CIVIL PLANS

- C9.00 LIFT STATION SITE PLAN
- C9.00 LIFT STATION SITE PLAN
 C9.01 WET WELL PLAN & PROFILE
 C9.02 SANITARY SEWER PLAN & PROFILE FORCE MAIN
 C9.03 SANITARY SEWER PLAN & PROFILE FORCE MAIN
 C9.04 SANITARY SEWER PLAN & PROFILE FORCE MAIN
 C9.05 SANITARY SEWER PLAN & PROFILE FORCE MAIN
 C9.D1 LIFT STATION DETAILS

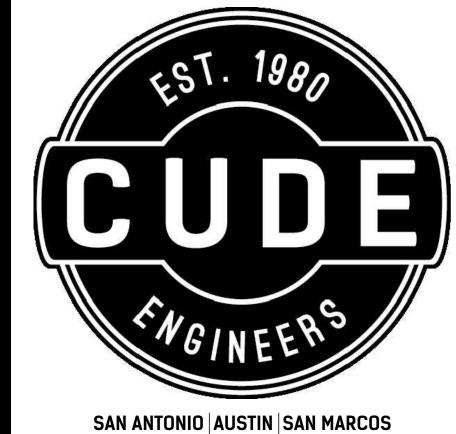
- C9.D2 LIFT STATION DETAILS
 C9.D3 LIFT STATION DETAILS

- E-1 ELECTRICAL SYMBOLS AND NOTES
- E-2 ELECTRICAL GENERATOR SPECIFICATIONS
- E-3 ELECTRICAL ATS SPECIFICATIONS
- E-4 ELECTRICAL SITE PLAN
- E-5 ELECTRICAL ONE-LINE DIAGRAM AND SCHEDULES
- E-6 ELECTRICAL PUMP CONTROL PANEL
- E-7 ELECTRICAL PUMP CONTROL PANEL
- E-8 ELECTRICAL SCADA PANEL • E-9 ELECTRICAL SCADA DETAILS
 • E-10 ELECTRICAL GENERAL DETAILS

- S1 STRUCTURAL DETAILS
- S2 STRUCTURAL DETAILS

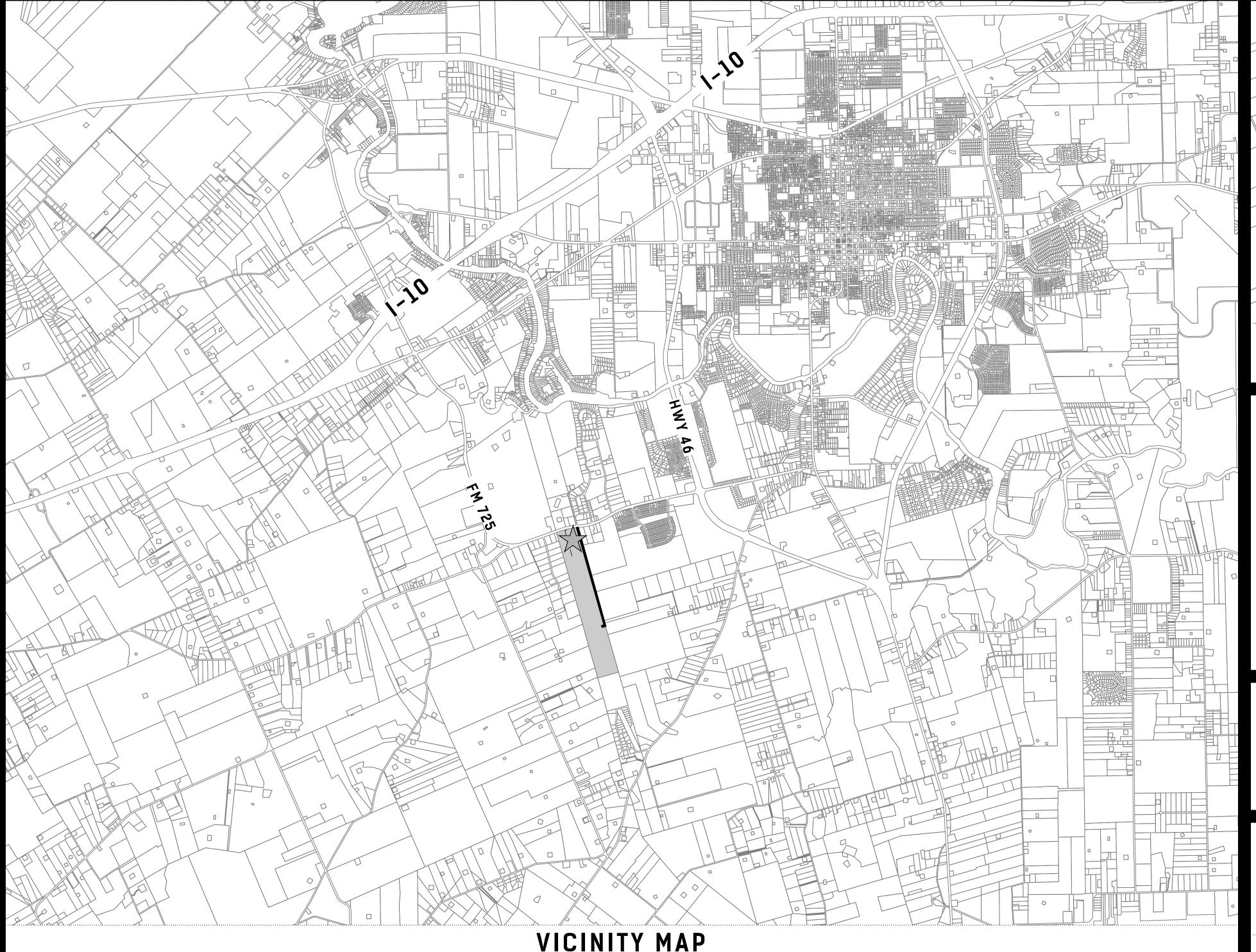
CONSTRUCTION DOCUMENTS FOR

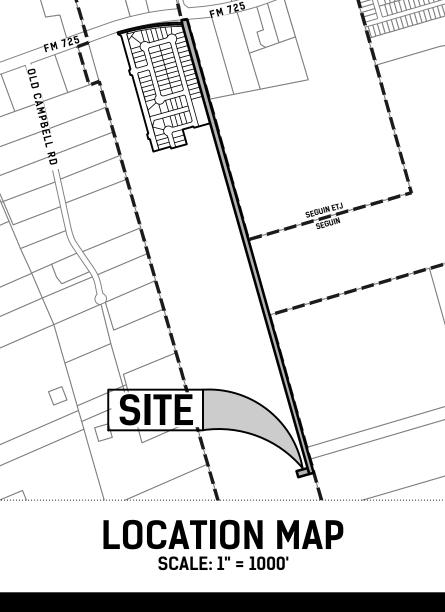
PARKHOUSE LIFT STATION



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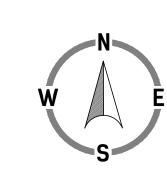
1290 WONDER WORLD DRIVE, SUITE 1240 SAN MARCOS, TEXAS 78666 P:(512) 260.9100 TBPE FIRM NO. 455 **TBPLS FIRM NO. 10048500** SBE CERTIFIED FIRM







DEVELOPER: REPUBLIC LAND AND DEVELOPMENT COMPANY, LP C/O KING FISH DEVELOPMENT, LLC CONTACT PERSON: OSCAR DOMINGUEZ 2722 WEST BITTERS ROAD, SUITE 106 SAN ANTONIO, TEXAS 78248 TEL: (210) 882-6800



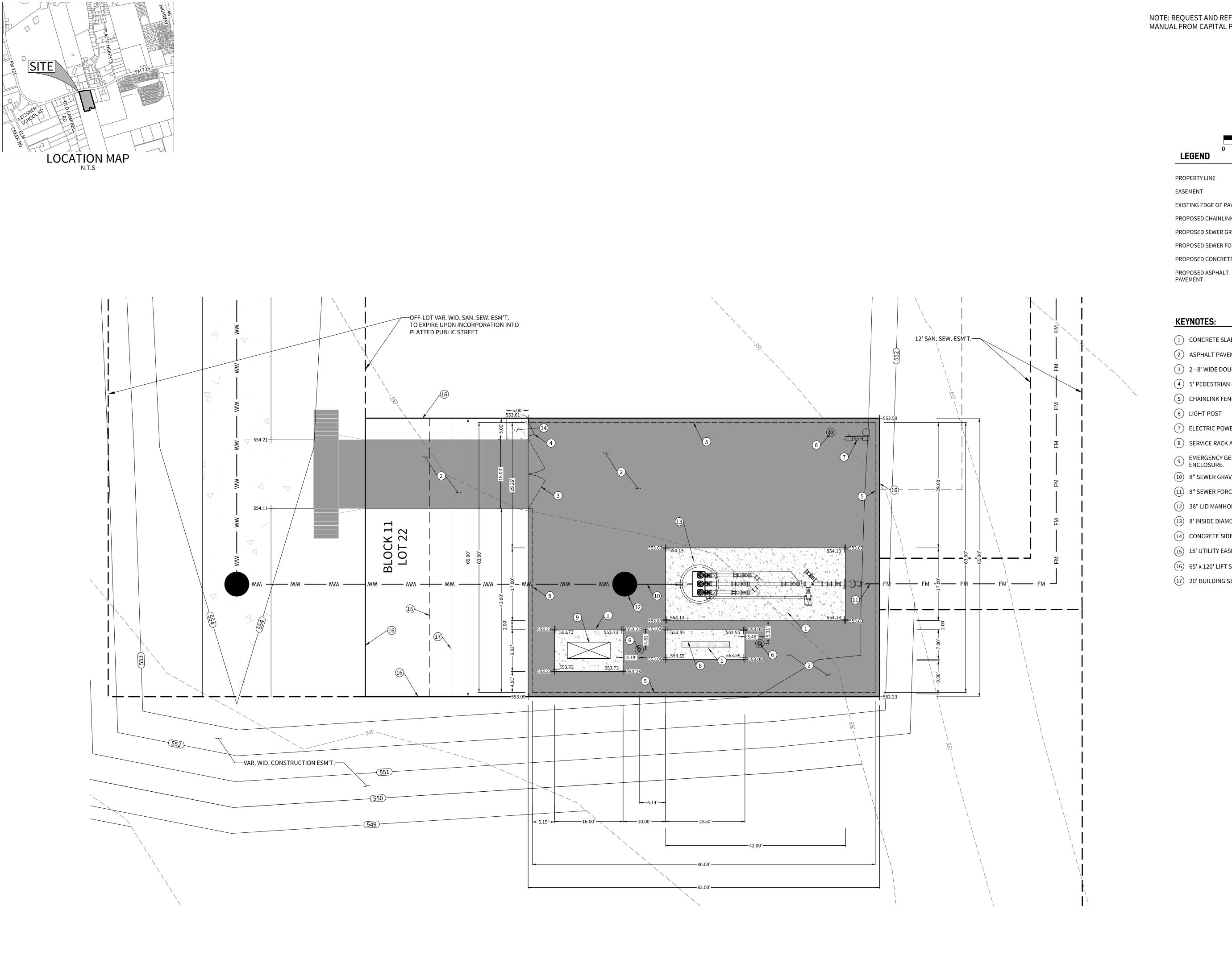
SITE ADDRESS: FM 725, SEGUIN, **TEXAS 78155 PLAN SET DATE: APRIL 2025**

PROJECT NUMBER: 04154.001

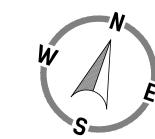


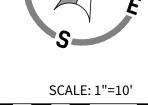
VICINITY MAP

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NOTE: REQUEST AND REFERENCE LIFT STATION TECHNICAL MANUAL FROM CAPITAL PROJECTS AND ENGINEERING.





ROPERTY LINE	
ASEMENT	
XISTING EDGE OF PAVEMENT	
ROPOSED CHAINLINK FENCE	x x x
ROPOSED SEWER GRAVITY MAIN	ww
ROPOSED SEWER FORCE MAIN	FM
ROPOSED CONCRETE PAD	

KEYNOTES:

- 1 CONCRETE SLAB SEE DETAIL 10 ON SHEET C9.D2
- 2 ASPHALT PAVEMENT SEE DETAIL 11 ON SHEET C9.D2
- 3 2 8' WIDE DOUBLE SWING GATE
- 4 5' PEDESTRIAN GATE
- 5 CHAINLINK FENCE SEE DETAILS ON SHEET C9.D3
- 6 LIGHT POST
- 7 ELECTRIC POWER SERVICE POLE & METER RACK
- 8 SERVICE RACK AND CANOPY
- 9 EMERGENCY GENERATOR WITH SOUND ATTENUATION ENCLOSURE.
- (10) 8" SEWER GRAVITY MAIN
- (11) 8" SEWER FORCE MAIN
- (12) 36" LID MANHOLE WITH SUMP ADJACENT TO WET WELL
- (13) 8' INSIDE DIAMETER WET WELL
- (14) CONCRETE SIDEWALK
- (15) 15' UTILITY EASEMENT

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- (16) 65' x 120' LIFT STATION LOT
- 20' BUILDING SETBACK LINE

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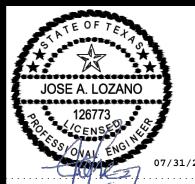
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PARK HOUSE Unit 1 STATION :

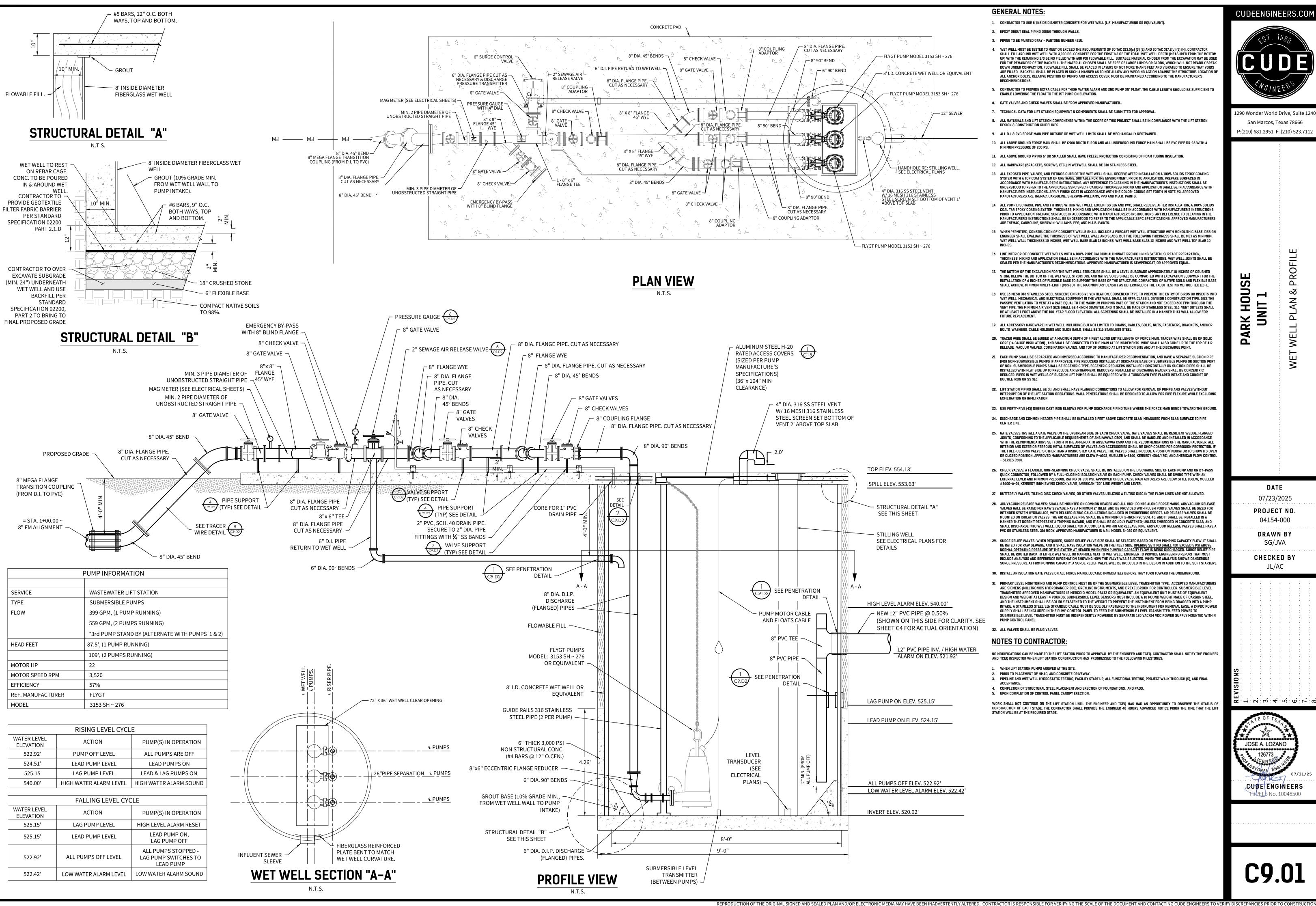
> DATE 07/11/2025 PROJECT NO. 04154-000

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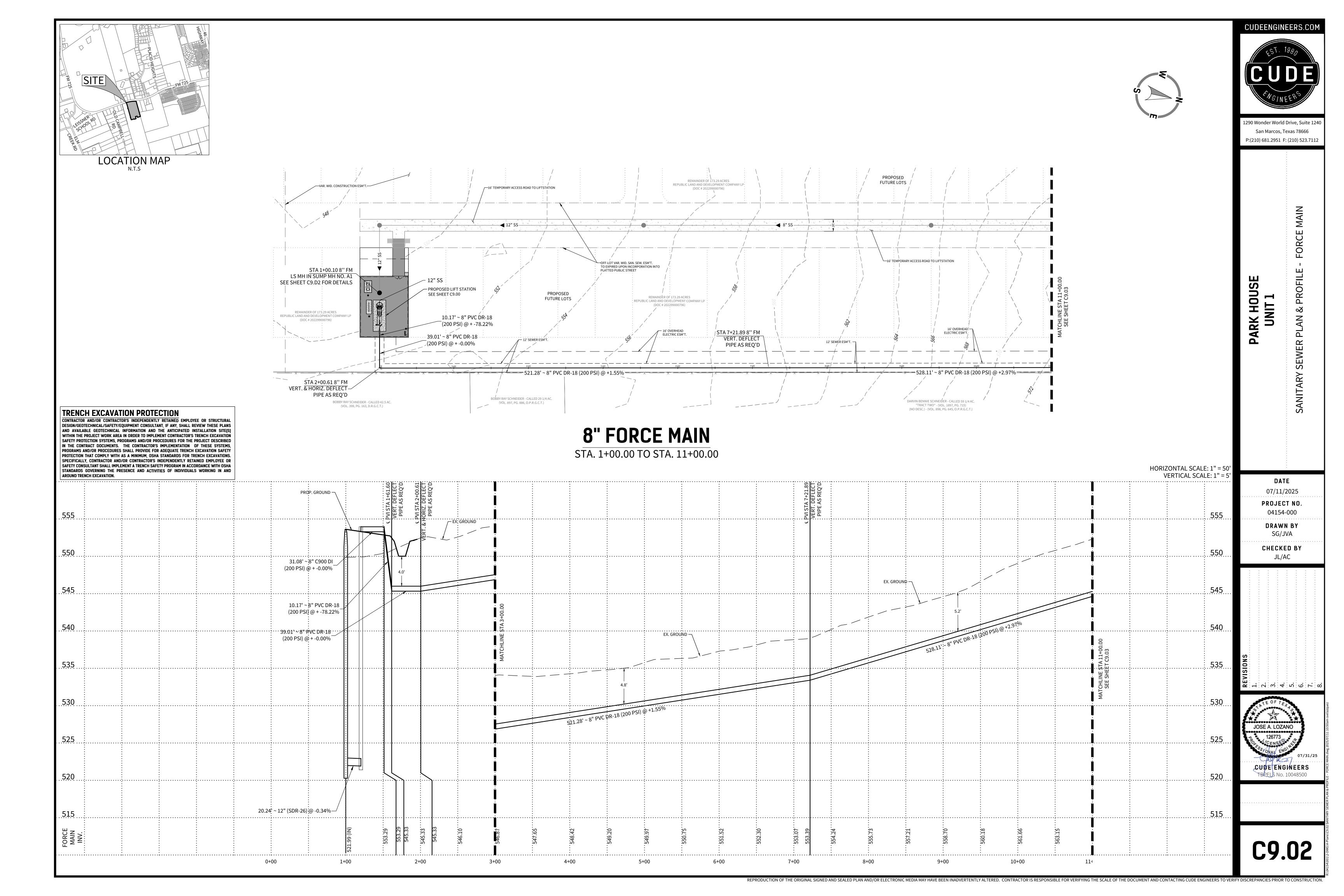
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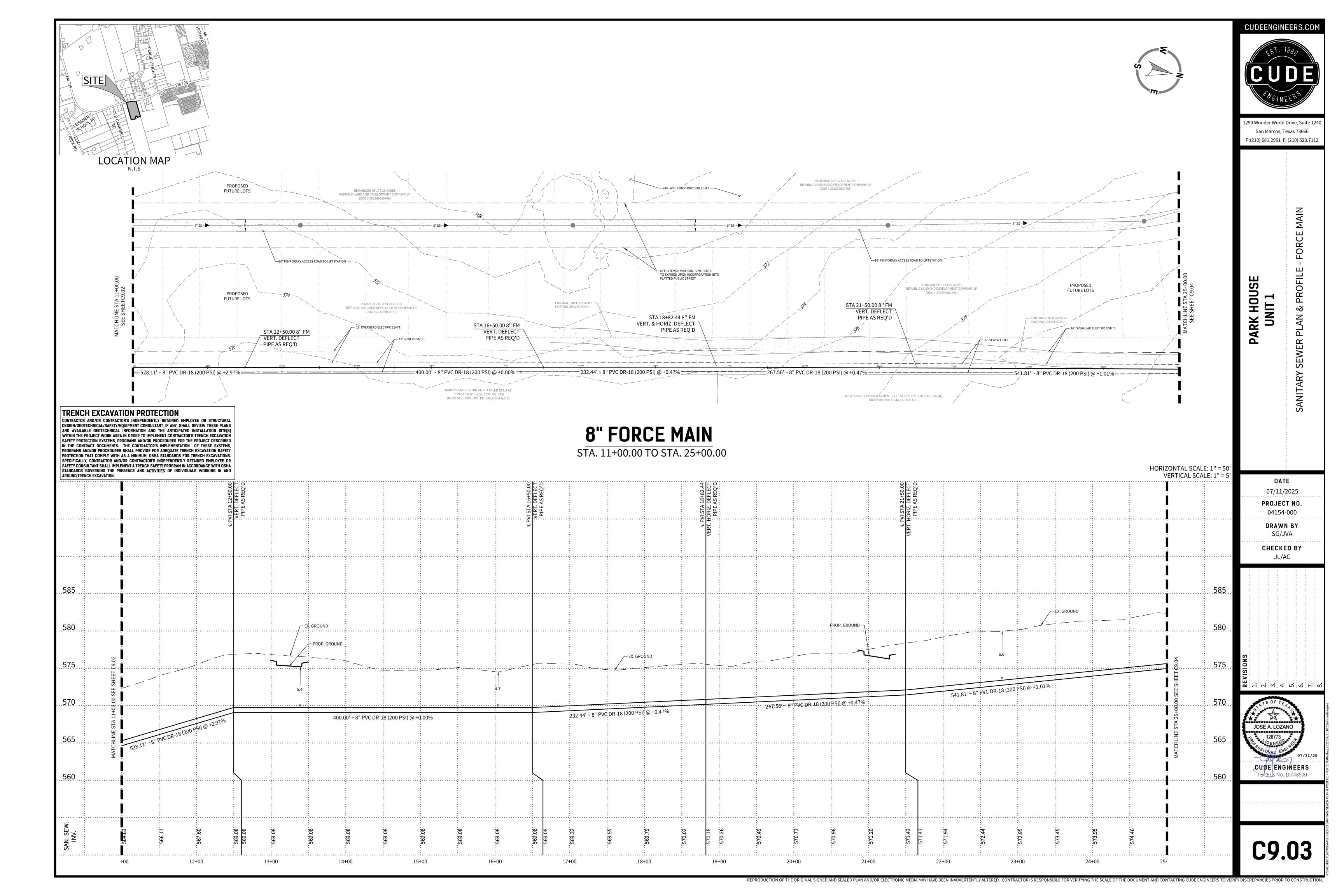
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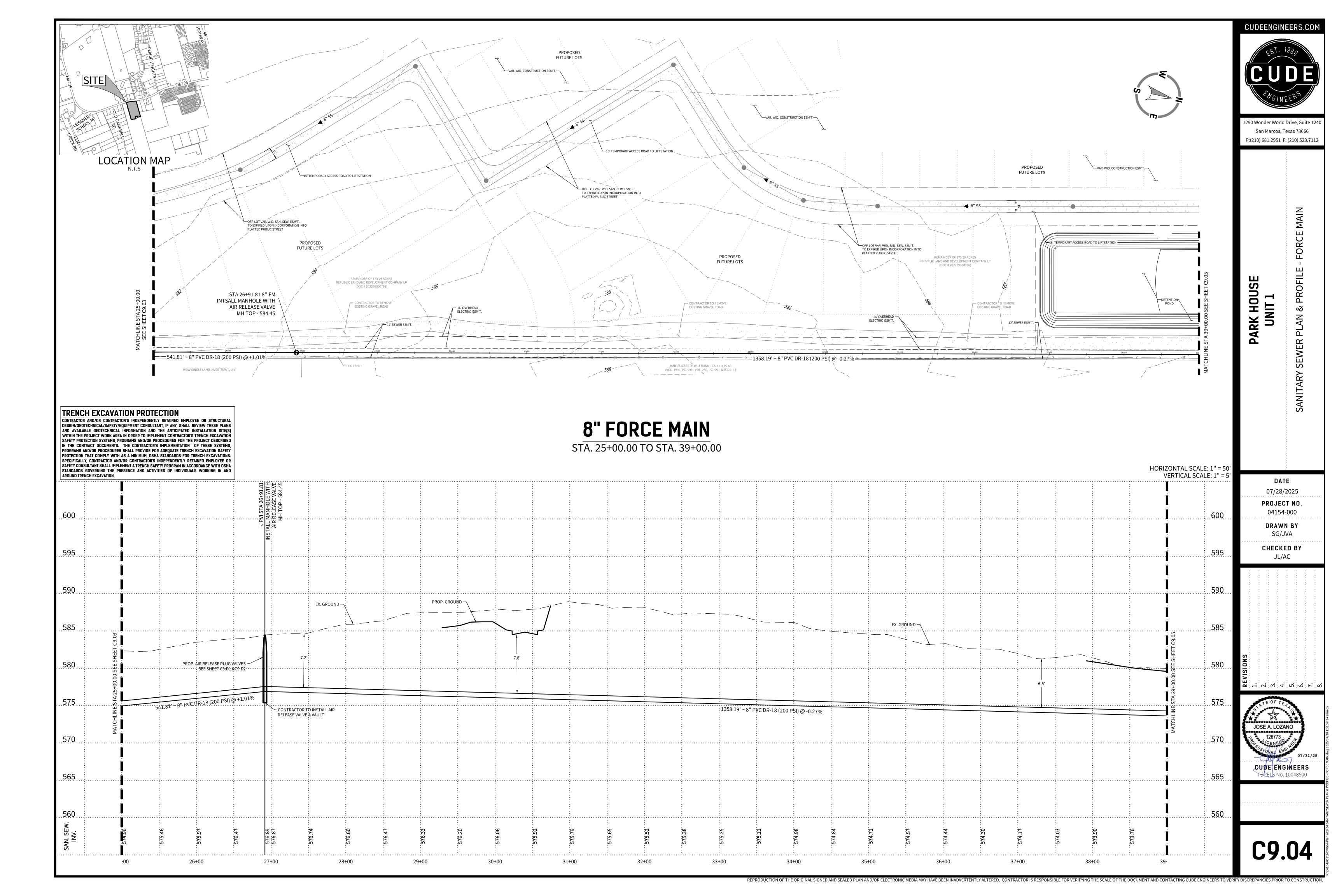
WORK SHALL NOT CONTINUE ON THE LIFT STATION UNTIL THE ENGINEER AND TCEQ HAS HAD AN OPPORTUNITY TO OBSERVE THE STATUS OF CONSTRUCTION OF EACH STAGE. THE CONTRACTOR SHALL PROVIDE THE ENGINEER 48 HOURS ADVANCED NOTICE PRIOR THE TIME THAT THE LIFT

