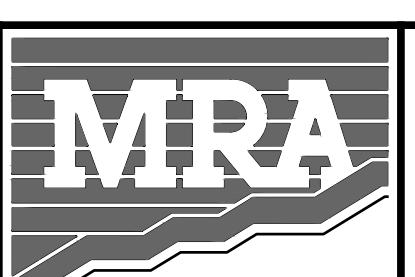


PROFILE

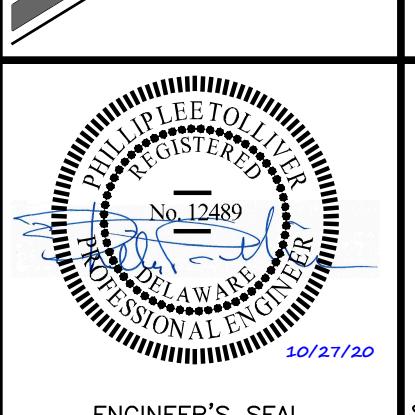
SCALE: 1"=50' (HORIZ.) 1"=5' (VERT.)



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NEW CASTLE, DELAWARE 19720
(302) 326-2200

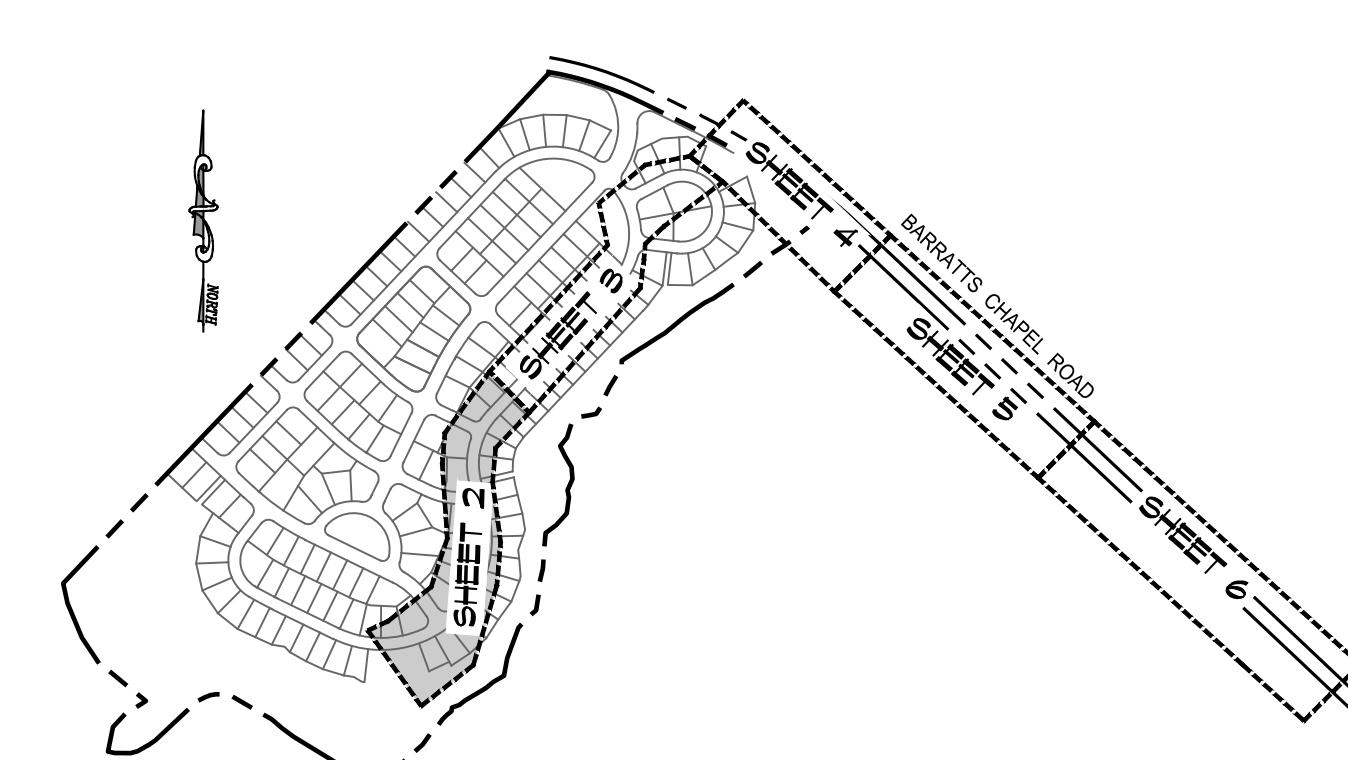
FORCE MAIN PLAN & PROFILE FOR **CATTAIL CREEK**



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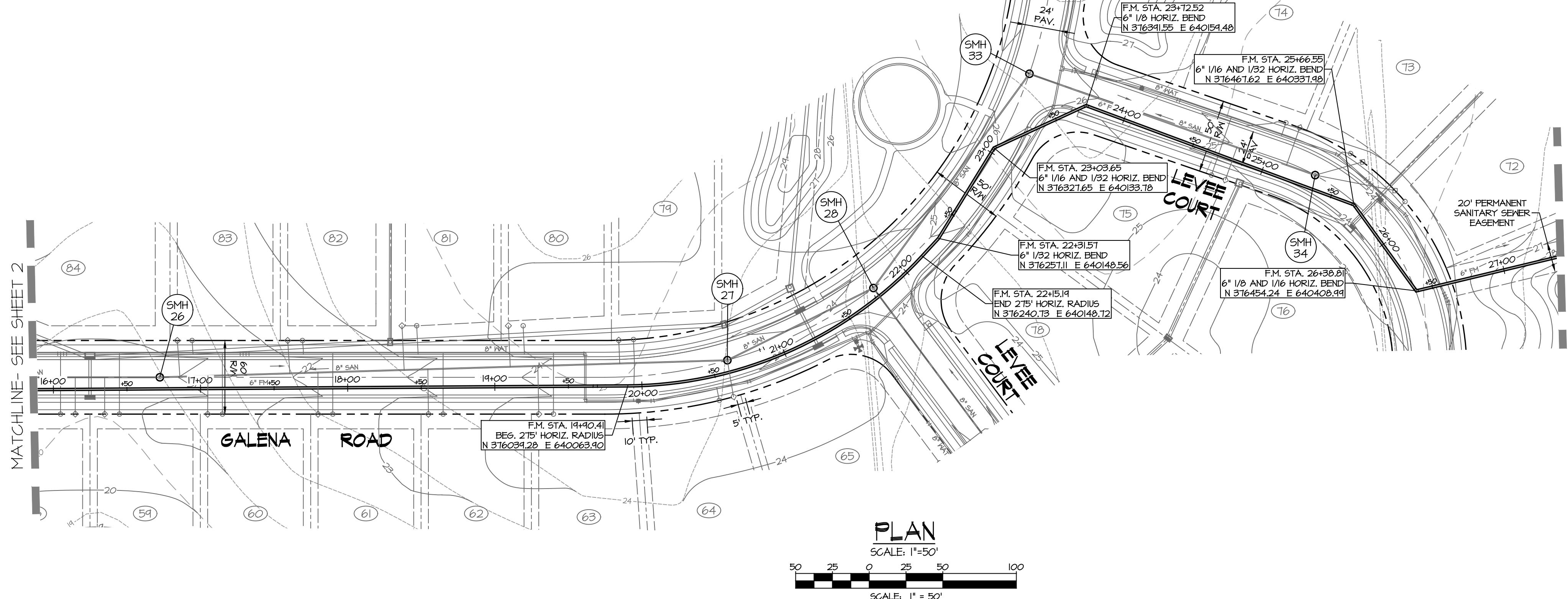
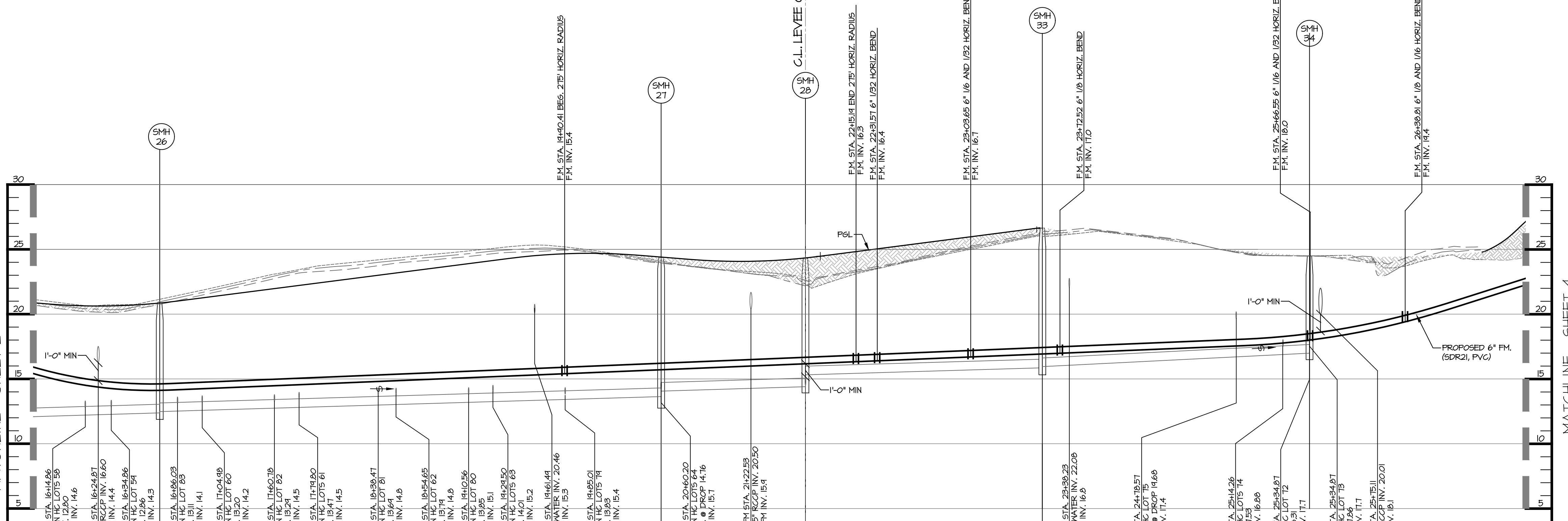
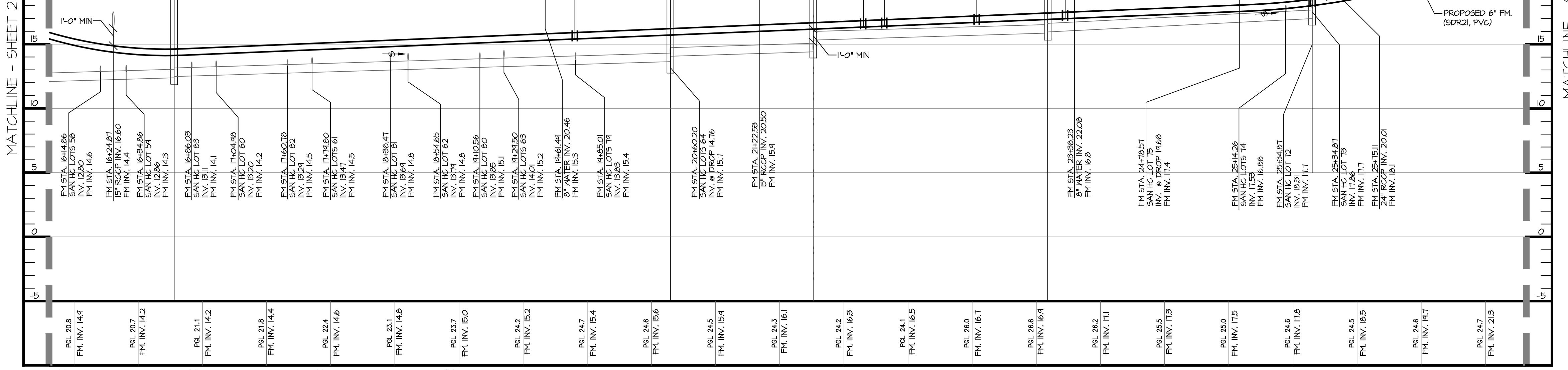
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FORCE MAIN PLAN & PROFILE FOR **CATTAIL CREEK**



INDEX MAP

ENGINEER'S SEAL		SOUTH MURDERKILL HUNDRED	KENT COUNTY, DELAWARE
DATE	REVISIONS		JOB NO.: 13870
10/21/20	QA/QC REVISIONS		SCALE: AS SHOWN
			DATE: 1/9/2019
			DRAWN BY: RDG
			DESIGN BY: RDG
			REVIEW BY: SMS/CWB
			SHEET: 2 OF 17



PROFILE

SCALE: 1"=50' (HORIZ.) 1"=5' (VERT.)

**MODIFIED PLATE PS-07 COMBINATION SEWAGE AIR RELEASE/VACCUM
RELIEF VALVE AND MANHOLE DETAIL - SIDEWALK AREAS**

NOTES:

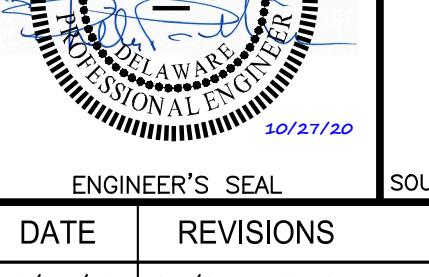
1. COAT MANHOLE INTERIOR, FRAME AND COVER AND APPURTENANCES EXCEPT IRON PIPE WITH/COAL TAR EPOXY COATING.
2. INSTALL COMPLETE SET OF MANUFACTURER-FURNISHED BACKWASH ACCESSORIES ON EACH VALVE PER MANUFACTURER DRAWINGS.
3. ALL HARDWARE, RODS, TIES AND ASSEMBLIES SHALL BE STAINLESS STEEL.
4. MANHOLE INSIDE DIAMETER SHALL BE 60" FOR 14" THROUGH 30" DIAMETER FORCE MAINS.



