GUAM WATERWORKS AUTHORITY
Gloria B. Nelson Public Service Building | 688 Route 15, Mangilao, Guam 96913
P.O. Box 3010, Hagåtña, Guam 96932
Tel. No. (671) 300-6846/48 Fax No. (671) 648-3290

Invitation For Bid:	IFB-05-ENG-2026
Project:	Ypao and Mamajanao Wastewater Pump Station Rehabilitation, GWA Project No. 22607
Addendum No.:	**01**
Date:	May 15, 2026

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. The following sheets of the Conceptual Drawings supersede all previously issued drawings. The drawings were revised to correct inconsistencies.

   YPAO DRAWINGS
   - G-20 Building Code Analysis Summary - Ypao - Sheet revised to black and white.
   - G-21 Life Safety Plan - Ypao - Sheet revised to black and white.
   - C-01 Site Demolition Plan - Added callouts.
   - C-02 Site Plan - Revised callouts. Added swing gate.
   - C-03 Utility Plan - Revised callouts. Deleted old fenceline.
   - C-04 Construction Sequencing And Bypass Plan - Revised sequence of operations.
   - W-01 Notes, Legend, And Symbols – Revised callout.
   - W-02 Pump, Piping, And Valve Schedules - Revised callout.
   - W-03 Demolition Plan - Ground Level - Revised callout.
   - W-04 Demolition Plan - Intermediate Level - Revised callout.
   - W-08 Piping Plan - Intermediate Level - Revised callout.
   - W-10 Basement Piping Sections - Revised callout.
   - E-02 Electrical Site Plan - Revised GPA service.
   - E-04 Ground Level - Electrical Plans - Shifted door.

   MAMAJANAO DRAWINGS
   - G-10 Building Code Analysis Summary - Mamajanao - Sheet revised to black and white.
   - G-11 Life Safety Plan - Mamajanao - Sheet revised to black and white.
   - C-01 Site Demolition Plan - Added demolition of electrical equipment
   - C-02 Site Plan - New electrical equipment. Revised concrete pad. Added bypass vault.
   - C-03 Utility Plan - Added swing gates. Added bypass vault. Relocated water meter and backflow preventer.
   - C-04 Construction Sequencing And Bypass Plan - Revised fence. Added manhole and wye. Added bypass vault.
   - A-06 Mamajanao - Ground Level - Sheet revised to black and white.
   - A-07 Mamajanao - Roof Plans - Sheet revised to black and white.

- A-11 Mamajanao - Sections - Sheet revised to black and white.
- S-13 Ground Level Plan - Revised callout.
- S-31 Section A - Revised callout.
- S-33 Section C - Revised callout.
- S-51 Structural Detail - 1 - Added detail.
- W-01 Notes, Legend, And Symbols - Revised callout.
- W-02 Pump, Piping, And Valve Schedules - Revised tables.
- W-03 Demolition Plan - Ground Level - Revised callout.
- W-04 Demolition Plan - Intermediate Level - Revised callout.
- W-07 Piping Plan - Ground Level - Revised callout.
- W-08 Piping Plan - Intermediate Level - Revised callout.
- W-09 Piping Plan - Basement Level - Revised Callout
- W-10 Basement Piping Sections - Revised Callout
- H-06 Basement Hvac Ductwork Plan - Revised Duct
- E-02 Electrical Site Plan - Revised GPA service
- E-04 Ground Level - Electrical Plans - Revised F.O.
- E-10 Single Line Diagram - Revised pump HP
- E-15 Conduit Schedule - Revised pump HP

2. The following sheets of the Specifications supersede all previously issued Specifications. The Specifications were updated as such:

   YPAO SPECIFICATIONS
   - Delete Specification Section 22 42 16.16 Commercial Sinks in its entirety and replace with the attached Specification Section 22 42 16.16 Commercial Sinks
   - Added new Specification Section 40 91 00 Primary Process Measurement Devices.
   - Delete Specification Section 43 21 00.06 Dry Pit Submersible Solids Handling Pumps and Appurtenances and replace with the attached Specification Section 43 21 00.06 Dry Pit Submersible Solids Handling Pumps and Appurtenances.
   - Delete Specification Section 43 21 14 Sump Pumps in its entirety and replace with the attached Specification Section 43 21 14 Sump Pumps.

   MAMAJANAO SPECIFICATIONS
   - Delete Specification Section 22 42 16.16 Commercial Sinks in its entirety and replace with the attached Specification Section 22 42 16.16 Commercial Sinks
   - Added new Specification Section 40 91 00 Primary Process Measurement Devices.
   - Delete Specification Section 43 21 00.06 Dry Pit Submersible Solids Handling Pumps and Appurtenances and replace with the attached Specification Section 43 21 00.06 Dry Pit Submersible Solids Handling Pumps and Appurtenances.
   - Delete Specification Section 43 21 14 Sump Pumps in its entirety and replace with the attached Specification Section 43 21 14 Sump Pumps.

All other terms and conditions of the IFB remain the same.

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

Miguel C. Bordallo, P.E.
General Manager

MCB; eq
Attachments: Revised Conceptual Drawings—Ypao, Mamajanao, Addendum No. 1
Revised Specifications— Ypao, Mamajanao, Addendum No. 1

PROJECT INFORMATION

CLIENT PROJECT NUMBER:	
AECOM PROJECT NUMBER:	60745967
PROJECT NAME	GUAM WATER AUTHORITY YPAO AND MAMAJANAO WASTEWATER PUMP STATIONS REHABILITATION
AUTHORITY HAVING JURISDICTION	GUAM WATER AUTHORITY
	GLORIA B. NELSON PUBLIC SERVICE BUILDING
	688 ROUTE 15, SUITE 200
	MANGILAO, GU 96913-6203
RESPONDING FIRE SERVICE	GUAM FIRE DEPARTMENT
	238 ARCHBISHOP FLORES ST
	HAGATNA, GUAM 96910
APPLICABLE CODES	10 GUAM CODE ANNOTATED (GCA) HEALTH AND SAFETY, CH. 73 FIRE PREVENTION
	21 GCA REAL PROPERTY CHAPTER 66 BUILDING LAW
	21 GCA REAL PROPERTY CHAPTER 67 THE BUILDING CODE
	2009 INTERNATIONAL BUILDING CODE
	2009 INTERNATIONAL EXISTING BUILDING CODE
	2009 IFC, INCLUDING APPENDICES B, C, D, E, F, G, H, AND I
	2009 INTERNATIONAL FUEL GAS CODE
	2009 INTERNATIONAL MECHANICAL CODE
	2009 INTERNATIONAL PLUMBING CODE, INCLUDING APPENDICES C, E, AND F
	2017 GUAM TROPICAL ENERGY CODE
	NFPA 820 - STANDARD FOR FIRE PROTECTION IN WASTEWATER TREATMENT AND COLLECTION FACILITY
	NFPA 70 - NATIONAL ELECTRIC CODE

BUILDING CODE CHART NOTES:
1. ACCESSIBILITY NOT REQUIRED PER THE FOLLOWING EXCEPTIONS:
A. IBC SECTION 1103.2.9 EQUIPMENT SPACES. SPACES FREQUENTED ONLY BY PERSONNEL FOR MAINTENANCE, REPAIR, OR MONITORING OF EQUIPMENT ARE NOT REQUIRED TO BE ACCESSIBLE.
2. AREAS CLASSIFIED AS GROUP B WILL BE DESIGNATED TO BE ACCESSIBLE TO INDIVIDUALS WITH DISABILITES.

