GUAM WATERWORKS AUTHORITY
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Invitation for Bid: IFB-04-ENG-2025

Project: Hagåtña Main Sewer Pump Station Redundant Force Main (Construction)
GWA Project No. 22002

Addendum No.: 02

Date: March 26, 2025

All Potential Bidders:

This addendum is issued to modify the previously issued bid documents and/or given for informational purposes, and is hereby made a part of the bid documents. Failure to acknowledge receipt of this addendum shall be grounds for the bidder's disqualification and rejection of the bidder's proposal.

1. **Amended engineering drawings & specifications supersede all previous engineering drawings and specifications. Amended drawings & specifications are meant for clarity purposes.**

   The following drawings and specifications were amended.
   Drawings: E-106, E-115, E-116, E-118, E-125, E-200, E-300, E-305, E-306, E-315, E-420, E-500, E-501, E-503, E-504, E-507, I-100, I-101, I-110, I-111, I-300, I-301, I-302, I-401, I-402.

   Specification Sections: Table of Contents, 22 14 29.16 (Submersible Sump Pumps), 26 29 13 (Motor Controllers), 33 01 30.11 (Television Inspection of Sewers), 33 31 23 (Sanitary Sewerage Force Main Piping), 33 32 11 (Wastewater Pumps)

2. **Section 00410, Bid Form**

   Bid Form updated.

3. **SECTION 00100 – Invitation for Bids** and other sections on the bid documents that applies, which states:

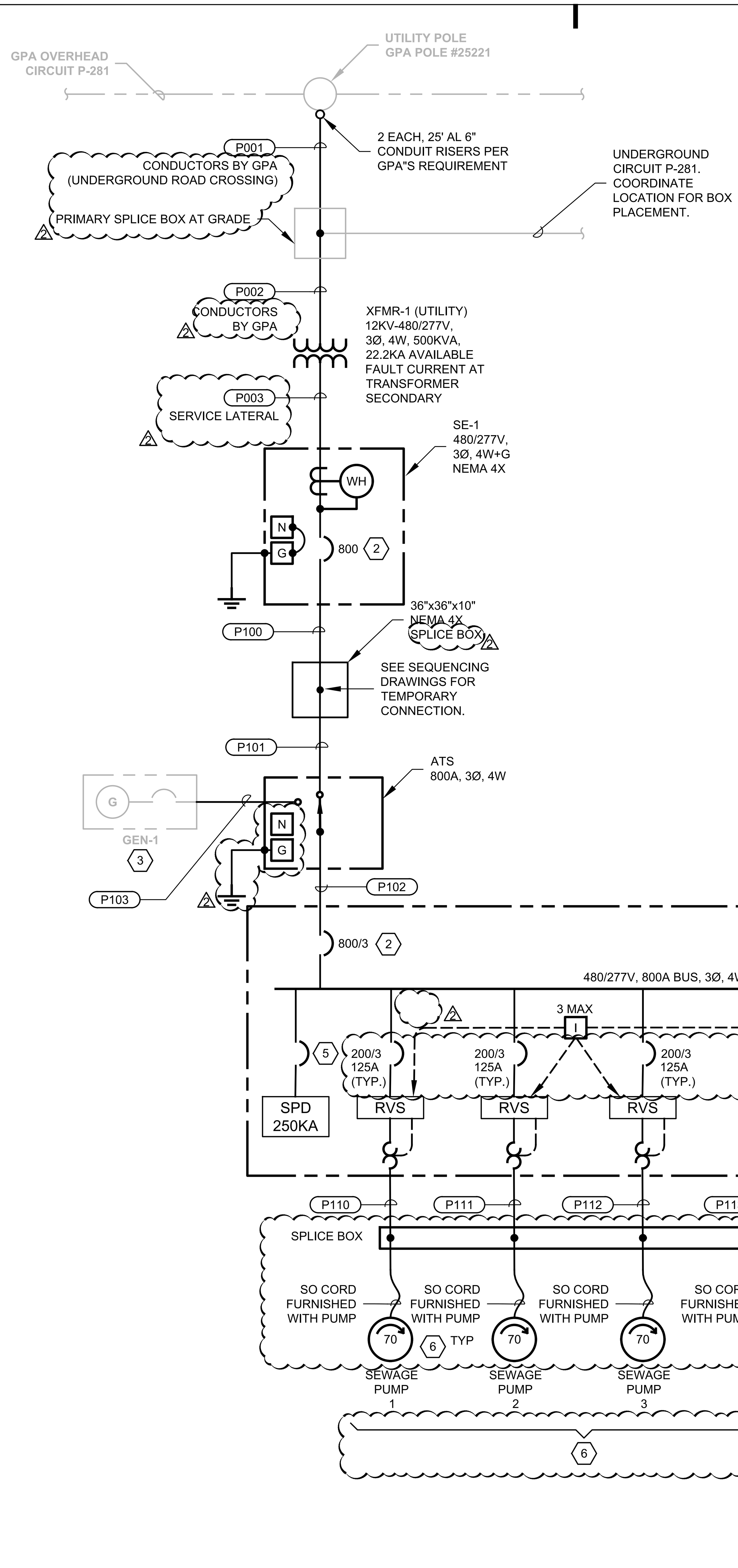
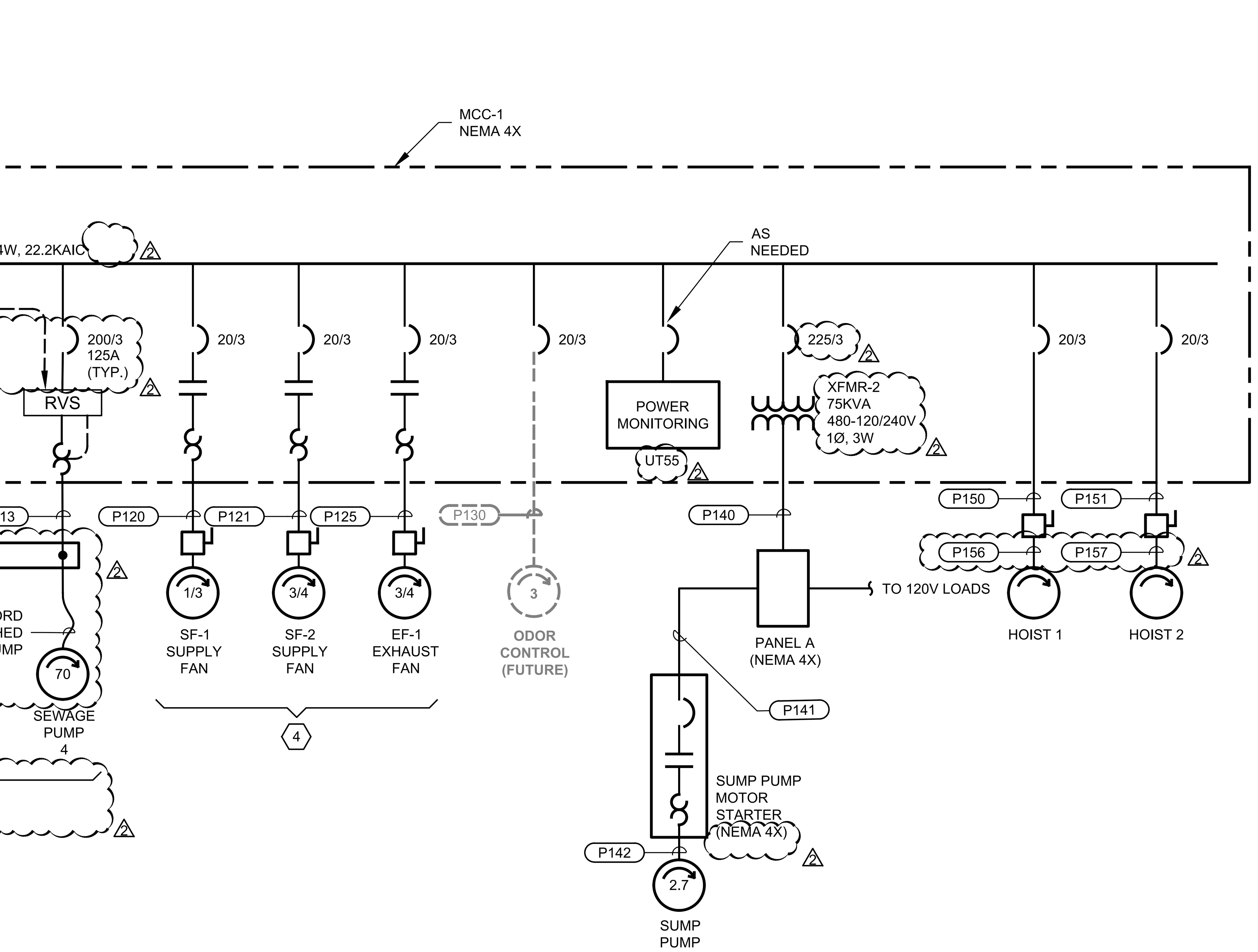
   "…All questions or clarifications (Request for Information) must be submitted in writing on or before March 26, 2025."

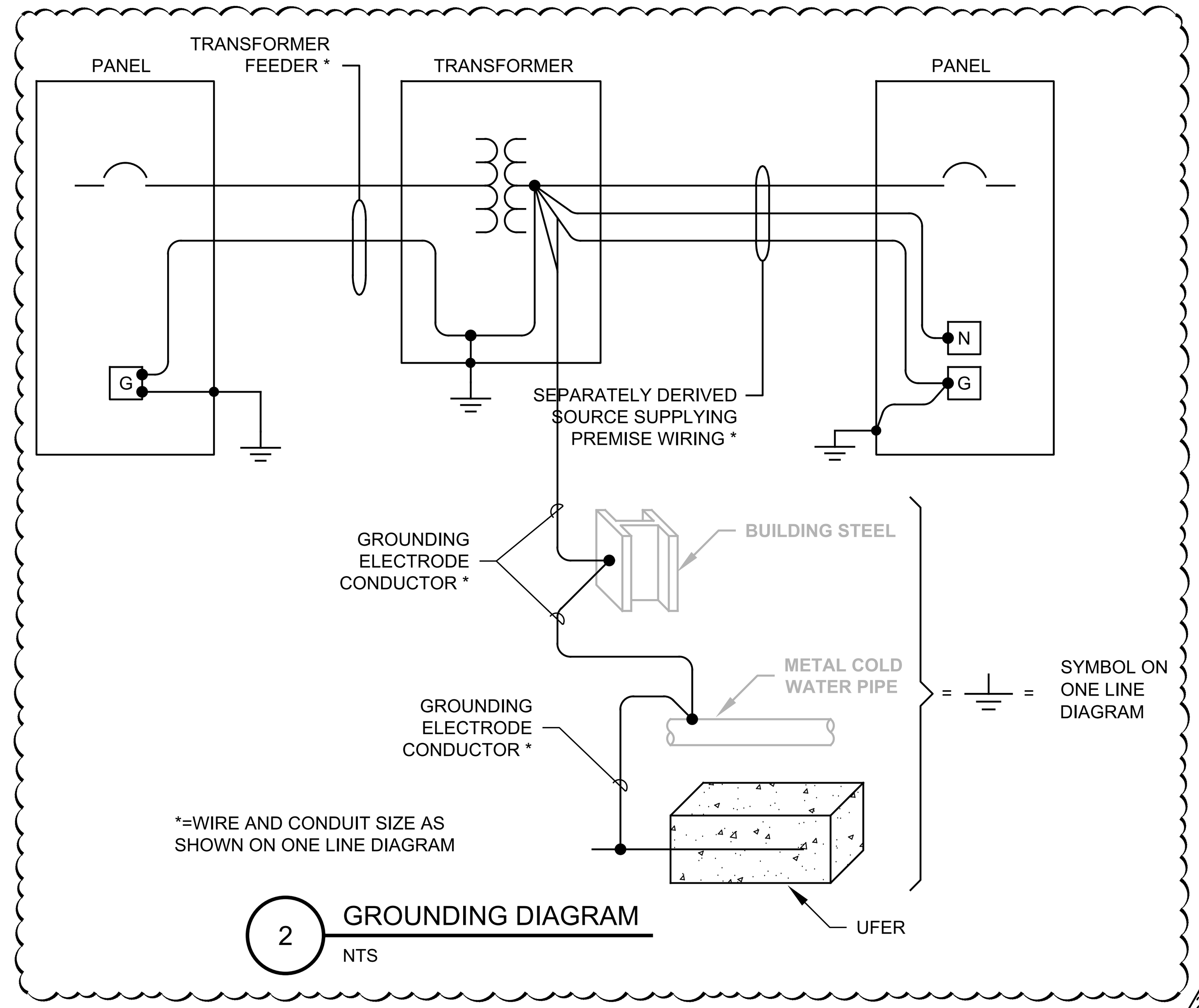
   Has now been changed to read:

   *"…All questions or clarifications (Request for Information) must be submitted in writing on or before **March 31, 2025**."*

Bidders are also notified and encourage to visit the GWA website, http://guamwaterworks.org/bids/ to ensure that addenda to the bid, answers to questions, and reminders are communicated to all bidders throughout the solicitation process.

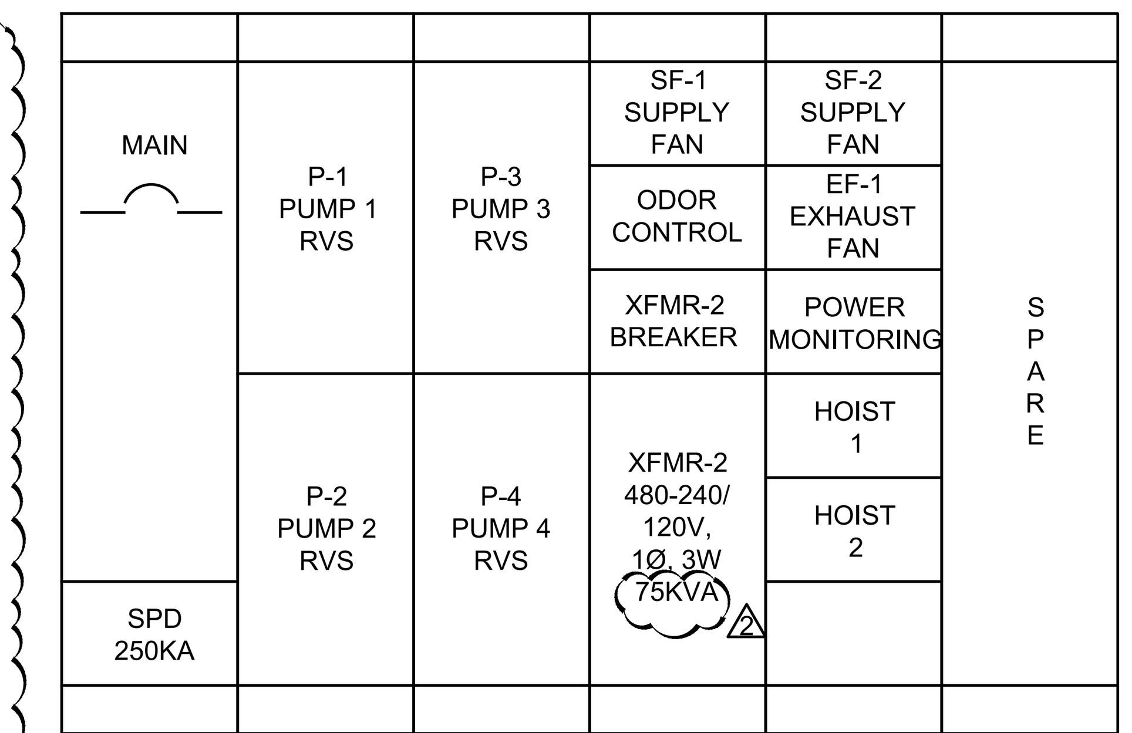
Miguel C. Bordallo, P.E.
General Manager



2 GROUNDING DIAGRAM

NTS



1 MCC-1 PANEL ELEVATION

NTS

SCHEDULE OF ELECTRIC SERVICE RESPONSIBILITIES

WORK ITEM	CONTRACTOR	GPA	GWA
PAY GPA FEES			X
UNDERGROUND PRIMARY CONDUITS	X		
PRIMARY SPLICE BOX	X		
TRANSFORMER VAULT AND PAD	X		
SWEEPS/RISERS AT POLE	X		
PRIMARY CONDUCTORS		X	
PRIMARY TERMINATIONS		X	
SERVICE LATERAL CONDUCTORS	X		
GENERATOR AND FUEL TANK		X	

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

B. COORDINATE WITH GPA, ASSIST GWA IN COMPLETING CONTRACT DOCUMENTS. GPA FEES WILL BE PAID BY GWA.

C. MEET GPA'S REQUIREMENTS FOR MATERIALS AND INSTALLATIONS.

D. SEE POWER CIRCUIT SCHEDULE ON SHEET E-116.

KEY NOTES

1. SEWAGE PUMPS WILL BE INITIALLY INTERLOCKED SUCH THAT ONLY 3 CAN OPERATE AT ONE TIME. AS A CONTINGENCY, THE EQUIPMENT RATINGS SHOULD BE ADEQUATE TO ALLOW FOR LATER REMOVAL OF THE INTERLOCK, ALLOWING FOR 4 PUMPS OPERATING SIMULTANEOUSLY.
2. SERVICE DISCONNECT SETTINGS SHALL CONFORM TO GPA'S REQUIREMENTS, IN ADDITION, SE-1 TRIP SETTING SHALL PROVIDE GOOD COORDINATION WITH MCC-1 CIRCUIT BREAKER TRIP SETTINGS.
3. THE GENERATOR AND BATTERY CHARGER ARE SCHEDULED FOR REPLACEMENT BY GPA. COORDINATE WITH GPA. FURNISH AND INSTALL NEW FEEDERS AND BRANCH CIRCUITS.
4. COORDINATE MOTOR OVERLOAD REQUIREMENTS AND INCLUDE OVERLOAD IN THE STARTERS IF NOT INTEGRAL WITH THE MOTORS.
5. SPD CIRCUIT BREAKER IN MCC-1 SHALL BE SIZED PER MANUFACTURER RECOMMENDATION.
6. THE INSTALLED SEWAGE PUMPS ARE EXPECTED TO BE APPROXIMATELY 70HP EACH. THE INITIAL INSTALLATION SHALL ANTICIPATE LATER PUMP REPLACEMENTS TO 100HP EACH, IN THE FOLLOWING AREAS:
   a. MOTOR STARTER CIRCUIT BREAKER FRAME SIZES ARE LARGER THAN INITIAL TRIP SETTINGS, AS SHOWN.
   b. RVS'S SHALL BE RATED 100HP, WITH INITIAL SETTINGS, AND OVERLOADS, SET UP FOR THE PUMPS INSTALLED UNDER THIS PROJECT. THE OVERLOADS SHALL PROTECT THE CONDUCTORS.
   c. CONDUITS FROM THE MCC TO THE SPLICE BOX ARE SIZED FOR LARGER LATER CONDUCTORS AS SHOWN IN THE CONDUIT SCHEDULE. INITIAL CONDUCTORS MATCH INITIAL PUMP SIZING.
   d. THE SPLICE BOX IS SIZED FOR THE ULTIMATE LARGER CONDUCTORS.
   e. COORDINATE DETAILS TO MATCH AND LINE UP WITH THE PUMPS BEING PROVIDED UNDER THIS PROJECT.
   f. SUBMITTALS SHALL DEMONSTRATE THAT THE REQUIREMENTS ABOVE ARE BEING MET FOR THE INITIAL INSTALLATION AND ALLOWANCE FOR FUTURE.

LOAD SUMMARY (SE-1, ATS-1, MCC)

GIVEN:						
Supply Voltage	480 /277V, 3 Phase, 4 Wire					
BUILDING AREA	1,400 SF					
General						
* EXTERIOR LIGHTING					@ 1 VA/SF (PER NEC)	1,400 VA
* INTERIOR LIGHTING					@ 1.5 VA/SF (PER NEC)	2,100 VA
RECEPTACLES					10 @ 180 VA EA First 10kVA	1,800 VA
					Remainder over 10kVA @50%	0 VA
					Subtotal General	5,300 VA
Loads	HP	Amps	Volts	Phase		
SEWAGE PUMP #1	100	129.0	480	3		107,249 VA
SEWAGE PUMP #2	100	129.0	480	3		107,249 VA
SEWAGE PUMP #3	100	129.0	480	3		107,249 VA
SEWAGE PUMP #4	100	129.0	480	3		107,249 VA
SF-1 SUPPLY FAN	0.33	1.0	480	3		831 VA
SF-2 SUPPLY FAN	0.75	1.6	480	3		1,330 VA
EF-1 EXHAUST FAN	0.75	1.6	480	3		1,330 VA
2-TON HOIST		2.8	480	3		2,328 VA
1-TON HOIST		5.8	480	3		4,822 VA
XFMR-2 (75KVA)		156.3	480	1		75,000 VA
ODOR CONTROL (FUTURE)	3	5.0	480	3		4,157 VA
					Subtotal Loads	**518,793 VA**
TOTAL CONNECTED LOAD						**524,093 VA**
***PLUS 25% OF LOADS(CONTINUOUS, NON-MOTOR LOADS)**						**875 VA**
****PLUS 25% OF LARGEST MOTOR**						**26,812 VA**
TOTAL DEMAND LOAD						**551,780 VA**
DEMAND AMPERAGE AT 480 V, THREE-PHASE						**664 A**

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No.	Issue	Checked	Approved	Date
2	ADDENDUM NO.2			03/19/2025

Author · Drafting Check · Project Manager
Designer · Design Check · Project Director

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0 1"

DOUGLAS C. McHANEY · CERTIFICATE · ELECTRICAL · No. 1476 · EXP. 04/30/2025 · GUAM · PROFESSIONAL ENGINEER

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Client: GUAM WATERWORKS AUTHORITY

Project: HAGATNA MAIN PUMP STATION IMPROVEMENTS

Title: ONE-LINE DIAGRAM IMPROVEMENT

Size: ANSI D

Project No.	Date	Scale	Sheet No.
11227781	02/04/2025	NOT TO SCALE	E-106

PANEL A

STATUS:	NEW	LINE-TO-NEUTRAL VOLTAGE:	120 V	MCB	400 A	JOB NAME:	HAGATNA PS
BUS RATING (A):	400	LINE-TO-LINE VOLTAGE:	240 V	FAULT RATING:	22.2 kAIC	ARCSINE NUMBER:	2334
MOUNTING:	SURFACE	ENCLOSURE RATING:	NEMA 4X (2)	LOCATION:	ELECTRICAL ROOM	DATE:	3/18/2025

Description	Category	Line Amps	Ph-A kVA	Ph-C kVA	Bkr. Size	Ckt. No.	Phase L1	Phase L2	Ckt. No.	Bkr. Size	Ph-A kVA	Ph-C kVA	Line Amps	Category	Description
CP-1 CONTROL PANEL	4	5.0	0.6		20	1			2	20	1.1		8.9	1	GEN, ELECT, BATH LIGHTS
CP-1 CONTROL PANEL	4	5.0		0.6	20	3			4	20		1.1	9.0	2	RECEPTACLES
SUMP PUMP	3	2.7	0.3		20	5			6	20	0.4		3.0	2	RECEPTACLES
↓	3	2.7		0.3		7			8	20		1.1	9.0	2	RECEPTACLES
DRYER	3	28.0	3.4		40	9			10	20	0.6		5.0	2	GEN-1 GENERATOR BATTERY CHARGER
↓	3	28.0		3.4		11			12	20		1.2	10.0	3	GENERATOR ROOM OVERHEAD DOOR
NOTE2 FACP	3	5.0	0.6		20	13			14	20	1.2		10.0	3	WASHER
(2) LCP	1	10.0		1.2	20	15			16	20		1.3	11.0	7	EF-2 EXHAUST FAN 2 NOTE 1
WH-1 WATER HEATER	3	48.0	5.8		60	17			18	20	1.2		10.0	3	LP-1
↓	3	48.0		5.8		19			20	20		1.2	10.0	3	LP-1
WH-2 WATER HEATER	3	48.0	5.8		60	21			22	30	2.4		20.0	7	HVAC NOTE 1
↓	3	48.0		5.8		23			24			2.4	20.0	7	↓
STORAGE, OFFICE, PERIMETER LIGHTS	1	8.9	1.1		20	25			26	20	0.6		4.9	1	DRY AND WETWELL LIGHTS
MAGMETER	4	15.0		1.8	20	27			28	20		1.2	10.0	4	LP-1 AIR COMPRESSOR
DATA RACK	4	15.0	1.8		20	29			30	20	1.2		10.0	4	LP-1 REDUNDANT AIR COMPRESSOR
CP-2	2	5.0		0.6	20	31			32	20		1.8	15.0	4	THERMAL FLOW SWITCH AIR FSL-71
(2) SPARE					20	33			34	20	1.8		15.0	4	THERMAL FLOW SWITCH AIR FSL-73 (2)
SPARE					20	35			36	20					SPARE
SPACE						37			38	20					SPARE
SPACE						39			40	20					SPARE
SPACE						41			42						SPACE
Subtotal kVA			19.3	19.4							10.4	11.3			
Subtotal Amps			160.6	161.7							86.8	94.0			

Load Summary

Category	Connected Load Description	Load		Demand Load Description	Factor	Load	
1	Lighting	3.92	kVA	Lighting	1.25	4.901	kVA
2	Receptacles < 10 kVA	3.72	kVA	Receptacles < 10 kVA	1.0	3.72	kVA
2	Receptacles > 10 kVA	0	kVA	Receptacles > 10 kVA	0.5	0	kVA
3	Miscellaneous non-continuous	35.81	kVA	Misc. non-continuous	1.0	35.81	kVA
4	Miscellaneous continuous	10.8	kVA	Misc. continuous	1.25	13.5	kVA
5	Largest motor	0	kVA	Largest Motor	1.25	0	kVA
6	Sub Panel Feeder	0	kVA	Sub Panel Feeder	1.0	0	kVA
7	HVAC Equipment	6.12	kVA	HVAC Equipment	1.0	6.12	kVA
	Total connected kVA	60.37	kVA	Total demand kVA		64.05	kVA
	Average connected Amps	251.5	A	Average demand Amps		266.9	A
	Total Demand without lights or receptacles					55.43	kVA
	Total Demand without lights, receptacles, or sub-panels					55.43	kVA

Notes:
1. BREAKER SHALL BE HACR RATED. COORDINATE BREAKER REQUIREMENTS WITH MANUFACTURER OF SELECTED EQUIPMENT PRIOR TO INSTALLING.
2. BREAKER SHALL BE RED IN COLOR.
3.
4.
5.

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

B. SEE NOTES ON INDIVIDUAL PANEL SCHEDULES.

C. EXCEPT WHERE OTHERWISE NOTED, CONDUCTORS SHALL BE STRANDED WITH THWN INSULATION AND SHALL BE INSTALLED IN CONDUIT EXCEPT SOLID CONDUCTORS MAY BE USED FOR 15, 20, 25, AND 30 AMP BRANCH CIRCUITS. USE COPPER EXCEPT WHERE ALUMINUM (AL) IS INDICATED. FOR COPPER BRANCH WIRING USE THE FOLLOWING WIRE SIZES EXCEPT WHERE OTHERWISE INDICATED:

CIRCUIT PROTECTION (AMPS)	15	20	25	30	35	40	45	50	60	70
COPPER WIRE SIZE (AWG)	12	12	10	10	8	8	6	6	4	4
GROUNDING WIRE SIZE (AWG)	12	12	10	10	10	10	10	10	10	8
CONDUIT SIZE (EMT)	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1 1/4"	1 1/4"

CIRCUIT PROTECTION (AMPS)	80	90	100	110	125	150	175	200	225	250
COPPER WIRE SIZE (AWG)	3	2	1	1	1/0	1/0	2/0	3/0	4/0	250
GROUNDING WIRE SIZE (AWG)	8	8	8	6	6	6	6	6	4	4
CONDUIT SIZE (EMT)	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2 1/2"	2 1/2"

DO NOT SHARE NEUTRALS IN BRANCH CIRCUIT WIRING.