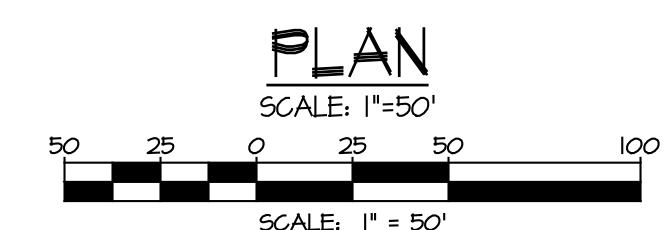
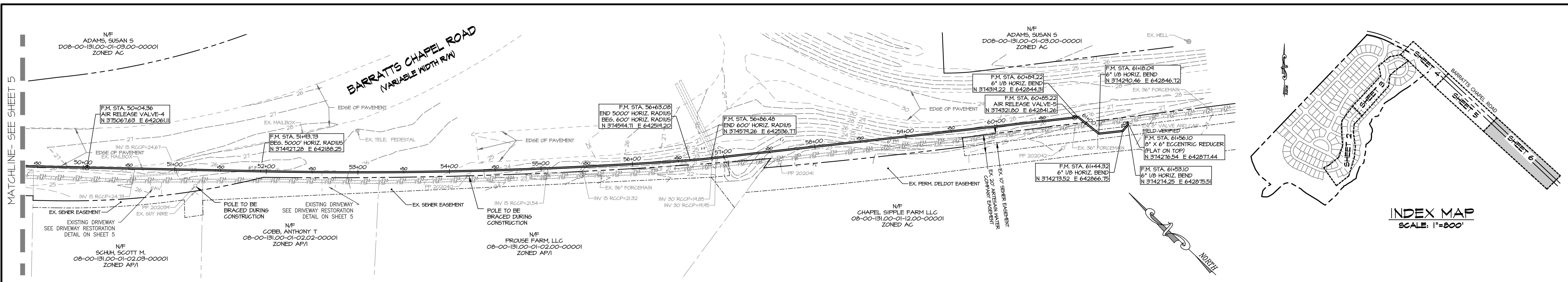
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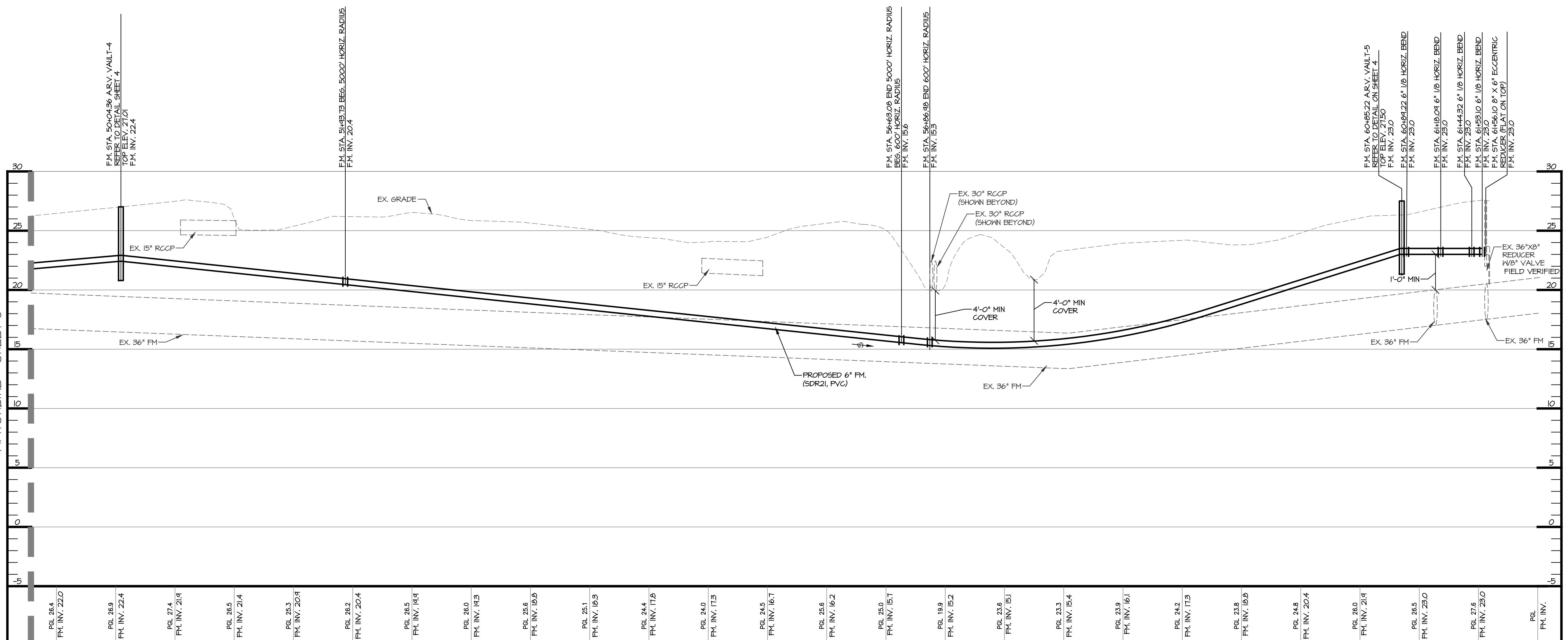
WATER MAIN PLAN & PROFILE FOR GATTAH, GREEK



CATTAIL CREEK	
L HUNDRED	KENT COUNTY, DELAWA
	JOB NO.: 13870
	SCALE: AS SHOWN
	DATE: 1/9/2019
	DRAWN BY: RDG
	DESIGN BY: RDG
	REVIEW BY: SMS/CWB
	SHEET: 3 OF 17



NOTE:
EXISTING UTILITY POLES ALONG THE FORCE MAIN ALIGNMENT MAY REQUIRE BRACING DURING CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE UTILITY OWNER PRIOR TO ANY WORK SO THAT THE NECESSARY BRACING/ACTION MAY BE TAKEN. ANY DAMAGE TO EX. UTILITIES INCURRED DUE TO CONSTRUCTION SHALL BE REPAIRED IMMEDIATELY AND THE COST BORNE BY THE CONTRACTOR.



OTE:

1. CONTRACTOR SHALL FIELD LOCATE EXISTING 8" VALVE TO DETERMINE LOCATION AND DEPTH OF PIPE TO HIS SATISFACTION. NOTE ANY DISCREPANCIES AND NOTIFY ENGINEER IMMEDIATELY.
2. PRIOR TO CONNECTION, CONTRACTOR SHALL PRESSURE TEST LINE IN ACCORDANCE WITH KENT COUNTY STANDARDS. CONNECTION TO THE FORCE MAIN WILL BE AFTER APPROVAL BY KENT COUNTY DPW.
3. EXISTING 36" FORCE MAIN INFORMATION TAKEN FROM AS-BUILT PLANS S-5, S-6, A-6, E PREPARED BY CENTURY ENGINEERING, LAST DATED 7/22/2016.

PS & FM

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FAX: (302) 326-2399

WATER FORCE MAIN PLAN & PROFILE

FOR

CATTAIL CREEK

HUNDRED KENT COU

JOB NO.: SCALE:

DATE: 1/9

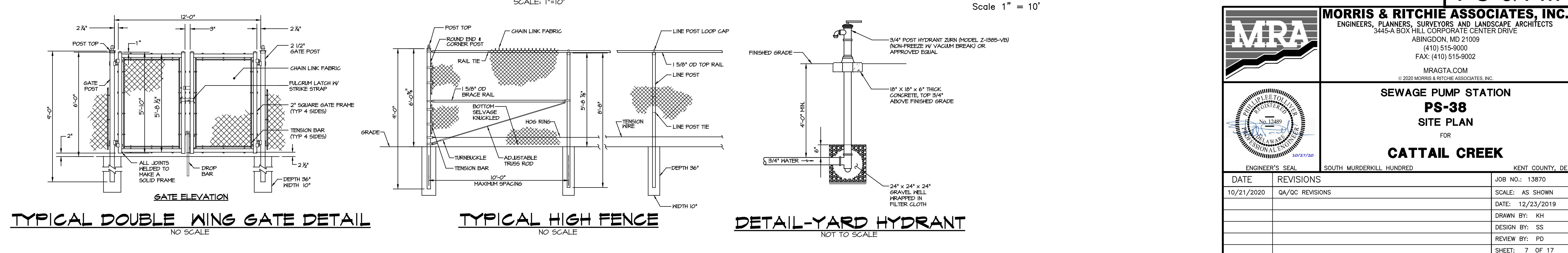
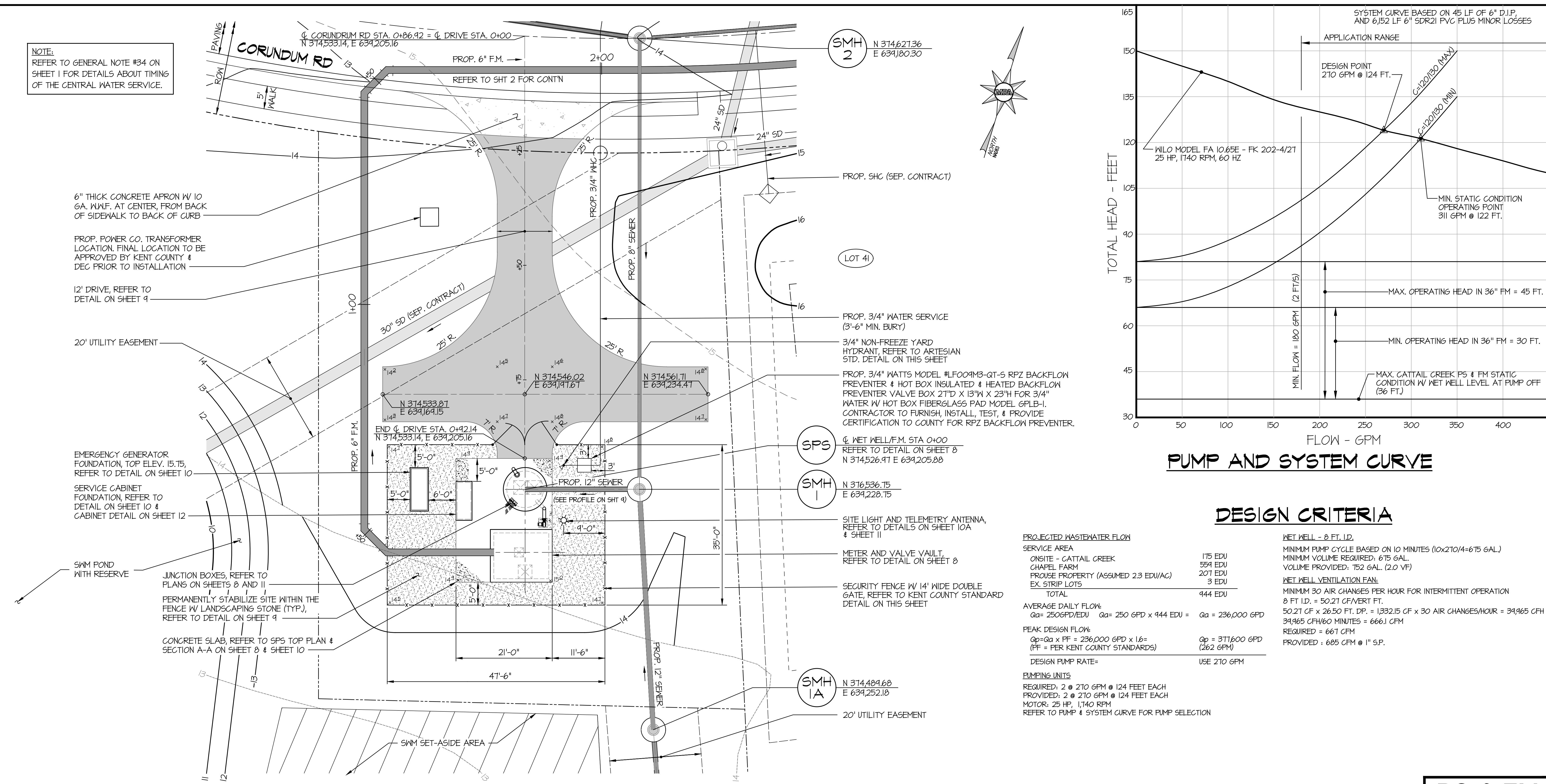
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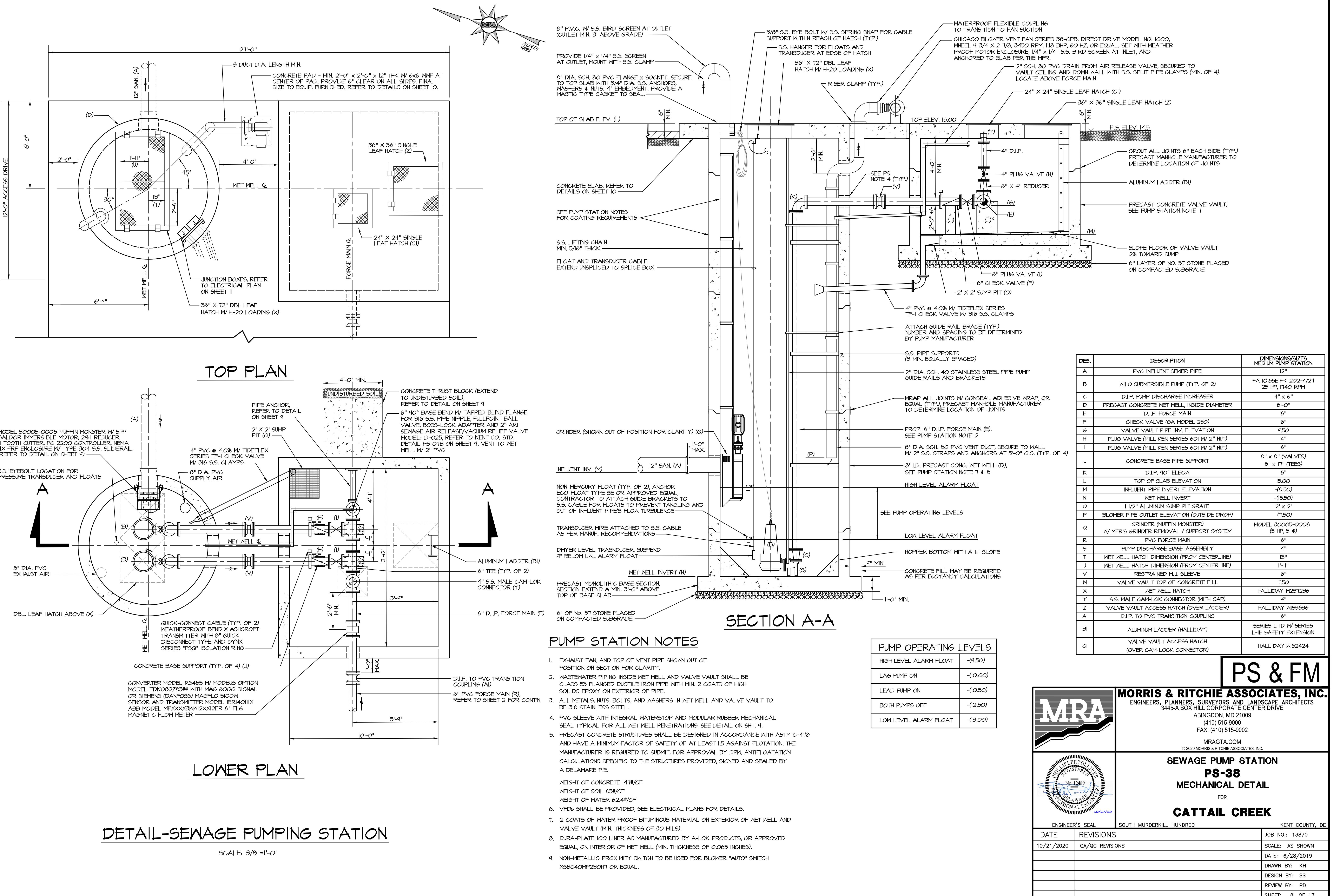
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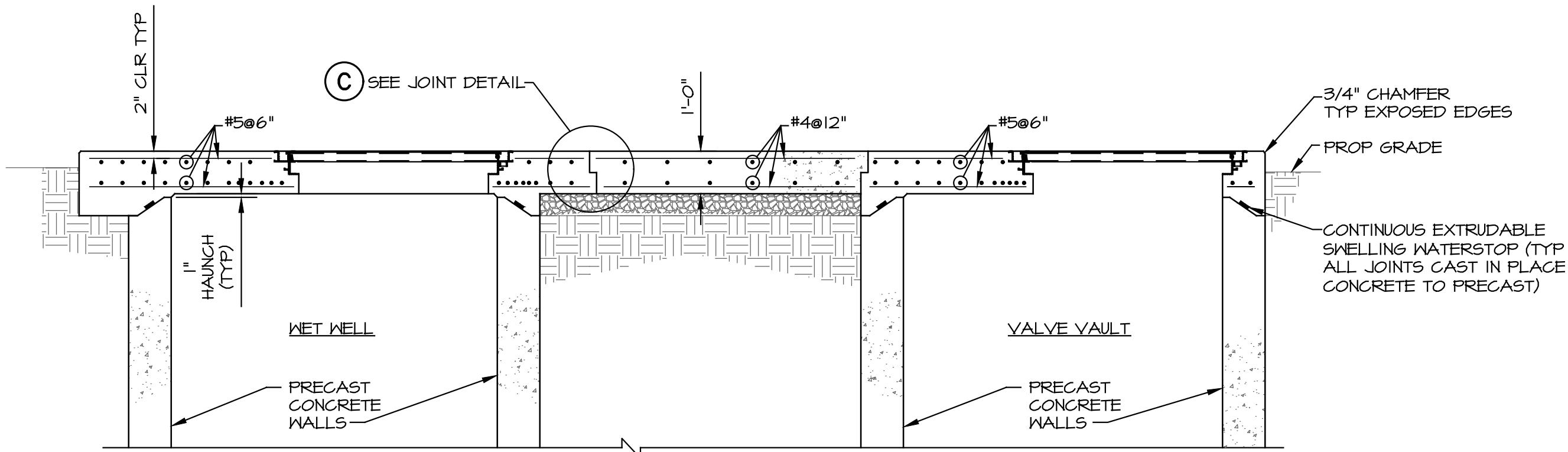
REVIEW B
SHEET: 6