BUILDING INFORMATION

CODE ITEM

CLASSIFICATION	**CODE REFERENCE**	**AREA 1**
USE & OCCUPANCY	IBC 306.3	GROUP F-2
CONSTRUCTION TYPE	IBC SECTION 602.2	I-A (602.2, NON-COMBUSTIBLE, 3-HR PROTECTED)
ALLOWABLE HEIGHT	IBC TABLE 503	UL - UNLIMITED
ACTUAL HEIGHT		9'-0"
ALLOWABLE AREA	IBC TABLE 503	UL
ACTUAL AREA		GROUND LEVEL - 1,151 GSF
		INTERMEDIATE LEVEL (MECH SPACE) - 1,059 GSF
		BASEMENT LEVEL (MECH SPACE) - 1,059 GSF
		TOTAL - 3,269 GSF (1,151 GSF OCCUPIED)
FIRE RATINGS		
FIRE RATING OF EXTERIOR WALLS	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
PRIMARY STRUCTURAL FRAME	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
BEARING WALLS - EXTERIOR	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
BEARING WALL - INTERIOR	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
NON BEARING - EXTERIOR	IBC TABLE 601	0-HOUR FIRE-RESISTANCE RATING
NON BEARING - INTERIOR	IBC TABLE 601	0-HOUR FIRE-RESISTANCE RATING
FLOOR CONSTRUCTION	IBC TABLE 601	2-HOUR FIRE-RESISTANCE RATING
ROOF CONSTRUCTION	IBC TABLE 601	1 1/2-HOUR FIRE-RESISTANCE RATING
FIRE SEPARATION DISTANCE	IBC TABLE 705.5	**FIRE SEPARATION DISTANCE X FEET**
		X ≥ 30'

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEM	**IEBC SECTION 803.2**	803.2.2 - NO REQUIREMENTS FOR F-2 AND EXEMPT FROM IEBC 803.2.3 PER IBC 903.2.11.1 AREA IS LESS THAN 1500 SF
PORTABLE FIRE EXTINGUISHERS	**IBC SECTION 906**	MIN TRAVEL DISTANCE = 50'-0"
FIRE ALARM DETECTION SYSTEMS	**IEBC SECTION 803.4.1**	EXEMPT 803.4.1 - NO REQUIREMENTS FOR F-2 OCCUPANCIES
STRUCTURAL DESIGN	SEE STRUCTURAL CODE SHEETS	
ELECTRICAL DESIGN	SEE ELECTRICAL CODE SHEETS	
MECHANICAL DESIGN	SEE MECHANICAL CODE SHEETS	
PLUMBING SYSTEMS	SEE PLUMBING CODE SHEETS	

EGRESS COMPONENTS

MEANS OF EGRESS		**FUNCTION OF SPACE**	**OCCUPANT LOAD FACTOR**
DESIGN OCCUPANT LOAD FACTOR	IBC TABLE 1004.1	ACCESSORY STORAGE AREAS, MECHANICAL EQUIPMENT ROOM	300 GROSS / TOTAL BLDG OCC = (10) OCCUPANTS
DEAD END CORRIDOR			
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY	IEBC 805.3.1	EXEMPT FROM IEBC REQUIREMENTS AS EXITS ARE SERVED BY SINGLE TENANT	
EGRESS WIDTH	IBC TABLE 1020.3	MIN CORRIDOR WIDTH 1020.3	
	IBC TABLE 1010.3.1(1)	IBC TABLE 1010.3.1(1)	
MAX. EXIT ACCESS TRAVEL DISTANCE	IEBC 805.4.1.1		
COMMON PATH OF TRAVEL	IEBC 805.4.1.1	EXEMPT PER IEBC 804.1.1 REQUIREMENTS AS EXITS ARE SERVED BY LESS THAN 50 OCCUPANTS	
MIN. CEILING HEIGHT MEANS OF EGRESS	IBC SECTION 1003.2	NOT LESS THAN 7'-6" ABOVE FINISH FLOOR	
HANDRAILS	IEBC 805.9		
GUARDS	IEBC 805.11		
ENERGY CONSERVATIONS	IEBC 810	ONLY COMPONENTS REPLACED OR INSTALLED TO COMPLY WITH 2017 GUAM TROPICAL ENERGY CODE PER IEBC 810	

EXISTING BUILDING NOTES

IECC (2009) LEVEL OF ALTERATION	**LEVEL 2 (IECC 701 - 711)** - INCLUDES ELIMINATION OF ANY DOOR/WINDOW, RECONFIGURATION OR EXTENSION OF ANY SYSTEM, ROOM LAYOUT ALTERATION, INCLUDING ADDITION OR DEMOLITION OF WALLS, AND WHERE THE WORK AREA IS LESS THAN OR EQUAL TO 50% OF THE BUILDING AREA
703.2.1 - EXISTING VERTICAL OPENINGS	- ALL EXISTING FIRE VERTICAL OPENINGS CONNECTING (2) OR MORE FLOORS SHALL BE ENCLOSED WITH AN APPROVED FIRE-RESISTANCE RATING OF NOT LESS THAN 1-HOUR WITH APPROVED OPENINGS - EXCEPTION 7.1 - IN GROUP F OCCUPANCIES, THE ENCLOSURE SHALL NOT BE REQUIRED FOR VERTICAL OPENINGS NOT EXCEEDING THREE STORIES

LEGEND - LIFE SAFETY

BASED ON 2015 IBC

FIRE WALLS (IBC 706)
- 2 HR RATED FIRE WALL — 2FW
- 3 HR RATED FIRE WALL — 3FW
- 4 HR RATED FIRE WALL — 4FW

FIRE BARRIERS (IBC 707)
- 1 HR RATED FIRE BARRIER — 1FB
- 2 HR RATED FIRE BARRIER — 2FB
- 3 HR RATED FIRE BARRIER — 3FB
- 4 HR RATED FIRE BARRIER — 4FB

FIRE PARTITIONS (IBC 708)
- 1/2 HR RATED FIRE PARTITION — 1/2FP
- 1 HR RATED FIRE PARTITION — 1FP

SMOKE BARRIER (IBC 709)
- 1 HR RATED SMOKE BARRIER — 1SB

FIRE/SMOKE BARRIER (IBC 707 & 709)
- 1 HR RATED FIRE/SMOKE BARRIER — 1FSB

FIRE/SMOKE BARRIER (IBC 709)
- 2 HR RATED FIRE/SMOKE BARRIER — 2FSB

SMOKE PARTITION (IBC 710)
- SMOKE PARTITION — SP

AIR TIGHT PARTITION
- AIR TIGHT PARTITION — AT

EXISTING RATED WALLS
INDICATED WITH "E" AS PREFIX TO WALL RATINGS LISTED ABOVE

ATRIUM ENCLOSURE (IBC 404.6)
- PER EXCEPTION 1 - GLASS WALL SMOKE PARTITION WITH SPRINKLER WATER CURTAIN — AD

GLAZED WINDOW SEPARATION (IBC 104.11)
- 2 HR RATED GLASS WINDOW ASSEMBLY WITH SPRINKLER DELUGE SYSTEM W/ DELUGE — 2D

-USE ONLY WITH PRIOR ACCEPTANCE BY AHJ.

APPROVED BY: _____
APPROVAL DATE: _____

LEGEND - LIFE SAFETY SYMBOLS

GENERAL

1
1
1

= PROVIDED OCCUPANT CAPACITY IN DIRECTION OF EGRESS

ACCESSIBLE ENTRANCE / EXIT

OCCUPANCY LOAD & USE GROUP

OCCUPANCY TYPE / USE GROUP AS DESCRIBED BY CODE

X-#	
XXX SF	XX OCC

OCCUPANCY LOAD (CAPACITY)
SQUARE FOOTAGE OF AREA

OCCUPANCY RATING

- ASSEMBLY - A-2
- ASSEMBLY - A-3
- BUSINESS - B
- FACTORY - F-1
- FACTORY - F-2
- HAZARDOUS - H-3
- HAZARDOUS - H-4
- WAREHOUSE - S-1
- WAREHOUSE - S-2
- UTILITY - U

FIRE EXTINGUISHERS

- FEC — FIRE EXTINGUISHER CABINET
- FEW — FIRE EXTINGUISHER WALL MOUNTED
- FE/T — FIRE EXTINGUISHER TEMPORARY
- STP — STANDPIPE

EXIT SIGNS

- CEILING MOUNTED - SINGLE
- CEILING MOUNTED - DOUBLE
- CEILING MOUNTED - SINGLE DIRECTIONAL
- CEILING MOUNTED - DOUBLE DIRECTIONAL
- WALL MOUNTED - SINGLE
- WALL MOUNTED - DOUBLE
- WALL MOUNTED - SINGLE DIRECTIONAL
- WALL MOUNTED - DOUBLE DIRECTIONAL

EGRESS & TRAVEL DISTANCE

EXIT NUMBER
EXIT NO. X
90 / 180 — 1@ 36"
EGRESS CAPACITY REQUIRED
N0. OF DOOR PANELS & PANEL WIDTH
EGRESS CAPACITY PROVIDED
EGRESS DISCHARGE DIRECTION

ESTIMATED TRAVEL DISTANCE

ESTIMATED COMMON PATH OF TRAVEL

AECOM
AECOM Technical Services, Inc
415 Chalan San Antonio Road, Ste. 112
Baltej Pavillion Bldg., Tamuning, Guam 96910
T 1.671.477.8327 F 1.671.472.8324
www.aecom.com

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	ADDENDUM NO. 1 - B&W REISSUE	5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD — CERTIFICATE № RA439 — EXP 12/30/2024 — GUAM REGISTERED ARCHITECT
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

