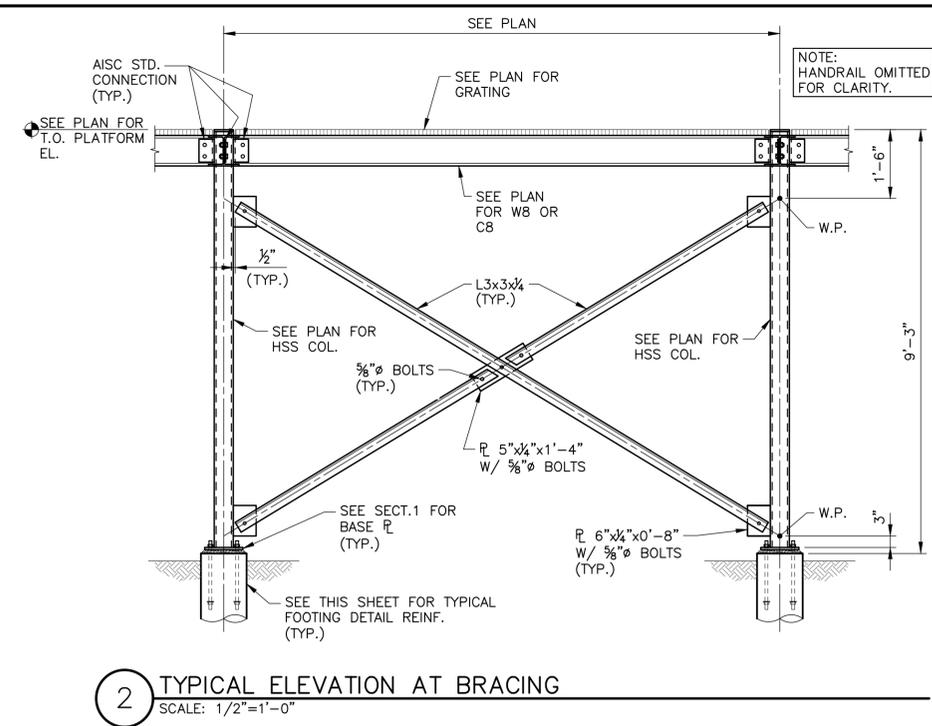
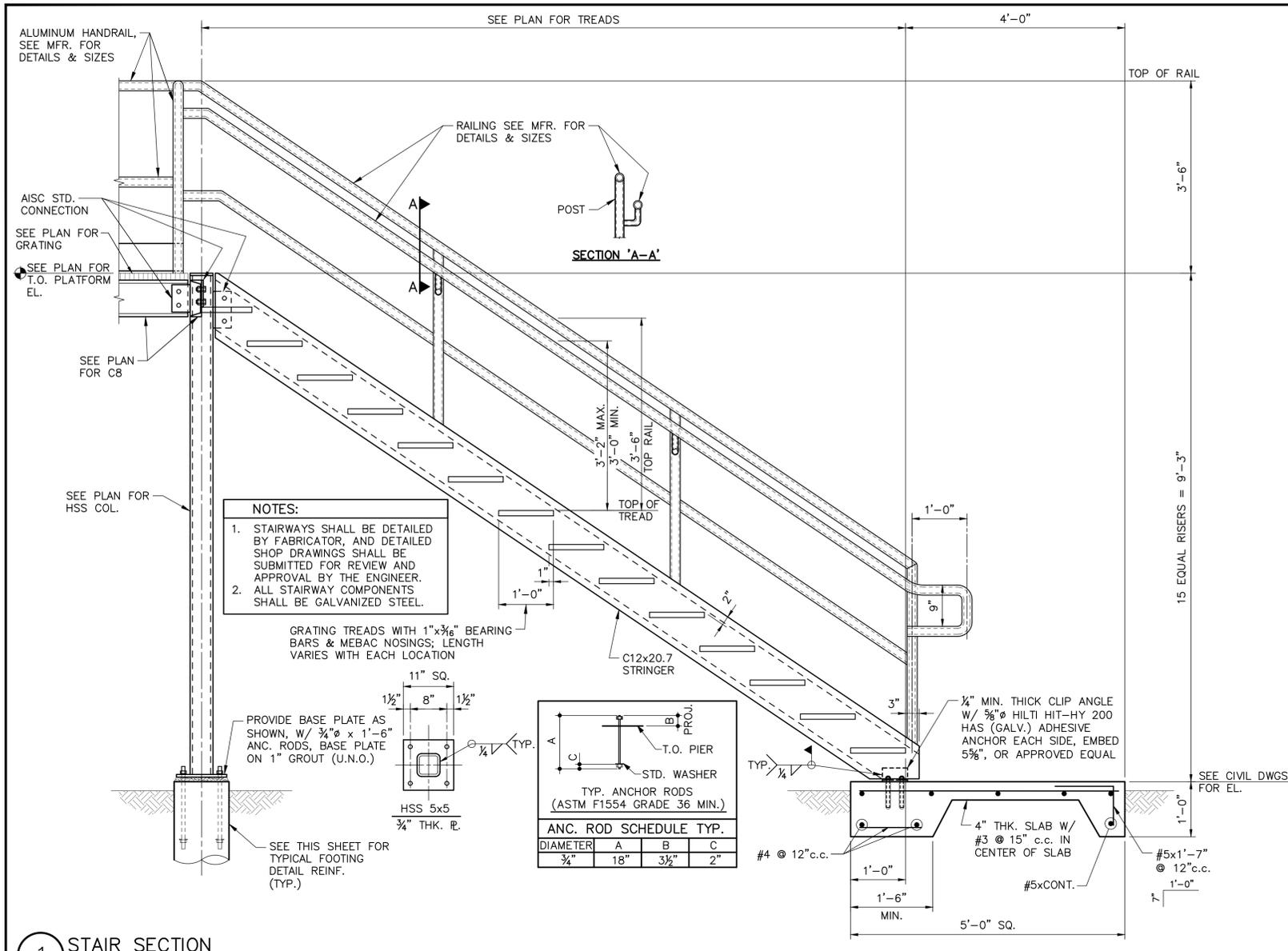
- GENERAL NOTES**
- ALL CONCRETE SHALL TEST 4000 PSI AT 28 DAYS.
  - ALL CONCRETE REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60.
  - DETAILING AND FABRICATION OF CONCRETE REINFORCEMENT AND ACCESSORIES SHALL BE IN ACCORDANCE WITH ACI-315 LATEST EDITION.
  - LAP ALL CONTINUOUS REINFORCING BARS 50 DIAMETERS AT SPLICES, TEES, AND CORNERS.
  - THE USE OF HEAT TO FACILITATE THE BENDING OF REINFORCING BARS WILL NOT BE PERMITTED.
  - ALL STRUCTURAL STEEL DETAILS AND CONNECTIONS SHALL CONFORM TO THE STANDARDS OF THE A.I.S.C.
  - ALL WIDE FLANGES AND CHANNELS SHALL CONFORM TO ASTM A992 (Fy=50 ksi, Fu=65 ksi); ALL STEEL PLATES, ANGLES AND BARS SHALL CONFORM TO ASTM A572; ALL HSS ROUND, RECTANGLE, AND SQUARE SHALL CONFORM TO ASTM A500, GRADE C (Fy=50 ksi, Fu=62 ksi).
  - SHOP CONNECTIONS SHALL BE WELDED WITH 1/4" FILLET WELDS, UNLESS NOTED OTHERWISE.
  - FIELD CONNECTIONS SHALL BE BOLTED WITH 3/4" DIAMETER ASTM F3125 GRADE A325 BOLTS WITH HARDENED WASHERS, UNLESS NOTED OTHERWISE.
  - ALL CONNECTIONS SHALL DEVELOP ONE-HALF THE SHEAR CAPACITY OF THE MEMBER, UNLESS NOTED OTHERWISE.
  - SPLICING OF STRUCTURAL STEEL WHERE NOT DETAILED IS PROHIBITED WITHOUT PRIOR APPROVAL OF STRUCTURAL ENGINEER.
  - SHOP PAINT ALL STEEL WITH ONE COAT APPROVED PRIMER.
  - ALL STEEL MEMBERS AND CONNECTIONS EXPOSED TO EARTH OR WEATHER SHALL BE HOT-DIP GALVANIZED.
  - FIELD PAINT ALL WELDS ON GALV. STEEL WITH "GALVILITE" BY Z.R.C. OR APPROVED EQUAL.
  - NO ENGINEERING DRAWING MAY BE REPRODUCED FOR USE AS SHOP DRAWINGS.



**SH STANLEY SPURLING & HAMILTON, INC.**  
Consulting Engineering Services  
T.B.P.E. Registration # F-000175  
www.sshinc.net  
3301 Edloe Street, Suite 200 Houston, Texas 77027 Tel 713-776-9433  
E-MAIL: info@sshinc.net 1495-0003

**5e Sengineering**  
11200 WESTHEIMER ROAD, SUITE 353  
HOUSTON, TEXAS 77042  
(832) 800-3483 | www.Sengineering.com  
TBPE FIRM NO. F-13748

City of Friendswood, Texas  
CONSTRUCTION PLANS FOR:  
**CENTRAL DISTRICT WWTP IMPROVEMENTS**  
STRUCTURAL GENERATOR PLATFORM PLAN AND SECTIONS  
SCALE: AS SHOWN DATE: JANUARY 15, 2025 DESIGNED: SB DRAWN: JA CONSULTANTS PROJ. No.: 0080-005 DWG. No. S-1 SHEET NO. 007 OF 025



MK	DESCRIPTION	DATE	DWN.	CHK.

**Sengering**  
11200 WESTHEIMER ROAD, SUITE 383  
HOUSTON, TEXAS 77042  
(832) 800-3483 | www.Sengering.com  
TBPE FIRM NO. F-13748

City of Friendswood, Texas  
CONSTRUCTION PLANS FOR:  
CENTRAL DISTRICT WWTP  
IMPROVEMENTS

January 15, 2025

**Ken Stanley**  
Professional Engineer  
69701  
STATE OF TEXAS

**STANLEY SPURLING & HAMILTON, INC.**  
Consulting Engineering Services  
3301 Edloe Street, Suite 200 Houston, Texas 77027 Tel 713-776-9433  
E-MAIL: info@sshinc.net 1495-0003

STRUCTURAL SECTIONS  
AND TYPICAL DETAILS

SCALE: AS SHOWN  
DATE: JANUARY 15, 2025  
DESIGNED: SB  
DRAWN: JA  
CONSULTANT'S PROJ. NO.: 0080-005

DWG. No.  
**S-2**  
SHEET NO. 008 OF 025

**NOTE:**  
SEE SHEET S-1 FOR GENERAL NOTES AND DESIGN CRITERIA.

PLAN SYMBOLS

SYMBOL	DESCRIPTION
	CEILING MOUNTED LIGHT FIXTURE (LETTER INDICATES FIXTURE TYPE)
	BRACKET MOUNTED LIGHT FIXTURE (NUMBER INDICATES LIGHTING PANEL CIRCUIT NUMBER/ LETTER INDICATES FIXTURE TYPE)
	BRACKET MOUNTED EXIT FIXTURE
	SINGLE CONVENIENCE RECEPTACLE
	DUPLEX CONVENIENCE RECEPTACLE (WP INDICATES WEATHER PROOF OUTLET BOX & COVER) XX DENOTES CIRCUIT NO. FROM DESIGNATED PANEL
	SINGLE SPECIAL PURPOSE RECEPTACLE (LETTER INDICATES TYPE PER SCHEDULE)
	240V AC, 20 AMP RECEPTACLE
	TELEPHONE UTILITY SYSTEM OUTLET
	PANELBOARD, MINIPOWER CENTER, CABINET OR PULL BOX
	UNFUSED SAFETY SWITCH - 3P, 30A, 600V UNLESS OTHERWISE INDICATED
	FUSED SAFETY SWITCH - 3P, 600V, 30A MINIMUM OR AS REQUIRED TO ACCOMMODATE FUSE SIZE INDICATED
	DEVICE AS DESIGNATED
	COMBINATION PROTECTIVE DEVICE & MAGNETIC STARTER
	SINGLE UNIT PUSHBUTTON STATION
	2-UNIT PUSHBUTTON STATION
	3-UNIT PUSHBUTTON STATION
	ELECTRIC MOTOR ACTUATOR
	LIMIT SWITCH
	FLOW SWITCH
	PRESSURE SWITCH
	TORQUE SWITCH
	TERMINAL BOX
	FLOAT SWITCH
	MOTOR CURRENT SENSOR WITH NEMA 4X ENCLOSURE FOR HVAC MOTORS (SPLIT CORE CT) WITH MOUNTING BRACKET VERIS HT21LC, HT21HC, H921 AS REQUIRED BY HVAC. COORDINATE HVAC 4-20 mA SIGNAL.
	FLOAT SWITCH
	ELECTRO-PNEUMATIC VALVE
	SOLENOID VALVE
	ELECTRIC THERMOSTAT
	TEMPERATURE ACTUATED DEVICE
	SINGLE POLE TOGGLE SWITCH
	DOUBLE POLE TOGGLE SWITCH

SYMBOL	DESCRIPTION
	3 - WAY SWITCH
	MOTOR RATED TOGGLE SWITCH
	MANUAL ROTARY TIMER LIGHT SWITCH
	HAND-OFF-AUTO SWITCH
	BATTERY POWERED EMERGENCY LIGHTING FIXTURE
	CLASS 1, DIV 1, CONDUIT SEAL
	EXPOSED CONDUIT
	EXPOSED PUMP CABLE
	CONDUIT CONCEALED IN FLOOR SLAB OR UNDERGROUND (CONDUITS 1-1/2" OR LARGER SHALL BE INSTALLED UNDER FLOOR SLAB). SEE NOTE 2
	CONDUIT TURNING UPWARD
	CONDUIT TURNING DOWNWARD
	CONCRETE ENCASED DUCTBANK (SECTION INDICATES CONDUIT CONFIGURATION & DESIGNATIONS)
	EXPOSED CONDUIT BANK
	GROUND ROD
	GROUND WELL
	GROUND RING.
	CONDUIT TAG
	GROUND BUS
	OVERHEAD ELECTRICAL LINE
	X-LETTER DESIGNATE BOX TYPE E-ELECTRICAL I-INSTRUMENT
	Y-LETTER DESIGNATE BOX SIZE REFER TO EZ-1 FOR SIZE

DIAGRAM SYMBOLS

SYMBOL	DESCRIPTION
	CONTACT, NORMALLY OPEN
	CONTACT, NORMALLY CLOSED
	PUSHBUTTON, NORMALLY CLOSED
	PUSHBUTTON, NORMALLY OPEN
	SELECTOR SWITCH
	OVERLOADS
	ESD (EMERGENCY SHUT DOWN), RED MUSHROOM HAND SWITCH WITH PROTECTIVE COVER. PUSH TO ACTIVE, PULL TO RESET.
	FUSE
	PILOT LIGHT, PUSH TO TEST
	AUXILIARY STARTER CONTACTS
	PRESSURE SWITCH, OPENS ON RISE
	PRESSURE SWITCH, CLOSSES ON RISE
	LIMIT SWITCH, NORMALLY CLOSED
	LIMIT SWITCH, NORMALLY OPEN
	TEMPERATURE ACTUATED SWITCH, OPENS ON RISE
	TEMPERATURE ACTUATED SWITCH, CLOSSES ON RISE
	VACUUM SWITCH, OPENS ON RISE
	VACUUM SWITCH, CLOSSES ON RISE
	THERMAL OVERLOAD
	EQUIPMENT SPACE HEATER
	GROUND CONNECTION
	SOLENOID
	TIME DELAY RELAY
	TIME DELAY CONTACT (O=OPEN, X=CLOSED, DESIGNATION INDICATES CONTACT POSITION WHEN RELAY IS RESET-TIMING-TIMED OUT)
	AUXILIARY RELAY
	ELAPSED TIME METER
	CONTROL POWER TRANSFORMER
	MOTOR STARTER OPERATING COIL
	SEPARABLE CONTACTS
	CIRCUIT BREAKER
	COMBINATION MOTOR STARTER/DISCONNECT NUMBER INDICATES NEMA SIZE
	VOLTMETER
	VOLTMETER SWITCH
	AMMETER
	AMMETER SWITCH
	CURRENT TRANSFORMER (CT) DESIGNATION INDICATES QUANTITY & RATIO
	POTENTIAL TRANSFORMER
	LIGHTING TRANSFORMER
	POWER FACTOR CORRECTION CAPACITOR
	PHASE FAILURE/UNDERVOLTAGE MONITOR RELAY
	FUSED DISCONNECT SWITCH
	SURGE PROTECTIVE DEVICE
	FUSED CUTOUT
	ELECTRIC MOTOR - NUMBER INDICATES HORSEPOWER
	DISCONNECT SWITCH
	ELECTRIC GENERATOR
	TRANSFER SWITCH

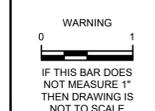
X-EQUIPMENT RATING  
Y-FUSE RATING OR NF FOR NON-FUSED  
Z-# OF POLES

TEXT SHOWN IN ITALICS REPRESENTS EXISTING INFORMATION - COLOR LEGEND APPLIES TO TEXT AS WELL AS LINES

ALL OTHER TEXT IS SHOWN IN NORMAL FORMAT

ABBREVIATIONS

A	AMP
ACLS	ACROSS LINE STARTER
ADJ	ADJUSTABLE
AFG	ABOVE FINISHED GRADE
AI	ANALOG INPUT
ALT	ALTERNATOR
AO	ANALOG OUTPUT
ASD	ADJUSTABLE SPEED DRIVE
B/C	BARE CONDUCTOR
C	CONDUIT
CA	CABLE
CAB	CABINET
CAT	CATALOG
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CNP	CENTERPOINT ENERGY COMMUNICATIONS
COMM	COMMUNICATIONS
CONT	CONTINUED
CPT	CONTROL POWER TRANSFORMER
CPT-N	CONTROL POWER TRANSFORMER NEUTRAL
CPU	CENTRAL PROCESSING UNIT
CT	CURRENT TRANSFORMER
CU	COPPER
DI	DISCRETE INPUT
DIREC	DIRECTIONAL
DIV	DIVISION
DN	DOWN
DO	DISCRETE OUTPUT
DWG	DRAWING
EL	ELEVATION
ESD	EMERGENCY SHUTDOWN HAND SWITCH
ETM	ELAPSED TIME METER
EV	ELECTRICALLY OPERATED VALVE
FACP	FIRE ALARM CONTROL PANEL
FF	FINISHED FLOOR
FM	FLOW METER
G.E.	GENERAL ELECTRIC
GFI	GROUND FAULT INTERRUPT
GND	GROUND
HVAC	HVAC CONTROL PANEL
HOA	HAND OFF AUTO
HPS	HIGH PRESSURE SODIUM
IC	INTERMEDIATE CLASS
ISCA	INTERUPTING SHORT CIRCUIT AMPS
ISW	ISOLATION SWITCH
JB	JUNCTION BOX
KA SYM	THOUSAND AMPS SYMMETRICAL
KS	KEY SWITCH
KVA	KILO-VOLT-AMPS
LINE	LINE
LMFC	LIQUID METALLIC FLEXIBLE CONDUIT
LOS	LOCK OUT STOP
LS	LIMIT SWITCH
LV	LOW VOLTAGE
LVN	LOW VOLTAGE NEUTRAL
M	MOTOR RUN CONTACT
MA	MILLIAMPERE
MADC	MILLIAMPERE DIRECT CURRENT
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MHP	MANHOLE
MIN	MINUTES
MOR	MOTOR OVERLOAD RELAY
mS	MILLISECOND
MTH	MOTOR TEMPERATURE SWITCH
MV	MEDIUM VOLTAGE
N	NEUTRAL
nA	NANOAMPERE
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEUT	NEUTRAL
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OL	OVERLOAD
OD	OUTER DIAMETER
OH	OVERHEAD
P	POLE
PFCC	POWER FACTOR CORRECTION CAPACITOR
PLC	PROGRAMMABLE LOGIC CONTROLLER
POS	POSITION
PS	PRESSURE SWITCH
PVC	POLYVINYL CHLORIDE
PVC RGS	PVC COATED RIGID GALV STEEL CONDUIT
PWR	POWER
R	RELAY
RALM	PUMP ALARM RELAY
REE	ELEC BLDG ENTRY AUX RELAY
RGS	RIGID GALVANIZED STEEL CONDUIT
RHLA	HIGH LEVEL ALARM RELAY
RM	PUMP RUN AUX RELAY
RMOR	MOTOR OVERLOAD AUX RELAY
R.O.W.	RIGHT OF WAY
RPLC	PLC MODE AUX RELAY
RPLCOR	PLC OVERRIDE
RPLM	PLC PUMP RUN RELAY
RPLMP	BACKUP SYSTEM RUN RELAY
RR	REMOTE RADIO
RRST	PUMP RESET AUX RELAY
RTAH	TEMPERATURE ALARM AUX RELAY
RUV	UNDERVOLTAGE AUX RELAY
RVSS	REDUCED VOLTAGE SOLID STATE STARTER
RWD	WATCHDOG RELAY
SAN	SANITARY
SE	SERVICE ENTRANCE
SEC	SECONDS
SL	SEAL LEAK
SN	SOLID NEUTRAL
SPD	SURGE PROTECTIVE DEVICE
SPST	SINGLE POLE SINGLE THROW
SS	STAINLESS STEEL
STM	STORM SWITCH
SW	SWITCH
TB	TERMINAL BOX
TEMP	TEMPERATURE
TD	TIME DELAY RELAY
TDLP	LOSS OF POWER TIME DELAY RELAY
TDRM	PUMP TIME DELAY RELAY
TSP	TWISTED SHIELDED PAIR
TST	TWISTED SHIELDED TRIAD
UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS
VA	VOLT-AMP
VAC	VOLTS ALTERNATING CURRENT
VDC	VOLTS DIRECT CURRENT
VT	VOLTAGE TRANSFORMER
W	WATT OR WIRE
WW	WATER WELL
XFMR	TRANSFORMER



GENERAL NOTES:

- THE EQUIPMENT AND DEVICE LOCATIONS SHOWN WILL VARY. LOCATE ALL EQUIPMENT & DEVICES FROM PROCESS, MECHANICAL DRAWINGS AND CERTIFIED SUBMITTALS TO DETERMINE CONDUIT AND WIRE REQUIREMENTS. NO EXTRA COST ALLOWED FOR DIFFERENT EQUIPMENT AND DEVICE LOCATION.
- AREA CLASSIFICATION - PROJECT AREA IS CLASSIFIED AS CLASS 1 DIVISION 1 INSIDE WETWELL, CLASS 1 DIVISION 2 WITHIN 3 FT OF WETWELL VENT, AND UNCLASSIFIED FOR ALL OTHER AREAS. ALL AREAS OF PROJECT ARE NOTED AS A WET ENVIRONMENT.
- BASIC MATERIALS OF CONSTRUCTION - ALL HARDWARE AND MATERIALS USED TO ANCHOR, SUPPORT, AND MOUNT ELECTRICAL EQUIPMENT SHALL BE 316 STAINLESS STEEL UNLESS PERMITTED OTHERWISE IN PROJECT MANUAL AND DRAWINGS.

CONDUIT SYSTEM NOTES

- ANY CONDUIT WITHOUT DESIGNATION CONTAINS 3 #10, #12 GND IN 1" CONDUIT.
- CONDUITS IMBEDDED IN STRUCTURAL CONCRETE (FLOOR SLABS, ETC.) SHALL BE SO LOCATED AS NOT TO UNDULY IMPAIR THE STRENGTH OF THE CONSTRUCTION AND SHALL BE SPACED NOT LESS THAN TWO TIMES THE CONDUIT OD BETWEEN ADJACENT CONDUITS EXCEPT WHERE CROSSING OR OTHERWISE APPROVED BY THE ENGINEER.
- WIRING FOR LIGHTING, RECEPTACLES AND OTHER MISCELLANEOUS CIRCUITS SHALL CONFORM TO THE CIRCUITING INDICATED ON THE DRAWINGS WITH FIELD ARRANGEMENT AND ROUTING AS REQUIRED. THE WIRING SHALL BE SO ARRANGED THAT NO MORE THAN 6 CURRENT CARRYING CONDUCTORS SHALL BE INSTALLED PER CONDUIT AND CIRCUITS OF DIFFERENT PANELS SHALL BE INSTALLED IN SEPARATE RACEWAYS.