KEY NOTES

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2	ADDENDUM NO.2			03/19/2025

Author | Drafting Check | Project Manager
Designer | Design Check | Project Director

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Client GUAM WATERWORKS AUTHORITY
Project HAGATNA MAIN PUMP STATION IMPROVEMENTS
Title PANELBOARD SCHEDULES
Size ANSI D

Project No.	Date	Scale	Sheet No.
11227781	02/04/2025	NOT TO SCALE	E-115

Plot Date: 18 March 2025 - 5:15 PM | Plotted By: Ryan Oliver | Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-115.dwg

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

KEY NOTES

1. PUMP CONDUITS ARE OVERSIZED TO ACCOMMODATE 100 HP FUTURE PUMP SIZES.

POWER CIRCUIT SCHEDULE

INDEX	CIRCUIT NO.	CONDUIT	CONDUIT TYPE	CONDUCTORS (FILL)	SOURCE (FROM)	DESTINATION (TO)
1	P001	(2)6"	PVC	MULETAPE	GPA UTILITY POLE	PRIMARY SPLICE BOX
2	P002	6"	PVC	MULETAPE	PRIMARY SPLICE BOX	XFMR - 1
3	P003	(3)3"	PVC	4#300KCMIL + #1/0G	XFMR-1	SE-1
4	P100	(3)3"	PVC	4#300KCMIL + #1/0G	SE-1	SPLICE BOX
5	P101	(3)3"	SST	4#300KCMIL + #1/0G	SPLICE BOX	ATS
6	P102	(3)3"	SST	4#300KCMIL + #1/0G	ATS	MCC-1
7	P103	(3)3"	PVC	4#300KCMIL + #1/0G	ATS	GEN-1
8	P110	2"	SST	3#1 + #6G	MCC-1	SPLICE BOX (SEWAGE PUMP 1)
9	P111	2"	SST	3#1 + #6G	MCC-1	SPLICE BOX (SEWAGE PUMP 2)
10	P112	2"	SST	3#1 + #6G	MCC-1	SPLICE BOX (SEWAGE PUMP 3)
11	P113	2"	SST	3#1 + #6G	MCC-1	SPLICE BOX (SEWAGE PUMP 4)
12	P120	1/2"	SST	3#12 + #12G	MCC-1	SF-1 SUPPLY FAN
13	P121	1/2"	SST	3#12 + #12G	MCC-1	SF-2 SUPPLY FAN
14	P125	1/2"	SST	3#12 + #12G	MCC-1	EF-1 EXHAUST FAN
15	P130		SST		MCC-1	FUTURE ODOR CONTROL
16	P140	(2)2"	SST	3#3/0 + #3G	XFMR-2	PANEL A
17	P141	1/2"	SST	3#12 + #12G	PANEL A	SUMP PUMP MOTOR STARTER
18	P142	1/2"	SST	3#12 + #12G	SUMP PUMP MOTOR STARTER	SUMP PUMP
19	P150	1/2"	SST	3#12 + #12G	MCC-1	HOIST 1
20	P151	1/2"	SST	3#12 + #12G	MCC-1	HOIST 2
21	P156	1/2"C	SST	3#12+#12G	HOIST 1 DISCONNECT	HOIST 1 MOTOR
22	P157	1/2"C	SST	3#12+#12G	HOIST 2 DISCONNECT	HOIST 2 MOTOR

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Client GUAM WATERWORKS AUTHORITY
Project HAGATNA MAIN PUMP STATION IMPROVEMENTS
Title POWER CIRCUIT SCHEDULE
Size ANSI D

Project No. 11227781
Date 02/04/2025
Scale NOT TO SCALE
Sheet No. E-116

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

KEY NOTES

1. CONTROL POWER FROM MCC SEWAGE PUMP CONTROLS SEE SHEET E-420.

CONTROL CIRCUIT SCHEDULE

INDEX	CIRCUIT NO.	CONDUIT	CONDUIT TYPE	CONDUCTORS (FILL)	SOURCE (FROM)	DESTINATION (TO)	
1	C001	3/4"C	SST	2#14	FSL71	PB(CP-1)	
2	C002	3/4"C	SST	2#14	FSL72	CP-1	
3	C003	3/4"C	SST	4#14	UL70A, UL70B	PB(CP-1)	
4	C004	1 1/2"C	SST	22#14+4#14SP	PB	CP-1	
5	C005	3/4"C	SST	2#14	ZS80A	PB(CP-1)	
6	C006	3/4"C	SST	2#14	ZS80B	PB(CP-1)	
7	C007	3/4"C	SST	2#14	ZS80C	PB(CP-1)	
8	C008	3/4"C	SST	2#14	ZS80D	PB(CP-1)	
9	C009	3/4"C	SST	2#14	ZS80E	PB(CP-1)	
10	C010	3/4"C	SST	2#14	ZS80F	PB(CP-1)	
11	C011	3/4"C	SST	2#14	ZS80G	PB(CP-1)	
12	C012	3/4"C	SST	2#14	ZS80H	PB(CP-1)	
13	CO13						NOT USED
14	C014	1"C	SST	8#14+4#14SP	LSLL1/LSL1/LSM1/LSHH1	CP-1	
15	C015	3/4"C	SST	4#14+2#14SP	PB (ZS 80G, ZS 80H)	CP-1	
16	C016						NOT USED
17	C017						NOT USED
18	C018						NOT USED
19	C019	1"C	SST	8#14+4#14SP	LSLL2/LSL2/LSM2/LSHH2	CP-1	
20	C020						NOT USED
21	C021						NOT USED
22	C022						NOT USED
23	C023						NOT USED
24	C024	3/4"C	SST	2-TSP	LP-1	CP-1	
25	C025						NOT USED
26	C026	1"C	SST	COAXIAL	AUTO DIALER (CP-1)	ANTENNA	
27	C027	1"C	SST	2TSP+1 TSP SP	ME60/TE60 (SUMP PUMP)	MCC	
28	C028	3/4"C	SST	3#14+2#14 SP	LSH/LSL61 (SUMP PUMP)	MCC	
29	C029	3/4"C	SST	2#14	LSHH61 (SUMP PUMP)	CP-1	
30	C030						NOT USED
31	C031	1 1/2"C	SST	8-TSP	SPLICE BOX (ME10/TE10, ME20/TE20, ME30/TE30, ME40/TE40)	CP-2	
32	C032						NOT USED
33	C033						NOT USED
34	C034						NOT USED
35	C035						NOT USED
36	C036						NOT USED
37	C037						NOT USED
38	C038						NOT USED
39	C039	1"C	SST	8#14+4#14SP	MCC	CP-1	
40	C040	3/4"C	SST	2#14	FSL73	PB(CP-1)	
41	C041	3/4"C	SST	2#14	FSL74	CP-1	
42	C042	3/4"C	SST	2#14	UL70C, UL70D	CP-1	
43	C043						NOT USED
44	C044	1"C	SST	8#14+4#14SP	GENERATOR / FUEL LEVEL MONITOR	CP-1	
45	C045	3/4"C	SST	1-TSP	FUEL LEVEL MONITOR	CP-1	
46	C046	3/4"C	SST	1-TSP+1-TSP SP	FE45	CP-1/FIT 45	
47	C047						NOT USED
48	C048	3/4"C	SST	8#14	ATS	CP-1	
49	C049	3/4"C	SST	6-TSP+6TSP SP	MCC(UT55)	CP-1	
50	C050						NOT USED
51	C051						NOT USED
52	C052						NOT USED
53	C053	3/4"C	SST	2#14	FACP	CP-1	
54	C054	1"C	SST	8#10+4#12G	CP-2	MCC	1
55	C055	3/4"C	SST	2#12	LP-1	CP-1	
56	C056	1"C	SST	8#14+4#14SP	CP-2	CP-1	
57	C057	1"C	SST	8#14+4#14SP	CP-2	MCC	
58	C058	1"C	SST	8#14+4#14SP	ATS	GENERATOR	

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Author | Drafting Check | Project Manager
Designer | Design Check | Project Director

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS
Title CONTROL CIRCUIT SCHEDULE
Size ANSI D
Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE
Sheet No. E-118

Plot Date: 18 March 2025 - 5:15 PM Plotted By: Ryan Oliver Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-118.dwg

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100 AND I-100.

B. BRANCH CIRCUITING NOT SHOWN. SEE DRAWING E-115 FOR PANEL A BRANCH CIRCUITS.

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Client: GUAM WATERWORKS AUTHORITY

Project: HAGATNA MAIN PUMP STATION IMPROVEMENTS

Title: INTERCONNECTION SCHEMATIC - IMPROVEMENT

Size: ANSI D

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Sheet No. E-125

Plot Date: 19 March 2025 - 4:10 PM   Plotted By: Ryan Oliver   Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-125.dwg

SHEET NOTES

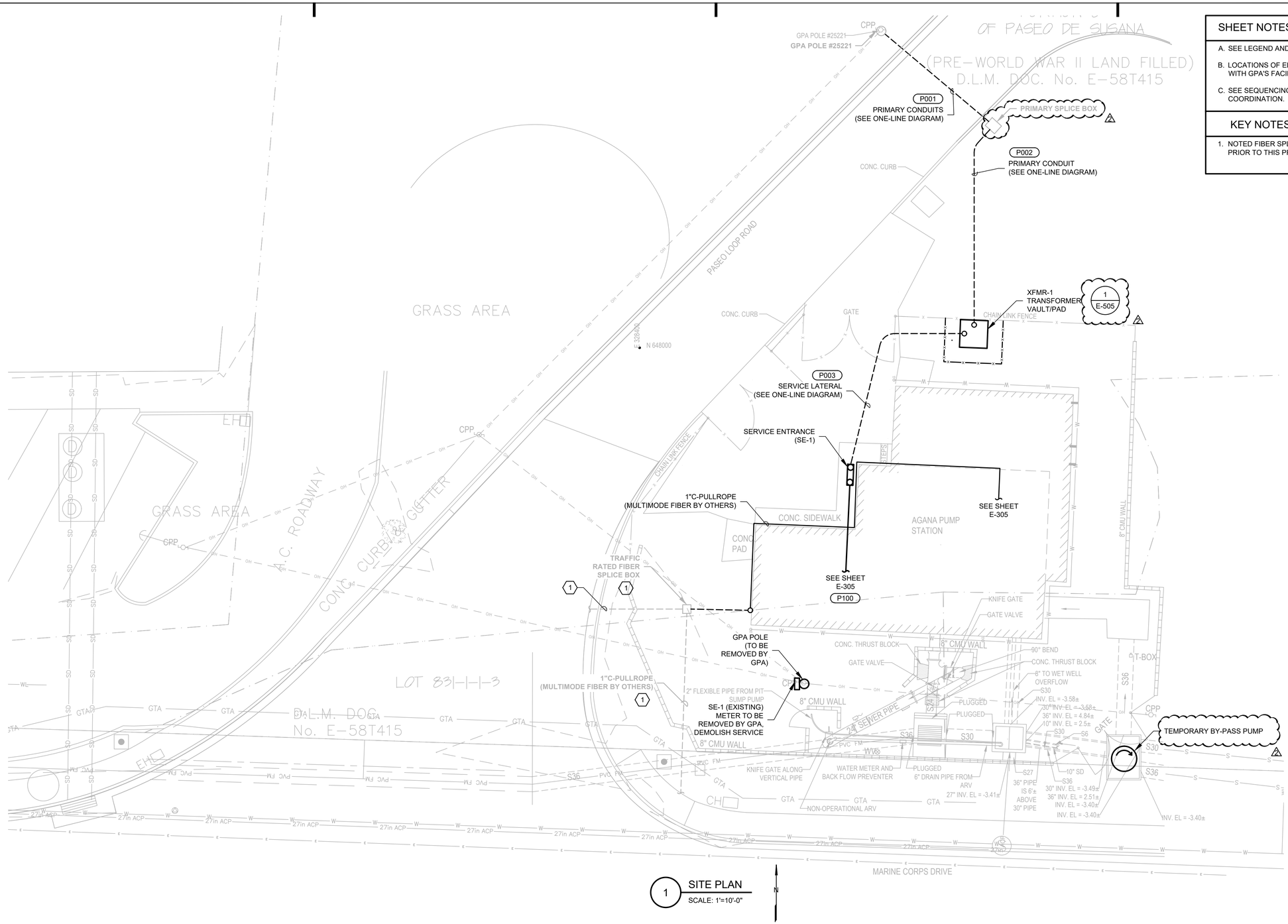
A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

B. LOCATIONS OF ELECTRIC SERVICE COMPONENTS, INCLUDING COORDINATION WITH GPA'S FACILITIES, ARE APPROXIMATE.

C. SEE SEQUENCING DRAWINGS ON SHEETS E-110 TO E-113 FOR SERVICE COORDINATION. (2)

KEY NOTES

1. NOTED FIBER SPLICE BOX AND CONDUITS WILL BE INSTALLED BY OTHERS PRIOR TO THIS PROJECT. OBTAIN AS-BUILT DRAWINGS FOR FINAL LOCATIONS.



1 SITE PLAN
SCALE: 1"=10'-0"

N

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS
Title ELECTRICAL SITE PLAN
Size ANSI D

Project No.	Date	Scale
11227781	02/04/2025	1"=10'-0"

Sheet No. E-200

Plot Date: 18 March 2025 - 5:16 PM
Plotted By: Ryan Oliver
Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-200.dwg

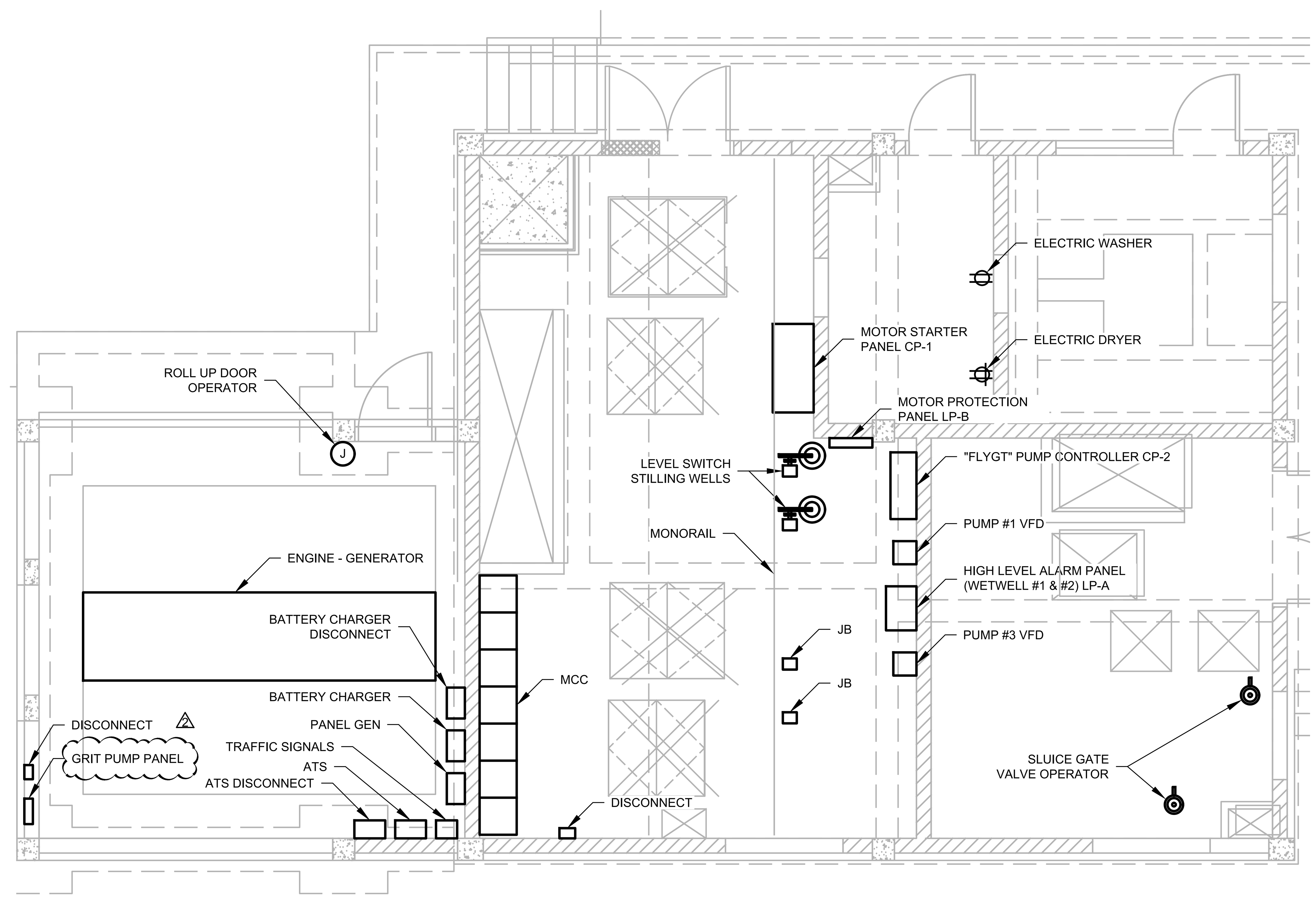
SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

B. ITEMS SHOWN BOLD ARE TO BE DEMOLISHED BY THE CONTRACTOR. ITEMS SHOWN SCREENED ARE TO REMAIN, UNLESS NOTED OTHERWISE.

C. THIS PROJECT INCLUDES DEMOLITION OF ALL POWER DISTRIBUTIONS, LIGHTING AND CONTROLS FOR THE ENTIRE PUMP STATION. INCLUDED ARE UTILITY SERVICE ENTRANCE, ALL ELECTRICAL DISTRIBUTION AND DISCONNECTION EQUIPMENT, FEEDERS, CONTROL PANELS, RACEWAYS, BOXES, LIGHTING AND RECEPTACLES. DEMOLISHED ITEMS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY.

KEY NOTES



1 BUILDING POWER PLAN-GROUND FLOOR

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

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Project **HAGATNA MAIN PUMP STATION IMPROVEMENTS**

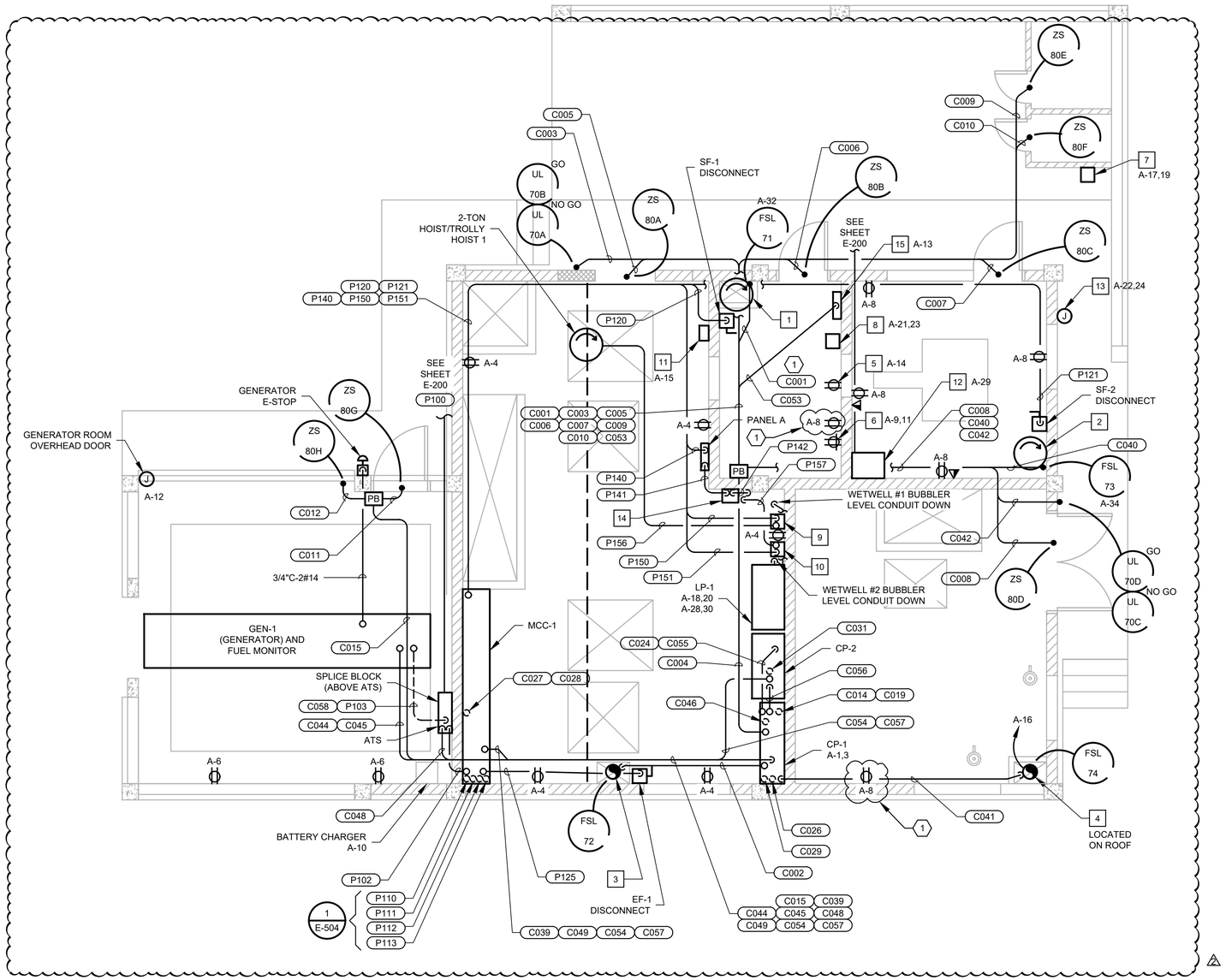
Project No. **11227781** | Date **02/04/2025** | Scale **1/4"=1'-0"**

Title **BUILDING POWER PLAN - DEMOLITION**

Size **ANSI D**

Sheet No. **E-300**

Plot Date: 18 March 2025 - 5:16 PM Plotted By: Ryan Oliver Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-300.dwg



KEY EQUIPMENT. (2)

1	SF-1 SUPPLY FAN
2	SF-2 SUPPLY FAN
3	EF-1 EXHAUST FAN
	LOCATED ON ROOF (1)
4	EF-2 EXHAUST FAN
5	ELECTRIC WASHER
6	ELECTRIC DRYER
7	WH-1 WATER HEATER
8	WH-2 WATER HEATER
9	HOIST 1 DISCONNECT
10	HOIST 2 DISCONNECT
11	LCP
12	DATA RACK
13	MINI SPLIT HVAC
14	SUMP PUMP MOTOR STARTER
15	FACP

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

B. ROUTE CONDUITS IN ELECTRICAL ROOM AROUND PERIMETER, HIGH ON WALL. AVOID STRUCTURAL OBSTACLES (HOIST I-BEAM STRUCTURE).

C. PANEL A BRANCH CIRCUIT CONDUIT ROUTING NOT SHOWN. FIELD COORDINATE AND LAYOUT AS REQUIRED. PANEL A BRANCH CIRCUITS HAVE BEEN IDENTIFIED ON PLANS.

KEY NOTES

1. FAN AND GENERAL SERVICE RECEPTACLE LOCATED ON ROOF.
2. KEY EQUIPMENT LOCATIONS ARE APPROXIMATE. DURING CONSTRUCTION, COORDINATE WITH THE EQUIPMENT SUPPLIER, OWNER, AND ARCHITECT FOR LOCATIONS AND MOUNTING HEIGHTS OF ALL LISTED EQUIPMENT.