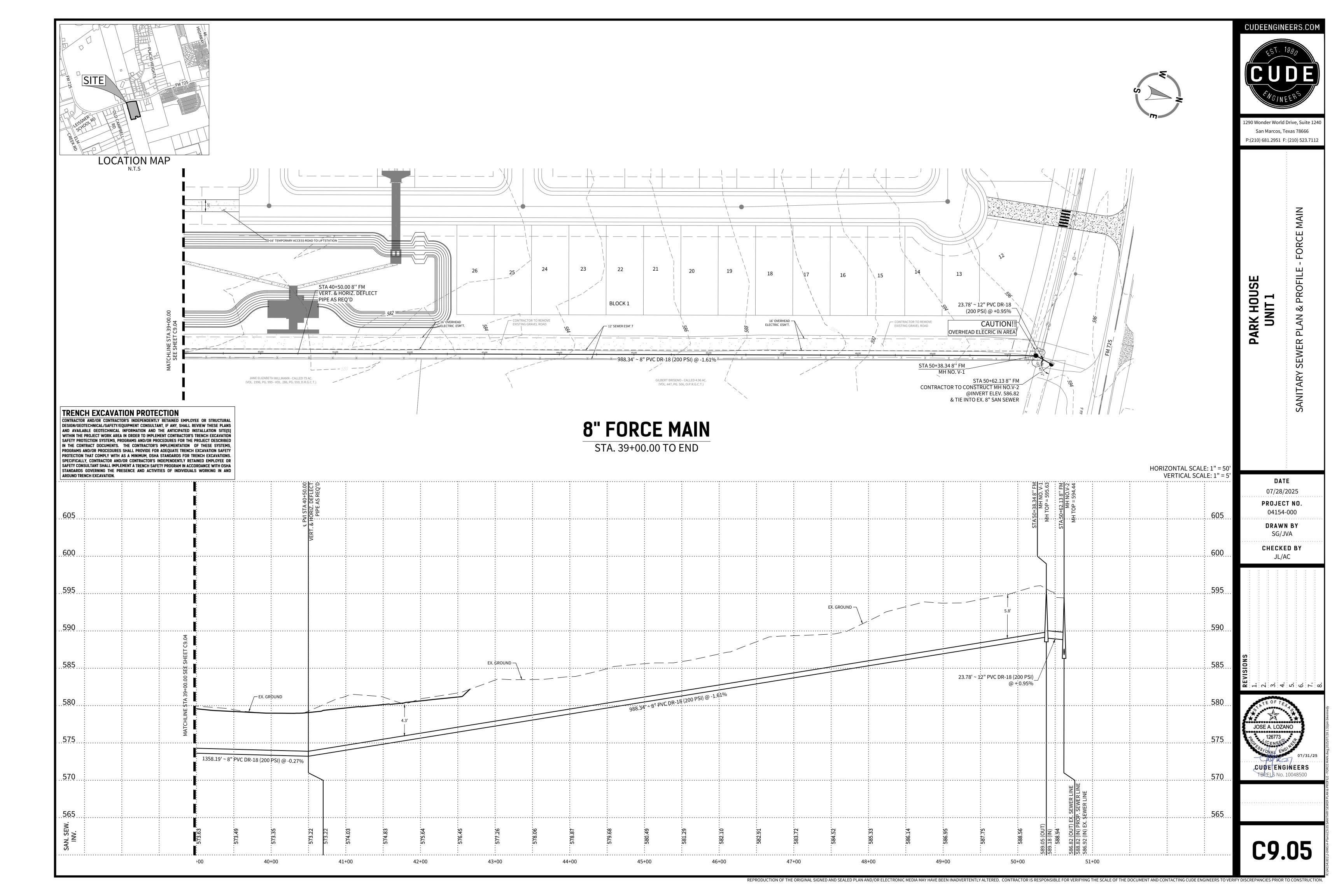


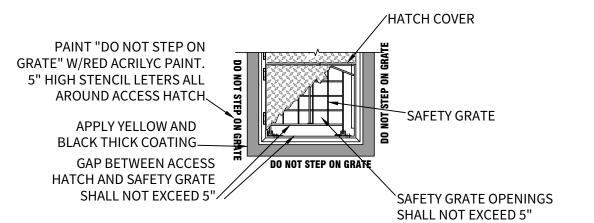
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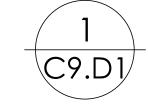


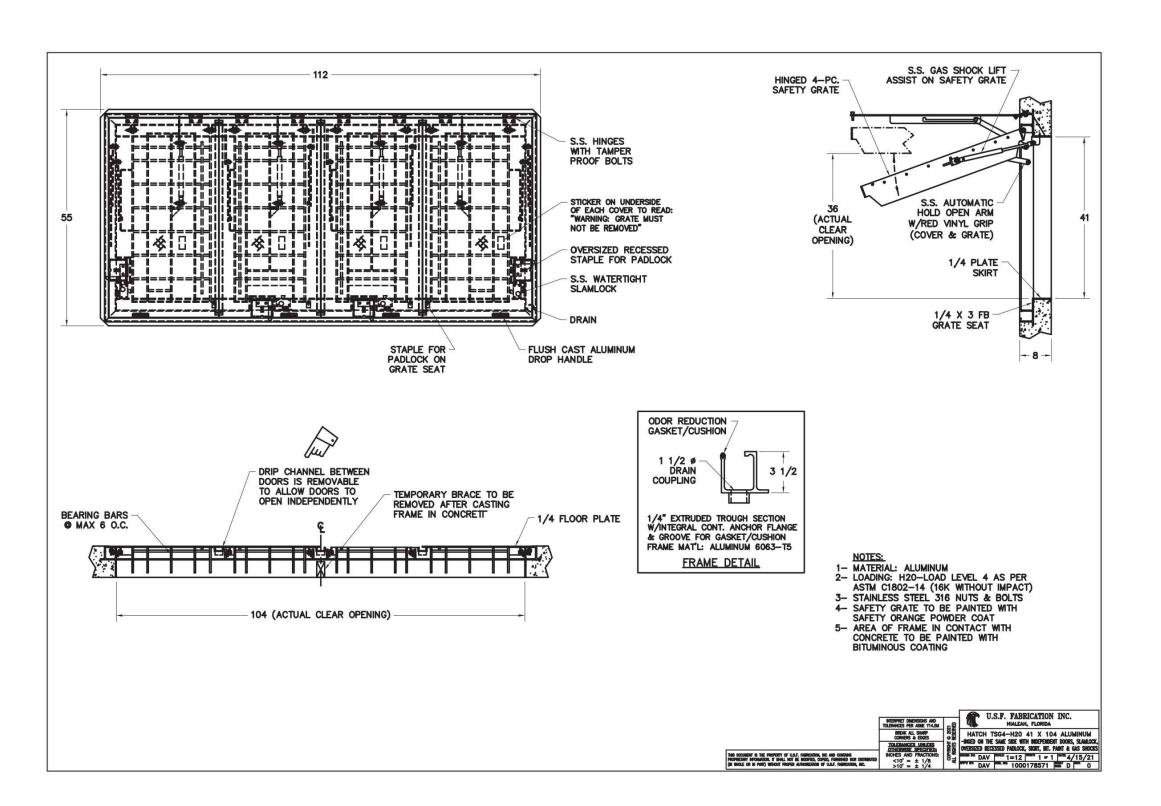
KEY NOTES:

- SAFETY GRATE SHALL BE UP TO ½" BELOW TOP OF CONCRETE SLAB, BUT IN NO CASE
- THE ½" DISTANCE SHALL BE EXCEEDED.

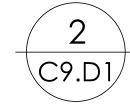
 ACCESS HATCH COVER SHALL BE PERFECTLY LEVELED WITH TOP OF CONCRETE SLAB.
- HINGES TO BE INSTALLED AT THE SAME SIDE AS THE PUMP DISCHARGE PIPING SO THAT THE DOOR OPENS TOWARD (AND NOT AWAY FROM) THE DISCHARGE PIPING.

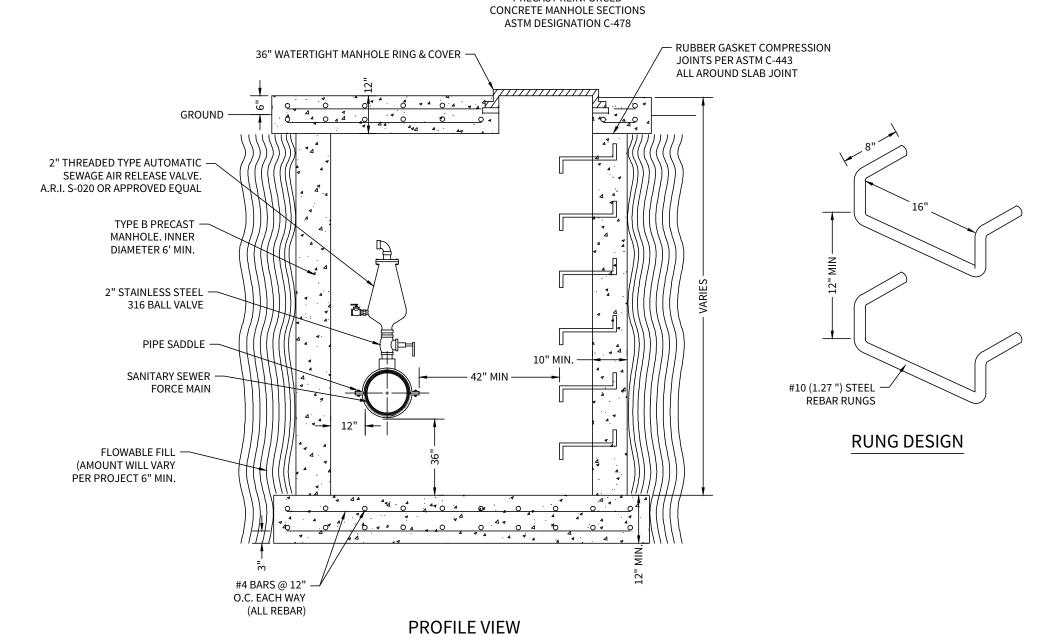
ACCESS COVER WITH SAFETY GRATE DETAIL SCALE: N.T.S.



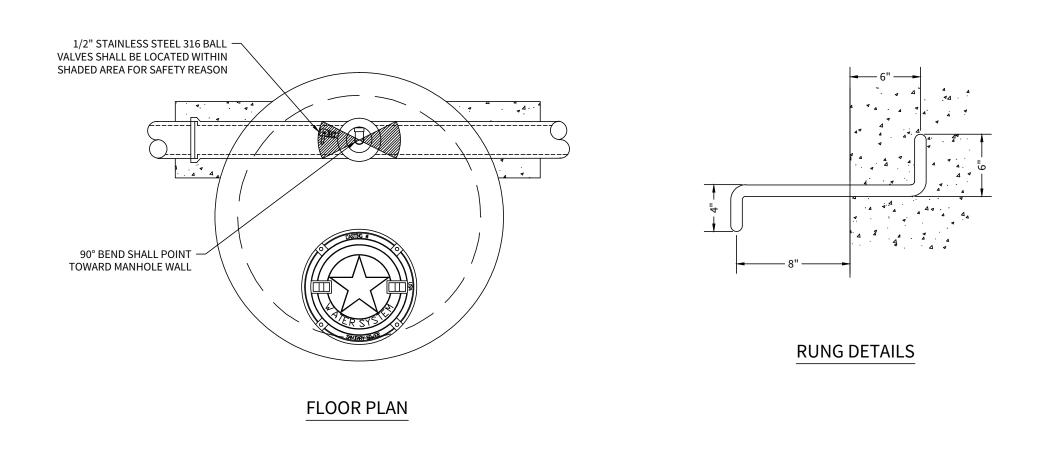


ACCESS COVER FRAME STRUCTURE DETAIL SCALE: N.T.S.





PRECAST REINFORCED

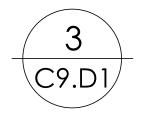


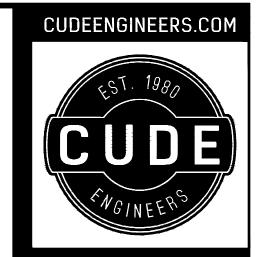
WATERTIGHT MANHOLE RINGS & COVERS SHALL BE TRANS-TEX A77 "O" RING OR APPROVED EQUAL.

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2. MOUNTING HARDWARE SHALL BE OF STAINLESS STEEL 316, UNLESS OTHERWISE NOTED.

AIR RELEASE VALVE MANHOLE VAULT DETAIL SCALE: N.T.S.





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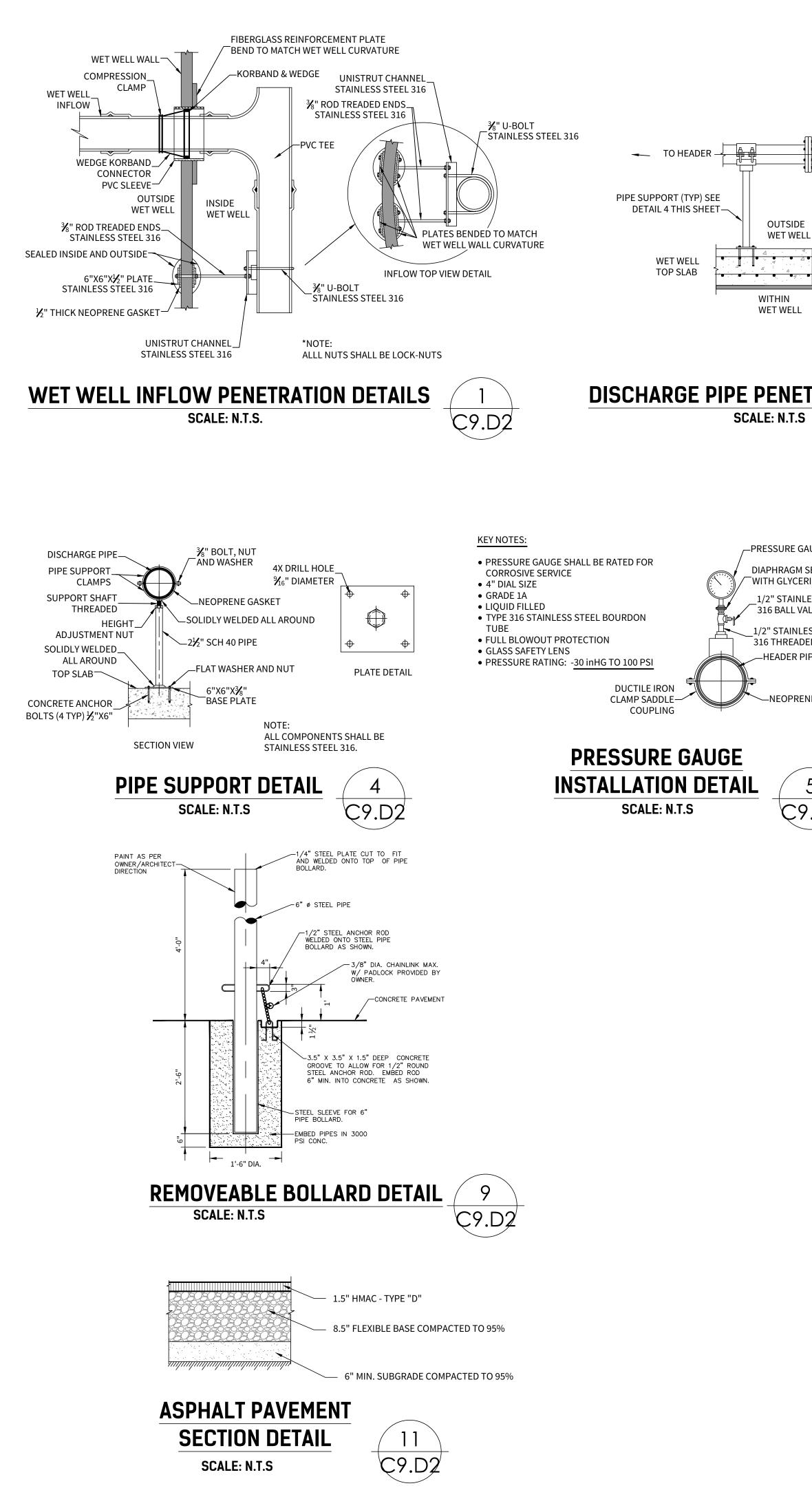
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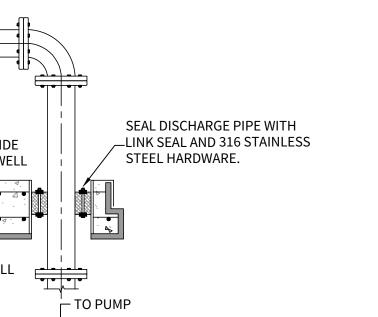
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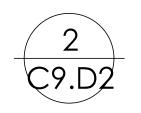


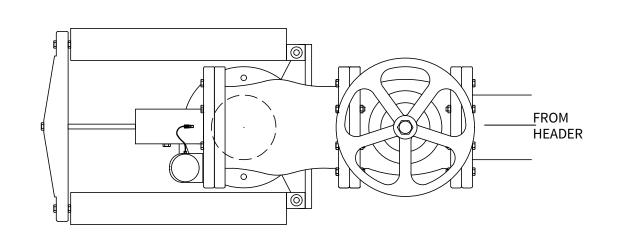
C9.D1



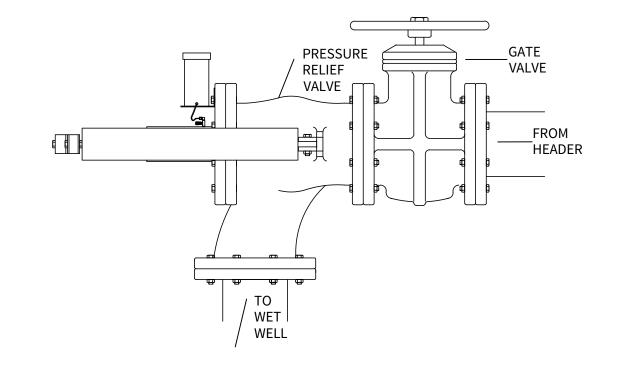






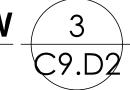


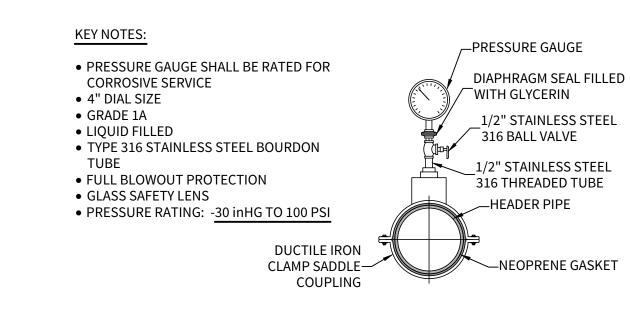


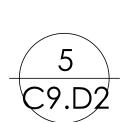


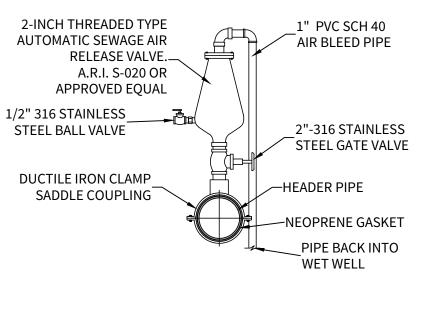
SURGE CONTROL VALVE PROFILE VIEW

SCALE: N.T.S.

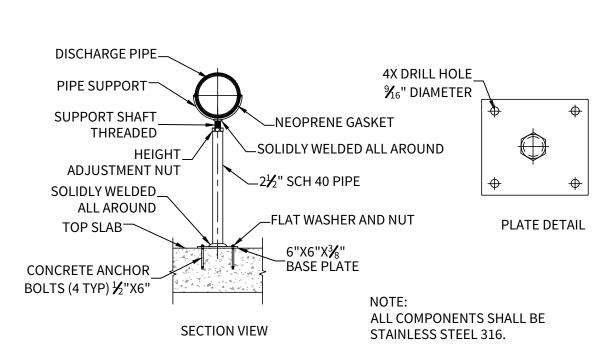




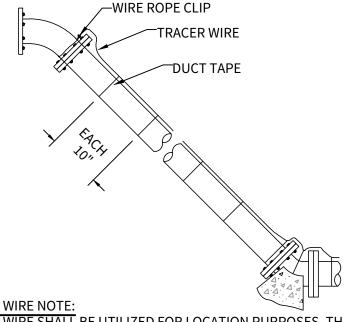




AIR/VACCUM RELEASE VALVE **INSTALLATION DETAIL** SCALE: N.T.S



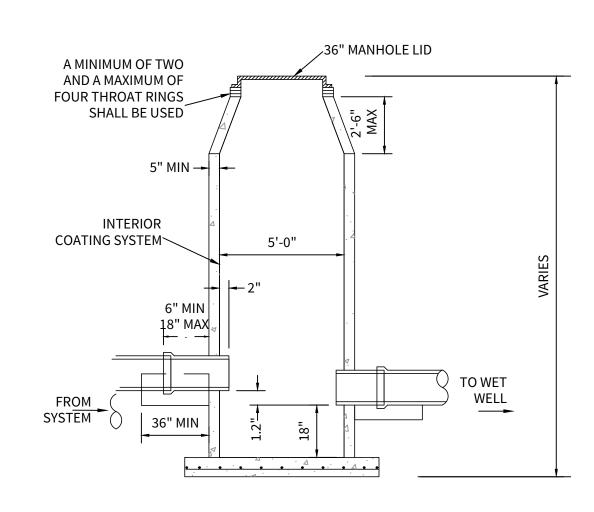
VALVE SUPPORT DETAIL SCALE: N.T.S



TRACER WIRE NOTE: TRACER WIRE SHALL BE UTILIZED FOR LOCATION PURPOSES. THE MAXIMUM BURY DEPTH SHALL BE THREE FEET, MINIMUM SHALL BE ONE FOOT. TRACER WIRE SHALL BE OF SOLID CORE (14 GAUGE INSULATED) AND SHALL BE TAPED TO THE MAIN A MINIMUM OF 10" INCREMENTS. WIRE SHALL ALSO COME UP TO THE TOP OF AIR RELEASE, VACUUM VALVES, TOP OF GROUND AT LIFT STATION, AND AT THE MAIN DISCHARGE POINT.