LEGEND

- (DARK) REMOVE EXISTING - EXISTING PLANS
- (LIGHT) EXISTING TO REMAIN

TEXT SHOWN IN ITALICS REPRESENTS EXISTING INFORMATION - COLOR LEGEND APPLIES TO TEXT AS WELL AS LINES

ALL OTHER TEXT IS SHOWN IN NORMAL FORMAT

MK	DESCRIPTION	DATE	DWN.	CHK.

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CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

LEGENDS, SYMBOLS & ABBREVIATIONS	
SCALE:	NONE
DATE:	JAN 2025
DESIGNED:	GA
DRAWN:	NS
CONSULTANTS PROJ. No.:	0101-01
DWG. No.	G-E-1
SHEET No.	009 OF 025

**ELECTRICAL GENERAL NOTES**

- ALL WORK SHALL BE PERFORMED IN COMPLIANCE WITH LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AND IN ACCORDANCE WITH LOCAL CODES. WIRING AND DETAILS COMMONLY DESCRIBED IN CODE MAY NOT BE SHOWN ON THE PLANS BUT ARE APPLICABLE PER CODE REQUIREMENTS.
- CONDUITS SHALL NOT BE ROUTED ACROSS WALKWAYS, PATHS OF ACCESS, TRAVEL OR EGRESS, ROUTE BENEATH GRATINGS, IN CONCRETE STRUCTURES, OR AROUND THE EQUIPMENT. DO NOT ROUTE IN CONFLICT WITH OTHER PIPING, CONDUITS, EQUIPMENT OR STRUCTURES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY AND ALL PERMITS ASSOCIATED WITH THE WORK. THE COSTS OF THE PERMITS, IF ANY, SHALL BE BORNE BY THE CONTRACTOR.
- ALL ASPECTS OF THIS INSTALLATION MUST COMPLY WITH LATEST UTILITY COMPANY STANDARDS. REVIEW THIS PROJECT'S SERVICE REQUIREMENTS, LOCATIONS, RATINGS, AND METHODS WITH POWER COMPANY PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION WITH THE UTILITY COMPANY. ADJUST LOCATIONS OF THE SERVICE POLES & SERVICE DROPS AS REQUIRED BY UTILITY.
- THE NOTES CONTAINED ON THIS SHEET ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR WHEN WORKING IN THE FIELD, AND CONTAIN EXCERPTS FROM THE SPECIFICATION SECTIONS. HOWEVER THE CONTRACTOR IS HEREBY ADVISED THAT THE CONTRACT DOCUMENTS CONSIST OF BOTH THE DRAWINGS AND THE SPECIFICATIONS, AND THAT THE CONTRACTOR MUST COMPLY FULLY WITH BOTH THE BOUND DRAWINGS AND THE BOUND SPECIFICATIONS.
- ALL EQUIPMENT WIRING, RACEWAYS, ETC. SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), LOCAL CODES, AND INDUSTRY STANDARDS (IE. UL, NEMA, IEEE, ANSI, ETC.) THE DRAWING NOTES AND DETAILS SHALL BE COMPLIED WITH IN ADDITION TO THE REQUIREMENTS IN THE SPECIFICATIONS. REFER TO EACH SPECIFICATION SECTION FOR ADDITIONAL REQUIREMENTS.
- ALL RACEWAY INSTALLATIONS SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. ALL EXPOSED RACEWAY SHALL BE INSTALLED PARALLEL TO BEAMS, CEILINGS, FLOORS AND WALLS. SEE SPECIFICATION ON RACEWAYS FOR ADDITIONAL REQUIREMENTS.
- CONDUITS SHALL BE TERMINATED IN A NEAT MANNER AND STRICTLY IN ACCORDANCE WITH THE SPECIFICATIONS AND DRAWING DETAILS.
- CONDUITS TERMINATED INTO ENCLOSURES SHALL BE PERPENDICULAR TO THE WALLS OF THE ENCLOSURE. THE USE OF SHORT SEALTIGHT ELBOW FITTINGS FOR SUCH TERMINATIONS IS NOT PERMITTED.
- ALL RACEWAY INSTALLATIONS, CROSSING EXPANSION JOINTS OR TRANSITIONS FROM BELOW GRADE TO EXPOSED ABOVE GRADE, SHALL HAVE EXPANSION OR EXPANSION/DEFLECTION TYPE FITTINGS AS SPECIFIED FOR THE APPLICATION. SEE THE DRAWINGS AND THE SPECIFICATION ON RACEWAYS FOR THE EXACT TYPE OF FITTING TO BE USED.
- NO CONDUIT SMALLER THAN 3/4", NOR WIRE SMALLER THAN NO. 12 AWG, SHALL BE USED UNLESS SPECIFICALLY NOTED.
- ALL UNDERGROUND SINGLE CONDUITS AND DUCTBANKS OF MULTIPLE CONDUITS SHALL BE RIGID PVC CONDUIT ENCASED IN REINFORCED RED CONCRETE. CONCRETE DYED RED BEFORE PLACEMENT. FIELD VERIFY THE ROUTING OF ALL EXISTING UNDERGROUND CONDUIT AND DUCTBANKS. COORDINATE ROUTING OF NEW CONDUIT AND DUCTBANKS TO AVOID INTERFERENCE WITH EXISTING CONDUIT, DUCTBANKS, AND OTHER UNDERGROUND UTILITIES.
- ALL CHANGES OF DIRECTION GREATER THAN 20 DEGREES IN UNDERGROUND SINGLE, OR DUCTBANKS OF MULTIPLE CONDUITS, SHALL BE ACCOMPLISHED USING PVC COATED RIGID ALUMINUM LONG RADIUS BENDS. BENDS OF PVC CONDUIT GREATER THAN 20 DEGREES, OR THE USE OF FLEXIBLE CONDUIT OF ANY TYPE, WILL NOT BE PERMITTED. SEE THE SPECIFICATIONS FOR MORE REQUIREMENTS.
- LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT SHALL BE USED FOR THE PRIMARY AND SECONDARY OF TRANSFORMERS, GENERATOR TERMINATIONS AND OTHER EQUIPMENT WHERE VIBRATION IS PRESENT. USE IN OTHER LOCATIONS IS NOT PERMITTED, EXCEPT FOR CONNECTIONS TO INSTRUMENTATION TRANSMITTERS, WHERE MULTIPLE PENETRATIONS ARE REQUIRED. LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT SHALL HAVE A MAXIMUM LENGTH NOT GREATER THAN THAT OF A FACTORY MANUFACTURED LONG RADIUS ELBOW OF THE CONDUIT SIZE BEING USED. THE MAXIMUM BENDING RADIUS SHALL NOT BE LESS THAN THAT SHOWN IN THE NEC CHAPTER 9, TABLE 2, "OTHER BENDS". BX OR AC TYPE PREFABRICATED CABLES WILL NOT BE PERMITTED.
- THE WIRING DIAGRAMS, BLOCK DIAGRAMS, QUANTITY/SIZES OF WIRES/CONDUITS REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY APPROVED. ALL MODIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFIED.
- SEAL ALL RACEWAYS ENTERING JUNCTION BOXES OR CONTROL PANELS CONTAINING ELECTRICAL OR INSTRUMENTATION EQUIPMENT WITH WATERTIGHT SEALANT. REFER TO THE SPECIFICATIONS FOR DETAILS.
- ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURE LOCATIONS, OR TERMINAL BOX LOCATIONS, ARE APPROXIMATE. THE EXACT LOCATIONS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER, DURING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.
- ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURES DIMENSIONS ARE APPROXIMATE. ALL EQUIPMENT AND ELECTRICAL EQUIPMENT ENCLOSURES OR TERMINAL BOX DIMENSIONS SHALL BE VERIFIED WITH THE EQUIPMENT SUPPLIER. ALLOW FOR LOCATION CHANGES AND INCLUDE IN THE CONTRACT PRICE. THE EXACT LOCATIONS OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF ALL CABLES AND CONDUITS SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER DURING CONSTRUCTION.
- CORING OF AN EXISTING STRUCTURE SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER/ENGINEER. CORING THROUGH STRUCTURAL BEAMS IS STRICTLY PROHIBITED WITHOUT PRIOR WRITTEN APPROVAL FROM THE OWNER/ENGINEER.
- THE LOCATION OF ALL ELECTRICAL EQUIPMENT AND ROUTING OF CABLES AND CONDUITS SHALL BE COORDINATED AND APPROVED BY THE OWNER.
- THE DUCTBANK ROUTING AS SHOWN ON THE DRAWING IS APPROXIMATE. FIELD VERIFY THE EXACT DUCTBANK ROUTING, CABLE LENGTH AND CONDUIT LENGTH.
- PROVIDE CONDUIT SEALS FOR CONDUIT PENETRATIONS AS PER NFPA 70 (NEC) AND NFPA 820.
- COORDINATE ALL WORK WITH THE OWNER.
- LOCATE ALL UNDERGROUND UTILITIES BEFORE DIGGING. COORDINATE THE EFFORT WITH THE OWNER.
- ALL SLOTTED CHANNEL, SLOTTED CHANNEL SUPPORT MATERIAL, WASHERS, SCREWS, NUTS, CONDUIT CLAMPS, ALL THREAD SPRING NUTS AND MISC. MOUNTING HARDWARE SHALL BE 316 STAINLESS STEEL.
- LIGHTING FIXTURES SHALL BE MOUNTED ACCORDING TO THE MOUNTING HEIGHT GIVEN ON THE DRAWINGS. THE MOUNTING HEIGHT SHALL BE MEASURED FROM THE BOTTOM OF THE LIGHTING FIXTURE TO THE FINISHED FLOOR.
- CONDUIT AND WIRE FOR THE HVAC EQUIPMENT AND MISCELLANEOUS DEVICES SHALL BE:
  - F. 3/4" (MIN) RIGID ALUMINUM.
  - G. NO.14 XHHW CU. WIRE XHHW (MIN.).
  - H. IN ACCORDANCE WITH ALL ELECTRICAL AND HVAC SPECIFICATIONS REQUIREMENTS.
- CONDUITS AND WIRES SHOWN ON THE INTERFACE DIAGRAM SHALL BE INSTALLED BY THE CONTRACTOR. GROUPING OF CONDUIT AND WIRE MAY BE CHANGED, IF APPROVED BY THE ENGINEER AND OWNER.
- ALL CONDULETS SHALL BE FORM 7 AND SHALL HAVE 316 SS CLAMP COVERS WITH 316 SS CLAMPS AND SCREWS. SCREW DOWN COVERS ARE UNACCEPTABLE. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.
- ALL BARE GROUNDING CONDUCTORS SHALL BE COPPER, ALL GROUND RODS SHALL BE 3/4" BY 10' LONG. ALL EXPOSED COPPER GROUND CABLES SHALL BE GREEN INSULATED CONDUCTORS. PROVIDE XHHW INSULATION.
- WHERE NOTES ON THE DRAWING INDICATE THAT THE CONTRACTOR SHALL FIELD-VERIFY, THE INTENT IS FOR THE CONTRACTOR TO INVESTIGATE TO THE EXTENT NECESSARY TO PROVIDE THE WORK AND MATERIALS PRIOR TO BIDDING AND INCLUDE ALL COSTS IN THE BID PRICE. THE CONTRACT PRICE SHALL NOT BE INCREASED WHEN THE CONTRACTOR HAS NOT INVESTIGATED PER THE NOTES DIRECTING THAT BE DONE.

**TYPICAL ENCLOSURE TYPES BY AREA TYPE**

NON-HAZARDOUS AREAS	BOXES & ENCLOSURES					CONDUIT
	1	3R	4X	4X*	12	
OUTDOOR; GENERAL AREAS		X	X			RIGID ALUMINUM
OUTDOOR; CHEMICAL AREAS				X		SCHEDULE 80 PVC
INDOOR; CHEMICAL ROOM				X		SCHEDULE 80 PVC
INDOOR; CONDITIONED SPACE					X	RIGID ALUMINUM
INDOOR; NON-CONDITIONED SHOP SPACE					X	RIGID ALUMINUM
INDOOR; NON-CONDITIONED PROCESS AREA			X			RIGID ALUMINUM
INDOOR, ADMIN BUILDING	X					EMT/RIGID ALUMINUM
CLASS I, DIVISION 1	REFER TO NEC, NFPA-820, AND CONTRACT CONSTRUCTION SPECIFICATIONS					
CLASS I, DIVISION 2	REFER TO NEC, NFPA-820, AND CONTRACT CONSTRUCTION SPECIFICATIONS					
<b>GENERAL NOTES:</b>						
<ul style="list-style-type: none"> <li>• EQUIPMENT SUCH AS MOTOR CONTROL CENTER, SWITCHGEAR, ASDS, AND OTHER STAND-ALONE MOTOR STARTERS ARE TO BE SPECIFIED UNIQUELY.</li> <li>• NEMA 1 ENCLOSURES ARE TO BE NEMA 1 GASKETED.</li> <li>• CONDUIT INSIDE ADMIN BUILDING LOCATION IS TO BE EMT IF CONCEALED IN DRY WALL (AKA SHEET ROCK WALL); OTHERWISE RIGID ALUMINUM.</li> <li>• OUTDOOR GENERAL AREAS COULD BE 3R OR 4X DEPENDING ON OWNER PREFERENCE - REFER TO DRAWINGS.</li> </ul>						

CONDUIT TYPE	LOCATION
RIGID GALVANIZED CONDUIT	NOT ACCEPTABLE FOR USE ON THIS PROJECT EXCEPT FOR THE UTILITY COMPANY'S CONDUCTORS. ALL UTILITY COMPANY'S DUCTS SHALL BE AS SPECIFIED BY UTILITY COMPANY.
PVC COATED ALUMINUM CONDUIT	ALL EMBEDDED CONDUIT BENDS, UNDERGROUND DUCTBANK OF MORE THAN 20 DEGREES, AND ALL CONDUIT STUB-UPS TO A MINIMUM OF 6" ABOVE FINISHED FLOOR OR GRADE AND IN CHLORINE AND CAUSTIC ROOMS.
LIQUID TIGHT FLEXIBLE ALUMINUM CONDUIT	RACEWAY CONNECTION TO VIBRATING EQUIPMENT ONLY, IN ALL AREAS.
RIGID NON-METALLIC, SCHEDULE 80 PVC CONDUIT	UNDERGROUND ENCASED IN RED DYE REINFORCED CONCRETE. (AS WHERE SPECIFIED)
RIGID NON-METALLIC, SCHEDULE 80 PVC CONDUIT	FOR USE IN CHLORINE AND CAUSTIC ROOMS, AND UNDERGROUND. ENCASED IN RED DYED REINFORCED CONCRETE. (AS WHERE SPECIFIED)
FLEXIBLE ALUMINUM CONDUIT	FIXTURE WHIP CONNECTION TO LIGHTING FIXTURES IN NEMA 12 AREAS (MAXIMUM 3-FT). BX OR AC TYPE PREFABRICATED CABLES ARE NOT PERMITTED.
ALUMINUM RIGID METAL CONDUIT	ALL ABOVE GRADE AREAS, EXCEPT FOR CONCRETE EMBEDDED AND THOSE AREAS ALREADY DESCRIBED IN THIS TABLE
ELECTRIC METALLIC TUBING (EMT) CONDUIT	FOR USE ONLY ON CONCEALED, ABOVE GROUND, INTERIOR ELECTRICAL WIRING IN AIR-CONDITIONED ADMINISTRATIVE BUILDINGS REMOTE TO THE PROCESS AREA, AND CLEARLY DEFINED AS SUCH ON THE DRAWINGS OR IN THE SPECIFICATIONS.

**MCC, CONTROL PANELS, PANELBOARDS**

THESE NOTES APPLY TO CONTROL PANELS, MCC ETC WHICH HAS TO BE REFURBISHED, MODIFIED, DISCONNECTED & RECONNECTED OR REWORKED. SEE SECTION 16060:

- THE CONTRACTOR SHALL NOT MAKE ANY MODIFICATION UNTIL THE FOLLOWING HAS BEEN DONE:
- A. THE OWNER/CONTRACTOR SHALL WITNESS THE CONDITION OF THE EXISTING EQUIPMENT, THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCY.
  - B. THE OWNER SHALL OPERATE THE EQUIPMENT TO DEMONSTRATE THE CURRENT CONDITIONS. THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCIES.
  - C. A RECORD OF THE OPERATION AND EXISTING CONDITION SHALL BE KEPT IN A THREE RING BINDER AT THE OWNER/CONTRACTOR TRAILER, IN FORM OF PICTURES AND INFORMATION.
  - D. A FORM SHALL BE GENERATED BY THE CONTRACTOR TO RECORD THE OBSERVATIONS. BOTH PARTIES SHALL SIGN ON THE FORM.
  - E. REPLACE ALL MATERIAL OR EQUIPMENT DAMAGED DURING THE COURSE OF WORK.
  - F. AFTER THE CHANGES ARE MADE, THE EQUIPMENT SHALL BE INSPECTED AND RE-TESTED TO DEMONSTRATE THAT IT FUNCTIONS CORRECTLY.

**DEMOLITION NOTES**

- COORDINATE THE REMOVAL OF ELECTRICAL CONDUIT, WIRE, EQUIPMENT AND DEVICES WITH THE GENERAL DEMOLITION AND SCHEDULE. THE DRAWINGS ARE INTENDED TO CONVEY THE GENERAL NATURE AND SCOPE OF THE DEMOLITION WORK. EVERY ITEM TO BE DEMOLISHED MAY NOT BE SHOWN. FIELD VERIFY, AND INCLUDE ALL DEMOLITION WORK IN THE CONTRACT PRICE.
- PROVIDE TEMPORARY WIRE AND CONDUIT FOR THE EQUIPMENT WHICH MAY BE AFFECTED BY THE DEMOLITION BUT TO REMAIN IN SERVICE.
- RELOCATE AND RECONNECT POWER AND CONTROL RACEWAYS AND CONDUCTORS TO EQUIPMENT AFFECTED BY DEMOLITION WORK.
- ALL CONDUCTORS BEING REMOVED SHALL BE DISCONNECTED AND REMOVED FROM THE LOAD TO THE SOURCE. SURFACE MOUNTED CONDUITS AND MOUNTING HARDWARE SHALL BE REMOVED. UNDERGROUND CONDUITS WHICH ARE NOT BEING REMOVED OR OTHERWISE NOT BEING MADE UNUSABLE SHALL BE CAPPED AND TAGGED AS SPARE, WITH INFORMATION CLEARLY INDICATING THE LOCATION OF THE OTHER END.
- ALL SURFACES WHERE DEMOLISHED EQUIPMENT OR CONDUIT IS REMOVED SHALL BE CLEANED, PATCHED AND PAINTED TO MATCH THE SURROUNDING SURFACE.
- CHECK THE FUNCTION OF EACH CONDUCTOR BEFORE REMOVING OR DISCONNECTING.
- IF A CONDUCTOR WHICH HAS TO STAY IN SERVICE (NOT BEING DEMOLISHED) IS INSTALLED IN A COMMON CONDUIT WITH CONDUCTORS WHICH ARE BEING DEMOLISHED, THE CONTRACTOR SHALL REMOVE ALL CONDUCTORS FROM THE CONDUIT, PROVIDE NEW CONDUCTORS WHICH ARE REPLACEMENTS FOR THE CONDUCTORS THAT ARE TO REMAIN IN SERVICE AND RE-INSTALL THE NEW CONDUCTORS. AFTER THE CONDUCTORS ARE PULLED, MEGGER OR VFL TEST EACH CONDUCTOR. CONNECT BOTH ENDS OF THE NEW CONDUCTORS AND TEST THE SYSTEM FOR PROPER FUNCTION. DO NOT RE-PULL USED CONDUCTORS UNLESS SPECIFIED.
- WHERE EQUIPMENT IS BEING RE-FED FROM A NEW SOURCE, EXISTING CONDUIT MAY BE REUSED ONLY IF THE CONDUIT AND FITTINGS ARE OF THE TYPE SPECIFIED FOR NEW WORK ON THIS CONTRACT. IF NOT, THE CONDUIT AND CONDUCTORS SHALL BE REPLACED WITH NEW MATERIAL MEETING THE SPECIFICATIONS, AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR SHALL COORDINATE WITH THE OWNER/ENGINEER TO FLAG EXISTING UNDERGROUND CONDUITS BEFORE DIGGING.
- THE OWNER HAS THE RIGHT OF FIRST REFUSAL TO THE EQUIPMENT BEING REMOVED. THE CONTRACTOR SHALL DELIVER THE EQUIPMENT WHICH THE OWNER WISHES TO KEEP AT A LOCATION DESIGNATED BY THE OWNER. SEE SPECIFICATIONS.
- DO NOT MAKE ANY MODIFICATIONS TO THE EXISTING ELECTRICAL EQUIPMENT UNTIL THE FOLLOWING HAS BEEN DONE:
  - A. THE OWNER/CONTRACTOR SHALL WITNESS AND RECORD THE CONDITION OF THE EXISTING EQUIPMENT, THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCIES.
  - B. THE OWNER SHALL OPERATE THE EQUIPMENT TO DEMONSTRATE THE CURRENT CONDITIONS. THE CONTRACTOR SHALL NOTE DOWN ANY DEFECTS OR DEFICIENCIES.
  - C. A WRITTEN AND PHOTOGRAPHIC RECORD OF THE OPERATION AND EXISTING CONDITION SHALL BE KEPT IN A THREE RING BINDER AT THE OWNER/CONTRACTOR TRAILER, IN FORM OF PICTURES AND INFORMATION.
  - D. A FORM SHALL BE GENERATED BY THE CONTRACTOR TO RECORD THE OBSERVATIONS. BOTH PARTIES SHALL SIGN ON THE FORM.
  - E. REPLACE ALL MATERIAL OR EQUIPMENT DAMAGED DURING THE COURSE OF WORK.
  - F. AFTER THE CHANGES ARE MADE, THE EQUIPMENT SHALL BE INSPECTED AND RE-TESTED TO DEMONSTRATE THAT IT FUNCTIONS CORRECTLY.
  - G. NO PORTION OF EXISTING CONDUCTORS SHALL BE SPLICED TO NEW CONDUCTORS FOR RE-USE WITHOUT SPECIFIC APPROVAL FROM THE OWNER/ENGINEER ON A CASE-BY-CASE BASIS.

MK	DESCRIPTION	DATE	DWN.	CHK.