1 BUILDING POWER PLAN-GROUND FLOOR

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

N

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Client: GUAM WATERWORKS AUTHORITY

Project: HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No.: 11227781 | Date: 02/04/2025 | Scale: 1/4"=1'-0"

Title: BUILDING POWER PLAN - IMPROVEMENT

Size: ANSI D

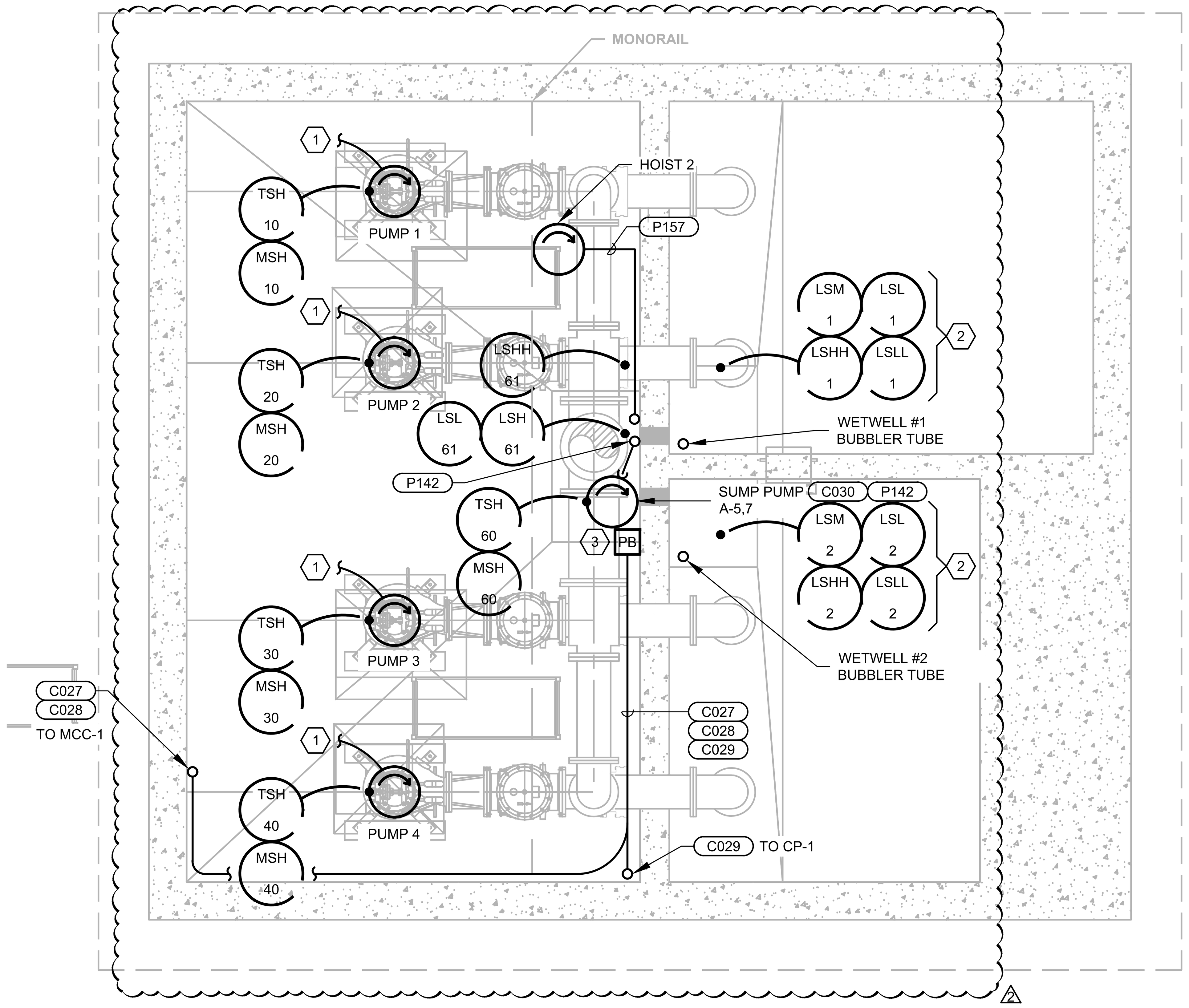
Sheet No.: E-305

SHEET NOTES

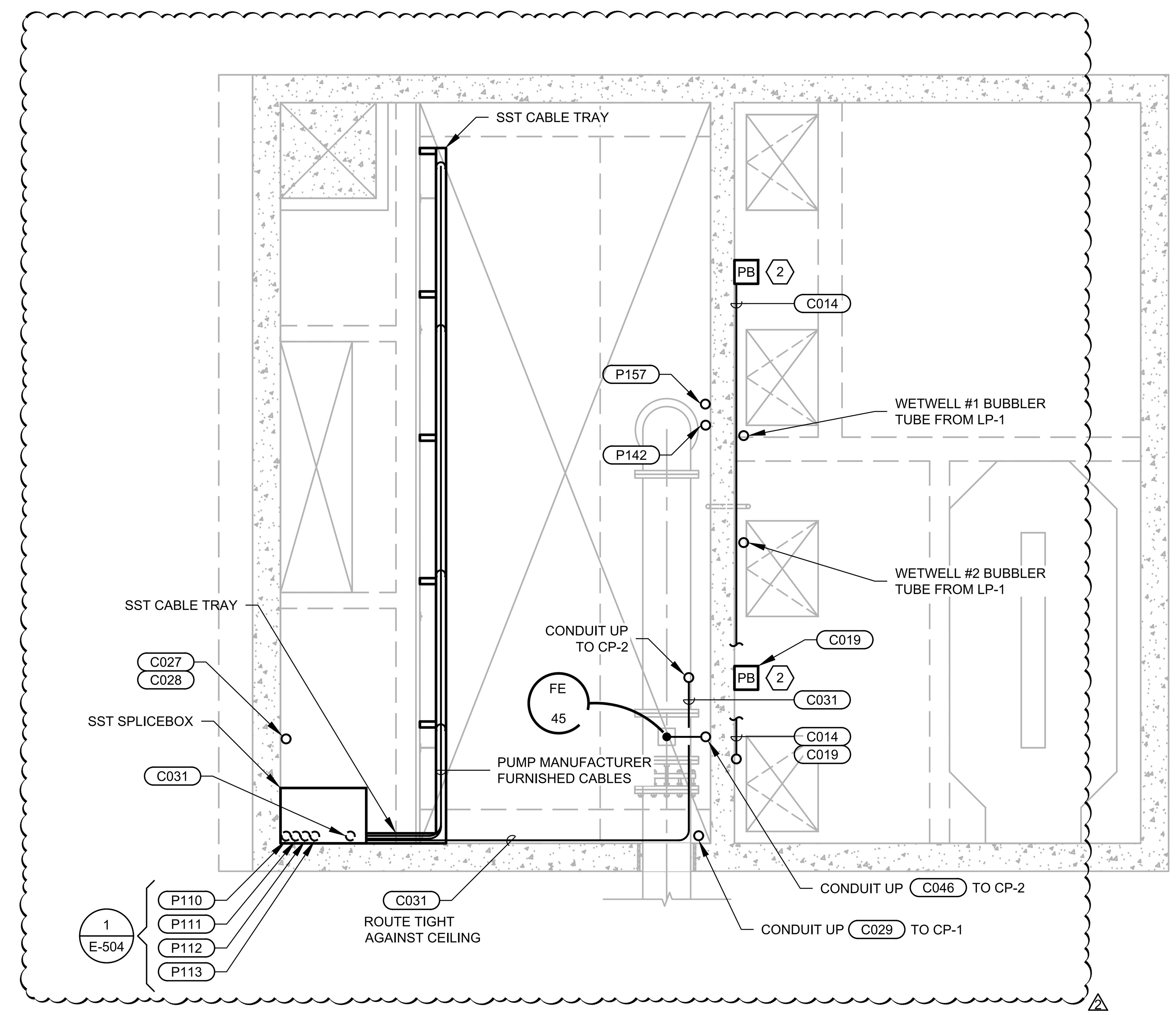
A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

KEY NOTES

1. CONTINUATION OF PUMP FEEDERS SHOWN ON E504, PUMP FEEDER IS A MANUFACTURER SUPPLIED CABLE WITH POWER AND CONTROL CABLES.
2. TRUNK RUN CONDUIT(S)/PULLBOX ARE MOUNTED HIGH ON WALL. INSTALL CONDUIT AND CONDUCTORS AS REQUIRED FROM PULLBOX TO INSTRUMENTS BELOW SHOWN IN WETWELL BASEMENT PLAN, REFERENCE E125 INTERCONNECTION SCHEMATIC FOR CONDUIT AND WIRE SIZES.
3. TRUNK RUN CONDUIT(S)/PULLBOX ARE MOUNTED HIGH ON WALL. INSTALL CONDUIT AND WIRE AS REQUIRED FROM PULLBOX TO SUMP PUMP INSTRUMENTS BELOW.



1 BUILDING POWER PLAN-BASEMENT
SCALE: 1/4"=1'-0"



2 BUILDING POWER PLAN-INTERMEDIATE
SCALE: 1/4"=1'-0"

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Project: HAGATNA MAIN PUMP STATION IMPROVEMENTS
Title: BUILDING POWER PLAN - IMPROVEMENT
Size: ANSI D
Project No. 11227781
Date 02/04/2025
Scale 1/4"=1'-0"
Sheet No. E-306

SHEET NOTES

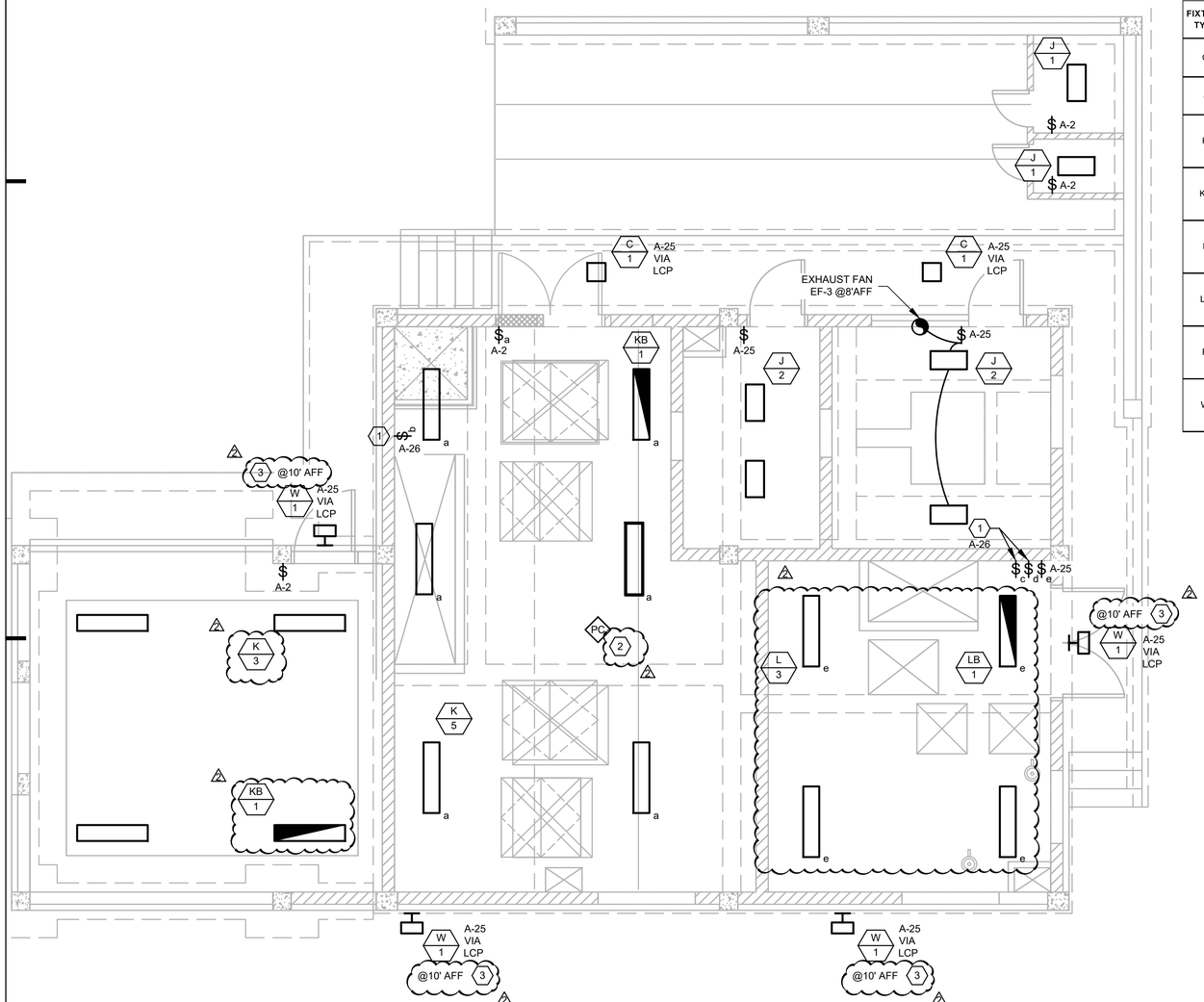
A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

KEY NOTES

1. LIGHTING SWITCH CONTROLS LIGHTING IN WETWELL/DRYWELL AREAS. SEE SHEET E-316.
2. PHOTOCELL SHALL BE MOUNTED ON THE ROOF, PHOTO EYE SHALL FACE NORTH.
3. EXTERIOR WALL PACK MOUNTING HEIGHT SHALL BE FIELD COORDINATED.

△2

FIXTURE TYPE	DESCRIPTION	OUTPUT (LUMENS)	COLOR TEMPERATURE	MOUNTING TYPE / HEIGHT	LOCATION	MANUFACTURER	MODEL	WATTAGE	VOLTAGE	CALCULATED VA (INCL. DRIVER)
C	LED CANOPY LIGHT, WET LOCATION LISTED, CAST-ALUMINUM, CORROSION-RESISTANT HOUSING.	6600	4000K	CANOPY	EXTERIOR	LITHONIA LIGHTING OR EQUAL	CNY LED	52	120	65
J	LED, 2 FOOT VANDAL RESISTANT LINEAR, SURFACE MOUNT, WET LOCATION LISTED HI ILLUMINATION LEVEL.	4712	4000K	CEILING (SURFACE)	VARIES	FAIL-SAFE OR EQUAL	HVSL4	43	120	54
K	LED, HIGH BAY LINEAR, DAMP LOCATION LISTED, WIDE DISTRIBUTION.	11,000	4000K	CEILING (SURFACE)	VARIES	METALUX OR EQUAL	4ILED	84	120	105
KB	SAME AS "K" EXCEPT WITH EMERGENCY BATTERY PACK PROVIDING 14 WATTS FOR A MINIMUM OF 90 MINUTES.	2,200	4000K	CEILING (SURFACE)	VARIES	METALUX OR EQUAL	4ILED-EL14W	14	120	18
L	LED, 4 FOOT HIGH BAY LINEAR, HAZARDOUS LOCATION RATED.	10,918	4000K	CEILING (SURFACE)	PUMP ROOM	HOLOPHANE OR EQUAL	HXPL	93.6	120	117
LB	SAME AS "L" EXCEPT WITH EMERGENCY BATTERY BACKUP FOR A MINIMUM OF 90 MINUTES.	10,918	4000K	CEILING (SURFACE)	PUMP ROOM	HOLOPHANE OR EQUAL	HXPL EM10WCP	93.6	120	117
P	LED, 12" ROUND PENDANT, HAZARDOUS LOCATION RATED CLASS 1 DIV 1. FIXTURE SHALL BE CHAIN SUSPENDED. SEE SHEET E-500 FOR DETAIL	8,800 △2	5000K	CEILING (SUSPENDED 12' AFF)	DRYWELL △2	HOLOPHANE OR EQUAL	HRLL	94	120	118
W	LED, WALL PACK, FULL CUT OFF, WET RATED, TYPE 2 DISTRIBUTION.	7316	4000K	WALL SURFACE	EXTERIOR	CURRENT OR EQUAL	TRP2 △2	50	120	63



1 BUILDING LIGHTING PLAN-GROUND FLOOR
SCALE: 1/4"=1'-0"

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Title BUILDING LIGHTING PLAN - IMPROVEMENT

Project No.	Date	Scale
11227781	02/04/2025	1/4"=1'-0"

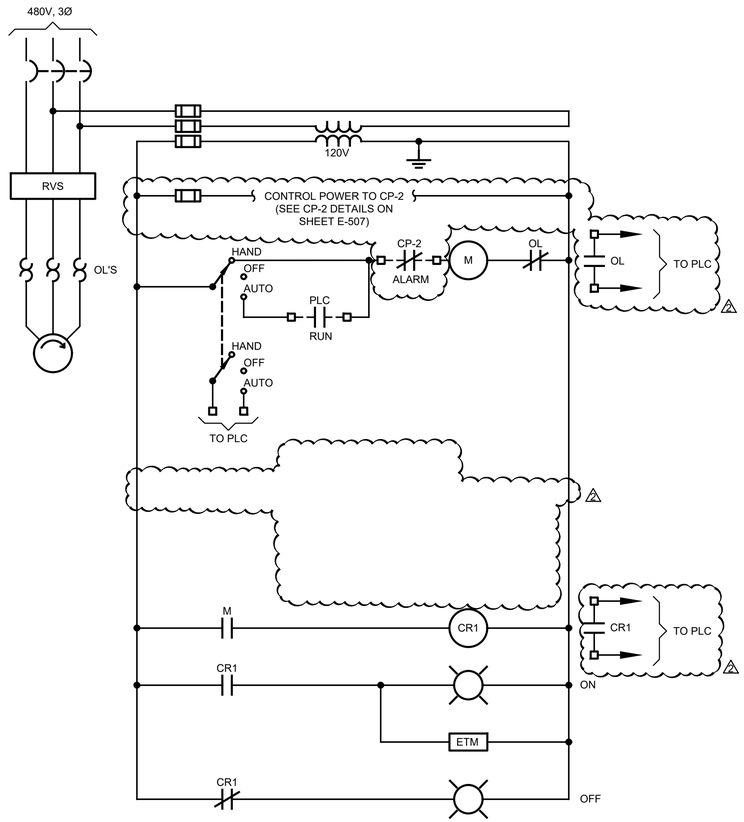
Size ANSI D
Sheet No. E-315

SHEET NOTES

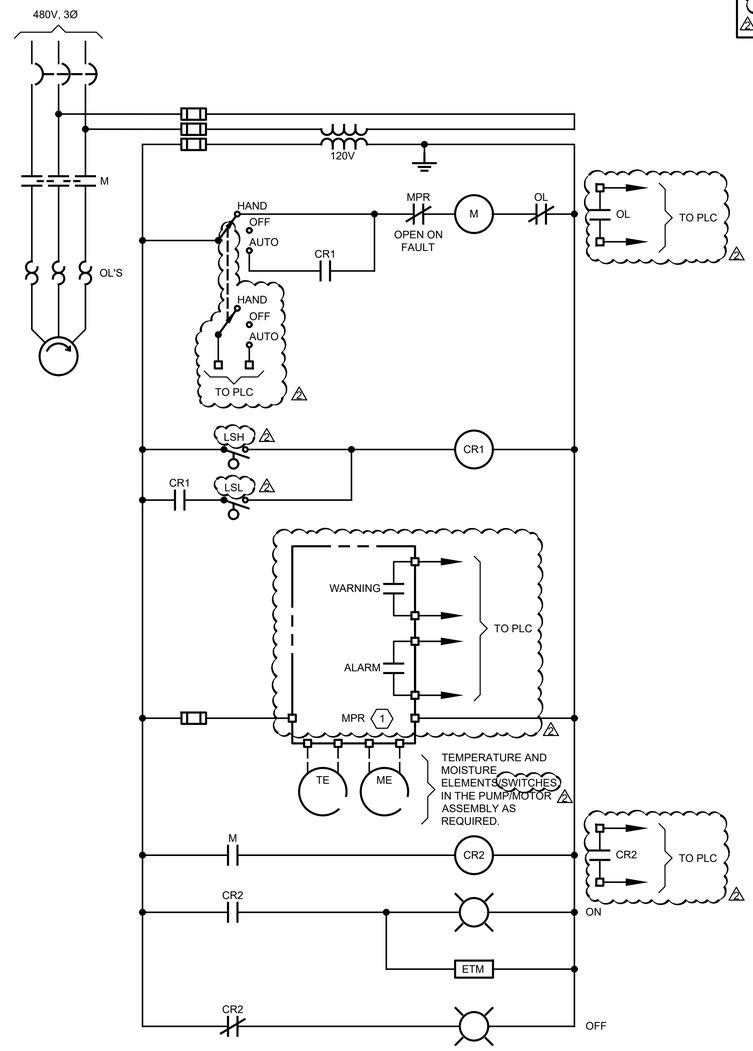
A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

KEY NOTES

1. THE MOTOR PROTECTION RELAY (MPR) SHOWN FOR THE SUMP PUMP IS REPRESENTATIVE. COORDINATE WITH PUMP VENDOR/MANUFACTURER, AND FURNISH AND INSTALL TEMPERATURE AND MOISTURE MONITORS AND ASSOCIATED MOTOR PROTECTION RELAYS AS RECOMMENDED BY THE MANUFACTURER AND/OR AS A CONDITION OF WARRANTY COMPLIANCE. COORDINATE WITH THE MCC MANUFACTURER AND INCLUDE PHYSICAL SPACE AND INTERCONNECTION AND TERMINATION PROVISIONS FOR THE MPR. FACTORY INSTALL OR FIELD INSTALL, DEPENDING ON AVAILABILITY OF COMPONENTS. AS BUILT DRAWINGS SHALL SHOW THE FINAL ARRANGEMENT. (2)



SEWAGE PUMP
(TYPICAL) (2)



SUMP PUMP

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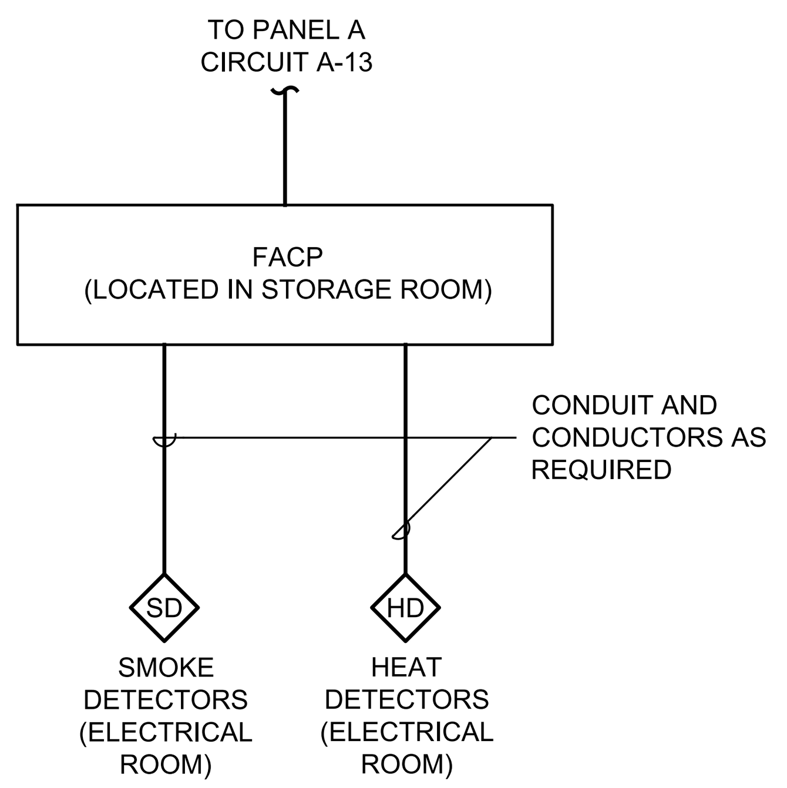
Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title CONTROL DIAGRAMS

Size ANSI D

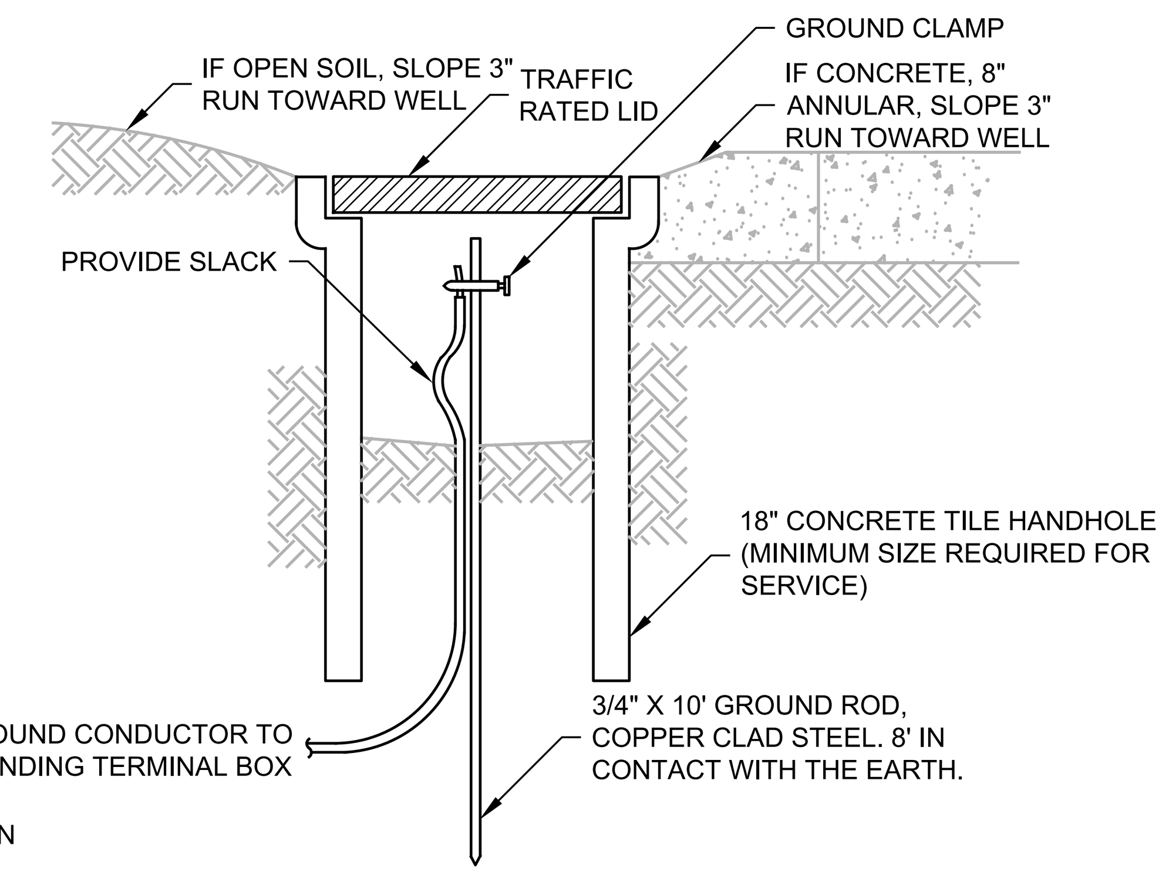
Sheet No. E-420



NOTES:

1. EQUIPMENT FED FROM FACP NOT LOCATED ON POWER PLAN. PREPARE A SUBMITTAL INCLUDING THE FOLLOWING:
   - SHOP DRAWINGS WITH EQUIPMENT LOCATIONS SHOWN.
   - VOLTAGE DROP AND BATTERY CALCULATIONS.
   - EQUIPMENT DATA SHEETS.
2. PROVIDE A DRY CONTACT OUTLET "ALARM" TO PLC.
3. INSTALL A COMPLETE AND OPERABLE SYSTEM, PERFORM A FUNCTIONAL ACCEPTANCE TEST WHEN COMPLETE.

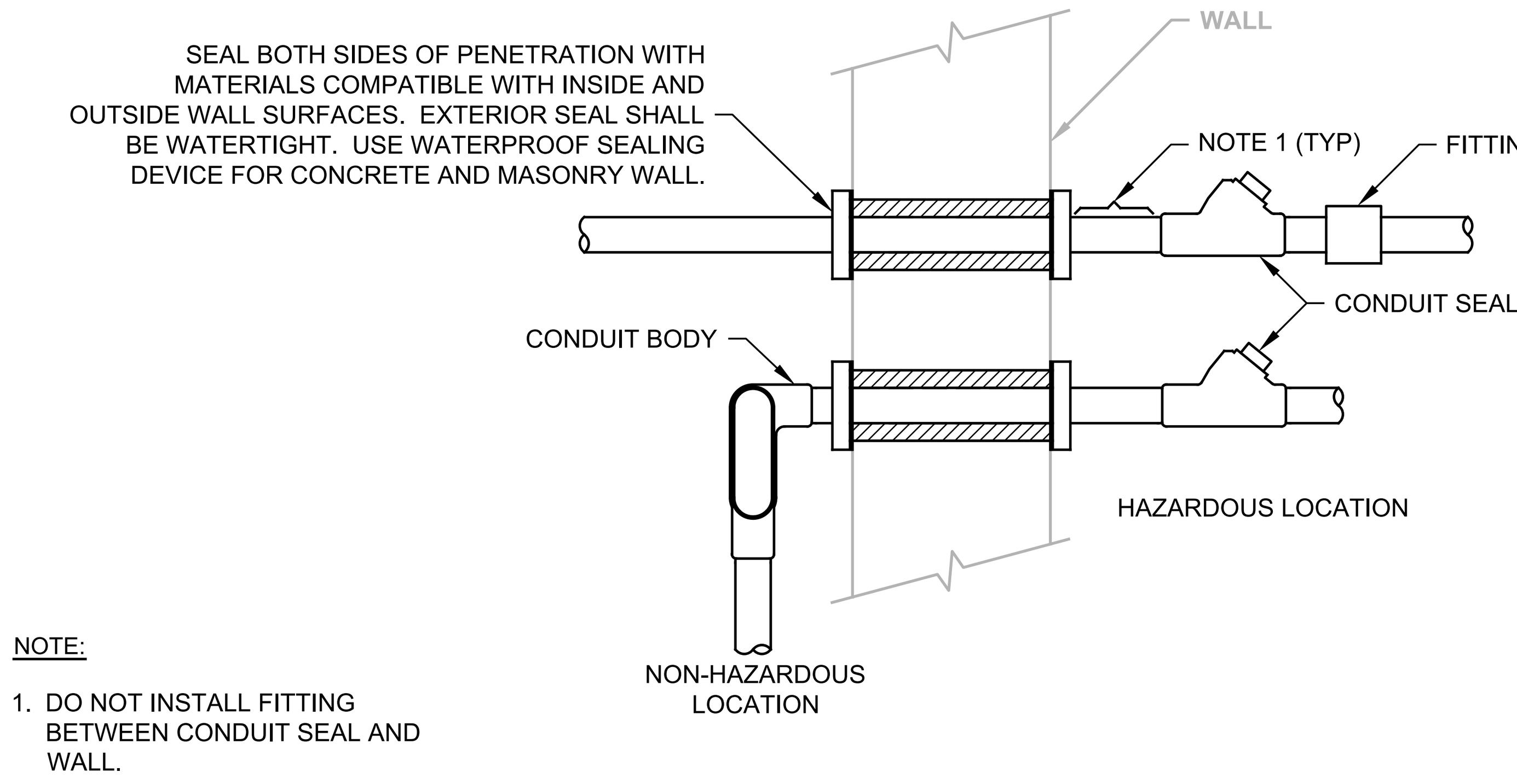
1 FACP INTERCONNECTION DIAGRAM
NTS



NOTE:

1. GROUND ROD MAY BE INSTALLED IN THE EQUIPMENT PAD UNDER THE SERVICE ENTRANCE SECTION OF THE ENCLOSURE (PROVIDE AT LEAST 3" ABOVE THE SLAB). IF SO INSTALLED, TILE, COVER & ANNULAR PAD MAY BE ELIMINATED.