SHEET. 0

PROFILE

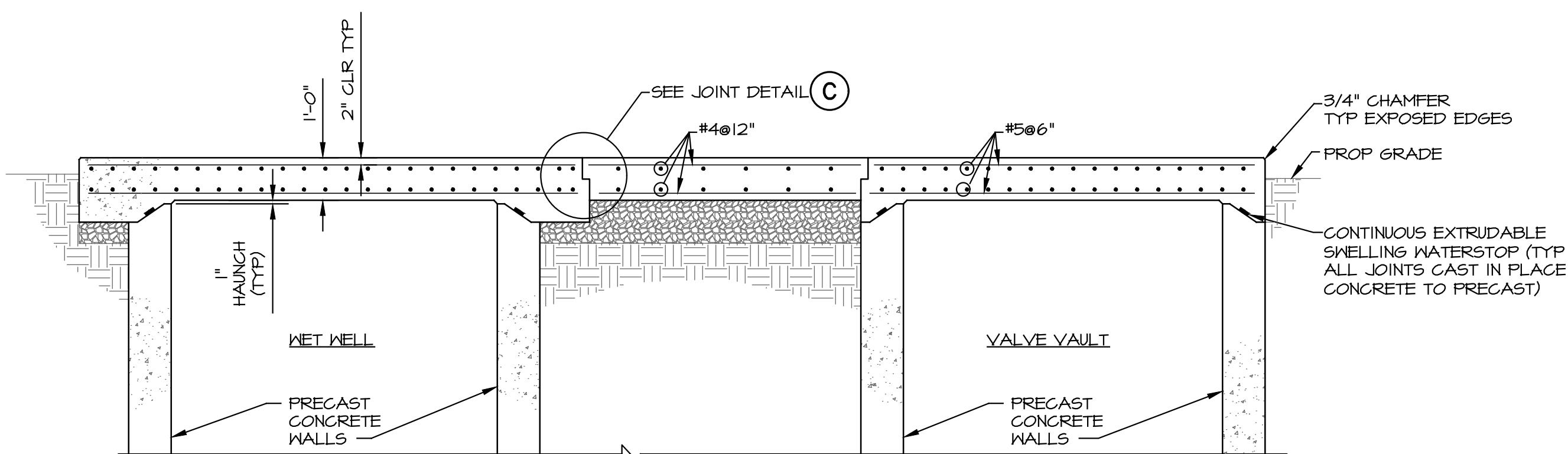






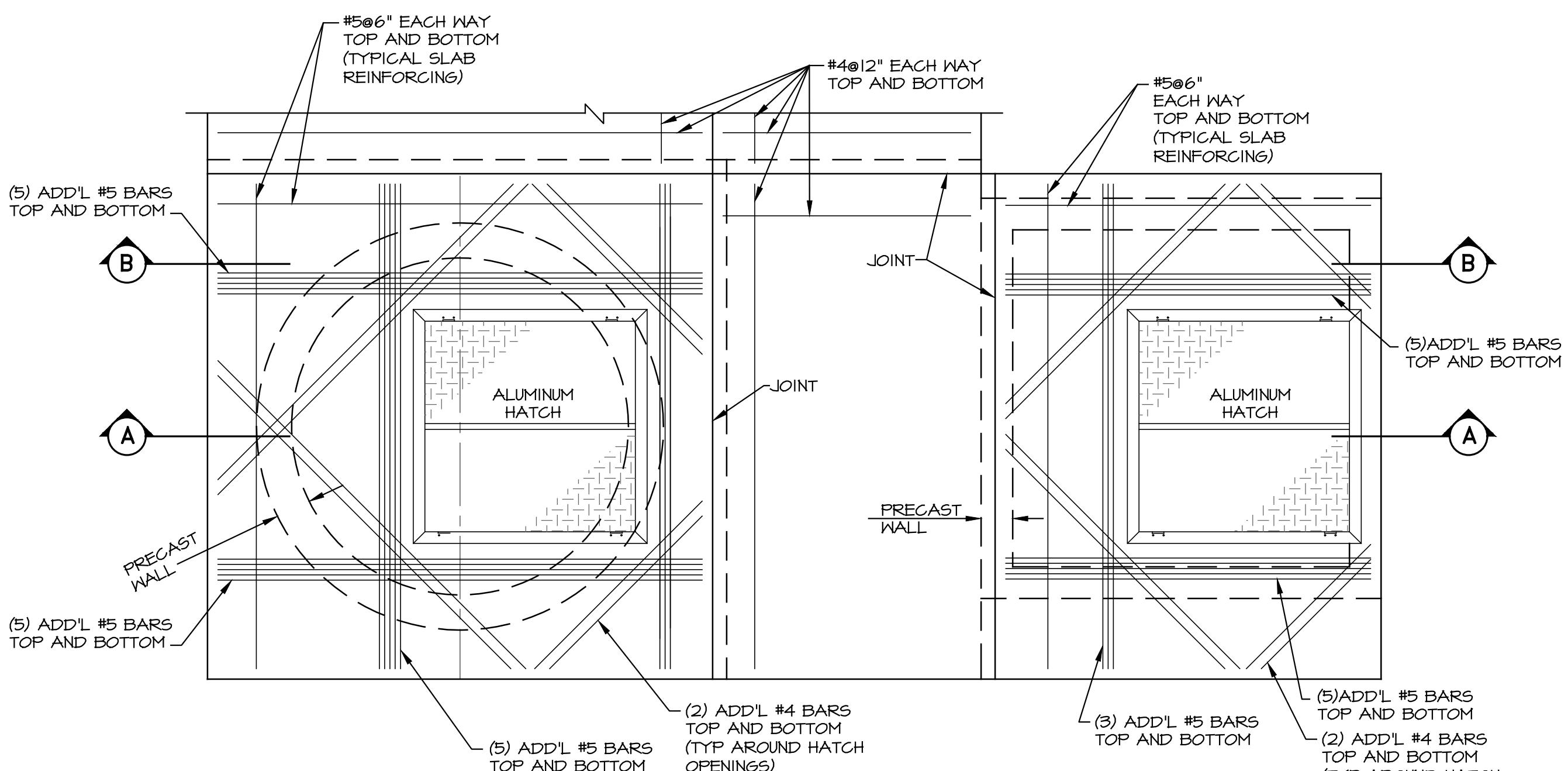
A SECTION THROUGH WETWELL AND VALVE VAULT

NOT TO SCALE



B SECTION THROUGH WETWELL AND VALVE VAULT

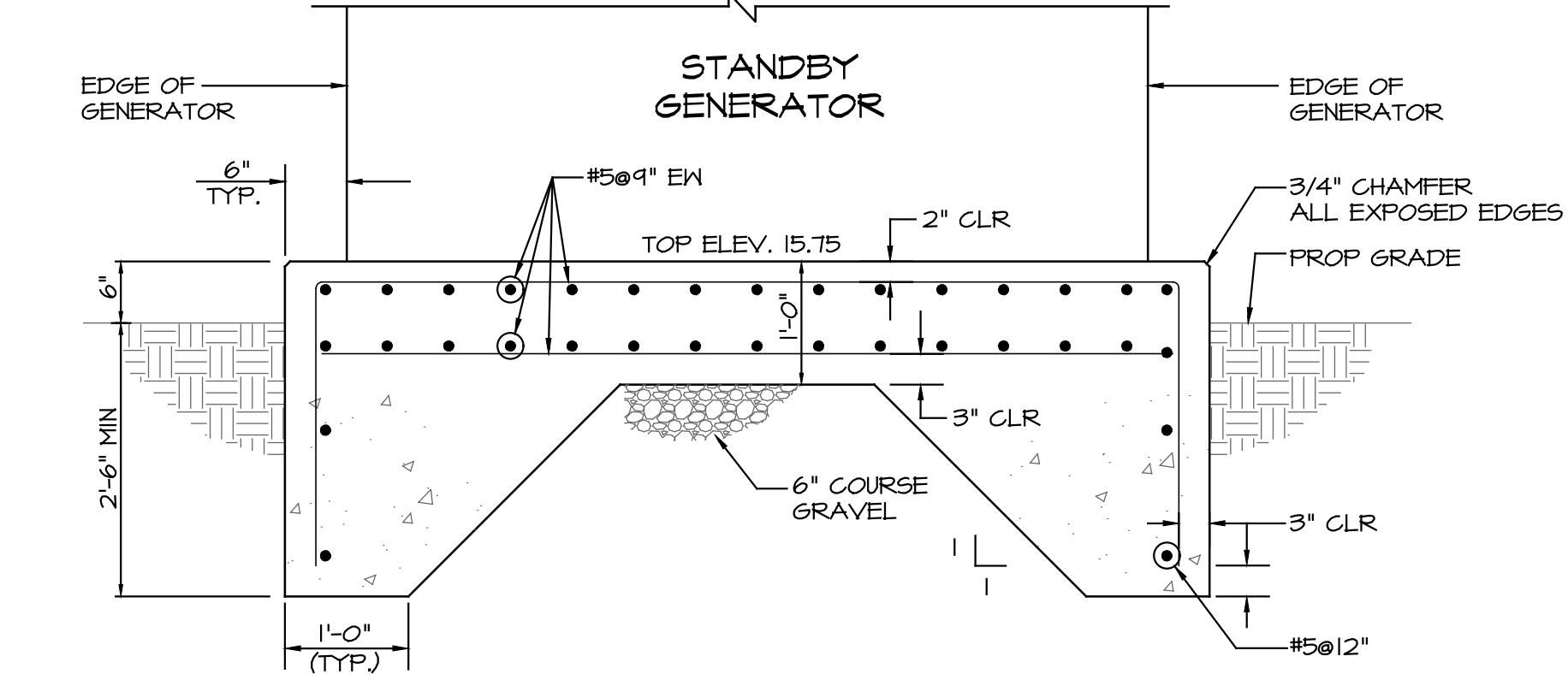
NOT TO SCALE



PLAN - TOP SLAB FOR VALVE VAULT AND WETWELL

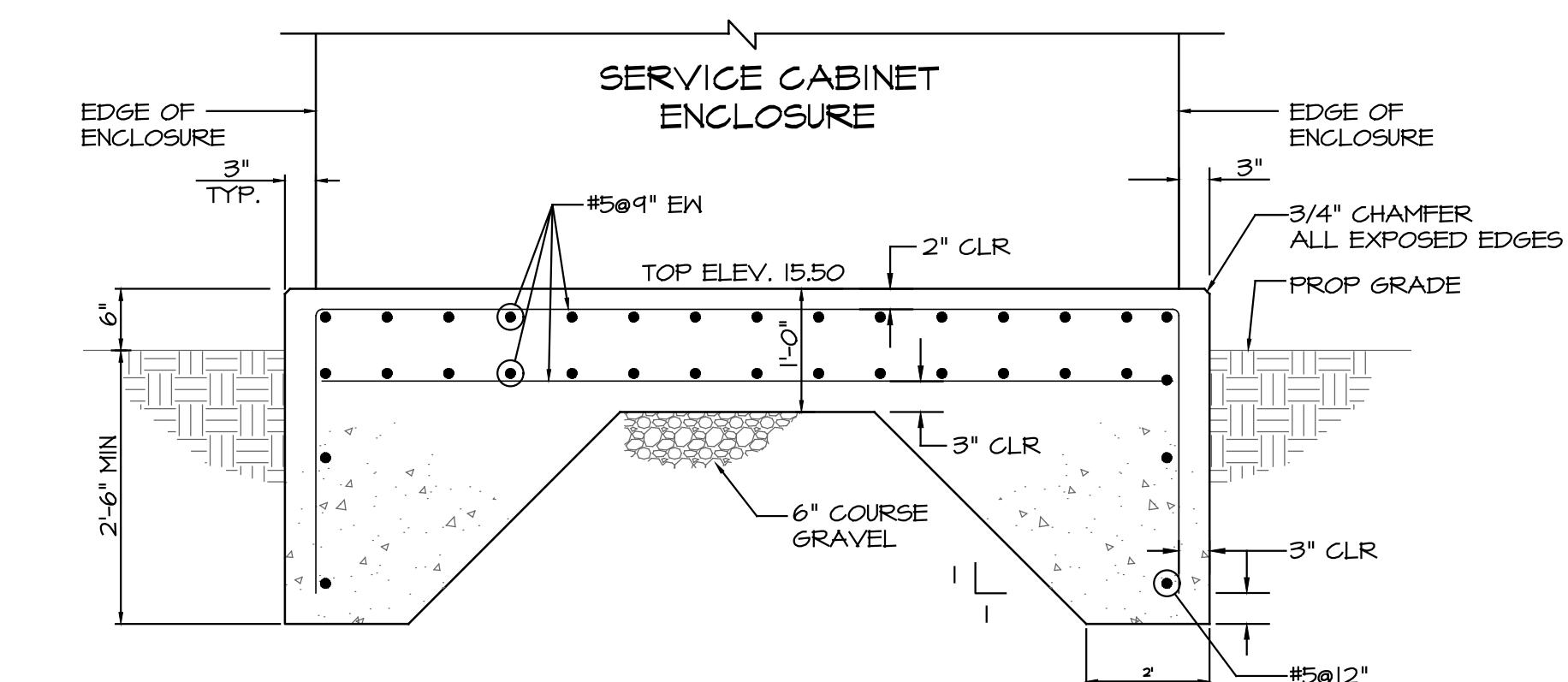
NOT TO SCALE

NOTE:
REFER TO PLANS AND ELEVATION ON SHEET 5 FOR SIZES,
AND EQUIPMENT LOCATIONS



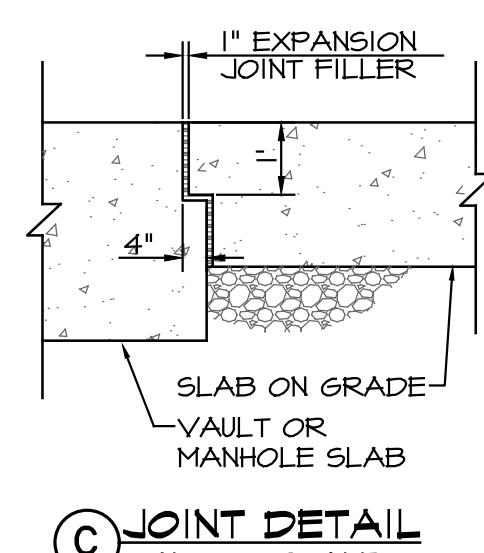
STANDBY GENERATOR FOUNDATION

NOT TO SCALE



SERVICE CABINET ENCLOSURE FOUNDATION

NOT TO SCALE



CAST IN PLACE CONCRETE

1. ALL CONCRETE WORK, INCLUDING FORMING, MIXING, PLACING, AND CURING, SHALL BE IN ACCORDANCE WITH ACI-318.
2. MINIMUM COMPRESSIVE STRENGTH, UNLESS NOTED OTHERWISE ON PLANS, AND MAXIMUM WATER CEMENT RATIO SHALL BE AS FOLLOWS:
 - FRAMED SLABS: 3500 PSI (0.45)
 - EXTERIOR EXPOSED PAVEMENT: 3500 PSI (0.50)
3. ALL CONCRETE REINFORCING SHALL CONFORM TO ASTM A615, GRADE 60.
4. WELDED WIRE MESH SHALL CONFORM TO ASTM-A165.
5. REINFORCING SHALL HAVE THE FOLLOWING COVER UNLESS OTHERWISE NOTED:
 - FOOTINGS AND OTHER CONCRETE Poured AGAINST EARTH: 3"
 - FORMED CONCRETE EXPOSED TO EARTH: 1 1/2" FOR #5 BARS AND SMALLER OR 2" FOR BARS LARGER THAN #5
 - INTERIOR FACES OF WALLS: 2"
 - SLAB ON GRADE: REINFORCING TOP THIRD OF THICKNESS
 - BEAMS, COLUMNS: 2"
 - SLABS: 2"
6. ALL EXTERIOR EXPOSED CONCRETE SHALL HAVE A MINIMUM OF 5% ENTRAINED AIR, ± 1.5%.
7. SURFACES OF ALUMINUM HATCHES TO BE IN CONTACT WITH CONCRETE SHALL HAVE A BITUMINOUS COATING.