**KGI** Kalluri Group, Inc.  
 TBPE Registration No. F-665  
 18300 Katy Freeway, Suite 172  
 Houston, Texas 77094  
 Phone: (713)-365-9288



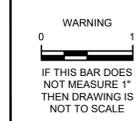
**5e Engineering**  
 11200 WESTHEIMER ROAD, SUITE 363  
 HOUSTON, TEXAS 77042  
 (832) 800-3483 | www.5eengineering.com  
 TBPE FIRM NO. F-13748

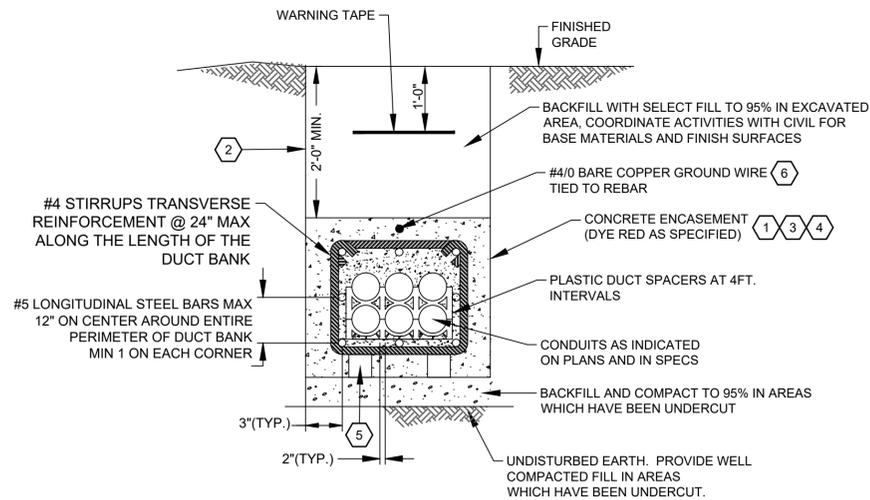


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**GENERAL ELECTRICAL NOTES**

SCALE: NONE	DWG. No. G-E-2
DATE: JAN 2025	
DESIGNED: GA	
DRAWN: NS	
CONSULTANT'S PROJ. No.: 0101-01	SHEET No. 010 OF 025

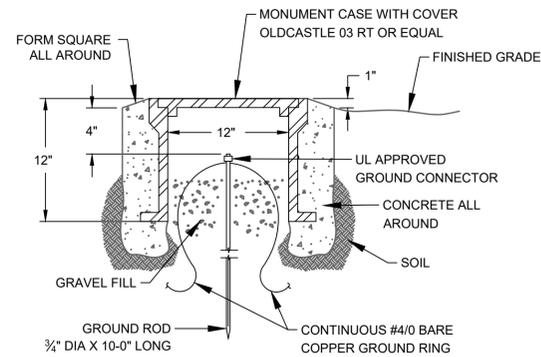




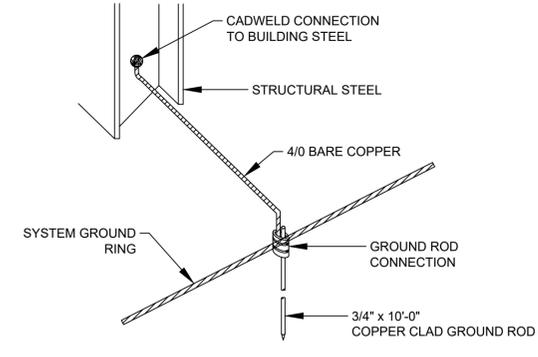
**DUCT BANK CONSTRUCTION**  
**DETAIL 1**  
 NTS

**KEYED NOTES:**

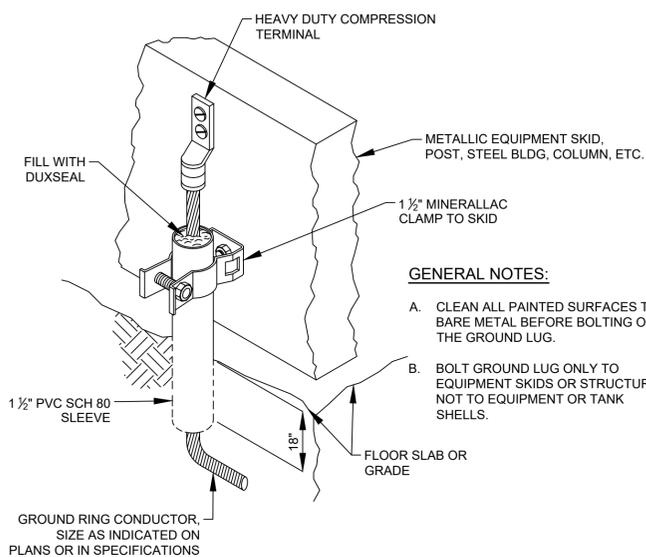
- 1 PROVIDE MIN. 3 INCHES CONCRETE COVER OVER AND UNDER REINFORCEMENT CAGE AND 3 INCHES ON EACH SIDE.
- 2 SELECT FILL TO A MINIMUM OF 2 FT. ABOVE DUCTBANK TOP 6\"/>



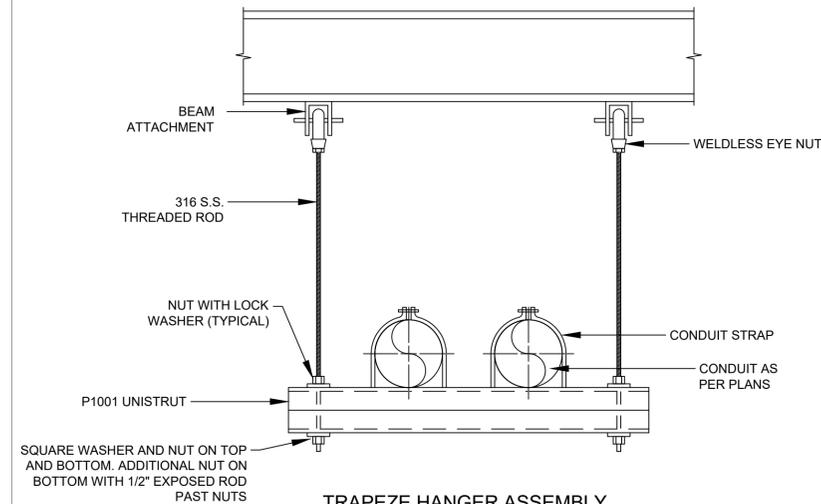
**GROUND ROD AND WELL**  
**DETAIL 2**  
 NTS



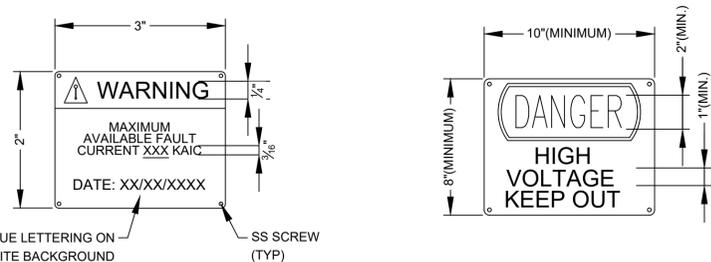
**GROUND ROD STRUCTURAL STEEL CONNECTION**  
**DETAIL 3**  
 NTS



**EQUIPMENT SKID GROUNDING COMPRESSION CONNECTION**  
**DETAIL 4**  
 NTS

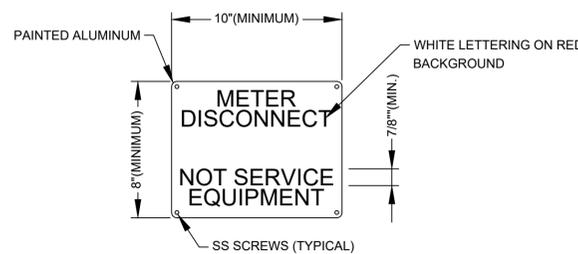


**TRAPEZE HANGER ASSEMBLY**  
**DETAIL 5**  
 NTS

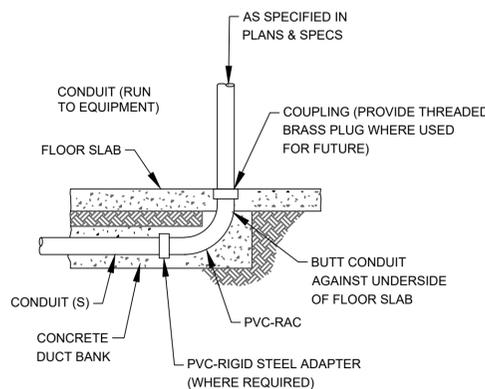


**FAULT CURRENT WARNING SIGN**  
**DETAIL 6**  
 NTS

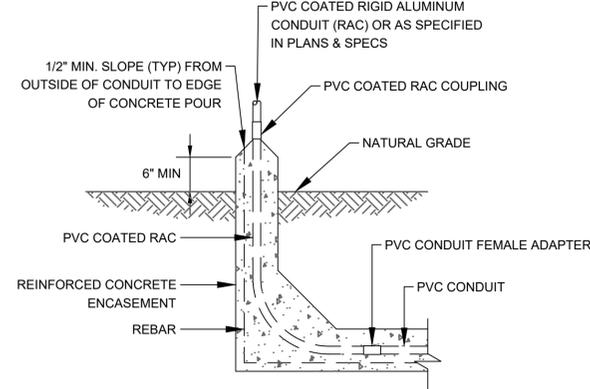
**HIGH VOLTAGE SIGN**  
**DETAIL 7**  
 NTS



**METER DISCONNECT WARNING SIGN**  
**DETAIL 8**  
 NTS



**FINISHED AREA CONDUIT STUB-UP**



**NON-FINISHED AREA CONDUIT STUB-UP**

**CONDUIT STUB-UP**  
**DETAIL 9**  
 NTS

MK	DESCRIPTION	DATE	DWN.	CHK.

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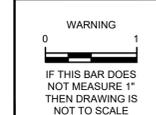


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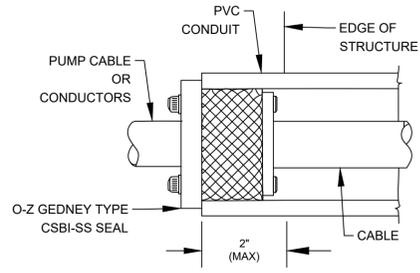
CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**ELECTRICAL DETAILS**  
**(SHEET 1 OF 4)**

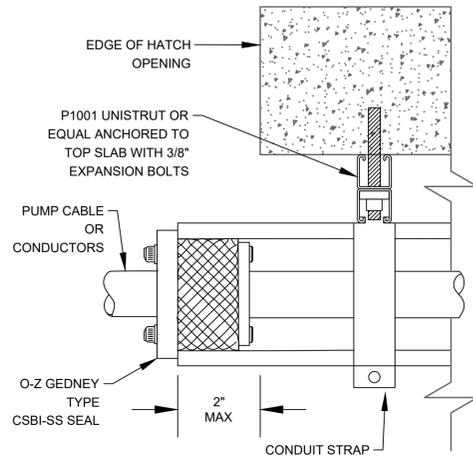


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 DATE: JAN 2025  
 DESIGNED: GA  
 DRAWN: NS  
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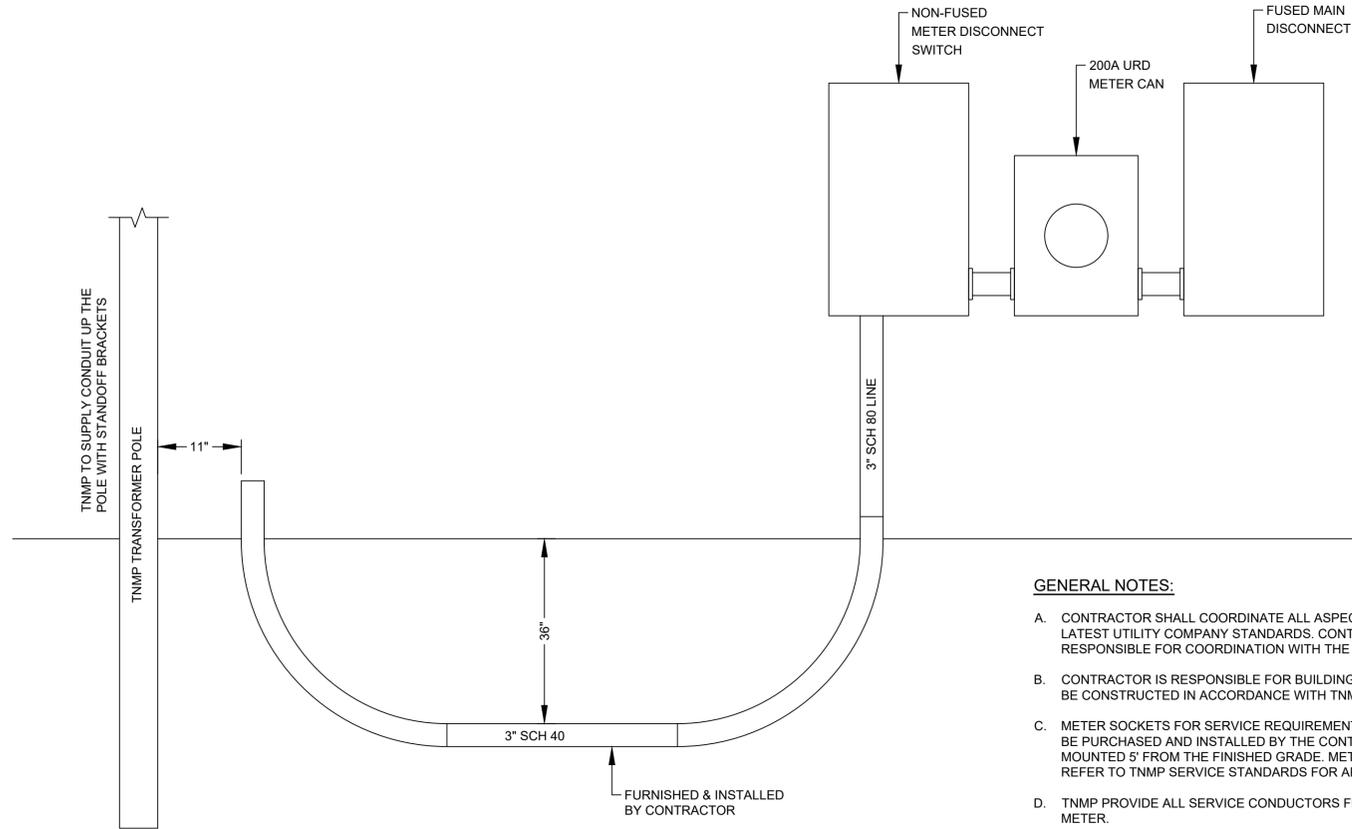
DWG. No.  
**G-E-3**  
 SHEET No. 011 OF 025



CONDUIT SEAL  
DETAIL 1  
NTS



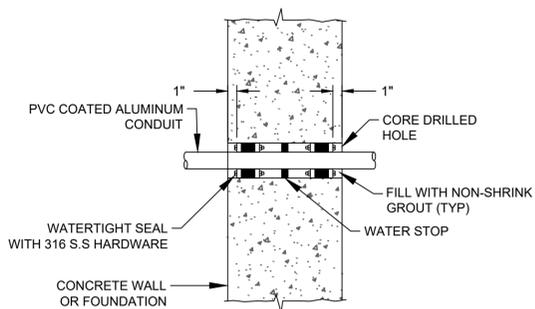
CONDUIT SEAL UNDER HATCH  
DETAIL 2  
NTS



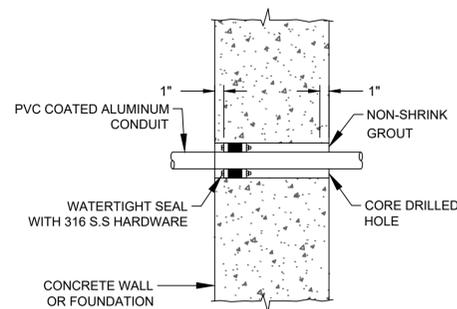
URD 200AMP  
277/480 OR 480V SERVICE ENTRANCE  
DETAIL 3  
NTS

GENERAL NOTES:

- A. CONTRACTOR SHALL COORDINATE ALL ASPECTS OF THIS INSTALLATION WITH LATEST UTILITY COMPANY STANDARDS. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE UTILITY COMPANY.
- B. CONTRACTOR IS RESPONSIBLE FOR BUILDING METER LOOP. THE LOOP MUST BE CONSTRUCTED IN ACCORDANCE WITH TNMP STANDARDS.
- C. METER SOCKETS FOR SERVICE REQUIREMENTS LESS THAN 400AMPS SHALL BE PURCHASED AND INSTALLED BY THE CONTRACTOR. METER CAN SHALL BE MOUNTED 5' FROM THE FINISHED GRADE. METER CAN SHALL BE RINGLESS. REFER TO TNMP SERVICE STANDARDS FOR APPROVED METER SOCKETS.
- D. TNMP PROVIDE ALL SERVICE CONDUCTORS FROM THE TRANSFORMER TO METER.
- E. ALL CONDUIT ELBOWS REQUIRE LONG SWEEPING 90's. FOR PRIMARY USE A MINIMUM 48" AND FOR SERVICE A 36" MINIMUM RADIUS IS REQUIRED. TNMP TO INSPECT THE CONDUIT PRIOR TO BACKFILL.



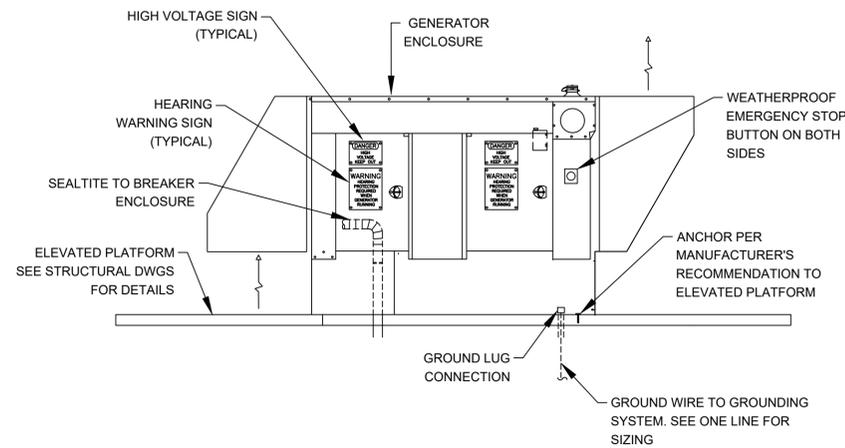
BELOW GRADE WATERTIGHT  
SINGLE CONDUIT PENETRATION



ABOVE GRADE WATERTIGHT  
SINGLE CONDUIT PENETRATION

EXISTING CONCRETE STRUCTURE  
WATERTIGHT SINGLE CONDUIT PENETRATION

DETAIL 4  
NTS



GENERATOR ENCLOSURE  
DETAIL 5  
NTS

MK	DESCRIPTION	DATE	DWN.	CHK.

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CONSTRUCTION PLANS FOR:  
LIFT STATION MITIGATION PROJECT  
PACKAGE 4 - LIFT STATION No.4

ELECTRICAL DETAILS  
(SHEET 2 OF 4)

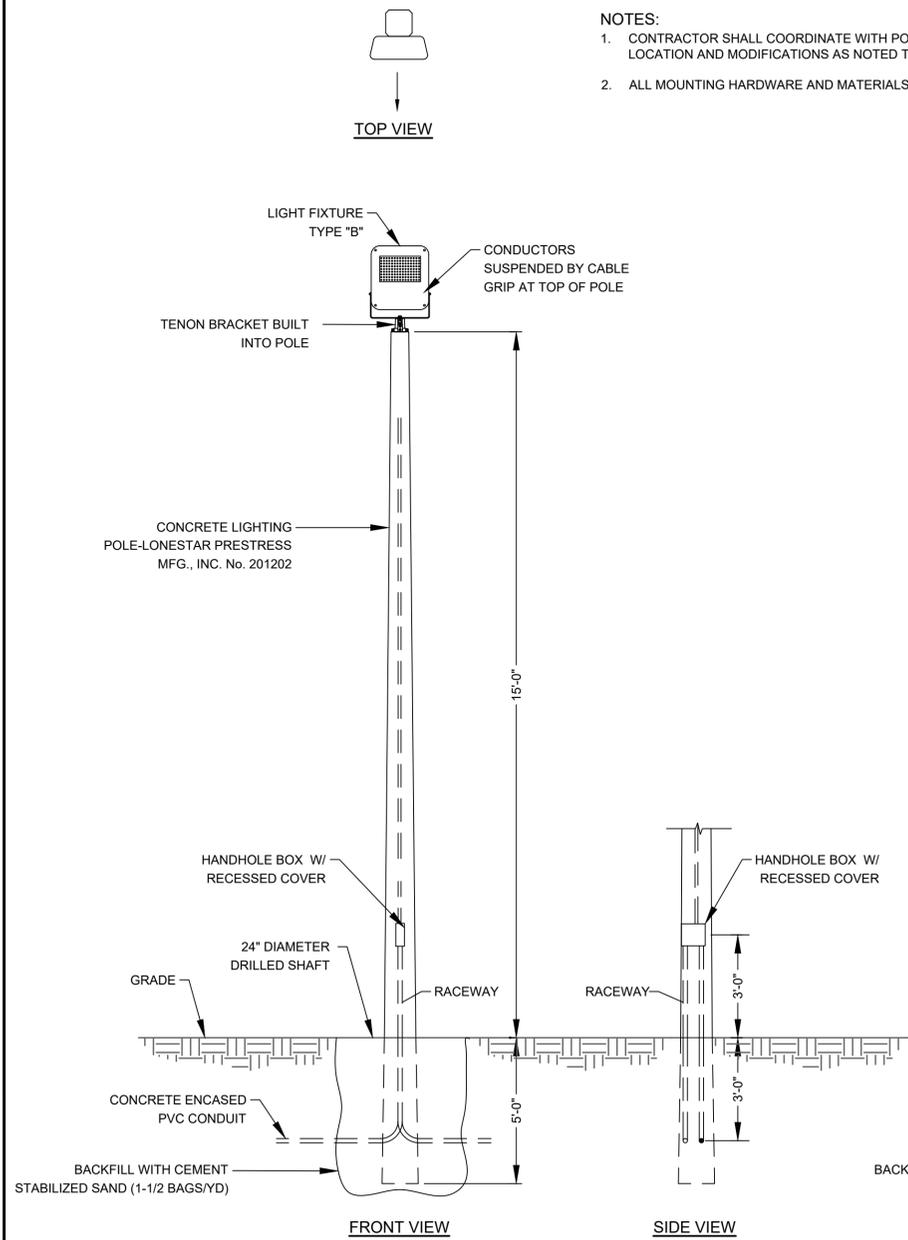
WARNING  
0 1  
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SCALE: NONE  
DATE: JAN 2025  
DESIGNED: GA  
DRAWN: NS  
CONSULTANT'S PROJ. No.: 0101-01

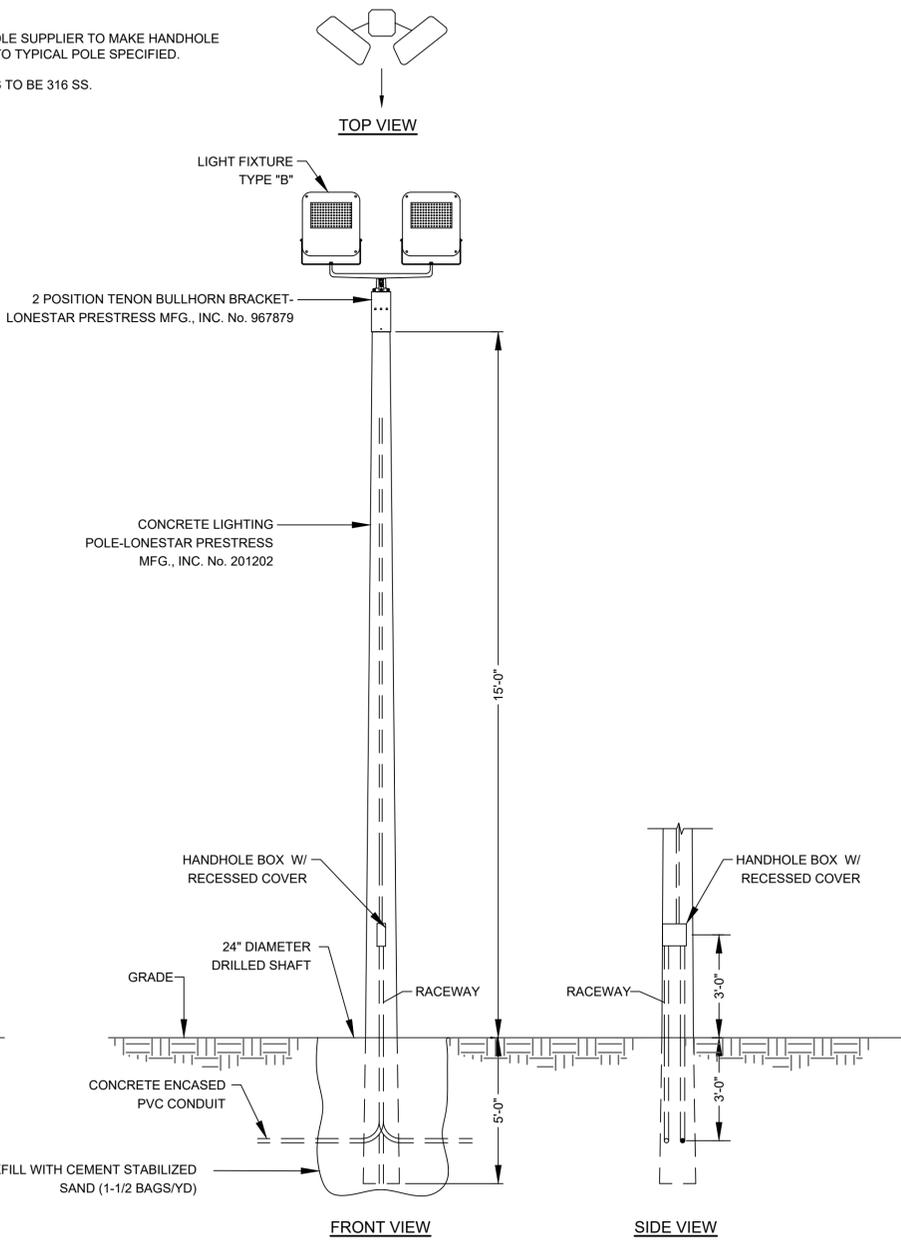
DWG. No.  
**G-E-4**  
SHEET No. 012 OF 025