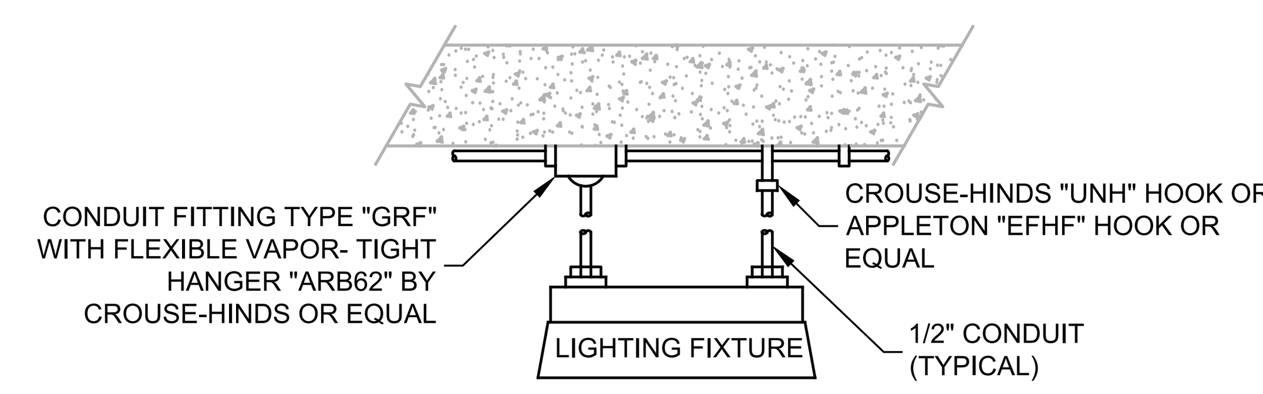
2 GROUND ROD WELL
NTS



NOTE:

1. DO NOT INSTALL FITTING BETWEEN CONDUIT SEAL AND WALL.

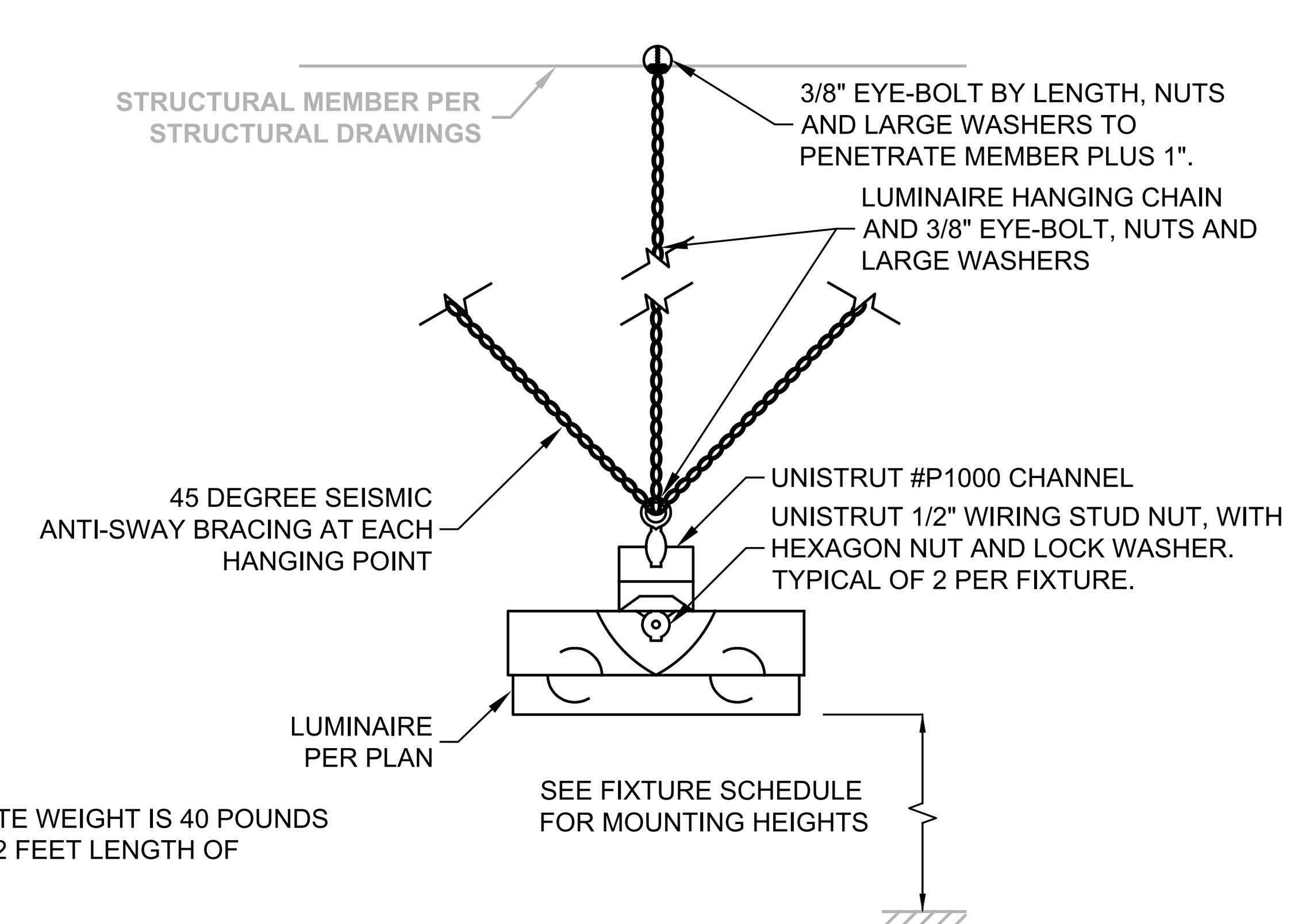
3 CONDUIT PENETRATION THROUGH HAZARDOUS AREA
NTS



FOR EXPOSED CONDUIT

5 DECK MOUNTED FIXTURE
NTS

6 NOT USED
NTS



NOTES:

1. APPROXIMATE WEIGHT IS 40 POUNDS PER EACH 12 FEET LENGTH OF LUMINAIRE.

4 CHAIN MOUNTED LUMINAIRE
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7 NOT USED
NTS

8 NOT USED
NTS

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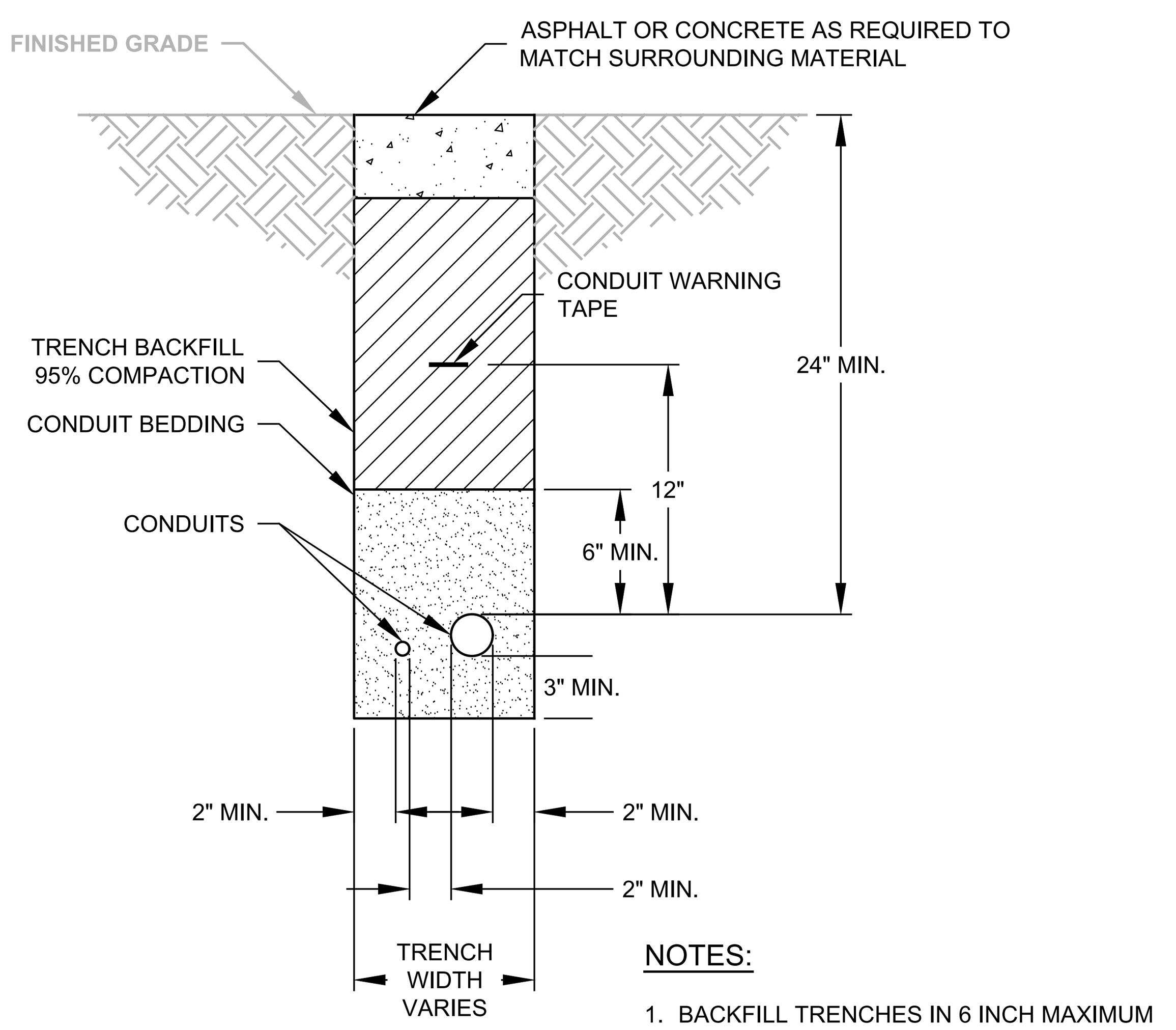
Title DETAILS

Project No.	Date	Scale	Size	Sheet No.
11227781	02/04/2025	NOT TO SCALE	ANSI D	E-500

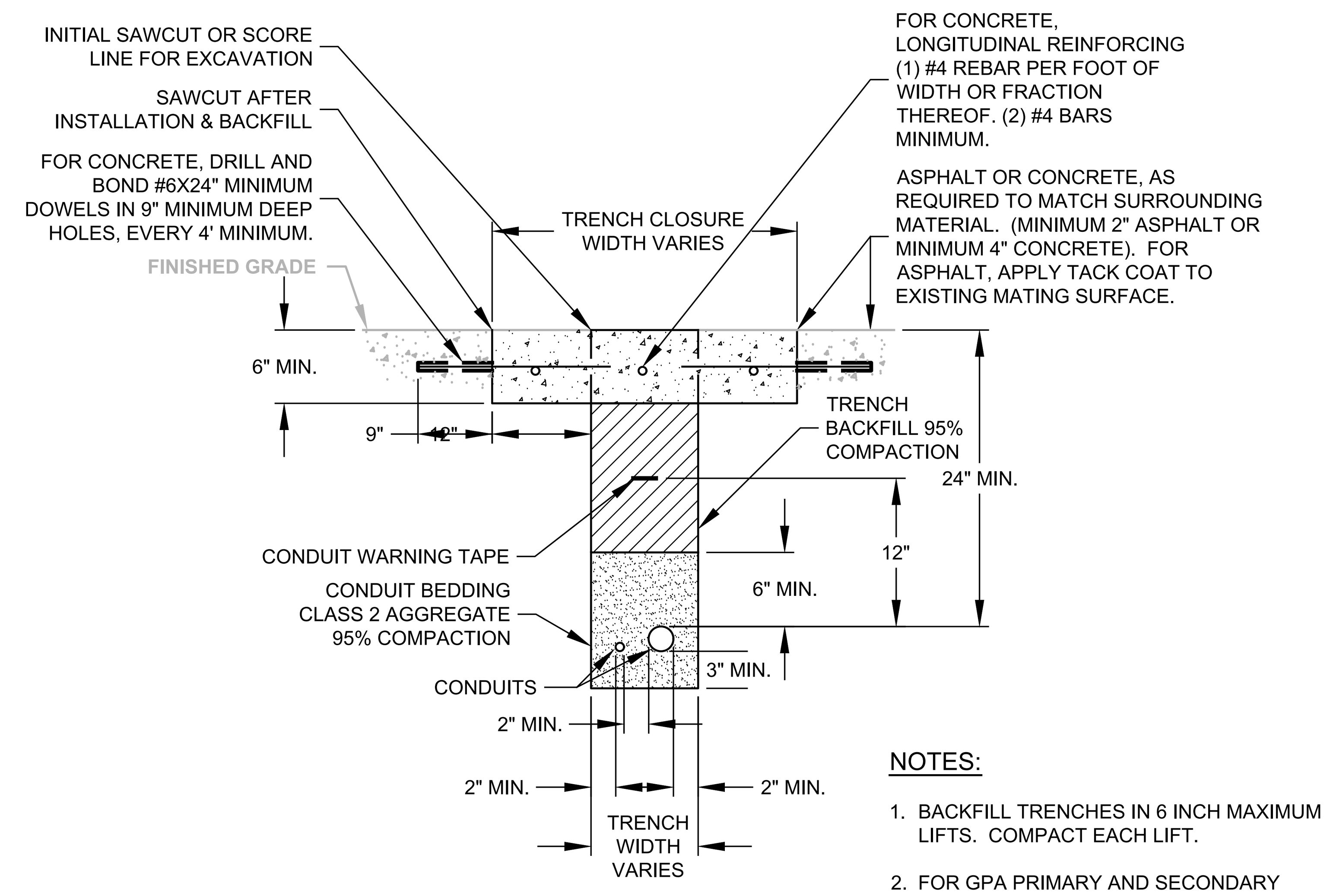
Plot Date: 18 March 2025 - 5:17 PM   Plotted By: Ryan Oliver   Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-500.dwg



NOTES:

1. BACKFILL TRENCHES IN 6 INCH MAXIMUM LIFTS. COMPACT EACH LIFT.
2. FOR GPA PRIMARY AND SECONDARY CONDUITS ALSO MEET THE REQUIREMENTS ON SHEET E-505. △2

1 BURIED CONDUIT
NTS



NOTES:

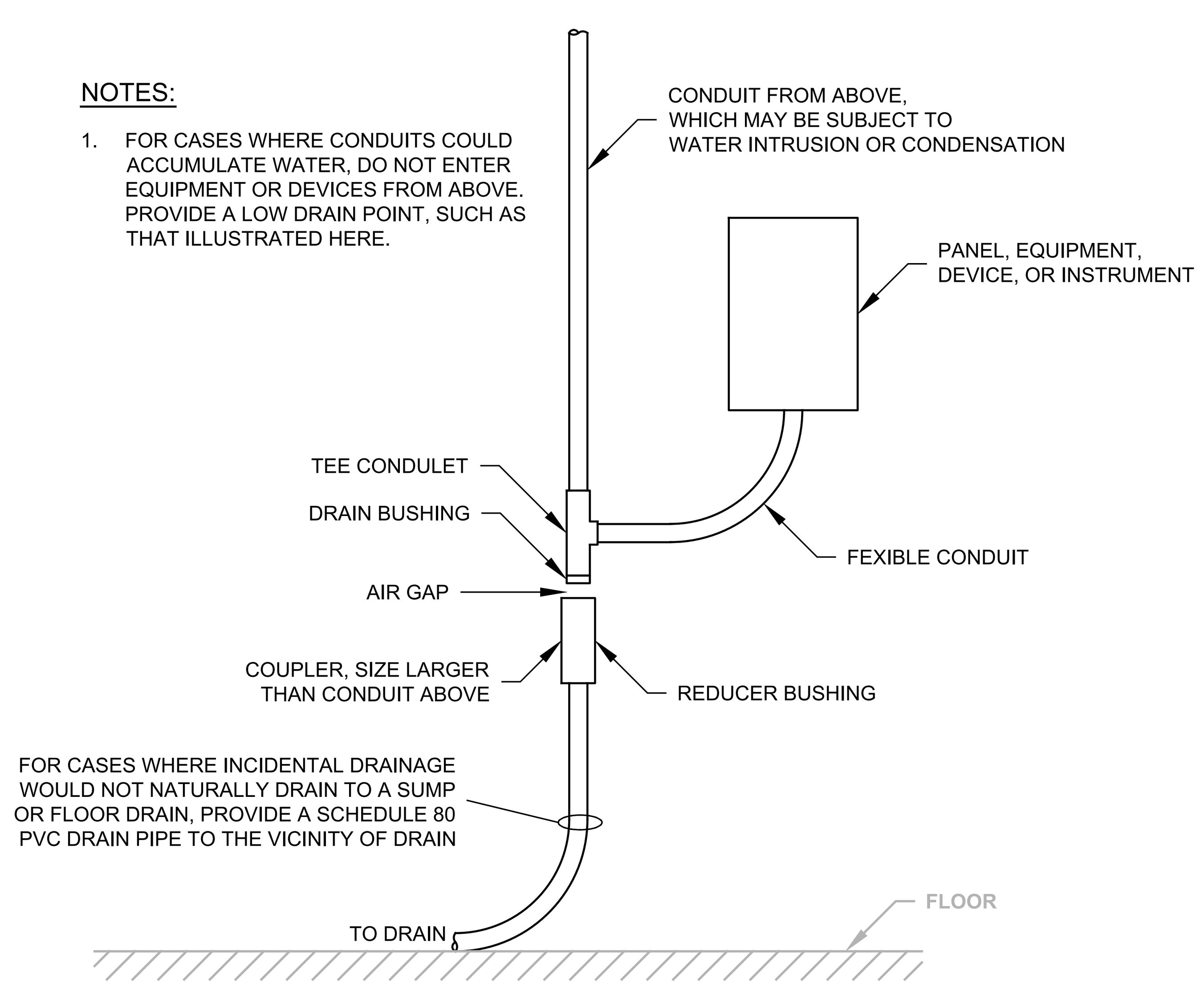
1. BACKFILL TRENCHES IN 6 INCH MAXIMUM LIFTS. COMPACT EACH LIFT.
2. FOR GPA PRIMARY AND SECONDARY CONDUITS ALSO MEET THE REQUIREMENTS ON SHEET E-505. △2

2 CONDUIT TRENCH THROUGH PAVED AREA
NTS

3 NOT USED
NTS

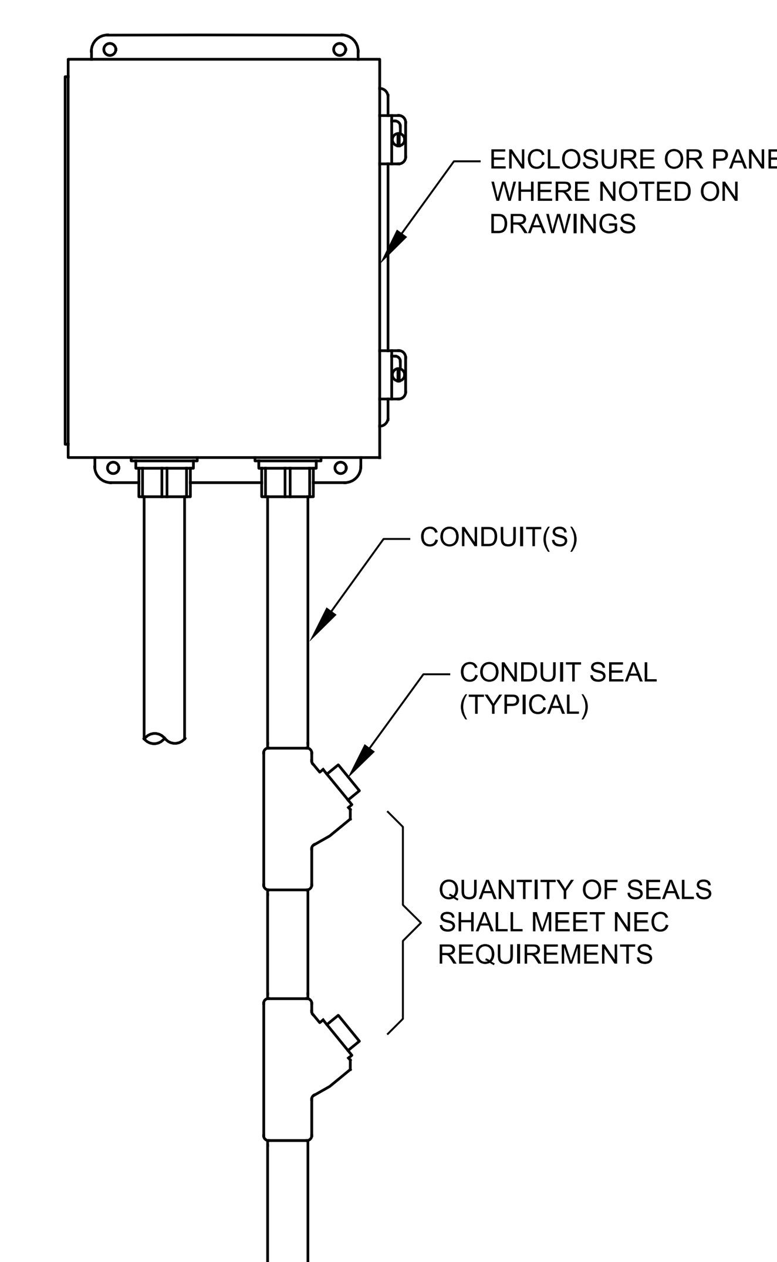
NOTES:

1. FOR CASES WHERE CONDUITS COULD ACCUMULATE WATER, DO NOT ENTER EQUIPMENT OR DEVICES FROM ABOVE. PROVIDE A LOW DRAIN POINT, SUCH AS THAT ILLUSTRATED HERE.



4 CONDUIT DRAIN
NTS

5 NOT USED
NTS



6 CONDUIT FROM HAZARDOUS LOCATION
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2	ADDENDUM NO.2			03/19/2025

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Designer | Design Check | Project Director

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Project **HAGATNA MAIN PUMP STATION IMPROVEMENTS**
Title **DETAILS-2**
Size ANSI D

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE | Sheet No. E-501

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

KEY NOTES

1. THE NFPA AREA-CLASSIFICATION REFERENCES ARE FROM NFPA 820, GWA, AS THE AUTHORITY HAVING JURISDICTION, IS NOT OBLIGATED TO FOLLOW ALL RECOMMENDED PRACTICES, IN THIS CASE, GWA IS ELECTING TO NOT IMPLEMENT COMBUSTIBLE GAS DETECTION.
2. SEE DETAIL 1 ON SHEET E-500 FOR FACP REQUIREMENTS.

NFPA AREA CLASSIFICATIONS TO BE APPLIED TO THE PROJECT

Area	Classification	Ventilation	Ventilation Flow Monitoring	Combustible Gas Detection	Go/No Go Indication
WETWELL	Class 1 Division 1	Yes	Yes	None	No
ROOM ABOVE WETWELL	Class 1 Division 2	Included above	Included above	None	Yes
DRYWELL	Unclassified	Yes	Yes	None	No
ELECTRICAL ROOM (ABOVE DRYWELL)	Unclassified	Included above	N/A	None	Yes
GENERATOR ROOM	Unclassified	No	N/A	None	No

NFPA AREA CLASSIFICATION REFERENCES (1)

Process Area	Table	Row	Line	Location and Function	Fire and Explosion Hazard	Ventilation	Extent of Classified Area	NFPA-Area Classification	Fire Protection Measures
WET WELL	4.2.2	14	a	WASTEWATER PUMPING STATION WET WELLS Liquid side of a pumping station serving a sanitary sewer or combined system	Possible ignition of flammable gases and floating flammable liquids	A	Entire room or space	Division 1	CGD required if mechanically ventilated or opens into a building interior
			b			B	Entire room or space	Division 2	CGD
DRY WELL	4.2.2	15	a	BELOW GRADE OR PARTIALLY BELOW GRADE WASTEWATER PUMPING STATION DRY WELL Pump room physically separated from wet well; pumping of wastewater from a sanitary or combined sewer system through closed pumps or pipes	Buildup of vapors from flammable or combustible liquids	C	Entire room or space	Unclassified	FE
			b			D	Entire room or space	Division 2	FE
GROUND FLOOR	4.2.2	16		ABOVE GRADE WASTEWATER PUMPING STATION Physically seperated with no personnel access to wet well; pumping of wastewater from a sanitary or combined sewer through closed pumps and pipes	N/A	NR	N/A	Unclassified	FE
VENTILATION SYSTEM DUCTING	4.2.2	18	a	ODOR CONTROL AND VENTILATION SYSTEMS SERVING CLASSIFIED LOCATIONS	Leakage and ignition of flammable gases and vapors	D	Entire area if enclosed	Division 2	CGD and FACP
			b			C	Areas within 0.9-meter (3-feet) of leakage sources such as fans, dampers, flexible connections, flanges, pressurized unwelded ductwork, and odor-control vessels	Division 2	CGD and FACP
			c			C	Areas beyond 0.9-meter (3-feet)	Unclassified	CGD and FACP
			d			Not enclosed, open to the atmosphere	Areas within 0.9-meter (3-feet) of leakage sources such as fans, dampers, flexible connections, flanges, pressurized unwelded ductwork, and odor-control vessels	Division 2	FE
			e			Not enclosed, open to the atmosphere	Areas beyond 0.9-meter (3-feet)	Unclassified	FE
MAINTENANCE HOLES	4.2.2	19	a	MAINTENANCE HOLES Access to sewer for personnel entry	Possible ignition of flammable gases and floating flammable liquids	NNV	Inside	Division 1	NR
			b			B	Inside	Division 2	NR

(2)

Abbreviations:

A	No ventilation or ventilated at less than 12 air changes per hour
B	Continuously ventilated at 12 air changes per hour
C	Continuously ventilated at six air changes per hour
CGD	Combustible gas detection system
D	No ventilation or ventilated at less than six air changes per hour
FAS	Fire alarm system
FE	Portable fire extinguisher
N/A	Not applicable
NNV	Not normally ventilated
NR	No requirement

Notes:

1. This Table is derived from NFPA 820-2020, Table 4.2.2.
2. NFPA 820 is recommended practice, and the extent to which the provisions are implemented are at the discretion of the authority having jurisdiction. GWA is the authority having jurisdiction.