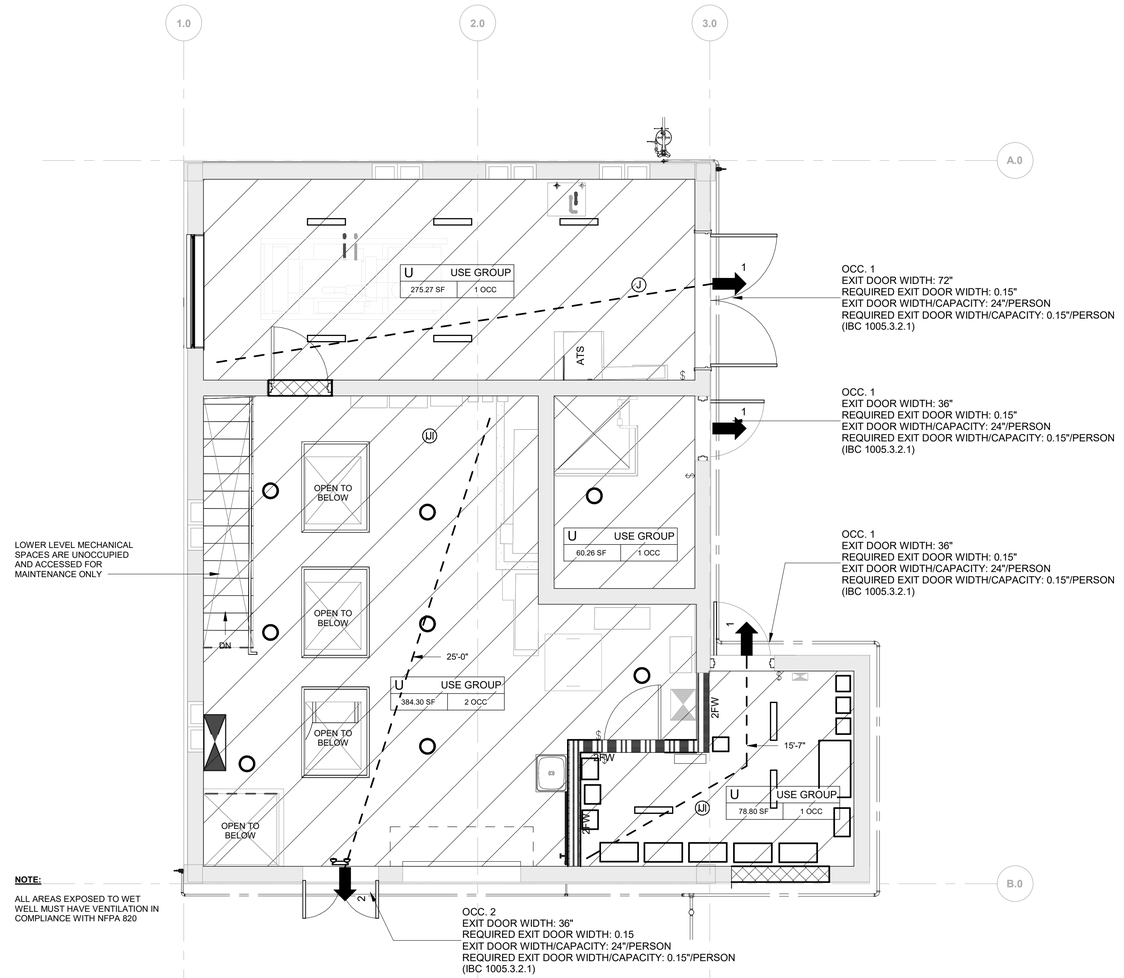
-	CITY ENGINEER
DESIGN GROUP	DATE:
ENGINEER:	
DESIGNED BY:	Designer
DRAWN BY:	Author
CHECKED BY:	Checker
APPROVED BY:	Approver

VERTICAL CONTROL:	-
HORIZONTAL CONTROL:	-
SHEET TITLE:	BUILDING CODE ANALYSIS SUMMARY - MAMAJANAO
PROJECT:	MAMAJANAO WWPS MODIFICATIONS
ADDRESS:	HARMON INDUSTRIAL PARK, GUAM 96913M 96913

WORK ORDER NO.

DRAWING NO. G-10

SHEET 05 OF 97 SHEETS



1 LIFE SAFETY PLAN - MAMAJANAO GROUND LEVEL
G-11 SCALE: 1/4" = 1'-0"

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	ADDENDUM NO. 1 - B&W REISSUE	5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD CERTIFICATE № RA439 EXP:12/31/2234 GUAM REGISTERED ARCHITECT
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER	-
DESIGN GROUP	DATE:
ENGINEER:	
DESIGNED BY: Designer	
DRAWN BY: Author	
CHECKED BY: Checker	
APPROVED BY: Approver	

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: LIFE SAFETY PLAN - MAMAJANAO

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913\M 96913

WORK ORDER NO.

DRAWING NO. G-11

SHEET 06 OF 97 SHEETS

AECOM
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Last Plotted: 5/6/2026 3:20:30 PM
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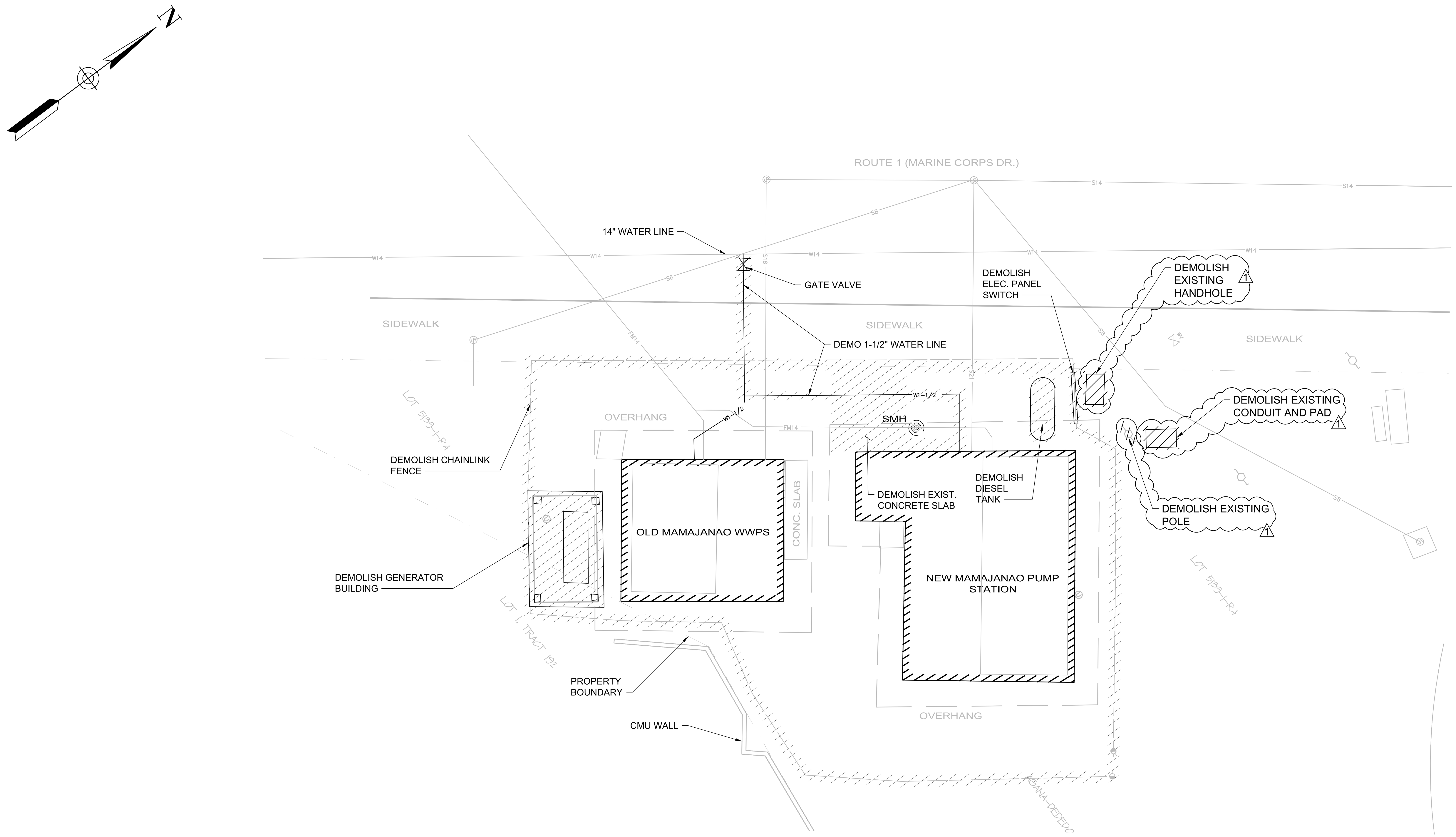

PLAN VIEW
SCALE: 1" = 10'