> TRACER WIRE DETAIL SCALE: N.T.S

DRAWN BY



PRECAST REINFORCED CONCRETE MANHOLE SECTIONS ASTM DESIGNATION C-478. MANHOLE TO BE COATED PER CITY OF SEGUIN SPECIFICATIONS

LIFT STATION SITE MANHOLE **ADJACENT TO WET WELL** SCALE: N.T.S

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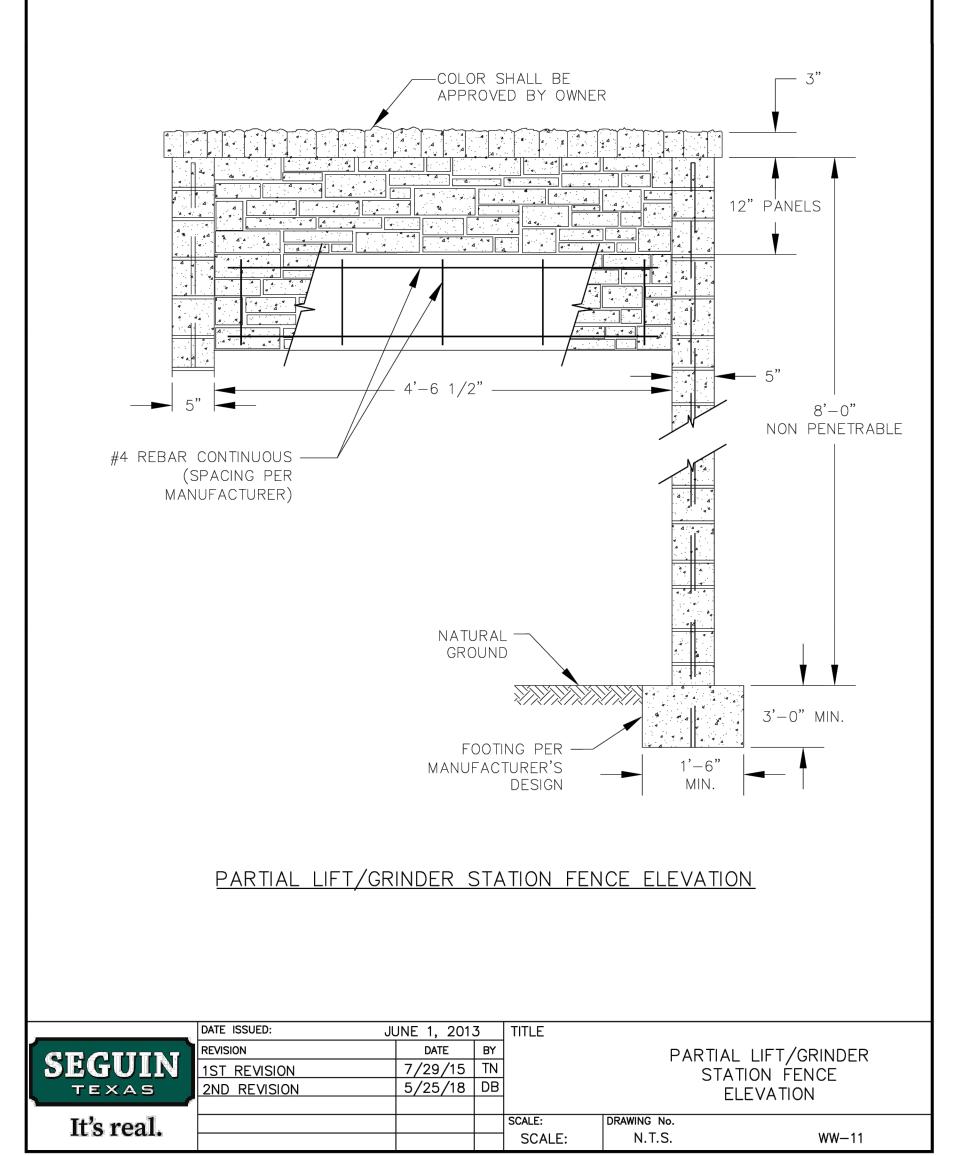
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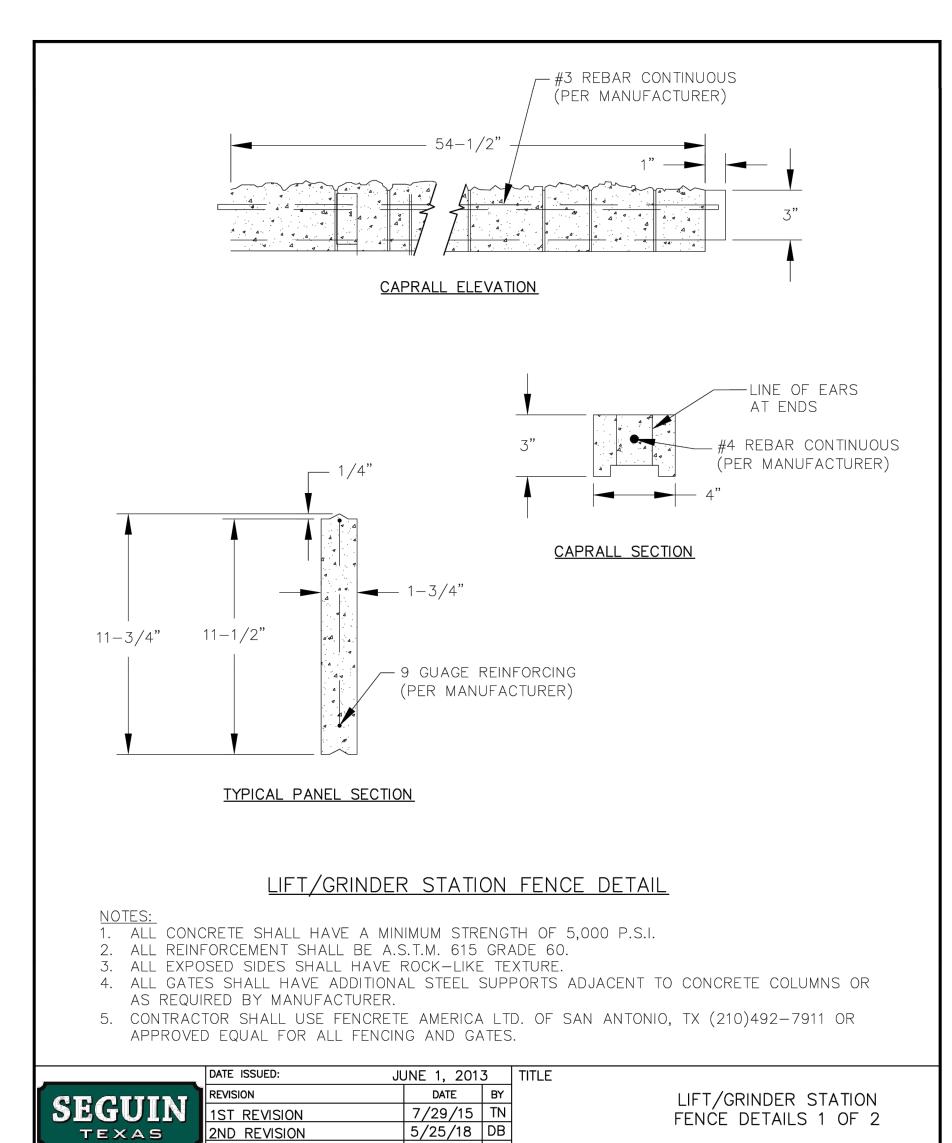
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C9.D2





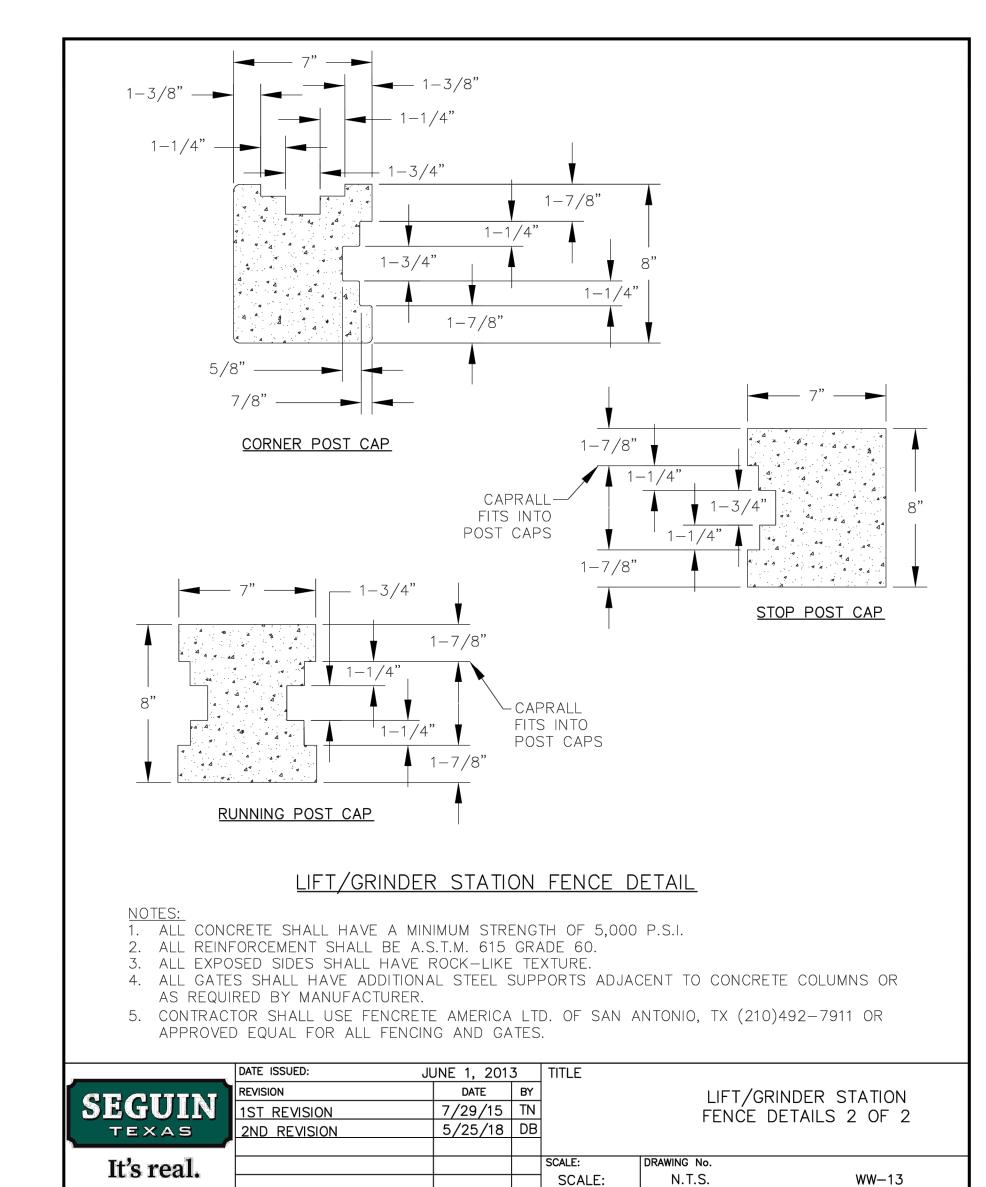
It's real.

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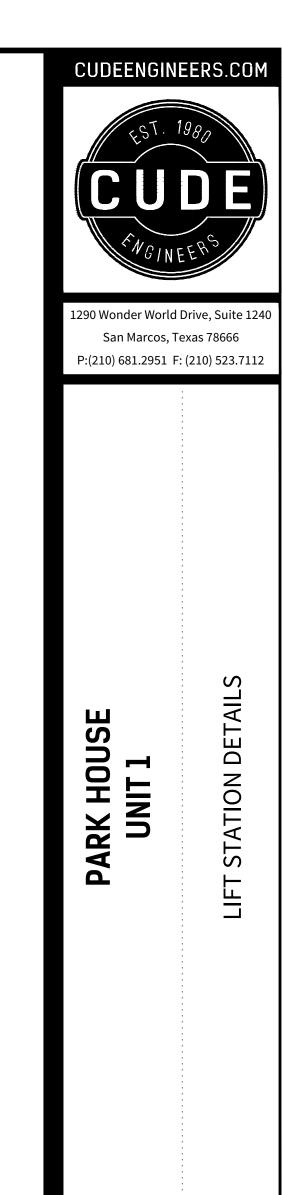
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WW-12

SCALE:



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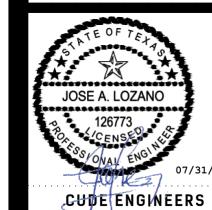


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C9.D3

TBPELS No. 10048500

CONCRETE & REINFORCEMENT GENERAL NOTES

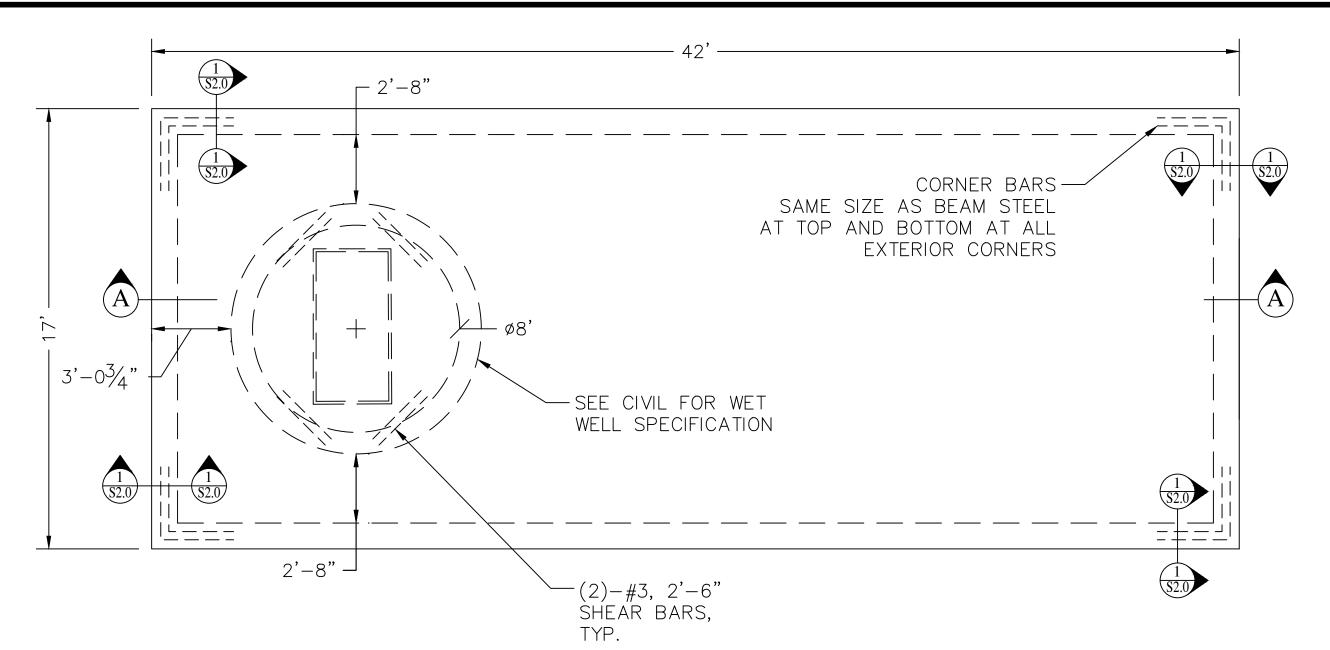
- 1.1 DESIGN, MATERIAL, AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE FOLLOWING STANDARDS
- ACI 318 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
- ACI DETAILING MANUAL.
- ACI 301 SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS. RECOMMENDED PRACTICE FOR PLACING REINFORCING STEEL.
- SAWS STANDARD SPECIFICATION 307 "CONCRETE STRUCTURES.
- 1.2 CONCRETE SHALL DEVELOP 4000 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS, EXCEPT AS NOTED ON DRAWINGS. FLY ASH PERMITTED. CLASS G CONCRETE SAWS STANDARD SPECIFICATION 300 "CONCRETE (NATURAL AGGREGATE).
- 1.3. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615 GRADE 60. SAWS STANDARD SPECIFICATION 301 "REINFORCING STEEL
- 1.4 WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185, (FLAT SHEETS ONLY).
- 1.5 UNLESS NOTED, CONCRETE COVER OVER REINFORCING SHALL BE: 3" WHEN THE CONCRETE IS PLACED DIRECTLY AGAINST THE GROUND
- 2" FOR BARS LARGER THAN NO. 5, AND 11/2" FOR NO. 5 AND SMALLER, IF AFTER
- REMOVAL OF FORMS THE CONCRETE IS EXPOSED DIRECTLY TO WEATHER OR GROUND. 1" IN SLABS AND WALLS, AND 11/2" FOR BEAMS AND COLUMNS NOT EXPOSED DIRECTLY TO WEATHER
- OR GROUND. 1.4. ALL REINFORCING HOOKS SHALL BE STANDARD HOOKS AS DEFINED BY ACI, UNLESS NOTED OTHERWISE.
- 1.5. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A 1 INCH, 45 DEGREE CHAMFER. 1.6. CONTRACTOR SHALL SUBMIT COMPLETE SHOP AND PLACING DRAWINGS AND OBTAIN APPROVAL PRIOR TO FABRICATION.
- 1.7. MAXIMUM AGGREGATE SHALL BE AS FOLLOWS:
 - WALLS, STRUCTURAL SLABS, BEAMS...
- FOOTING, SLABS ON GRADE. 1 1/2"
- 1.8. GRIND ALL CONSTRUCTION JOINTS IN SLAB SO AS TO PRODUCE A SMOOTH AND LEVEL SURFACE 1.9. WET WELL BOTTOM SLAB TO HAVE 'ROUGH' FINISH. SURFACE SLABS TO HAVE 'ROUGH' FINISH ON SIDES
- AND 'LIGHT BROOM' FINISH ON TOP.
- 1.10. SLOPE SLAB TO DRAIN AWAY FROM LIFT STATION SITE.
- 1.11. EXCAVATION FOR THE WET WELL STRUCTURE SHALL EXTEND 24" BELOW THE BOTTOM OF THE WET WELL STRUCTURE. NATIVE SOILS SHALL BE COMPACTED TO A DEPTH OF 6" WITH VIBRATORY COMPACTION EQUIPMENT. ABOVE THE NATIVE SOILS PLACE 6" OF FLEXIBLE BASE. COMPACTION OF NATIVE SOILS AND FLEXIBLE BASE SHALL ACHIEVE MINIMUM 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE TXDOT TESTING METHOD TEX 113-E AT THE OPTIMUM MOISTURE CONTENT TO +4%. ABOVE THE FLEXIBLE BASE
- PLACE 18" OF CRUSHED STONE. 1.12. SEE "DD-903-04" SAWS LIFT STATION DESIGN GUIDE FOR MORE INFORMATION.
- 1.13. SITE CLASS "D", UNO IN THE GEOTECHNICAL REPORT
- 1.14. REFER TO GEOTECHNICAL REPORT FOR GROUNDWATER CONDITIONS

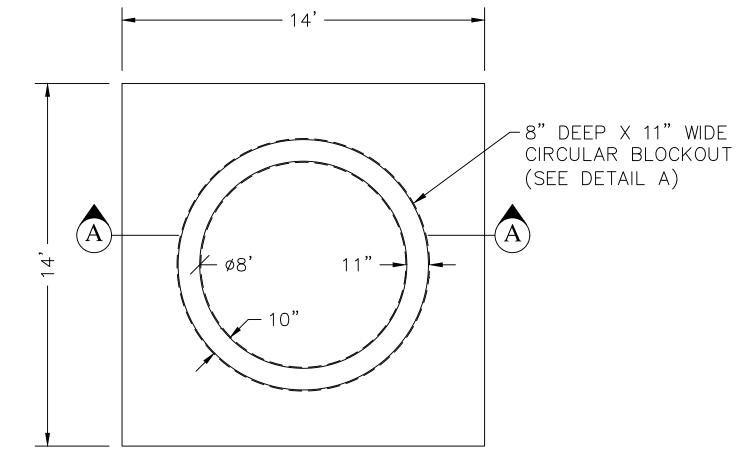
2.0 FOUNDATION CONSTRUCTION

- 2.1 THIS FOUNDATION DESIGN IS BASED ON FROST GEOSCIENCES, INC PROJECT NO. FGS-G2113. BORING B-22 IS CLOSEST TO THE LIFT STATION LOCATION PROVIDED TO OUTLIER AND WAS USED TO DESIGN THESE FOUNDATIONS. A MINIMUM OF 12INCHES OF SELECT FILL TO BE PLACED BENEATH ALL SURFACE SLAB ELEMENTS. THE RECOMMENDED DESIGN PI = 20. SURFACE FOUNDATIONS DESIGNED FOR 2000PSF BEARING PRESSURE. WET WELL FOUNDATION SIZED FOR MINIMUM 2000PSF BEARING PRESSURE.
- 2.2 SELECT FILL TO MEET TXDOT STANDARD SPECIFICATION ITEM 247 ANY GRADE. MAX PI= 20. FLOWABLE FILL MEETING STANDARD SPECIFICATION 401 MAY ALSO BE USED.
- 2.3 GENERATOR AND ELECTRICAL CANOPY SURFACE SLABS TO HAVE A MINIMUM OF 12INCHES OF SELECT FILL BENEATH ALL SURFACE ELEMENTS. 2.4 WET WELL EXCAVATION TO BE COMPLETELY FILLED WITH COMPACTED BACKFILL OR FLOWABLE FILL OR
- BOTH. THIS APPLIES TO THE PLAN LIMITS OF THE TOP SLAB. 2.5 FOLLOWING EXCAVATION, THE EXPOSED SUBGRADE AREAS SHALL BE PROOF-ROLLED TO EXPOSE ANY
- WEAK, SOFT, WET, OR OTHERWISE UNSUITABLE SOILS THAT SHALL BE REMOVED. 2.6 FOLLOWING PROOF-ROLLING, THE EXPOSED SUBGRADE SOILS SHALL BE SCARIFIED TO A DEPTH OF SIX (6) INCHES; MOISTURE CONDITIONED BETWEEN +/- 3 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AND COMPACTED TO AT LEAST 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED IN ACCORDANCE WITH TEX-114-E.
- 2.7 SOIL FROM SITE EXCAVATIONS SHALL NOT BE USED AS FILL MATERIAL.
- 2.8 SLAB FILL MATERIAL SHALL BE COVERED AND PROTECTED FROM GETTING WET PRIOR TO PLACEMENT IN THE FOUNDATION SLAB AREAS AND AFTER PLACEMENT IN THE FOUNDATION SLAB AREAS.
- 2.9 PLACE SELECT FILL IN THIN, LOOSE LIFTS LESS THAN 8INCHES THICK. COMPACT TO 95% OF THE MAXIMUM DENSITY DEFINED BY ASTM D 698.
- 2.10 CONDUCT FIELD DENSITY TESTS AT A RATE OF ONE PER 3,000SF PER LIFT AND TWO MINIMUM PER LIFT. 2.11 TRENCHING OF GRADE BEAMS SHALL BE EXCAVATED TO PROVIDE THE BEAM CROSS SECTION INDICATED. BEAM AND SLAB DEPTHS AND WIDTHS AS INDICATED ARE MINIMUM ACCEPTABLE SIZES. LARGER SIZE BEAMS AND SLABS FORMED BY LESS ACCURATE TRENCHING MAY REQUIRE ADDITIONAL REINFORCING NOT SHOWN WHICH SHALL BE DETERMINED BY THE ENGINEER DURING CONSTRUCTION REVIEW. ALL LOOSE DIRT FROM SIDES AND BOTTOMS OF TRENCHES SHALL BE REMOVED. HAUNCHES SHALL BE CUT ON EACH SIDE OF TRENCHES OF ADEQUATE SIZE TO MAINTAIN THE VERTICAL SIDES OF THE TRENCH.
- 2.12 PROVIDE A LAYER OF 10 MILL. POLYETHYLENE VAPOR BARRIER MEMBRANE OR EQUIVALENT BENEATH ALL SLAB AREAS. THE VAPOR BARRIER MEMBRANE MUST BE TAPED AT ALL SPLICES AND TEARS. BARRIER MEMBRANE MUST EXTEND TO THE BOTTOM OF THE SIDES OF THE BEAM TRENCHES. IF BARRIER IS EXTENDED ACROSS BOTTOM OF BEAM, BARRIER MUST BE FLAT FORMING A SQUARE BOTTOM TO THE BEAM.
- 2.13 ALL EXTERIOR FOUNDATION BEAMS ARE TO BE EXCAVATED AND EMBEDDED INTO UNDISTURBED SOIL OR PROPERLY COMPACTED LOT FILL MATERIAL TO A MINIMUM DEPTH OF 6 INCHES OR AS NOTED IN THE DETAILS AND DESIGN CHART ON THIS DRAWING, WHICHEVER IS GREATER, OR INTO BEDROCK TO A MINIMUM DEPTH OF
- 2.14 REMOVE FREE WATER FROM BEAM TRENCHES AND ALL OTHER EXCAVATIONS BEFORE PLACING CONCRETE. CLEAN BOTTOM OF BEAM TRENCHES OF LOOSE SOIL, ROOTS, GRAVEL, AND ALL DEBRIS PRIOR TO PLACING CONCRETE. CONCRETE SHALL NOT BE PLACED ON SOILS THAT HAVE BEEN DISTURBED BY RAINFALL OR WATER SEEPAGE.

3.0 BOTTOM SLAB CONSTRUCTION

- 3.1 AS PRECAST SEGMENT PROFILES VARY BETWEEN MANUFACTURERS, CONTRACTOR SHALL SUBMIT, BEFORE CONSTRUCTION, DETAILS OF ALL PRECAST TO CAST-IN-PLACE CONCRETE JOINT CONDITIONS INCLUDING LOCATIONS OF SEALANT TO ENGINEER FOR REVIEW.
- 3.2 PROVIDE A CONTINUOUS 7 1/2" TO 8" DEEP X 11"WIDE CIRCLE BLOCKOUT CENTERED ON PRECAST SHELL (SEE CIVIL FOR INSIDE RADIUS) IN MAT SURFACE TO RECEIVE PRECAST. BLOCKOUT MAY BE TAPERED UP 1/3" TO 1" AT TOP FOR EASE OF FORM REMOVAL.
- 3.3 AFTER REMOVAL OF BLOCKOUT, PROVIDE 3 ROWS OF 1/3"X3/4" CONTINUOUS BEADS OF ADEKA P-21 ELASTIC SEALANT BELOW BOTTOM OF PRECAST SHELL. ALLOW SEALANT TO FULLY CURE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION BEFORE INSTALLING PRECAST RINGS ABOVE.
- 3.4 AFTER BOTTOMMOST PRECAST SHELL HAS BEEN INSTALLED, COMPLETELY FILL THE INTERIOR AND EXTERIOR ANNULAR SPACES BETWEEN SHELL AND MAT CONCRETE WITH EUCLID NS GROUT (FLOWABLE NON-SHRINK) BY EUCLID CHEMICAL.
- 3.5 INSTALL GROUT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. ALLOW 48 HRS MIN CURING TIME BEFORE INSTALLING ADDITIONAL SHELLS.