LIGHT FIXTURE SCHEDULE			
TYPE	CATALOG NUMBER	DESCRIPTION	LAMPS
A	LITHONIA No. DSXF1 LED-P2-40K-MFL-MVOLT- THK-PE-UBV-DDBXD OR EQUAL	D-SERIES SIZE 1 PLATFORM LIGHTING FLOOD WITH UPPER VISOR. ALUMINUM HOUSING WITH INTEGRAL HEAT SINK. HOUSING IS COMPLETELY SEALED AGAINST MOISTURE AND ENVIRONMENTAL CONTAMINANTS. PROVIDE PHOTOCELL CONTROL AND TENON MOUNT.	LED
B	LITHONIA No. DSXF3 LED-P2-40K-MFL-MVOLT- THK-PE-DDBXD OR EQUAL	D-SERIES SIZE 3 AREA LIGHTING FLOOD LIGHT FIXTURE WITH ALUMINUM HOUSING WITH INTEGRAL HEAT SINK. HOUSING IS COMPLETELY SEALED AGAINST MOISTURE AND ENVIRONMENTAL CONTAMINANTS. PROVIDE PHOTOCELL CONTROL AND TENON MOUNT.	LED

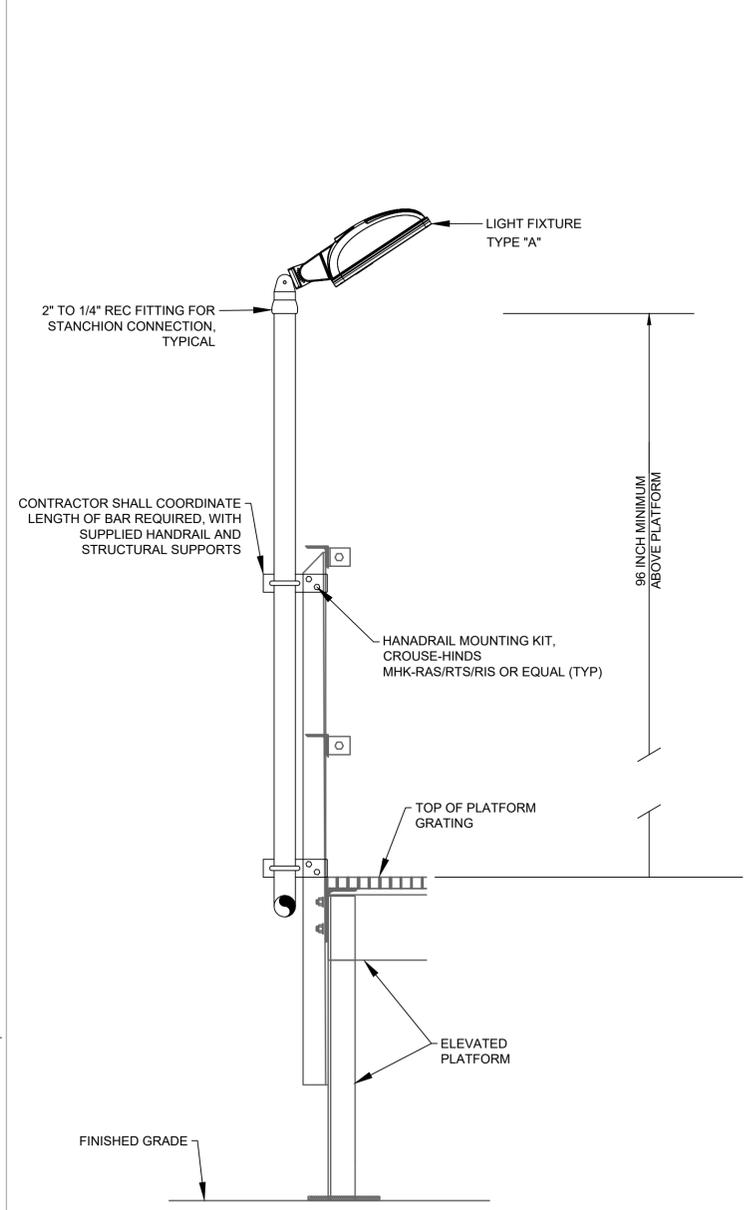
- NOTES:
- CONTRACTOR SHALL COORDINATE WITH POLE SUPPLIER TO MAKE HANDHOLE LOCATION AND MODIFICATIONS AS NOTED TO TYPICAL POLE SPECIFIED.
  - ALL MOUNTING HARDWARE AND MATERIALS TO BE 316 SS.



SITE LIGHT  
DETAIL 1  
NTS



SITE LIGHT  
DETAIL 2  
NTS



TYPICAL STANCHION LIGHT SUPPORT  
DETAIL 3  
NTS



MK	DESCRIPTION	DATE	DWN.	CHK.

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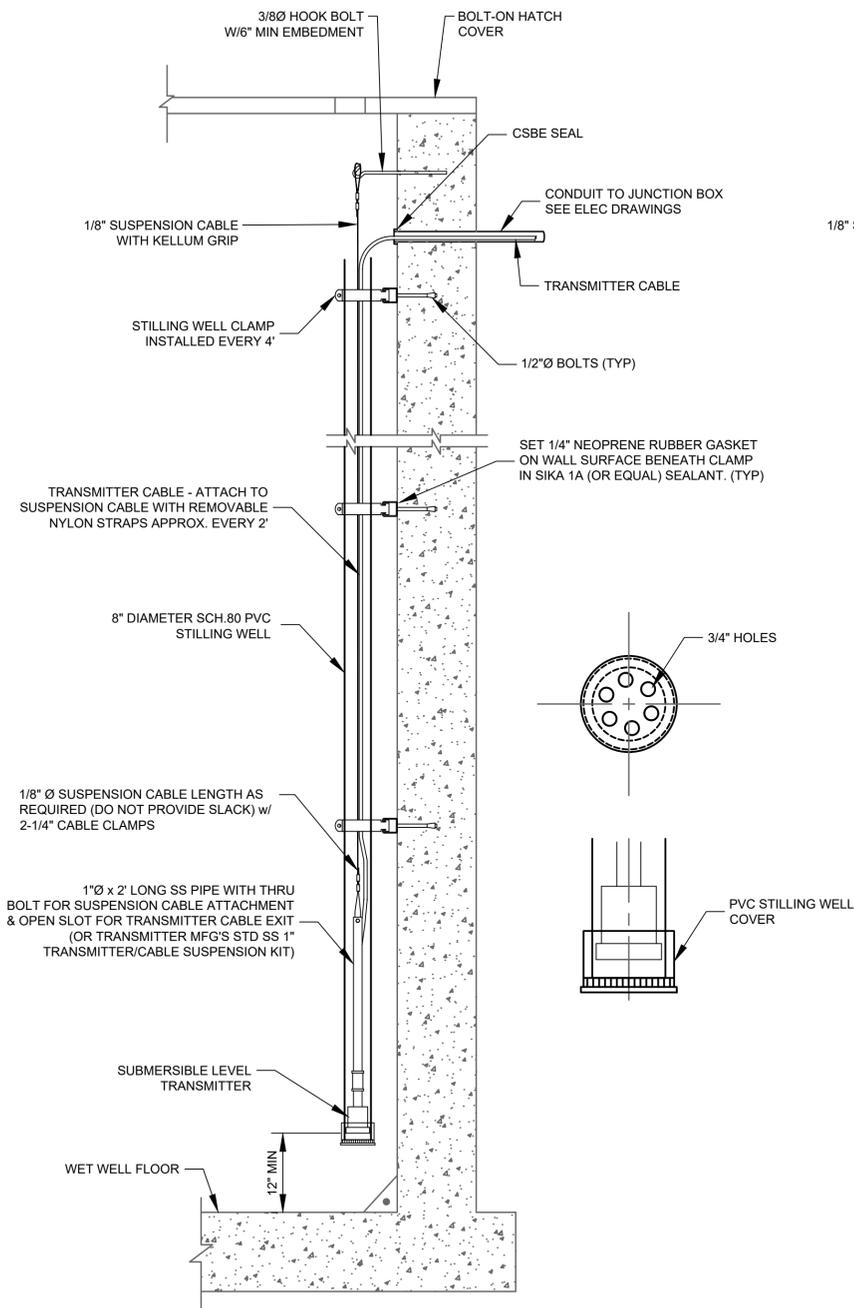
STATE OF TEXAS  
 GURWINDER S. AULAKH  
 147121  
 LICENSED PROFESSIONAL ENGINEER  
 05/10/2025

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 11200 WESTHEIMER ROAD, SUITE 383  
 HOUSTON, TEXAS 77042  
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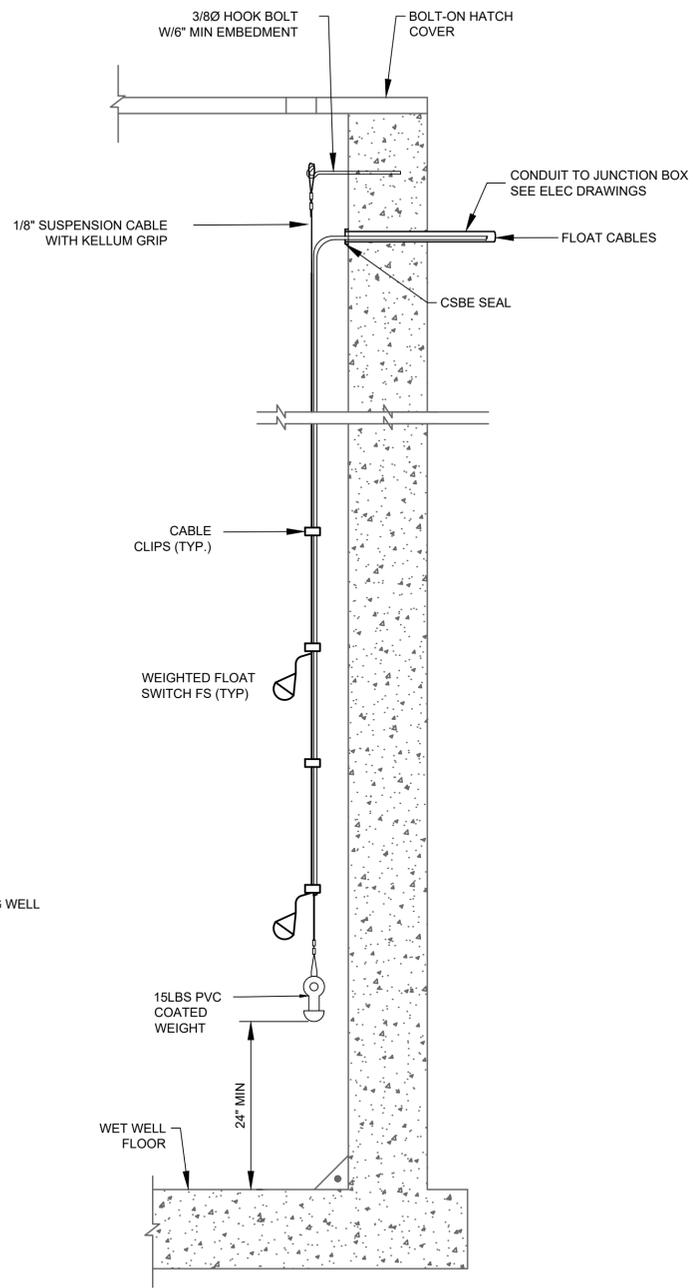
City of Friendswood, Texas  
 CONSTRUCTION PLANS FOR:  
 LIFT STATION MITIGATION PROJECT  
 PACKAGE 4 - LIFT STATION No.4

**ELECTRICAL DETAILS  
 (SHEET 3 OF 4)**

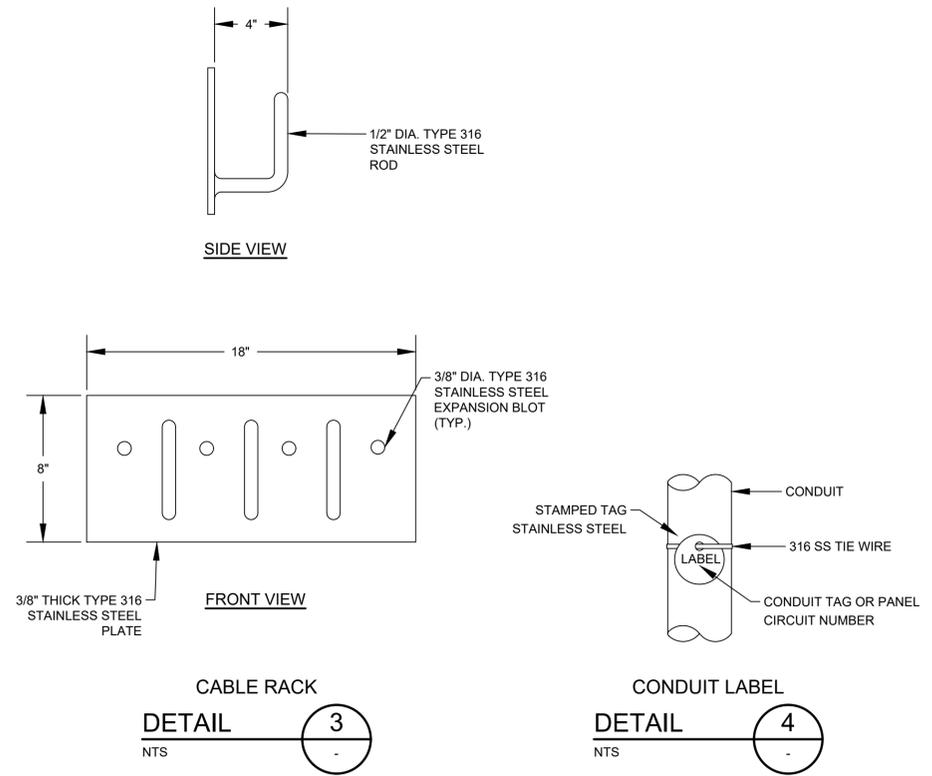
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DATE: JAN 2025	SHEET NO. 013 OF 025
DESIGNED: GA	
DRAWN: NS	
CONSULTANT'S PROJ. No.: 0101-01	



SUBMERSIBLE LEVEL TRANSDUCER  
**DETAIL 1**  
 NTS

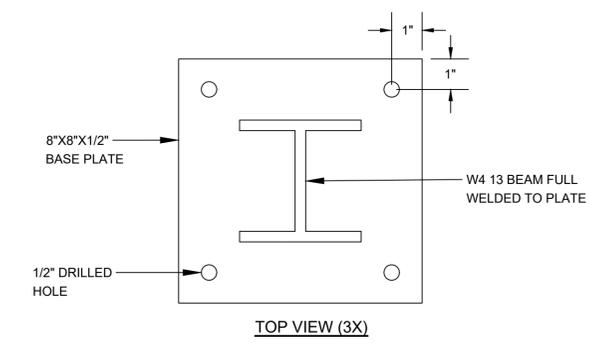


FLOAT SWITCH MOUNTING  
**DETAIL 2**  
 NTS

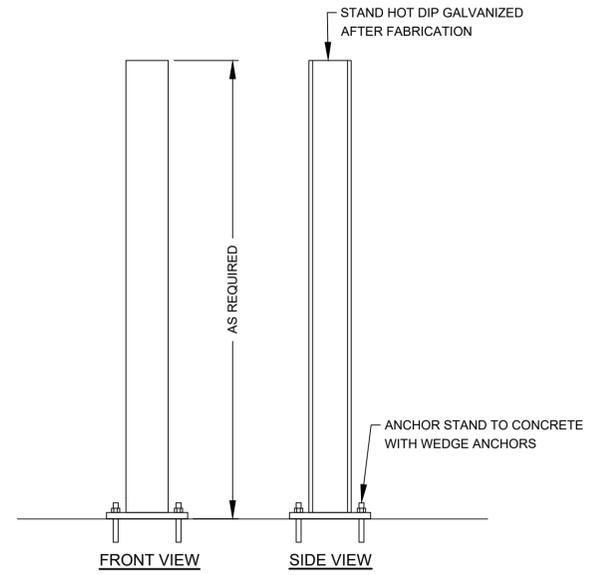


CABLE RACK  
**DETAIL 3**  
 NTS

CONDUIT LABEL  
**DETAIL 4**  
 NTS



TOP VIEW (3X)



TYPICAL I-BEAM SUPPORT  
**DETAIL 5**  
 NTS

- NOTES:
1. ALL MOUNTING HARDWARE AND MATERIALS TO BE 316 SS. SEE GENERAL NOTES ON DRAWING G-E-1.
  2. AS-BUILT DRAWINGS SHOULD CONTAIN RECORD OF ACTUAL INSTALLED CONDUITS AND CONDUCTORS THAT COORDINATE WITH FIELD LABELS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

MK	DESCRIPTION	DATE	DWN.	CHK.

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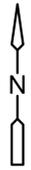
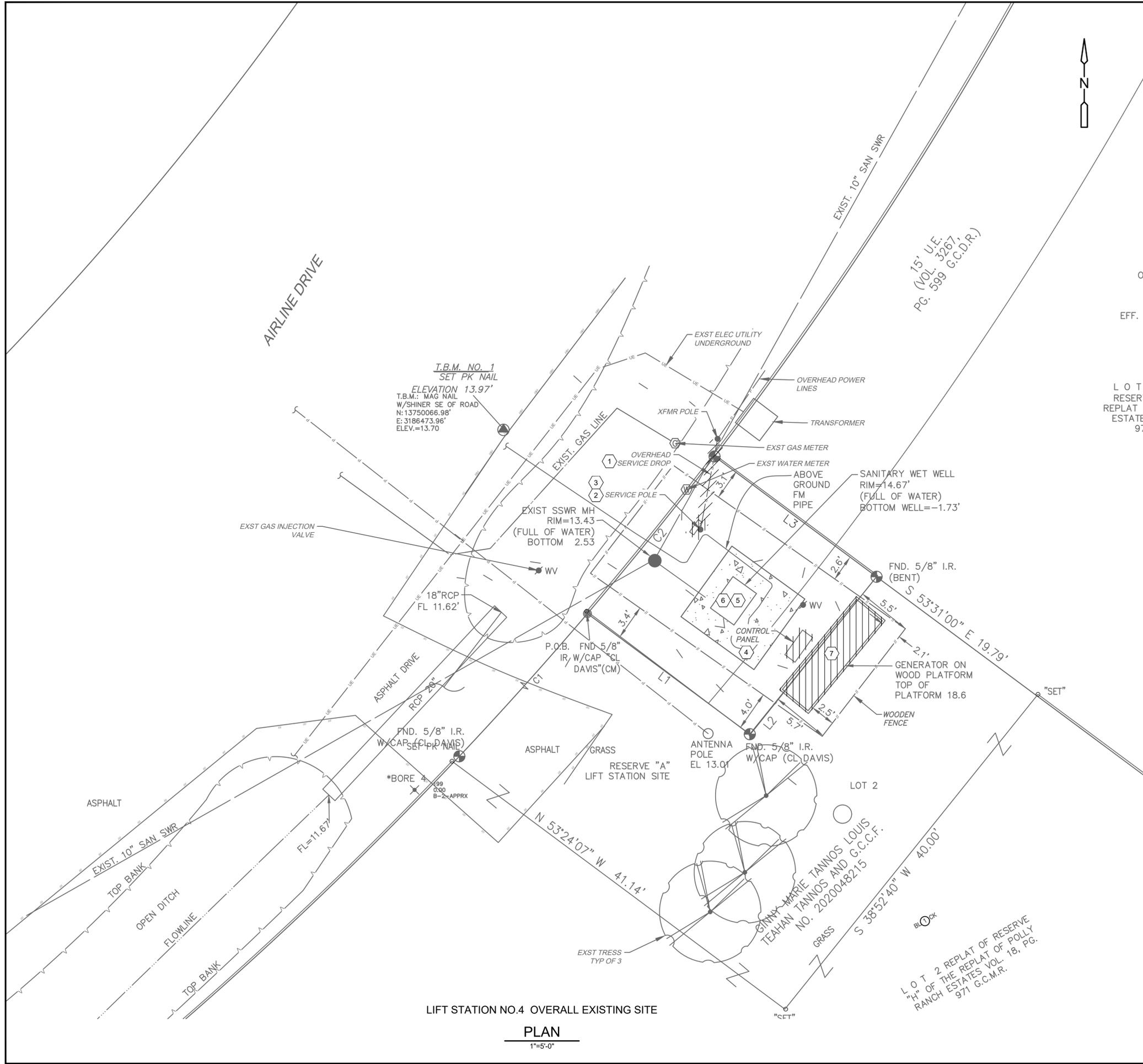


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**ELECTRICAL DETAILS**  
 (SHEET 4 OF 4)



SCALE:	NONE	DWG. No.	G-E-6
DATE:	JAN 2025	DESIGNED:	GA
DRAWN:	NS	CONSULTANT'S PROJ. No.:	0101-01
WARNING		SHEET NO. 014 OF 025	



LOT  
 RESE  
 REPLA  
 ESTATE  
 97

**GENERAL NOTES:**

- A. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS REQUIRED TO PROTECT THE EXISTING FACILITIES FROM DAMAGE. ANY DAMAGE TO EXISTING FACILITIES INCURRED AS A RESULT OF THE CONSTRUCTION SHALL BE CORRECTED BY THE CONTRACTOR AT THE CONTRACTORS EXPENSE.
- B. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
- C. OWNER RETAIN SALVAGE RIGHTS TO ALL MATERIALS AND EQUIPMENT. ALL MATERIALS & EQUIPMENT RETAINED BY THE OWNER SHALL BE DELIVERED TO A LOCATION DESIGNATED BY OWNER REPRESENTATIVE. ALL REMOVED EQUIPMENT TO BE TURNED OVER TO OWNER. ANY EQUIPMENT OWNER CHOOSES NOT TO RETAIN SHALL BE REMOVED FROM THE SITE AND DISPOSED OF BY CONTRACTOR IN ACCORDANCE WITH APPLICABLE REGULATIONS.
- D. ELECTRICAL POWER TO THE LIFT STATION IS PROVIDED BY TEXAS-NEW MEXICO POWER (TNMP). CONTRACTOR SHALL COORDINATE WITH POWER COMPANY FOR PROJECT REQUIREMENTS.
- E. BASED ON CONVERSATION DURING DESIGN, TNMP TO REMOVE AND REPLACE EXISTING LEANING TRANSFORMER POLE.
- F. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD BEFORE COMMENCING WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES TO THE OWNER IN A TIMELY MANNER.
- G. THE EXISTING LIFT STATION TO REMAIN IN SERVICE DURING PROPOSED WORK. RELOCATE EXISTING ELECTRICAL AS REQUIRED DURING CONSTRUCTION.
- H. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY POWER REQUIREMENTS IF REQUIRED DURING ANY SCHEDULED OUTAGES COORDINATED WITH TNMP. THE EXISTING LIFT STATION SHALL REMAIN IN SERVICE DURING PROPOSED IMPROVEMENTS.
- I. REFER TO OTHER DISCIPLINE DRAWINGS FOR ADDITIONAL INFORMATION.

**KEYED NOTES:**

- 1 CONTRACTOR SHALL COORDINATE WITH ELECTRICAL UTILITY PROVIDER TO DISCONNECT SERVICE DROP AND REMOVE BACK TO TRANSFORMER POLE.
- 2 CONTRACTOR SHALL REMOVE EXISTING WEATHERHEAD & WOODEN SERVICE POLE ALONG WITH ALL THE ASSOCIATED CONDUITS & CONDUCTORS.
- 3 CONTRACTOR SHALL REMOVE EXISTING METER DISCONNECT, UTILITY REVENUE METER, & MAIN SERVICE DISCONNECT MOUNTED ON THE SERVICE ALONG WITH ALL CONDUITS & CONDUCTORS.
- 4 CONTRACTOR SHALL REMOVE EXISTING ELECTRICAL CONTROL PANEL ALONG WITH ALL ASSOCIATED CONDUITS & CONDUITS.
- 5 CONTRACTOR SHALL REMOVE ALL EXISTING CONDUITS AND CONDUCTORS FROM WET WELL AREA.
- 6 CONTRACTOR SHALL REMOVE ALL EXISTING INSTRUMENTS & ASSOCIATED CONDUITS AND CONDUCTORS FROM WET WELL AREA.
- 7 CONTRACTOR SHALL REMOVE EXISTING NATURAL GAS GENERATOR, WOODEN PLATFORM AND ALL ASSOCIATED CONDUITS AND CONDUCTORS IN THEIR ENTIRETY.

MK	DESCRIPTION	DATE	DWN.	CHK.