1
C-10

0 10' 20' 30'
1" = 10'-0"

LEGEND:

- PROPERTY BOUNDARY
- CHAINLINK FENCE
- FORCE MAIN
- SEWER LINE
- DEMOLITION

AECOM
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GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - DEMO ELEC. EQUIPMENT	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARETT BROWN, CERTIFICATE No1478 CIVIL, EXP. 4/30/2026, GUAM, PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER
DESIGN GROUP

		DATE:
ENGINEER:	HC	12/2025
DESIGNED BY:	HC	12/2025
DRAWN BY:	SI	04/2026
CHECKED BY:	BS	04/2026
APPROVED BY:	BS	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: SITE DEMOLITION PLAN
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO. -
DRAWING NO. C-01

SHEET 09 OF 97 SHEETS

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Sheet Version 3.0

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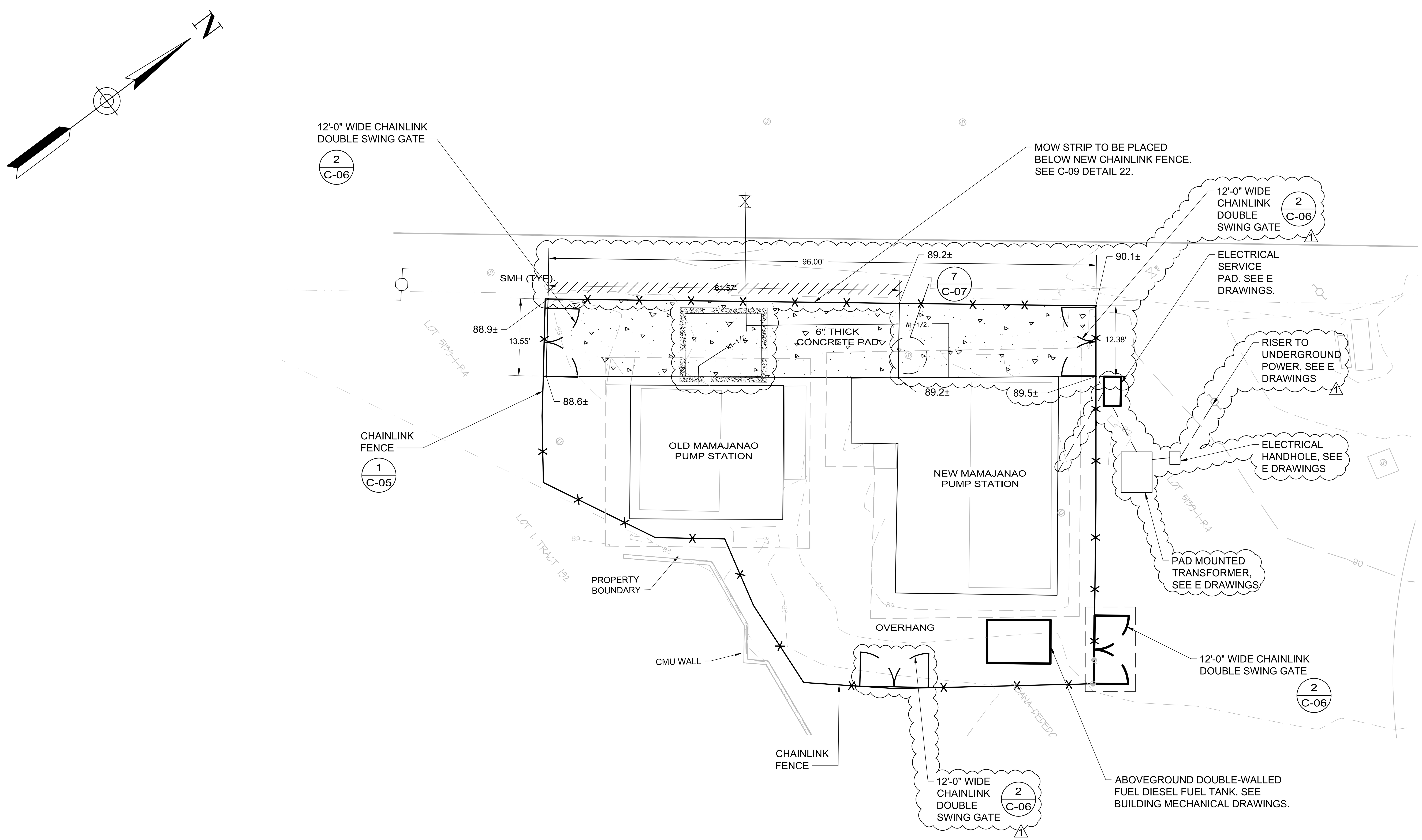

PLAN VIEW

1 C-02

SCALE: 1" = 10'

LEGEND:

- PROPERTY BOUNDARY
- CHAINLINK FENCE
- NEW
- EXISTING
- CONCRETE

0 10' 20' 30'
1" = 10'-0"

AECOM

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www.aecom.com

GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - NEW ELEC EQUIPMENT, REV CONC PAD, ADDED BYPASS VAULT	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARRETT BROWN, CERTIFICATE No. 1478, CIVIL, PROFESSIONAL ENGINEER, GUAM
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER
DESIGN GROUP

		DATE:
ENGINEER:	HC	04/2026
DESIGNED BY:	HC	04/2026
DRAWN BY:	SI	04/2026
CHECKED BY:	BS	04/2026
APPROVED BY:	BS	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: SITE PLAN
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO. -

DRAWING NO. C-02

SHEET 10 OF 97 SHEETS

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Sheet Version 3.0

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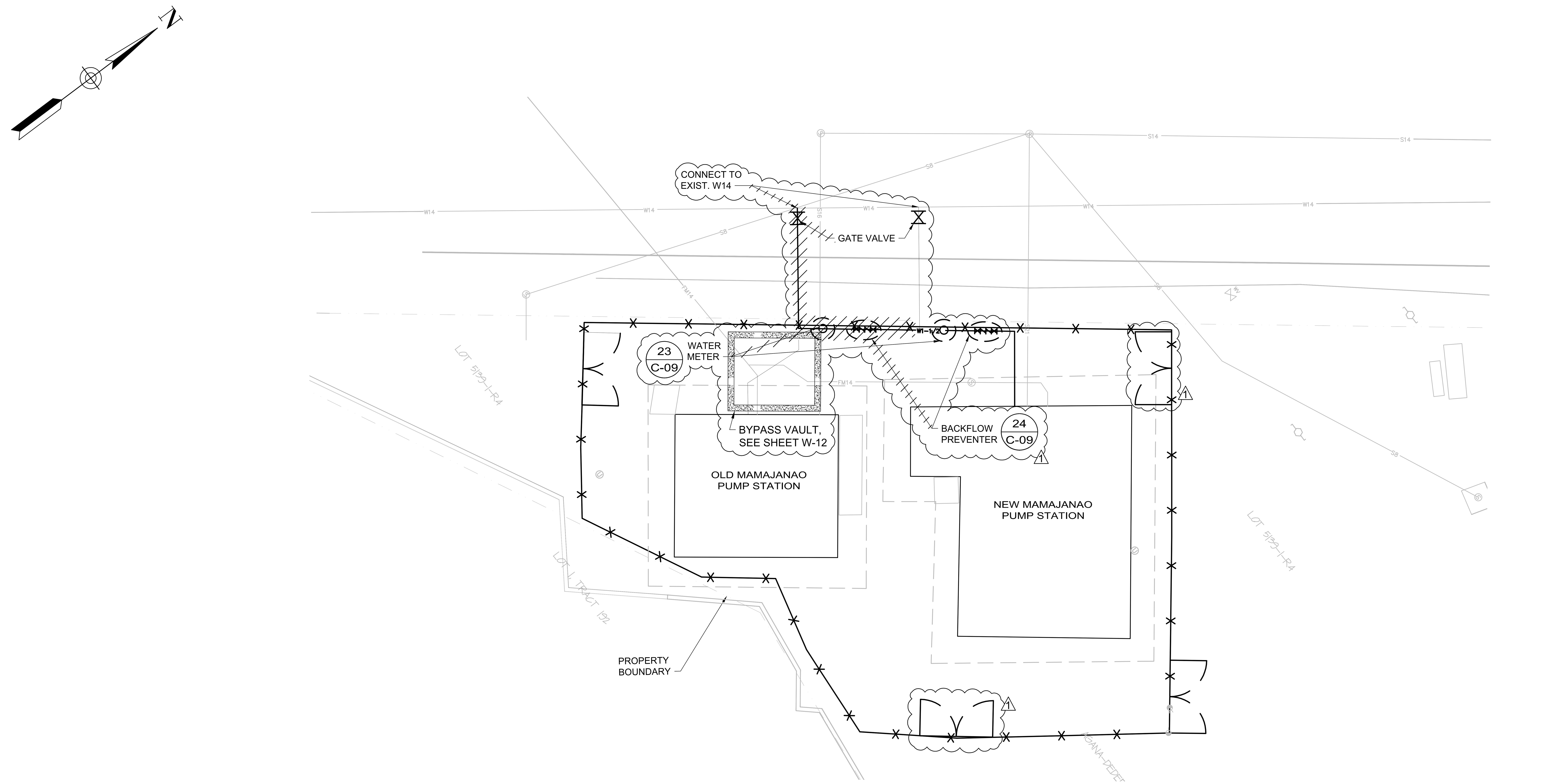