∠INTERIOR WALL OF

-#6 @ 12" C/C

T & B EACH

6" FLEXIBLE BASE

-COMPACT NATIVE SOILS

NOTE ON SAWS LIFT

STATION DESIGN AND

TO 98% SEE COMPACTION

CONSTRUCTION GUIDELINES

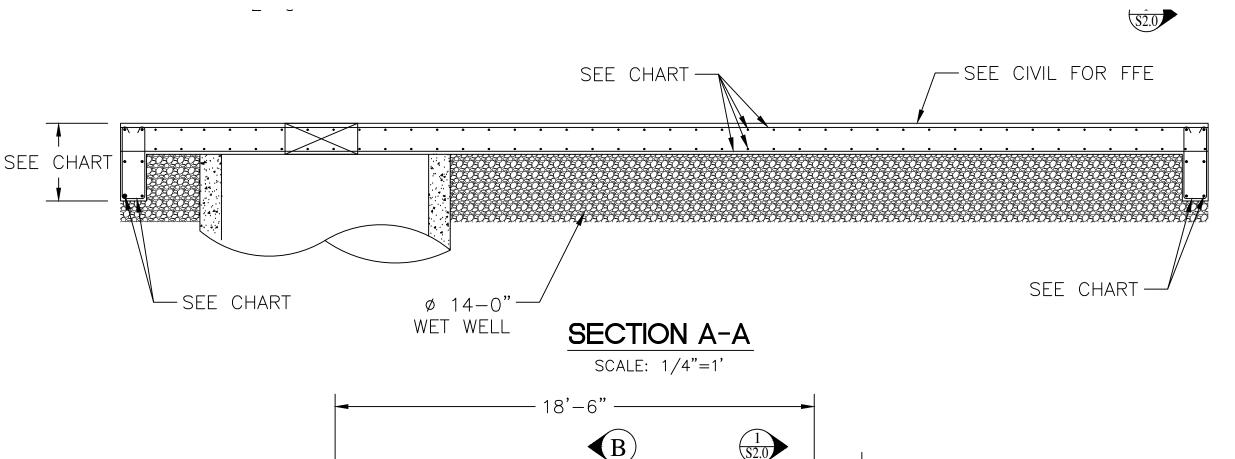
WET WELL

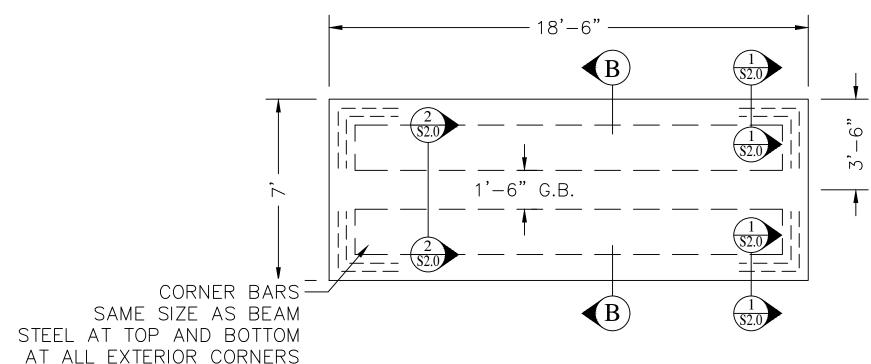
PLAN VIEW OF LIFT STATION BOTTOM SLAB

SCALE: 1/4"=1'

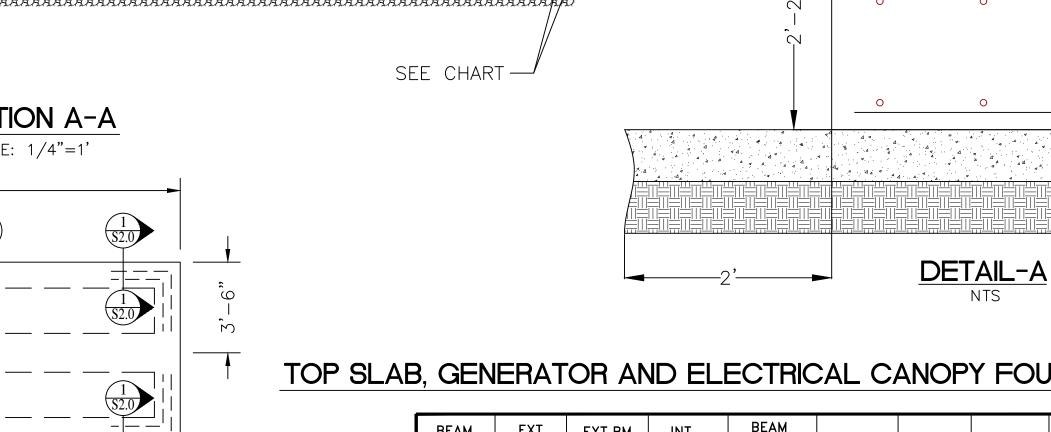
PLAN VIEW OF LIFT STATION TOP SLAB

SCALE: 1/4"=1'





ELECTRICAL CANOPY FOUNDATION SCALE: 1/4"=1



TOP SLAB, GENERATOR AND ELECTRICAL CANOPY FOUNDATION CHART

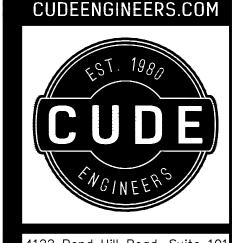
SEE NOTES FOR-

FILL REQUIREMENT

BEAM WIDTH (MINIMUM)	EXT. BEAM DEPTH	EXT.BM. DEPTH IN GRADE	INT. BEAM DEPTH	BEAM BARS T & B	STIRRUP EXT. BEAM	STIRRUP INT. BEAM	PAD BARS	SLAB THICKNESS
12" EXT. 12" INT.	24"MIN.	6" MIN.	24" MIN.	2-#6 BTM 2-#6 TOP		#3 @24"0.C.	2 MATS #4 @12"0.C.	12"

BUILDER/CONTRACTOR TO VERIFY ALL DIMENSIONS, DROP AREAS, FLOOR PENETRATIONS, AND BLOCK-OUT LOCATIONS ON SITE.

GRADE BEAM WIDTH SHALL BE REFERENCED FROM CHART, U.N.O.



22 Pond Hill Road, Suite 10 San Antonio, Texas 78231 P:(210) 681.2951 F: (210) 523.7112

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DATE 05/15/2025 PROJECT NO. 04154-000 DRAWN BY

PPS

REVISIONS

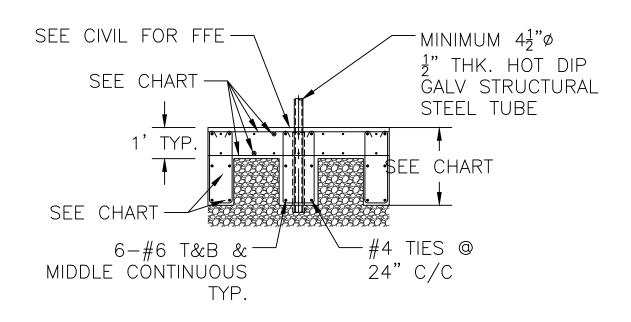
CHECKED BY AS

* A.M. STONE

91049 ENGINEERING, INC TBPE No. 14384

PLAT NO.

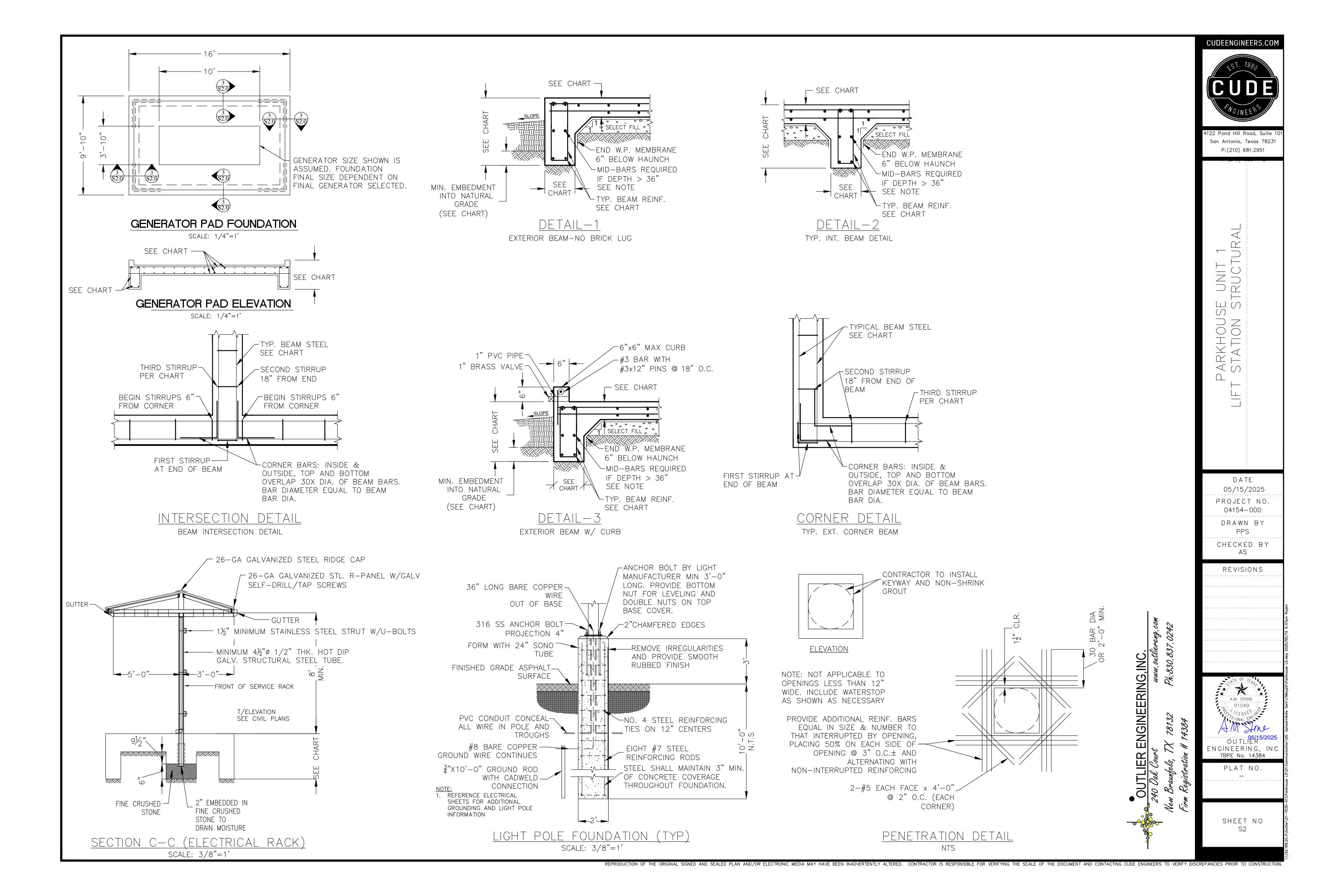
SHEET NO S1



SECTION B-B SCALE: 1/4"=1'

REPRODUCTION OF THE ORIGINAL SIGNED AND SEALED PLAN AND/OR ELECTRONIC MEDIA MAY HAVE BEEN INADVERTENTLY ALTERED. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE SCALE OF THE DOCUMENT AND CONTACTING CUDE ENGINEERS TO VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION

ENGINEERING, INC





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TELEPHONE OUTLET - WALL

PROVIDE 4X4 OUTLET BOX IN-WANQUINNTED 38"4"A PRONDUNT

TO ABOVE CEILING WITH PULL WIRE. WIRING BY OTHERS.

COMPUTER OUTLET - WALL - MOUNTED 18" AFF UON. PROVIDE 4X4 OUTLET BOX IN WALL WITH 3/4" CONDUIT

TO ABOVE CEILING WITH PULL WIRE. WIRING BY OTHERS.

DUPLEX RECEPTACLE ON COUNTER TOP

FOURPLEX RECEPTACLE ON COUNTER TOP

DOUBLE DUPLEX RECEPTACLE ON COUNTER TOP

CP

DISCONNECT SWITCH (600V, 30A, 3P)

CONTROL PANEL

- 1. ALL WORK SHALL MEET THE REQUIREMENTS OF THE LATEST ADOPTED VERSION OF THE NATIONAL ELECTRICAL CODE 2. CONTRACTOR SHALL PROVIDE ELECTRICAL INSPECTION CERTIFICATION VIA UL APPROVED AGENCY HAVING AREA
- CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL ELECTRICAL PERMITS AND ELECTRICAL INSPECTION. 4. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, AND SUPERVISION TO STORE, HANDLE, AND INSTALL
- EQUIPMENT AND SYSTEMS AS SHOWN ON DRAWINGS AND DESCRIBED IN NOTES. MATERIALS FURNISHED BY OTHERS SHALL BE INSTALLED COMPLETE. THE CONTRACTOR SHALL PROVIDE PROOF OF CURRENT LICENSING AS REQUIRED BY CURRENT STATE AND LOCAL REQUIREMENTS.
- 5. ALL MATERIAL SHALL BE NEW AND BEAR THE LABEL OR LISTING OF A NATIONALLY RECOGNIZED INDEPENDENT TESTING LABORATORY; UL, FM, ETC. 5. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND CONDITIONS AT SITE PRIOR TO STARTING WORK.
- 7. ALL ELECTRICAL/INSTRUMENT WORK SHALL BE COORDINATED WITH THE ENGINEER AND OWNER TO VERIFY FINAL LOCATION AND CONNECTIONS OF ALL EQUIPMENT FOR ROUGHING-IN AND FINAL CONNECTIONS. DEVICE MOUNTING HEIGHTS, UNLESS OTHERWISE NOTED, SHALL BE: TOP OF PANELS TO FINISHED GRADE-72" A.F.G.
- 8. ALL DEVICES SHALL BE ADEQUATELY IDENTIFIED WITH PERMANENT NAMEPLATE OR TAGS. WIRING SHALL BE IDENTIFIED AS TO PHASING AND CONDUCTOR IDENTIFICATION. CIRCUIT CHANGES AND ROUTING SHALL BE REFLECTED ON "RECORD" DRAWINGS. VOLTAGE AND PHASE CHARACTERISTICS SHALL BE INCLUDED ON PUMP CONTROL PANELS, MAIN DISCONNECT SWITCHES, AND JUNCTION BOXES.
- 9. THE COMPLETE INSTALLATION SHALL BE TESTED AT COMPLETION OF WORK TO BE FREE OF SHORT CIRCUIT CONDITIONS. ALL INTERLOCK AND ALARM CIRCUITS SHALL BE TESTED TO VERIFY CORRECT OPERATION OF EACH DEVICE. ALL INSTRUMENT LOOPS SHALL BE CALIBRATED AND VERIFIED FOR CORRECT OPERATION.
- 10. THE CONTRACTOR SHALL KEEP ONE SET OF THE LATEST ISSUE OF ELECTRICAL DRAWINGS WHICH SHALL REFLECT THE ACTUAL INSTALLED CONDITIONS AND CONNECTIONS OF ALL EQUIPMENT AND DEVICES. THE CONTRACTOR SHALL PROVIDE COPIES OF ALL MAINTENANCE INFORMATION AND INSTRUCTIONS RECEIVED WITH EQUIPMENT AND SYSTEMS. ALL "RECORD" DRAWINGS, EQUIPMENT MANUALS, AND MISCELLANEOUS INFORMATION SHALL BE GIVEN TO THE ENGINEER/OWNER AT COMPLETION OF WORK.

ELECTRICAL MATERIALS SPECIFICATIONS:

NOTE: REFER TO SHEET E-2 FOR GENERATOR SPECIFICATIONS.
REFER TO SHEET E-3 FOR AUTOMATIC TRANSFER SWITCH SPECIFICIATIONS. ADDITIONAL EQUIPMENT SPECIFICATIONS ARE ON SHEET E-5.

REFER TO SHEETS E-6 AND E-7 FOR PUMP CONTROL PANEL SPECIFICATIONS.

REFER TO SHEET E-8 FOR SCADA PANEL SPECIFICATIONS.

POWER AND CONTROL WIRE AND CABLE

- A. UNDERGROUND OR WET LOCATION POWER AND CONTROL WIRE AND CABLE SHALL BE STRANDED COPPER WIRE TYPE XHHW-2, BELDEN, CAROL, HWC OR EQUAL WITH INSULATION RATED FOR 600V.
- CAROL, HWC OR EQUAL WITH INSULATION RATED FOR 600V. C. ANALOG SIGNAL CABLE TO BE 18AWG MINIMUM WITH 300V INSULATION. ANALOG SIGNAL CABLE TO HAVE TWO TWISTED CONDUCTORS WITH OVERALL SHIELD, DRAIN WIRE, AND COLOR CODED INSULATION.
- D. MINIMUM POWER WIRE SIZE TO BE #12 AWG.

RACEWAYS AND BOXES

- UNLESS OTHERWISE NOTED. CONDUIT SHALL CONFORM TO THE FOLLOWING: A. CONDUIT ROUTINGS ARE SHOWN DIAGRAMMATICALLY ON THE DRAWINGS. THE CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF ALL ROUTINGS TO MEET THE SPECIFIC CONDITIONS OF THE INSTALLATION.
- B. ALL CONDUIT TRANSITION ELBOWS FROM UNDERGROUND TO ABOVE GROUND SHALL BE PVC COATED RIGID C. ALL CONDUIT LEAVING WET WELL SHALL BE PVC COATED RIGID ALUMINUM.
- E. ALL UNDERGROUND CONDUITS SHALL BE 1" MINIMUM. - ALL UNDERGROUND CONDUITS TO BE SCHEDULE 40 PVC IN GRAVEL (SEE "TYPICAL DUCTBANK SECTION,"
- F. INCLUDE A GROUNDING CONDUCTOR IN ALL CONDUITS. G. BITUMINOUS COATING IS TO BE PROVIDED FOR ALL METAL PARTS IN CONTACT WITH CONCRETE.

GROUNDING SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF N.E.C. AVAILABLE AT THE TIME OF INSTALLATION. GROUNDING SHALL MEET ALL LOCAL CODES IN EFFECT AT THE TIME OF INSTALLATION.

- A GROUNDING SYSTEM SHALL BE INSTALLED TO TIE ALL ELECTRICAL EQUIPMENT ENCLOSURES AND DEVICES TO A COMMON REFERENCE. GROUND RODS SHALL BE COPPER CLAD, 3/4" ØX 10' LONG. ALL UNDERGROUND CONNECTIONS SHALL BE MADE WITH AN EXOTHERMIC WELD. GROUND RODS SHALL BE BURIED 18" BELOW FINISHED GRADE EXCEPT GROUND ROD IN INSPECTION CELL. GROUND RESISTANCE SHALL NOT EXCEED 5.00
- GROUND ROD INSPECTION WELL SHALL BE ERICO T416B, NOT RATED FOR ROADWAY USE, OR EQUAL. SEE

ELECTRICAL SHEET LIST:

- E-1 ELECTRICAL SYMBOLS AND NOTES E-2 ELECTRICAL GENERATOR SPECIFICATIONS
- E-4 ELECTRICAL SITE PLAN
- E-6 ELECTRICAL PUMP CONTROL PANEL
- E-7 ELECTRICAL PUMP CONTROL PANEL
- E-8 ELECTRICAL SCADA PANEL
- E-10 ELECTRICAL GENERAL DETAILS

2 working **CALL 811**

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Thomas E. Okughan

THOMAS EDWARD VAUGHAN

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AN PRICE

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT APPLY TO THIS SECTION.

BE USED AS THE STANDBY POWER SOURCE FOR THE SYSTEM.

A. THIS SECTION INCLUDES PACKAGED ENGINE-GENERATOR SETS SUITABLE FOR USE IN APPLICATIONS WITH THE FEATURES AS SPECIFIED AND INDICATED WHERE THE ENGINE GENERATORS WILL

- A. EMERGENCY STANDBY POWER (ESP): PER ISO 8528: THE MAXIMUM POWER AVAILABLE DURING A VARIABLE ELECTRICAL POWER SEQUENCE, UNDER THE STATED OPERATING CONDITIONS, FOR WHICH A GENERATING SET IS CAPABLE OF DELIVERING IN THE EVENT OF A UTILITY POWER OUTAGE OR UNDER TEST CONDITIONS FOR UP TO 200 HOURS OF OPERATION PER YEAR WITH THE MAINTENANCE INTERVALS AND PROCEDURES BEING CARRIED OUT AS PRESCRIBED BY THE MANUFACTURERS. THE PERMISSIBLE AVERAGE POWER OUTPUT (PPP) OVER 24 HOURS OF
- OPERATION SHALL NOT EXCEED 70 PERCENT OF THE ESP UNLESS OTHERWISE AGREED BY THE RIC ENGINE MANUFACTURER. B. PRIME POWER (PRP): PER ISO 8528: THE MAXIMUM POWER WHICH A GENERATING SET IS CAPABLE OF DELIVERING CONTINUOUSLY WHILST SUPPLYING A VARIABLE ELECTRICAL LOAD WHEN OPERATED FOR AN UNLIMITED NUMBER OF HOURS PER YEAR UNDER THE AGREED OPERATING CONDITIONS WITH THE MAINTENANCE INTERVALS AND PROCEDURES BEING CARRIED OUT AS A PRESCRIBED BY THE MANUFACTURER. THE PERMISSIBLE AVERAGE POWER OUTPUT (PPP) OVER 24 HOURS OF OPERATION SHALL NOT EXCEED 70 PERCENT OF THE PRP UNLESS OTHERWISE AGREED BY THE RIC ENGINE MANUFACTURER.
- C. LIMITED TIME RUNNING POWER (LTP): PER ISO 8528: THE MAXIMUM POWER AVAILABLE, UNDER THE AGREED OPERATING CONDITIONS, FOR WHICH THE GENERATING SET IS CAPABLE OF DELIVERING FOR UP TO 500 HOURS OF OPERATION PER YEAR WITH THE MAINTENANCE INTERVALS AND PROCEDURES BEING CARRIED OUT AS PRESCRIBED BY THE MANUFACTURERS.
- D. CONTINUOUS OPERATING POWER (COP): PER ISO 8528: THE MAXIMUM POWER WHICH A GENERATING SET IS CAPABLE OF DELIVERING CONTINUOUSLY WHILST SUPPLYING A CONSTANT ELECTRICAL LOAD WHEN OPERATED FOR AN UNLIMITED NUMBER OF HOURS PER YEAR UNDER THE AGREED OPERATING CONDITIONS WITH THE MAINTENANCE INTERVALS AND PROCEDURES BEING CARRIED OUT AS A PRESCRIBED BY THE MANUFACTURER.
- E. DATA CENTER CONTINUOUS (DCC): THE MAXIMUM POWER WHICH A GENERATING SET IS CAPABLE OF DELIVERING CONTINUOUSLY WHILST SUPPLYING A VARIABLE OR CONSTANT ELECTRICAL LOAD WHEN OPERATED FOR AN UNLIMITED NUMBER OF HOURS IN A DATA CENTER APPLICATION UNDER THE AGREED OPERATING CONDITIONS WITH THE MAINTENANCE INTERVALS AND PROCEDURES BEING CARRIED OUT AS A PRESCRIBED BY THE MANUFACTURER. THE PERMISSIBLE AVERAGE POWER OUTPUT (PPP) OVER 24 HOURS OF OPERATION SHALL NOT EXCEED 100
- F. OPERATIONAL BANDWIDTH: THE TOTAL VARIATION FROM THE LOWEST TO HIGHEST VALUE OF A PARAMETER OVER THE RANGE OF CONDITIONS INDICATED, EXPRESSED AS A PERCENTAGE OF THE NOMINAL VALUE OF THE PARAMETER.

1.4 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PACKAGED ENGINE GENERATOR INDICATED. INCLUDE RATED CAPACITIES, OPERATING CHARACTERISTICS, AND FURNISHED SPECIALTIES AND ACCESSORIES. IN ADDITION, INCLUDE THE FOLLOWING:

- 1. THERMAL DAMAGE CURVE FOR GENERATOR.
- 2. TIME-CURRENT CHARACTERISTIC CURVES FOR GENERATOR PROTECTIVE DEVICE.
- 3. SOUND TEST DATA, BASED ON A FREE FIELD REQUIREMENT B. SHOP DRAWINGS: DETAIL EQUIPMENT ASSEMBLIES AND INDICATE DIMENSIONS, WEIGHTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.
- 1. DIMENSIONED OUTLINE PLAN AND ELEVATION DRAWINGS OF ENGINE-GENERATOR SET AND OTHER COMPONENTS SPECIFIED.
- 2. WIRING DIAGRAMS: CONTROL INTERCONNECTION, CUSTOMER CONNECTIONS.

1. SUBMIT STATEMENT OF COMPLIANCE WHICH STATES THE PROPOSED PRODUCT(S) IS CERTIFIED TO THE EMISSIONS STANDARDS REQUIRED BY THE LOCATION FOR EPA, STATIONARY EMERGENCY APPLICATION.

1.5 INFORMATIONAL SUBMITTALS

- A. SOURCE QUALITY-CONTROL TEST REPORTS. 1. CERTIFIED SUMMARY OF PROTOTYPE-UNIT TEST REPORT. SEE REQUIREMENTS IN PART 2 "SOURCE QUALITY CONTROL" ARTICLE PART A. INCLUDE STATEMENT INDICATING TORSIONAL COMPATIBILITY OF COMPONENTS.
- 2. CERTIFIED TEST REPORT: PROVIDE CERTIFIED TEST REPORT DOCUMENTING FACTORY TEST PER THE REQUIREMENTS OF THIS SPECIFICATION, AS WELL AS CERTIFIED FACTORY TEST OF GENERATOR SET SENSORS PER NFPA110 LEVEL 1
- 3. LIST OF FACTORY TESTS TO BE PERFORMED ON UNITS TO BE SHIPPED FOR THIS PROJECT.
- 4. REPORT OF EXHAUST EMISSIONS AND COMPLIANCE STATEMENT CERTIFYING COMPLIANCE WITH APPLICABLE REGULATIONS.
- B. WARRANTY: 1. SUBMIT MANUFACTURER'S WARRANTY STATEMENT TO BE PROVIDED FOR THIS PROJECT.

- A. INSTALLER QUALIFICATIONS: MANUFACTURER'S AUTHORIZED REPRESENTATIVE WHO IS TRAINED AND APPROVED FOR INSTALLATION OF UNITS REQUIRED FOR THIS PROJECT. B. MANUFACTURER QUALIFICATIONS: A QUALIFIED MANUFACTURER. MAINTAIN, WITHIN 150 MILES OF PROJECT SITE, A SERVICE CENTER CAPABLE OF PROVIDING TRAINING, PARTS, AND EMERGENCY MAINTENANCE
- C. SOURCE LIMITATIONS: OBTAIN PACKAGED GENERATOR SETS AND AUXILIARY COMPONENTS THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
- D. COMPLY WITH NFPA 37 (STANDARD FOR THE INSTALLATION AND USE OF STATIONARY COMBUSTION ENGINES AND GAS TURBINES). E. COMPLY WITH NFPA 70 (NATIONAL ELECTRICAL CODE. EQUIPMENT SHALL BE SUITABLE FOR USE IN SYSTEMS IN COMPLIANCE TO ARTICLE 700, 701, AND 702).
- F. COMPLY WITH NFPA 110 (EMERGENCY AND STANDBY POWER SYSTEMS) REQUIREMENTS FOR LEVEL 1 EMERGENCY POWER SUPPLY SYSTEM.
- G. COMPLY WITH UL 2200. H. COMPLY WITH CSA 22.2.

- A. ENVIRONMENTAL CONDITIONS: ENGINE-GENERATOR SYSTEM SHALL WITHSTAND THE FOLLOWING ENVIRONMENTAL CONDITIONS WITHOUT MECHANICAL OR ELECTRICAL DAMAGE OR DEGRADATION OF PERFORMANCE
- . AMBIENT TEMPERATURE: 0.0 DEG C (32.0 DEG F) TO 40.0 DEG C (104.0 DEG F).
- 2. RELATIVE HUMIDITY: 0 TO 95 PERCENT.
- 3. ALTITUDE: SEA LEVEL TO 600.0 FEET (183.0 M).

A. BASE WARRANTY: MANUFACTURER SHALL PROVIDE BASE WARRANTY COVERAGE ON THE MATERIAL AND WORKMANSHIP OF THE GENERATOR SET FOR A MINIMUM OF TWENTY-FOUR (24) MONTHS FOR STANDBY PRODUCT FROM REGISTERED COMMISSIONING AND START-UP.