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Client GUAM WATERWORKS AUTHORITY

Project HAGATNA MAIN PUMP STATION IMPROVEMENTS

Title DETAILS-4

Size ANSI D

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Sheet No. E-503

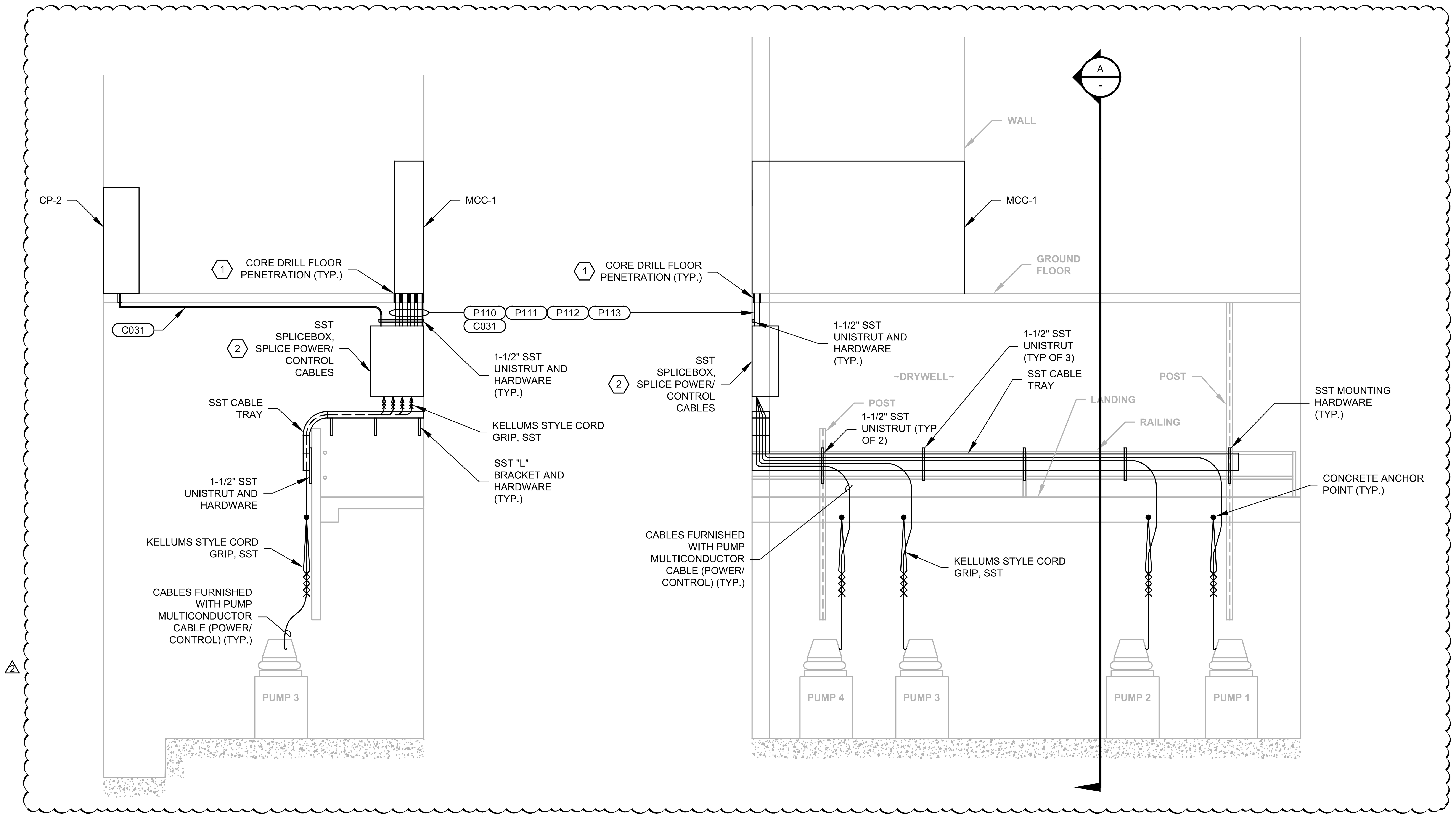
SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET E-100.

B. COORDINATE UNISTRUT MOUNTING REQUIREMENTS TO EXISTING HANDRAIL IN FIELD.

KEY NOTES

1. CONDUIT PENETRATIONS SHALL BE SEALED WITH GROUT TO PREVENT HAZARDOUS GASES FROM DRYWELL ENTERING GROUND FLOOR AREA.
2. SPLICE BOX SHALL BE SIZED TO ACCOMMODATE ALL PUMP FEEDER POLARIS SPLICES. CONDUITS FROM DRYWELL ENTERING SPLICE BOX SHALL INCLUDE EYS SEALS. SPLICE BOX SHALL INCLUDE A COMPARTMENT DIVIDER BETWEEN POWER AND CONTROL CABLES. CONTROL CABLES SHALL TERMINATE AT A TERMINAL BLOCK.



SOUTH ELEVATION (A / –)

WEST ELEVATION

1 PUMP CABLE MOUNTING DETAIL IN DRYWELL

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

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Project **HAGATNA MAIN PUMP STATION IMPROVEMENTS**

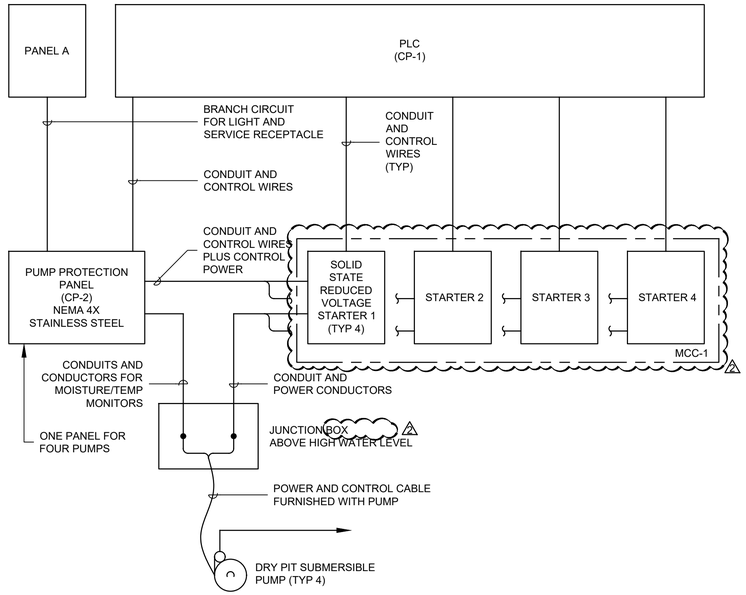
Project No. 11227781 | Date 02/04/2025 | Scale 1/4"=1'-0"

Title **DETAIL-5**

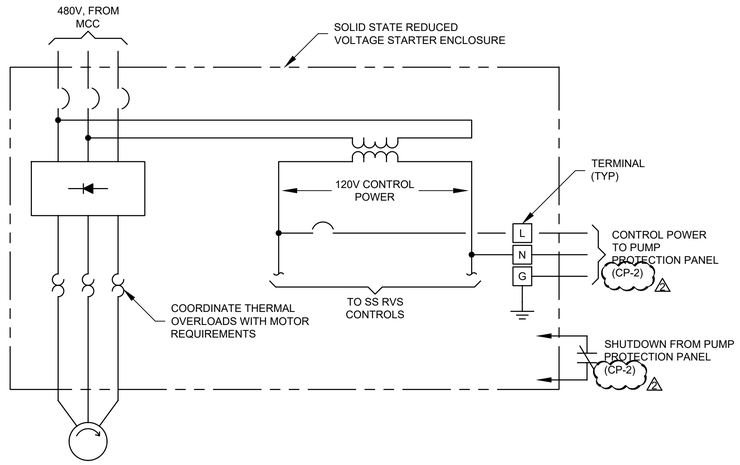
Size ANSI D

Sheet No. E-504

Plot Date: 19 March 2025 - 4:23 PM Plotted By: Ryan Oliver Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-504.dwg



1 INTERCONNECTION
NTS



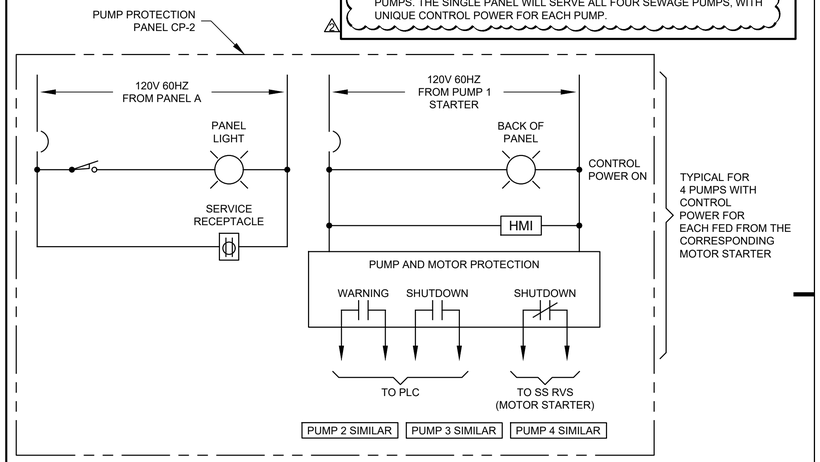
2 SS RVS CONTROL POWER SOURCE
NTS

SHEET NOTES

A. THE PUMP SUPPLIER AND THE MOTOR STARTER SUPPLIER SHALL COORDINATE ON THE DETAILS SHOWN HERE, PRIOR TO SHOP DRAWING SUBMISSIONS.

B. THE CONTROL TRANSFORMER ASSOCIATED WITH THE MOTOR STARTER SHALL BE SIZED FOR THE MOTOR STARTER AND ASSOCIATED LOADS IN THE MOTOR PROTECTION PANEL. PROVIDE LOAD CALCULATION.

C. THE PUMP PROTECTION PANEL (CP-2) SHALL BE FURNISHED WITH THE PUMPS. THE SINGLE PANEL WILL SERVE ALL FOUR SEWAGE PUMPS, WITH UNIQUE CONTROL POWER FOR EACH PUMP.



3 ELEMENTARY DIAGRAM
NTS

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title DETAILS-8
PUMP PROTECTION PANEL

Size ANSI D

Sheet No. E-507

Plot Date: 19 March 2025 - 3:57 PM Plotted By: Ryan Oliver Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-E-507.dwg

INSTRUMENT IDENTIFICATION

- FIRST LETTER(S) / SUCCEEDING LETTER(S) — FUNCTION (SEE TABLE)
- SOLID LINE — PANEL MOUNTED INSTRUMENT
- DASHED LINE — REAR-OF-PANEL MOUNTED INSTRUMENT
- NO LINE — FIELD MOUNTED INSTRUMENT
- DOUBLE LINE — MOTOR CONTROL CENTER MOUNTED INSTRUMENT
- PDIC B22-1 (3)
- LOOP NUMBER (& SUFFIX NO. IF REQUIRED)
- NUMBER OF ITEMS & SUFFIXES (B22-1, B22-2, B22-3)
- PROCESS LETTER

TAG NO. CONSISTS OF FUNCTION IDENTIFICATION & LOOP NO. EXAMPLE: PDIC B22-3

EQUIPMENT IDENTIFICATION

- M-B12-2
- UNIT PROCESS LETTER
- LOOP NUMBER AND SUFFIXES
- EQUIPMENT PREFIX
  - P PUMP
  - M OTHER MOTOR DRIVEN EQUIPMENT
  - T TANK

ABBREVIATIONS

316SS	TYPE 316 STAINLESS STEEL
ATM	ATMOSPHERE
CCS	CENTRAL CONTROL SYSTEM
CP	CONTROL PANEL
CS	CONTROL STATION
EXST, (E)	EXISTING
FP	FIELD PANEL
GBT	GRAVITY BELT THICKENER
MCC	MOTOR CONTROL CENTER
O/C	OPEN/CLOSE(D)
OIP	OPERATOR INTERFACE PANEL
PLC	PROGRAMMABLE LOGIC CONTROLLER
RTD	RESISTANCE TEMPERATURE DETECTION
SS	STAINLESS STEEL
SST	STAINLESS STEEL TUBING
TYP	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
UPS	UNINTERRUPTABLE POWER SUPPLY

TRANSDUCER

A	= ANALOG
BCD	= BINARY CODED DECIMAL
I	= CURRENT
P	= PNEUMATIC
PD	= PULSE DURATION
PF	= PULSE FREQUENCY
V	= VOLTAGE

FY 82 I/P — CURRENT TO PNEUMATIC TRANSDUCER (BACK OF PANEL IN A FLOW LOOP)

HAND SWITCHES AND INDICATING LIGHTS

HS OO / YL OC

MAINTAINED CONTACTS:

HOA	HAND-OFF-AUTO
LR	LOCAL-REMOTE
MA	MANUAL-AUTO
OA	OFF-AUTO
OCA	OPEN-CLOSE-AUTO
OO	ON-OFF
OOA	ON-OFF-AUTO
OOAB	ON-OFF-AUTO-BYPASS
OOR	ON-OFF-REMOTE

MOMENTARY CONTACTS:

OC	OPEN-CLOSE
OSC	OPEN-STOP-CLOSE
SS	START-STOP

ACTUATOR

POWERED ACTUATOR:

- H = HYDRAULIC
- M = ELECTRIC MOTOR
- N = NITROGEN
- P = PNEUMATIC
- S = SOLENOID

S = PILOT SOLENOID
Z = POSITIONER

FAILURE MODE ON LOSS OF PNEUMATIC OR ELECTRIC POWER

- FC = FAIL CLOSED
- FLP = FAIL IN LAST POSITION
- FO = FAIL OPEN

THE INTERNATIONAL SOCIETY OF AUTOMATION

BASED ON ANSI/ISA-5.1-2009, TABLE 4.1

LETTER	FIRST LETTERS: MEASURED OR INITIATING VARIABLE	FIRST LETTERS: VARIABLE MODIFIER	SUCCEEDING LETTERS: READOUT OR PASSIVE FUNCTION	SUCCEEDING LETTERS: OUTPUT OR ACTIVE FUNCTION	SUCCEEDING LETTERS: FUNCTION MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	CLOSE
D	USER'S CHOICE	DIFFERENCE, DIFFERENTIAL			DEVIATION
E	VOLTAGE		SENSOR, PRIMARY ELEMENT		
F	FLOW, FLOW RATE	RATIO (FRAC)			
G	GAS DETECTION		GLASS, GAUGE, VIEWING DEVICE		
H	HAND (MANUAL)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER		SCAN		
K	TIME, SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (INDICATING)		LOW
M	USER'S CHOICE				MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE (OR VACUUM)		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE, TOTALIZE	INTEGRATE, TOTALIZE		
R	RADIATION		RECORD		RUN
S	SPEED, FREQUENCY	SAFETY		SWITCH	STOP
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL, PROBE		
X	UNCLASSIFIED	X-AXIS	ACCESSORY DEVICES,UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		AUXILIARY DEVICES	
Z	POSITION, DIMENSION	Z-AXIS, SAFETY INSTRUMENTED SYSTEM		DRIVER, ACTUATOR, OR UNCLASSIFIED FINAL CONTROL ELEMENT	

FLOW STREAM IDENTIFICATION

AA	AGITATION AIR	PAS	PLANT AIR SUPPLY
AIR	AIR	PD	PUMPED DRAIN
ALS	ALUM SOLUTION	PLD	PLANT DRAIN
BD	BLOWDOWN STREAM	PE	PRIMARY EFFLUENT
BIS	SODIUM BISULFITE SOLUTION	PI	PRIMARY INFLUENT
BWW	BACKWASH WASTE	POS	POLYMER SOLUTION
CD	CHEMICAL DRAIN	PS	PRIMARY SLUDGE
CGS	COAGULANT SOLUTION	PW	PROCESS WATER (PROTECTED DOMESTIC)
CLS	CHLORINE SOLUTION	RAS	RETURN ACTIVATED SLUDGE
CS	CIRCULATING SLUDGE	RCW	RECYCLED WATER
CTE	CHLORINATED TERTIARY EFFLUENT	RS	RAW SEWAGE
D	DRAIN	RW	RECLAIMED WATER
DCW	DOMESTIC COLD WATER	SA	SERVICE AIR
DD	DIGESTED DECANT	SAM	SAMPLE
DHW	DOMESTIC HOT WATER	SC	SCREENINGS
DR	DRAIN	SD	SANITARY DRAIN
DS	DIGESTED SLUDGE	SE	SECONDARY EFFLUENT
DWS	DEWATERED SLUDGE	SF	SLUDGE FILTRATE
EQE	EQUALIZATION TANK EFFLUENT	SH	SODIUM HYPOCHLORITE
FA	FOUL AIR	SS	SECONDARY SCUM
FBW	FILTER BACKWASH	SW	SERVICE WATER (CHLORINATED EFFLUENT)
FI	FILTER INFLUENT	SWD	STORM WATER DRAIN
FE	FILTER EFFLUENT	TD	TANK DRAIN
FW	FIRE WATER	TE	TERTIARY EFFLUNT (UNCHLORINATED)
G	GRIT	TS	THICKENED SLUDGE
HPCL	HYPOCHLORITE SOLUTION	TW	TREATED WATER
IA	INSTRUMENT AIR	UD	UNDERDRAIN
IAS	INSTRUMENT AIR SUPPLY	UW	UTILITY WATER
ML	MIXED LIQUOR	VP	VENT PIPE
OF	OVERFLOW	WAS	WASTE ACTIVATED SLUDGE

LOGIC ELEMENTS

- A, B — AND — C: IF A AND B, THEN C
- A, B — OR — C: IF A OR B, THEN C
- A —o— B: IF A, THEN NOT B; IF NOT A, THEN B

INTERFACE SYMBOLS

- INTERFACE EXTERNAL TO PROJECT
- DRAWING INTERFACE (XXX-X)
- PROCESS INTERFACE & SIGNAL INTERFACE (WITH IDENTIFIER) (X, XXX-X)

NOTE:

1. THIS IS A STANDARD LEGEND, THEREFORE, SOME SYMBOLS AND ABBREVIATIONS MAY APPEAR ON THIS LEGEND AND NOT ON THE PLANS.

SYMBOLS

- MPR — MOTOR PROTECTION RELAY
- FLOW SWITCH
- XP — PURGE SET: X: W = WATER, A = AIR
- AIR SET (FILTER-REGULATOR WITH GAGE)
- INSTRUMENT AIR SUPPLY
- INSTRUMENT
- BUBBLER TUBE
- ROTAMETER W/ NEEDLE VALVE & DIFFERENTIAL PRESSURE REGULATOR

LINE LEGEND

- DATA SIGNALS
- PROCESS LINE
- BUILDING, SYSTEM, OR FACILITY BOUNDARY
- A — ANALOG SIGNAL
- DISCRETE SIGNAL (ON/OFF, ETC.)
- PD — PULSE DURATION SIGNAL
- PF — PULSE FREQUENCY SIGNAL
- PNEUMATIC SIGNAL
- FILLED SYSTEM SIGNAL
- HYDRAULIC SYSTEM SIGNAL
- XX AIR SET — XX=AIRSET OUTPUT PRESSURE IN PSIG:
- (4) PARALLEL SIGNALS (NUMBER OF SIGNALS SHOWN IN PARENTHESIS) (3) (8)
- BRANCHED SIGNALS
- CONNECTING LINES
- NON-CONNECTING LINES

EXAMPLES:

- INDICATES SOURCE SHT. I-1, POINT 1 (1, I-1)
- INDICATES DESTINATION SHT. I-2, POINT 1 (I-2, 1)

AIR SET · SAMPLE (S) · AIR GAP · VENT (V) · FILTER · INTERLOCK (I) · RELAY (R) · FLUSHING CONNECTION (F) · PULSATION DAMPENER (D) · PRESSURE INDICATOR (PI) · PULSATION DAMPENER · BASKET STRAINER · QUICK-COUPLER CONNECTION · FAN · AIR AND/OR VACUUM RELEASE · TEST CONNECTION QUICK COUPLER · FLUID LEVEL (FLUCTUATING) · BLIND FLANGE · GRINDER (M)

BACKFLOW PREVENTER · VALVE, TYPE NOT INDICATED · GATE VALVE (G) · BUTTERFLY VALVE · BALL VALVE · V-BALL VALVE · CHECK VALVE · BALL CHECK VALVE · BALL CHECK VALVE (SPRING LOADED) · 3-WAY BALL VALVE · GLOBE VALVE · DIAPHRAGM VALVE · PLUG VALVE · ECCENTRIC PLUG VALVE · PLUG DRAIN VALVE · BUTTERFLY GATE · GATE · GATE WITH HANDWHEEL · SLUICE GATE · FLAP GATE · RUPTURE DISK · BACK PRESSURE REGULATOR · PRESSURE REDUCING VALVE · PRESSURE RELIEF · FLUME · WEIR OR WEIR WALL · ORIFICE PLATE · FLOW TUBE · PROPELLER OR TURBINE FLOWMETER · PITOT-STATIC · ROTAMETER · MASS FLOW METER

ELECTROMAGNETIC FLOWMETER · ULTRASONIC LEVEL ELEMENT · RADAR LEVEL ELEMENT · BUBBLER ASSEMBLY (B) · BUBBLER · FLOAT · EJECTOR · MIXER, OR AGITATOR (M) · SUBMERSIBLE PUMP · PROGRESSIVE CAVITY PUMP · ANNULAR SEAL · DIAPHRAGM SEAL · VERTICAL PUMP · PUMP OR COMPRESSOR · PISTON PUMP · DIAPHRAGM PUMP · COMPRESSOR BLOWER (CENTRIFUGAL) GEAR PUMP OR BLOWER · COMPRESSOR BLOWER (MULTI STAGE CENTRIFUGAL) · COMPRESSOR (PISTON TYPE) · PARASTALTIC PUMP · CAKE PUMP · STRAINER

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Title: LEGEND AND GENERAL NOTES
Size: ANSI D

Project No. 11227781 · Date 02/04/2025 · Scale NOT TO SCALE · Sheet No. I-100

INSTRUMENT LIST

TAG	DESCRIPTION
LSLL1	LEVEL SWITCH LOW LOW
LSL1	LEVEL SWITCH LOW
LSM1	LEVEL SWITCH MEDIUM
LSHH1	LEVEL SWITCH HIGH HIGH
LE1	LEVEL TRANSMITTER
LIT1	LEVEL INDICATOR TRANSMITTER
LSLL2	LEVEL SWITCH LOW LOW
LSL2	LEVEL SWITCH LOW
LSM2	LEVEL SWITCH MEDIUM
LSHH2	LEVEL SWITCH HIGH HIGH
LE2	LEVEL TRANSMITTER
LIT2	LEVEL INDICATOR TRANSMITTER
ME 10	PUMP 1 MOISTURE ELEMENT
TE 10	PUMP 1 TEMPERATURE ELEMENT
MLH10	PUMP 1 MOISTURE INDICATOR
TLH10	PUMP 1 TEMPERATURE INDICATOR
HS10A	PUMP 1 HAND OFF AUTO
ME 20	PUMP 2 MOISTURE ELEMENT
TE 20	PUMP 2 TEMPERATURE ELEMENT
MLH20	PUMP 2 MOISTURE INDICATOR
TLH20	PUMP 2 TEMPERATURE INDICATOR
HS20A	PUMP 2 HAND OFF AUTO
ME 30	PUMP 3 MOISTURE ELEMENT
TE 30	PUMP 3 TEMPERATURE ELEMENT
MLH30	PUMP 3 MOISTURE INDICATOR
TLH30	PUMP 3 TEMPERATURE INDICATOR
HS30A	PUMP 3 HAND OFF AUTO
ME 40	PUMP 4 MOISTURE ELEMENT
TE 40	PUMP 4 TEMPERATURE ELEMENT
MLH40	PUMP 4 MOISTURE INDICATOR
TLH40	PUMP 4 TEMPERATURE INDICATOR
HS40A	PUMP 4 HAND OFF AUTO
FIT45	FLOW TRANSMITTER
FE45	FLOW ELEMENT
UT55	POWER MONITORING TRANSMITTER
ME60	SUMP MOISTURE ELEMENT
TE60	SUMP TEMPERATURE ELEMENT
HS60A	SUMP PUMP HAND OFF AUTO
LSL61	LEVEL SWITCH LOW
LSH61	LEVEL SWITCH HIGH
LSHH61	LEVEL SWITCH HIGH HIGH
LLHH61	LEVEL LIGHT HIGH HIGH
UL70A	NO GO LIGHT
UL70B	GO LIGHT
UL70C	NO GO LIGHT
UL70D	GO LIGHT
FSL71	FLOW SWITCH
FSL72	FLOW SWITCH
FSL73	FLOW SWITCH
FSL74	FLOW SWITCH
ZS80A	DOOR INTRUSION ALARM
ZS80B	DOOR INTRUSION ALARM
ZS80C	DOOR INTRUSION ALARM
ZS80D	DOOR INTRUSION ALARM
ZS80E	DOOR INTRUSION ALARM
ZS80F	DOOR INTRUSION ALARM
ZS80G	DOOR INTRUSION ALARM
ZS80H	DOOR INTRUSION ALARM
HS85	HARDWIRED BACKUP SELECT 1/2
YL85A	HARDWIRED BACKUP LIGHT ACTIVE
YL85B	HARDWIRED BACKUP LIGHT ACTIVE

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100. (2)

KEY NOTES

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GUAM WATERWORKS AUTHORITY

Bar is one inch on original size sheet
0 1"

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title INSTRUMENT LIST
Size ANSI D
Sheet No. I-101

Plot Date: 18 March 2025 - 5:20 PM | Plotted By: Ryan Oliver | Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-I-101.dwg

PLC

CP-1

(2)"WETWELL/SUPPLY VENTILATION FAIL"

I

"STATION DOOR OPEN"

OR

(2) HBS SELECT 1/2/OFF

HS 85

(9)

HARDWIRED BACKUP SYSTEM

"PLC FAIL"

(5)"ON/ AUTO/ OVERLOAD/ WARNING/ ALARM"

"HBS ACTIVE"

AUTODIALER

LLHH 61

(3)"ON BATTERY/ BATTERY LOW/ FAULT"

UPS

120V

HMI

120V

"CONTROL POWER TROUBLE"

NO GO UL 70A

GO UL 70B

GO/NO GO INDICATORS AT TOP OF STAIRWELL

ZS 80A

ZS 80B

ZS 80C

ZS 80D

ZS 80E

ZS 80F

ZS 80G

ZS 80H

120V

480V VIA MCC-1

AIR

FSL 73

FSL 74

SUPPLY FAN SF-2

EXHAUST FAN EF-2

VIA PANEL A

WETWELL AREA

"LEVEL"

"LEVEL"

"LOW PRESSURE"

SOPHOS SD-RED20 CELLULAR ANTENNA

HS 1

HS 2

LIT 1

LIT 2

LP-1

HOA

HS 60A

MPR

SUMP PUMP MOTOR STARTER

SUMP PUMP CONTROLS

(8)

(7)

"LEVEL HIGH HIGH"

LSHH 2

"MOTOR POWER"

(2)"LEVEL HIGH/ LEVEL LOW"

INLET CHANNELS

"LEVEL MEDIUM"

LSM 2

STORM DRAIN (PRESUMED)

CHARRORRO VILLAGE

GRAVITY SEWER FROM SOUTH

CAPPED

DESTINATION UNKNOWN (MAYBE WETWELL)

JUNCTION BOX NO.2

18"

24"

BUBBLER

I-111 4 TO PUMP 4

(2)"MOISTURE /TEMP"

"LEVEL LOW"

LSL 2

"LEVEL LOW LOW"

"LEVEL HIGH HIGH"

LSLL 2

LSHH 1

WETWELL NO.2

I-111 3 TO PUMP 3

"LEVEL MEDIUM"

LSM 1

"LEVEL HIGH HIGH"

GRAVITY SEWERS FROM NORTH AND CENTRAL AREAS

JUNCTION BOX NO.1

BUBBLER

I-111 2 TO PUMP 2

LSL 1

LSLL 1

"LEVEL LOW"

"LEVEL LOW LOW"

WETWELL NO.1

DRYWELL FLOOD

LSHH 61

I-111 1 TO PUMP 1

SUMP PUMP, 240V VIA PANEL A / PUMP MOTOR STARTER

ME 60

TE 60

LSH 61

LSL 61

DRYWELL SUMP

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100.

B. ITEMS SHOWN BOLD ARE TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR. ITEMS SHOWN SCREENED ARE TO REMAIN, UNLESS NOTED OTHERWISE.