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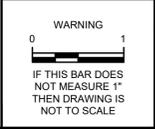
**5e Engineering**  
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 (832) 800-3483 | www.5eengineering.com  
 TBPE FIRM NO. F-13748



CONSTRUCTION PLANS FOR:  
 LIFT STATION MITIGATION PROJECT  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4  
 EXISTING SITE PLAN**

SCALE:	AS SHOWN	DWG. No.	LS4-E-1
DATE:	JAN 2025	SHEET No.	015 OF 025
DESIGNED:	GA		
DRAWN:	NS		
CONSULTANT'S PROJ. No.:	0101-01		



LIFT STATION NO.4 OVERALL EXISTING SITE  
**PLAN**  
 1"=5'-0"

LOT 2 REPLAT OF RESERVE  
 "H" OF THE REPLAT OF POLLY  
 RANCH ESTATES VOL. 18, PG.  
 971 G.C.M.R.



EXST XFMR POLE  
**PHOTOGRAPH 1** SEE NOTE 1  
 NTS



EXST SERVICE POLE  
**PHOTOGRAPH 2** SEE NOTE 2  
 NTS



EXST METER DISCONNECT, UTILITY METER & MAIN SERVICE DISCONNECT  
**PHOTOGRAPH 3** SEE NOTE 3  
 NTS



EXST CONTROL PANEL  
**PHOTOGRAPH 4** SEE NOTE 4  
 NTS



EXST GENERATOR ON WOODEN PLATFORM  
**PHOTOGRAPH 5** SEE NOTE 5  
 NTS

**PHOTOGRAPH NOTES:**

1. CONTRACTOR SHALL COORDINATE WITH UTILITY PROVIDER TO REMOVE EXISTING ELECTRICAL SERVICE DROP.
2. CONTRACTOR SHALL REMOVE EXISTING SERVICE POLE ALONG WITH WEATHERHEAD IN ITS ENTIRETY.
3. CONTRACTOR SHALL COORDINATE WITH UTILITY PROVIDER TO REMOVE EXISTING METER DISCONNECT, UTILITY METER & MAIN SERVICE DISCONNECT ALONG WITH ALL ASSOCIATED CONDUITS AND CONDUCTORS.
4. CONTRACTOR SHALL REMOVE EXISTING CONTROL PANEL ALONG WITH ALL ASSOCIATED CONDUITS & CONDUCTORS.
5. CONTRACTOR SHALL REMOVE EXISTING GENERATOR AND PLATFORM. REMOVE ALL EXISTING ASSOCIATED CONDUITS & CONDUCTORS. GAS LINE TO BE RELOCATED TO PROPOSED GENERATOR LOCATION.

MK	DESCRIPTION	DATE	DWN.	CHK.

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City of Friendswood, Texas

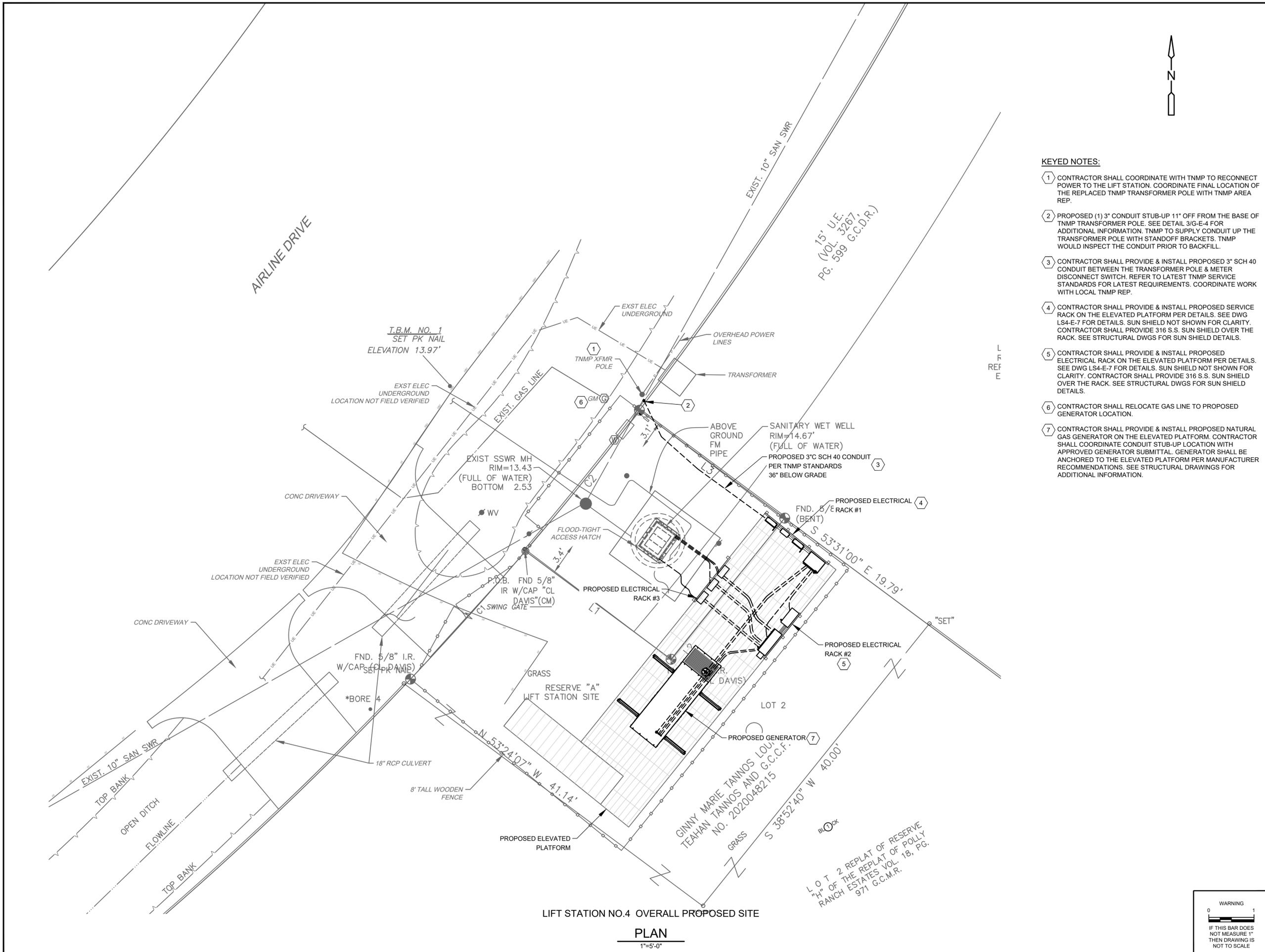
CONSTRUCTION PLANS FOR:  
 LIFT STATION MITIGATION PROJECT  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4  
 PHOTOGRAPHS**

WARNING  
 0 1  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SCALE: AS SHOWN  
 DATE: JAN 2025  
 DESIGNED: GA  
 DRAWN: NS  
 CONSULTANT'S PROJ. No.: 0101-01

DWG. No.  
**LS4-E-2**  
 SHEET NO. 016 OF 025



**KEYED NOTES:**

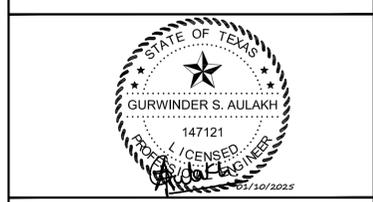
- 1 CONTRACTOR SHALL COORDINATE WITH TNMP TO RECONNECT POWER TO THE LIFT STATION. COORDINATE FINAL LOCATION OF THE REPLACED TNMP TRANSFORMER POLE WITH TNMP AREA REP.
- 2 PROPOSED (1) 3" CONDUIT STUB-UP 11" OFF FROM THE BASE OF TNMP TRANSFORMER POLE. SEE DETAIL 3/G-E-4 FOR ADDITIONAL INFORMATION. TNMP TO SUPPLY CONDUIT UP THE TRANSFORMER POLE WITH STANDOFF BRACKETS. TNMP WOULD INSPECT THE CONDUIT PRIOR TO BACKFILL.
- 3 CONTRACTOR SHALL PROVIDE & INSTALL PROPOSED 3" SCH 40 CONDUIT BETWEEN THE TRANSFORMER POLE & METER DISCONNECT SWITCH. REFER TO LATEST TNMP SERVICE STANDARDS FOR LATEST REQUIREMENTS. COORDINATE WORK WITH LOCAL TNMP REP.
- 4 CONTRACTOR SHALL PROVIDE & INSTALL PROPOSED SERVICE RACK ON THE ELEVATED PLATFORM PER DETAILS. SEE DWG LS4-E-7 FOR DETAILS. SUN SHIELD NOT SHOWN FOR CLARITY. CONTRACTOR SHALL PROVIDE 316 S.S. SUN SHIELD OVER THE RACK. SEE STRUCTURAL DWGS FOR SUN SHIELD DETAILS.
- 5 CONTRACTOR SHALL PROVIDE & INSTALL PROPOSED ELECTRICAL RACK ON THE ELEVATED PLATFORM PER DETAILS. SEE DWG LS4-E-7 FOR DETAILS. SUN SHIELD NOT SHOWN FOR CLARITY. CONTRACTOR SHALL PROVIDE 316 S.S. SUN SHIELD OVER THE RACK. SEE STRUCTURAL DWGS FOR SUN SHIELD DETAILS.
- 6 CONTRACTOR SHALL RELOCATE GAS LINE TO PROPOSED GENERATOR LOCATION.
- 7 CONTRACTOR SHALL PROVIDE & INSTALL PROPOSED NATURAL GAS GENERATOR ON THE ELEVATED PLATFORM. CONTRACTOR SHALL COORDINATE CONDUIT STUB-UP LOCATION WITH APPROVED GENERATOR SUBMITTAL. GENERATOR SHALL BE ANCHORED TO THE ELEVATED PLATFORM PER MANUFACTURER RECOMMENDATIONS. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.

**GENERAL NOTES:**

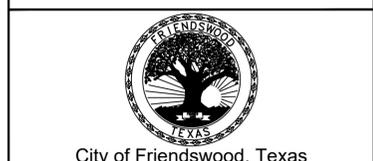
- A. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS REQUIRED TO PROTECT THE EXISTING FACILITIES FROM DAMAGE. ANY DAMAGE TO EXISTING FACILITIES INCURRED AS A RESULT OF THE CONSTRUCTION SHALL BE CORRECTED BY THE CONTRACTOR AT THE CONTRACTORS EXPENSE.
- B. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING AND PROPOSED DIMENSIONS PRIOR TO COMMENCING WORK. IT SHALL BE CONTRACTORS RESPONSIBILITY TO REPORT ANY AND ALL DISCREPANCIES, ERRORS, AND CONFLICTS TO THE ATTENTION OF THE OWNER AND THE ENGINEER PRIOR TO CONSTRUCTION IN A TIMELY MANNER.
- C. LOCATION OF UNDERGROUND UTILITIES HAS NOT BEEN FIELD VERIFIED. INFORMATION PRESENTED ON THESE DRAWINGS HAS BEEN OBTAINED FROM RECORD DRAWINGS.
- D. ELECTRICAL POWER TO THE LIFT STATION IS PROVIDED BY TEXAS-NEW MEXICO POWER (TNMP) THROUGH OVERHEAD DISTRIBUTION SYSTEM.
- E. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE TNMP SERVICE CONSULTANT IN THE AREA FOR A SERVICE OUTLET LOCATION AND OBTAIN NECESSARY SERVICE SPECIFICATIONS FOR THE INSTALLATION PRIOR TO ANY CONSTRUCTION.
- F. REFER TO MECHANICAL, CIVIL AND OTHER DISCIPLINE DRAWINGS FOR ADDITIONAL INFORMATION AND CONSTRUCTION SEQUENCE.
- G. REFER TO STRUCTURAL DRAWINGS FOR DETAILS ON ELEVATED PLATFORM.
- H. LIFT STATION SHALL REMAIN IN SERVICE DURING CONSTRUCTION. COORDINATE WITH OTHER DISCIPLINES FOR THE PROVISIONS REQUIRED. RELOCATE EXISTING ELECTRICAL AS REQUIRED TO KEEP EXISTING LIFT STATION IN SERVICE.
- I. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED 1 FOOT ABOVE THE HURRICANE HARVEY FLOOD MARK. HURRICANE HARVEY FLOOD EL WAS 21.30' THE PROPOSED PLATFORM HAS A FF EL. AT 22.30'.
- J. CONTRACTOR SHALL EMPLOY THE SERVICES OF A LICENSED LIGHTNING PROTECTION ENGINEERING SYSTEM COMPANY TO DESIGN AND INSTALL LIGHTNING PROTECTION SYSTEM. SEE SPECIFICATION 16670 FOR ADDITIONAL INFORMATION.

MK	DESCRIPTION	DATE	DWN.	CHK.

**KGI** Kalluri Group, Inc.  
 TBPE Registration No. F-665  
 18300 Katy Freeway, Suite 172  
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 Phone: (713)-365-9288

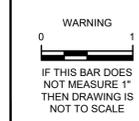


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CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT  
 PACKAGE 4 - LIFT STATION No.4**

<b>LIFT STATION NO.4 PROPOSED SITE PLAN</b>	
SCALE: AS SHOWN	DWG. No. <b>LS4-E-3</b>
DATE: JAN 2025	SHEET NO. 017 OF 025
DESIGNED: GA	
DRAWN: NS	
CONSULTANT'S PROJ. No.: 0101-01	



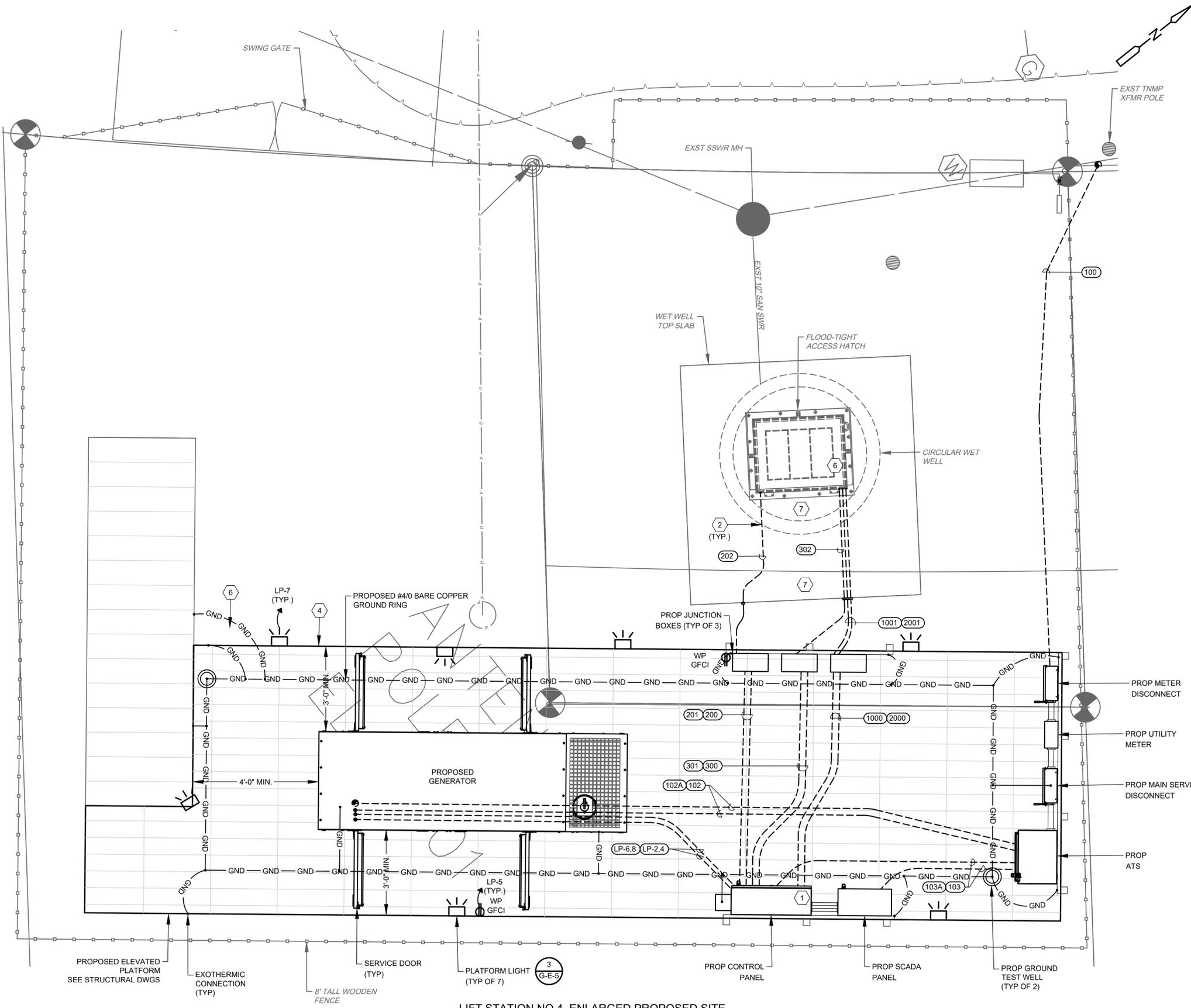
LIFT STATION NO.4 OVERALL PROPOSED SITE

**PLAN**  
1"=5'-0"

LOT 2 REPLAT OF RESERVE RANCH ESTATES VOL. 18, PG. 971 G.C.M.R.

GINNY MARIE TANNOS LOU TEAHAN TANNOS AND G.C.C.F. NO. 2020048215

REFER

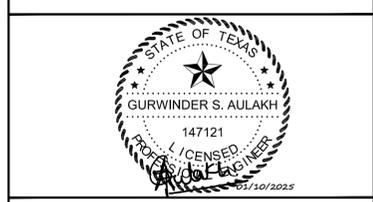


- KEYED NOTES:**
- 1 CONTRACTOR SHALL COORDINATE THE ENTRY POINT FOR THE INTRINSICALLY SAFE CONDUCTORS WITH CONTROL PANEL SUPPLIER.
  - 2 CORE DRILL THE SIDE OF THE LIFT STATION WET WELL TO INSTALL PROPOSED CONDUITS UNDERNEATH THE LIFT STATION SLAB. SUPPORT CONDUITS ON A UNISTRUT. REPAIR OPENINGS WITH NON-SHRINK STRUCTURAL GROUT.
  - 3 REFER TO SPECIFICATION 16170 FOR GROUND RING REQUIREMENTS. PROVIDE (2) BONDING POINTS TO ELEVATED METAL STRUCTURE, (2) TO METAL HANDRAIL, (2) TO GENERATOR FRAME, (2) TO EACH OF THE ELECTRICAL RACK, (1) GROUNDING ELECTRODE FROM ELECTRICAL RACK, (1) GROUNDING ELECTRODE FROM XFMR, AND (1) TO AIR TERMINAL.
  - 4 SURFACE MOUNT 1" CONDUIT ALONG THE PERIMETER OF THE PLATFORM FOR LIGHTING.
  - 5 MOUNT PLATFORM LIGHT SWITCH ON THE POST 6 FT ABOVE GRADE. PHOTOCELL MOUNTED ON THE RACK. LIGHT SWITCH SHALL BE RATED FOR WET LOCATION.
  - 6 CONTRACTOR SHALL FIELD LOCATE THE FINAL LOCATION OF THE STILLING WELL AND FLOATS INSIDE THE WET WELL. CABLES SHALL BE ACCESSIBLE FROM PUMP HATCH.
  - 7 CONDUITS INSTALLED IN CLASS 1, DIV 1 OR CLASS 1 DIV 2 LOCATIONS SHALL ALL BE RIGID ALUMINUM CONDUITS UNLESS NOTED OTHERWISE.

- GENERAL NOTES:**
- A. GENERATOR SHALL BE MOUNTED ON ELEVATED PLATFORM. CONDUITS BETWEEN ELECTRICAL SERVICE RACK AND GENERATOR TO BE INSTALLED UNDER PLATFORM. SEE DETAILS FOR A TRAPEZE HANGER ASSEMBLY.
  - B. CONTRACTOR SHALL COORDINATE ELECTRICAL AND GAS STUB-UP LOCATIONS WITH APPROVED GENERATOR SUBMITTAL SHOP DRAWINGS.
  - C. CONDUITS ROUTED TO THE EQUIPMENT ON PLATFORM ARE SHOWN BASHED TO NOTE THEY ARE ROUTED BELOW THE PLATFORM. THEY ARE NOT ROUTED UNDERGROUND.
  - D. CONTRACTOR SHALL PROVIDE GROUND RING AROUND THE ELEVATED STRUCTURE AS SHOWN. REFER TO SPECIFICATION 16170 FOR COMPLETE GROUNDING AND BONDING REQUIREMENTS.
  - E. ALL CONDUIT STUB UP FROM DUCT BANK SHALL HAVE EXPANSION COUPLINGS BETWEEN DUCT BANK AND FIRST SUPPORT FROM PLATFORM. SEE DETAIL 4/G-E-5 FOR DUCT BANK STUB UP. BOND DUCT BANK GROUND TO STRUCTURE AT STUB UP.
  - F. LIFT STATION IS A CLASSIFIED AREA. REFER TO AREA CLASSIFICATION NOTES ON G-E-1 FOR COMPLETE LIST OF CLASSIFIED AREAS AROUND THE LIFT STATION. CONTRACTOR SHALL PROVIDE EQUIPMENT RATED ACCORDINGLY.
  - G. FOR MOTOR FEEDER AND CONTROL CABLES. INSTALL TYPE CSBE CABLE SEALING FITTING AT JUNCTION BOX ENTRANCE AND EXPLOSION PROOF SEAL IN CONDUITS ROUTED BACK TO CONTROL PANEL.
  - H. TERMINATE PUMP POWER & CONTROL CONDUITS WITH CSBE SEAL. ATTACH STAINLESS STEEL SPLIT SLEEVE CABLE SUPPORT ON EACH POWER AND CONTROL CABLE.
  - I. ALL PUMP AND TRANSMITTER CABLES MUST BE OF SUFFICIENT LENGTH TO ALLOW FOR TERMINATIONS WITHIN THEIR RESPECTIVE JUNCTION BOXES. DO NOT SPLICE PUMP CABLES. CONTRACTOR SHALL COORDINATE WITH PUMP MANUFACTURER TO FIELD REPLACE ALL OF THE PUMP CABLES FOR REQUIRED LENGTH. CONDUIT ENTRY POINTS INTO THE WET WELL MUST BE EASILY ACCESSIBLE. ELIMINATING THE NECESSITY FOR PASSAGE THROUGH CONFINED SPACE.
  - J. CONDUIT ROUTE SHOWN ON THE DRAWINGS IS A CONCEPTUAL LAYOUT ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO FIELD ROUTE THE FINAL ROUTE BASED ON THE ACTUAL SITE CONDITIONS.
  - K. REFER TO MECHANICAL DRAWINGS FOR LIFT STATION WET WELL WATER LEVEL SET POINTS.

MK	DESCRIPTION	DATE	DWN.	CHK.