PLAN VIEW 1 C-03

SCALE: 1" = 10'

LEGEND:

- PROPERTY BOUNDARY
- CHAINLINK FENCE
- NEW
- EXISTING
- FORCE MAIN
- SEWER LINE

0 10' 20' 30'

1" = 10'-0"

AECOM

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Baltej Pavilion Bldg., Tamuning, Guam 96910
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www.aecom.com

GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - ADD. GATES, ADD. VAULT, RELOCATE WATER METER AND BACKFLOW PREVENTER	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARRETT BROWN CERTIFICATE №1478 CIVIL EXP. 4/30/2026 GUAM PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER

DESIGN GROUP		DATE:
ENGINEER:	XX	10/2025
DESIGNED BY:	XX	12/2025
DRAWN BY:	XX	12/2025
CHECKED BY:	XX	12/2025
APPROVED BY:	XX	12/2025

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: UTILITY PLAN

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO. -

DRAWING NO. C-03

SHEET 11 OF 97 SHEETS

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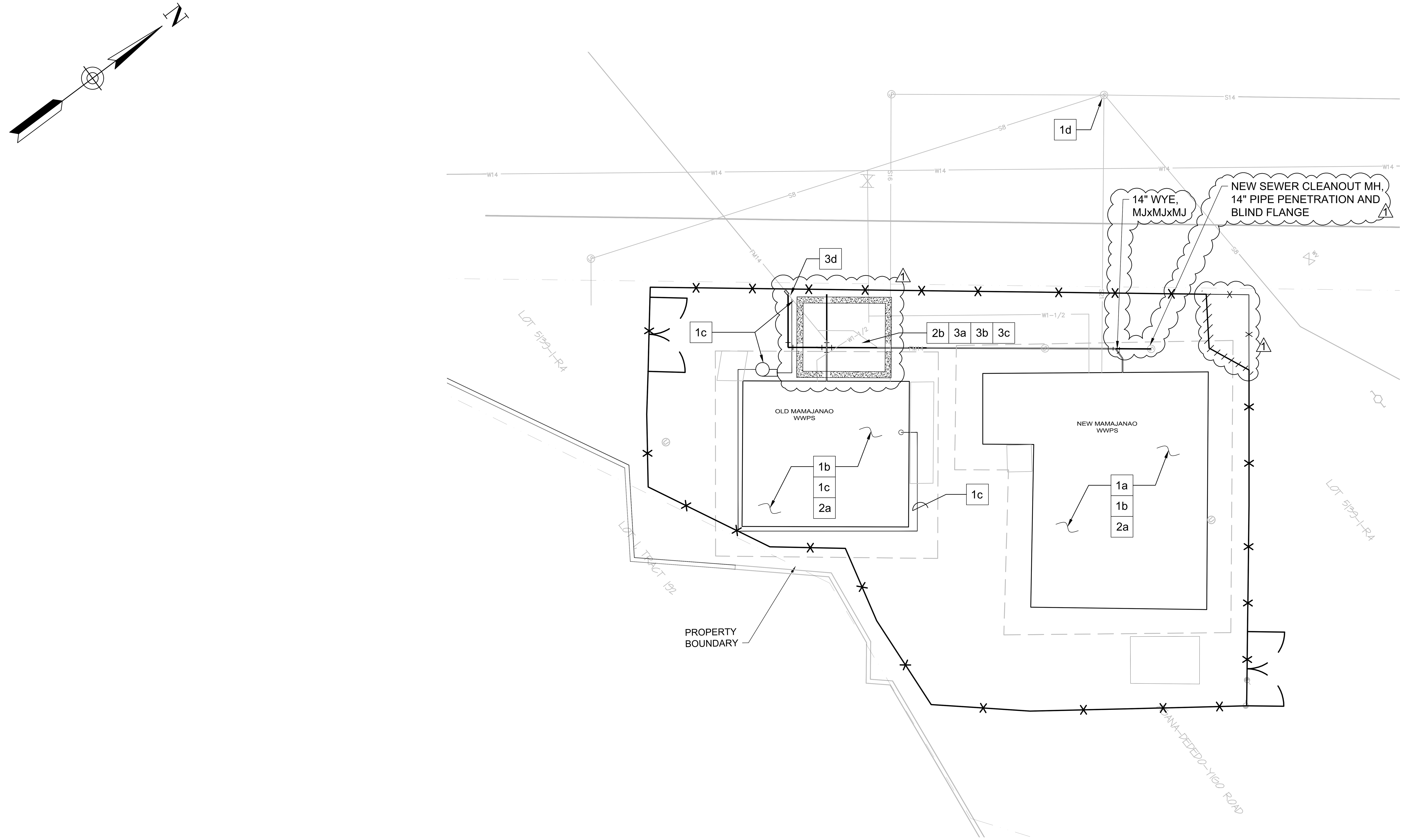
DATE: May 06, 2026 3:56pm XREFS: G-BORDER-MAMAJANAO 2025-008_01_mm_topo1 IMAGES:

Sheet Version 3.0



PLAN VIEW
SCALE: 1" = 10'
1 / C-04

SUGGESTED SEQUENCE OF OPERATION:

CONTRACTOR SHALL MAINTAIN FULL FUNCTIONAL OPERATION AT ALL TIMES DURING CONSTRUCTION OF THE WORK.

PROPOSED PHASE 1: DRAIN FORCE MAIN AND EMPTY WETWELL TO MAXIMIZE DOWNTIME FOR TEMPORARY BYPASS CONNECTION AND ISOLATE NEW MAMAJANAO

1a. DRAWDOWN NEW MAMAJANAO WETWELL.
1b. ALLOW BACKFLOW OF EXISTING 14" FORCE MAINS (OLD AND NEW PUMP STATION) BY SECURING CHECK VALVES IN THE OPEN POSITION. IT IS RECOMMENDED TO THROTTLE BACKFLOW INTO THE WETWELL BY CONTROLLING GATE VALVE OPENING POSITION. DURATION TO EMPTY EXISTING 14" FORCE MAIN MAY VARY DEPENDING ON INFLOW FROM COLLECTION SYSTEM. PROVIDE VACTOR TRUCKS TO CONTROL SEWER INFLOW.
1c. MAKE TEMPORARY CONNECTION TO EXISTING 14" FORCE MAIN. TEMPORARY BYPASS LINE AND PORTABLE PUMPS TO PUMP FROM THE OLD MAMAJANAO WETWELL.
1d. PLUG NEW MAMAJANAO UPSTREAM MANHOLE AND ALLOW OVERFLOW TO OLD MAMAJANAO UPSTREAM MANHOLE AND WETWELL.

PROPOSED PHASE 2: INSTALLATION OF PUMPS, PIPING, VALVES AND NEW BYPASS VAULT AT NEW AND OLD MAMAJANAO

2a. INSTALL NEW PUMP, PIPING AND VALVES AT NEW AND OLD MAMAJANAO.
2b. INSTALL NEW BYPASS VAULT STRUCTURE, PIPING AND VALVES.

SUGGESTED SEQUENCE OF OPERATION (CONT.):

PROPOSED PHASE 3: FORCE MAIN CONNECTIONS TO NEW BYPASS VAULT

3a. MAKE CONNECTION FROM NEW BYPASS VAULT EAST BRANCH TO NEW MAMAJANAO 14" FORCE MAIN.
3b. MAKE CONNECTION FROM NEW BYPASS VAULT SOUTH BRANCH TO OLD MAMAJANAO 14" FORCE MAIN.
3c. MAKE CONNECTION FROM NEW BYPASS VAULT WEST BRANCH TO EXISTING 14" FORCE MAIN.
3d. REMOVE TEMPORARY BYPASS LINE AND PORTABLE PUMPS.