2.1 MANUFACTURERS

A. MANUFACTURERS: THE BASIS FOR THIS SPECIFICATION IS CUMMINS POWER GENERATION EQUIPMENT, THE APPROVED EQUALS LISTED BELOW MAY BE CONSIDERED IF EQUIPMENT PERFORMANCE IS SHOWN TO MEET THE REQUIREMENTS HEREIN. KOHLER

2. CATERPILLAR

2.2 ENGINE-GENERATOR SET

- A. FACTORY-ASSEMBLED AND -TESTED, ENGINE-GENERATOR SET.
- B. MOUNTING FRAME: MAINTAIN ALIGNMENT OF MOUNTED COMPONENTS WITHOUT DEPENDING ON CONCRETE FOUNDATION; AND HAVE LIFTING ATTACHMENTS 1. RIGGING INFORMATION: INDICATE LOCATION OF EACH LIFTING ATTACHMENT, GENERATOR—SET CENTER OF GRAVITY, AND TOTAL PACKAGE WEIGHT IN SUBMITTAL DRAWINGS.
- C. CAPACITIES AND CHARACTERISTICS 1. POWER OUTPUT RATINGS: ELECTRICAL OUTPUT POWER RATING FOR STANDBY OPERATION OF NOT LESS THAN 80.0KW, AT 80 PERCENT LAGGING POWER FACTOR, 277/480, SERIES WYE, THREE PHASE, 4 -WIRE, 60
- 2. ALTERNATOR SHALL BE CAPABLE OF ACCEPTING MAXIMUM 306.0 KVA IN A SINGLE STEP AND BE CAPABLE OF RECOVERING TO A MINIMUM OF 90% OF RATED NO LOAD VOLTAGE. FOLLOWING THE APPLICATION OF
- THE SPECIFIED KVA LOAD AT NEAR ZERO POWER FACTOR APPLIED TO THE GENERATOR SET.
- 3. NAMEPLATES: FOR EACH MAJOR SYSTEM COMPONENT TO IDENTIFY MANUFACTURER'S NAME AND ADDRESS, AND MODEL AND SERIAL NUMBER OF COMPONENT. THE ENGINE-GENERATOR NAMEPLATE SHALL INCLUDE INFORMATION OF THE POWER OUTPUT RATING OF THE EQUIPMENT.
- D. GENERATOR-SET PERFORMANCE 1. STEADY-STATE VOLTAGE OPERATIONAL BANDWIDTH: 0.5 PERCENT OF RATED OUTPUT VOLTAGE FROM NO LOAD TO FULL LOAD.
- 2. TRANSIENT VOLTAGE PERFORMANCE: NOT MORE THAN 20 PERCENT VARIATION FOR 50 PERCENT STEP-LOAD INCREASE OR DECREASE. VOLTAGE SHALL RECOVER AND REMAIN WITHIN THE STEADY-STATE
- OPERATING BAND WITHIN 5 SECONDS. ON APPLICATION OF A 100% LOAD STEP THE GENERATOR SET SHALL RECOVER TO STABLE VOLTAGE WITHIN 10 SECONDS.
- 3. STEADY-STATE FREQUENCY OPERATIONAL BANDWIDTH: 0.25 PERCENT OF RATED FREQUENCY FROM NO LOAD TO FULL LOAD.
- 4. STEADY-STATE FREQUENCY STABILITY: WHEN SYSTEM IS OPERATING AT ANY CONSTANT LOAD WITHIN THE RATED LOAD, THERE SHALL BE NO RANDOM SPEED VARIATIONS OUTSIDE THE STEADY-STATE
- 5. TRANSIENT FREQUENCY PERFORMANCE: NOT MORE THAN 10 PERCENT VARIATION FOR 50 PERCENT STEP-LOAD INCREASE OR DECREASE. FREQUENCY SHALL RECOVER AND REMAIN WITHIN THE STEADY-STATE OPERATING BAND WITHIN 1 SECOND. ON APPLICATION OF A 100% LOAD STEP THE GENERATOR SET SHALL RECOVER TO STABLE FREQUENCY WITHIN 10 SECONDS.
- 6. OUTPUT WAVEFORM: AT FULL LOAD, HARMONIC CONTENT MEASURED LINE TO LINE OR LINE TO NEUTRAL SHALL NOT EXCEED 5 PERCENT TOTAL AND 3 PERCENT FOR ANY SINGLE HARMONIC. TELEPHONE INFLUENCE FACTOR, DETERMINED ACCORDING TO NEMA MG 1, SHALL NOT EXCEED 50.
- 7. SUSTAINED SHORT-CIRCUIT CURRENT: FOR A 3-PHASE, BOLTED SHORT CIRCUIT AT SYSTEM OUTPUT TERMINALS, SYSTEM SHALL SUPPLY A MINIMUM OF 300 PERCENT OF RATED FULL-LOAD CURRENT FOR NOT
- LESS THAN 8 SECONDS WITHOUT DAMAGE TO GENERATOR SYSTEM COMPONENTS. FOR A 1-PHASE, BOLTED SHORT CIRCUIT AT SYSTEM OUTPUT TERMINALS, SYSTEM SHALL REGULATE BOTH VOLTAGE AND CURRENT TO PREVENT OVER-VOLTAGE CONDITIONS ON THE NON-FAULTED PHASES.
- 8. START TIME: COMPLY WITH NFPA 110, LEVEL 1, TYPE 10, SYSTEM REQUIREMENTS. 9. AMBIENT CONDITION PERFORMANCE: ENGINE GENERATOR SHALL BE DESIGNED TO ALLOW OPERATION AT FULL RATED LOAD IN AN AMBIENT TEMPERATURE UNDER SITE CONDITIONS, BASED ON HIGHEST AMBIENT
- CONDITION. AMBIENT TEMPERATURE SHALL BE AS MEASURED AT THE AIR INLET TO THE ENGINE GENERATOR FOR ENCLOSED UNITS, AND AT THE CONTROL OF THE ENGINE GENERATOR FOR MACHINES INSTALLED IN

- A. FUEL: ASTM D975 #2 DIESEL FUEL
- B. RATED ENGINE SPEED: 1800RPM.
- C. LUBRICATION SYSTEM: THE FOLLOWING ITEMS ARE MOUNTED ON ENGINE OR SKID: 1. LUBE OIL PUMP: SHALL BE POSITIVE DISPLACEMENT, MECHANICAL, FULL PRESSURE PUMP.
- 2. FILTER AND STRAINER: PROVIDED BY THE ENGINE MANUFACTURER OF RECORD TO PROVIDE ADEQUATE FILTRATION FOR THE PRIME MOVER TO BE USED.
- 3. CRANKCASE DRAIN: ARRANGED FOR COMPLETE GRAVITY DRAINAGE TO AN EASILY REMOVABLE CONTAINER WITH NO DISASSEMBLY AND WITHOUT USE OF PUMPS, SIPHONS, SPECIAL TOOLS, OR APPLIANCES.
- D. ENGINE FUEL SYSTEM: THE ENGINE FUEL SYSTEM SHALL BE INSTALLED IN STRICT COMPLIANCE TO THE ENGINE MANUFACTURER'S INSTRUCTIONS
- E. MAIN FUEL PUMP: MOUNTED ON ENGINE. PUMP ENSURES ADEQUATE PRIMARY FUEL FLOW UNDER STARTING AND LOAD CONDITIONS.
- F. GOVERNOR: ADJUSTABLE ISOCHRONOUS, WITH SPEED SENSING, THE GOVERNING SYSTEM DYNAMIC CAPABILITIES SHALL BE CONTROLLED AS A FUNCTION OF ENGINE COOLANT TEMPERATURE TO PROVIDE FAST, STABLE OPERATION AT VARYING ENGINE OPERATING TEMPERATURE CONDITIONS. THE CONTROL SYSTEM SHALL ACTIVELY CONTROL THE FUEL RATE AS APPROPRIATE TO THE STATE OF THE ENGINE GENERATOR. FUEL RATE SHALL BE REGULATED AS A FUNCTION OF STARTING, ACCELERATING TO START DISCONNECT SPEED, ACCELERATING TO RATED SPEED, AND OPERATING IN VARIOUS ISOCHRONOUS STATES. G. COOLING SYSTEM: CLOSED LOOP, LIQUID COOLED
- 1. THE GENERATOR SET MANUFACTURER SHALL PROVIDE PROTOTYPE TEST DATA FOR THE SPECIFIC HARDWARE PROPOSED DEMONSTRATING THAT THE MACHINE WILL OPERATE AT RATED STANDBY LOAD IN AN
- 2. COOLANT: SOLUTION OF 50 PERCENT ETHYLENE-GLYCOL-BASED ANTIFREEZE AND 50 PERCENT WATER, WITH ANTICORROSION ADDITIVES AS RECOMMENDED BY ENGINE MANUFACTURER
- 3. SIZE OF RADIATOR OVERFLOW TANK: ADEQUATE TO CONTAIN EXPANSION OF TOTAL SYSTEM COOLANT FROM COLD START TO 110 PERCENT LOAD CONDITION.

- 4. EXPANSION TANK: CONSTRUCTED OF WELDED STEEL PLATE AND RATED TO WITHSTAND MAXIMUM CLOSED-LOOP COOLANT SYSTEM PRESSURE FOR ENGINE USED. EQUIP WITH GAGE GLASS AND PETCOCK.
- 5. TEMPERATURE CONTROL: SELF-CONTAINED, THERMOSTATIC-CONTROL VALVE MODULATES COOLANT FLOW AUTOMATICALLY TO MAINTAIN OPTIMUM CONSTANT COOLANT TEMPERATURE AS RECOMMENDED BY ENGINE
- 6. DUCT FLANGE: GENERATOR SETS INSTALLED INDOORS SHALL BE PROVIDED WITH A FLEXIBLE RADIATOR DUCT ADAPTER FLANGE.
- H. MUFFLER/SILENCER: SELECTED WITH PERFORMANCE AS REQUIRED TO MEET SOUND REQUIREMENTS OF THE APPLICATION, SIZED AS RECOMMENDED BY ENGINE MANUFACTURER AND SELECTED WITH EXHAUST PIPING SYSTEM TO NOT EXCEED ENGINE MANUFACTURER'S ENGINE BACKPRESSURE REQUIREMENTS. FOR GENERATOR SETS WITH OUTDOOR ENCLOSURES THE SILENCER SHALL BE INSIDE THE ENCLOSURE.
- I. AIR-INTAKE FILTER: ENGINE-MOUNTED AIR CLEANER WITH REPLACEABLE DRY-FILTER ELEMENT AND RESTRICTION INDICATOR.
- J. STARTING SYSTEM: 12 OR 24V, AS RECOMMENDED BY THE ENGINE MANUFACTURER; ELECTRIC, WITH NEGATIVE GROUND. 1. COMPONENTS: SIZED SO THEY WILL NOT BE DAMAGED DURING A FULL ENGINE—CRANKING CYCLE WITH AMBIENT TEMPERATURE AT MAXIMUM SPECIFIED IN PART 1 "PROJECT CONDITIONS" ARTICLE.
- 2. CRANKING CYCLE: AS REQUIRED BY NFPA 110 FOR LEVEL 1 SYSTEMS.
- 3. BATTERY CABLE: SIZE AS RECOMMENDED BY ENGINE MANUFACTURER FOR CABLE LENGTH AS REQUIRED. INCLUDE REQUIRED INTERCONNECTING CONDUCTORS AND CONNECTION ACCESSORIES.
- 4. BATTERY COMPARTMENT: FACTORY FABRICATED OF METAL WITH ACID—RESISTANT FINISH.
- 5. BATTERY-CHARGING ALTERNATOR: FACTORY MOUNTED ON ENGINE WITH SOLID-STATE VOLTAGE REGULATION. THE BATTERY CHARGING ALTERNATOR SHALL HAVE SUFFICIENT CAPACITY TO RECHARGE THE BATTERIES WITH ALL PARASITIC LOADS CONNECTED WITHIN 4 HOURS AFTER A NORMAL ENGINE STARTING SEQUENCE.
- 6. BATTERY CHARGERS: UNIT SHALL COMPLY WITH UL 1236, PROVIDE FULLY REGULATED, CONSTANT VOLTAGE, CURRENT LIMITED, BATTERY CHARGER FOR EACH BATTERY BANK. IT WILL INCLUDE THE FOLLOWING
- a. OPERATION: EQUALIZING-CHARGING RATE BASED ON GENERATOR SET MANUFACTURER'S RECOMMENDATIONS SHALL BE INITIATED AUTOMATICALLY AFTER BATTERY HAS LOST CHARGE UNTIL AN ADJUSTABLE EQUALIZING VOLTAGE IS ACHIEVED AT BATTERY TERMINALS. UNIT SHALL THEN BE AUTOMATICALLY SWITCHED TO A LOWER FLOAT-CHARGING MODE AND SHALL CONTINUE TO OPERATE IN THAT MODE UNTIL BATTERY IS DISCHARGED AGAIN.
- b. AUTOMATIC TEMPERATURE COMPENSATION: ADJUST FLOAT AND EQUALIZE VOLTAGES FOR VARIATIONS IN AMBIENT TEMPERATURE FROM MINUS 20 DEG C TO PLUS 40 DEG C TO PREVENT OVERCHARGING AT HIGH PART 3 EXECUTION TEMPERATURES AND UNDERCHARGING AT LOW TEMPERATURES.
- c. AUTOMATIC VOLTAGE REGULATION: MAINTAIN CONSTANT OUTPUT VOLTAGE REGARDLESS OF INPUT VOLTAGE VARIATIONS UP TO PLUS OR MINUS 10 PERCENT.
- e. PROVIDE LED INDICATION OF GENERAL CHARGER CONDITION, INCLUDING CHARGING, FAULTS, AND MODES. PROVIDE A LCD DISPLAY TO INDICATE CHARGE RATE AND BATTERY VOLTAGE. CHARGER SHALL PROVIDE

d. Safety functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage

AND LOSS OF AC INPUT OR DC OUTPUT OF BATTERY CHARGER. EITHER CONDITION SHALL CLOSE CONTACTS THAT PROVIDE A BATTERY-CHARGER MALFUNCTION INDICATION AT SYSTEM CONTROL AND

RELAY CONTACTS FOR FAULT CONDITIONS AS REQUIRED BY NFPA110. f. ENCLOSURE AND MOUNTING: NEMA, TYPE 1, WALL-MOUNTED CABINET.

2.4 FUEL OIL STORAGE

- B. SUB BASE-MOUNTED FUEL OIL TANK: PROVIDE A DOUBLE WALL SECONDARY CONTAINMENT TYPE SUB BASE FUEL STORAGE TANK. THE TANK SHALL BE CONSTRUCTED OF CORROSION RESISTANT STEEL AND SHALL BE UL 142 LISTED AND LABELED. THE FUEL TANK SHALL INCLUDE THE FOLLOWING FEATURES:
- 1. CAPACITY: FUEL FOR 24 HOUR(S) CONTINUOUS OPERATION AT 100 PERCENT RATED POWER OUTPUT.
- 2. TANK RAILS AND LIFTING EYES SHALL BE RATED FOR THE FULL DRY WEIGHT OF THE TANK, GENSET, AND ENCLOSURE.
- 3. ELECTRICAL STUB UP(S)
- 4. NORMAL & EMERGENCY VENTS 5. LOCKABLE FUEL FILL

8. LEAK DETECTOR SWITCH

- 6. MECHANICAL FUEL LEVEL GAUGE
- 7. HIGH AND LOW LEVEL SWITCHES TO INDICATE FUEL LEVEL

2.5 CONTROL AND MONITORING

- A. ENGINE GENERATOR CONTROL SHALL BE MICROPROCESSOR BASED AND PROVIDE AUTOMATIC STARTING, MONITORING, PROTECTION AND CONTROL FUNCTIONS FOR THE UNIT.
- B. AUTOMATIC STARTING SYSTEM SEQUENCE OF OPERATION: WHEN MODE-SELECTOR SWITCH ON THE CONTROL AND MONITORING PANEL IS IN THE AUTOMATIC POSITION, REMOTE-CONTROL CONTACTS IN ONE OR MORE SEPARATE AUTOMATIC TRANSFER SWITCHES INITIATE STARTING AND STOPPING OF GENERATOR SET. WHEN MODE-SELECTOR SWITCH IS SWITCHED TO THE ON POSITION, GENERATOR SET STARTS. THE OFF POSITION OF SAME SWITCH INITIATES GENERATOR-SET SHUTDOWN. (SWITCHES WITH DIFFERENT CONFIGURATIONS BUT EQUAL FUNCTIONS ARE ACCEPTABLE.) WHEN GENERATOR SET IS RUNNING, SPECIFIED SYSTEM OR EQUIPMENT FAILURES OR DERANGEMENTS AUTOMATICALLY SHUT DOWN GENERATOR SET AND INITIATE ALARMS. OPERATION OF THE LOCAL (GENERATOR SET-MOUNTED) AND/OR REMOTE EMERGENCY-STOP SWITCH ALSO SHUTS
- DOWN GENERATOR SET. C. MANUAL STARTING SYSTEM SEQUENCE OF OPERATION: SWITCHING ON-OFF SWITCH ON THE GENERATOR CONTROL PANEL TO THE ON POSITION STARTS GENERATOR SET. THE OFF POSITION OF SAME SWITCH INITIATES GENERATOR-SET SHUTDOWN. WHEN GENERATOR SET IS RUNNING, SPECIFIED SYSTEM OR EQUIPMENT FAILURES OR DERANGEMENTS AUTOMATICALLY SHUT DOWN GENERATOR SET AND INITIATE ALARMS.
- OPERATION OF THE LOCAL (GENERATOR SET-MOUNTED) AND/OR REMOTE EMERGENCY-STOP SWITCH ALSO SHUTS DOWN GENERATOR SET. D. CONFIGURATION: OPERATING AND SAFETY INDICATIONS, PROTECTIVE DEVICES, SYSTEM CONTROLS, ENGINE GAGES AND ASSOCIATED EQUIPMENT SHALL BE GROUPED IN A COMMON CONTROL AND MONITORING PANEL. MOUNTING METHOD SHALL ISOLATE THE CONTROL PANEL FROM GENERATOR—SET VIBRATION. AC OUTPUT POWER CIRCUIT BREAKERS AND OTHER OUTPUT POWER EQUIPMENT SHALL NOT BE MOUNTED IN THE
- CONTROL ENCLOSURE E. INDICATING AND PROTECTIVE DEVICES AND CONTROLS: AS REQUIRED BY NFPA 110 FOR LEVEL 1 SYSTEM, AND THE FOLLOWING:
- 1. AC VOLTMETER (3-PHASE, LINE TO LINE AND LINE TO NEUTRAL VALUES).
- 2. AC AMMETER (3-PHASES).
- AC FREQUENCY METER.
- 4. AMMETER-VOLTMETER DISPLAYS SHALL SIMULTANEOUSLY DISPLAY CONDITIONS FOR ALL THREE PHASES. 5. EMERGENCY STOP SWITCH: SWITCH SHALL BE A RED "MUSHROOM HEAD" PUSHBUTTON DEVICE COMPLETE WITH LOCK-OUT/TAG-OUT PROVISIONS. DEPRESSING SWITCH SHALL CAUSE THE GENERATOR SET TO
- IMMEDIATELY STOP THE GENERATOR SET AND PREVENT IT FROM OPERATING. 6. FAULT RESET SWITCH: SUPPLY A DEDICATED CONTROL SWITCH TO RESET/CLEAR FAULT CONDITIONS.
- 7. DC VOLTMETER (ALTERNATOR BATTERY CHARGING).
- 8. ENGINE—COOLANT TEMPERATURE GAUGE.
- 9. ENGINE LUBRICATING-OIL PRESSURE GAUGE.
- 11.GENERATOR-VOLTAGE AND FREQUENCY DIGITAL RAISE/LOWER SWITCHES. RHEOSTATS FOR THESE FUNCTIONS ARE NOT ACCEPTABLE. THE CONTROL SHALL ADJUSTMENT OF THESE PARAMETERS IN A RANGE OF PLUS OR MINUS 5% OF THE VOLTAGE AND FREQUENCY OPERATING SET POINT (NOT NOMINAL VOLTAGE AND FREQUENCY VALUES.) THE VOLTAGE AND FREQUENCY ADJUSTMENT FUNCTIONS SHALL BE DISABLED
- 12. FUEL TANK DERANGEMENT ALARM.
- 13. FUEL TANK HIGH-LEVEL SHUTDOWN OF FUEL SUPPLY ALARM.
- 14. AC PROTECTIVE EQUIPMENT: THE CONTROL SYSTEM SHALL INCLUDE OVER/UNDER VOLTAGE, REVERSE KVAR OVER CURRENT, LOSS OF VOLTAGE REFERENCE, AND OVER EXCITATION SHUT DOWN PROTECTION. THERE SHALL BE A OVERLOAD WARNING, AND OVERCURRENT WARNING ALARM.
- 15. STATUS LED INDICATING LAMPS TO INDICATE REMOTE START SIGNAL PRESENT AT THE CONTROL, EXISTING SHUTDOWN CONDITION, EXISTING ALARM CONDITION, NOT IN AUTO, AND GENERATOR SET RUNNING. 16. A GRAPHICAL DISPLAY PANEL WITH APPROPRIATE NAVIGATION DEVICES SHALL BE PROVIDED TO VIEW ALL INFORMATION NOTED ABOVE, AS WELL AS ALL ENGINE STATUS AND ALARM/SHUTDOWN CONDITIONS

(INCLUDING THOSE FROM AN INTEGRATED ENGINE EMISSION CONTROL SYSTEM). THE DISPLAY SHALL ALSO INCLUDE INTEGRATED PROVISIONS FOR ADJUSTMENT OF THE GAIN AND STABILITY SETTINGS FOR THE

- GOVERNING AND VOLTAGE REGULATION SYSTEMS. 17. PANEL LIGHTING SYSTEM TO ALLOW VIEWING AND OPERATION OF THE CONTROL WHEN THE GENERATOR ROOM OR ENCLOSURE IS NOT LIGHTED.
- 18. DATA LOGGING: THE CONTROL SYSTEM SHALL LOG THE LATEST 20 DIFFERENT ALARM AND SHUT DOWN CONDITIONS, THE TOTAL NUMBER OF TIMES EACH ALARM OR SHUTDOWN HAS OCCURRED, AND THE DATE AND TIME THE LATEST OF THESE SHUTDOWN AND FAULT CONDITIONS OCCURRED.
- 19. DC CONTROL POWER MONITORING: THE CONTROL SYSTEM SHALL CONTINUOUSLY MONITOR DC POWER SUPPLY TO THE CONTROL, AND ANNUNCIATE LOW OR HIGH VOLTAGE CONDITIONS. IT SHALL ALSO PROVIDE AN ALARM INDICATING IMMINENT FAILURE OF THE BATTERY BANK BASED ON DEGRADED VOLTAGE RECOVER ON LOADING (ENGINE CRANKING).

2.6 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

I. WINDINGS: TWO-THIRDS PITCH STATOR WINDING AND FULLY LINKED AMORTISSEUR WINDING

J. SUBTRANSIENT REACTANCE: 15 PERCENT MAXIMUM, BASED ON THE RATING OF THE ENGINE GENERATOR SET.

- B. DRIVE: GENERATOR SHAFT SHALL BE DIRECTLY CONNECTED TO ENGINE SHAFT. EXCITER SHALL BE ROTATED INTEGRALLY WITH GENERATOR ROTOR.
- C. ELECTRICAL INSULATION: CLASS H
- D. TEMPERATURE RISE: 125 / CLASS F ENVIRONMENT. E. CONSTRUCTION SHALL PREVENT MECHANICAL, ELECTRICAL, AND THERMAL DAMAGE DUE TO VIBRATION, OVER SPEED UP TO 125 PERCENT OF RATING, AND HEAT DURING OPERATION AT 110 PERCENT OF RATED
- CAPACITY. F. PERMANENT MAGNET GENERATOR (PMG) SHALL PROVIDE EXCITATION POWER FOR OPTIMUM MOTOR STARTING AND SHORT CIRCUIT PERFORMANCE.
- G. ENCLOSURE: DRIP-PROOF H. VOLTAGE REGULATOR: SCR TYPE, SEPARATE FROM EXCITER, PROVIDING PERFORMANCE AS SPECIFIED. THE VOLTAGE REGULATION SYSTEM SHALL BE MICROPROCESSOR-CONTROLLED, FULL WAVE RECTIFIED, AND PROVIDE A PULSE-WIDTH MODULATED SIGNAL TO THE EXCITER. NO EXCEPTIONS OR DEVIATIONS TO THESE REQUIREMENTS WILL BE PERMITTED.

2.7 OUTDOOR GENERATOR-SET ENCLOSURE

- A. DESCRIPTION: SOUND ATTENUATED ALUMINUM HOUSING. MULTIPLE PANELS SHALL BE LOCKABLE AND PROVIDE ADEQUATE ACCESS TO COMPONENTS REQUIRING MAINTENANCE. INSTRUMENTS, CONTROL, AND BATTERY SYSTEM SHALL BE MOUNTED WITHIN ENCLOSURE.
- B. CONSTRUCTION: 1. HINGED DOORS: WITH PADLOCKING PROVISIONS. RESTRAINT/HOLD BACK HARDWARE TO PREVENT DOOR TO KEEP DOOR OPEN AT 180 DEGREES DURING MAINTENANCE. RAIN LIPS OVER ALL DOORS.
- 2. EXHAUST SYSTEM:
 - a. MUFFLER LOCATION: WITHIN ENCLOSURE. 3. HARDWARE: ALL HARDWARE AND HINGES SHALL BE STAINLESS STEEL.
- 4. MOUNTING BASE: SUITABLE FOR MOUNTING ON SUB-BASE FUEL TANK OR HOUSEKEEPING PAD.
- 5. A WEATHER PROTECTIVE ENCLOSURE SHALL BE PROVIDED WHICH ALLOWS THE GENERATOR SET TO OPERATE AT FULL RATED LOAD WITH A STATIC PRESSURE DROP EQUAL TO OR LESS THAN 0.5 INCHES OF WATER. C. ENGINE COOLING AIRFLOW THROUGH ENCLOSURE: HOUSING SHALL PROVIDE AMPLE AIRFLOW FOR ENGINE GENERATOR OPERATION AT RATED LOAD IN AN AMBIENT TEMPERATURE OF 40 DEG C.
- 1. LOUVERS: FIXED-ENGINE, COOLING-AIR INLET AND DISCHARGE. D. SOUND PERFORMANCE: REDUCE THE SOUND LEVEL OF THE ENGINE GENERATOR WHILE OPERATING AT FULL RATED LOAD TO A MAXIMUM OF 71.2 DBA MEASURED AT ANY LOCATION 7 M FROM THE ENGINE
- GENERATOR IN A FREE FIELD ENVIRONMENT. 1. LIFTING: COMPLETE ASSEMBLY OF ENGINE GENERATOR, ENCLOSURE, AND SUB BASE FUEL TANK (WHEN USED) SHALL BE DESIGNED TO BE LIFTED INTO PLACE AS A SINGLE UNIT, USING SPREADER BARS.

2.8 VIBRATION ISOLATION DEVICES

A. VIBRATION ISOLATION: GENERATORS INSTALLED ON GRADE SHALL BE PROVIDED WITH ELASTOMERIC ISOLATOR PADS INTEGRAL TO THE GENERATOR, UNLESS THE ENGINE MANUFACTURER REQUIRES USE OF SPRING

2.9 FINISHES

A. INDOOR AND OUTDOOR ENCLOSURES AND COMPONENTS: POWDER-COATED AND BAKED OVER CORROSION-RESISTANT PRETREATMENT AND COMPATIBLE PRIMER. MANUFACTURER'S STANDARD COLOR OR AS DIRECTED ON THE DRAWINGS.