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ENGINEERS, PLANNERS, SURVEYORS AND LANDSCAPE ARCHITECTS

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PS & FM

**SEWAGE PUMP STATION
PS-38
STRUCTURAL DETAILS**

FOR

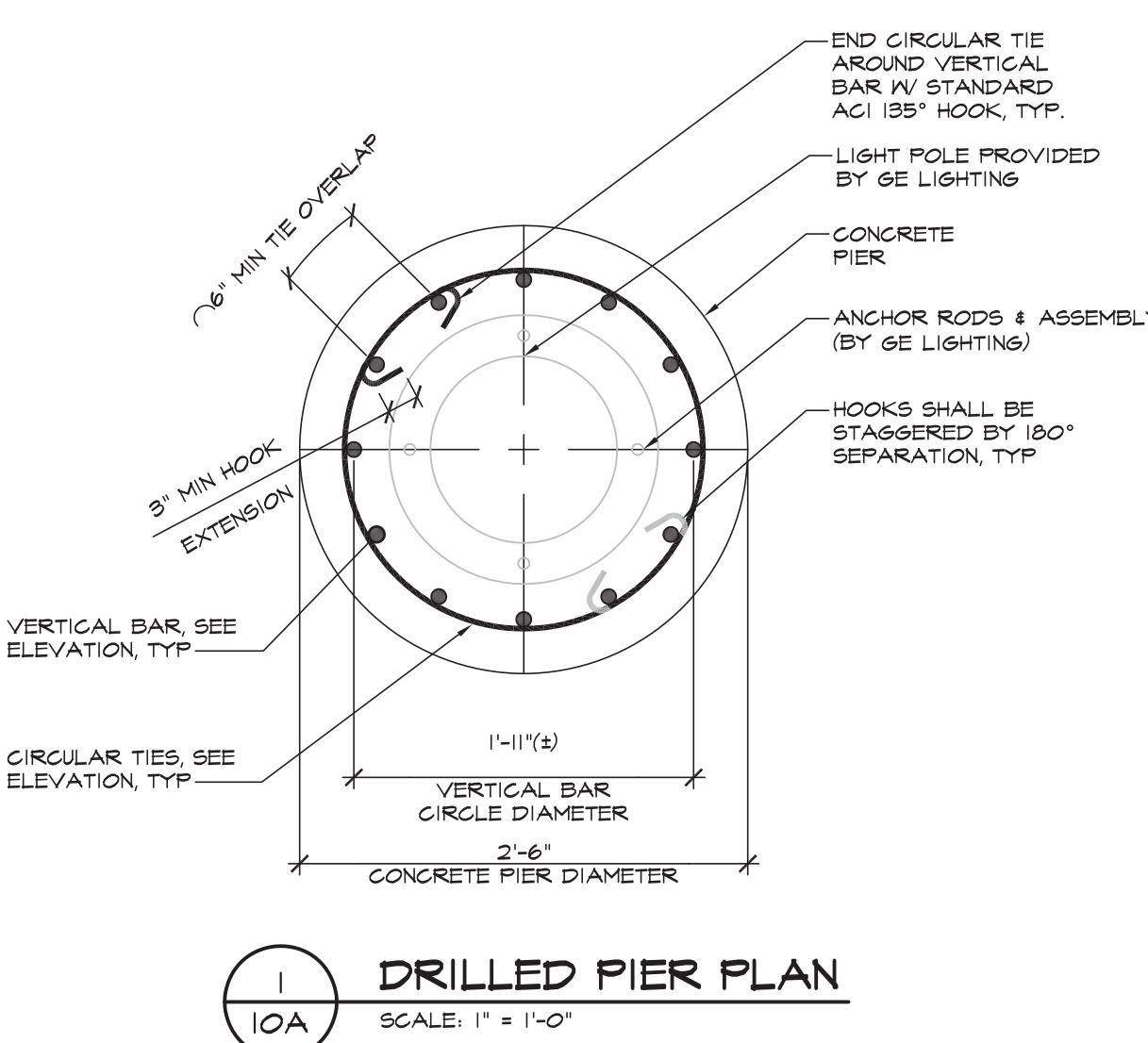
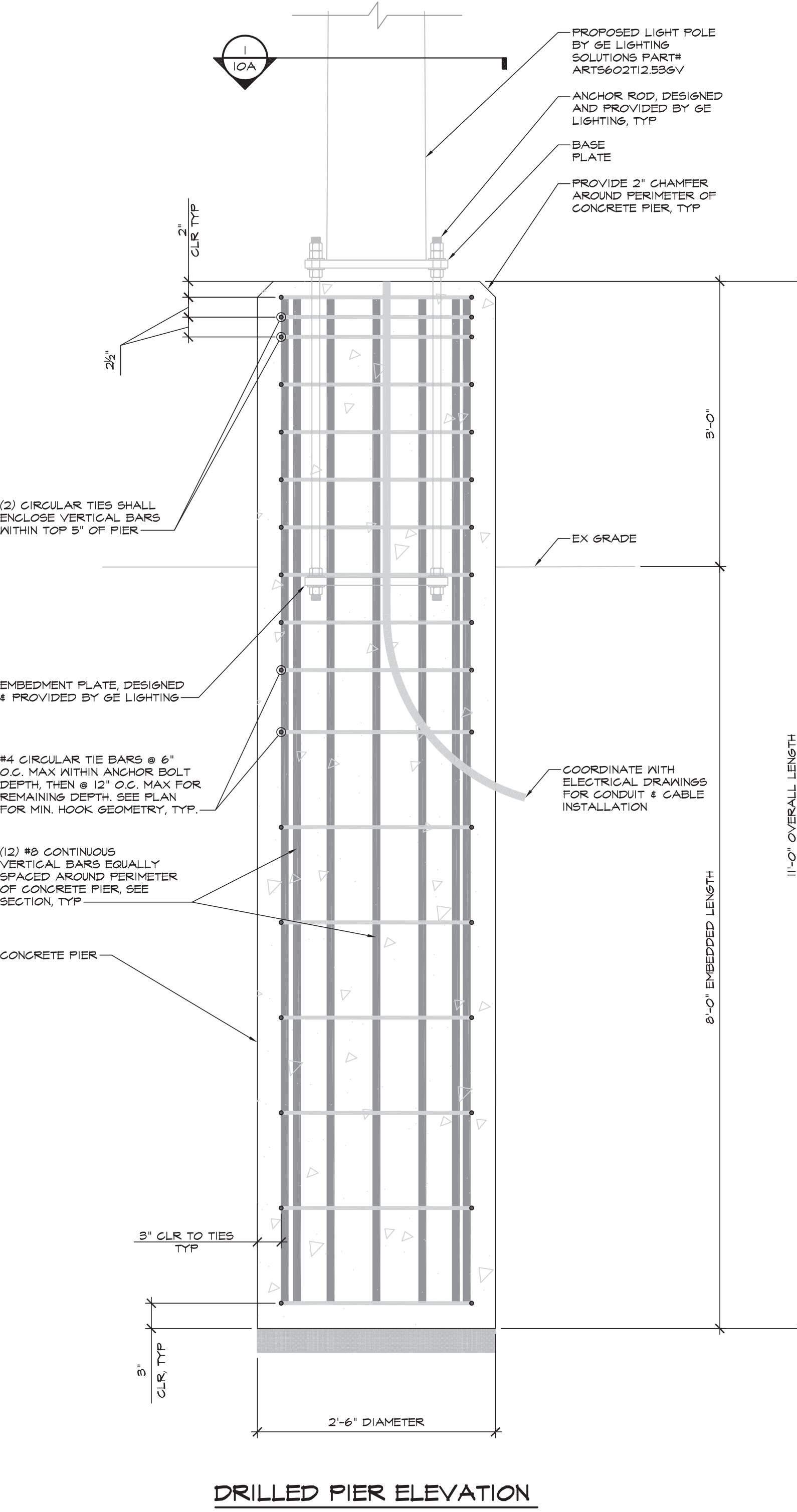
CATTAIL CREEK

SOUTH MURDERKILL HUNDRED

KENT COUNTY, DE



DATE	REVISIONS	JOB NO.: 13870
10/21/2020	QA/QC REVISIONS	SCALE: AS SHOWN
		DATE: 6/28/2019
		DRAWN BY: KH
		DESIGN BY: SS
		REVIEW BY: PD
		HEET: 10 OF 17



DRILLED PIER PLAN
SCALE: 1" = 1'-0"

GENERAL STRUCTURAL NOTES

BUILDING CODES

- A. AASHTO LRFD-1 "LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS", FIRST EDITION 2015
- B. INTERNATIONAL BUILDING CODE (IBC 2012) AND ALL SUBSEQUENT SUPPLEMENTS
- C. IN ADDITION, ALL CONSTRUCTION SHALL CONFORM WITH THE GOVERNING LOCAL BUILDING CODE

DESIGN LOADS

- A. THE DRILLED PIER HAS BEEN DESIGNED TO SUPPORT A PROPOSED 60' TAPERED STEEL POLE PER THE MAXIMUM FACTORED FOUNDATION REACTIONS AND IN CONJUNCTION WITH THE GEOTECHNICAL RECOMMENDATIONS PREPARED BY GEOTECHNICAL ASSOCIATES, INC. (JOB#104951 DATED MARCH 29, 2019) THE MAXIMUM FACTORED REACTIONS PROVIDED ARE LISTED BELOW:

DOWNLOAD: 1.8 KIPS
SHEAR: 0.7 KIPS
OVERTURNING MOMENT: 24.2 FT-KIPS

- B. THE CONTRACTOR SHALL PROVIDE TEMPORARY BRACING AND SHORING AS REQUIRED DURING ERECTION AND CONSTRUCTION. DESIGN OF TEMPORARY BRACING AND SHORING IS THE RESPONSIBILITY OF THE CONTRACTOR.

MISCELLANEOUS

- A. THE CONTRACTOR SHALL LOCATE ALL UTILITIES IN THE AREA OF CONSTRUCTION AND PREVENT DAMAGE TO THEM. SHOULD DAMAGE OCCUR TO ANY UTILITIES, THE CONTRACTOR IS REQUIRED TO REPAIR THE DAMAGE TO THE SATISFACTION OF THE OWNER AT HIS OWN EXPENSE.
- B. SHOP DRAWINGS FOR ALL STRUCTURAL ELEMENTS SHOWN ON THE CONTRACT DOCUMENTS MUST BE SUBMITTED BY THE CONTRACTOR OR OWNER FOR REVIEW BY THE ENGINEER. THE CONTRACTOR OR OWNER SHALL REVIEW DRAWINGS FOR ENGINEER'S APPROVAL. NO REWORK OR STRUCTURAL CERTIFICATION AND DESIGN OF THE PROJECT. THE SHOP DRAWINGS SHALL INDICATE ANY DEVIATIONS OR OMISSIONS FROM THE CONTRACT DOCUMENTS. THE GENERAL CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMISSION AND MAKE ALL CORRECTIONS DEEMED NECESSARY.
- C. IN CASES OF CONFLICT BETWEEN THE DRAWINGS AND/OR SPECIFICATIONS AND OTHER SPECIFICATIONS OR EXISTING/PROPOSED CONDITIONS, CONTRACTOR SHALL NOTIFY THE DESIGN PROFESSIONALS AND OBTAIN CLARIFICATION PRIOR TO BIDDING AND PROCEEDING WITH WORK.
- D. THE CONTRACTOR SHALL NOT SUBMIT REPRODUCTIONS OF THE STRUCTURAL CONTRACT DOCUMENTS AS SHOP DRAWINGS.
- E. SCALES SHOWN ON THE STRUCTURAL CONTRACT DRAWINGS ARE FOR GENERAL INFORMATION ONLY. DIMENSIONAL INFORMATION SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.
- F. APPLY DETAILS, SECTIONS AND NOTES ON THE DRAWINGS WHERE CONDITIONS ARE SIMILAR TO THOSE INDICATED BY DETAIL, DETAIL TITLE OR NOTE.
- G. ASSUME EQUAL SPACING BETWEEN ESTABLISHED DIMENSIONS, IF NOT INDICATED ON DRAWINGS.
- H. THE CONTRACTOR SHALL VERIFY THAT CONSTRUCTION LOADS DO NOT EXCEED THE CAPACITY OF THE STRUCTURE AT THE TIME THE LOAD IS APPLIED.
- I. PROVIDE SHORING AND PROTECTION FOR EXCAVATION BANKS AS NECESSARY TO PREVENT CAVING AND COMPLY WITH ALL APPLICABLE OSHA RULES AND REGULATIONS.