KEY NOTES

1 MAIN PUMP STATION IMPROVEMENT - P&ID - 1

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title P&ID - 1 IMPROVEMENT

Size ANSI D

Sheet No. I-110

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PLC

"RUN"

(2)"HBS ACTIVE"

(2)"WARNING/ ALARM"

(3)"ON/ AUTO/OL

(2)"WARNING/ ALARM" HBS 1 ACTIVE

YL 85A

(2)"WARNING/ ALARM" HBS 2 ACTIVE

YL 85B

(2)"WARNING/ ALARM"

(3)"ON/ AUTO/OL

(2)"WARNING/ ALARM"

(6)"CURRENT" - 3 "VOLTAGE" -3

(3)"ON/ AUTO/OL

(2)"DRYWELL/SUPPLY VENTILATION FAIL"

HARDWIRED BACKUP SYSTEM

CP-1

"RUN"

(3)"ON/ AUTO/OL

"RUN"

"RUN"

(3)"ON/ AUTO/OL

"RUN"

(3)"ON/AUTO/OL

PUMP CONTROLS (TYP FOR 4)

HS HOA 10A

480V INCOMING POWER

UT 55

MCC-1

UL 70C NO GO

UL 70D GO

GO/NO GO INDICATORS AT DRYWELL STAIRWELL

"LOW"

"LEVEL"

"FLOW"

120V UPS

FIT 45

(3)"ON/LOW LEVEL/ TROUBLE"

"STANDBY COMMAND" (FOR FUTURE USE)

(2)"UTILITY/STANDBY"

FUEL LEVEL MONITOR

120V

FUTURE

120V

FUEL TANK

ENGINE-GENERATOR

BATTERY CHARGER

ATS

COORDINATE WORK WITH GPA

(2)"WARNING/ALARM"

"MOTOR POWER"

"ALARM"

(2)"WARNING/ALARM"

"MOTOR POWER"

"ALARM"

(2)"WARNING/ALARM"

"MOTOR POWER"

"ALARM"

(2)"WARNING/ALARM"

"MOTOR POWER"

"ALARM"

120V

FSL 71

480V VIA MCC-1

AIR

SUPPLY FAN SF-1

480V VIA MCC-1

FSL 72

EXHAUST FAN EF-1

DRYWELL SIDE

FLYGT MOTOR PROTECTION (TYP. OF 4)

MLH 10

TLH 10

CP-2

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100.

B. ITEMS SHOWN BOLD ARE TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR. ITEMS SHOWN SCREENED ARE TO REMAIN, UNLESS NOTED OTHERWISE.

KEY NOTES

FROM WETWELL #2 4 I-110

FROM WETWELL #2 3 I-110

FROM WETWELL #1 2 I-110

CS

FROM WETWELL #1 1 I-110

AS

(2)"MOISTURE/TEMP"

ME 10

TE 10

PUMP 1 DRY PIT SUBMERSIBLE

(2)"MOISTURE/TEMP"

ME 20

TE 20

PUMP 2 DRY PIT SUBMERSIBLE

(2)"MOISTURE/TEMP"

ME 30

TE 30

PUMP 3 DRY PIT SUBMERSIBLE

(2)"MOISTURE/TEMP"

ME 40

TE 40

PUMP 4 DRY PIT SUBMERSIBLE

FE 45

CLOSED

BOX IN YARD (ABANDONED)

TO JB1

TO HAGATNA WWTP VIA NEW FM

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title P&ID - 2 IMPROVEMENT

Size ANSI D

Sheet No. I-111

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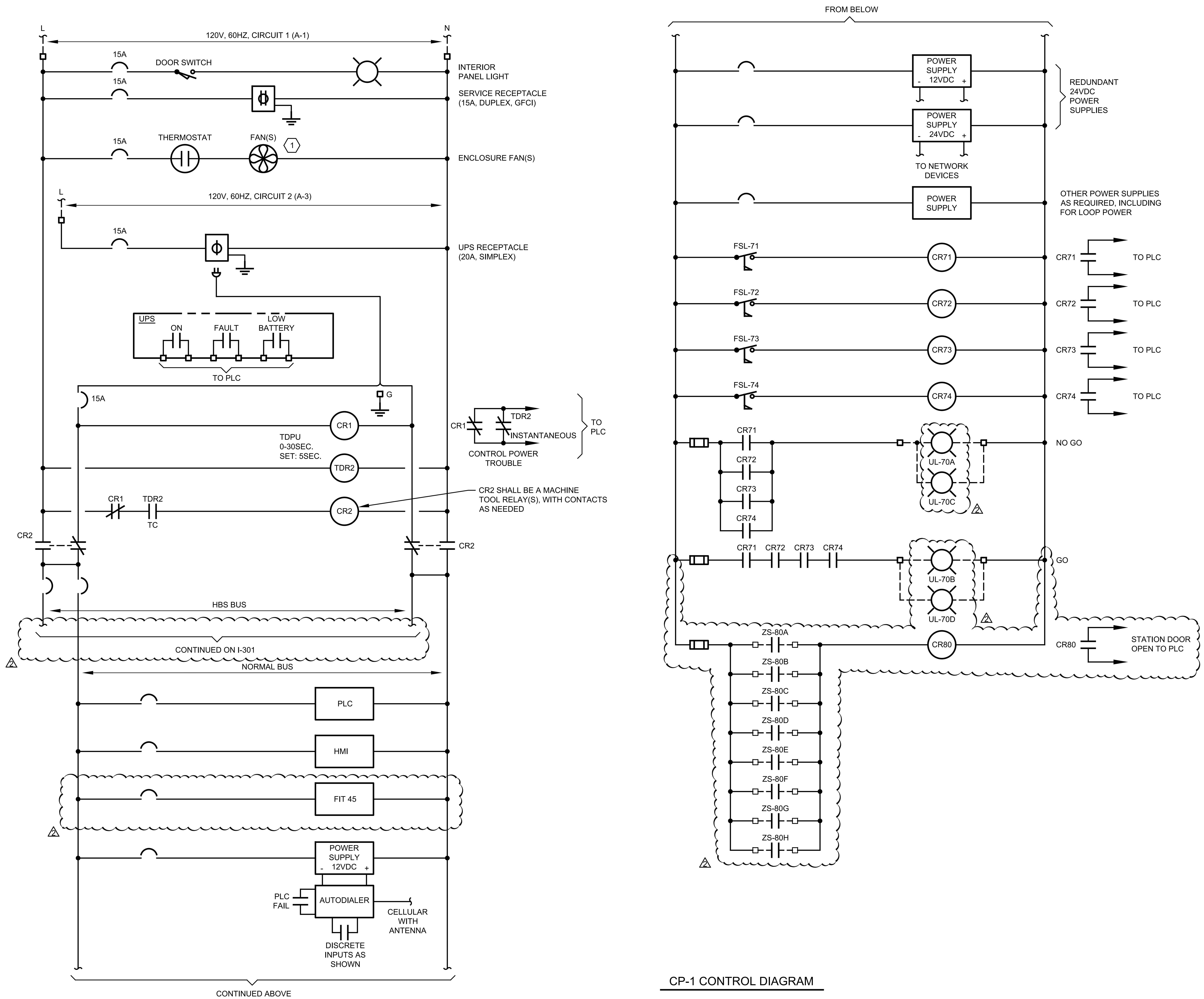

CP-1 CONTROL DIAGRAM

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100.

B. ITEMS SHOWN BOLD ARE TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR. ITEMS SHOWN SCREENED ARE TO REMAIN, UNLESS NOTED OTHERWISE.

C. FOR OVERCURRENT PROTECTION SIZING (FUSING AND BREAKERS) PROVIDE LOAD CALCULATIONS AND RECOMMEND SIZES WITH SHOP DRAWINGS.

D. FOR PLC INPUTS/OUTPUTS, FUSE ON A PER-MODULE BASIS, PLUS SMALLER PER-INPUT FUSING (TYPICALLY 250 MA). FUSES SHALL BE INDICATING AND INCLUDE INTEGRAL DISCONNECTING MEANS.

E. PLC DISCRETE OUTPUTS SHALL HAVE INTERPOSING RELAYS.

F. PROVIDE MULTIPLYING RELAYS AS NEEDED.

KEY NOTES

1. PROVIDE ENCLOSURE FAN(S) (WITH FILTERS) TO THE EXTENT NEEDED TO MEET PANEL TEMPERATURE REQUIREMENTS. IF TEMPERATURE LIMITS CAN BE MET WITHOUT FAN(S), FANS MAY BE OMITTED, SUBJECT TO GWA APPROVAL TO DO SO.

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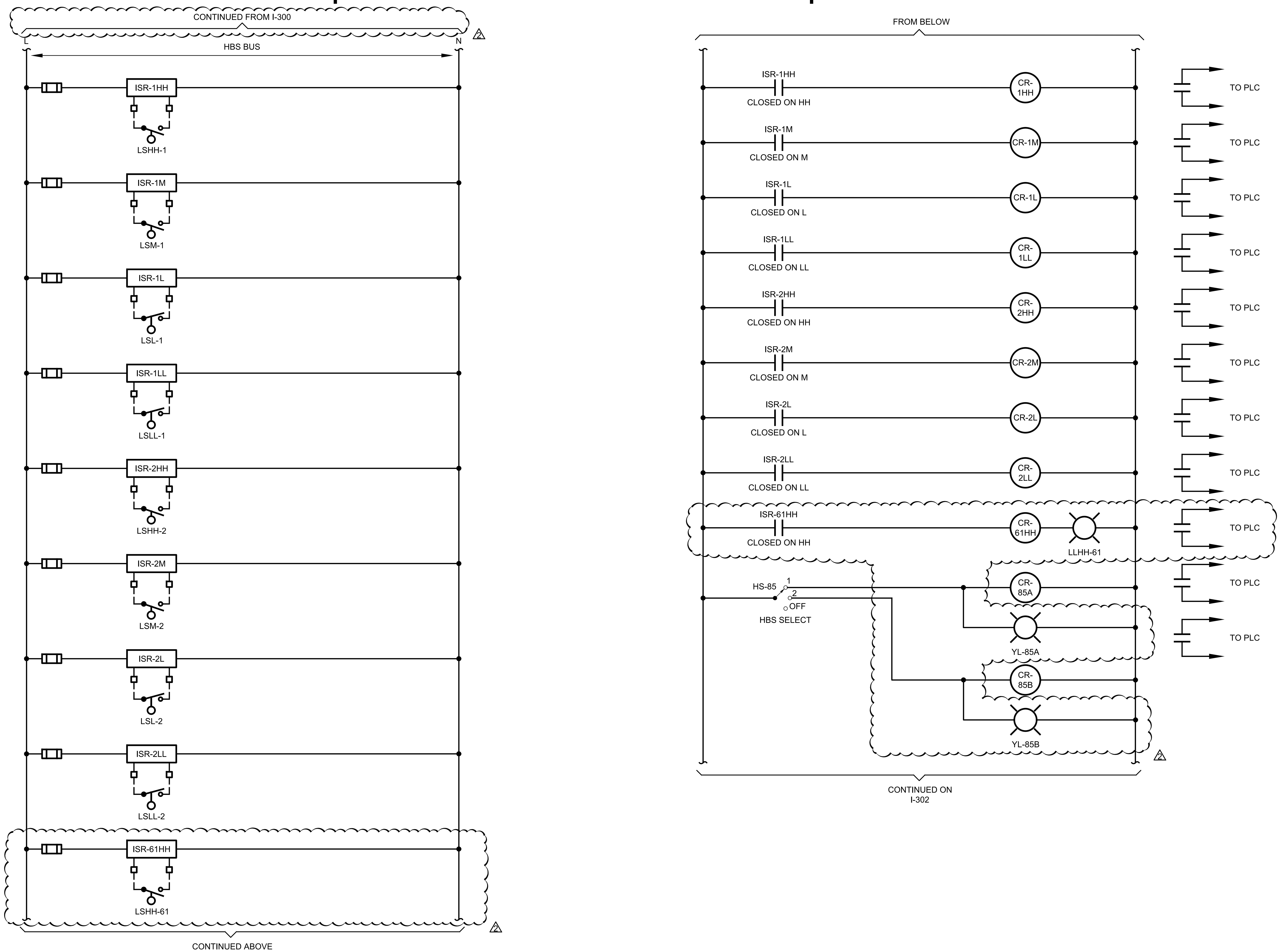
Project **HAGATNA MAIN PUMP STATION IMPROVEMENTS**

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title **CP-1 CONTROL DIAGRAM - 1**

Size ANSI D

Sheet No. I-300



CP-1 CONTROL DIAGRAM

SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100.

B. SEE NOTES ON SHEET I-300.

KEY NOTES

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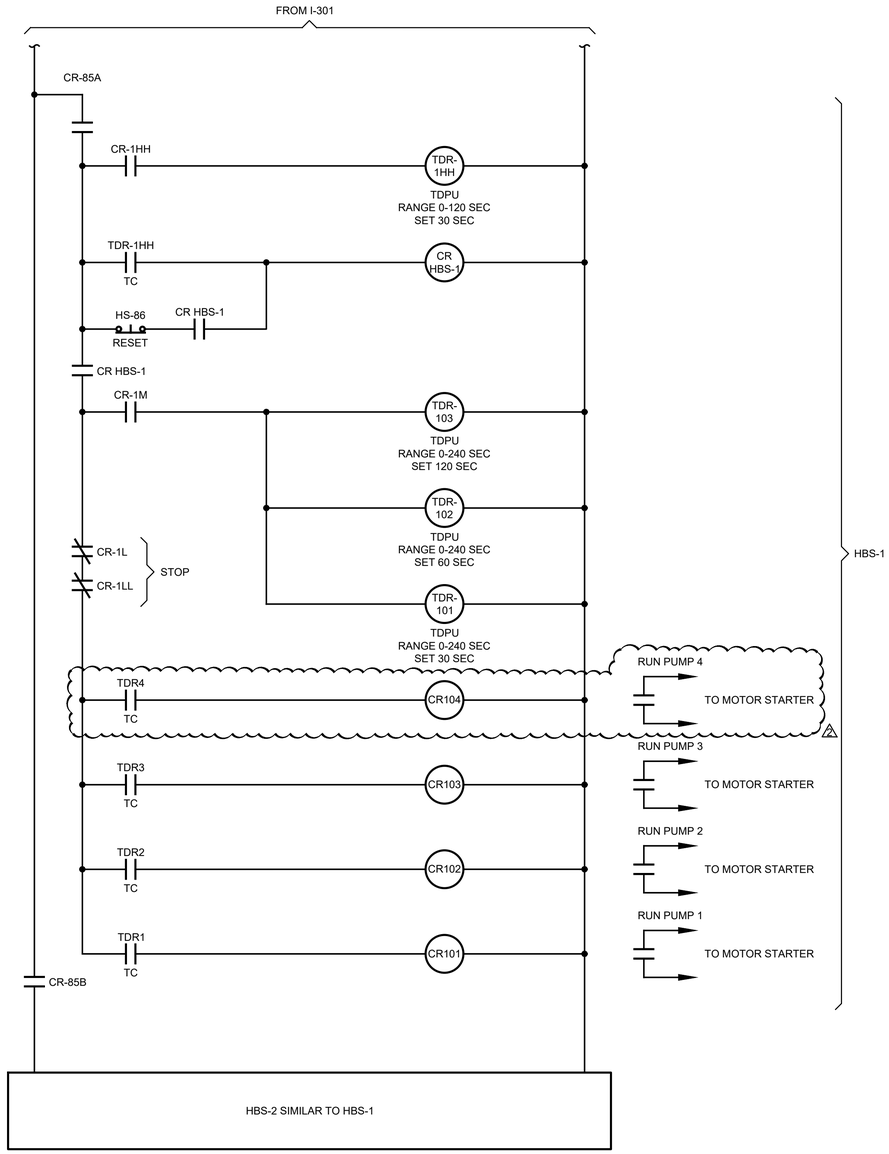
Project: HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title: CP-1 CONTROL DIAGRAM - 2

Size: ANSI D

Sheet No. I-301



SHEET NOTES

A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100.

B. SEE NOTES ON SHEET I-300.

KEY NOTES

CP-1 CONTROL DIAGRAM

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Client **GUAM WATERWORKS AUTHORITY**

Project **HAGATNA MAIN PUMP STATION IMPROVEMENTS**

Project No. **11227781** | Date **02/04/2025** | Scale **NOT TO SCALE**

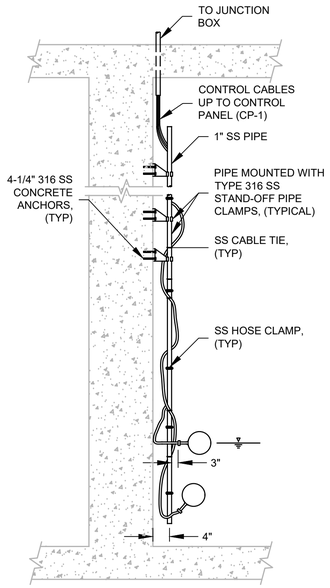
Title **CP-1 CONTROL DIAGRAM - 3**

Size **ANSI D**

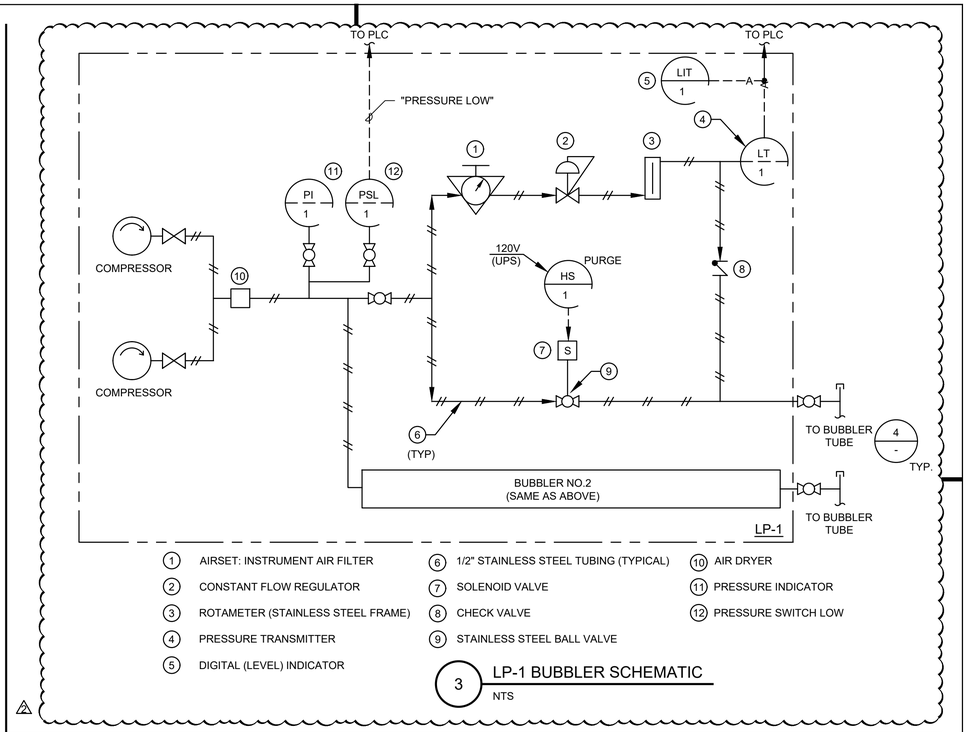
Sheet No. **I-302**

Plot Date: 18 March 2025 - 5:27 PM | Plotted By: Michael Haverlock | Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-I-302.dwg

1 NOT USED
NTS



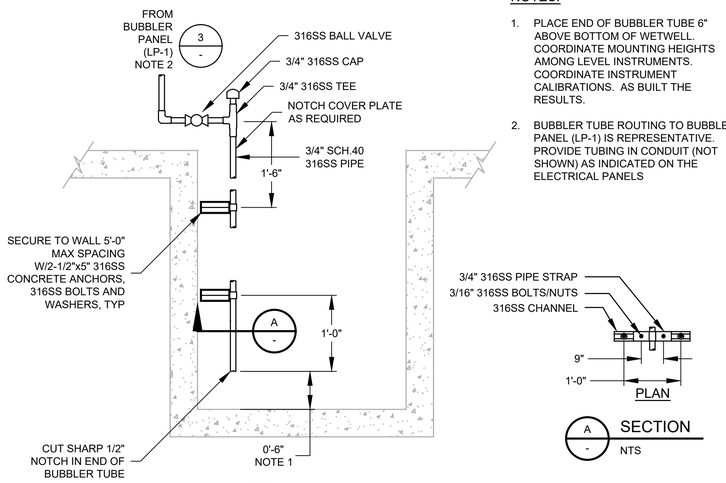
2 LEVEL SWITCH SUPPORT BRACKET
NTS



3 LP-1 BUBBLER SCHEMATIC
NTS

NOTES:

1. PLACE END OF BUBBLER TUBE 6" ABOVE BOTTOM OF WETWELL. COORDINATE MOUNTING HEIGHTS AMONG LEVEL INSTRUMENTS. COORDINATE INSTRUMENT CALIBRATIONS. AS BUILT THE RESULTS.
2. BUBBLER TUBE ROUTING TO BUBBLER PANEL (LP-1) IS REPRESENTATIVE. PROVIDE TUBING IN CONDUIT (NOT SHOWN) AS INDICATED ON THE ELECTRICAL PANELS



A - SECTION
NTS

4 BUBBLER DETAIL
NTS

5 NOT USED
NTS

6 NOT USED
NTS

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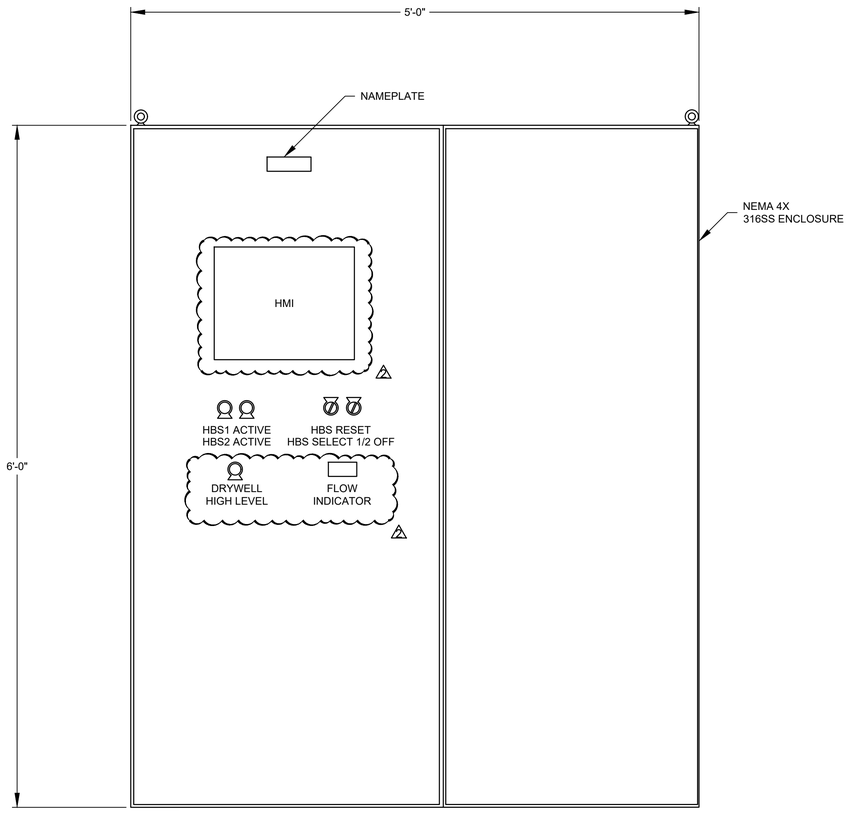
Client GUAM WATERWORKS AUTHORITY
Project HAGATNA MAIN PUMP STATION IMPROVEMENTS
Title DETAILS-2
Size ANSI D
Project No. 11227781
Date 02/04/2025
Scale NOT TO SCALE
Sheet No. I-401

Plot Date: 18 March 2025 - 5:22 PM
Plotted By: Ryan Oliver
Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-I-401.dwg

SHEET NOTES

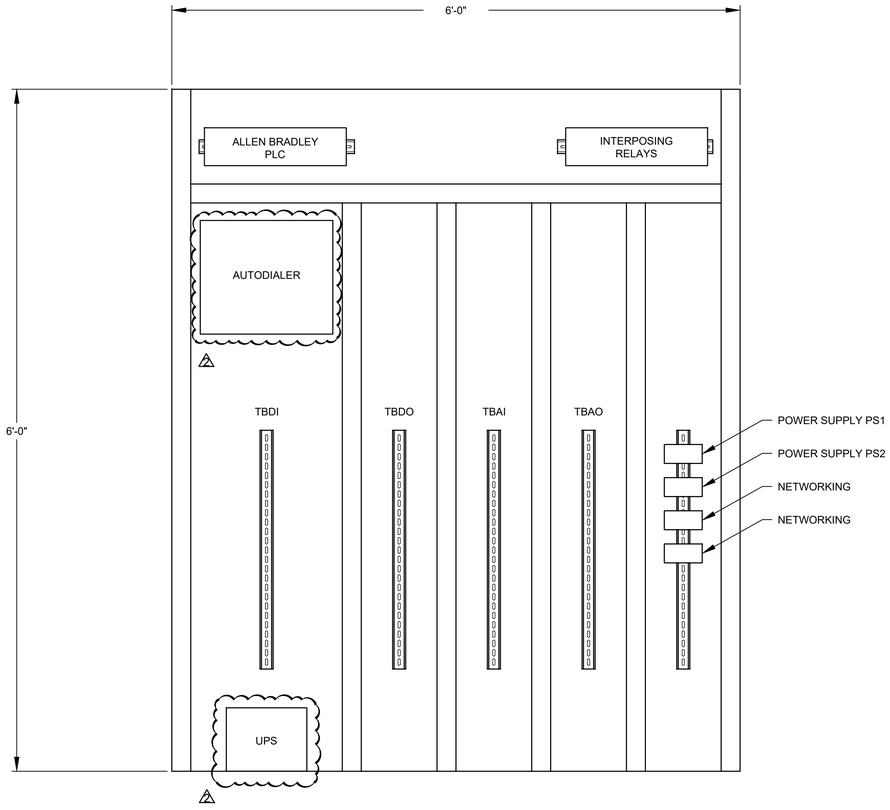
A. SEE LEGEND AND GENERAL NOTES ON SHEET I-100.

B. THIS LAYOUT IS REPRESENTATIVE. DEVELOP PROJECT SHOP DRAWINGS, SEE SPECIFICATIONS.



CP-1 FRONT ELEVATION

NTS



INTERIOR ELEVATION

NTS

CP-1 ELEVATION

NTS

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Project HAGATNA MAIN PUMP STATION IMPROVEMENTS

Project No. 11227781 | Date 02/04/2025 | Scale NOT TO SCALE

Title DETAILS-3

Size ANSI D

Sheet No. I-402

Plot Date: 18 March 2025 - 5:22 PM | Plotted By: Ryan Oliver | Filename: P:\2334 Guam Hagatna Pump Station Rehab\Design_Drawings\2334-I-402.dwg

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08 11 16	ALUMINUM DOORS AND FRAMES
08 33 23	OVERHEAD COILING DOORS (PENDING)
08 71 00	DOOR HARDWARE
DIVISION 9	**FINISHES**
09 90 00	PAINTS AND COATINGS
DIVISION 22	**PLUMBING**
22 05 00	COMMON WORK RESULTS FOR PLUMBING
22 05 23	GENERAL-DUTY VALVES FOR PLUMBING PIPING
22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING
22 05 53	IDENTIFICATIONS FOR PLUMBING PIPING AND EQUIPMENT
22 07 00	PLUMBING INSULATION
22 10 00	PLUMBING PIPING
22 11 00	FACILITY WATER DISTRIBUTION
22 13 00	FACILITY SANITARY SEWERAGE
22 14 29.16	SUBMERSIBLE SUMP PUMPS
22 33 00	ELECTRIC, DOMESTIC-WATER HEATER
22 40 00	PLUMBING FIXTURE
DIVISION 23	**HEATING, VENTILATING, AND AIR CONDITIONING**
23 05 29	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
23 05 53	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
23 05 93	TESTING, ADJUSTING, AND BALANCING FOR HVAC
23 07 00	HVAC INSULATION
23 23 00	REFRIGERANT PIPING
23 31 00	HVAC DUCTS AND CASINGS
23 33 00	AIR DUCT ACCESSORIES
23 34 00	HVAC FANS
23 37 00	AIR OUTLETS AND INLETS
23 81 26	SPLIT SYSTEM AIR CONDITIONERS

BID FORM

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BID FORM

ARTICLE 1 - BID RECIPIENT

1.01 This Bid is submitted to:

Guam Waterworks Authority
Gloria B. Nelson Public Service Building
688 Route 15 Mangilao, Guam 96913

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with Buyer in the form included in the Bidding Documents to furnish the Goods and Special Services as specified or indicated in the Bidding Documents, for the prices and within the times indicated in this Bid, and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Buyer.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

Addendum No.	Addendum Date

B. Bidder has visited the Point of Destination and site where the Goods are to be installed or Special Services will be provided and become familiar with and is satisfied as to the observable local conditions that may affect cost, progress, or the furnishing of Goods and Special Services, if required to do so by the Bidding Documents, or if, in Bidder's judgment, any local condition may affect cost, progress, or the furnishing of Goods and Special Services.