2.10 SOURCE QUALITY CONTROL

- A. PROTOTYPE TESTING: FACTORY TEST ENGINE-GENERATOR SET USING SAME ENGINE MODEL, CONSTRUCTED OF IDENTICAL OR EQUIVALENT COMPONENTS AND EQUIPPED WITH IDENTICAL OR EQUIVALENT ACCESSORIES. 1. TESTS: COMPLY WITH NFPA 110, LEVEL 1 ENERGY CONVERTERS. IN ADDITION, THE EQUIPMENT ENGINE, SKID, COOLING SYSTEM, AND ALTERNATOR SHALL HAVE BEEN SUBJECTED TO ACTUAL PROTOTYPE TESTS TO VALIDATE THE CAPABILITY OF THE DESIGN UNDER THE ABNORMAL CONDITIONS NOTED IN NFPA110. CALCULATIONS AND TESTING ON SIMILAR EQUIPMENT WHICH ARE ALLOWED UNDER NFPA110 ARE NOT SUFFICIENT TO MEET THIS REQUIREMENT.
- B. PROJECT-SPECIFIC EQUIPMENT TESTS: BEFORE SHIPMENT, FACTORY TEST ENGINE-GENERATOR SET MANUFACTURED SPECIFICALLY FOR THIS PROJECT. PERFORM TESTS AT RATED LOAD AND POWER FACTOR.
- INCLUDE THE FOLLOWING TESTS: 1. TEST ENGINE GENERATOR SET MANUFACTURED FOR THIS PROJECT TO DEMONSTRATE COMPATIBILITY AND FUNCTIONALITY.
- 2. FULL LOAD RUN.
- 3. MAXIMUM POWER.
- 4. VOLTAGE REGULATION. STEADY—STATE GOVERNING.
- SINGLE-STEP LOAD PICKUP.
- 7. SIMULATED SAFETY SHUTDOWNS. 8. PROVIDE 14 DAYS' ADVANCE NOTICE OF TESTS AND OPPORTUNITY FOR OBSERVATION OF TESTS BY OWNER'S REPRESENTATIVE

- 3.1 INSTALLATION A. COMPLY WITH PACKAGED ENGINE-GENERATOR MANUFACTURERS' WRITTEN INSTALLATION, APPLICATION, AND ALIGNMENT INSTRUCTIONS AND WITH NFPA 110.
- B. EQUIPMENT SHALL BE INSTALLED BY THE CONTRACTOR IN ACCORDANCE WITH FINAL SUBMITTALS AND CONTRACT DOCUMENTS. INSTALLATION SHALL COMPLY WITH APPLICABLE STATE AND LOCAL CODES AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND INSTRUCTIONS INCLUDED IN THE LISTING OR LABELING OF UL LISTED PRODUCTS. C. INSTALLATION OF EQUIPMENT SHALL INCLUDE FURNISHING AND INSTALLING ALL INTERCONNECTING WIRING BETWEEN ALL MAJOR EQUIPMENT PROVIDED FOR THE ON-SITE POWER SYSTEM. THE CONTRACTOR SHALL
- ALSO PERFORM INTERCONNECTING WIRING BETWEEN EQUIPMENT SECTIONS (WHEN REQUIRED), UNDER THE SUPERVISION OF THE EQUIPMENT SUPPLIER. D. EQUIPMENT SHALL BE INSTALLED ON CONCRETE HOUSEKEEPING PADS. EQUIPMENT SHALL BE PERMANENTLY FASTENED TO THE PAD IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND SEISMIC
- E. EQUIPMENT SHALL BE INITIALLY STARTED AND OPERATED BY REPRESENTATIVES OF THE MANUFACTURER. ALL PROTECTIVE SETTINGS SHALL BE ADJUSTED AS INSTRUCTED BY THE CONSULTING ENGINEER. F. ALL EQUIPMENT SHALL BE PHYSICALLY INSPECTED FOR DAMAGE. SCRATCHES AND OTHER INSTALLATION DAMAGE SHALL BE REPAIRED PRIOR TO FINAL SYSTEM TESTING. EQUIPMENT SHALL BE THOROUGHLY CLEANED TO REMOVE ALL DIRT AND CONSTRUCTION DEBRIS PRIOR TO INITIAL OPERATION AND FINAL TESTING OF THE SYSTEM.
- G. ON COMPLETION OF THE INSTALLATION BY THE ELECTRICAL CONTRACTOR, THE GENERATOR SET SUPPLIER SHALL CONDUCT A SITE EVALUATION TO VERIFY THAT THE EQUIPMENT IS INSTALLED PER MANUFACTURER'S

3.2 ON-SITE ACCEPTANCE TEST

REQUIREMENTS OF THE SITE.

- A. THE COMPLETE INSTALLATION SHALL BE TESTED TO VERIFY COMPLIANCE WITH THE PERFORMANCE REQUIREMENTS OF THIS SPECIFICATION FOLLOWING COMPLETION OF ALL SITE WORK. TESTING SHALL BE CONDUCTED BY REPRESENTATIVES OF THE MANUFACTURER, WITH REQUIRED FUEL SUPPLIED BY CONTRACTOR. THE ENGINEER SHALL BE NOTIFIED IN ADVANCE AND SHALL HAVE THE OPTION TO WITNESS THE TESTS. THE GENERATOR SET MANUFACTURER SHALL PROVIDE A SITE TEST SPECIFICATION COVERING THE ENTIRE SYSTEM. TESTS SHALL INCLUDE:
- B. PRIOR TO START OF ACTIVE TESTING, ALL FIELD CONNECTIONS FOR WIRING, POWER CONDUCTORS, AND BUS BAR CONNECTIONS SHALL BE CHECKED FOR PROPER TIGHTENING TORQUE. C. INSTALLATION ACCEPTANCE TESTS TO BE CONDUCTED ON SITE SHALL INCLUDE A "COLD START" TEST, A TWO HOUR FULL LOAD (RESISTIVE) TEST, AND A ONE-STEP RATED LOAD PICKUP TEST IN ACCORDANCE WITH
- NFPA 110. PROVIDE A RESISTIVE LOAD BANK AND MAKE TEMPORARY CONNECTIONS FOR FULL LOAD TEST, IF NECESSARY. D. PERFORM A POWER FAILURE TEST ON THE ENTIRE INSTALLED SYSTEM. THIS TEST SHALL BE CONDUCTED BY OPENING THE POWER SUPPLY FROM THE UTILITY SERVICE, AND OBSERVING PROPER OPERATION OF THE

SYSTEM FOR AT LEAST 2 HOURS. COORDINATE TIMING AND OBTAIN APPROVAL FOR START OF TEST WITH SITE PERSONNEL.

A. THE EQUIPMENT SUPPLIER SHALL PROVIDE TRAINING FOR THE FACILITY OPERATING PERSONNEL COVERING OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED. TRAINING DATE SHALL BE COORDINATED WITH THE FACILITY OWNER.

A. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO ASSIST IN

3.4 FIELD QUALITY CONTROL

A. THE GENERATOR SET SUPPLIER SHALL MAINTAIN SERVICE PARTS INVENTORY FOR THE ENTIRE POWER SYSTEM AT A CENTRAL LOCATION WHICH IS ACCESSIBLE TO THE SERVICE LOCATION 24 HOURS PER DAY, 365

B. THE GENERATOR SET SHALL BE SERVICED BY A LOCAL SERVICE ORGANIZATION THAT IS TRAINED AND FACTORY CERTIFIED IN GENERATOR SET SERVICE. THE SUPPLIER SHALL MAINTAIN AN INVENTORY OF CRITICAL

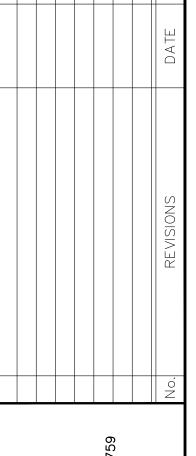
DAYS PER YEAR. THE INVENTORY SHALL HAVE A COMMERCIAL VALUE OF \$3 MILLION OR MORE. THE MANUFACTURER OF THE GENERATOR SET SHALL MAINTAIN A CENTRAL PARTS INVENTORY TO SUPPORT THE

POWER SYSTEM REPLACEMENT PARTS IN THE LOCAL SERVICE LOCATION. SERVICE VEHICLES SHALL BE STOCKED WITH CRITICAL REPLACEMENT PARTS. THE SERVICE ORGANIZATION SHALL BE ON CALL 24 HOURS PER DAY, 365 DAYS PER YEAR. THE SERVICE ORGANIZATION SHALL BE PHYSICALLY LOCATED WITHIN 150 MILES OF THE SITE. C. THE MANUFACTURER SHALL MAINTAIN MODEL AND SERIAL NUMBER RECORDS OF EACH GENERATOR SET PROVIDED FOR AT LEAST 20 YEARS.

A. THE SUPPLIER SHALL INCLUDE IN THE BASE PRICE, A ONE-YEAR SERVICE AGREEMENT. THE MAINTENANCE SHALL BE PERFORMED BY FACTORY AUTHORIZED SERVICE TECHNICIANS CAPABLE OF SERVICING BOTH THE ENGINE GENERATOR SET AND THE TRANSFER SWITCH. THIS AGREEMENT SHALL INCLUDE THE FOLLOWING:

SUPPLIER, COVERING ALL THE MAJOR COMPONENTS OF THE POWER SYSTEM, INCLUDING ENGINES, ALTERNATORS, CONTROL SYSTEMS, PARALLELING ELECTRONICS, AND POWER TRANSFER EQUIPMENT.

- 1. GENERATOR SUPPLIER MUST HAVE AN IN-HOUSE RENTAL FLEET WITH EQUIPMENT SIZED TO BACK UP THIS PROJECT SITE. 2. ALL ENGINE MAINTENANCE AS RECOMMENDED BY THE SERVICE MANUAL.
- 3. ALL ELECTRICAL CONTROLS MAINTENANCE AND CALIBRATIONS AS RECOMMENDED BY THE MANUFACTURER.
- 4. ALL AUXILIARY EQUIPMENT AS A PART OF THE EMERGENCY SYSTEMS. 5. THE SUPPLIER SHALL GUARANTEE EMERGENCY SERVICE.
- 6. ALL EXPENDABLE MAINTENANCE ITEMS ARE TO BE INCLUDED IN THIS AGREEMENT. 7. A COPY OF THIS AGREEMENT AND A SCHEDULE SHALL BE GIVEN TO THE OWNER AT THE TIME OF HIS ACCEPTANCE, SHOWING WHAT WORK IS TO BE ACCOMPLISHED AND WHEN.



Thomas & Vaugha THOMAS EDWARD VAUGHA

A. RACK MOUNT TRANSFER SWITCH AS SHOWN ON CONTRACT DRAWINGS.

B. SET FIELD-ADJUSTABLE INTERVALS AND DELAYS, RELAYS, AND ENGINE EXERCISER CLOCK.

A. WRING TO REMOTE COMPONENTS: MATCH TYPE AND NUMBER OF CABLES AND CONDUCTORS TO CONTROL AND COMMUNICATION REQUIREMENTS OF TRANSFER SWITCHES AS RECOMMENDED BY MANUFACTURER. INCREASE RACEWAY SIZES AT NO ADDITIONAL COST TO OWNER IF NECESSARY TO ACCOMMODATE REQUIRED WIRING.

B. FIELD CONTROL CONNECTIONS SHALL BE MADE ON A COMMON TERMINAL BLOCK THAT IS CLEARLY AND PERMANENTLY LABELED.

C. TRANSFER SWITCH SHALL BE PROVIDED WITH AL/CU MECHANICAL LUGS SIZED TO ACCEPT THE FULL OUTPUT RATING OF THE SWITCH. LUGS SHALL BE SUITABLE FOR THE NUMBER AND SIZE OF CONDUCTORS SHOWN ON THE DRAWINGS.

3.3 SOURCE QUALITY CONTROL

A. PRIOR TO SHIPPING, FACTORY SHALL TEST AND INSPECT COMPONENTS, ASSEMBLED SWITCHES, AND ASSOCIATED EQUIPMENT TO ENSURE PROPER OPERATION.

B. FACTORY SHALL CHECK TRANSFER TIME AND VOLTAGE, FREQUENCY, AND TIME-DELAY SETTINGS FOR COMPLIANCE WITH SPECIFIED REQUIREMENTS.

C. FACTORY SHALL PERFORM DIELECTRIC STRENGTH TEST COMPLYING WITH NEMA ICS 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. EQUIPMENT SPECIFICATIONS FOR THIS PROJECT ARE BASED ON AUTOMATIC TRANSFER SWITCHES MANUFACTURED BY CUMMINS POWER GENERATION, THE APPROVED EQUALS LISTED BELOW MAY BE CONSIDERED IF EQUIPMENT PERFORMANCE IS SHOWN TO MEET THE REQUIREMENTS HEREIN.

1. CUMMINS POWER GENERATION

ON THIS SPECIFICATION.

2. ASCO

ZENITH/ABB B. EQUIPMENT SPECIFICATIONS FOR THIS PROJECT ARE BASED ON AUTOMATIC TRANSFER SWITCHES MANUFACTURED BY CUMMINS POWER GENERATION. SWITCHES MANUFACTURED BY OTHER MANUFACTURERS THAT MEET THE REQUIREMENT OF THIS SPECIFICATION ARE ACCEPTABLE, IF APPROVED NOT LESS THAN TWO WEEKS BEFORE SCHEDULED BID DATE. PROPOSALS MUST INCLUDE A LINE—BY—LINE COMPLIANCE STATEMENT BASED

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. PROVIDE TRANSFER SWITCHES IN THE NUMBER AND RATINGS THAT ARE SHOWN ON THE DRAWINGS.

B. INDICATED CURRENT RATINGS: APPLY AS DEFINED IN UL 1008 FOR CONTINUOUS LOADING AND TOTAL SYSTEM TRANSFER.

C. FAULT-CURRENT CLOSING AND WITHSTAND RATINGS: UL 1008 WCR RATINGS MUST BE SPECIFICALLY LISTED AS MEETING THE REQUIREMENTS FOR USE WITH PROTECTIVE DEVICES AT INSTALLATION LOCATIONS, UNDER SPECIFIED FAULT CONDITIONS. WITHSTAND AND CLOSING RATINGS SHALL BE BASED ON USE OF THE SAME SET OF CONTACTS FOR THE WITHSTAND TEST AND THE CLOSING TEST.

D. SOLID-STATE CONTROLS: ALL SETTINGS SHOULD BE ACCURATE TO +/- 2% OR BETTER OVER AN OPERATING TEMPERATURE RANGE OF - 40 TO + 60 DEGREES C (- 40 TO + 140 DEGREES F). E. RESISTANCE TO DAMAGE BY VOLTAGE TRANSIENTS: COMPONENTS SHALL MEET OR EXCEED VOLTAGE-SURGE WITHSTAND CAPABILITY REQUIREMENTS WHEN TESTED ACCORDING TO IEEE C62.41. COMPONENTS SHALL

MEET OR EXCEED VOLTAGE-IMPULSE WITHSTAND TEST OF NEMA ICS 1. F. ELECTRICAL OPERATION: ACCOMPLISHED BY A NON-FUSED, MOMENTARILY ENERGIZED SOLENOID OR ELECTRIC MOTOR OPERATOR MECHANISM, MECHANICALLY AND ELECTRICALLY INTERLOCKED IN BOTH DIRECTIONS

(EXCEPT THAT MECHANICAL INTERLOCK IS NOT REQUIRED FOR CLOSED TRANSITION SWITCHES). G. SWITCH CHARACTERISTICS: DESIGNED FOR CONTINUOUS-DUTY REPETITIVE TRANSFER OF FULL-RATED CURRENT BETWEEN ACTIVE POWER SOURCES.

1. SWITCHES USING MOLDED-CASE SWITCHES OR CIRCUIT BREAKERS, OR INSULATED CASE CIRCUIT BREAKER COMPONENTS ARE NOT ACCEPTABLE.

2. TRANSFER SWITCHES SHALL BE DOUBLE-THROW, ELECTRICALLY AND MECHANICALLY INTERLOCKED, AND MECHANICALLY HELD IN THE SOURCE 1 AND SOURCE 2 POSITIONS.

3. MAIN SWITCH CONTACTS SHALL BE HIGH PRESSURE SILVER ALLOY. CONTACT ASSEMBLIES SHALL HAVE ARC CHUTES FOR POSITIVE ARC EXTINGUISHING. ARC CHUTES SHALL HAVE INSULATING COVERS TO PREVENT INTER-PHASE FLASHOVER.

4. CONTACTS SHALL BE OPERATED BY A HIGH-SPEED ELECTRICAL MECHANISM THAT CAUSES CONTACTS TO OPEN OR CLOSE WITHIN THREE ELECTRICAL CYCLES FROM SIGNAL. 5. TRANSFER SWITCH SHALL BE PROVIDED WITH FLAME RETARDANT TRANSPARENT COVERS TO ALLOW VIEWING OF SWITCH CONTACT OPERATION BUT PREVENT DIRECT CONTACT WITH COMPONENTS THAT COULD BE

6. THE TRANSFER SWITCH SHALL INCLUDE THE MECHANICAL AND CONTROL PROVISIONS NECESSARY TO ALLOW THE DEVICE TO BE FIELD-CONFIGURED FOR OPERATING SPEED. TRANSFER SWITCH OPERATION WITH

MOTOR LOADS SHALL BE AS IS RECOMMENDED IN NEMA MG1.

a. PHASE ANGLE MONITORING/TIMING EQUIPMENT IS NOT AN ACCEPTABLE SUBSTITUTE FOR THIS FUNCTIONALITY

7. TRANSFER SWITCHES DESIGNATED ON THE DRAWINGS AS "3-POLE" SHALL HAVE A FULL CURRENT-RATED NEUTRAL BAR WITH LUGS.

H. FACTORY WIRING: TRANSFER SWITCH INTERNAL WIRING SHALL BE COMPOSED OF PRE-MANUFACTURED HARNESSES THAT ARE PERMANENTLY MARKED FOR SOURCE AND DESTINATION. HARNESSES SHALL BE CONNECTED TO THE CONTROL SYSTEM BY MEANS OF LOCKING DISCONNECT PLUG(S), TO ALLOW THE CONTROL SYSTEM TO BE EASILY DISCONNECTED AND SERVICED WITHOUT DISCONNECTING POWER FROM THE TRANSFER SWITCH

I. TERMINALS: TERMINALS SHALL BE PRESSURE TYPE AND APPROPRIATE FOR ALL FIELD WIRING. CONTROL WIRING SHALL BE EQUIPPED WITH SUITABLE LUGS, FOR CONNECTION TO TERMINAL STRIPS.

J. ENCLOSURES: ALL ENCLOSURES SHALL BE THIRD-PARTY CERTIFIED FOR COMPLIANCE TO NEMA ICS 6 AND UL 508, UNLESS OTHERWISE INDICATED:

1. THE ENCLOSURE SHALL PROVIDE WIRE BEND SPACE IN COMPLIANCE TO THE LATEST VERSION OF NFPA70, REGARDLESS OF THE DIRECTION FROM WHICH THE CONDUIT ENTERS THE ENCLOSURE.

2. EXTERIOR CABINET DOORS SHALL PROVIDE COMPLETE PROTECTION FOR THE SYSTEM'S INTERNAL COMPONENTS. DOORS MUST HAVE PERMANENTLY MOUNTED KEY-TYPE LATCHES. BOLTED COVERS OR DOORS ARE NOT ACCEPTABLE.

3. TRANSFER SWITCHES SHALL BE PROVIDED IN ENCLOSURES THAT ARE THIRD PARTY CERTIFIED FOR THEIR INTENDED ENVIRONMENT PER NEMA REQUIREMENTS.

3.4 FIELD QUALITY CONTROL

A. MANUFACTURER'S FIELD SERVICE: THE SUPPLIER OF THE TRANSFER SWITCH(ES) AND ASSOCIATED EQUIPMENT SHALL INSPECT, TEST, AND ADJUST COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND REPORT RESULTS IN WRITING.

B. MANUFACTURER'S REPRESENTATIVE SHALL PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.

NATURE OF THE EVENT, WHEN IT LAST OCCURRED, AND HOW MANY TIMES IT HAS OCCURRED.

C. AFTER INSTALLING EQUIPMENT AND AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, INSTALLER SHALL TEST FOR COMPLIANCE WITH REQUIREMENTS.

7. PERFORM RECOMMENDED INSTALLATION TESTS AS RECOMMENDED IN MANUFACTURER'S INSTALLATION AND SERVICE MANUALS.

8. AFTER ENERGIZING CIRCUITS, DEMONSTRATE INTERLOCKING SEQUENCE AND OPERATIONAL FUNCTION FOR EACH SWITCH.

a. SIMULATE POWER FAILURES OF NORMAL SOURCE TO AUTOMATIC TRANSFER SWITCHES AND OF EMERGENCY SOURCE WITH NORMAL SOURCE AVAILABLE

b. VERIFY TIME-DELAY SETTINGS. c. VERIFY THAT THE TRANSFER SWITCH IS ACCURATELY METERING AC VOLTAGE AND CURRENT.

D. INFRARED SCANNING: AFTER SUBSTANTIAL COMPLETION, BUT NOT MORE THAN 60 DAYS AFTER FINAL ACCEPTANCE, PERFORM AN INFRARED SCAN OF EACH SWITCH. REMOVE ALL ACCESS PANELS SO JOINTS AND CONNECTIONS ARE ACCESSIBLE TO PORTABLE SCANNER.

d. VERIFY PROPER SEQUENCE AND CORRECT TIMING OF AUTOMATIC ENGINE STARTING, TRANSFER TIME DELAY, RETRANSFER TIME DELAY ON RESTORATION OF NORMAL POWER, AND ENGINE COOL-DOWN AND

1. FOLLOW-UP INFRARED SCANNING: PERFORM AN ADDITIONAL FOLLOW-UP INFRARED SCAN OF EACH SWITCH 11 MONTHS AFTER DATE OF SUBSTANTIAL COMPLETION.

2. INSTRUMENT: USE AN INFRARED SCANNING DEVICE DESIGNED TO MEASURE TEMPERATURE OR TO DETECT SIGNIFICANT DEVIATIONS FROM NORMAL VALUES. PROVIDE CALIBRATION RECORD FOR DEVICE.

3. RECORD OF INFRARED SCANNING: PREPARE A CERTIFIED REPORT THAT IDENTIFIES SWITCHES CHECKED AND THAT DESCRIBES SCANNING RESULTS. INCLUDE NOTATION OF DEFICIENCIES DETECTED, REMEDIAL ACTION TAKEN, AND OBSERVATIONS AFTER REMEDIAL ACTION.

3.5 DEMONSTRATION

A. AFTER GENERATOR SET INSTALLATION, THE GENERATOR AND TRANSFER SWITCH SUPPLIER SHALL CONDUCT A COMPLETE OPERATION, BASIC MAINTENANCE, AND EMERGENCY SERVICE SEMINAR COVERING GENERATOR SET AND TRANSFER SWITCH EQUIPMENT, FOR UP TO 10 PEOPLE EMPLOYED BY THE OWNER.

1. THE SEMINAR SHALL INCLUDE INSTRUCTION ON OPERATION OF THE TRANSFER EQUIPMENT, NORMAL TESTING AND EXERCISE, ADJUSTMENTS TO THE CONTROL SYSTEM, USE OF THE PC BASED SERVICE AND MAINTENANCE TOOLS PROVIDED UNDER THIS CONTRACT, AND EMERGENCY OPERATION PROCEDURES.

3.6 SERVICE AND SUPPORT

A. THE MANUFACTURER SHALL SUPPLY THE SERVICE PROVIDER WITH A COMPLETE SET OF THE SERVICE AND MAINTENANCE SOFTWARE REQUIRED TO SUPPORT THE PRODUCT. THE SOFTWARE SHALL BE PROVIDED AT A TRAINING CLASS ATTENDED BY THE USER, TO QUALIFY THE USER IN PROPER USE OF THE SOFTWARE. THE SOFTWARE SHALL HAVE THE FOLLOWING FEATURES AND CAPABILITIES:

1. THE SOFTWARE SHALL ALLOW ADJUSTMENT OF ALL FUNCTIONS DESCRIBED HEREIN, ADJUSTMENT OF OPERATING LEVELS OF ALL PROTECTIVE FUNCTIONS, AND PROGRAMMING OF ALL OPTIONAL FUNCTIONS IN THE

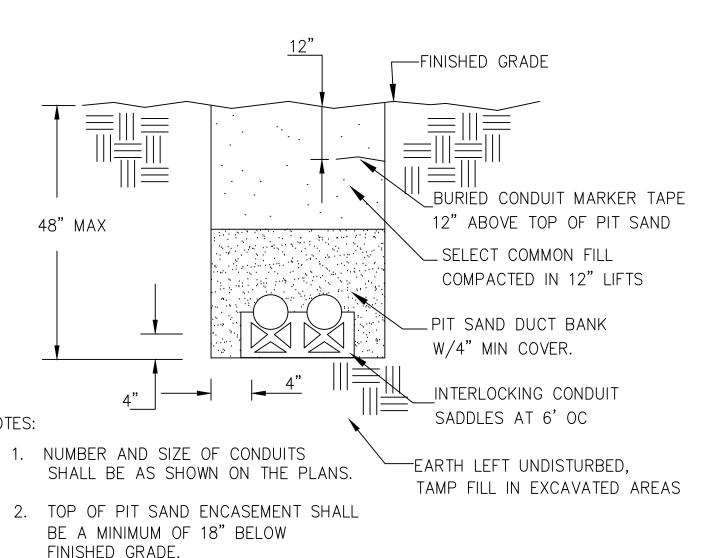
4. THE SOFTWARE SHALL DISPLAY ALL WARNING, SHUTDOWN, AND STATUS CHANGES PROGRAMMED INTO TRANSFER SWITCH CONTROLLER. FOR EACH EVENT, THE CONTROL SHALL PROVIDE INFORMATION ON THE

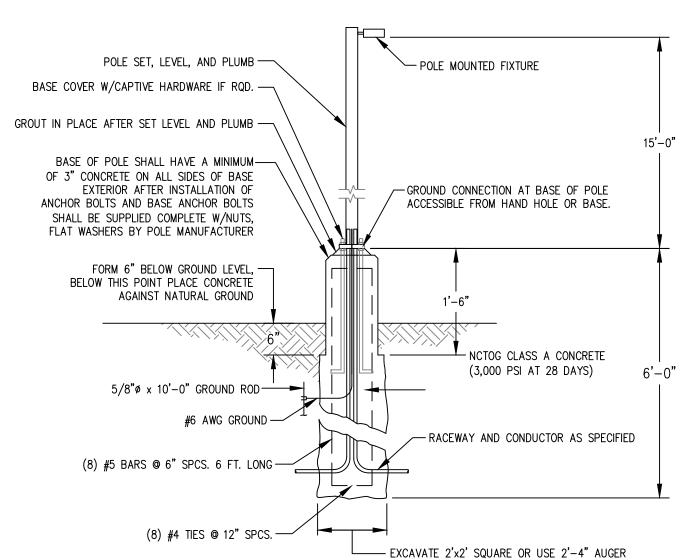
2. THE SOFTWARE SHALL BE CAPABLE OF STORING AND DISPLAYING DATA FOR ANY FUNCTION MONITORED BY THE GENERATOR SET CONTROL. THIS DATA SHALL BE AVAILABLE IN COMMON FILE FORMATS, AND ON GRAPHICAL "STRIP CHART" DISPLAYS.

3. THE SOFTWARE SHALL AUTOMATICALLY RECORD ALL CONTROL OPERATIONS AND ADJUSTMENTS PERFORMED BY ANY OPERATOR OR SOFTWARE USER, FOR TRACKING OF CHANGES TO THE CONTROL.