CAST IN PLACE CONCRETE & REINFORCING STEEL

- A. ALL CONCRETE CONSTRUCTION SHALL CONFORM TO THE "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301)", AND TO THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318)".
- B. IN ADDITION TO THE ABOVE, ALL CONCRETE WORK SHALL CONFORM TO THE FOLLOWING:
 - RECOMMENDED PRACTICE FOR HOT WEATHER CONCRETING (ACI 308),
RECOMMENDED PRACTICE FOR COLD WEATHER CONCRETING (ACI 306),
RECOMMENDED PRACTICE FOR CONCRETE FORMWORK (ACI 347),
STANDARD SPECIFICATION FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS (ACI 111), CHEMICAL ADMIXTURES FOR CONCRETE (ACI 212),
STANDARD SPECIFICATION FOR CURING CONCRETE (ACI 308).
- C. ALL CONCRETE, UNLESS NOTED OTHERWISE, SHALL BE STONE AGGREGATE CONCRETE HAVING A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4000 psi. ALL CONCRETE EXPOSED TO WEATHER SHALL HAVE AN AIR ENTRIMENT OF NOT OVER 1.5%. NO ADMIXTURES CONTAINING CALCIUM CHLORIDE SHALL BE PERMITTED. MAXIMUM AGGREGATE SIZE SHALL BE 1", AND MAXIMUM SLUMP SHALL BE 4". MAXIMUM WATER / CEMENT (W/C) RATIO = 0.45.
- D. ALL CONCRETE MIX DESIGNS, INCLUDING CEMENT CONTENT, WATER CEMENT RATIO, FINE AND COARSE AGGREGATE CONTENT AND ALL ADMIXTURES, SHALL BE REVIEWED BY ENGINEER PRIOR TO PLACING FIRST CONCRETE.
- E. ALL CONCRETE SHALL BE SAMPLED AND TESTED BY THE TESTING AGENCY. THE CONTRACTOR SHALL NOTIFY THE TESTING AGENCY 48 HOURS PRIOR TO THE PLACING OF ANY CONCRETE. TESTING SHALL BE IN ACCORDANCE WITH ASTM C112.
- F. THE CONCRETE STRUCTURE SHALL NOT SUPPORT THE DESIGN LIVE LOAD FOR A MINIMUM OF 28 DAYS AND ALL SHORING AND RE-SHORING REQUIRED TO SUPPORT THE CONCRETE STRUCTURE DURING CONSTRUCTION SHALL BE REMOVED BY THE CONTRACTOR. DRAWINGS, SIGNED AND SEALED BY A REGISTERED ENGINEER IN THE GOVERNING JURISDICTION, SHALL BE SUBMITTED FOR REVIEW. SHOP DRAWINGS SHALL INDICATE THE TYPE, EXTENT, SIZE, AND LOCATION OF ALL SHORING AND RE-SHORING AS WELL AS THE SEQUENCE OF CONSTRUCTION.
- G. GROUND BLAST FURNACE SLAG MAY BE USED TO REPLACE UP TO 50 PERCENT OF THE PORTLAND CEMENT IN A CONCRETE MIX, AND FLY ASH OR POZZOLAN MAY BE USED TO REPLACE UP TO 25 PERCENT OF PORTLAND CEMENT, SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER AND SHALL CONFORM TO ASTM C180.
- H. ALL REINFORCING BARS SHALL BE NEW BILLET STEEL CONFORMING TO ASTM A615 GRADE 60 (Fy = 60 KSI).
- I. LAP ALL REINFORCING BARS A MINIMUM OF 48 BAR DIAMETERS, UNLESS OTHERWISE NOTED.
- J. ALL REINFORCING SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH THE CRSI "MANUAL OF STANDARD PRACTICE", ACI 318, DETAILS AND DETAILING OF CONCRETE REINFORCEMENT", ACI SP-66 "DETAILED MANUAL".
- K. MINIMUM COVER FOR ALL REINFORCING SHALL BE AS SHOWN ON THE DRAWINGS. APPROVED SPACERS SHALL BE USED TO ENSURE THE MINIMUM COVER FOR REINFORCING HAS BEEN SATISFIED. SPACERS SHALL BE ATTACHED INTERMITTENTLY THROUGHOUT THE ENTIRE LENGTH OF VERTICAL REINFORCING CASES TO ENSURE CONCENTRIC PLACEMENT OF CASES IN EXCAVATIONS.
- L. REINFORCING CASES SHALL BE BRACED TO RETAIN PROPER DIMENSIONS DURING HANDLING AND THROUGHOUT PLACEMENT OF CONCRETE. WHEN TEMPORARY CASING IS UTILIZED, BRACING SHALL BE ADEQUATE TO RESIST FORCES OCCURRING FROM FLOWING CONCRETE DURING CASING EXTRACTION.
- M. WELDING IS PROHIBITED ON REINFORCING STEEL AND EMBEDMENTS.
- N. LOOSE MATERIAL SHALL BE REMOVED FROM BOTTOM OF EXCAVATION PRIOR TO CONCRETE PLACEMENT. SIDES OF EXCAVATION SHALL BE ROUGH AND FREE OF LOOSE CUTTINGS.
- O. CONCRETE SHALL BE PLACED IN A MANNER THAT WILL PREVENT SEGREGATION OF CONCRETE MATERIALS, INFILTRATION OF WATER OR SOIL AND OTHER OCCURRENCES WHICH MAY DECREASE THE STRENGTH OR DURABILITY OF THE FOUNDATION.
- P. FREE FALL CONCRETE MAY BE USED PROVIDED FALL IS VERTICAL DOWN WITHOUT HITTING SIDES OF EXCAVATION. FORMWORK, REINFORCING BARS, FORM TIES, CASE BRACING OR OTHER OBSTRUCTIONS, UNDER NO CIRCUMSTANCES SHALL CONCRETE FALL THROUGH WATER.
- Q. DRILLING FLUID, IF USED, SHALL BE FULLY DISPLACED BY CONCRETE AND SHALL NOT BE DEDUCTED TO CONCRETE OR SURROUNDING SOIL. CONTAMINATED CONCRETE SHALL BE REMOVED FROM TOP OF FOUNDATION AND REPLACED WITH FRESH CONCRETE.
- R. ALL CAST-IN-PLACE CONCRETE WILL EXPERIENCE DIFFERENT VARIATIONS OF CRACKING. ANY ELEMENT EXPOSED TO DIRECT WEATHER AND/OR TEMPERATURE VARIATIONS DURING CONSTRUCTION OR IN THE FINAL CONDITION IS TO BE TREATED AND REGULARLY MAINTAINED TO PREVENT PROPAGATION OF CRACKS AND WATER INFILTRATION. THE CONTRACTOR SHALL DEVELOP A REGULAR MAINTENANCE PROGRAM AND SUBMIT IT TO THE OWNER.
- S. ALL CONCRETE CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH CHAPTER 11 OF THE INTERNATIONAL BUILDING CODE.

DRILLED PIER FOUNDATIONS

- A. DRILLED PIER FOUNDATIONS (CAISONS) SHALL BEAR ON UNDISTURBED SOIL WITH AN ASSUMED ALLOWABLE NET BEARING CAPACITY OF 8 KSF. THE ALLOWABLE SOIL BEARING PRESSURE SHALL BE FIELD VERIFIED BY A REGISTERED GEOTECHNICAL ENGINEER AND APPROVED PRIOR TO PLACING FOUNDATIONS. SHOULD THE ACTUAL SOIL BEARING PRESSURE BE LESS THAN 8 KSF, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER.
- B. BEARING ELEVATION OF DRILLED PIER FOUNDATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE AND MAY NEED TO BE ADJUSTED IN FIELD.
- C. DRILLED PIER FOUNDATIONS SHALL BE DRILLED WITHOUT DISTURBING THE SURROUNDING SOIL AND SHALL BE KEEP FREE OF WATER INFILTRATION UNTIL CONCRETE CAN BE PLACED.
- D. DRILLED PIERS WITH BELLS OR SHAFTS LESS THAN 2'-0" CLEAR SHALL NOT BE PLACED LESS THAN 24 HOURS APART.
- E. FOUNDATION DEPTH INDICATED IS BASED ON THE GRADE LINE DESCRIBED IN THE REFERENCED GEOTECHNICAL REPORT. FOUNDATION MODIFICATION MAY BE REQUIRED IN THE EVENT CUT OR FILL OPERATIONS HAVE TAKEN PLACE SUBSEQUENT TO THE GEOTECHNICAL INVESTIGATION.

POST-CONSTRUCTION INSPECTION

- A. A POST-MODIFICATION INSPECTION REPORT IS REQUIRED AND SHALL BE INCLUDED IN THE CONTRACTOR'S BID. A POST-MODIFICATION INSPECTION IS A VISUAL INSPECTION OF THE FOUNDATION CONSTRUCTION AND A REVIEW OF CONSTRUCTION INSPECTIONS AND OTHER REPORTS TO ENSURE THE INSTALLATION WAS CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NAMELY THE FOUNDATION DESIGN ITSELF.
- B. THE POST-MODIFICATION INSPECTION REPORT SHALL BE COMPLETED BY A PROFESSIONAL ENGINEER LICENSED IN THE JURISDICTION IN WHICH THE PROJECT IS LOCATED.
- C. THE INTENT OF THE POST-MODIFICATION INSPECTION REPORT IS TO CONFIRM INSTALLATION AND CONFIGURATION AND WORKMANSHIP ONLY AND IS NOT A REVIEW OF THE FOUNDATION DESIGN ITSELF.
- D. TO ENSURE THAT THE REQUIREMENTS OF THE POST-MODIFICATION INSPECTION REPORT ARE MET, IT IS VITAL THAT THE CONTRACTOR AND POST-MODIFICATION INSPECTOR BEGIN COMMUNICATING AND COORDINATING AS SOON AS A PO IS RECEIVED.

PS & FM

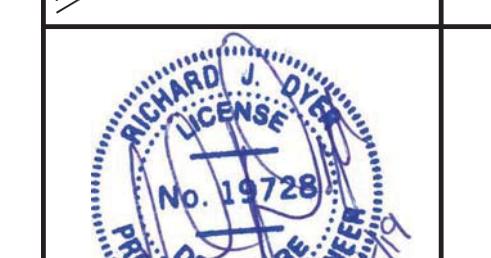


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SEWAGE PUMP STATION
PS-38

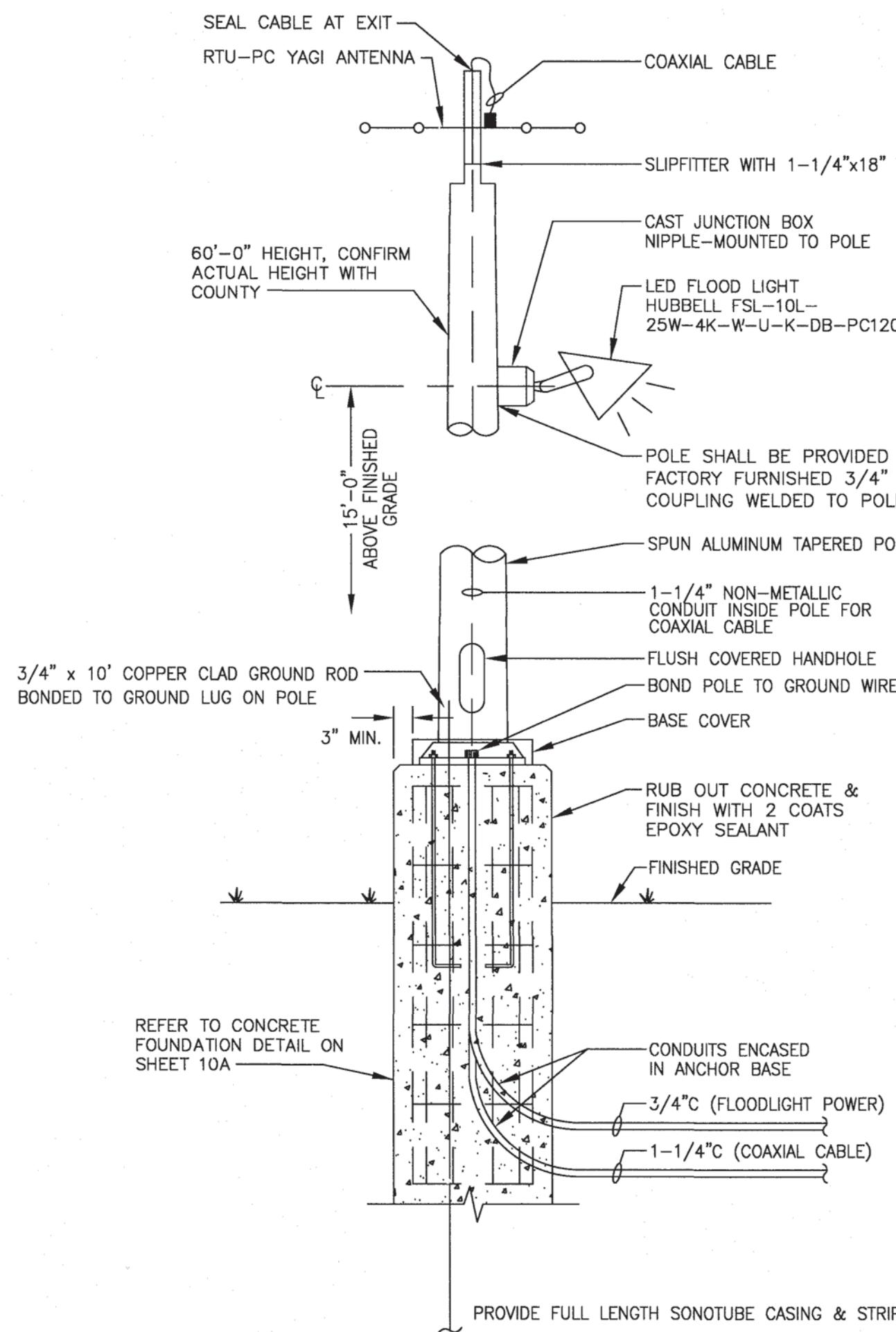
STRUCTURAL DETAIL & NOTES
FOR

CATTAIL CREEK

SOUTH MURDERKILL HUNDRED
KENT COUNTY, DE

DATE	REVISIONS	JOB NO.: 13870
		SCALE: AS SHOWN
		DATE: 6/5/2019
		DRAWN BY: SG
		DESIGN BY: RJD
		REVIEW BY: RJD
		Sheet: 10A of 17

PROFESSIONAL CERTIFICATION
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF DELAWARE.
LICENSE NO. 19728 EXPIRATION DATE: 06/30/2020



LIGHT POLE ELEVATION
N.T.S.

GENERATOR SIZING CHART FOR MULTIPLE SEWAGE PUMP SIZES

1) ASSUME ADDITIONAL LOAD OF 5 HP @ 400V 3PHASE (GRINDER) FOR ALL CALCULATIONS & 5KVA ANCILLARY LOAD.
2) MOTORS INCLUDED IN CALCULATIONS ARE BASED ON VFD (4-POLE) PUMPS.

Start Pump 1	Start Pump 2	Genset size w/ (2) 5HP	Genset size w/ (2) 7.5HP	Genset size w/ (2) 10HP	Genset size w/ (2) 12HP	Genset size w/ (2) 15HP	Genset size w/ (2) 18HP	Genset size w/ (2) 20HP
VFD	VFD	25kW	35kW	35kW	35kW	40kW	40kW	
VFD	SS	25kW	35kW	35kW	35kW	40kW	40kW	
SS	SS	25kW	35kW	35kW	40kW	40kW	40kW	
VFD	ATL	25kW	35kW	35kW	35kW	40kW	50kW	50kW
SS	ATL	25kW	35kW	35kW	35kW	40kW	50kW	50kW
ATL	ATL	25kW	35kW	35kW	40kW	50kW	50kW	
<hr/>								
Genset size w/ (1) 5HP		Genset size w/ (1) 7.5HP	Genset size w/ (1) 10HP	Genset size w/ (1) 12HP	Genset size w/ (1) 15HP	Genset size w/ (1) 18HP	Genset size w/ (1) 20HP	
VFD		25kW	25kW	35kW	35kW	35kW	35kW	
SS		25kW	25kW	25kW	35kW	35kW	35kW	
ATL		25kW	25kW	25kW	35kW	40kW	40kW	
<hr/>								
Start Pump 1	Start Pump 2	Genset size w/ (2) 25HP	Genset size w/ (2) 30HP	Genset size w/ (2) 35HP	Genset size w/ (2) 40HP	Genset size w/ (2) 45HP	Genset size w/ (2) 50HP	Genset size w/ (2) 60HP
VFD	VFD	50kW	60kW	80kW	80kW	80kW	100kW	125kW
VFD	SS	60kW	60kW	80kW	80kW	80kW	100kW	125kW
SS	SS	60kW	60kW	80kW	80kW	80kW	100kW	150kW
VFD	ATL	80kW	80kW	100kW	100kW	100kW	125kW	150kW
SS	ATL	80kW	80kW	100kW	100kW	100kW	125kW	150kW
ATL	ATL	80kW	80kW	100kW	100kW	100kW	125kW	150kW
<hr/>								
Genset size w/ (1) 25HP		Genset size w/ (1) 30HP	Genset size w/ (1) 35HP	Genset size w/ (1) 40HP	Genset size w/ (1) 45HP	Genset size w/ (1) 50HP	Genset size w/ (1) 60HP	
VFD		35kW	35kW	35kW	40kW	50kW	50kW	60kW
SS		35kW	40kW	40kW	40kW	85kW	80kW	100kW
ATL		40kW	50kW	100kW	100kW	100kW	125kW	125kW

NOTE: CALCULATIONS ARE BASED ON CUMMINS POWER SYSTEMS GENERATORS

STANDBY GENERATOR SIZING CRITERIA:

THE GENERATOR SHALL BE SIZED TO SUPPORT EITHER ONE OR TWO SEWAGE PUMPS AND ANCILLARY LOADS SUCH AS A GRINDER PUMP AND CABINET HEATERS/CONTROLS. ALL PUMPS (INCLUDING GRINDER) SHALL BE STEPPED IN THROUGH THE PLC AND SO REPRESENTED IN THE GENERATOR SIZING CALCOS. THE STANDBY GENERATOR SHALL BE SIZED TO SUPPORT BOTH OF THE FOLLOWING SCENARIOS. THE LARGER GENERATOR SIZE RESULTS FOR THE TWO CRITERIA STATEMENTS SHALL BE UTILIZED.