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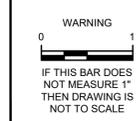
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 TBPE FIRM NO. F-13748



CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT  
 PACKAGE 4 - LIFT STATION No.4**

**LIFT STATION NO.4 ENLARGED  
 PROPOSED SITE PLAN**

SCALE:	AS SHOWN	DWG. No.	LS4-E-4
DATE:	JAN 2025	SHEET No.	018 OF 025
DESIGNED:	GA		
DRAWN:	NS		
CONSULTANT'S PROJ. No.:	0101-01		



LIFT STATION NO.4 ENLARGED PROPOSED SITE  
**PLAN**  
 1/2"=1'-0"

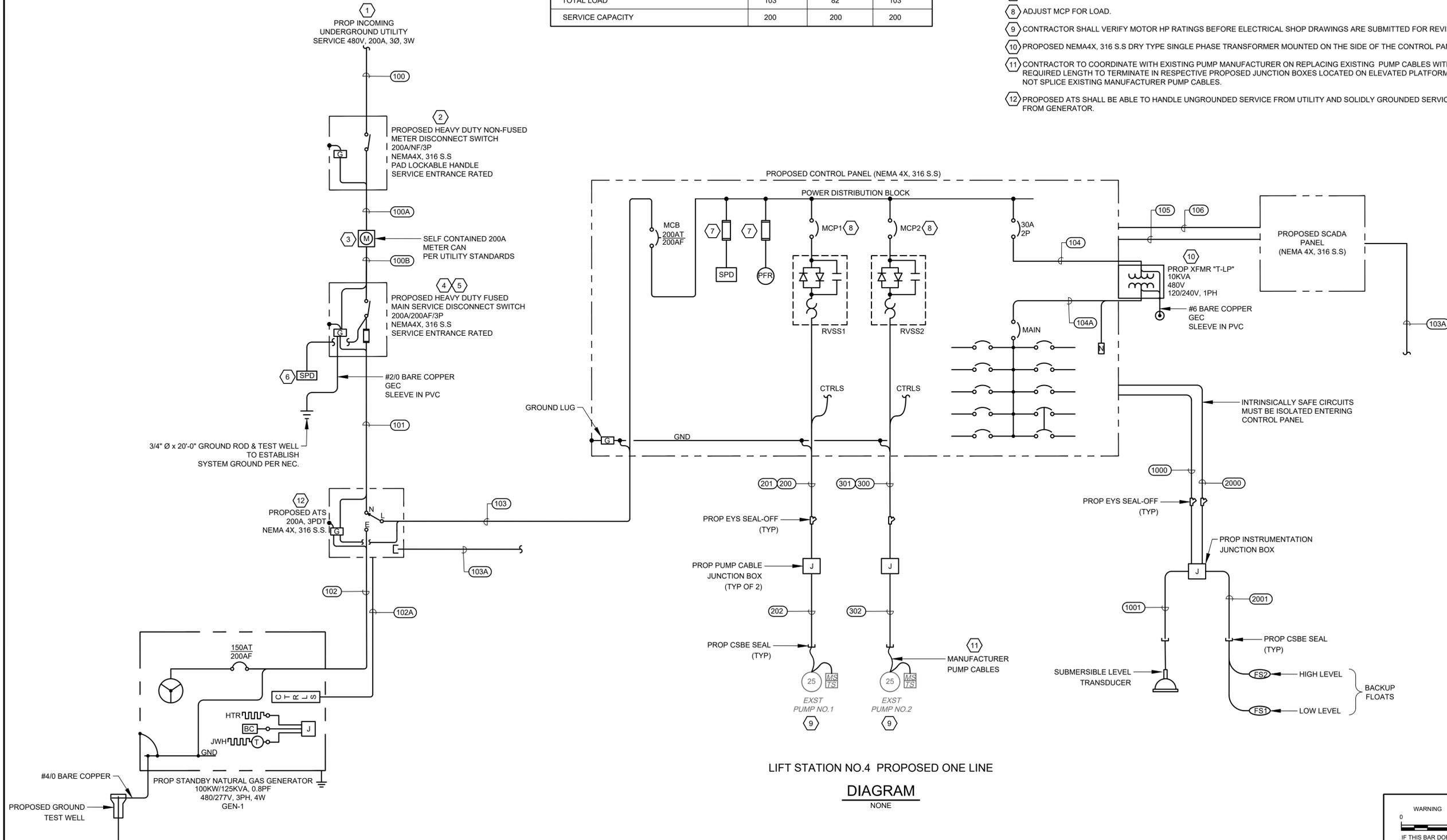
**GENERAL NOTES:**

- A. CONTRACTOR TO COORDINATE BETWEEN VENDORS TO ENSURE ELECTRICAL EQUIPMENT RATINGS ARE COORDINATED WITH MECHANICAL PUMPS PRIOR TO ELECTRICAL EQUIPMENT SHOP DRAWINGS.
- B. ALL EQUIPMENT MUST BE ELECTRICALLY BONDED TOGETHER VIA PLANT GROUNDING SYSTEM.
- C. CONTRACTOR SHALL VERIFY AVAILABLE FAULT CURRENT WITH TNMP AND PROVIDE EQUIPMENT RATED ACCORDINGLY. UNLESS NOTED OTHERWISE, MINIMUM EQUIPMENT RATING SHALL BE NO LESS THAN 35 KAIC.
- D. ENSURE ALL BREAKERS USED ARE 480V RATED ONLY. A CIRCUIT BREAKER MARKED 480/277V IS NOT INTENDED FOR USE ON A 480V SYSTEM WITH UP TO 480V TO GROUND.

LOAD		AMPS		
		PH A	PH B	PH C
PUMP NO.1	25 HP	34	34	34
PUMP NO.2 (STANDBY)	25 HP	34	34	34
MISC. POWER & CONTROLS	10 KVA	21	-	21
40% OF LARGEST MOTOR		14	14	14
<b>TOTAL LOAD</b>		<b>103</b>	<b>82</b>	<b>103</b>
<b>SERVICE CAPACITY</b>		<b>200</b>	<b>200</b>	<b>200</b>

**KEYED NOTES:**

- 1 CONTRACTOR TO COORDINATE WITH TNMP TO UPGRADE THE EXISTING POLE TOP TRANSFORMER BANK TO PROVIDE PROPOSED ELECTRICAL SERVICE.
- 2 CONTRACTOR TO PROVIDE UTILITY APPROVED COMPANY NON-FUSED METER DISCONNECT SWITCH. SEE TNMP STANDARDS FOR DETAILS. PAD LOCKABLE HANDLE.
- 3 CONTRACTOR TO PROVIDE UTILITY APPROVED METER MOUNTING DEVICE. REFER TO LATEST TNMP STANDARDS ON METER MOUNTING DEVICE DETAILS.
- 4 IN LIEU OF THE MAXIMUM AVAILABLE FAULT CURRENT MARKING AS REQUIRED BY 110.24, A PERMANENTLY AFFIXED LABEL SHALL BE APPLIED WITH THE AVAILABLE FAULT CURRENT AT THE TIME OF INSTALLATION AND CALCULATION. THE LABEL SHALL BE 2" X 3" IN SIZE AND SHALL BE BLUE LETTERING ON A CONTRASTING BACKGROUND. THIS LABEL SHALL ALSO INCLUDE THE DATE OF THE CALCULATION.
- 5 LOW PEAK FUSES TO BE USED IN DISCONNECT TO LIMIT AVAILABLE FAULT CURRENT ON THE EQUIPMENT TO LESS THAN 10KA. FUSES TO BE PROVIDED ON UNGROUNDED CONDUCTORS ONLY. DUMMY FUSE TO BE PROVIDED ON GROUNDED CONDUCTOR.
- 6 CONTRACTOR SHALL PROVIDE & INSTALL NEMA 4X, SQUARE D SURGE PROTECTOR #SSP05EMA24SD. SURGE PROTECTION DEVICE SHALL BE INSTALLED SUCH THAT FACTORY LEADS ARE UTILIZED WITHOUT SPLICES.
- 7 PROVIDE FUSE ACCORDING TO MANUFACTURER'S REQUIREMENTS.
- 8 ADJUST MCP FOR LOAD.
- 9 CONTRACTOR SHALL VERIFY MOTOR HP RATINGS BEFORE ELECTRICAL SHOP DRAWINGS ARE SUBMITTED FOR REVIEW.
- 10 PROPOSED NEMA4X, 316 S.S DRY TYPE SINGLE PHASE TRANSFORMER MOUNTED ON THE SIDE OF THE CONTROL PANEL.
- 11 CONTRACTOR TO COORDINATE WITH EXISTING PUMP MANUFACTURER ON REPLACING EXISTING PUMP CABLES WITH REQUIRED LENGTH TO TERMINATE IN RESPECTIVE PROPOSED JUNCTION BOXES LOCATED ON ELEVATED PLATFORM. DO NOT SPLICE EXISTING MANUFACTURER PUMP CABLES.
- 12 PROPOSED ATS SHALL BE ABLE TO HANDLE UNGROUNDED SERVICE FROM UTILITY AND SOLIDLY GROUNDED SERVICE FROM GENERATOR.



LIFT STATION NO.4 PROPOSED ONE LINE

**DIAGRAM**  
NONE

MK	DESCRIPTION	DATE	DWN.	CHK.

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CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4**  
**ONE LINE DIAGRAM**

SCALE:	AS SHOWN	DWG. No.	LS4-E-5
DATE:	JAN 2025		
DESIGNED:	GA		
DRAWN:	NS		
CONSULTANT'S PROJ. No.:	0101-01	SHEET No.	019 OF 025



TAG	DESCRIPTION	VOLTAGE	HP	ROUTING			CONDUIT & WIRE SIZES
				FROM	TO	VIA	
100	SERVICE ENTRANCE	480V		TNMP TRANSFORMER POLE	METER DISCONNECT SWITCH		3"C, (3)#3/0 (1)
100A	SERVICE ENTRANCE	480V		METER DISCONNECT SWITCH	METER CAN		3"C, (3)#3/0, (1)#2 SSB (1)
100B	SERVICE ENTRANCE	480V		METER CAN	MAIN SERVICE DISCONNECT SWITCH		3"C, (3)#3/0, (1)#2 SSB
101	ATS NORMAL FEEDER	480V		MAIN SERVICE DISCONNECT SWITCH	AUTOMATIC TRANSFER SWITCH		3"C, (3)#3/0, (1)#2 GND
102	ATS EMERGENCY FEEDER	480V		AUTOMATIC TRANSFER SWITCH	GENERATOR		3"C, (3)#3/0, (1)#2 GND
102A	GENERATOR CONTROL	24V		AUTOMATIC TRANSFER SWITCH	GENERATOR		1"C, (4)#14, #14 GND
103	CONTROL PANEL FEEDER	480V		AUTOMATIC TRANSFER SWITCH	CONTROL PANEL	WIREWAY	3"C, (3)#3/0, (1)#2 GND
103A	ATS STATUS	24V		AUTOMATIC TRANSFER SWITCH	SCADA PANEL	WIREWAY	1"C, (4)#14, #14 GND
104	XFMR FEEDER	480V		CONTROL PANEL	XFMR "T-LP"		1"C, (2)#8, 1#10 GND
104A	PANELBOARD FEEDER	120/240V		XFMR "T-LP"	PANELBOARD "LP"		1"C, (3)#4, 1#8 GND
105	SCADA SIGNALS	120V		CONTROL PANEL	SCADA PANEL		1"C, ETHERNET CABLE
106	SCADA POWER	120V		PANELBOARD "LP"	SCADA PANEL	CONTROL PANEL	1"C, (2)#10, 1#12 GND
200	PUMP NO.1 POWER	480V	25HP	CONTROL PANEL	PUMP JUNCTION BOX		1 1/2"C, (3)#6, 1#8 GND
201	PUMP NO.1 CONTROLS	24V	-	CONTROL PANEL	PUMP JUNCTION BOX		1"C, (4)#14, 1#14 GND
202	PUMP NO.1 POWER & CONTROLS	480/24V	25HP	PUMP JUNCTION BOX	WET WELL		2"C, MANUFACTURER PUMP CABLE
300	PUMP NO.2 POWER & CONTROLS	480/24V	25HP	CONTROL PANEL	PUMP JUNCTION BOX		1 1/2"C, (3)#6, (4)#14, 1#8 GND
301	PUMP NO.2 CONTROLS	24V	-	CONTROL PANEL	PUMP JUNCTION BOX		1"C, (4)#14, 1#14 GND
302	PUMP NO.2 POWER & CONTROLS	480/24V	25HP	PUMP JUNCTION BOX	WET WELL		2"C, MANUFACTURER PUMP CABLE
1000	LEVEL INSTRUMENT	24V		CONTROL PANEL	INSTRUMENTATION JUNCTION BOX		1"C, (1)#16 TSP, #14 GND
1001	LEVEL INSTRUMENT	24V		INSTRUMENTATION JUNCTION BOX	LEVEL TRANSDUCER		2"C, MANUFACTURER CABLE
2000	BACKUP FLOATS	24V		CONTROL PANEL	INSTRUMENTATION JUNCTION BOX		1"C, (4)#14, #14 GND
2001	BACKUP FLOATS	24V		INSTRUMENTATION JUNCTION BOX	BACKUP FLOATS		2"C, MANUFACTURER FLOAT CABLES

**GENERAL NOTES:**

- A. ANY CONDUIT REQUIRING CSBE SEAL SHALL BE MINIMUM SIZE OF 1 1/2" REGARDLESS OF THE CONDUIT SIZE INDICATED IN THIS SCHEDULE.
- B. ALL UNDERGROUND CONDUITS TO BE ENCASED IN REINFORCED CONCRETE DUCT BANK.
- C. CONTRACTOR SHALL VERIFY PUMP MANUFACTURER CABLE REQUIREMENTS. IF PUMP IS SUPPLIED WITH SEPARATE POWER & CONTROL CABLES, CONTRACTOR SHALL PROVIDE ADDITIONAL CONDUIT BETWEEN THE JUNCTION BOX AND WET WELL. MINIMUM CONDUIT SIZE 2"C. VERIFY PUMP CABLE DIAMETER AND ADJUST AS REQUIRED.
- D. EACH CONDUIT SHALL BE TAGGED WITH THE PANEL DESIGNATOR AND CIRCUIT NUMBERS THAT ARE IN THE CONDUIT AT EACH BOX, STUB UP, TRANSITION THRU WALL AND END OF CIRCUIT.
- E. UNLESS NOTED OTHERWISE, PROVIDE 1"C, (2)#12, #12 GND FOR ALL SINGLE POLE CIRCUITS AND 1"C, (3)#12, #12 GND FOR ALL DOUBLE POLE CIRCUITS.
- F. ALL CONDUIT STUB UP FROM DUCT BANK OR DIRECT BURIED SHALL HAVE EXPANSION COUPLINGS BETWEEN DUCT BANK AND FIRST SUPPORT FROM PLATFORM. BOND DUCT BANK GROUND TO STRUCTURE AT STUB UP.

**KEYED NOTES:**

- (1) SERVICE ENTRANCE CONDUCTORS TYPICALLY SIZED AND PROVIDED BY TNMP. CONTRACTOR SHALL COORDINATE WITH LOCAL TNMP REP. CONTRACTOR SHALL PROVIDE & INSTALL RACEWAY PER TNMP STANDARDS.

**CONDUIT & CONDUCTOR SCHEDULE**

MK	DESCRIPTION	DATE	DWN.	CHK.

**KGI** Kalluri Group, Inc.  
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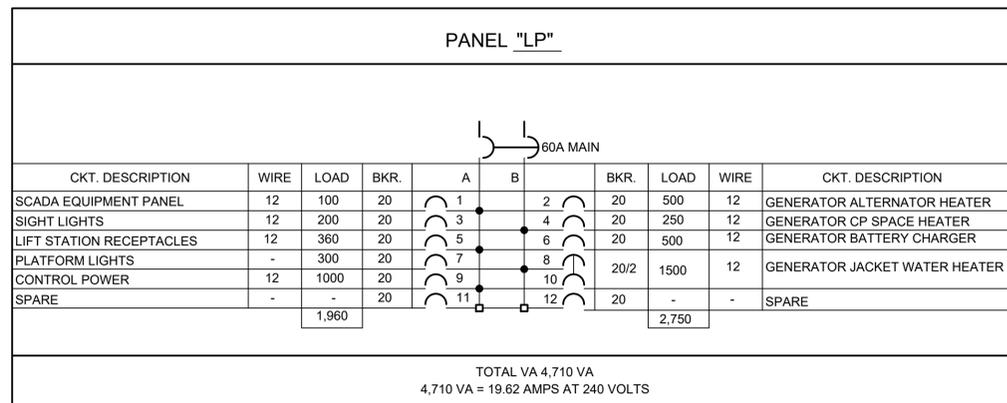


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT  
 PACKAGE 4 - LIFT STATION No.4**

**LIFT STATION NO.4  
 SCHEDULES**

SCALE:	AS SHOWN	DWG. No.	LS4-E-6
DATE:	JAN 2025	SHEET No.	020 OF 025
DESIGNED:	GA		
DRAWN:	NS		
CONSULTANT'S PROJ. No.:	0101-01		

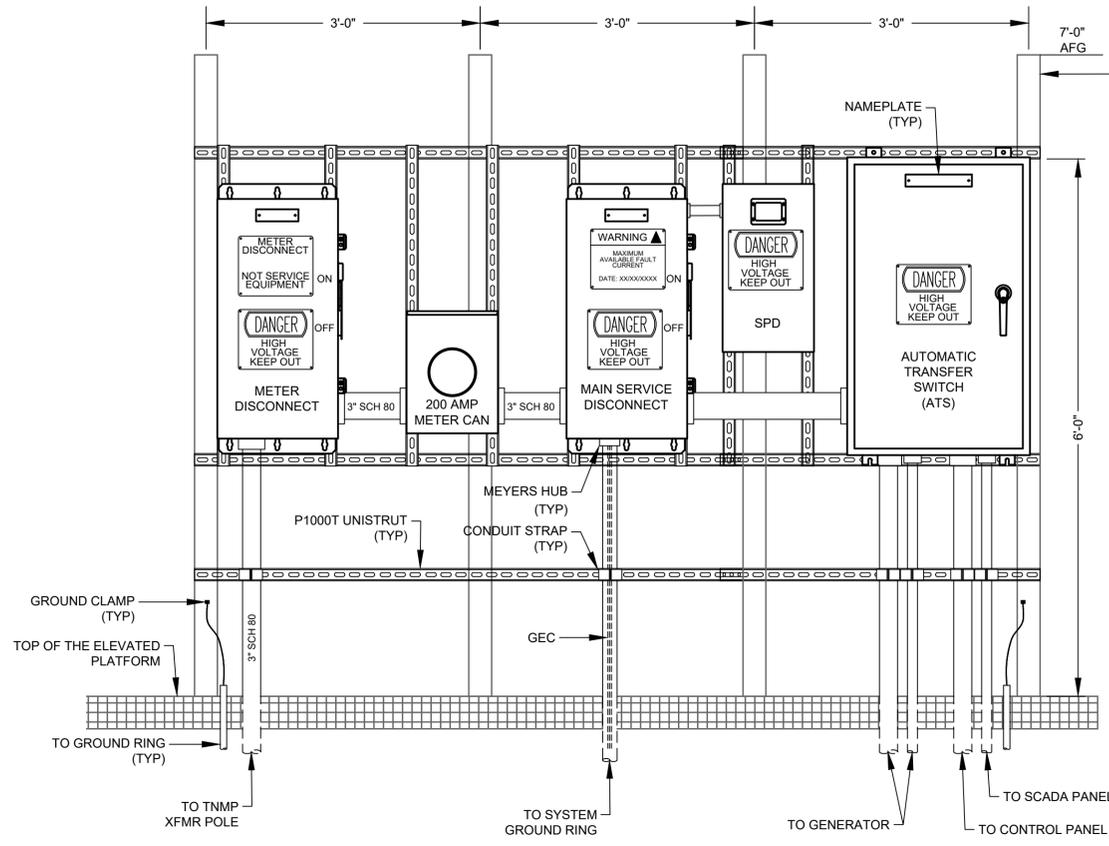
WARNING  
 0 1  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



**PANELBOARD SCHEDULE**

**GENERAL NOTES:**

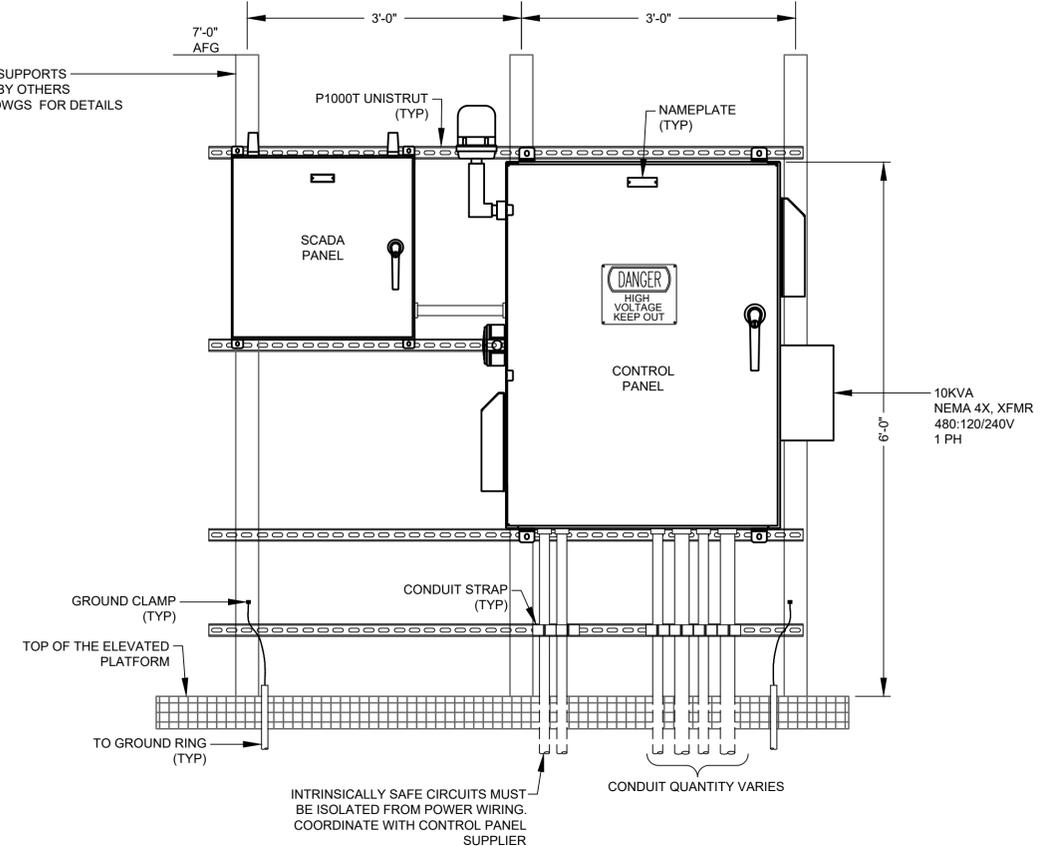
- A. LAYOUT SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL EQUIPMENT LAYOUT AND SPACING. NOT ALL CONDUITS SHOWN FOR CLARITY. SEE ONE LINE DIAGRAM, CONDUIT & CONDUCTOR SCHEDULE FOR DETAILS.
- B. SEE SPECIFICATION 16195 FOR EQUIPMENT NAMEPLATES & WARNING LABEL REQUIREMENTS. NAMEPLATES SHALL BE MOUNTED USING 316 S.S. HARDWARE.
- C. REFER TO SPECIFICATION 16170 FOR GROUNDING & BONDING REQUIREMENTS.
- D. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, SCREWS, WASHERS, ETC SHALL BE TYPE 316 STAINLESS STEEL.
- E. UNLESS OTHERWISE NOTED, ALL EXPOSED CONDUITS SHALL BE PVC COATED RIGID ALUMINUM.
- F. CONTRACTOR SHALL PROVIDE SUN SHIELD OVER THE PROPOSED EQUIPMENT RACKS. SUN SHIELD NOT SHOWN FOR CLARITY. SEE STRUCTURAL DRAWINGS FOR SUN SHIELD DETAILS.
- G. ALL CONDUITS STUB UP FROM DUCT BANK OR DIRECT BURIED SHALL HAVE EXPANSION COUPLINGS BETWEEN DUCT BANK AND FIRST SUPPORT FROM PLATFORM. BOND DUCT BANK GROUND TO STRUCTURE.