CONTROLLER. ADJUSTMENTS SHALL BE POSSIBLE OVER MODEM FROM A FACILITY THAT IS REMOTE FROM THE GENERATOR SET.

THOMAS EDWARD VAUGH





POLE LIGHT DETAIL

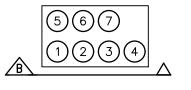
LUMINAIRE SCHEDULE								
FIXTURE ID	QUANTITY	MANUFACTURER/ MODEL	DESCRIPTION	REMARKS				
L _A (RACK LIGHTS)	2	COOPER LIGHTING 4VT2-LD5-4-DR-UNV L840-CD1-WL-U	4' LED LIGHT FIXTURE, 4000 LUMENS, 4000K, UNIVERSAL VOLTAGE 120—277V. DR HIGH IMPACT ADDITIVE LENS	MOUNT UNDER CANOPY.				
L _B (POLE LIGHT)	3	COOPER LIGHTING PRV-C40-D-UNV-T4-SA-BZ ADD OPTION: HSS	17,100 NOMINAL LUMENS, 4000K, TYPE IV, UNIVERSAL VOLTAGE, BRONZE POLE SHALL BE COOPER SQUARE STRAIGHT ALUMINUM POLE, 4" SHAFT, BRONZE FINISH. PROVIDE POLE LENGTH AS INDICATED ON "POLE LIGHT DETAIL", THIS SHEET.	PROVIDE NECESSARY MOUNTING ACCESSORIES TO MOUNT LIGHT FIXTURE AS SHOWN ON THIS SHEET. PROVIDE PHOTOCONTROL. LIGHT FIXTURE IS TO BE CONTROLLED BY PHOTOCELL AND SWITCH AT RACK/CANOPY.				

KEY NOTES

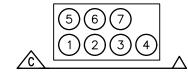
- PROVIDE AND INSTALL NEW 150A, 277/480V/3PH/4W ELECTRIC SERVICE PER GVEC'S SPECIFICATIONS. CONTRACTOR TO COORDINATE WITH GVEC BEFORE STARTING WORK: (800)-223-4832.
- 2 PROVIDE AND INSTALL METER SOCKET PER GVEC'S REQUIREMENTS.
- $\overline{3}$ REFER TO SHEET E-5 KEY NOTES FOR DETAILED EQUIPMENT INFORMATION.
- 4 PROVIDE AND INSTALL POLE LIGHT, PER "POLE LIGHT DETAIL," THIS SHEET.
- 5 PROVIDE AND INSTALL CANOPY RACK PER DETAIL ON SHEET E-10.
- 6 PROVIDE AND INSTALL WET WELL JUNCTION BOXES PER DETAIL ON SHEET E-10.
- LOCATE CU BUS BAR BELOW MAIN DISCONNECT. CU BUS BAR SHALL BE MINIMUM 1/4" X 2", LENGTH AS REQUIRED FOR CONNECTIONS SHOWN ON ONE-LINE DIAGRAM, SHEET E-5.
- ORIENT GENERATOR AS SHOWN, WITH AIR INTAKE END OF GENERATOR FURTHEST AWAY FROM WET WELL.
- 9 PROVIDE AND INSTALL N4XSS FLOWMETER PULLBOX.
- 10 PROVIDE AND INSTALL SCADA ANTENNA TOWER PER SHEET E-9.



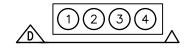
RACEWAY	SIZE	CONTENTS	DESCRIPTION	FROM	ТО	
1	2"	(4) 1/6	SERVICE ENTRANCE	MAIN	ATS	
2	2"	PULLCORD W/LABEL	SPARE	MAIN DISCONNECT	STUB UP 6" AFG AT ATS	
RUN DUCTBANK PER "TYPICAL DUCTBANK SECTION" DETAIL, THIS SHEET.						



2"	() , () , , , , , , , , , , , , , , ,		1	TO	
	(4) 1/0, #6G	POWER			
2"	PULLCORD W/LABEL	JLLCORD W/LABEL SPARE ATS			
1"	(2) #14	SIGNAL			
1"	(8) #14	GEN RUN, FAIL, LOW FUEL, FUEL TANK RUPTURE	SCADA PANEL	GENERATOR	
1"	(2) #12, #12G	BLOCK HEATER			
1"	(2) #12, #12G	BATTERY CHARGER	MPC1		
1"	(2) #12, #12G	POLE LIGHT #3 POWER		POLE LIGHT #3	
	1" 1" 1" 1" 1"	1" (2) #14 1" (8) #14 1" (2) #12, #12G 1" (2) #12, #12G 1" (2) #12, #12G	1" (2) #14 SIGNAL 1" (8) #14 GEN RUN, FAIL, LOW FUEL, FUEL TANK RUPTURE 1" (2) #12, #12G BLOCK HEATER 1" (2) #12, #12G BATTERY CHARGER	1" (2) #14 SIGNAL 1" (8) #14 GEN RUN, FAIL, LOW FUEL, FUEL TANK RUPTURE 1" (2) #12, #12G BLOCK HEATER 1" (2) #12, #12G BATTERY CHARGER MPC1 1" (2) #12, #12G POLE LIGHT #3 POWER	



RACEWAY	SIZE	CONTENTS	DESCRIPTION	FROM	ТО	
1	1"	(3) #8, #10G	PUMP 1			
2	1"	(3) #8, #10G	PUMP 2		WET WELL J-BOX (POWER) WET WELL J-BOX	
3	1"	(3) #8, #10G	PUMP 3	PUMP CONTROL PANEL		
4	1"	(20) #14G	PUMP SIGNALS & FLOATS			
5	1"	(1) #18 TSP	SUBMERSIBLE LEVEL SENSOR		(INSTR)	
6	1"	PULLCORD W/ LABEL	WET WELL SPARE		STUB UP 6" AFG AT WET WELL AND CAP	
RUN DUCTE	BANK PER	"TYPICAL DUCTBANK SECTIO	N" DETAIL, THIS SHEET.	<u>'</u>		



RACEWAY	SIZE	CONTENTS	DESCRIPTION	FROM	ТО	
1	1"	(2) #12, #12G	POLE LIGHT #1 POWER	NDC1	POLE LIGHT #1	
2	1"	(2) #12, #12G	POLE LIGHT #2 POWER	MPC1	POLE LIGHT #2	
3	1"	MANUFACTURER SUPPLIED CABLES	FLOWMETER SIGNAL	FLOW	EL OWNETED	
4	1"	MANUFACTURER SUPPLIED CABLES	FLOWMETER POWER	IND/TRANS	FLOWMETER	
RUN DUCTBANK PER "TYPICAL DUCTBANK SECTION" DETAIL, THIS SHEET.						



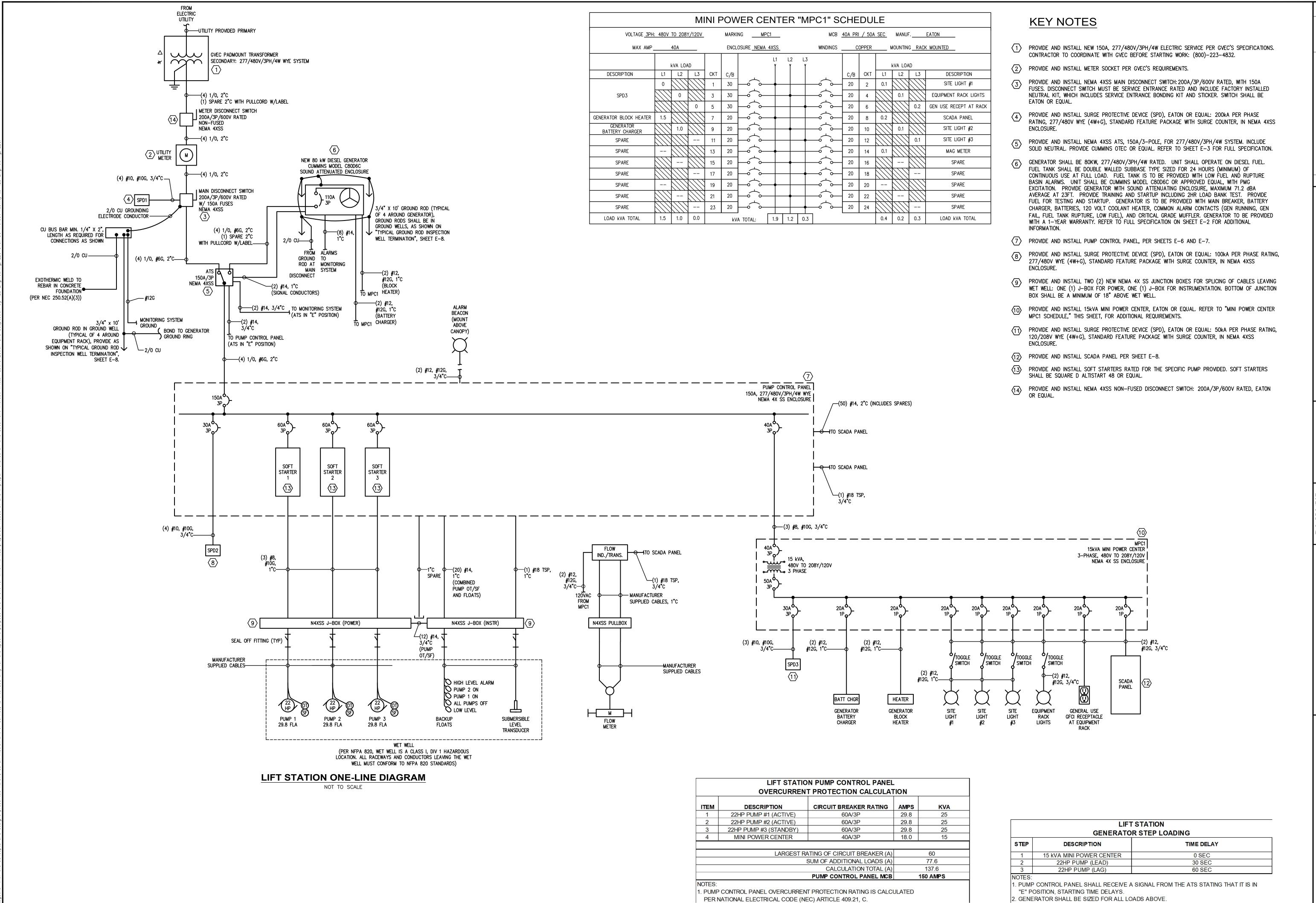
RACEWAY	SIZE	CONTENTS	DESCRIPTION	FROM	ТО		
1	2"	COAX CABLE	ANTENNA CABLE	SCADA PANEL	ANTENNA TOWER		
RUN DUCTBANK PER "TYPICAL DUCTBANK SECTION" DETAIL, THIS SHEET.							



SITE TRICAL ELEC

SHEET NUMBER

E-4



No. REVISIONS

NGINEERING
AS HWY. SUITE 4200 AUSTIN, TX 78
AE: 512-962-4413
FTSTATIONENGINEERING.COM
ENGINEERING, LLC.
E Firm #F-23165

THOMAS EDWARD VAUGHAN

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SONAL ENGINE

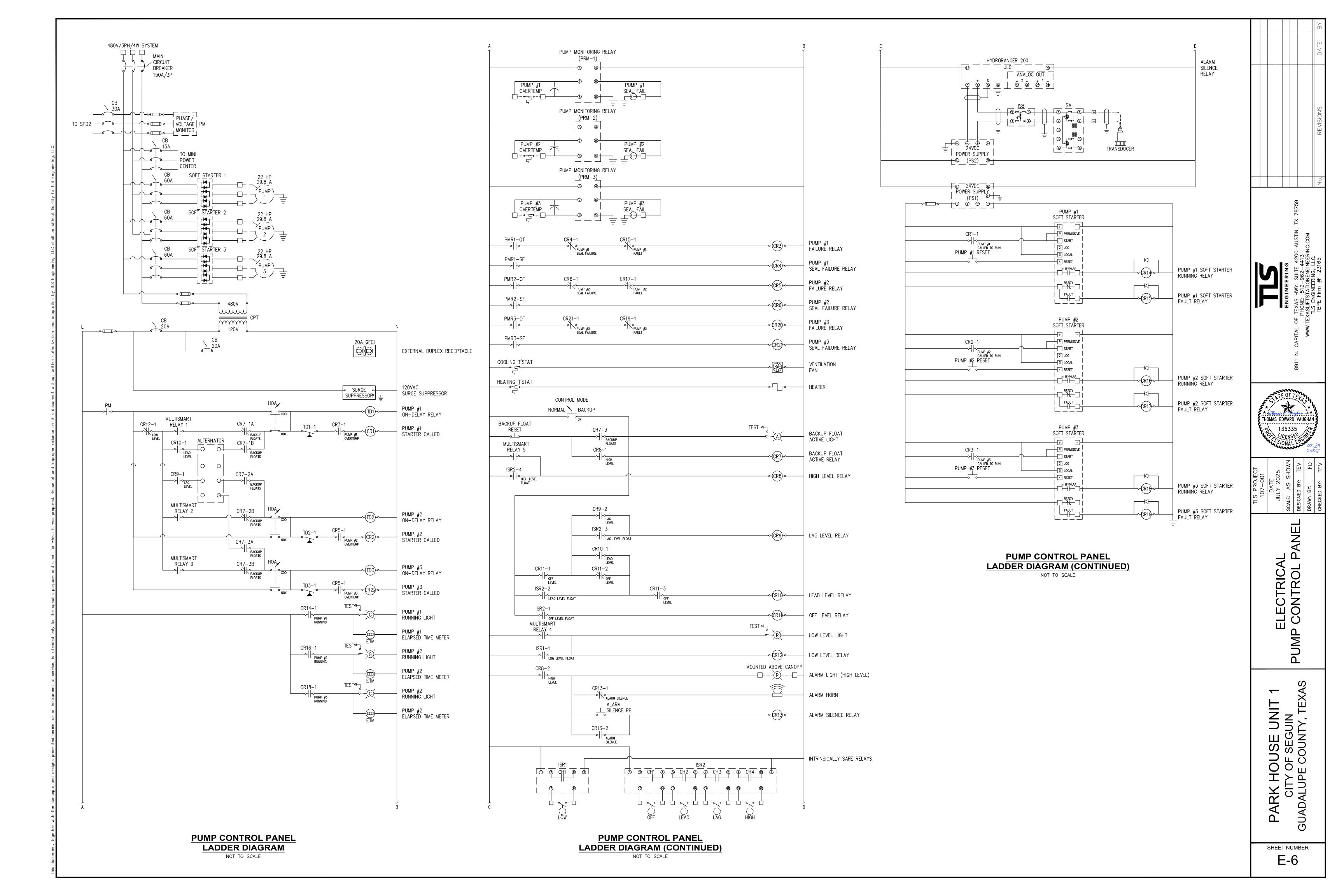
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JULY 2025
SCALE: AS SHOWN
DESIGNED BY: TEV
DRAWN BY: FD

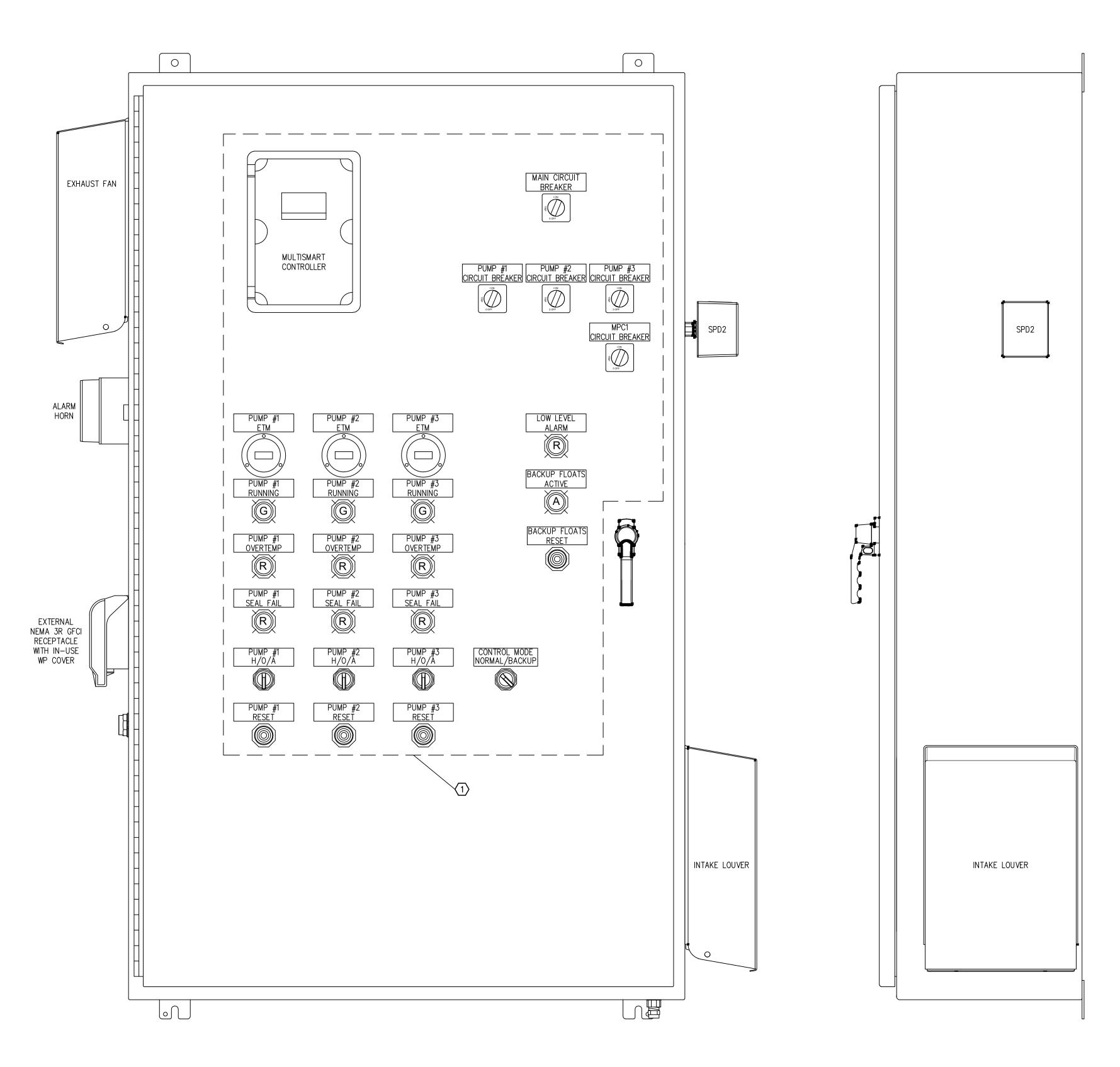
ELECTRICAL ONE-LINE DIAGRAM AND SCHEDULES

PARK HOUSE UNIT 1
CITY OF SEGUIN
GUADALUPE COUNTY, TEXAS

SHEET NUMBER

E-5





PUMP CONTROL PANEL ENCLOSURE EXTERIOR (FRONT) NOT TO SCALE

PUMP CONTROL PANEL **ENCLOSURE EXTERIOR (SIDE)** NOT TO SCALE

GENERAL NOTES

- 1. DIAGRAM IS TYPICAL IN NATURE, FINAL HARDWARE CONFIGURATION WILL VARY ACCORDING TO CONTROL PANEL SPECIFICATIONS/REQUIREMENTS FOR THE PUMP MODELS
- 2. PUMP CONTROL PANEL ENCLOSURE SHALL INCLUDE A DEAD FRONT DOOR, WITH
- CONTROLS ON INTERIOR DOOR. ENCLOSURE SHALL BE NEMA 4X 316 SS. 3. PUMP CONTROL PANEL SHALL BE PROVIDED BY AN EXPERIENCED PANEL BUILDER, WITH 5-YEARS MINIMUM OF LIFT STATION PUMP CONTROL PANEL BUILDING EXPERIENCE. PANEL BUILDER MUST HAVE AND MAINTAIN ENVIRONMENTALLY CONTROLLED SPACE DEDICATED TO THE PRODUCTION, ASSEMBLY, CHECK-OUT, AND TESTING OF CUSTOM CONTROL PANELS WITH 4,000 SQ FT MINIMUM DEDICATED SHOP SPACE. THE ORGANIZATION MUST BE A CERTIFIED UL-698A FACILITY AND HAVE A ISO 9001 QUALITY MANAGEMENT STANDARD. PANEL BUILDER TO INCLUDE STATEMENT OF QUALIFICATIONS WITH THEIR BIDDING PACKAGE, STATING THAT THESE REQUIREMENTS ARE MET.

KEY NOTES

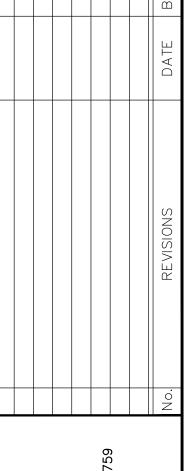
(1) NOTE THAT CONTROLS SHALL BE ON INTERIOR DOOR. SHOWN HERE FOR CLARITY.

CONTROL STRATEGY

- 1. LIFT STATION CONTAINS THREE (3) PUMPS: TWO (2) ACTIVE, ONE (1) STANDBY. PUMPS SHALL RUN AS DESCRIBED BELOW. THREE (3) PUMPS SHALL NEVER RUN AT THE SAME
- 2. PRIMARY LEVEL SENSING FOR PUMP OPERATION SHALL BE BY A SUBMERSIBLE LEVEL TRANSDUCER IN THE WET WELL. BACKUP LEVEL SENSING IS TO BE PERFORMED BY FIVE (5) BACK-UP FLOATS:
 - 2.1. LOW LEVEL ALARM 2.2. ALL PUMPS OFF
 - 2.3. LEAD PUMP ON
 - 2.4. LAG PUMP ON
 - 2.5. HIGH LEVEL ALARM
- 3. PRIMARY LEVEL CONTROL (SUBMERSIBLE LEVEL TRANSDUCER): 3.1. LEVEL SETPOINTS SHALL BE PROGRAMMED INTO CONTROLLER AS SHOWN ON
 - 3.2. THREE (3) PUMPS SHALL ALTERNATE TO MAINTAIN EQUAL RUN TIMES, WITH ONLY TWO (2) PUMPS (MAXIMUM) RUNNING SIMULTANEOUSLY.
 - 3.3. PUMPS SHALL START WITH TIME DELAYS PER "GENERATOR STEP LOADING"
- SCHEDULE, SHEET E-5. 3.4. AS WET WELL LEVEL RISES TO "LEAD PUMP ON" SETTING, PUMP 1 SHALL BE CALLED TO RUN. IF WET WELL LEVEL LOWERS TO "ALL PUMPS OFF" SETTING, THE PUMP SHALL STOP. IF WET WELL LEVEL CONTINUES TO RISE TO "LAG PUMP ON" SETTING, PUMP 2 SHALL BE CALLED TO RUN. IF WET WELL LEVEL LOWERS TO "ALL PUMPS OFF" SETTING, THEN ALL PUMPS SHALL STOP. IF WET WELL LEVEL CONTINUES TO RISE TO "HIGH LEVEL ALARM," THIS SHOULD TRIGGER A HORN ALARM AND BEACON ALARM, IN ADDITION TO AN ALARM OUTPUT TO SCADA. LEVEL DROPPING TO "LOW LEVEL
- RUNNING, IN ADDITION TO AN ALARM OUTPUT TO SCADA. 4. BACKUP LEVEL CONTROL (FIVE (5) BACKUP FLOATS):
 - 4.1. FLOAT ELEVATIONS SHALL BE SET AS SHOWN ON CIVIL PLANS. 4.2. THREE (3) PUMPS SHALL ALTERNATE TO MAINTAIN EQUAL RUN TIMES, WITH

ALARM" SHALL TRIGGER AN ALARM LIGHT AND LOCKOUT THE PUMPS FROM

- ONLY TWO (2) PUMPS (MAXIMUM) RUNNING SIMULTANEOUSLY. 4.3. PUMPS SHALL START WITH TIME DELAYS PER "GENERATOR STEP LOADING"
- SCHEDULE, SHEET E-5.
- 4.4. AS WET WELL LEVEL RISES TO "LEAD PUMP ON" FLOAT, PUMP 1 SHALL BE CALLED TO RUN. IF WET WELL LEVEL LOWERS TO "ALL PUMPS OFF" FLOAT, THE PUMP SHALL STOP. IF WET WELL LEVEL CONTINUES TO RISE TO "LAG PUMP ON" FLOAT, PUMP 2 SHALL BE CALLED TO RUN. IF WET WELL LEVEL LOWERS TO "ALL PUMPS OFF" FLOAT, THEN ALL PUMPS SHALL STOP. IF WET WELL LEVEL CONTINUES TO RISE TO "HIGH LEVEL ALARM" FLOAT, THIS SHOULD TRIGGER A HORN ALARM AND BEACON ALARM, IN ADDITION TO AN ALARM OUTPUT TO SCADA. LEVEL DROPPING TO "LOW LEVEL ALARM" FLOAT SHALL TRIGGER AN ALARM LIGHT AND LOCKOUT THE PUMPS FROM RUNNING, IN ADDITION TO AN ALARM OUTPUT TO SCADA.



* Thomas & Thughan THOMAS EDWARD VAUGHAN

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PARK HOUSE UNIT 1 CITY OF SEGUIN GUADALUPE COUNTY, TEXA

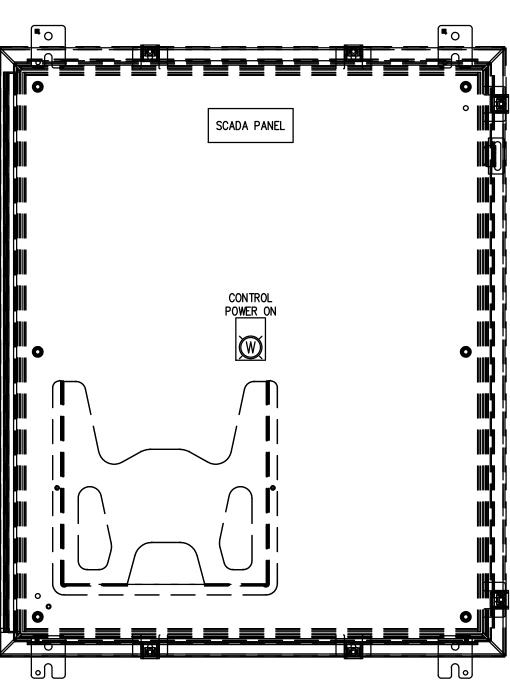
SHEET NUMBER

E-7

LADDER DIAGRAM

NOT TO SCALE







SYSTEMS INTEGRATOR

A SINGLE PRE—APPROVED SCADA SYSTEM INTEGRATOR SHALL PROVIDE A REMOTE TERMINAL UNIT (RTU) FOR ALL SUPERVISORY CONTROL AND DATA ACQUISITION FUNCTIONS AT THE PROPOSED LIFT STATION. TO ASSURE COMPATIBILITY WITH THE EXISTING SCADA SYSTEM AND CONTINUITY OF EXISTING WARRANTIES, PRIME CONTROLS SHALL PROVIDE THE SCADA RTU AND RELATED EQUIPMENT, INCLUDING DESIGN, INTEGRATION, AND PROGRAMMING SERVICES TO MEET THE NEEDS OF THE OWNER (NO EQUAL). PRIME CONTROLS SHALL PROVIDE LABOR AND MATERIALS AS SPECIFIED, INCLUDING INSURANCE AND WARRANTIES TO MEET THE PROJECT REQUIREMENTS. FOR ALL SCADA RELATED QUESTIONS CONTACT PRIME CONTROLS, JASON FORD, j.ford@prime—controls.com.