*1. ONE (1) SEWAGE PUMP STARTING ACROSS THE LINE, OTHER SEWAGE PUMP NOT RUNNING.

*2. TWO (2) SEWAGE PUMPS STARTING WITH ONE IN VFD MODE AND THE OTHER IN SOFT START MODE.

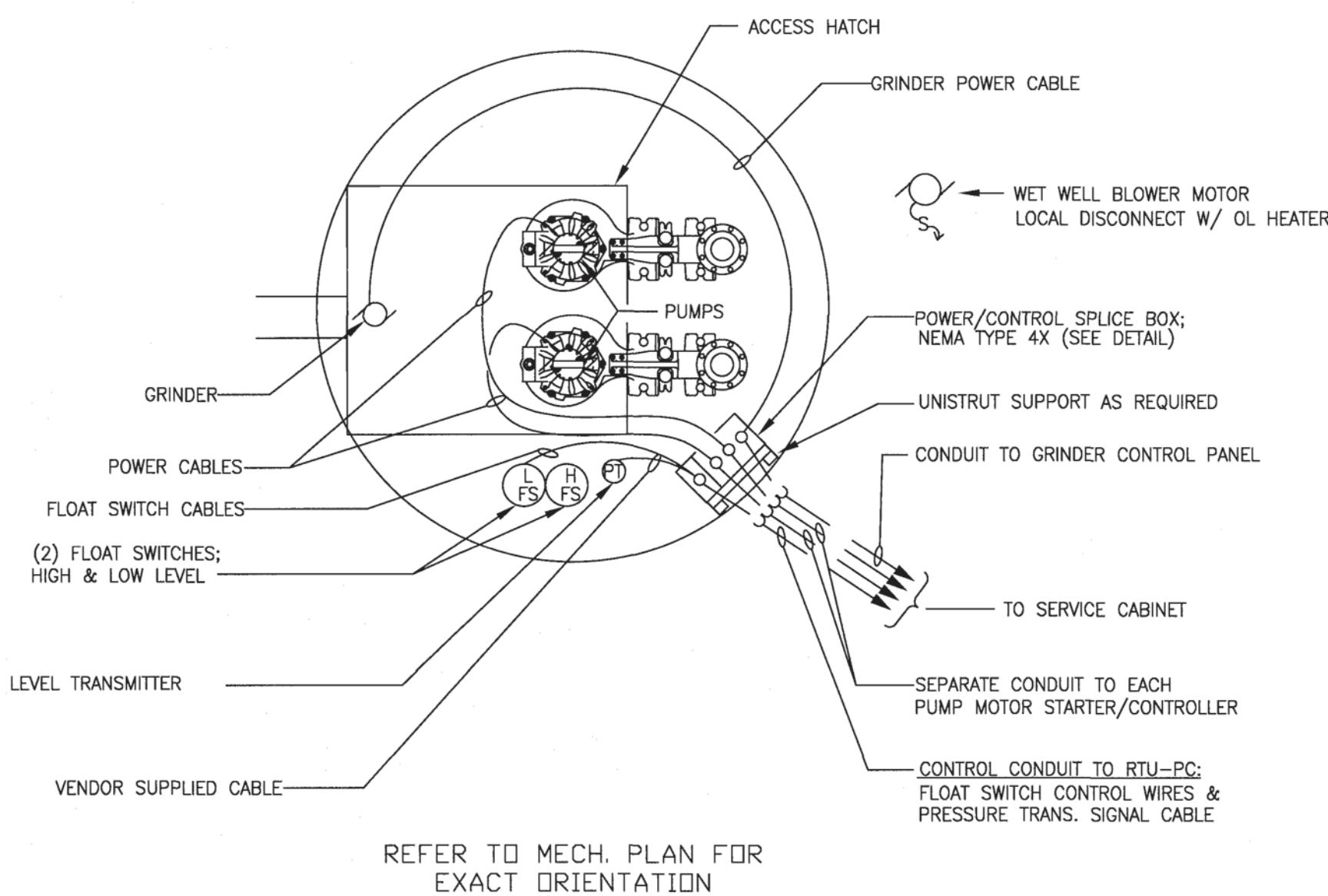
EXAMPLE: MINIMUM GENERATOR SIZE FOR (2) 30HP SEWAGE PUMPS AND ONE 5HP GRINDER PUMP ALL STEPPED IN SEPARATELY SHALL BE 60kW.

MINIMUM WIRING SIZING NOTES FOR 480 V 3Ø MOTORS, COPPER WIRING

REFER TO EQUIPMENT LIST NOTES:

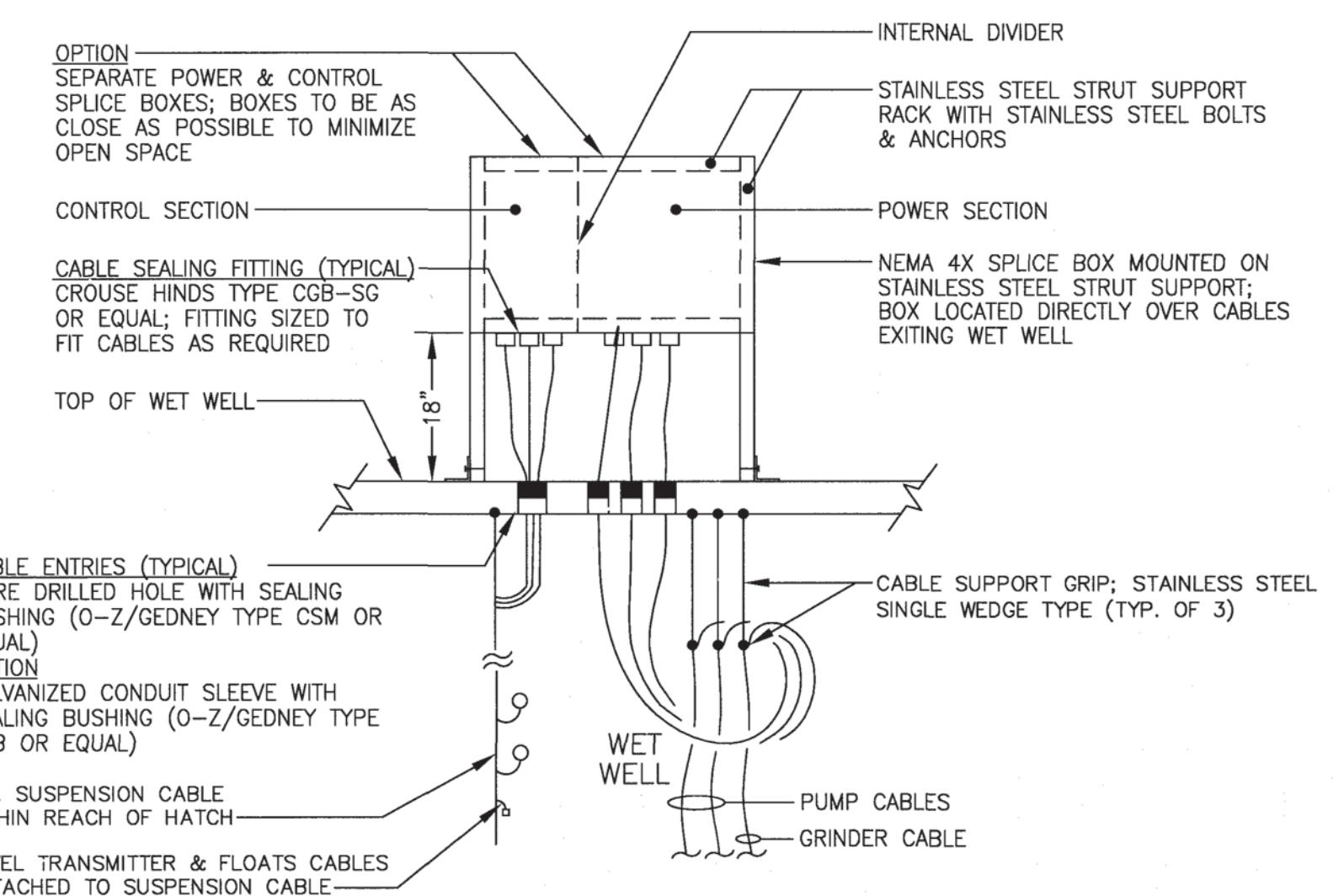
1. MOTORS LESS THAN EQUAL TO 7½ HP SHALL BE 3#10 & 1#12 GRD IN ¾" C.
2. MOTORS GREATER THAN 7½ HP & LESS THAN OR EQUAL TO 15 HP SHALL BE 3#8 & 1#10 GRD IN ¾" C.
3. MOTORS GREATER THAN 15 HP AND LESS OR EQUAL TO 20 HP SHALL BE 3#6 & 1#8 GRD IN ¾" C.
4. MOTORS GREATER THAN 20 HP AND LESS OR EQUAL TO 30 HP SHALL BE 3#4 & 1#8 GRD IN ¾" C.
5. MOTORS GREATER THAN 30 HP AND LESS OR EQUAL TO 40 HP SHALL BE 3#3 & 1#8 GRD IN 1 ¼" C.
6. MOTORS GREATER THAN 40 HP AND LESS OR EQUAL TO 50 HP SHALL BE 3#2 & 1#8 GRD IN 1 ¼" C.
7. MOTORS GREATER THAN 50 HP AND LESS OR EQUAL TO 60 HP SHALL BE 3#1 & 1#6 GRD IN 1 ½" C.
8. MOTORS GREATER THAN 60 HP AND LESS OR EQUAL TO 70 HP SHALL BE 3#1/0 & 1#6 GRD IN 2" C.
9. FEEDERS FROM GENERATOR 50 kW OR LESS TO ATS SHALL BE 4#1 & 1#6 GRD IN 2" C.
10. FEEDERS FROM GENERATOR GREATER THAN 50 kW OR LESS THAN OR EQUAL TO 100 kW SHALL BE 4#3/0 & 1#4 GRD IN 2½" C.
11. FEEDERS FROM GENERATOR GREATER THAN 100 kW OR LESS THAN OR EQUAL TO 200 kW SHALL BE 4#500 KCMIL & 1#3 GRD IN 4" C.

NOTICE
SPLICING BOX SHALL BE LOCATED AT WET WELL AS DETAILED ON THIS DRAWING WHEN DISTANCE FROM EDGE OF WET WELL TO END OF SERVICE CABINET CONTROL SECTION IS GREATER THAN 10 FEET. WHEN DISTANCE IS LESS THAN 10 FEET, AN ACCEPTABLE OPTION IS TO SURFACE-MOUNT SPLICE BOX ON END OF SERVICE CABINET; CONDUITS FROM WET WELL SHALL RISE DIRECTLY UNDER SPLICE BOX AND HAVE SEALING BUSHINGS (O-Z/GEENEY TYPE CSB OR EQUAL) INSTALLED FOR CABLES.



TYPICAL WET WELL PLAN

N.T.S.



FRONT ELEVATION SPLICE BOX DETAIL

N.T.S.

GENERATOR ENCLOSURE & FUEL TANK SIZING CHART

USE ON GENERIC MEDIUM PUMPING STATION DETAIL SHEET			
Generator Size	Distance to Property Line	Enclosure Type	Fuel Tank Capacity
25kW	9.1' or less	Specialty Enclosure	70 Gallons
	9.2' or greater	QS 2nd Stage	
	14.2' or greater	QS 1st Stage	
DSKCA	24.3' or greater	Basic Weather	
	8.7' or less	Specialty Enclosure	
	8.8' or greater	QS 2nd Stage	
DSFAA	14.2' or greater	QS 1st Stage	140 Gallons
	57.1' or greater	Basic Weather	
	9.0' or less	Specialty Enclosure	
40kW	9.1' or greater	QS 2nd Stage	
	14.2' or greater	QS 1st Stage	
	64.8' or greater	Basic Weather	
DSFAB	11.7' or less	Specialty Enclosure	140 Gallons
	11.8' or greater	QS 2nd Stage	
	15.4' or greater	QS 1st Stage	
DSFAC	36.9' or greater	Basic Weather	140 Gallons
	13.0' or less	Specialty Enclosure	
	13.1' or greater	QS 2nd Stage	
60kW	18.0' or greater	QS 1st Stage	140 Gallons
	66.4' or greater	Basic Weather	
	15.9' or less	Specialty Enclosure	
DSFAD	16.0' or greater	QS 2nd Stage	173 Gallons
	19.8' or greater	QS 1st Stage	
	88.5' or greater	Basic Weather	
DSGAA	18.8' or less	Specialty Enclosure	309 Gallons
	22.5' or greater	QS 1st Stage	
	89.5' or greater	Basic Weather	
DSGAA	23.4' or less	Specialty Enclosure	309 Gallons
	23.5' or greater	QS 2nd Stage	
	26.7' or greater	QS 1st Stage	
DSGAB	95.9' or greater	Basic Weather	309 Gallons
	26.0' or less	Specialty Enclosure	
	26.1' or greater	QS 2nd Stage	
DSGAC	32.8' or greater	QS 1st Stage	336 Gallons
	198.0' or greater	Basic Weather	
	32.8' or less	Specialty Enclosure	
175kW	34.0' or greater	QS 2nd Stage	
	34.1' or less	QS 1st Stage	
	222.2' or greater	Basic Weather	
200kW	33.1' or less	Specialty Enclosure	336 Gallons
	33.2' or greater	QS 2nd Stage	
	35.6' or greater	QS 1st Stage	
DSHAC	205.0' or greater	Basic Weather	
	205.0' or greater	Specialty Enclosure	
	205.0' or greater	QS 1st Stage	

NOTES: 1.) CALCULATIONS ARE BASED ON CUMMINS POWER SYSTEMS GENERATORS

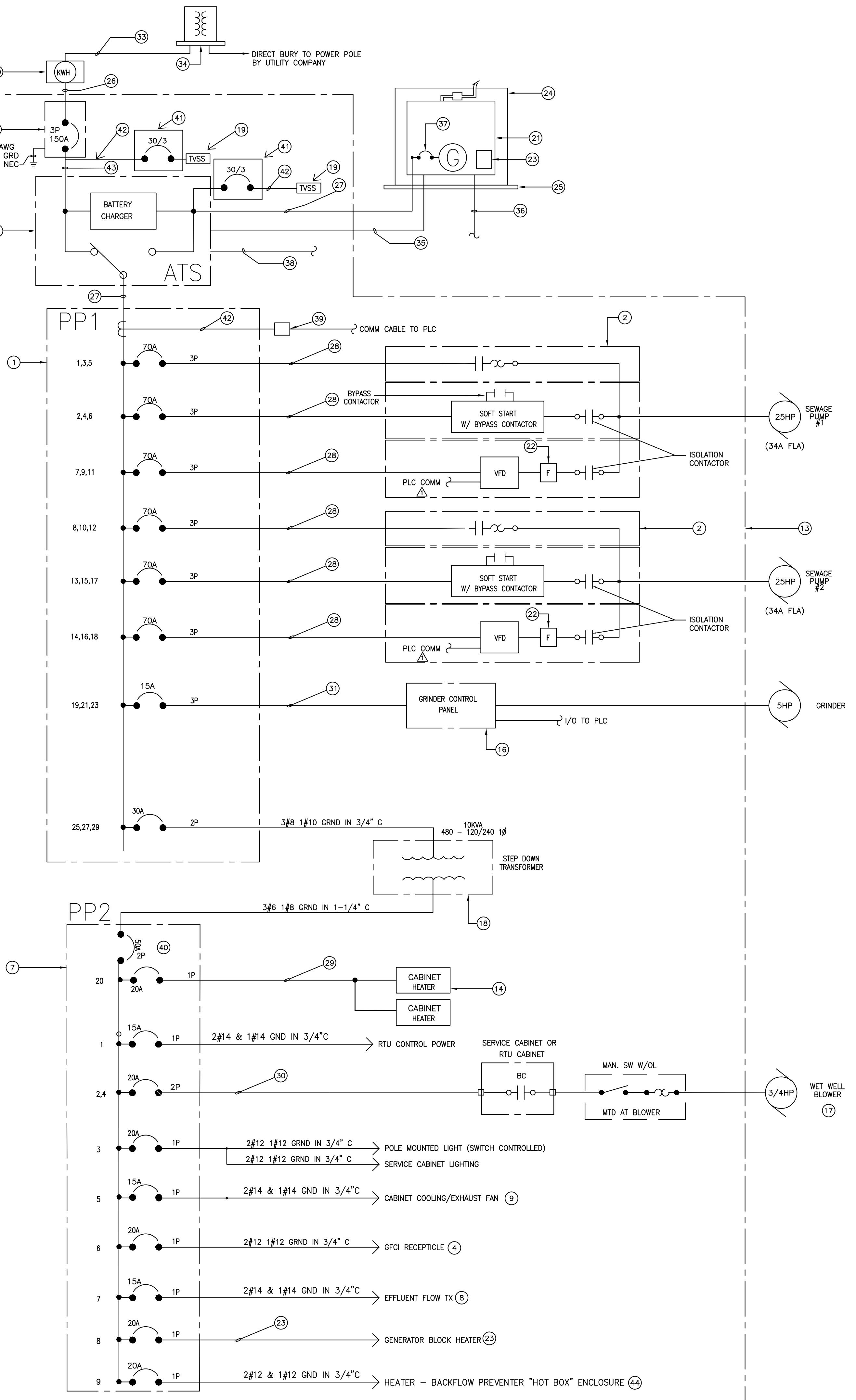
2.) SPECIALTY ENCLOSURE IS BASED ON ACOUSTICAL SHEETMETAL INC.