0 10' 20' 30'
1" = 10'-0"

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GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - REV. FENCE, ADD. MANHOLE AND WYE, REV. BYPASS VULT	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARRETT BROWN, CERTIFICATE No. 1478, CIVIL, GUAM, PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER
DESIGN GROUP

		DATE:
ENGINEER:	XX	10/2025
DESIGNED BY:	XX	12/2025
DRAWN BY:	XX	12/2025
CHECKED BY:	XX	12/2025
APPROVED BY:	XX	12/2025

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: CONSTRUCTION SEQUENCING AND BYPASS PLAN

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

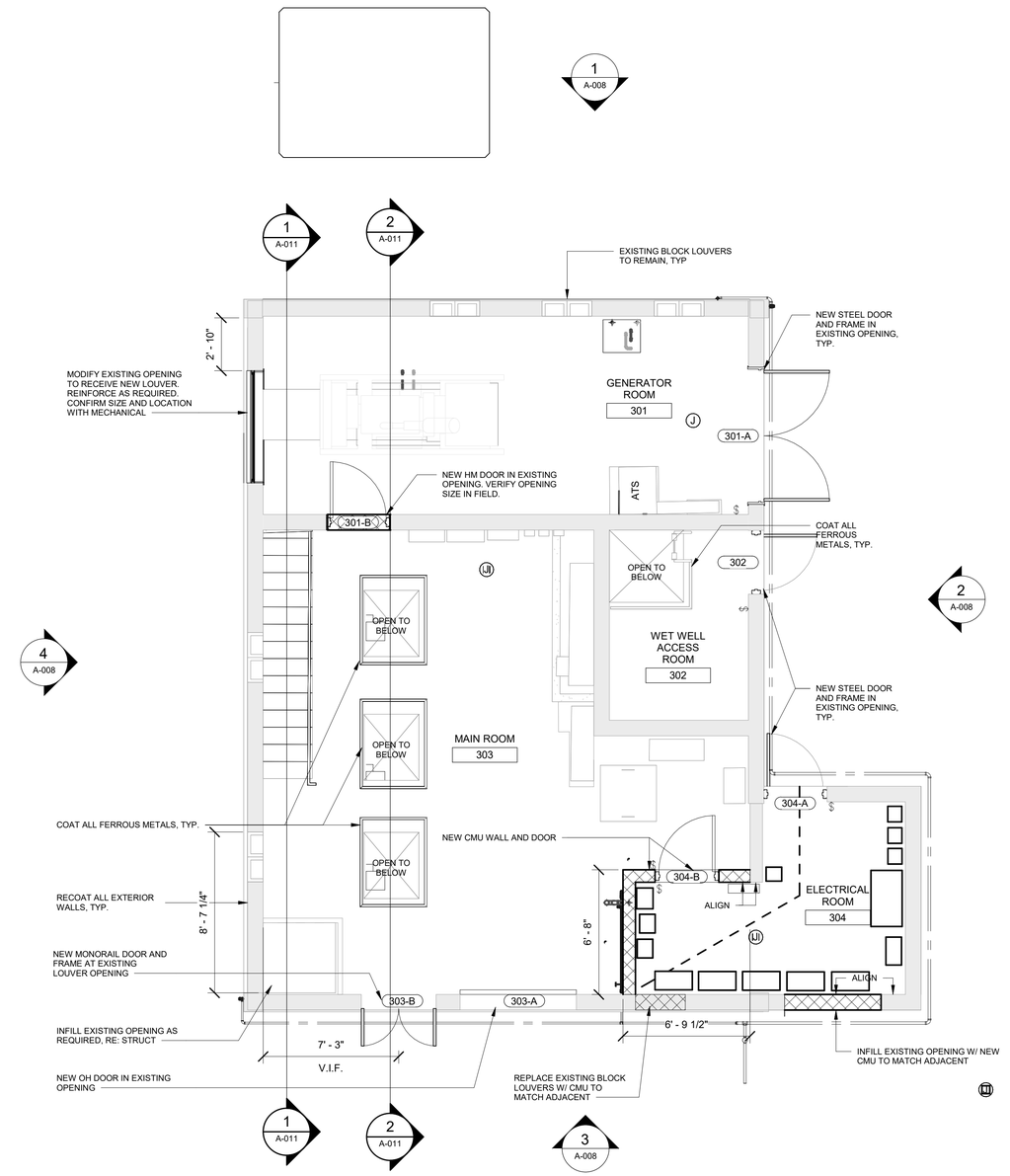
WORK ORDER NO. -

DRAWING NO. C-04

SHEET 12 OF 97 SHEETS

DWG: C:\Users\hernan.co\DC\ACCDocs\AECOM\CI-AMER(US)-60745967-GWA TO2 CCTV Pump Station\Project Files\900 Design Collaboration\20-SHEETS\C\MAMAJANAO WWPS\C-04.dwg USER: hernan.co
DATE: May 06, 2026 3:49pm XREFS: G-BORDER-MAMAJANAO 2025-008_01_mm]topo1 IMAGES:

Sheet Version 3.0



1 MAMAJANAO - GROUND LEVEL
A-006 | SCALE: 1/4" = 1'-0"

GENERAL NOTES - FLOOR PLANS

A. REFER TO THE PROJECT GENERAL NOTES FOR GENERAL PROJECT REQUIREMENTS.

B. PROVIDE HOUSEKEEPING PADS BENEATH MECHANICAL AND PLUMBING EQUIPMENT IN MECHANICAL ROOMS.

C. DOOR OPENINGS SHALL BE 36", UNLESS OTHERWISE NOTED. REFER TO THE DOOR AND LOUVER SCHEDULE FOR ADDITIONAL INFORMATION.

D. ALL FERROUS METALS TO BE COATED

E. ALL PENETRATIONS BETWEEN WET WELL AND ADJACENT ROOMS TO HAVE NFPA 820 COMPLIANT FIRESTOPPING.

F. NEW OPENINGS WITHIN EXISTING CONCRETE OR BLOCK WALLS TO BE VERIFIED WITH STRUCTURAL PRIOR TO DEMOLITION.

G. VERIFY ALL DIMENSIONS IN FIELD.

H. ALL NEW WALLS TO ALIGN FINISH FACE WITH EXISTING ADJACENT SURFACES

I. ALL NEW RAILINGS TO MATCH EXISTING AND BE PAINTED AS REQUIRED.

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	ADDENDUM NO. 1 - B&W REISSUE	5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD — CERTIFICATE № RA439 — EXP: 12/31/2024 — GUAM REGISTERED ARCHITECT

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

	CITY ENGINEER	DATE:
-	DESIGN GROUP	
	ENGINEER:	
	DESIGNED BY: DB	
	DRAWN BY: JJF	
	CHECKED BY: DMA	
	APPROVED BY: DB	

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: MAMAJANAO - GROUND LEVEL

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913\M 96913

MAMAJANO KEYPLAN

N

WORK ORDER NO.

DRAWING NO. A-06

SHEET 24 OF 97 SHEETS

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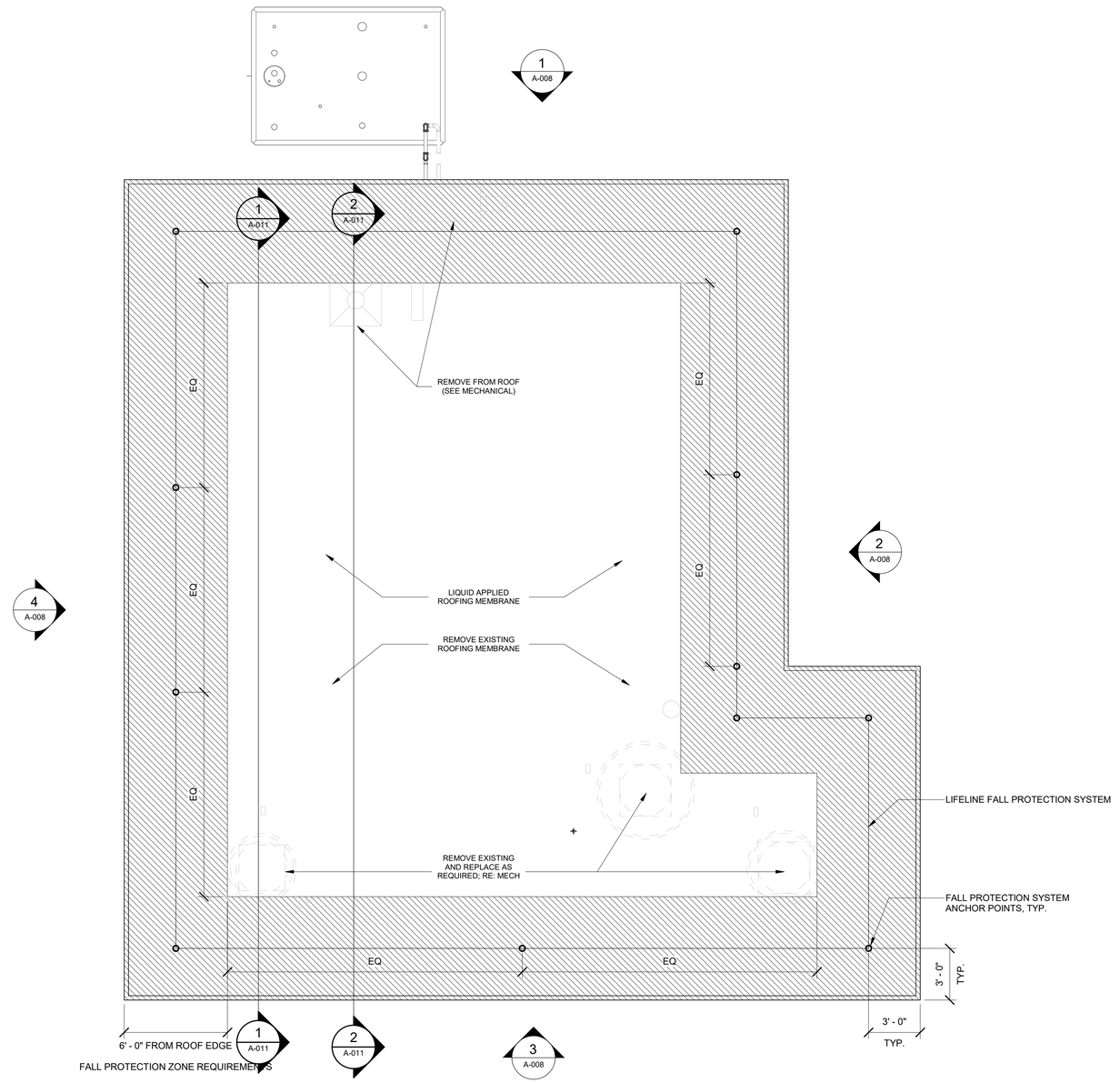