LIFT STATION NO.4 ELECTRICAL RACK #1

**ELEVATION**

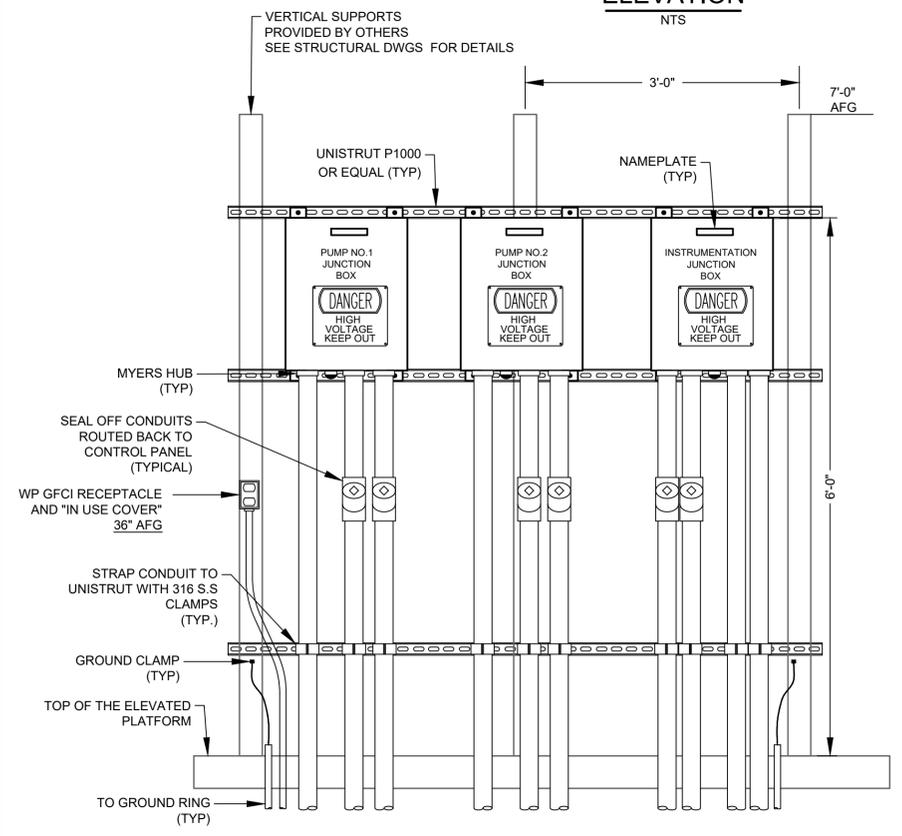
NTS



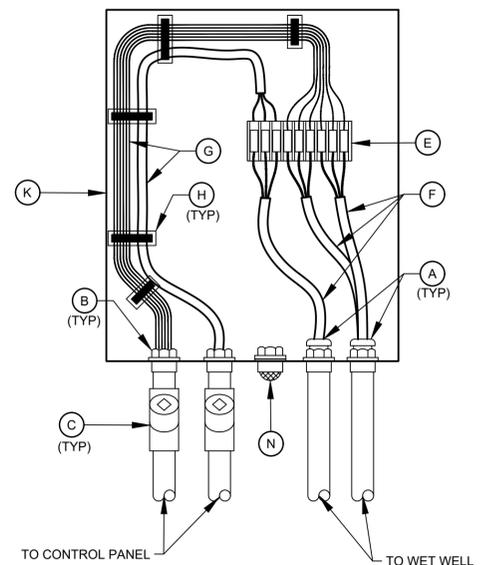
LIFT STATION NO.4 ELECTRICAL RACK #2

**ELEVATION**

NTS



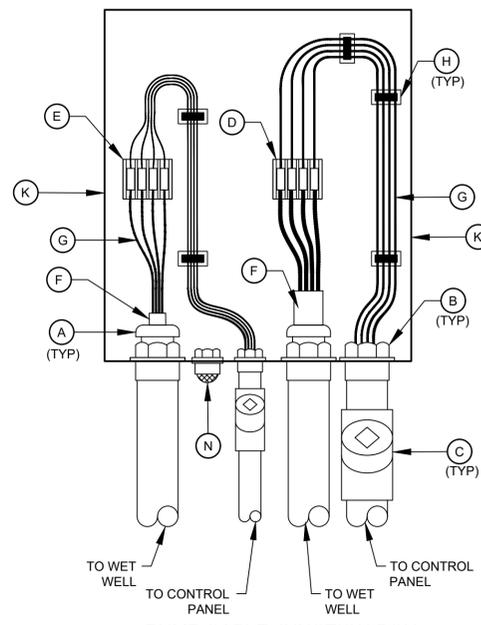
**NOTE:**  
PROVIDE ADDITIONAL TERMINALS WIRING, CONDUITS AS REQUIRED. SEE PLAN DRAWINGS & CONDUIT & CONDUCTOR SCHEDULE FOR QUANTITY OF CONDUITS REQUIRED.



LEVEL INSTRUMENTATION JUNCTION BOX

**DETAIL 1**  
NTS

**NOTE:**  
PROVIDE ADDITIONAL TERMINALS WIRING, CONDUITS AS REQUIRED. SEE PLAN DRAWINGS & CONDUIT & CONDUCTOR SCHEDULE FOR QUANTITY OF CONDUITS REQUIRED.



PUMP CABLE JUNCTION BOX

**DETAIL 2**  
NTS

**JUNCTION BOX EQUIPMENT SCHEDULE**

A	OZ GEDNEY CSBE SEAL WITH 316 S.S PRESSURE PLATES AND HARDWARE
B	WATERTIGHT CONDUIT HUB WITH INSULATED BUSHING
C	CLASS I, DIV I, EXPLOSION PROOF SEAL INSTALLED PER NEC DIV 501
D	POWER TERMINAL BLOCK W/SCREW DOWN BOX LUGS
E	CONTROL TERMINAL BLOCK W/SCREW DOWN BOX LUGS
F	MULTI-CONDUCTOR CABLE, REMOVE OUTER JACKET AS SHOWN
G	WIRING AS SCHEDULED
H	WIRING HARNESS PERMANENTLY AFFIXED
I	NOT USED
J	NOT USED
K	NEMA 4X 316 STAINLESS STEEL JUNCTION BOX WITH GASKETED FRONT COVER, CONTINUOUS HINGE, CLAMPS, HASP & PADLOCKING PROVISIONS HOFFMAN A20H1608S6LP OR EQUAL.
L	NAMEPLATE, 3/8" HIGH LETTERS IN WHITE ON BLACK BACKGROUND (SEE NAMEPLATE SCHEDULE)
M	EXPANSION JOINTS/SLEEVES
N	DRAIN VENT

**NAMEPLATE SCHEDULE**

DESIGNATION	ENGRAVED
N1	PUMP NO.1
N2	PUMP NO.2
N3	INSTRUMENTATION

MK	DESCRIPTION	DATE	DWN.	CHK.

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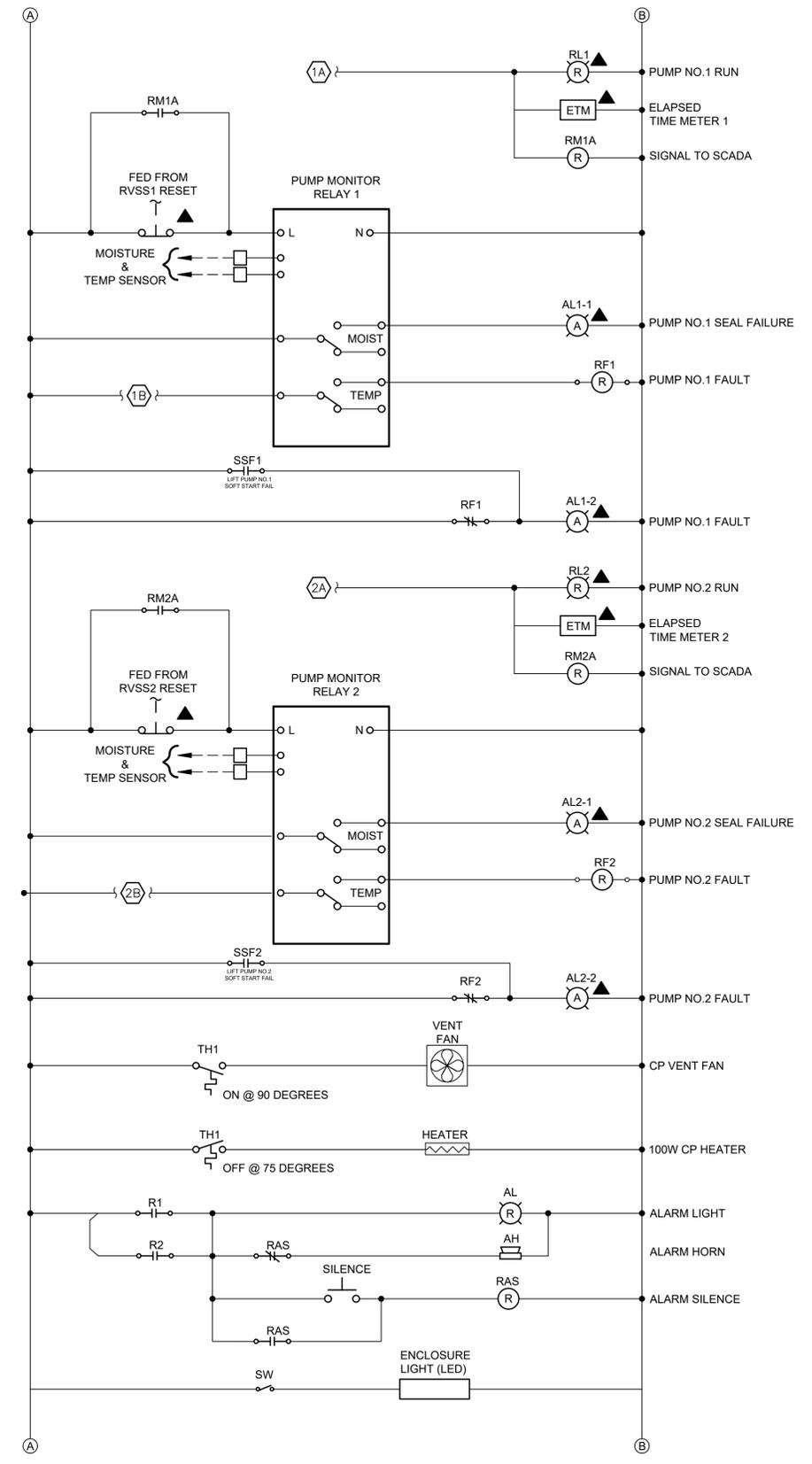
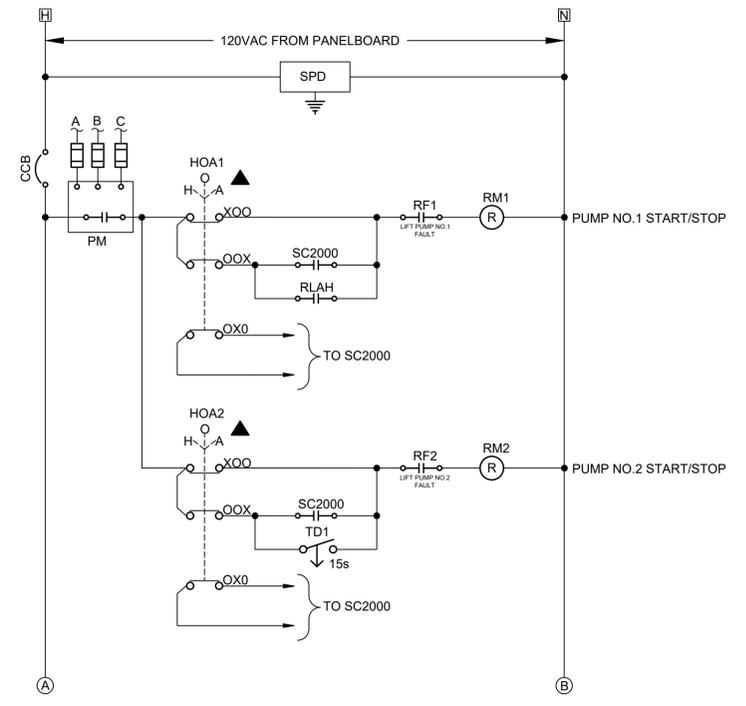
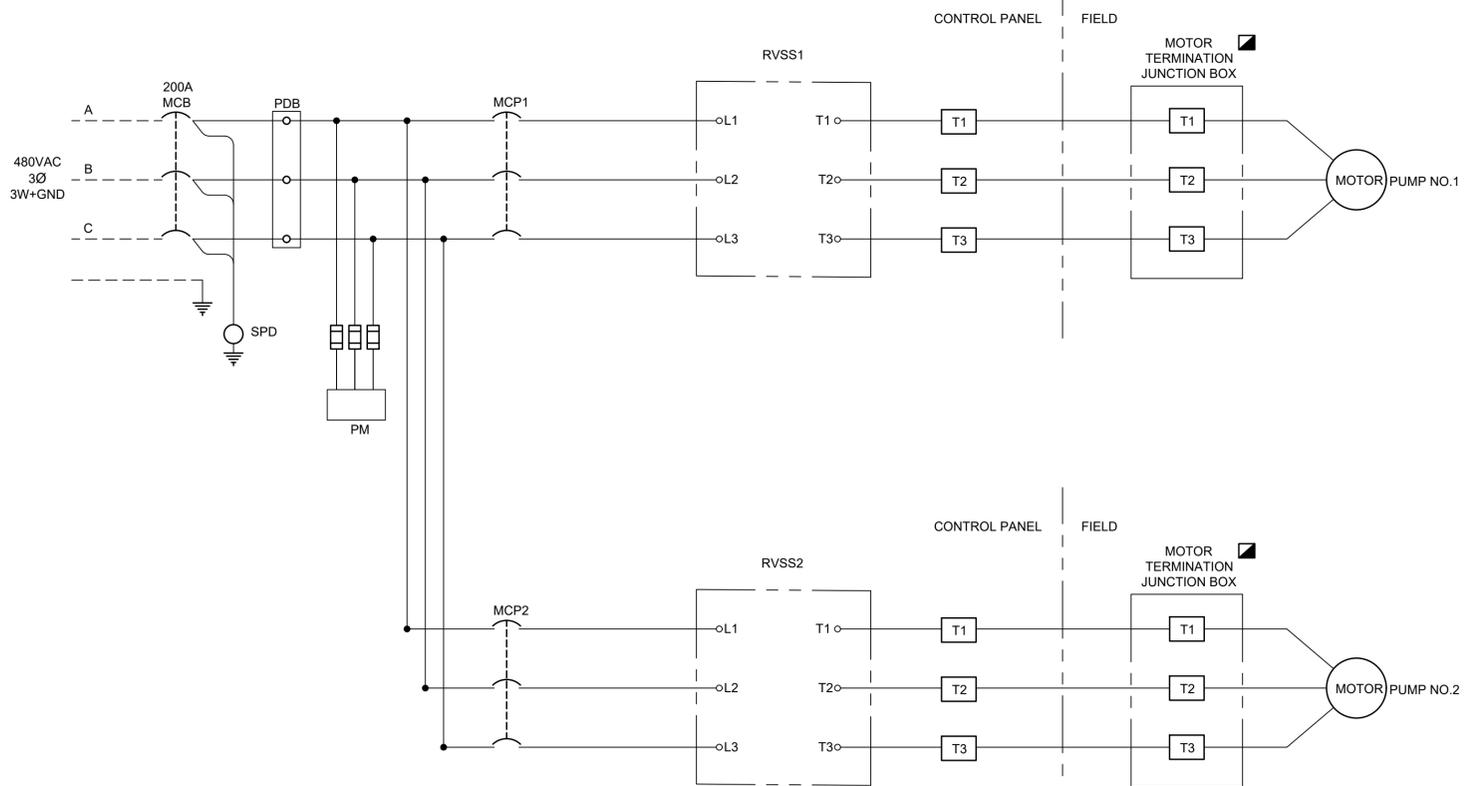


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4 ELECTRICAL RACK DETAILS**

SCALE:	AS SHOWN	DWG. No.	LS4-E-7
DATE:	JAN 2025	DESIGNED:	GA
DRAWN:	NS	CONSULTANT'S PROJ. No.:	0101-01
SHEET NO. 021 OF 025		SHEET NO. 021 OF 025	





- ▣ DEVICE LOCATED IN THE FIELD
- ▲ DEVICE LOCATED ON SWING OUT PANEL

**GENERAL NOTES:**

- A. CONTROL SCHEMATICS IS PROVIDED ONLY FOR REFERENCE AND MAY VARY PER EQUIPMENT MANUFACTURERS STANDARDS COORDINATE ACCORDINGLY. CONTRACTOR TO ENSURE PROPER FUNCTIONING OF THE SCHEMATICS TO MEET THE DESIGN INTENT.
- B. VERIFY TOTAL QUANTITY DEVICES PER CONTROL DIAGRAMS.
- C. COORDINATE ALL NORMALLY CLOSED (N.C.) AND NORMALLY OPEN (N.O.) CONTACTS.
- D. USE MULTIPLE RELAYS WERE ADDITIONAL CONTROLS ARE REQUIRED.
- E. CONTRACTOR TO PROVIDE HEATING AND COOLING CALCULATIONS FOR THE CONTROL PANEL PER DIVISION 13. CONTRACTOR TO PROVIDE FAN OR AIR CONDITIONER AS REQUIRED. PROVIDE MINIMUM OF ONE AIR CHANGE PER MINUTE INSIDE CONTROL PANEL. PROVIDE EXHAUST FAN/ AIR CONDITIONER MOUNTED HIGH ON SIDE OF ENCLOSURE WITH RAIN CAP, BACK DRAFT DAMPER AND INSECT SCREEN. PROVIDE SUPPLY VENT (IF APPLICABLE) ON OPPOSITE LOWER SIDE OF ENCLOSURE WITH RAIN CAP, GRAVITY DAMPER, FILTER AND INSECT SCREEN.
- F. CONTROL PANEL SHALL BE SHOP TESTED BEFORE DELIVERY TO THE JOB SITE. ANY PANELS INSTALLED BUT NOT SHOP TESTED SHALL BE REMOVED AT CONTRACTORS EXPENSE AND RETURNED TO SHOP FOR TESTING. ALL PANELS SHALL BE RETURNED TO SITE IN A NEW CONDITION AFTER SHOP TESTING.

MK	DESCRIPTION	DATE	DWN.	CHK.

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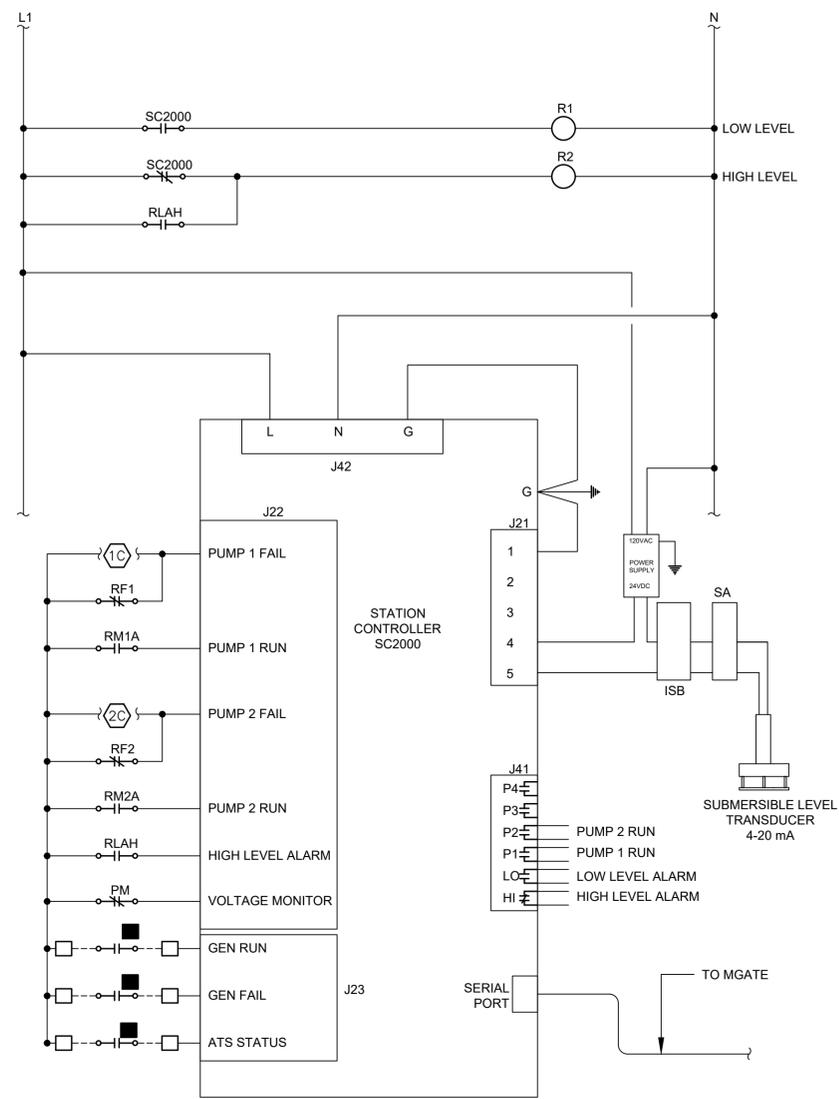
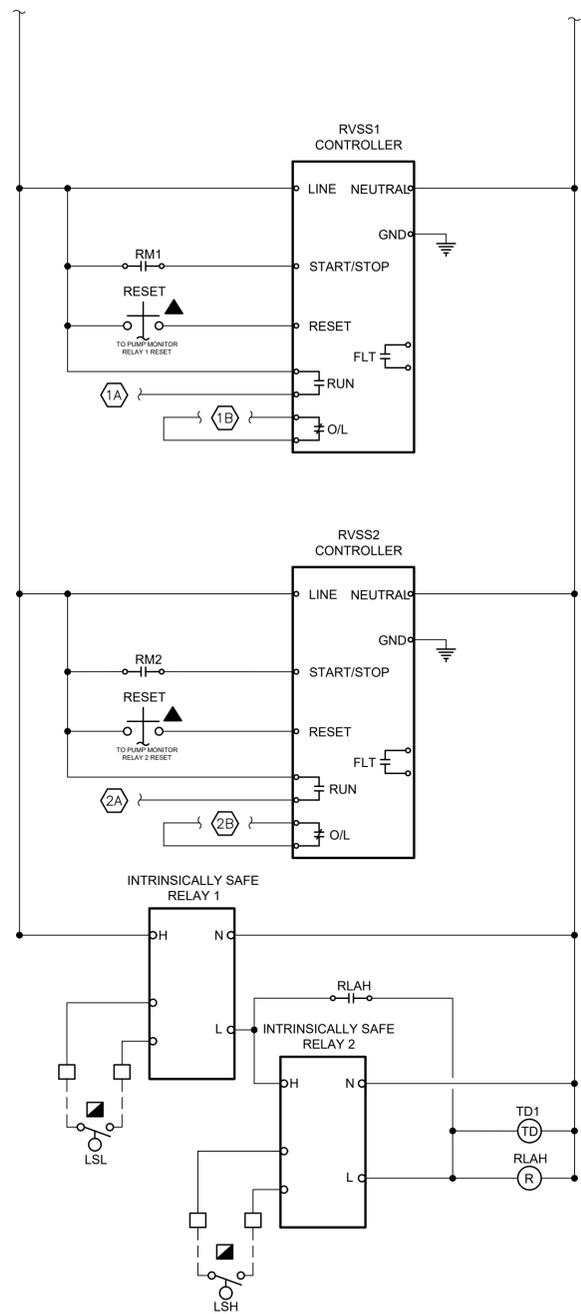


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4**  
**CONTROL WIRING DIAGRAM**  
**(SHEET 1 OF 2)**



SCALE:	AS SHOWN	DWG. No.	LS4-E-8
DATE:	JAN 2025	SHEET No. 022 OF 025	
DESIGNED:	GA		
DRAWN:	NS		
CONSULTANT'S PROJ. No.:	0101-01		



PROVIDE THE FOLLOWING SIGNALS TO/FROM SC2000  
SC2000

- | DISCRETE INPUT  |                    |
|-----------------|--------------------|
| ▶               | PUMP 1 RUN         |
| ▶               | PUMP 1 FAIL        |
| ▶               | PUMP 2 RUN         |
| ▶               | PUMP 2 FAIL        |
| ▶               | HIGH LEVEL ALARM   |
| ▶               | GENERATOR RUN      |
| ▶               | GENERATOR FAIL     |
| ▶               | VOLTAGE MONITOR    |
| ▶               | ATS STATUS         |
| DISCRETE OUTPUT |                    |
| ▶               | PUMP 1 START/STOP  |
| ▶               | PUMP 2 START/STOP  |
| ▶               | WETWELL LEVEL LOW  |
| ▶               | WETWELL LEVEL HIGH |

**SCADA PANEL SIGNALS**  
NONE

**GENERAL NOTES:**  
A. SCHEMATIC SHOWN IS TO PROVIDE CONTRACTOR WITH THE BASIC CONCEPT OF THE CONTROL SYSTEM. CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPLETE WIRING DIAGRAMS.

- ▣ DEVICE LOCATED IN THE FIELD
- SIGNAL OUTSIDE CONTROL PANEL
- ▲ DEVICE LOCATED ON SWING OUT PANEL

MK	DESCRIPTION	DATE	DWN.	CHK.