3.) GENERATOR MUST MEET CURRENT EPA & DNREC EXHAUST EMISSIONS REQUIREMENTS AT TIME OF PURCHASE.

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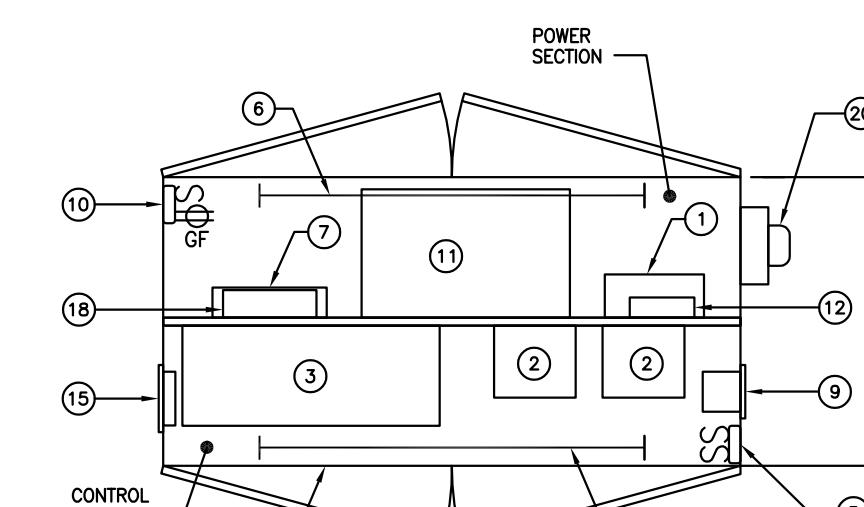
GENERAL NOTES

1. WIRING ENTERING FROM CONCRETE PAD SHALL BE IN RIGID GALVANIZED STEEL CONDUIT.
2. ALL INTERCONNECT WIRING WITHIN ENCLOSURE SHALL BE IN SCHEDULE 40 PVC OR RIGID ALUMINUM CONDUIT. LIQUID-TIGHT FLEXIBLE NONMETALLIC CONDUIT IN LENGTHS NOT EXCEEDING 12" MAY BE USED WHERE INSTALLATION OF RIGID CONDUIT IS IMPRACTICAL.
3. CONTROL SECTIONS WITH VFD DRIVE CONTROLLERS INSTALLED SHALL BE VENTILATED WITH AN ADDITIONAL THERMOSTATICALLY CONTROLLED FAN AND AN ADDITIONAL EXHAUST LOUVER WITH REPLACEABLE FILTER. LIVE TERMINALS OF THERMOSTAT SHALL BE SHIELDED FROM CONTACT.
4. FOR MOTOR & GENERATOR FEEDER EQUIPMENT SIZE REFER TO SIZING CHART.

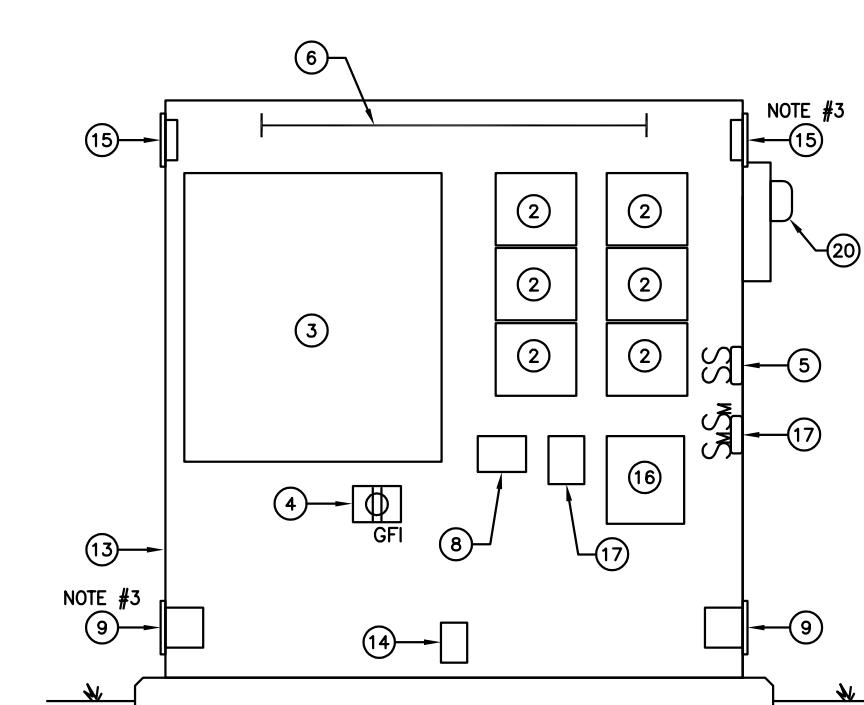


EQUIPMENT LIST

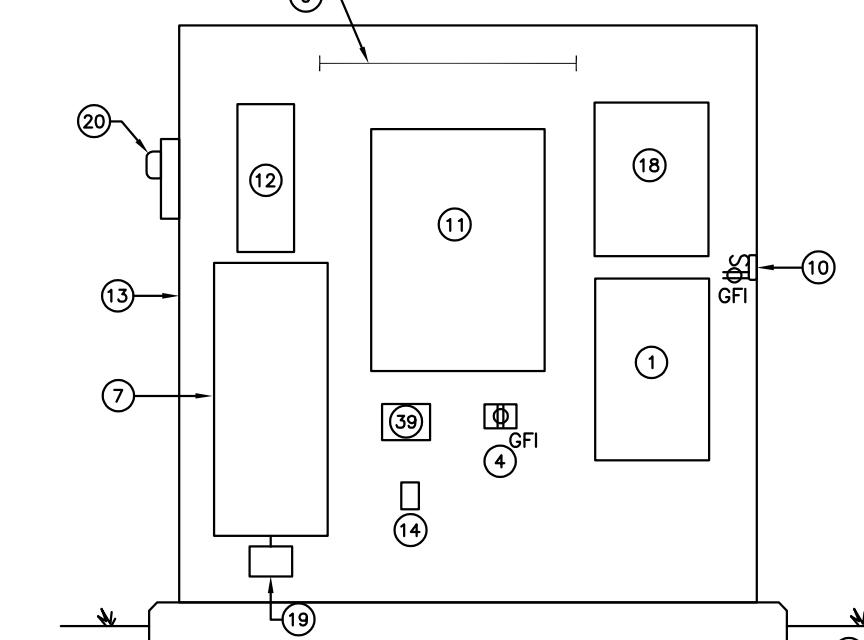
- 1) 480/277V, 3PH, 4W PANEL, 225A MLO
- 2) AC DRIVE CONTROLLER WITH BACKUP SOLID STATE SOFT START AND STAND ALONE ACROSS THE LINE STARTERS.
- 3) REMOTE TELEMETRY UNIT WITH PUMP CONTROLLER (RTU/PLC) IN NEMA 12 ENCLOSURE
- 4) 20A/120VAC DUPLEX GFCI RECEPTACLE IN FS BOX WITH COVER
- 5) FLOODLIGHT & ENCLOSURE LIGHT SWITCHES IN DUAL-GANG FS BOX; PROVIDE IDENTIFICATION LABELS
- 6) 4' LONG (APPROX) LED LIGHTING FIXTURE.
- 7) 100A, 120/240 1PH, 3W, 30 CKT PANEL - NEMA 1
- 8) EFFLUENT FLOW TRANSMITTER; 24V DC WITH RS-485 SERIAL WIRED TO ③
- 9) THERMOSTATICALLY CONTROLLED COOLING FAN
- 10) LIGHT SWITCH & 20A/120VAC DUPLEX GFCI RECEPTACLE IN DUAL-GANG FS BOX WITH COVER
- 11) 3 POLE AUTOMATIC TRANSFER SWITCH, CUMMINS OTEC MODEL (POWER MONITORING MODULES ON LOAD SIDE CONDUCTORS)
- 12) NEMA 1 ENCLOSED MAIN CIRCUIT BREAKER, 3P 150A, 480V.
- 13) SERVICE CABINET ENCLOSURE; FREESTANDING NEMA TYPE 12, TYPICAL SIZE 72"H X 72"W X 36"D (ADJUST LENGTH AND NUMBER OF SECTIONS AS REQUIRED FOR INSTALLED EQUIPMENT)
- 14) THERMOSTATICALLY CONTROLLED ELECTRIC HEATER; QUANTITY/CAPACITIES AS REQUIRED FOR 30°F RISE ABOVE AMBIENT TEMPERATURE.
- 15) EXHAUST LOUVER PLATE WITH REPLACEABLE FILTER
- 16) GRINDER CONTROL PANEL
- 17) CAST ALUMINUM DIRECT DRIVE BLOWING INTO WET WELL
- 18) DRY TYPE TRANSFORMER - 10KVA, 1Ø 480-120/240
- 19) TRANSIENT VOLTAGE SURGE SUPPRESSOR UNIT (MODULAR) (TYPE I) FOR \geq 400A SERVICE (TYPE II) FOR \leq 400A SERVICE LEADS TO BE KEPT AS SHORT AS POSSIBLE
- 20) POWER METER - CONTRACTOR TO FURNISH AND INSTALL KWH METER SOCKET. LOCATION PER UTILITY COMPANY.
- 21) DIESEL GENERATOR WITH DUAL WALL SUB BASE FUEL TANK. GENERATOR SHALL MATCH INCOMING UTILITY SERVICE VOLTAGE AND PHASE (277/480V, 3Ø, 4W).
- 22) FILTER TO REDUCE OUTPUT SIGNAL NOISE PER MANUFACTURER'S RECOMMENDATIONS
- 23) BLOCK HEATER - 2#12 & 1#12 GND IN 3/4°C. CHECK MANUFACTURE REQUIREMENTS.
- 24) GENSET SOUND ENCLOSURE TYPE WILL BE SELECTED PER SIZING CHART
- 25) GENSET PAD - SEE DETAIL SHEET
- 26) 4#1/0AWG - 1 1/2°C
- 27) 4#1/0AWG + #6GRD - 1 1/2°C
- 28) SIZE PER MOTOR, #12 AWG MINIMUM
- 29) 2#12 & 1#12 GND IN 3/4°C
- 30) 2#12 & 1#12 GND IN 3/4°C
- 31) 3#14 & 1#14 GND IN 3/4°C
- 32) SEE STRUCTURAL DRAWING FOR SERVICE CABINET ENCLOSURE PAD
- 33) DIRECT BURY FROM UTILITY TRANSFORMER TO POWER METER. PROVIDED BY UTILITY COMPANY. THE CONTRACTOR WILL FURNISH & INSTALL (SIZE & TYPE AS DIRECTED BY THE UTILITY) EMPTY CONDUIT FROM THE BOTTOM OF THE CONTRACTOR FURNISHED & INSTALLED METER SOCKET TO A LOCATION PAST THE CONCRETE PAD AS DIRECTED BY THE UTILITY.
- 34) TRANSFORMER, PAD AND GROUNDING PROVIDED BY UTILITY COMPANY
- 35) GENERATOR START SIGNAL WIRING IN 3/4°C. NO. & SIZE OF WIRES PROVIDED BY MANUFACTURER
- 36) GENERATOR CONTROL PANEL ALARM SIGNAL TO PLC
- 37) GENERATOR MCB PROVIDED BY GENERATOR MANUFACTURER
- 38) CONTROL WIRE TO PLC
- 39) POWER LOGIC PM-8000 DIGITAL METER, THD, MODBUS RS485 (SHARK MODEL 100) WITH A PATCH CABLE TO A 5 PORT ETHERNET SWITCH. SEPARATE NEMA 1 ENCLOSURE. PROVIDE CTS IN PP1 BACKBOX.
- 40) OMIT MAIN BREAKER FOR STATIONS WITH 120/240VAC SERVICE VOLTAGE
- 41) NEMA 1 ENCLOSED 3P-30A CKT BRKR
- 42) 4#10 & 1#10 GND - 3/4°C - 24" MAX. LEAD LENGTH
- 43) 4#1/0AWG + #6GRD - 1 1/2°C
- 44) PROVIDE WEATHER-RESISTANT, GFCI TYPE RECEPTACLE IN ENCLOSURE FOR CONNECTION TO HEATER/HEAT TRACE TAPE.



PLAN VIEW—SERVICE CABINET ENCLOSURE
N.T.S.



CONTROL SIDE ELEVATION—SERVICE CABINET ENCLOSURE
N.T.S.



POWER SIDE ELEVATION—SERVICE CABINET ENCLOSURE
N.T.S.



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SEWAGE PUMP STATION
PS-38

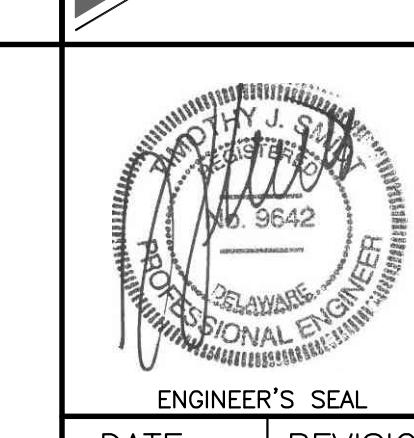
MEDIUM PS WITH VFD, & SINGLE LINE ENCLOSURE
FOR
CATTAIL CREEK

SOUTH MURDERKILL HUNDRED
KENT COUNTY, DE

PROFESSIONAL CERTIFICATION

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, TIMOTHY SMIDT AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF DELAWARE.