SYSTEMS INTEGRATOR DELIVERABLES

PRIME CONTROLS SHALL PROVIDE THE FOLLOWING:

j. ONE-YEAR PARTS AND LABOR WARRANTY

- 1. SCADA REMOTE TERMINAL UNIT
 - a. THE PROPOSED RTU SHALL BE INSTALLED FOR LIFT STATION MONITORING, DISPLAYING, ALARMING, AND TRENDING FUNCTIONS VIA THE EXISTING SCADA SYSTEM.
- b. THE PROPOSED SCADA PANEL SHALL BE COMPATIBLE WITH, AND INTEGRAL TO THE EXISTING SCADA SYSTEM. PROPOSED EQUIPMENT SHALL MATCH THE EXISTING SYSTEM ARCHITECTURE TO THE EXTENT REQUIRED WITH DUE CONSIDERATION GIVEN TO ECONOMY, STANDARDIZATION, AND COMPATIBILITY. THE SYSTEM SHALL INCLUDE:
- c. ONE (1) SCADA REMOTE TERMINAL UNIT PANEL TO INCLUDE ONE ALLEN BRADLEY MICRO LOGIX 1400 PLC IN A NEMA 4X STAINLESS STEEL ENCLOSURE, RADIO COMMUNICATION EQUIPMENT, AND RELATED PANEL EQUIPMENT.
- d. PRIME CONTROLS SHALL COMPLETE ALL CONTROL AND MONITORING TERMINATIONS IN THE SCADA PANEL AND LABEL ALL TERMINALS WITH PHENOLIC LABELS.
- e. PRIME CONTROLS SCOPE EXCLUDES ONE (1) ANTENNA TOWER/POST FOR RADIO COMMUNICATION BETWEEN THE LIFT STATION RTU AND THE HOST SCADA SITE.

 f. NOTE THAT THE INSTALLATION AND MOUNTING OF ANTENNA TOWER/POST SECTIONS AND MASTS,
- ARE EXCLUDED FROM PRIME CONTROLS SCOPE OF WORK.
 g. PRIME CONTROLS SHALL SUPPLY THE RTU TO THE ELECTRICAL CONTRACTOR. ELECTRICAL
- CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING/MOUNTING OF RTU.
- h.PLC PROGRAMMING TO MEET FUNCTIONAL REQUIREMENTS, AS SPECIFIED.
 i. ELECTRONIC SUBMITTALS, START-UP AND O&M MANUALS

KEY NOTES

- SCADA PANEL COMPONENTS SHALL BE SUPPLIED BY PRIME CONTROLS, IN ACCORDANCE WITH CITY OF SEGUIN STANDARDS.
- CONTRACTOR SHALL PROVIDE AND INSTALL ALL FIELD WIRING. CONTRACTOR SHALL ROUTE WIRE/CONDUIT TO SCADA PANEL AND LEAVE A SERVICE LOOP FOR SYSTEMS INTEGRATOR TO MAKE FINAL TERMINATIONS.

PUMP CONTROL PANEL
PUMP CONTROL PANEL
PUMP CONTROL PANEL

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FLOW IND/TRANS

PUMP CONTROL PANEL

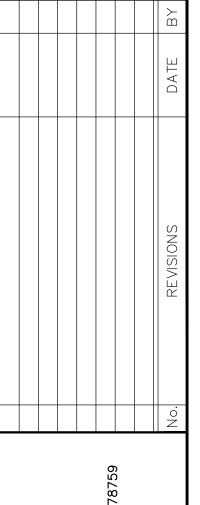
GENERATOR
GENERATOR
GENERATOR
GENERATOR

	SCADA I/O POIN
I/O TYPE	DESCRIPTION
DI	PUMP 1 FAIL
DI	PUMP 1 RUNNING
DI	PUMP 1 SEAL FAIL
DI	PUMP 1 OVERTEMP FAIL
DI	PUMP 1 IN HAND
DI	PUMP 1 IN AUTO
DI	SPARE
DI	SPARE
DI	PUMP 2 FAIL
DI	PUMP 2 RUNNING
DI	PUMP 2 SEAL FAIL
DI	PUMP 2 OVERTEMP FAIL
DI	PUMP 2 IN HAND
DI	PUMP 2 IN AUTO
DI	SPARE
DI	SPARE
DI	PUMP 3 FAIL
DI	PUMP 3 RUNNING
DI	PUMP 3 SEAL FAIL
DI	PUMP 3 OVERTEMP FAIL
DI	PUMP 3 IN HAND
DI	PUMP 3 IN HAND
DI	SPARE
DI	SPARE
DI	GENERATOR RUNNING
DI	GENERATOR FAIL
DI	GEN FUEL LOW LEVEL
DI	GEN FUEL TANK RUPTURE
DI	ATS IN "E" POSITION
DI	SPARE
DI	SPARE
DI	SPARE
DI	HIGH LEVEL ALARM
DI	LOW LEVEL ALARM
DI	PUMP PANEL POWER LOSS
DI	PUMP PANEL IN FLOAT BACKUP MOI
DI	SPARE
Al	SPARE
Al	SPARE

AI SPARE

Al FLOW SIGNAL

AI LEVEL TRANSDUCER



ENGINEERING

CAPITAL OF TEXAS HWY. SUITE 4200 AUST
PHONE: 512-962-4413

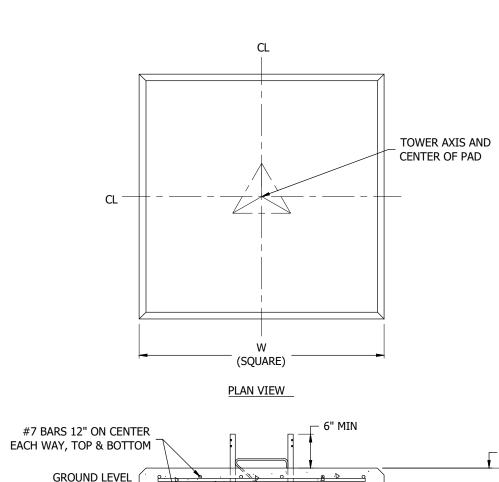
WWW.TEXASLIFTSTATIONENGINEERING.COITS ENGINEERING, LLC.
TBPE Firm #F-23165

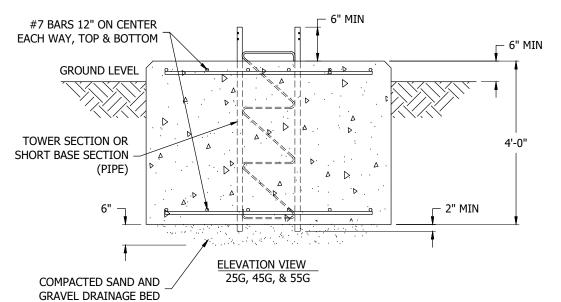


DATE
JULY 2025
SCALE: AS SHOWN
DESIGNED BY: TEV
DRAWN BY: FD

ELECTRICAL SCADA PANEL

PARK HOUSE UNIT 1 CITY OF SEGUIN GUADALUPE COUNTY, TEXAS



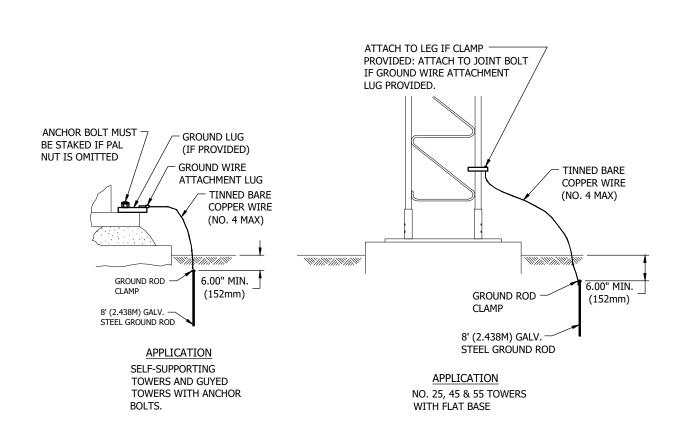


	FOUNDATION DETAILS									
	TOWER NUMBER	OVER-TURNING MOMENT (FT-LBS)	TOTAL SHEAR (LBS)	MAT WIDTH "W"	CONCRETE VOLUME (CU. YDS.)					
	25G	7000	500	4'-0"	2.4					
1	45G	12300	1000	5'-3"	4.1					
	55G	22100	1600	6'-0"	5.3					
	45GSR/65G	53100	3500	7'-9"	8.9					

1. FOR STANDARD FOUNDATION NOTES, SEE DRAWING NUMBER B090548. 2. FOR 25G, 45G, 55G, 65G, AND 45GSR TOWER ASSEMBLY DRAWINGS AND MAXIMUM TOWER HEIGHTS, REFER TO DRAWING NUMBER 25GSS, 45GSS, 55GSS, 65GSS, AND 45GSRSS RESPECTIVELY.

ANTENNA TOWER FOUNDATION DETAIL (2)

NOT TO SCALE



ANTENNA TOWER GROUNDING DETAILS (2) NOT TO SCALE

KEY NOTES

1) FOUNDATION SHALL FOLLOW MANUFACTURER RECOMMENDATIONS FOR THE 45G MODEL.

2 MANUFACTURER PROVIDED DETAILS.

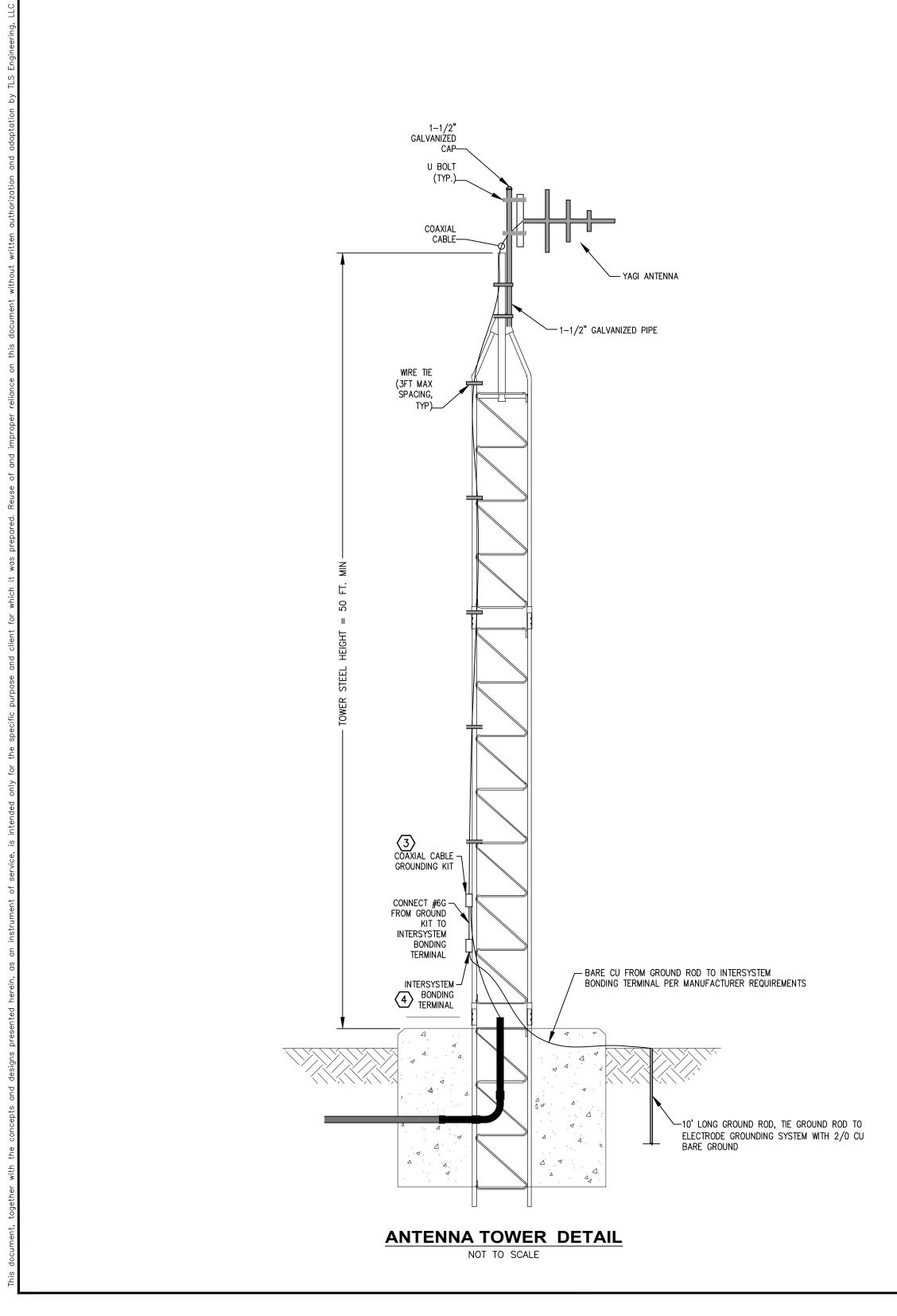
COAXIAL GROUNDING KIT SHALL BE ANDREW OR EQUAL, STANDARD GROUNDING KIT FOR 1/4" AND 3/8" CORRUGATED COAXIAL CABLE.

(4) INTERSYSTEM BONDING TERMINAL SHALL BE ARLINGTON OR EQUAL.



ELECTRICAL SCADA DETAILS

PARK HOUSE UNIT 1 CITY OF SEGUIN GUADALUPE COUNTY, TEXA

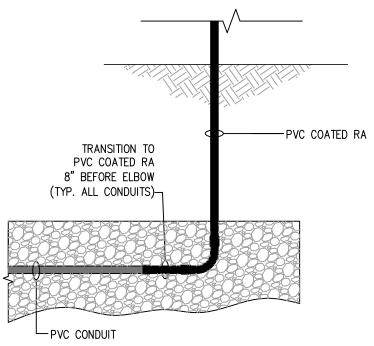


JUNCTION BOX DETAIL

SCALE: N.T.S.

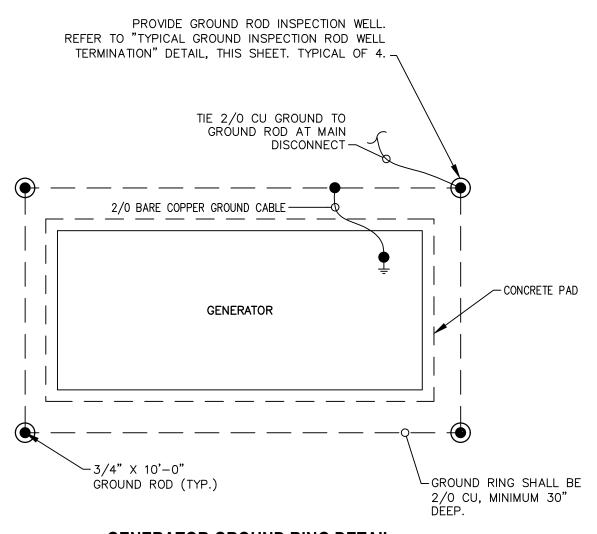
NOTES:

1. TERMINAL BLOCKS SHALL BE INSTALLED IN THE JUNCTION BOXES FOR TERMINATING THE MANUFACTURER SUPPLIED CONDUCTORS TO THE CONDUCTORS PROVIDED BY THE CONTRACTOR.

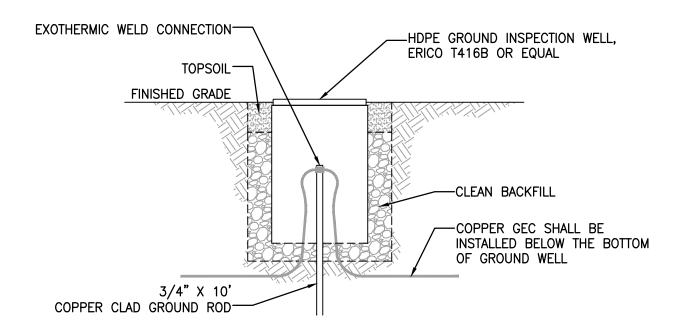


RACEWAY TRANSITION DETAIL

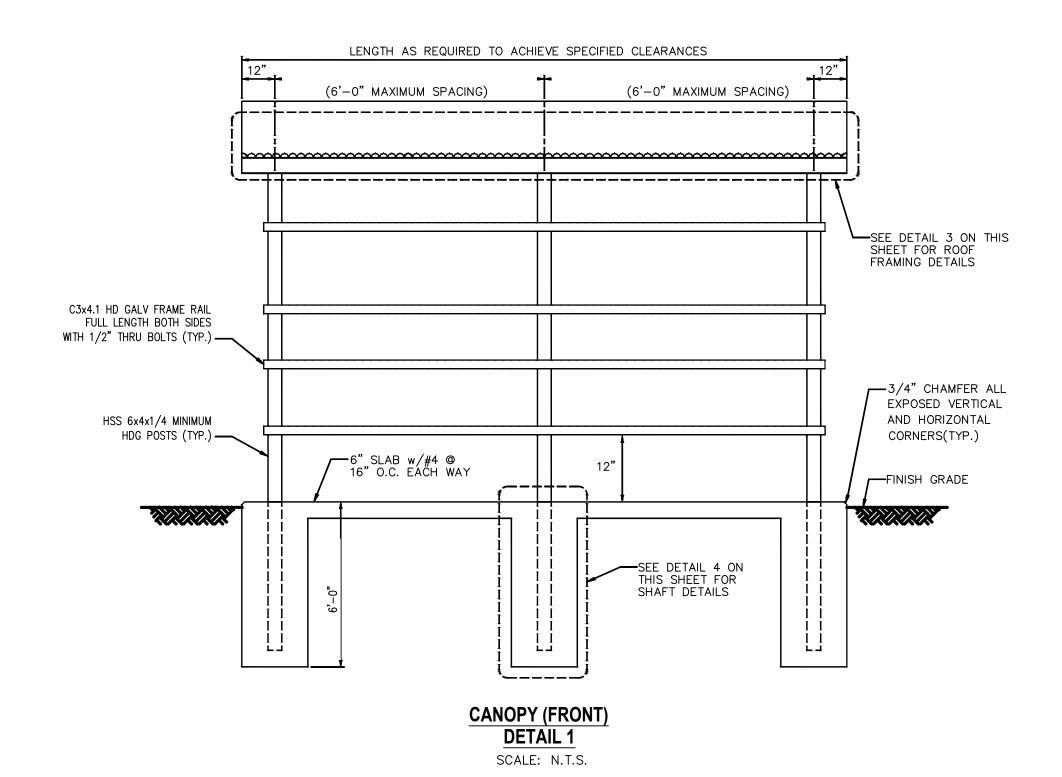
SCALE: N.T.S.

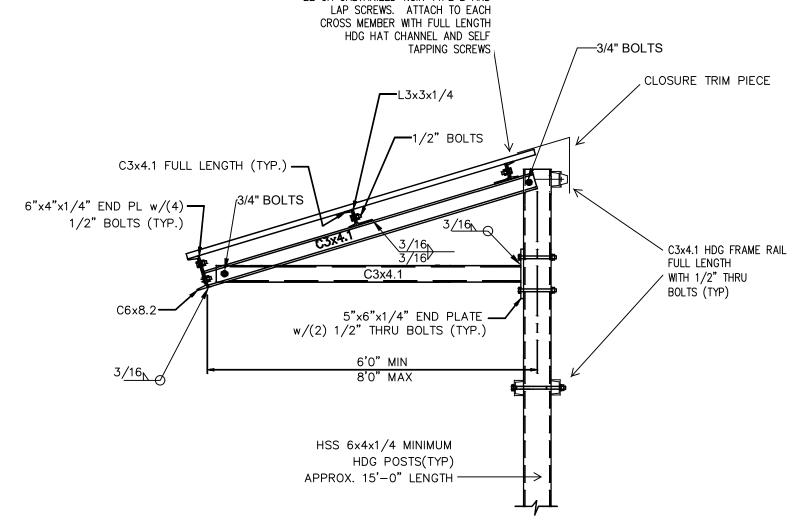


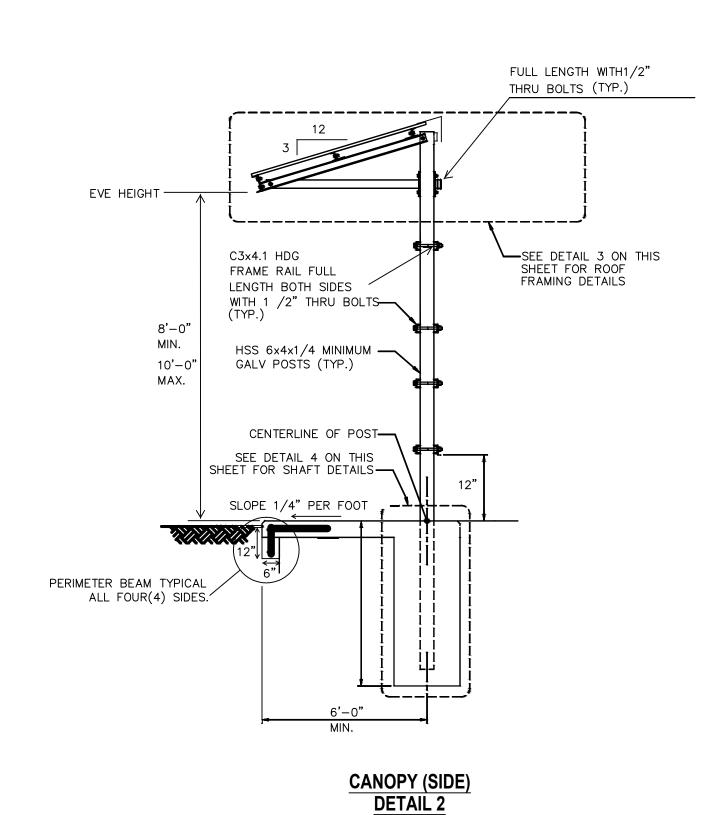
GENERATOR GROUND RING DETAIL SCALE: N.T.S.



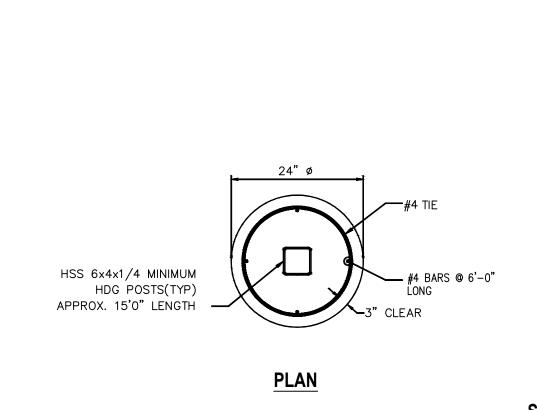
TYPICAL GROUND ROD INSPECTION WELL **TERMINATION** SCALE: N.T.S.

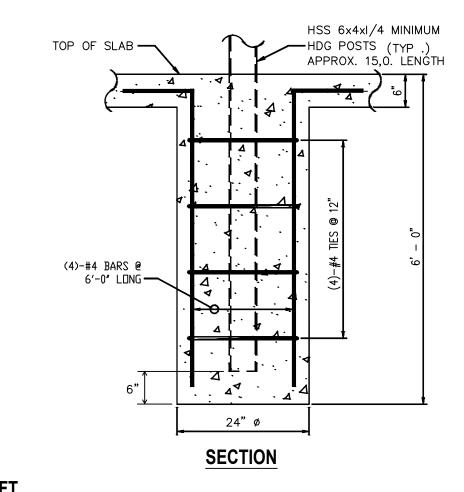






SCALE: N.T.S.

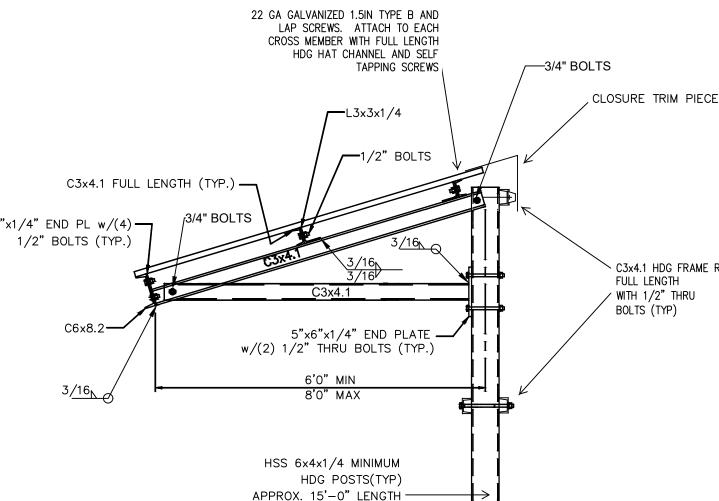




SHAFT DETAIL 4 SCALE: N.T.S.

CANOPY NOTES

- 1. ALL BOLTS, NUTS, AND HARDWARE TO BE 316SS. FLAT WASHERS AND LOCK WASHERS ARE REQUIRED FOR ALL BOLTS AND NUTS. APPLY ANTI-SEIZE COMPUND TO THREADS PRIOR TO INSTALLATION.
- 2. STRUCTURE TO BE HOT DIP GALVANIZED (HDG) AFTER FABRICATION. FIELD CUTTING AND
- WELDING IS NOT ALLOWED. SPLICING OF MATERIAL IS NOT ALLOWED. 3. ATTACH ALL ELECTRICAL ENCLOSURES AND DEVICES TO STRUCTURE WITH VERTICAL 316SS STRUT. CLAMPS AND HARDWARE TO BE 316SS.
- 4. UNLESS OTHERWISE NOTED, VERTICAL STACKING OF ENCLOSURES IS NOT ALLOWED. PROVIDE 6" MINIMUM CLEARANCE BETWEEN ENCLOSURES. PROVIDE 12" MINIMUM CLEARANCE FROM CENTER OF END POSTS TO ENCLOSURES. CONTRACTOR SHALL SUBMIT A DIMENSIONED ELECTRICAL LAYOUT DRAWING DEMONSTRATING THE REQUIRED CLEARANCES PRIOR TO FABRICATION OF CANOPY.
- 5. ALARM BEACON TO BE MOUNTED 12" ABOVE TOP OF ROOF AT END OF CANOPY. DO NOT PENETRATE CANOPY ROOF.



ROOF AND WALL DETAIL 3 SCALE: N.T.S.

THOMAS EDWARD VAUGHAN

AL TAIL ELECTRIC/ GENERAL DET

PARK HOUSE UNIT COLTY OF SEGUIN GUADALUPE COUNTY, TEXA