1 | **MAMAJANAO - ROOF PLAN**
A-007 | SCALE: 1/4" = 1'-0"

GENERAL NOTES - ROOF PLANS

A. REMOVE EXISTING FLASHINGS AND TIE-DOWNS.

B. REMOVE EXISTING ROOFING MEMBRANE.

C. ROOF SPOT ELEVATIONS, WHERE NOTED, ARE APPROXIMATE AND RELATIVE TO THE ROOF DATUM.

D. DETAILS SHOWN ARE TYPICAL CONDITIONS AT VARYING LOCATIONS WITHIN THE PROJECT. MODIFICATIONS TO THESE DETAILS NECESSARY FOR ROOF SYSTEM MANUFACTURER'S WARRANTED ASSEMBLY SHALL TAKE PRECEDENCE. USE OF ALTERNATE DETAILS DUE TO THE PRECEDING STATEMENT SHALL NOT BE THE BASIS FOR ADDITIONAL COMPENSATION.

E. ALL EXPOSED METAL FLASHING AND COUNTERFLASHING, EXPANSION JOINTS, GUTTERS, DOWNSPOUTS, SCUPPERS, AND ASSOCIATED ACCESSORIES, SHALL BE PREFINISHED METAL AS SPECIFIED. COLOR(S) SHALL BE AS SELECTED BY ARCHITECT.

F. PROVIDE THE ROOF SYSTEM MANUFACTURER'S RECOMMENDED PREFABRICATED BOOTS, ACCESSORIES, CLAMPS AND RELATED MATERIALS AT ALL PENETRATIONS THROUGH THE ROOF (INCLUDING STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL). REFER TO DISCIPLINE SPECIFIC SHEETS FOR SIZES AND QUANTITIES OF PENETRATIONS. VERIFY EXACT LOCATION IN FIELD. PROPERLY FLASH ALL SUCH PENETRATIONS TO ACHIEVE A WATER-TIGHT INSTALLATION.

G. AT ALL VENT PENETRATIONS THROUGH THE ROOF, OFFSET THE VENT BELOW THE ROOF A MINIMUM OF 18" FROM ANY OTHER ROOFTOP EQUIPMENT OR EXPANSION JOINT. COORDINATE ROUTING IN FIELD WITH PLUMBING CONTRACTOR.

H. ALL ROOFTOP EQUIPMENT REQUIRING SERVICE SHALL BE LOCATED MORE THAN 10 FEET FROM ROOF EDGES.

I. REQUIRE MINIMUM 18 INCHES CLEARANCE BETWEEN ALL PENETRATIONS, BETWEEN PENETRATIONS AND PARAPETS, ETC.

J. FALL PROTECTION ANCHOR POINTS TO BE INSTALLED PER OSHA REQUIREMENTS. LOCATIONS TO BE VERIFIED IN FIELD.

MAMAJANO KEYPLAN

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GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	ADDENDUM NO. 1 - B&W REISSUE	5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD
CERTIFICATE
№ RA439
EXP 12/31/2024
GUAM
REGISTERED ARCHITECT
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

	CITY ENGINEER	DATE:
-	DESIGN GROUP	
	ENGINEER:	
	DESIGNED BY: DB	
	DRAWN BY: JJF	
	CHECKED BY: DMA	
	APPROVED BY: DB	

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: MAMAJANAO - ROOF PLANS

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913/M 96913

WORK ORDER NO.

DRAWING NO. A-07

SHEET 25 OF 97 SHEETS

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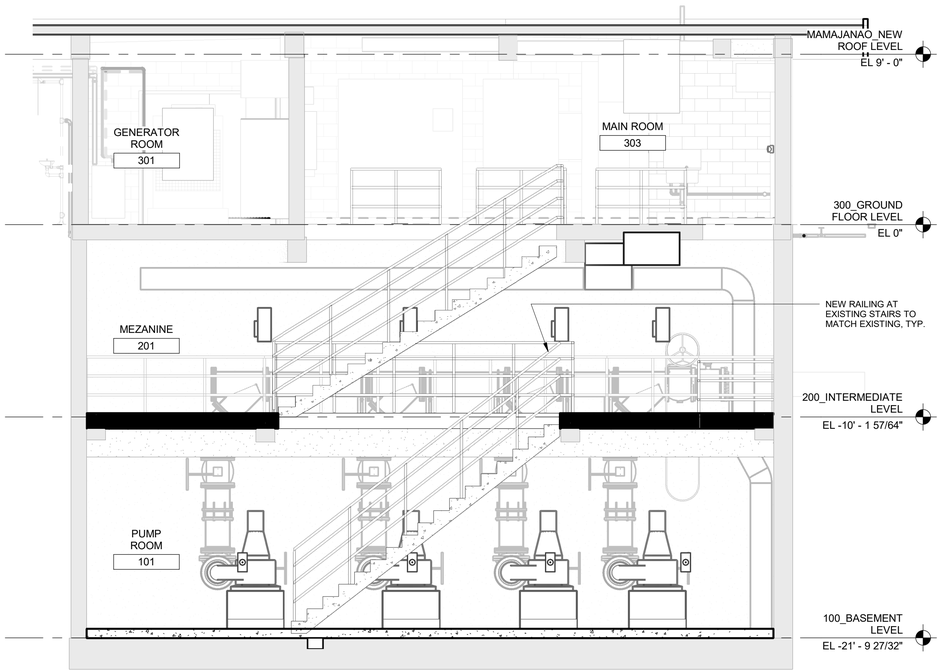
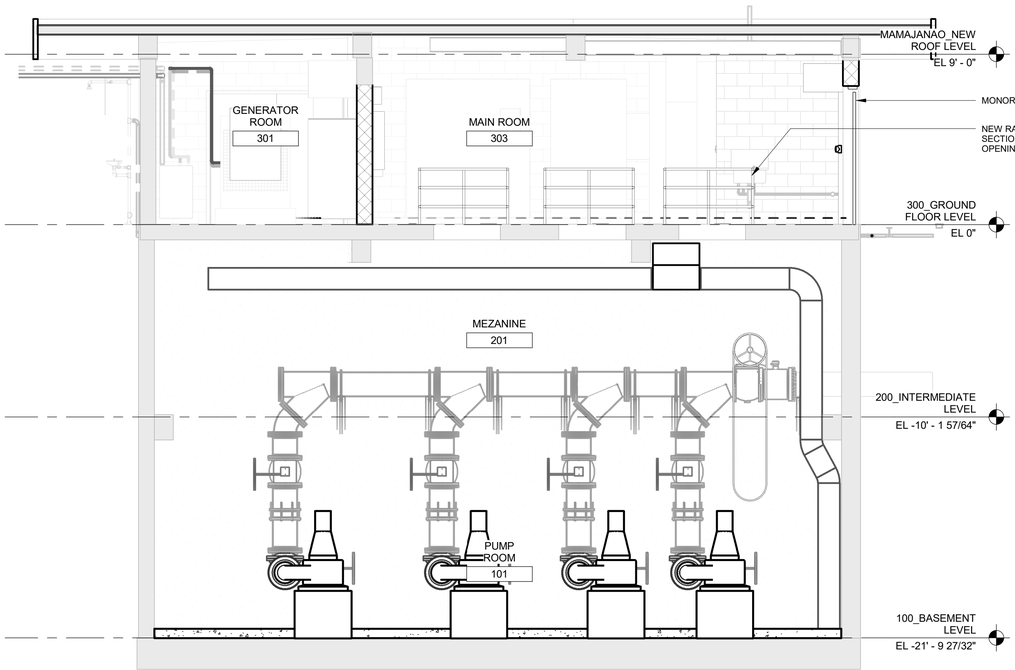