LICENSE No. P.E. # 9642 EXPIRATION DATE: 6/30/2020



DATE: 12/23/2019

REVISIONS:

SCALE: AS NOTED

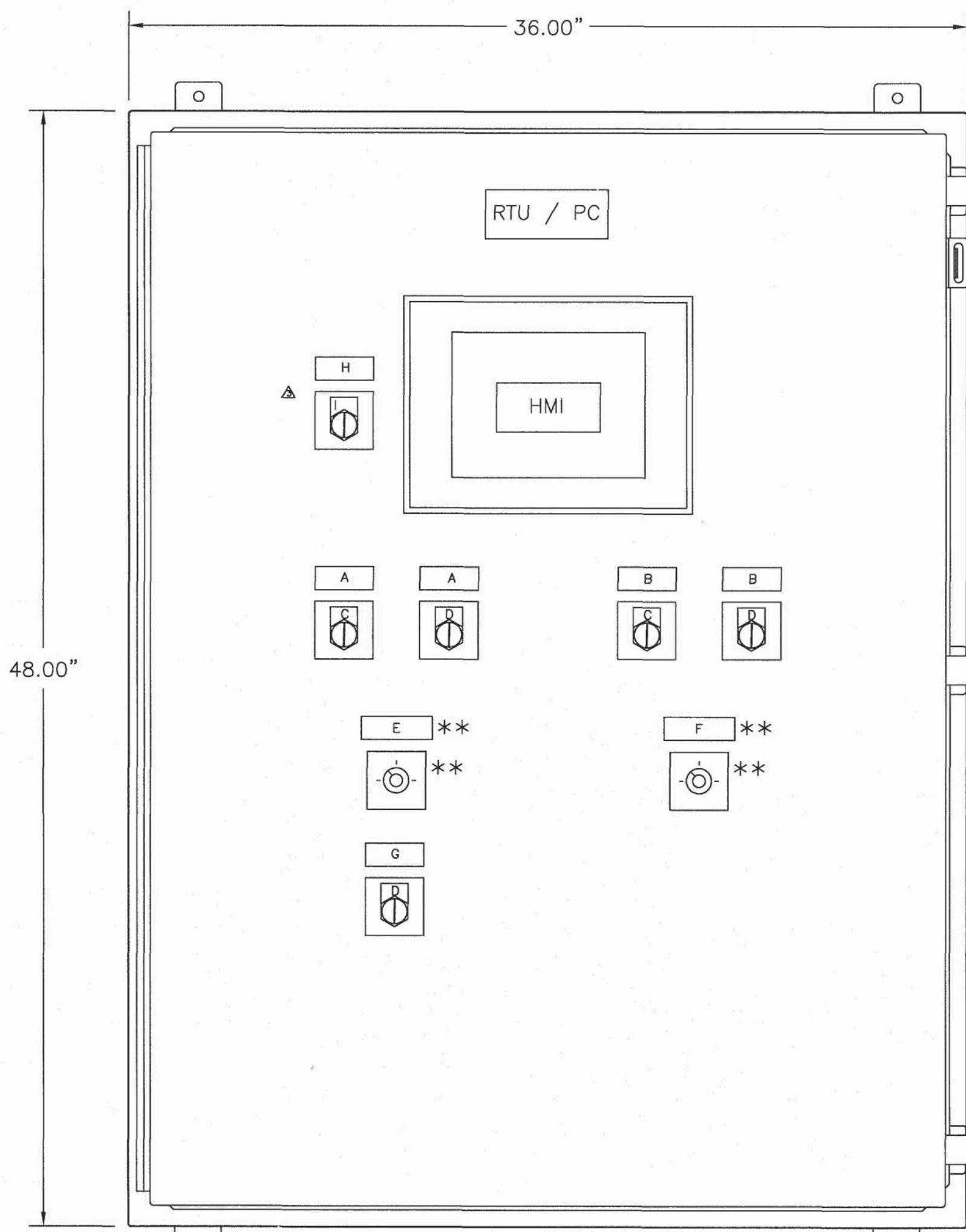
DATE: 12/23/2019

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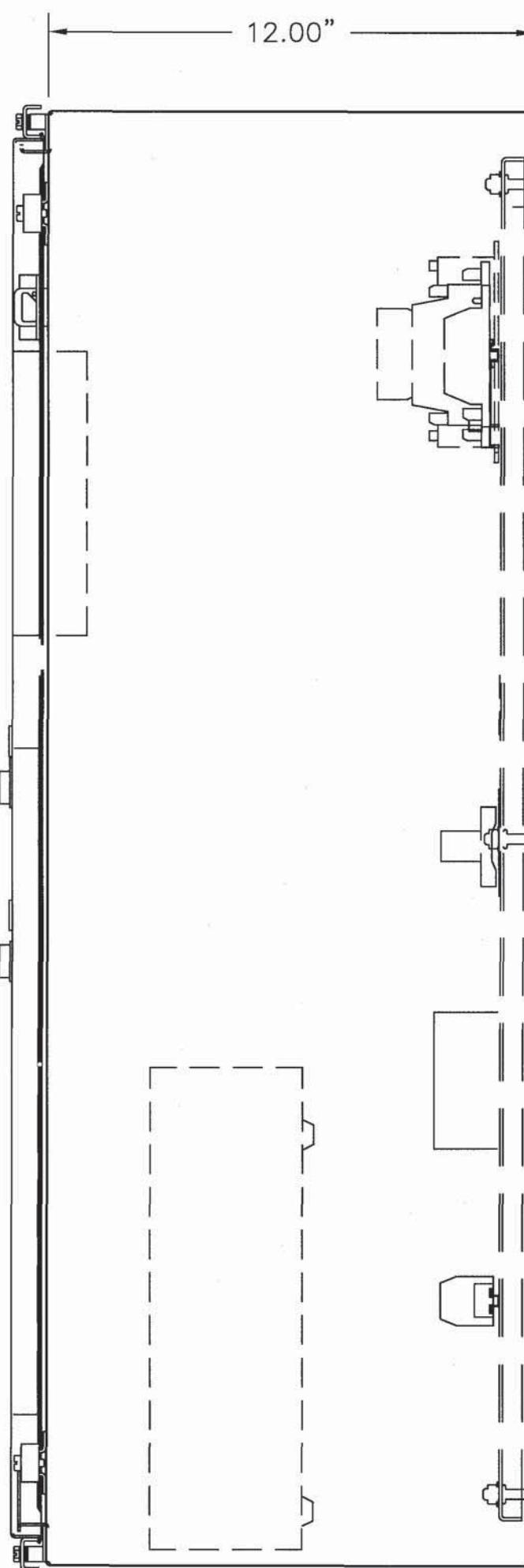
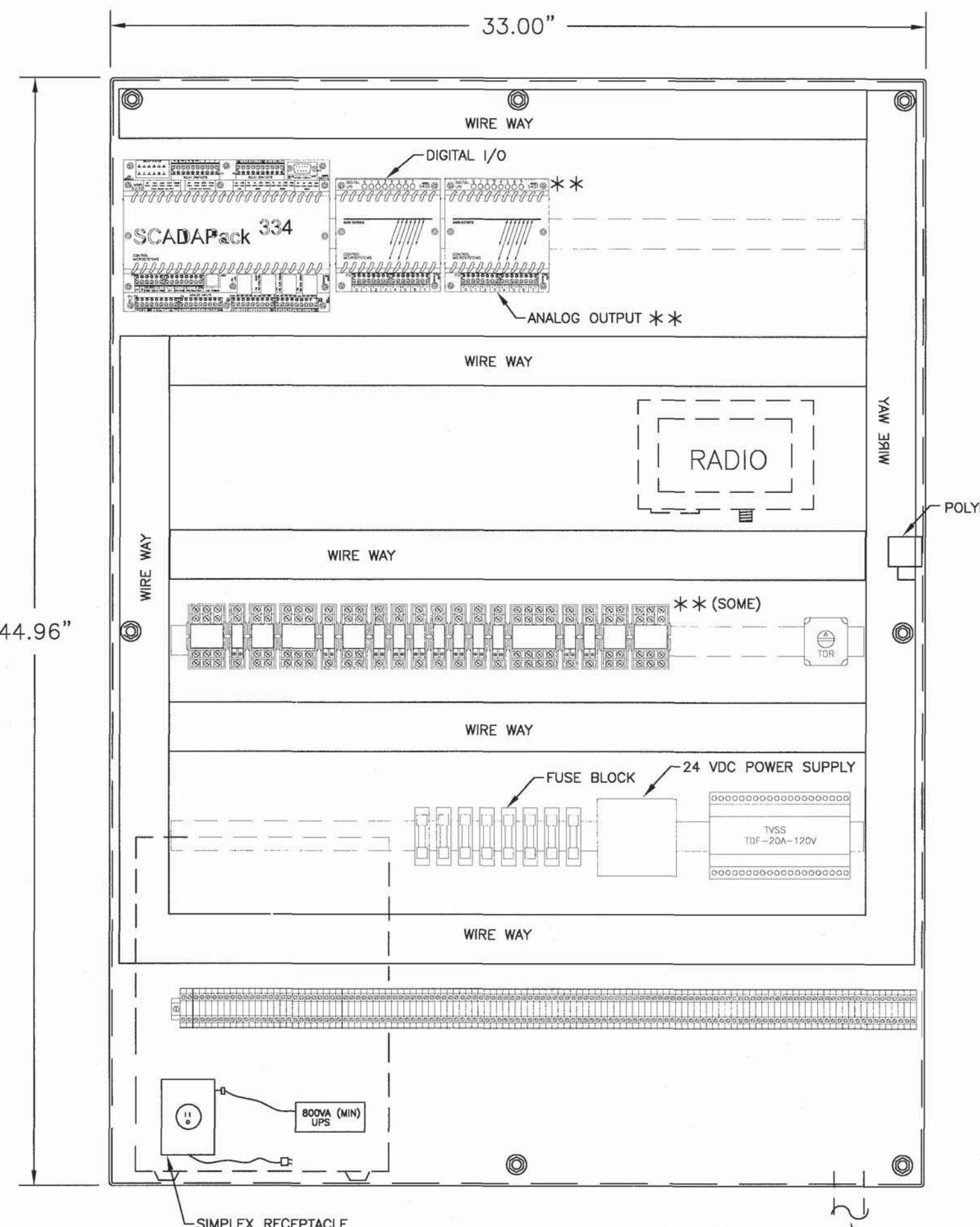
DESIGN BY: AV

REVIEW BY: TS

HEET: 12 OF 17



FRONT VIEW
NEMA 12 ENCLOSURE



END VIEW
WIREWAY OMITTED FOR CLARITY

MATERIAL SCHEDULE			
QTY	DESCRIPTION	CATALOG NUMBER	MANUFACTURER
1	ENCLOSURE NEMA 12	C-SD423612	HOFFMAN
1	BACK PANEL	C-P4236	HOFFMAN
1	SCADAPACK 334 24VDC INPUTS	TBUP334-1A20-AB00	SCHNEIDER
1	32 PT MODULE DIGITAL INPUT 120VAC	TBUX297249	SCHNEIDER
*1	4 PT ANALOG OUTPUT (VFD STATIONS)	TBUX297248	SCHNEIDER
1	LIGHTING SUPPRESSOR	IS-50NX-C2	POLYPHASER
1	RADIO	SP900XL-1000	COYOTE DATA COMM
1	INDUCTIVE PROXIMITY SWITCH	XS8C40MP230H7	TELEMECANIQUE
1	SURGE PROTECTOR (TVSS)	TDF-20A-120V	ERICO OR EQUAL
A/R	DT RELAY W/ BASE	TYPE RH	IDEK
A/R	TERMINALS	UK5N	PHOENIX
A/R	WIRE WAY	2X3, 1.5X3	TYTON
58	TERMINALS	UK5K	PHOENIX
1	POWER SUPPLY (60W MINIMUM)	PS5R-024	IDEK
1	HMI	MMI-8070IE	KEP
1	TDR	330-12-300S	TIME MARK
A/R	FUSES	3AG1A313, 3AG3A313	LITTELFUSE
A/R	TERMINAL	USLK65	PHOENIX
1	UPS	PULSAR 800/560 VA/W	MGE SYSTEMS

FIELD INSTRUMENT SCHEDULE			
QTY	DESCRIPTION	CATALOG NUMBER	MANUFACTURER
1	MAGNETIC FLOW METER WITH MODBUS MODULE	MAGFLO MAG6000	SIEMENS
1	LEVEL TRANSMITTER (30' CABLE)	PBLT2-8.662-30	DWYER
1	0-20ft H2O	0-30 PSI	ASHCROFT
2	PRESSURE TRANSMITTER	PSQ	ONYX
2	FLOAT SWITCHES (30' CABLE)	ALL NORMALLY OPEN	HYDROMATIC

ENGRAVING SCHEDULE *

ID	FIRST LINE / SECOND LINE
A	PUMP 1
B	PUMP 2
C	VFD SS AUX (SS AUX)
D	HAND OFF AUTO
E	PUMP 1 / SPEED POT
F	PUMP 2 / SPEED POT
G	BLOWER
H	OFF ON
I	HMI POWER

* DESCRIPTIONS IN PARENTHESIS APPLY TO "SMALL" PUMP STATIONS.

NOTES:

1. RTU/PC PANEL AND ASSOCIATED CONTROL COMPONENTS SHALL BE PROVIDED AND CONFIGURED BY A SYSTEMS INTEGRATOR. CURRENT APPROVED RTU VENDORS INCLUDE TRIJAY (SUMMERTIME, SC), POWER ELECTRONICS (MILLINGTON, MD), & ATLANTIC CONTROLS (FELTON, DE). CONTACT KENT COUNTY ENGINEERING FOR PRE-APPROVAL OF OTHER VENDORS PRIOR TO BID.

2. THE SYSTEMS INTEGRATOR SHALL PROVIDE AS-BUILT DRAWINGS DOCUMENTING FINAL INSTALLATION & WIRING IN HARD COPY AND ELECTRONIC (AUTOCAD V14 .DWG COMPATABLE) FORMAT. ONE SET OF THE RTU SCHEMATICS SHALL REMAIN ON-SITE AT ALL TIMES AFTER INITIAL INSTALLATION. THE PLC AND HMI PROGRAMS SHALL BE PROVIDED BY KENT COUNTY. THE PANEL SHALL BE WIRED AS SHOWN IN THE PROJECT SCHEMATICS. THE SYSTEMS INTEGRATOR SHALL PROVIDE CHECKOUT AND STARTUP ASSISTANCE AND WILL CORRECT ANY WIRING DEFICIENCIES.

3. THE VFD AND SOFTSTART WIRING SCHEMATICS ARE BASED ON SQUARE D COMPONENTS. THE CONTRACTOR SHALL FURNISH AS-BUILT SCHEMATICS AS DETAILED ABOVE.

4. LEVEL AND PRESSURE TRANSMITTERS SHALL BE 24VDC LOOP POWERED.

5. FLOWMETER MUST HAVE A SELF-POWERED, ACTIVE OUTPUT & MODBUS RS-485 OPTION INSTALLED & WIRED..

6. SEE TYPICAL MECHANICAL PLANS, ELEVATION AND DETAILS DRAWING FOR LOCATIONS OF COMPONENTS.

1. IN GENERAL, VFD'S ARE NOT REQUIRED FOR SMALL & MEDIUM PUMP STATIONS (GREATER THAN 5 HP & LESS THAN 20 HP) THAT DO NOT DISCHARGE TO A FORCE MAIN. SEPERATE SCHEMATICS ARE PROVIDED FOR "VFD" AND "NON-VFD" STATIONS.



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SEWAGE PUMP STATION
PS-38

RTU AND PC ENCLOSURE
FOR
CATTAIL CREEK

SOUTH MURDERKILL HUNDRED
KENT COUNTY, DE



PROFESSIONAL CERTIFICATION

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, TIMOTHY SMIDT AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF DELAWARE.

LICENSE No. P.E. # 9642 EXPIRATION DATE: 6/30/2020

JOB NO.: 18140

SCALE: AS NOTED

DATE: 6/21/2019

DRAWN BY: AV

DESIGN BY: AV

REVIEW BY: TS

Sheet: 13 of 17