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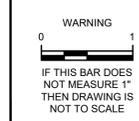


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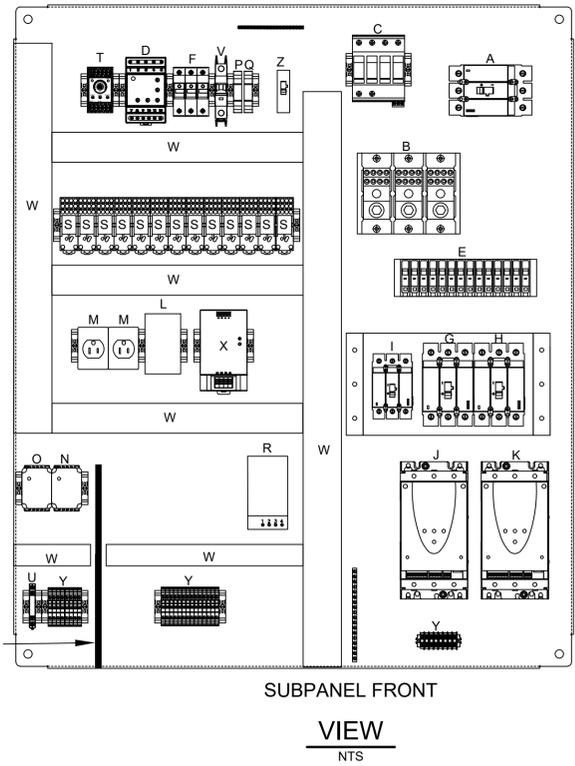
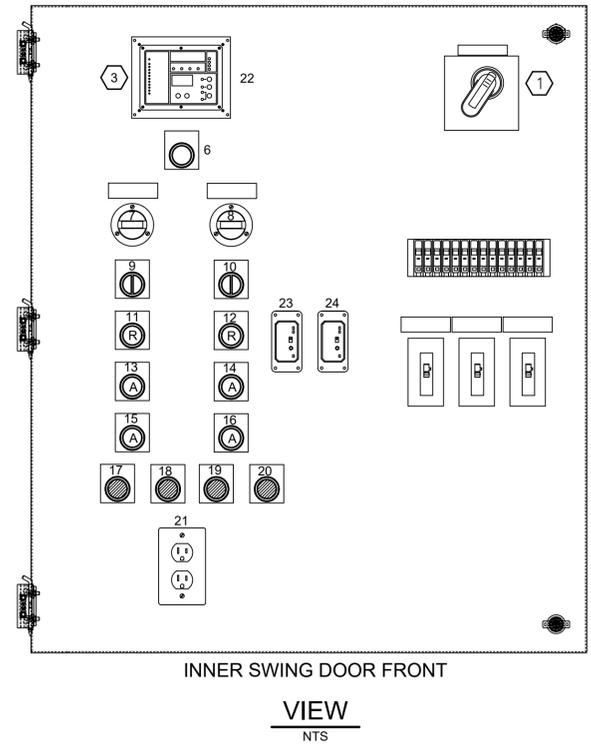
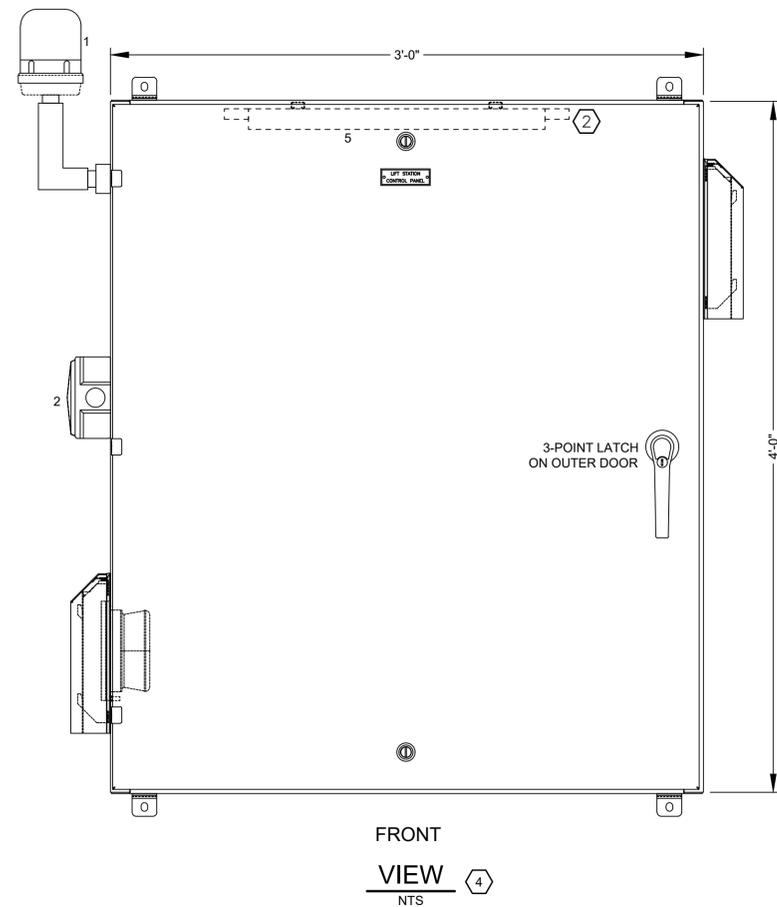
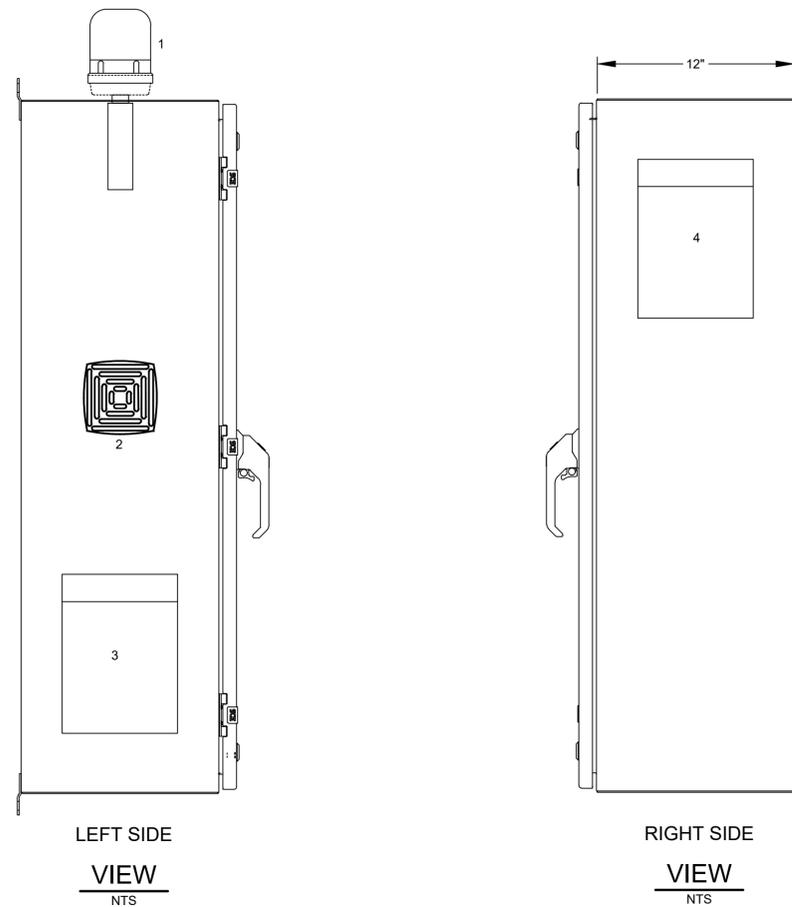


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4**  
**CONTROL WIRING DIAGRAM**  
 (SHEET 2 OF 2)



SCALE:	AS SHOWN	DWG. No.	LS4-E-9
DATE:	JAN 2025	CONSULTANT'S PROJ. No.:	0101-01
DESIGNED:	GA	SHEET No. 023 OF 025	
DRAWN:	NS		



- 1 - RED FLASHING LED BEACON
- 2 - WEATHERPROOF HORN
- 3 - AIR VENT W/FAN
- 4 - AIR VENT LOUVER WITH BUG GUARD
- 5 - LED WORK LIGHT
- 6 - PUSH BUTTON ALARM SILENCE
- 7 - ETM ELAPSED TIME METER 1
- 8 - ETM ELAPSED TIME METER 2
- 9 - HOA HAND OFF AUTO SWITCH PUMP 1
- 10 - HOA HAND OFF AUTO SWITCH PUMP 2
- 11 - RL1 PUMP 1 RUN LIGHT
- 12 - RL2 PUMP 2 RUN LIGHT
- 13 - FL1 PUMP 1 FAULT LIGHT
- 14 - FL2 PUMP 2 FAULT LIGHT
- 15 - ML1 PUMP 1 SEAL FAILURE LIGHT
- 16 - ML2 PUMP 2 SEAL FAILURE LIGHT
- 17 - PPM RESET PUMP 1
- 18 - PPM RESET PUMP 2
- 19 - RVSS RESET PUMP 1
- 20 - RVSS RESET PUMP 2
- 21 - DUPLEX RECEPTACLE (GFCI)
- 22 - STATION CONTROLLER SC2000
- 23 - PUMP MONITOR RELAY 1
- 24 - PUMP MONITOR RELAY 2

- A - MAIN CIRCUIT BREAKER (MCB)
- B - POWER DIST. BLOCK (PDB)
- C - SPD SURGE PROTECTION DEVICE (SPD)
- D - PHASE FAILURE RELAY (PFR)
- E - 120V LOAD CENTER
- F - FUSE BLOCKS
- G - MCP 1
- H - MCP 2
- I - BREAKER FOR 10KVA XFMR
- J - RVSS1
- K - RVSS2
- L - MOXA MODBUS ETHERNET/SERIAL GATEWAY
- M - RECEPTACLE
- N - INTRINSICALLY SAFE RELAY 1
- O - INTRINSICALLY SAFE RELAY 2
- P - TH1 THERMOSTAT (HEATER)
- Q - TH2 THERMOSTAT (FAN)
- R - HT HEATER (100W)
- S - CONTROL RELAYS
- T - TD1 TIME DELAY
- U - SURGE ARRESTOR
- V - CCB
- W - WIRING DUCT
- X - PS POWER SUPPLY (24VDC)
- Y - TERMINAL STRIP
- Z - LIGHT SWITCH (CABINET LIGHT, 120V, 20A, SPST)

**GENERAL NOTES:**

- A. LAYOUT SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL LAYOUT. CONTRACTOR FIELD VERIFY ALL DIMENSIONS INSIDE THE CONTROL PANEL. RELOCATE & ADJUST COMPONENTS AS REQUIRED TO PROVIDE SPACE FOR EQUIPMENT.
- B. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING MINIMUM WIRE BENDING SPACE WITH THE ENCLOSURE SHALL BE IN ACCORDANCE WITH NEC.
- C. CONTROL PANEL SHALL BE UL698A LISTED ENCLOSED INDUSTRIAL CONTROL PANEL. PANEL SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH NEC AND UL STANDARDS.
- D. ALL INTRINSICALLY SAFE WIRING SHALL BE SEPARATED FROM NON-INTRINSICALLY SAFE WIRING. REFER TO NEC ARTICLE 504 FOR INSTALLATION OF INTRINSICALLY SAFE WIRING.
- E. CONTRACTOR TO PROVIDE HEATING AND COOLING CALCULATIONS FOR THE CONTROL PANEL PER DIVISION 13. CONTRACTOR TO PROVIDE FAN OR AIR CONDITIONER AS REQUIRED. PROVIDE MINIMUM OF ONE AIR CHANGE PER MINUTE INSIDE CONTROL PANEL. PROVIDE EXHAUST FAN/ AIR CONDITIONER MOUNTED HIGH ON SIDE OF ENCLOSURE WITH RAIN CAP, BACK DRAFT DAMPER AND INSECT SCREEN. PROVIDE SUPPLY VENT (IF APPLICABLE) ON OPPOSITE LOWER SIDE OF ENCLOSURE WITH RAIN CAP, GRAVITY DAMPER, FILTER AND INSECT SCREEN.

**KEYED NOTES:**

- ① THE DOOR SHALL BE MECHANICALLY INTERLOCKED WITH ALL DISCONNECTING MEANS MOUNTED WITHIN THE INDUSTRIAL CONTROL PANEL. SUCH THAT INNER DOOR CAN BE OPENED UNLESS THE POWER IS DISCONNECTED.
- ② CONTROL PANEL WORK LIGHT SHALL BE ACTUATED WITH INSIDE DOOR LIMIT SWITCH.
- ③ MPE STATION CONTROLLER WILL BE PROGRAMMED BY THE PANEL BUILDER. SCADA INTEGRATION WILL BE PERFORMED BY OWNER'S PRE-SELECTED SCADA INTEGRATOR.
- ④ CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE PRE-SELECTED SCADA INTEGRATOR BEFORE SUBMITTING SUBMITTAL FOR REVIEW.

MK	DESCRIPTION	DATE	DWN.	CHK.

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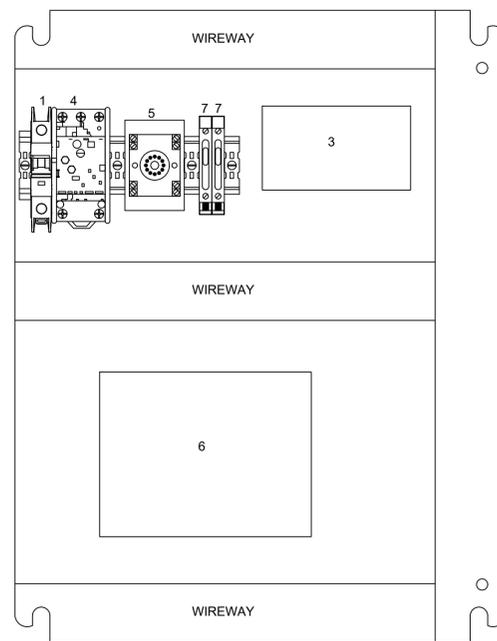
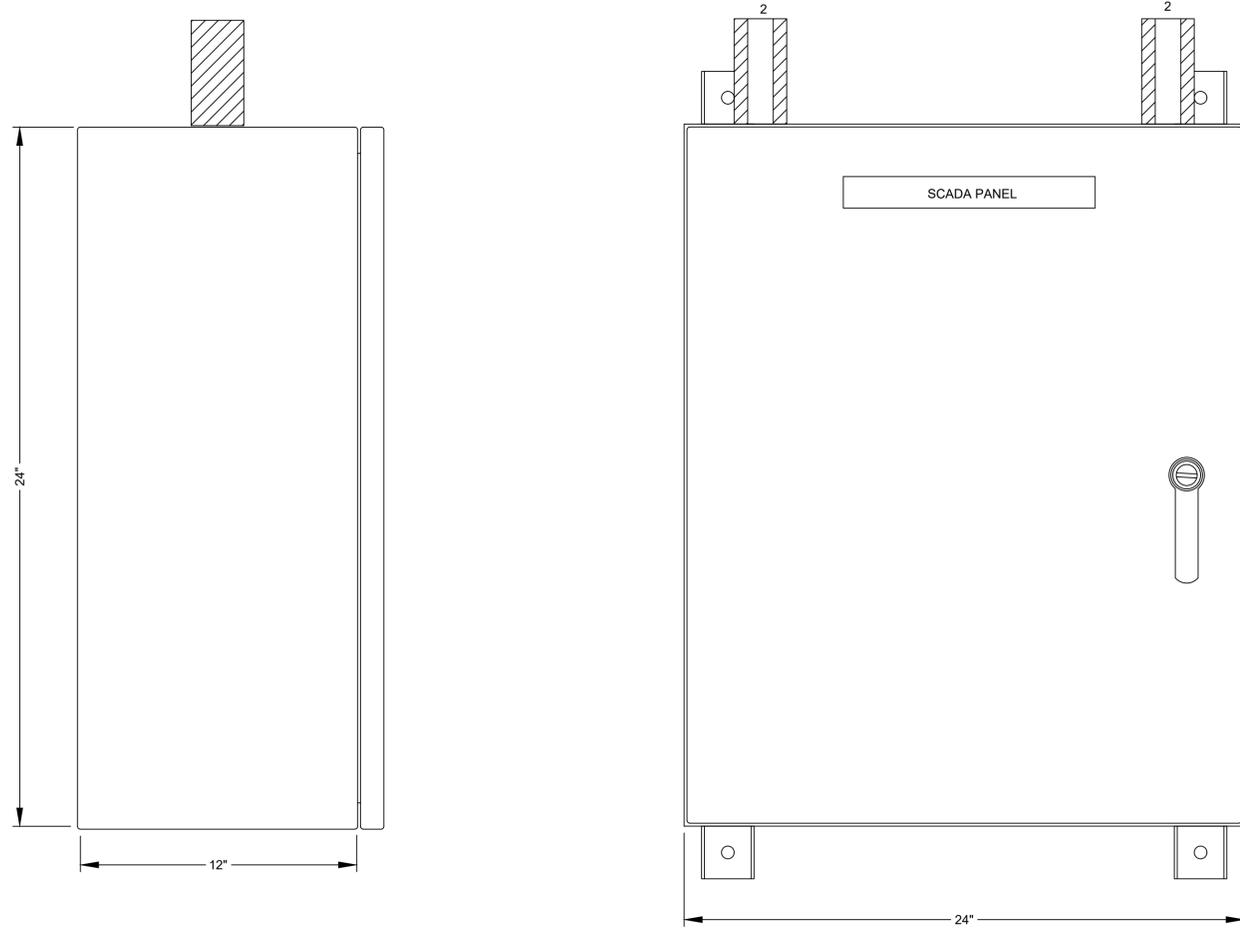


CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4**  
**CONTROL PANEL EQUIPMENT LAYOUT**

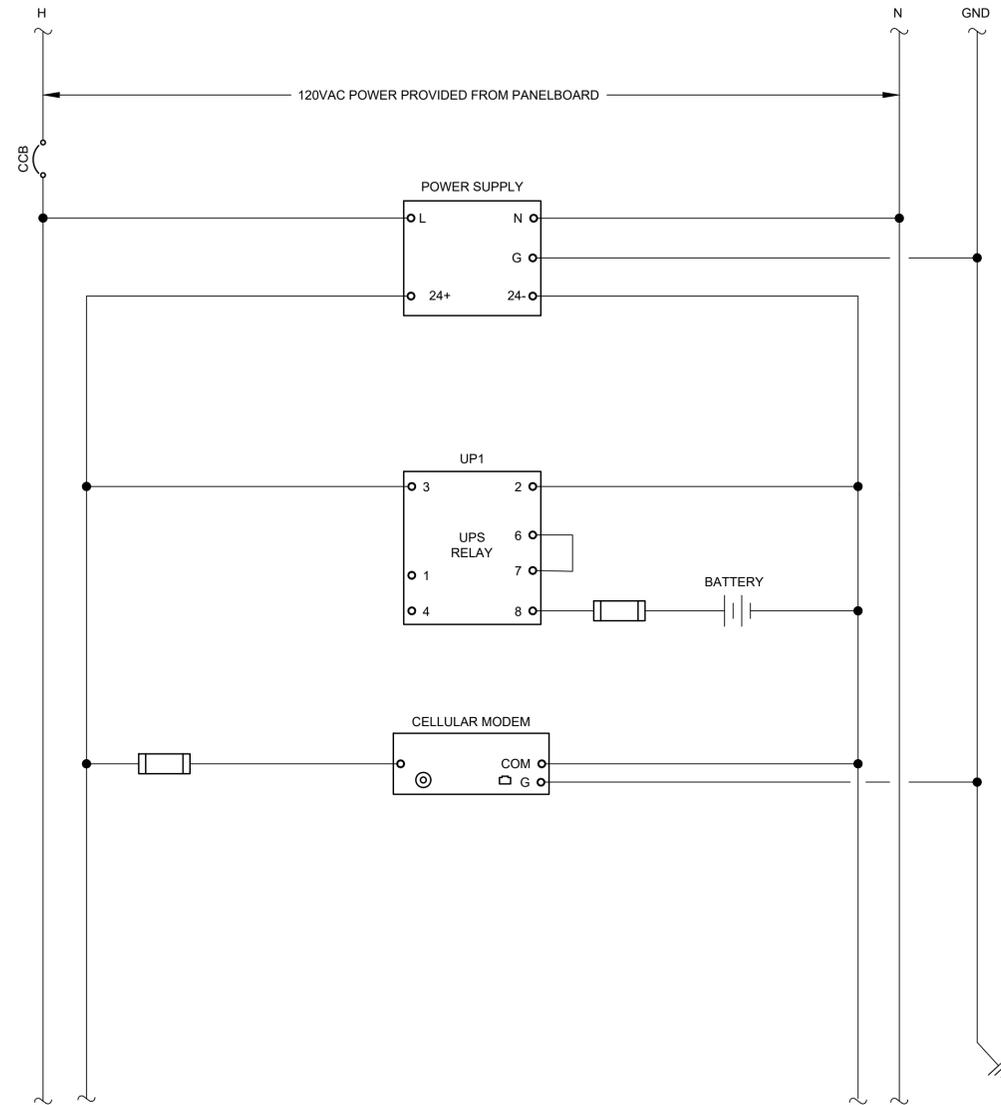


SCALE:	AS SHOWN	DWG. No.	LS4-E-10
DATE:	JAN 2025	DESIGNED:	GA
DRAWN:	NS	CONSULTANT'S PROJ. No.:	0101-01
		SHEET NO. 024 OF 025	

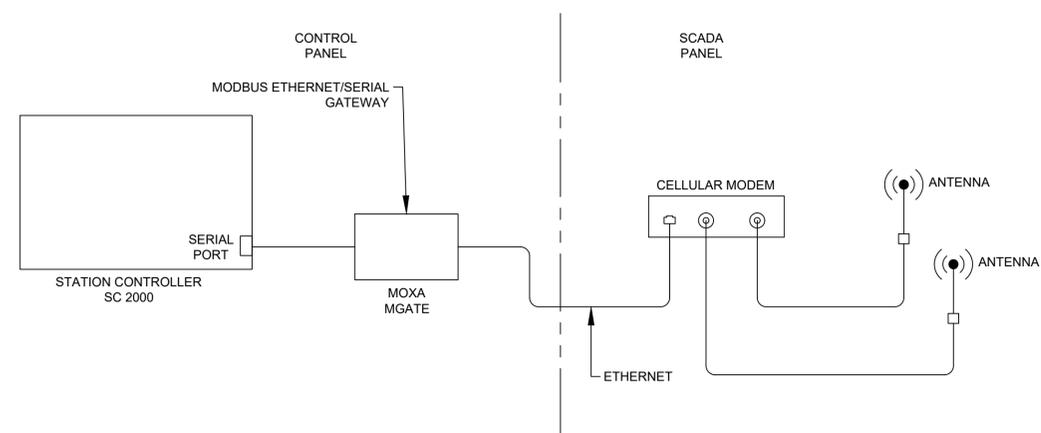


**SCADA PANEL EQUIPMENT LAYOUT**  
NTS

- 1 - CONTROL CIRCUIT BREAKER
- 2 - LAIRD ANTENNA
- 3 - CRADLE POINT CELLULAR MODEM
- 4 - POWER SUPPLY
- 5 - UPS RELAY
- 6 - BATTERY
- 7 - FUSE BLOCK



**SCADA PANEL DC POWER SUPPLY SCHEMATIC DIAGRAM**  
NONE



**NETWORK DIAGRAM**  
NTS

**GENERAL NOTES:**

- A. DRAWING IS PROVIDED TO GIVE CONTRACTOR WITH THE BASIC CONCEPT OF THE SCADA SYSTEM. CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPLETE WIRING DIAGRAMS.
- B. LAYOUT IS SHOWN FOR REFERENCE ONLY. EQUIPMENT SUPPLIER SHALL BE RESPONSIBLE FOR FINAL LAYOUT & SPACING.
- C. ENCLOSURE TO BE NEMA4X, 316 STAINLESS STEEL.
- D. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH OWNER'S PRE-SELECTED SCADA INTEGRATOR BEFORE SUBMITTING THE SUBMITTAL FOR REVIEW.
- E. CONTRACTOR SHALL COORDINATE WITH OWNER TO CONFIRM AND OBTAIN THE PREFERRED MODEL NUMBERS FOR THE CRADLEPOINT CELLULAR MODEM AND LAIRD ANTENNA PRIOR TO PROCUREMENT AND INSTALLATION.

MK	DESCRIPTION	DATE	DWN.	CHK.

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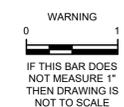
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City of Friendswood, Texas

CONSTRUCTION PLANS FOR:  
**LIFT STATION MITIGATION PROJECT**  
 PACKAGE 4 - LIFT STATION No.4

**LIFT STATION NO.4**  
**SCADA PANEL EQUIPMENT LAYOUT & SCHEMATIC DIAGRAM**



SCALE:	AS SHOWN	DWG. No.	LS4-E-11
DATE:	JAN 2025	SHEET No.	025 OF 025
DESIGNED:	GA		
DRAWN:	NS		
CONSULTANT'S PROJ. No.:	0101-01		