C. Bidder is familiar with and is satisfied as to all Laws and Regulations in effect as of the date of the Bid that may affect cost, progress, and the furnishing of Goods and Special Services.

D. Bidder has carefully studied, considered, and correlated the information known to Bidder; information commonly known to sellers of similar goods doing business in the locality of the

Point of Destination and the site where the Goods will be installed or where Special Services will be provided; information and observations obtained from Bidder's visits, if any, to the Point of Destination and the site where the Goods will be installed or Special Services will be provided; and any reports and drawings identified in the Bidding Documents regarding the Point of Destination and the site where the Goods will be installed or where Special Services will be provided, with respect to the effect of such information, observations, and documents on the cost, progress, and performance of Seller's obligations under the Bidding Documents.

E. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution (if any) thereof by Engineer is acceptable to Bidder.

F. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing the Goods and Special Services for which this Bid is submitted.

ARTICLE 4 - BIDDER'S CERTIFICATIONS

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Buyer, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Buyer of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Buyer, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process.

ARTICLE 5 - BASIS OF BID

5.01 Basis of award shall be in accordance with Article 19 of the instruction to bidders and the Base bid form.

5.02 Bidder will complete the Work in accordance with the Contract Documents for the following price(s) as delineated per scope item. Prices include all labor, materials, services, and equipment necessary for completion of the Work. All other Work necessary for the complete operational pump station not listed in Attachment 1 Base Bid Formare considered incidental and are an obligation of the Contractor under the various Bid Items as specified in the Bid at no additional cost to Owner. Bidder will furnish the Goods and Special Services in accordance with the Contract Documents for the following price(s): **See attached:**

a. Attachment 1 –Base Bid Form

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, to be determined and as provided in the Contract Documents. Bidder also acknowledges that each unit price includes an amount considered by Bidder to be adequate to cover Bidder's overhead and profit for each separately identified item.

ARTICLE 6 - TIME OF COMPLETION

6.01 Bidder agrees that the furnishing of Goods and Special Services will conform to the schedule set forth in Article 5 of the Agreement.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 - ATTACHMENTS TO THIS BID

7.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of _____.

B. List of Proposed Major Suppliers;

C. Required Bidder Qualification Statement with Supporting Data; and

ARTICLE 8 - DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 - BID SUBMITTAL

9.01 This Bid submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

Business address: _____

_____

Phone: _____ Facsimile: _____

E-mail address: _____ _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner - attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____

_____

Phone: _____ Facsimile: _____

E-mail address: _____

A Corporation

Corporation Name: _____

State of Incorporation: _____

Type (General Business, Professional, Service, other): _____

By: _____
(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

Attest _____

(Signature of Corporate Secretary)

Business address: _____

_____

Phone: _____ Facsimile: _____

E-mail address: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____

(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone: _____ Facsimile: _____

E-mail address: _____

A Joint Venture

First Joint Venturer Name: _____ (SEAL)

By: _____

(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone: _____ Facsimile: _____

E-mail address: _____

Second Joint Venturer Name: _____(SEAL)

By: _____

(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone: _____ Facsimile: _____

E-mail address: _____

Phone and Facsimile Number, and Address for receipt of official communications to Joint Venture:__

_____

_____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation, and limited liability company that is a party to the joint venture should be in the manner indicated above.)

Attachment 1 – Base Bid Form

Hagatna Main Sewage Pump Station and Redundant Forcemain
GWA Project No. 22002

Base Bid - Description of Work:
The base bid items consist of but not specifically limited to mobilization/demobilization, installation of new sewer, force main, pump station and all associated connections and commission works needed for a complete and functional wastewater system.

Bidders will complete the work for the following price(s) as broken down per scope item:

Item No.	Description (BASIC BID)	Qty	Unit	Unit Cost	Total Cost
1	**General Works**				
1.1	Mobilization/Demobilization	1	LS		
1.2	Bond	1	LS		
1.3	Insurance	1	LS		
1.4	Permit	1	LS		
1.5	Field end Engineering support	1	LS		
1.6	Field Office	1	LS		
1.7	Clearing and grubbing	1	LS		
1.8	Erosion and Sedimentation Control (ESC)	1	LS		
1.9	Archeological Monitor	1	LS		
1.10	Traffic Control	1	LS		
1.11	Pump By-pass	1	LS		
1.12	Temporary Power	1	LS		
1.13	TV Inspection of Sewer	1	LS		
2	**Demolition and Removal**				
2.1	Chain link fence and gates	134	LF		

2.2	Vehicle Gate	2	EA		
2.3	CMU wall and partial junction box in yard	1	LS		
2.4	Site water	1	LS		
2.5	Concrete	1	LS		
2.6	Junction box hatch	1	EA		
2.7	Inlet channel steel covers	1	LS		
2.8	Hatch cover and frame in control room	4	EA		
2.9	Hatch cover, frame, grate in rack room	4	EA		
2.10	Asphalt removal for electrical trenching	27.5	LF		
2.11	14” to 24” piping fittings, valves, and accessories	1	LS		
2.12	Sewage pumps and concrete pedestal	1	LS		
2.13	Sump pump, piping, fittings and accessories	1	LS		
2.14	Grit recirculating system	1	LS		
2.15	Float switch system and conduit casing	1	LS		
2.16	Sluice gates and operators	3	EA		
2.17	Hand railing	1	LS		
2.18	I-beams	1	LS		
2.19	HVAC duct and ventilation system	1	LS		
2.20	Plumbing System	1	LS		
2.21	Monorail and anchor system	1	LS		
2.22	Steel rail in driveway	1	LS		
2.23	Control room exterior wall	1	LS		
2.24	Storage Room #2 exterior wall	1	LS		
2.25	Swing doors	1	LS		
2.26	Roll up door	1	LS		
2.27	Electrical conduits, electrical controls, cables, fixtures, boxes, panels, switches	1	LS		

2.28	Misc. pipe supports, threaded rods, hardware, racks, piping	1	LS		
2.29	General cleaning, pressure wash and preparation of surfaces for surface coatings	1	LS		
3	**Civil Site**				
3.1	Chain link fence	127	LF		
3.2	Vehicle Gate	2	EA		
3.3	Site water	1	LS		
3.4	Junction box access hatch, double door with safety grates (5'-6" x 4-6")	1	EA		
3.5	Inlet channel access hatch, H20 single door access hatch (4'x4')	1	LS		
3.6	Pavement trench restoration	30	LF		
3.7	Concrete vault and access hatches	1	LS		
4.0	**Piping, Valves, Fittings and Appurtenances**				
4.1	16-inch piping including all fittings (Furnish and Install)	78	LF		
4.2	24-inch piping including all fittings (Furnish and Install)	88	LF		
4.3	90 Degree elbow, 16"	10	EA		
4.4	90 Degree elbow, 24"	4	EA		
4.5	Swing flex check valve, 16"	4	EA		
4.6	Plug valve, 16" (without chain wheel)	4	EA		
4.7	Plug valve, 16" with chain wheel	4	EA		
4.8	Plug valve, 24"	2	EA		
4.9	Plug valve, 8"	1	EA		
4.10	Air Relief Valve	1	EA		
4.11	Flow meter	1	EA		
4.12	Pressure gauge	4	EA		
4.13	Suction bell, 16"	4	EA		
4.14	Eccentric reducer, 16" x 12"	4	EA		

4.15	Tee, 24” x 24” x 24”	2	EA		
4.16	Tee, 24” x 24” x 16”	2	EA		
4.17	Tee, 24” x 24” x 8”	1	EA		
4.18	Dismantling joint, 16”	4	EA		
4.19	Dismantling joint, 24”	3	EA		
4.20	Flexible coupling, 16”	4	EA		
4.21	Restrained flanged coupling adaptor, 16”	4	EA		
4.22	Restrained flanged coupling adaptor, 24”	5	EA		
4.23	Blind flange, 24”	1	EA		
4.24	Steel pipe supports	1	LS		
4.25	Concrete pipe supports	1	LS		
4.26	Testing	1	LS		
5	**Pumps and Related**				
5.1	12” Sewage Pumps, 70 hp	4	EA		
5.2	Concrete pedestal for pumps	4	EA		
5.3	Sump Pump, piping, accessories, and sump grating	1	LS		
5.4	Testing	1	LS		
6	**Miscellaneous Architectural, Structural Civil, Mechanical, and Piping**				
6.1	Double door access hatch with safety grate, cover and frame in control room	4	EA		
6.2	Single door access hatch with safety grate, cover, frame in rack room	4	EA		
6.3	Sluice gates and operators	3	EA		
6.4	Handrailing	1	LS		
6.5	HVAC duct and ventilation system	1	LS		

6.6	Building water	1	LS		
6.7	Building sewer	1	LS		
6.8	Bathroom and shower fixtures	1	LS		
6.9	Emergency eye wash	1	EA		
6.10	1 Ton Monorail and Crane Hoist	1	EA		
6.11	2 Ton Monorail and Crane Hoist	1	EA		
6.12	Swing doors	1	LS		
6.13	Roll up door	1	LS		
6.14	Floor slab infill in control and pump room	1	LS		
6.15	CMU Wall construction in control room	1	LS		
6.16	CMU Wall construction and infill in storage room #2	1	LS		
6.17	HVAC ducting and ventilation system	1	LS		
6.18	Concrete minor repairs, waterproof sealing	1	LS		
6.19	Swing door system, Type F	5	EA		
6.20	Swing door system, Type FF	2	EA		
6.21	Roll up door system, Type RD	1	EA		
6.22	Concrete stairs	1	LS		
6.23	Start-up and testing for new pump system	1	LS		
6.24	All building and room coating	1	LS		
6.25	Miscellaneous concrete sealing and repairs	1	LS		
7	**Power and Control Systems**				
7.1	Control Panel and Conduit Installation (Furnish and Install)	1	LS		
7.2	Wet well float system	1	LS		
7.3	Generator transfer switch	1	LS		
7.4	Electrical works	1	LS		

7.5	Communication/Instrumentation works	1	LS		
7.6	Relocation of existing power	1	LS		
7.7	Fiber cable and handhole	1	LS		
7.8	Power transformer	1	EA		
7.9	Pump station testing of control systems	1	LS		
8	**Miscellaneous Work Item**				
8.1	All other work items not covered by the other bid items.	1	LS		
Total Base Bid					
Write out total bid amount in words below					

SECTION 22 14 29.16 - SUBMERSIBLE SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submersible sump pumps, controls, and accessories.

1.2 SUBMITTALS

A. Product Data:

1. Pump type and capacity.
2. Certified pump curves showing pump performance characteristics with pump and system operating point plotted, including NPSH curve when applicable.
3. Electrical characteristics and connection requirements.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Manufacturer Reports: Indicate that pumps have been installed according to manufacturer's instructions.

E. Qualifications Statement:

1. Qualifications for manufacturer.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with **three** years' experience.

1.4 WARRANTY

A. Furnish **five**-year manufacturer's warranty for sump pumps.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE SUMP PUMPS

A. Manufacturers:

1. Flygt Ready 4
2. Substitutions: **Permitted**.

B. Description: Portable, submersible, vertical, centrifugal sump pump.

C. Performance and Design Criteria:

1. Design Flow Rate: 35 gpm.
2. Design Total Dynamic Head: 15 feet.
3. Max Particle Size: 0.2 in.

D. Casing:

1. Pump Body: **Cast aluminum**.
2. Stator Housing: Cast aluminum.

E. Impeller:

1. Material: Polyurethane .

F. Strainer:

1. Material: Rubber

G. Shaft Material: **Corrosion-resistant alloy** steel.

H. Bearings: Ball type.

I. Mounting: Rest on sump floor and secured by chain hooked taut to the wall above the sump pump.

J. Operation:

1. Electrical Characteristics: As specified in Section 26 05 03 - Equipment Wiring Connections and following:

a. 0.6 **hp**.
b. Voltage: 230 V, **single** phase, 60 Hz.
c. Rated Circuit Ampacity: 2.7 A.

2. Motor Starter

a. Provide an across the line combination motor starter meeting the requirements of Section 26 29 13 – Motor Controllers.
b. Defer to electrical drawings for NEMA rating and for motor starter controller requirements. The drawings show start/stop level control. Note that the motor

control diagrams show intrinsically safe relaying for the level switches, which shall reside within the motor starter enclosure.

c. Provide complete shop drawings depicting the combination motor starter.

3. Level Switches

a. Defer to electrical and instrumentation drawings for level switches.

4. Coordination

a. During bid and construction, members of the Contractor's organization shall coordinate on details of equipment ratings, motors, motor controllers, conductors, terminations, controls, and overload/overcurrent protection. Coordination shall include defining the source of supply for each element. Regardless of source of supply, submittals for motors and motor controllers shall be coordinated, and include ratings and other details. Coordination shall include the General Contractor, the Electrical Contractor, and Contractors/Suppliers associated with electrical and mechanical equipment.

~~5. Controls:~~

~~a. Control Panel:~~

~~b. NEMA 250 **Type 1**.~~

~~1) Furnish across-the-line electric motor starters with ambient-compensated, quick-trip overloads in each phase and with manual trip and reset buttons, circuit breaker, control transformer, electro-mechanical alternator, HAND-OFF-AUTO selector switches, pilot lights, HIGH LEVEL alarm pilot light, reset button, and alarm horn.~~

~~2) Single point power connection and grounding lug.~~

~~c. Liquid Level Switches:~~

~~1) Manufacturer supplied float switch.~~

~~6. Disconnect Switch: Factory mounted **in control panel**.~~

~~2.2 ACCESSORIES~~

~~A. Cord and Plug:~~

~~1. Oil resistant.~~

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide line-sized **ball** valve, line-sized **soft seated** check valve on pump discharge.

B. Furnish flexible piping between pump discharge and rigid piping anchored to wall per the drawings.

C. Decrease from line size with long-radius reducing elbows or reducers.

D. Support piping adjacent to pump independently of pump casings.

3.2 FIELD QUALITY CONTROL

A. Check, align, and certify alignment of pumps prior to startup.

B. Startup and Performance Testing:

1. Operate pump using clear water for continuous period of 10 minutes in presence of Owner.
2. Verify pump performance by performing time-drawdown test or time-fill test.
3. Check pump and motor for high temperature and excessive vibration.
4. Check for motor overload by taking ampere readings.

3.3 DEMONSTRATION

A. Demonstrate pump startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 221429.16

SECTION 33 01 30.11 - TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipeline flushing and cleaning.
2. Television inspection of sewer pipelines.
3. Audio-video recording of pipeline interior.

1.2 DEFINITIONS

A. Digital Format: Information encoded and stored using digital technology, and can be opened on a computer, tablet, or mobile device.. Digital formats include PDF, DOCX, JPEG, PNG, MP3, WAV, MP4, AVI, MOV, XML.

~~1.3 UNIT PRICES~~

~~A. Television Inspection of Sewers:~~

~~1. Basis of Measurement: By linear **foot**~~
~~2. Basis of Payment: Includes pipeline flushing and cleaning, bypass pumping, television inspection, and audio-video recording of pipeline.~~

1.4 SUBMITTALS

A. Digital Format:

1. **Three** copies of completed narrated color videos identified by Project name, street name, right-of-way property name, and manhole numbers.
2. Digital formats can to be transmitted per GWA's preference (i.e. DVD, USB, download link, etc.)

B. Inspection Logs:

1. Submit cleaning and television inspection logs for each section of sewer line to be rehabilitated.
2. Include following minimum information:

a. Stationing and location of lateral services, wyes, or tees.
b. Date and clock time references.
c. Pipe joints.
d. Infiltration/inflow defects.
e. Cracks.

f. Leaks.
g. Offset joints.

C. Proposed bypass pumping system, including written description of plan addressing schedule, quantity, capacity, and location of pumping equipment.

D. Spill plan to address any spills that might occur.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statement:

1. Qualifications for applicator.

1.5 QUALITY ASSURANCE

A. Perform Work according to GWA standards.

B. Applicator: Company specializing in performing Work of this Section with **three** years' experience.

PART 2 - PRODUCTS

2.1 Digital Format

A. Description: Either digital video formatted discs, universal serial bus, or download links.

B. Audio track containing simultaneously recorded narrative commentary and evaluations of videographer, describing in detail condition of pipeline interior.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify location of sewer pipelines to be inspected.

3.2 PREPARATION

A. Flush and clean pipeline to remove sludge, dirt, sand, stone, grease, and other materials to ensure clear view of interior conditions.

B. Debris:

1. Intercept flushed debris at next downstream manhole using weir or screening device.
2. Remove and dispose of debris off Site.

C. Bypassing:

1. Furnish temporary bypass pumping system around Work area for time required to complete television inspection.
2. Provide standby pump of equal or greater capacity at bypass location.
3. Provide safety precautions, including barricades, lights, and flaggers.

3.3 APPLICATION

A. Closed-Circuit Television (CCTV) Camera System:

1. Use cameras specifically designed and constructed for closed-circuit sewer line inspection.
2. Use camera equipment with pan-and-tilt capability to view each lateral connection at multiple angles.
3. Use camera capable of moving both upstream and downstream with the allowable horizontal distance within one setup and direct-reading cable position meter.

3.4 FIELD QUALITY CONTROL

A. Pipeline Inspection:

1. Audio-video record sections of sewer pipeline between designated manholes.
2. Identify and record locations of flat grades, dips, deflected joints, open joints, broken pipe, protrusions into pipeline, and points of infiltration.
3. Locate and record service connections.
4. Record locations of pipeline defects, connection horizontal distance in feet, and direction from manholes.
5. Video-record with pipe section plugged to view 100 percent of pipe ID.
6. Use flow-control methods as specified for bypass pumping system to eliminate surcharging and to reduce flow.

END OF SECTION 330130.11

SECTION 26 29 13 - MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

B. This Section hereby includes the applicable general requirements of Section 26 05 10, ELECTRICAL.

1.2 WORK INCLUDED

A. This Section covers motor controllers (motor starters).

B. Motor controllers are typically installed in motor control center equipment. For motor controllers shown on the Drawings in stand-alone enclosures, refer to Section 26 05 33, RACEWAY AND BOXES, for enclosure requirements.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70, National Electrical Code, NEMA, NETA, and UL, latest editions where applicable standards have been established.

B. Meet the applicable requirements of Section 26 05 10, ELECTRICAL, including the following:

1. Field investigations.

2. O&M manuals.

3. Warranty.

1.4 SUBMITTALS

A. This Section hereby includes the applicable submittal requirements of Section 26 05 10, ELECTRICAL.

B. Each submittal shall be accompanied by a copy of the applicable specifications, with applicable paragraphs annotated as follows:

1. The Contractor shall use checkmarks (✓) by each Specification paragraph, which shall denote full compliance with the paragraph as a whole. If the submittal deviates from the requirements, then the area of deviation shall be underlined and indexed with a number or other unique ID. Passages not underlined are represented by the Contractor as being in

compliance. Accompanying the submittal shall be a detailed written description of the deviations and the records thereof, with the ID's matching those used in the Specification. Failure to include with the submittal a copy of marked-up Specification Section(s), along with justification(s) for any requested deviations to the Specification requirements, shall be cause for rejection of the entire submittal with no further consideration.

C. Each resubmittal shall be accompanied by a pdf copy of the prior submittal review comments, with Contractor comment-by-comment annotations on each individual comment. Each annotation shall clearly indicate compliance, or non-compliance, with sufficient explanation.

PART 2 - PRODUCTS

2.1 GENERAL

A. This Section hereby includes the applicable general product requirements of Section 26 05 10, ELECTRICAL.

2.2 MOTOR CONTROLLERS (MOTOR STARTERS)

A. Provide each motor with a suitable controller and devices that will perform the functions as specified for the respective motors. Controllers shall conform to the applicable requirements of NEMA ICS, the NEC, and UL. Provide suitable laminated phenolic nameplates for each starter cubicle or enclosure, with blank nameplates for empty or spare units, unless designated otherwise on the Drawings. Refer to Section 26 05 53, ELECTRICAL IDENTIFICATION, for additional labeling requirements.

B. Motor horsepower ratings and enclosures shown are what is expected. This information is for guidance only and does not limit the equipment size.

1. When motors furnished differ from the expected ratings and inrush current, make the necessary adjustments to wiring, conduit, disconnects, motor starters, branch circuit protection, and other affected material or equipment to accommodate the motors actually installed, at no additional cost to the Owner.

2. Provide motor short-circuit and ground-fault protection as required by the National Electrical Code for the nameplate rating and actual inrush current of the motors actually provided.

C. Motor starters shall be of NEMA standard ratings, except none shall be smaller than Size 1, unless otherwise indicated. Contactors shall be standard NEMA-rated sizes.

D. When included in a motor control center assembly, each motor control unit and feeder tap unit shall be stab connected, except where impracticable, due to size or weight of the unit. Each shall be in an individual compartment isolated by steel barriers, shall be front wired, and shall have pull-apart terminal blocks for control wiring. Provide defeater mechanism for door interlocks.

~~E. Motor control centers are to be configured with networked interfaces. See Section 26 24 19, MOTOR CONTROL CENTERS.~~

F. Terminal blocks shall have covers to prevent contact with energized parts and shall be permanently marked with the same terminal and wire numbers as shown on the control schematics (elementary diagrams) and wiring diagrams. Identify each control conductor at both ends. Each disconnecting device shall have barriers over the lugs on the line side.

G. Motor circuit protectors (MCP's) in combination starters shall meet the applicable requirements of NEMA AB 1 and UL 489; shall be molded case, magnetic trip only; shall be lockable in the open position; and shall have interrupting current ratings required for the application. Each magnetic trip only circuit breaker shall have an adjustable trip range which at least covers the range from 800% to 1,300% of motor full-load current.

H. Circuit breakers in motor controllers shall be Eaton HMCP, or equal.

I. Full-voltage magnetic starters shall meet the requirements of NEMA ICS Class A~~, with the rating and enclosure shown~~. Standalone combination motor starters shall be furnished with NEMA-rated enclosures as shown on the drawings, including lockable external disconnect, and motor control provisions as shown one the drawings and as required. Contactors used shall be standard NEMA-rated sizes.

J. Motor controllers/starters, including the MCP's in combination starters, shall be Eaton with Eaton PowerXpert C445 Intelligent Motor Management Relay, or equal.

K. Manual motor starters shall be rated for the intended use, except rating shall be 1 horsepower, minimum. They shall provide thermal overload protection for all ungrounded phases, and shall have provision for locking in the OFF position. Manual motor starters shall meet the requirements of NEMA ICS. Include an ON indicating light when so noted on the Drawings. Provide suitable NEMA-rated enclosures or mount in panels as indicated.

2.3 SOLID-STATE REDUCED-VOLTAGE MOTOR STARTERS (SSRVS)

A. Provide SSRVS's as specified herein and as shown on the Drawings.

B. SSRV's shall be an integrated package, including SCR's, bypass contactor, motor overload protection, 120-volt control power transformer, and controls and monitoring as required.

C. Solid-state motor controllers shall be of solid-state design with soft-start capabilities, and shall have ambient temperature rating of 50 degrees C. A bypass contactor shall be provided which will carry motor full-load current when the motor reaches operating speed. The controller shall be designed such that the bypass contactor neither starts the motor nor interrupts motor current on shutdown.

D. As a minimum, the SSRVS shall include three selectable starting modes:

1. Ramp start, with adjustable initial torque setting and adjustable ramp time.

2. Current limit start, with adjustable current limit and adjustable ramp time.

3. Pump control option, with special adjustable parameters for starting and stopping the motor in a centrifugal pump system.

E. As an acceptable alternative to the starting modes above, the SSRVS may have voltage ramps as described below:

1. The initial voltage ramp, which lasts for five cycles, brings the motor voltage from 0 to preset initial pedestal voltage (10% to 90%).

2. The acceleration ramp, which increases the motor voltage from the preselected initial voltage to 100% voltage over the selected acceleration time period.

3. The fast ramp, which brings the motor voltage to 100% if the motor reaches full speed before the end of the acceleration ramp.

F. The motor starting current may be limited. Minimum adjustable current range shall be 100% to 600% of the motor full-load current.

G. Motor overload protection shall protect the motor from overheating under all operating conditions, including low speed (low ventilation) operation when motor current may be less than motor rated current. Adjustment range shall be at least 30% to 100% of the maximum continuous rating of the starter.

H. The bypass contactor shall be fully rated and shall close at the end of the starting cycle to bypass the SCR's. SCR firing shall be suspended while bypass contactor is closed.

I. Continuous output rating of each SSRVS shall be not less than 115% of the full-load rating of the driven motor.

J. The starter shall have a maximum motor current setting that can be adjusted. Minimum adjustment range shall be 40% to 120% of the starter frame size.

K. The SSRVS shall have a 30-second rating not less than 300% of the starter frame size.

L. The SSRVS shall be capable of starting a motor using a 30-second ramp time up to five times an hour when the starting current is 300% of the motor full-load current rating.

M. As a minimum, the following protective functions shall be provided. Error codes shall be stored in memory.

1. Current limit: 100% to 700% of motor full-load current.

2. Overload (I^2t): Selectable for NEMA Class 5, 10, 20, or 30.

3. Loss of input phase.

4. 50% current differential between any two phases.

5. Thyristor short circuit.

6. Heat sink overheating.

7. Loss of output phase.

8. Stalled rotor.

9. CPU error.

N. SSRVS's shall be Eaton Type S811, Allen-Bradley SMC-Plus Series with pump control option, General Electric GE ASTAT-IBP, or equal.

2.4 ELAPSED TIME METERS (ETM)

A. Elapsed time meters shall be panel mounted, synchronous motor driven, 6-digit (including tenths of an hour), non-resettable, Eaton, or equal.

2.5 CONTROL POWER TRANSFORMERS

A. Provide control power transformers as shown on the Drawings or as otherwise required. Control power transformers shall be sized for the connected load.

2.6 MOTOR OVERLOAD RELAYS

A. Provide electronic intelligent overload relays in motor controllers as specified herein and as shown on the Drawings.

B. Overload relays shall include the following features:

1. Selectable Trip Class: Class 5 to Class 40

2. Thermal overload protection. Adjust for the actual motors when exact nameplate data are available.

3. On-board I/O
   a. 4 digital inputs: 120Vac or 24Vdc
   b. 3 relay outputs: 2 NO, 1 NO/NC

4. Optional External Expansion I/O

5. Logic engine, allowing for programming local logic

6. On-board communications
   a. Ethernet/IP
   b. Modbus TCP
   c. Modbus RTU
   d. Web pages
   e. USB

7. Realtime clock and backup non-volatile memory

8. Ground fault detection
   a. Pulse detection
   b. Zero sequencing
   c. High resistance ground

C. UL Certified

D. The overload relays shall be Eaton PowerXpert C445 Intelligent Motor Management relays, or Schneider Tesys T overload relays, no equal.

PART 3 - EXECUTION

3.1 GENERAL

A. This Section hereby includes the applicable general execution requirements of Section 26 05 10, ELECTRICAL, including the following:

1. Protection during construction

2. Equipment installation

B. During bid and construction, members of the Contractor's organization shall coordinate on details of equipment ratings, motors, motor controllers, conductors, terminations, controls, and overload/overcurrent protection. Coordination shall include defining the source of supply for each element. Regardless of source of supply, submittals for motors and motor controllers shall be coordinated, and include ratings and other details. Coordination shall include the General Contractor, the Electrical Contractor, and Contractors/Suppliers associated with electrical and mechanical equipment.

3.2 TESTING

A. Installation, start-up, and testing shall be coordinated project-wide. Meet the requirements of Section 26 05 10, ELECTRICAL.

B. Provide testing and test reports as listed below and as required elsewhere in this Section.

1. Products specified in this Section shall be completely assembled, wired, adjusted, and tested at the factory. All tests shall be in accordance with the latest version of UL, NETA-ATS, and NEMA standards. After assembly, the complete assembly will be tested for operation under simulated service conditions to assure the accuracy of the wiring and the functioning of all equipment. The main circuits shall be given a dielectric test of 2,200 volts for 1 minute between live parts and ground, and between opposite polarities. The wiring and control circuits shall be given a dielectric test of 1,500 volts for 1 minute between live parts and ground. (Note: SPD's shall be disconnected during this test.)

2. The manufacturer shall provide three certified copies of factory test reports.

3. A certified test report of all standard production tests shall be available to the Engineer upon request.

C. Provide Unwitnessed Factory Test (UFT) for the items specified in this Section.

D. Incorporate the items specified in this Section into the Operational Readiness Test (ORT) and the Functional Acceptance Test (FAT). Coordinate testing with testing of other systems and equipment.

END OF SECTION 26 19 13

SECTION 33 31 23 - SANITARY SEWERAGE FORCE MAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Force mains (buried)
2. Bedding and cover materials.

B. Related Requirements:

1. Section 033000 - Cast-in-Place Concrete: Concrete material requirements.
2. Section 310513 - Soils for Earthwork: Soil backfill from above pipe to finish grade.
3. Section 310516 - Aggregates for Earthwork: Aggregate for pipe bedding and cover.
4. Section 312316.13 - Trenching: Excavation, backfilling, compacting, and fill over underground pipe markers.
5. Section 312323 - Fill: Requirements for fill over underground pipe markers.
6. Section 330505.31 - Hydrostatic Testing: Pressure testing of completed force mains.
7. Section 330509.33 - Thrust Restraint for Utility Piping: Thrust restraints as required by this Section.
8. Section 330561 - Concrete Manholes: Connection to sanitary sewerage system.
9. Section 330573 - Polyethylene Manholes: Connection to sanitary sewerage system.
10. Section 330576 - Fiberglass Manholes: Connection to sanitary sewerage system.
11. Section 330597 - Identification and Signage for Utilities: Pipe markers.

~~1.2 UNIT PRICE - MEASUREMENT AND PAYMENT~~

~~A. Section 012000 - Price and Payment Procedures: Contract Sum/Price modification procedures.~~

~~B. Pipe and Fittings:~~

~~1. Basis of Measurement: By linear **foot** .~~
~~2. Basis of Payment: Includes excavation, backfill, bedding, thrust restraints, pipe and fittings , and appurtenances.~~

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
5. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.

C. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).
3. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
4. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
5. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
6. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with connection to existing **municipal sewer utility service**.

1.5 PREINSTALLATION MEETINGS

A. Section 013000 - Administrative Requirements: Requirements for preinstallation meeting.

B. Convene minimum **two weeks** prior to commencing Work of this Section.

1.6 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information indicating pipe material used, pipe accessories, valves**, and restrained joint details and materials**.

C. Shop Drawings:

1. Indicate piping piece numbers and locations.
2. Indicate restrained joint locations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for restrained joints, including establishing lengths of restrained joint piping required.

F. Manufacturer Instructions: Submit special procedures required to install specified products.

G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

H. Qualifications Statement:

1. Submit qualifications for manufacturer, installer, and licensed professional.

I. Product Cost Data:

1. Submit cost of products to verify compliance with Project design requirements.
2. Exclude cost of labor and equipment to install products.

1.7 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record **invert** elevations and actual locations of pipe runs and connections.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

A. Perform Work according to GWA section 01 40 00 – Quality Requirements.

B. Maintain one **copy** of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum **three** years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum **three** years' **documented** experience.

C. Licensed Professional: **Professional engineer** experienced in design of specified Work and licensed **in the territory of Guam.**

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Do not place materials on private property without written permission of property owner.
3. Do not stack pipe higher than recommended by pipe manufacturer.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Store gaskets for mechanical and push-on joints in cool and dry location, out of direct sunlight, and not in contact with petroleum products.
3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 FORCE MAIN

A. Ductile-Iron Pipe:

1. Comply with AWWA C151.
2. Standard cement-mortar lining, according to AWWA C104, and outside coating.
3. Pressure Classes:
   a. Sizes 14 to 20 Inches: **250** psig.
   b. Size 24 Inches: **250** psig.

B. Ductile-Iron Fittings:

1. Comply with AWWA C110.
2. Pressure Rating: **250**psig.
3. Cement mortar lined, according to AWWA C104, and outside coated.

C. Joints:

1. Comply with AWWA C111.
2. Type: **Mechanical** restrained
3. Type: **Flanged** (in vaults)

D. Rubber Gaskets, Lubricants, Glands, Bolts, and Nuts: Comply with AWWA C111.

2.2 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill Type **A6**, as specified in Section **310516 - Aggregates for Earthwork.**
2. Cover: Fill Type **A1,** as specified in Section **310516 - Aggregates for Earthwork**.
3. Soil Backfill from above Pipe to Finish Grade: Soil Type **S1** Section **310513 - Soils for Earthwork**
4. Subsoil: No rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.3 MIXES

A. Concrete: As specified in Section 033000 - Cast-in-Place Concrete.

2.4 ACCESSORIES

A. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that **trench cut** is ready to receive Work.

C. Verify that excavations, dimensions, and elevations are as indicated on **Shop Drawings**.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Correct over-excavation with **fine aggregate**.

C. Remove large stones or other hard matter capable of damaging pipe or of impeding consistent backfilling or compaction.

3.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in Section **312316.13 – Trenching**.
2. Place bedding material at trench bottom.

3. Level materials in continuous layers not exceeding **8**inches Maintain optimum moisture content of bedding material to attain required compaction density.

B. Piping:

1. Install pipe, fittings, and accessories as indicated on **Drawings**.
2. Route piping in straight line.
3. Install bedding at sides and over top of pipe to minimum compacted thickness of **12** inches.
4. Backfilling and Compacting:

   a. As specified in Section [=**312316.13 - Trenching**.
   b. Do not displace or damage pipe while compacting.

5. Connect to **municipal sewer system**.
6. Pipe Markers:
   a. Install detectable ribbon tape and trace wire continuous buried 18 inches below finish grade, and over top of pipe, respectively.
   b. Coordinate with trench Work as specified in Section 312316.13 - Trenching.

C. Thrust Restraints:

1. Provide pressure pipeline with restrained joints or concrete thrust blocking at pumps, bends, tees, and changes in direction.

D. Cradles and Encasements: Provide concrete cradles and encasements for pipelines **where indicated on Drawings and** as specified in Section 033000 - Cast-in-Place Concrete.

3.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Section 017000 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

C. Inspections: Request inspection by **Engineer** prior to **and immediately after** placing bedding.

D. Pressure Testing:

1. Pressure:

   a. Not less than 100 psig or 1.5 times the working pressure , whichever is greater.
   b. Conduct hydrostatic testing for at least 2 hours
   c. Maintain pressure within plus or minus 5 psi of test pressure.
2. Initial Procedure:

   a. Install corporation cocks at high points.
   b. Slowly fill section to be tested with water, expelling air from piping at high points from air vents and by opening corporation cocks.
   c. Close air vents and corporation cocks after air is expelled.
   d. Raise pressure to specified test pressure.

3. Testing:

   a. Observe joints, fittings, and valves under test.
   b. Remove and replace cracked pipes, joints, fittings, and valves showing visible leakage.
   c. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.

4. Leakage:

   a. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
   b. Maximum Allowable Leakage:

      1) L = SD x sqrt(P)/C.
      2) L = testing allowance, gph.
      3) S = length of pipe tested, feet.
      4) D = nominal diameter of pipe, inches.
      5) P = average test pressure during hydrostatic test, psig.
      6) C = 148,000.

   c. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.
   d. If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
   e. Correct visible leaks regardless of quantity of leakage.

E. Compaction Testing:

1. Comply with **ASTM D1557**.
   a. Testing Frequency: One set of two (2) tests per 100 L.F. of trench per lift when under roadways pavement or structures and one set of one (1) tests per 100 L.F. of trench per lift in other areas, for each trench typ.

3.5 PROTECTION

A. Section 017000 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 333123

SECTION 33 32 11 WASTEWATER PUMPS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The work in this section shall include furnishing and placing into operation four (4) vertically dry-pit mounted submersible wastewater pumps with integral motor cooling system, as specified herein and as indicated on the drawings.

B. Also included is pump and motor protection, including Panel CP-2.

1.2 RELATED SECTIONS

A. Section 09 90 00 – Paints and Coating

B. Section 33 31 23.00 - Sanitary Sewerage Force Main Piping

C. Section 40 23 36- Sanitary Water Process Piping

D. Section 26 29 13 Motor Controllers

E. Section 40 61 90 Control Descriptions

F. Section 40 67 90 Interface Drawings

G. Section 40 70 20 Instrument and Control Components

1.3 REFERENCES

A. American Society for testing and material (ASTM) International
   1. A 48: Standard Specification for Gray Iron Castings.
   2. A743: Standard Specification Iron-Chromium Nickel, Corrosion Resistant,

B: American National Standards Institute (ANSI):
   1. B16.1: Standard for Cast Iron Pipe Flanges and Flanged Fittings, 125 lb.

C. Hydraulic Institute: Current Standards.
   1. HI 14.6: Hydrodynamic Pumps for Hydraulic Performance Acceptance Tests.
   2. HI 11.6: Submersible Pump Tests

1.4 SUBMITTALS

A. Provide in accordance with Section 01 33 00. Submittals shall include but no be limited to the following:
   1. Dimensional and installation drawings
   2. Pump performance curves
   3. Electrical motor data
   4. Installation and operation manual
   5. Printed warranty

6. Management system certificate ISO 9001
7. Bill of Material (BOM)
8. Manufacturer’s standard recommended start-up report form
9. Shop drawings for motor protection Panel CP-2, meeting the requirements of Section 40 67 10, CONTROL PANELS.
10. Contributions to test procedures specified in Section 40 61 21, CONTROL SYSTEM TESTING

B. Performance Testing: Submit certified non-witnessed factory performance test results. Receive favorable review of test results prior to shipping the equipment.

C. Manuals: Furnish manufacturer's installation, lubrication, operation and maintenance manuals, bulletins, and spare parts lists.

D. Affidavits: Submit affidavit from the manufacturer stating that the equipment has been properly installed, adjusted, and tested and is ready for full time operation.

1.5 QUALIFICATION REQUIREMENTS

A. The manufacturer shall provide data on alternate equipment manufacturer's experience. Only Manufacturers with 20 or more years of experience who have furnished at least 5 similar lift stations and having factory certified representative and repair facility within 300 miles of project site shall be considered.

B. After installation, a pump station start-up shall be performed by the installing contractor under the supervision of the manufacture’s authorized representative. Minimum of 8 hours of field service shall be provided by an authorized, factory trained representative of the pump manufacturer. Services shall include, but not be limited to, inspection of the completed pump station installation to ensure that it has been performed in accordance with the manufacturer’s instructions and recommendations, supervision of all field-testing and activation of the Pump Manufacturer’s Warranty. The test shall demonstrate to the satisfaction of the Owner that the equipment meets all specified performance criteria, is properly installed and anchored, and operates smoothly without exceeding the full load amperage rating of the motor. The Contractor shall be responsible for coordinating the required field services with the Pump Manufacturer.

C. The factory start up form shall be submitted for approval prior to start up and approved by the Engineer/Owner. The Engineer/Owner, at their discretion, may add items to be completed at the start up that they feel proves compliance with all project requirements and will notify the Contractor of these items prior to start up. The factory start up form must be signed after completion and retained for records.

1.6 DELIVERY, STORAGE, AND HANDLING

A. All equipment shall be factory assembled, crated and delivered, to protect against damage during shipment.

B. All exposed flanges shall be covered and sealed with shrink-wrap to prevent the entrance of moisture. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

C. All equipment delivered to the site shall be stored as specified in accordance with the manufacturer's instructions.

1.7 OPERATIONAL REQUIREMENTS AND WARRANTY

A. The lift station shall be equipped with four (4) vertical dry mounted submersible wastewater pumps with integral motor cooling system. The pump configuration shall include four (4) 70 HP pumps.

B. The impeller shall also be a semi open multi vane self-cleaning impeller designed to transport wastewater with fibrous materials like wet wipes.

C. The impeller shall be made of high chromium cast iron with at least 24% chrome against sand and grit which may be expected to enter the pump station. Impellers that have surface hardening (by thermal, coating, etc.) will not be allowed.

D. The pumps shall be provided with prorated 60 months (5 years) warranty against defects in materials and or workmanship. Unless otherwise specified, all other equipment shall be warrantied for 12 months (1 year). Upon warranty occurrence, the manufacturer's authorized service center shall remove the pump, repair, reinstall and provide start up on the repaired pump. A detailed failure analysis shall be submitted to the Owner for their records summarizing corrective action taken.

E. The manufacturer shall guarantee clog-free operation for a period of 12 months from the date of start-up of the pumps by the local authorized factory representative. A certificate shall be provided to the Owner on the day of start up with the local contact information and effective date. If the impeller clogs with typical solids or modern trash debris normally found in domestic wastewater during this period, an authorized representative shall travel to the jobsite, remove the pump, clear the obstruction and reinstall the pump at no cost for the Owner. A written report shall be provided to the Owner detailing the service call with pictures for verification purposes.

PART 2 PRODUCTS

2.1 SUBMERSIBLE SEWAGE PUMPS FOR VERTICAL DRY INSTALLATION

A. Pump Specific Requirements
   a. The pump shall be equipped with a 70 HP submersible electric motor, capable to operate on a 460 volt, 3 phases, 60 hertz voltage supply.
   b. The discharge flange of the pump shall be 12-inch and suction flange shall be 16-inch. Both shall be drilled according ANSI pattern.
   c. The pump shall be capable of operating without any limitation between 50% and 125% of the Best efficiency point (B.E.P) of the performance curve.
   d. Required Duty Points:

Minimum Flow (GPM)	Maximum Head (FT)	Minimum Hydraulic Efficiency (%)	Maximum NPSH Required (FT)
5,000	52	-	-

8,333 (Design Point, 2 Pumps Running)	41	78	13
11,000	26	-	-

B. Submersible sewage pumps for vertical dry installation shall be manufactured by Flygt or approved equal.

C. The hydraulic of the pump shall be capable of handling raw domestic wastewater with fibrous materials like wet wipes.

D. The impeller blades shall be self-cleaning upon each rotation as they pass across a sharp relief groove in the Insert ring and shall keep the impeller blades clear of debris.

E. Due to the presence of sand the impeller shall be made of high chromium cast iron with at least 24% chrome. Impellers that have surface hardening or coating will not be allowed.

F. The motor of the pump shall be induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. It shall be submersible according to standard IEC 60034 and protection class IP 68. It shall continue to operate satisfactorily even when the station is subjected to a flooding and the motor is permanently submerged. up to a depth of 65 feet. Motors which only can be submerged for a limited time (IP 67) shall not be considered as equal.

G. The motor shall be capable to operate the pump at continuous condition in an ambient temperature up to 104°F. Operational restrictions or the demand of auxiliary cooling systems like fans or blowers are not acceptable.

H. Stator shall be insulated with class H trickle impregnated insulation rated at 356°F.

I. The junction chamber containing the terminal board shall be hermetically sealed from the motor by an elastomeric compression seal. Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board.

J. The motor shall be protected by the following sensors:

- 3 bi-metal Thermal switches for thermal control of the stator
- 1 PT 100 thermal sensor (RTD) to monitor the stator temperature of 1 Winding
- 1 PT 100 thermal sensor (RTD) to monitor the temperature of the main bearing
- 1 Vibration sensor to monitor vibration on 3 axes from 10 – 600 Hz.
- 1 float switch in leakage chamber to monitor leakage in the leakage chamber.
- 1 float switch in the terminal connection housing to monitor any leakage thru the cables and the cable entries.

The sensors shall be integrated with the manufacturer's provided Pump Protection Panel.

K. The motor shall be capable of no fewer than 15 evenly spaced starts per hour and be able to operate throughout the entire pump performance curve from shut-off through run-out.

L. The volute shall have conveniently located drain and air inlet ports to aid with inspection and or maintenance operations.

M. The impeller shall be mounted on the motor shaft. Couplings or gear boxes shall not be accepted.

N. The motor shall be provided with an integral motor cooling system. A stainless steel cooling jacket shall encircle the stator housing.

O. The cable entry shall consist of dual cylindrical elastomer sleeves, flanked by washers, all having a close tolerance fit against the cable and the cable entry. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable. The shaft shall be sealed by two mechanical seals, each having an independent spring system. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counterclockwise direction of rotation without damage or loss of seal function.

P. Motor and Pump shall be produced and supplied by the pump manufacturer.

Q. The pump shaft shall rotate on at least three grease-lubricated bearings. The upper bearing, provided for radial forces, shall be a single roller bearing. The lower bearings shall consist of at least one roller bearing for radial forces and one or two angular contact ball bearings for axial thrust. The minimum L10 bearing life shall be 100,000 hours at any point along the usable portion of the pump curve at maximum product speed. The lower bearing housing shall include an independent thermal sensor to monitor the bearing temperature. If a high temperature occurs, the sensor shall activate an alarm and shut the pump down.

R. The shaft seal shall be a positively driven dual, tandem mechanical shaft seal system consisting of two seals, each having an independent spring system. The seal is in a separate lubricant chamber and is lubricated and cooled by environmental friendly medical white oil. The lubricant chamber shall be designed to prevent over-filling and shall provide capacity for lubricant expansion. It shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal function. The rotating inner seal ring shall have small back-swept grooves laser inscribed upon its face to act as a micro pump as it rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber. Shaft seals without positively driven tandem mechanical seal or conventional double mechanical seals that are either carried out with a common single or double spring are not accepted. Any leakage passing the sealing shall not pass the bearings. Before it reaches the bearings the liquid shall create an alarm via the floating leakage sensor. Where a seal cavity is present in the seal chamber, the area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

S. The Materials of construction shall be as follows:
   1. Pump housing: ASTM A-48, Class 35B
   2. Cooling jacket: Stainless steel AISI 316
   3. Impeller and insert ring: A 532 ALLOY III A (25% chrome)
   4. Stator housing: ASTM A-48, Class 35B

5. Shaft: ASTM A479 S43100-T.
6. Shaft seal: Pump side: - Corrosion resistant Tungsten carbide WCCR
7. Shaft seal Motor side: - Corrosion resistant Tungsten carbide WCCR

T. All castings must be blasted before coating. All wet surfaces are to be coated with two-pack oxyrane ester Duasolid 50. The total layer thickness should be at least 120 microns. Zink dust primer shall not be used.

U. The motor shall be equipped with screened cable suitable for submersible pump applications. Minimum lengths required per pump are listed below. Contractor shall field verify prior to ordering. Provide a minimum of 5 feet extra cable length for each pump. The power cable shall be sized according to NEC and ICEA standards. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.
1. Pump 1: 25 ft
2. Pump 2: 28 ft
3. Pump 3: 41 ft
4. Pump 4: 45 ft

V. Each completed and assembled pump/motor unit shall undergo the following factory tests at the manufacturer's plant prior to shipment. The Manufacturer shall provide on demand a copy of the quality control plan for these tests and an ISO 9001 factory certificate.
1. Minimum 3-point hydraulic performance test according HI 11.6:2012 Grade 2B
2. No-Leak seal integrity test
3. Electrical integrity test

2.2 PUMP PROTECTION PANEL (CP-2)

A. Included with the pump package shall be a motor protection panel, designed, furnished, and tested by the pump supplier.

B. CP-2 shall meet the requirements of Section 40 67 10, CONTROL PANELS. CP-2 shall be NEMA 4X, 316 stainless steel.

C. Provide complete shop drawings.

D. For each pump, provide a Flygt MAS 801 controller, display and appurtenances, for a complete monitoring and protection system. Refer to the drawings for a schematic depiction of key external interfaces. A specific requirement is receiving individual control power inputs from the motor starters.

E. CP-2 signal interfaces with the pump and motor elements shall be configured to be intrinsically safe, since the signals are spliced in the dry well which is a classified location.

F. As an alternative to the intrinsic requirement above, the signal conductors could be routed in a continuous cable unique from the power conductors, to eliminate terminations in the splice box. Should this alternative be chosen by the pump supplier, perform all coordination, furnish and install all required provisions, and as built the result.

G. Meet all requirements for startup and testing specified in Section 40 61 21, CONTROL SYSTEM TESTING. This includes, but is not limited to, factory testing.

H. Following startup and testing, furnish complete as-built documentation. For configuration parameters, provide a comprehensive listing, and electronic file, to allow for recovery in the event of a later component failure.

2.3 EQUIPMENT FOR INSTALLATION

A. For each pump the contractor shall supply and install a discharge connection made of cast iron ASTM A-48, Class 35B.

B. The outlet flange of the discharge connection shall be **12"** drilled according ANSI B16.1-89; tab.5.

C. The sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal contact. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be accepted. The entire weight of the pump/motor unit shall be borne by the pump discharge elbow. No portion of the pump/motor unit shall bear on the sump floor directly or on a sump floor mounted stand.

2.4 CABLE SPLICE BOX

A. The drawings show a splice box for termination of pump cables, including power and signal conductors.

B. The General Contractor shall determine which member(s) of the Contractor's organization are responsible for design, furnishing, and installing the box. Regardless of the assignments, the pump supplier shall provide recommendations on the design of the box, with those recommendations being included in pump submittals early in the project.

C. The box shall be sized for the initial installation and for the possible ultimate increase in pump size(s) to 100hp. (100hp power conductors are physically larger.)

D. The box shall include terminals for the signal conductors, with layout to segregate signal types and electric power. Consideration shall be given to minimize electrical noise.

E. The box shall include cable suspension and strain relief provisions, and suitable protection at cable points of entry.

F. Power terminations within the box shall be made with fixed terminals, Polaris or equal splice blocks.

G. The box shall be NEMA 4X, 316 stainless steel.

PART 3 EXECUTION

3.1 GENERAL

A. Perform installation in accordance with Contract Documents and manufacturer's specifications.

3.2 EXAMINATION

A. A factory trained technician shall examine the work area prior to beginning work and check the following:

1. The environment is safe to begin working in
2. All surfaces are ready to receive work
3. All tools are in the proper location and are in good condition
4. Grounding of the system

3.3 COORDINATION

A. During bid and during construction, members of the Contractor's organization shall coordinate on details of equipment ratings, motors, motor controllers, conductors, terminations, controls, and overload/overcurrent protection. Coordination shall include defining the source of supply for each element. Regardless of source of supply, submittals for motors and motor controllers shall be coordinated, and provide details including ratings. Coordination shall include the General Contractor, the Electrical Contractor, and Contractors/Suppliers associated with electrical and mechanical equipment.

B. The pump supplier shall participate as described above. In addition, the pump supplier shall coordinate with the Electrical Contractor on cable tray layout, splice box layout, and conductor routing and lengths, including cables furnished with the pumps. For power and signal interconnection between the motor splice box and CP-2, coordinate conductor types and counts, and provide those recommendations in the pump submittal for review, and for use by the Electrical Contractor.

3.4 FIELD QUALITY CONTROL

A. The follow field tests shall be performed by a factory trained technician

1. Point to point wiring verification
2. Utility power verification
3. Site acceptance testing
4. System demonstration

B. Point to Point I/O Verification

1. After installation of the pumps and the control panel, a factory trained technician shall prepare the I/O checklist. The checklist shall include the following:
    a. All inputs and outputs connected to the control panel
    b. All alarms that can be generated by the control panel
2. The technician shall follow a test procedure to test all I/O and alarms.
    a. All digital inputs shall be tested from point of origin unless it is unsafe.
    b. All digital outputs shall be tested by running a simulation test from the controller or by simulating the fault condition.
    c. All analog inputs shall be tested from the point of origin where possible and by use of a signal generator otherwise.
    d. All analog outputs shall be tested by running a simulation program or by forcing the output to a value.

3. The technician shall follow a test procedure to ensure the system operation parameters are met.

C. Configuration Verification

1. The factory trained technician shall document the settings using a factory provided configuration checklist. Each parameter shall be verified prior to the beginning of testing and then again after testing is completed.
2. The configuration of the pump station manager as well as the IPS gateways shall be documented.
3. The pump station manager configuration shall be saved to a factory provided SD card after testing is completed.

D. Operation Verification

4. Test and demonstrate to the Engineer that all equipment operates properly and specified performance has been attained. For pumps, include measurement of suction and discharge pressure at the pump and measurement of pumping rate by volumetric means or through a suitably calibrated meter for two points on the performance curve. Furnish any test equipment or measuring devices required which are not part of the permanent installation.
5. In addition, demonstrate that the entire facility is in full operating condition prior to the acceptance of the work. Should any equipment or part thereof fail to operate as intended, immediately remove and replace it, all at the Contractor's expense, and pay for all tests involved in this Section.
6. Pressure test equipment and connections thereto as required by these Specifications

3.5 FACTORY TRAINED SUPERVISION

A. The contractor shall procure a factory trained technician to check over equipment prior to putting the equipment into operation.

B. Point to point test of all wiring.

C. Functional test of all equipment alarms and controls.

3.6 CERTIFICATION OF TESTING

A. All tests shall be performed in the presence of a duly authorized representative of the Owner. If the presence is waived, certified results shall be provided by the Contractor.

B. Written notice of all tests shall be given two weeks in advance.

3.7 TEST EQUIPMENT

A. All test equipment shall be provided by the Contractor.

3.8 CONTROL SYSTEM TESTING

A. The components and systems covered by this Section shall be included in control system testing. Section 40 61 21, CONTROL SYSTEMS TESTING.

B. Meet all applicable requirements.

3.9 TRAINING

A. Training shall be a minimum of four (4) hours and cover the complete pumping system and related controls.
B. Instruction material shall be provided for four (4) trainees.

3.10 ANNUAL PREVENTATIVE MAINTENANCE AGREEMENT

A. In addition to the pumps, the supplier shall provide a minimum two-year preventative maintenance agreement that includes a minimum of one site visit per year with a multi-point pump inspection performed by manufacturer certified and manufacturer trained technician(s) within 24 months of installation.
B. The multi-point inspection shall include visual and functional inspections of all pumps and control panels; oil inspection and oil change of pumps; pertinent physical and electrical data to reasonably expect prolonged equipment operation for a year of additional service.
C. The Owner shall be provided a copy of a summarized report at the conclusion of the multi-point inspection.

END OF SECTION