1 MAMAJANAO - BLDG SECTION 1

A-011 | SCALE: 1/4" = 1'-0"



2 MAMAJANAO - BLDG SECTION 2

A-011 | SCALE: 1/4" = 1'-0"

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GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	ADDENDUM NO. 1 - B&W REISSUE	5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD CERTIFICATE № RA439 EXP:12/31/2234 GUAM REGISTERED ARCHITECT

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER - DATE:

DESIGN GROUP

ENGINEER:
DESIGNED BY: Designer
DRAWN BY: Author
CHECKED BY: Checker
APPROVED BY: Approver

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: MAMAJANAO - SECTIONS

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913\3W 96913

WORK ORDER NO.

DRAWING NO. A-11

SHEET 27 OF 97 SHEETS

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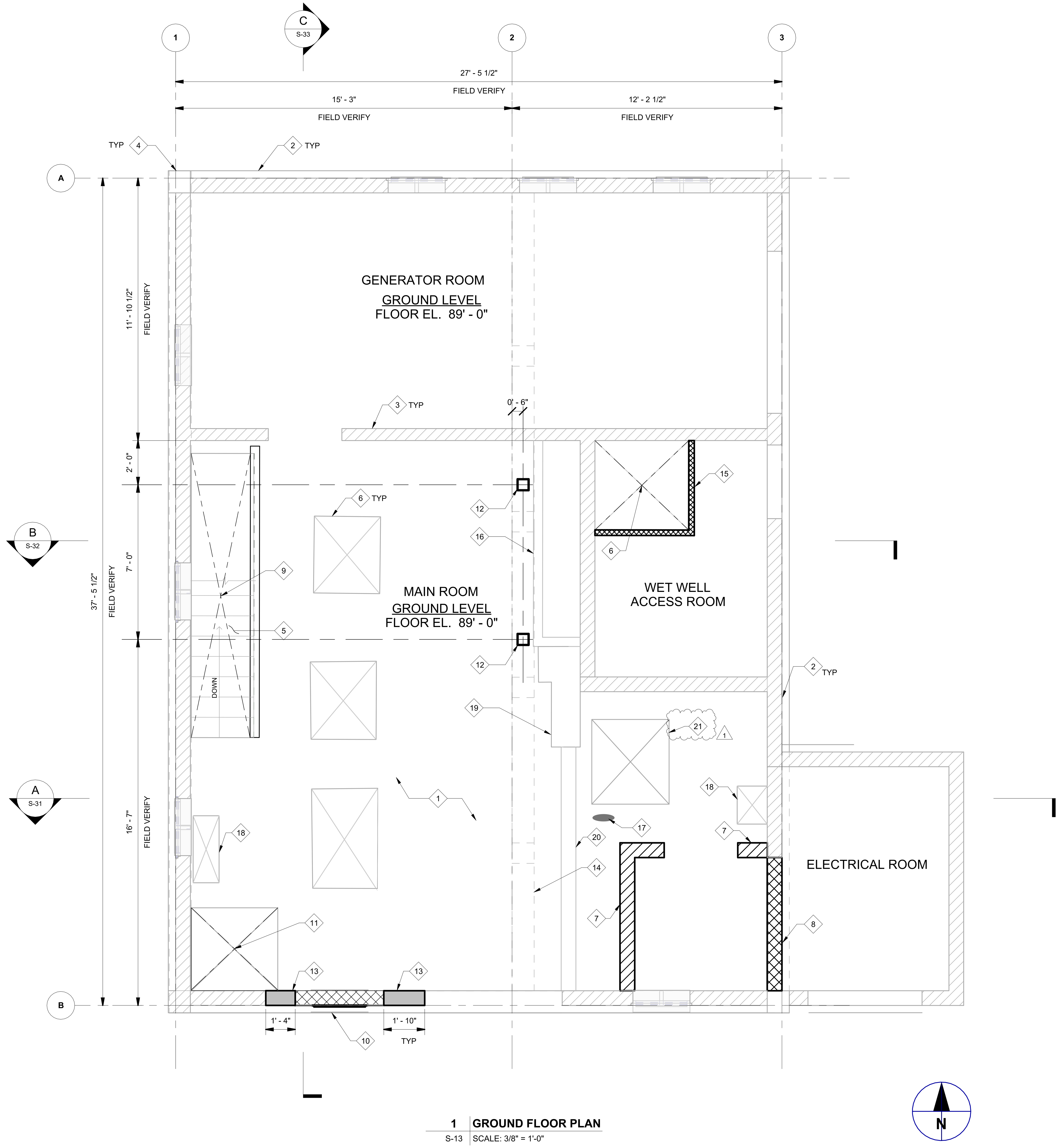
KEYNOTES

1. EXISTING GROUND FLOOR CONCRETE ELEVATED SLAB
2. EXISTING CMU EXTERIOR WALLS
3. EXISTING CMU INTERIOR WALL
4. EXISTING CONCRETE PILASTER
5. EXISTING CONCRETE STAIRS
6. EXISTING OPENING THROUGH FLOOR SLAB
7. 8" THICK (NOMINAL) CONCRETE BLOCK WALL (FULLY GROUNTED) w/ #5 @ 16"VERT AND HORIZ BARS. REFER TO MASONRY NOTES ON SHEET S-01 AND SPECIAL INSPECTION REQUIREMENTS ON SHEET S-02. REFER TO TYPICALSTRUCTURAL DETAILS FOR ADDITIONAL REINFORCING.
8. DEMOLISH EXISTING CMU WALL. CUT EXISTING DOWELS TO 1-1/2 INCHES BELOW SLAB SURFACE AND FILL RESULTING CAVITY WITH CEMENT GROUT; GRIND ENTIRE SLAB SURFACE BENEATH REMOVED CMU WALL SMOOTH
9. EXISTING SLAB OPENING FOR STAIRS
10. REMOVE EXISTING LOUVER AND DEMOLISH WALL TO CREATE A 4'-0" WIDE OPENING FOR NEW CUSTOM DOOR INSTALLATION TO ACCOMMODATE MONORAIL BEAM PASSATE
11. EXISTING OPENING THROUGH FLOOR SLAB
12. HSS 6x6x1/4" COLUMN
13. DEMOLISH EXISTING CMU BLOCKS AND INSTALL FULL HEIGHT CAST-IN-PLACE CONCRETE PILASTER- SEE DETAIL 1 ON SHEET S-54. SELF-CONSOLIDATING CONCRETE SHALL BE USED TO ENSURE WELL CONSOLIDATED CONCRETE FREE OF ANY VOIDS AND ROCK POCKETS
14. EXISTING CONCRETE INTERIOR WALL BELOW
15. EXISTING CURB TO BE DEMOLISHED AND REPLACED WITH STEEL TOEBOARD DESIGNED BY CONTRACTOR'S ENGINEER
16. EXISTING CONCRETE CURB
17. CONCRETE SPALL ON TOP SLAB - SEE DETAIL 1 ON SHEET S-72 FOR REPAIR DETAILS. SEE PHOTO 13 ON SHEET S-73
18. EXISTING SLAB OPENING FOR HVAC DUCT
19. EXISTING HOUSEKEEPING PAD
20. EXISTING 8" WIDE BY 3" HIGH CONCRETE CURB
21. EXISTING OPENING THROUGH FLOOR SLAB TO BE INFILLED WITH CONCRETE - SEE DETAIL 2 ON S-51



1 GROUND FLOOR PLAN
S-13 SCALE: 3/8" = 1'-0"

NO	REVISIONS:	DATE:	BY
1	ADDENDUM NO. 1 - REVISED CALLOUT	05/4/26	DA

STRUCTURE NO.

INDEX NO.

DALE EDWARD WAH – CERTIFICATE NO. 1980 – STRUCTURAL – GUAM – PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.

DATE

GUAM WATERWORKS AUTHORITY

CITY ENGINEER

DESIGN GROUP

		DATE:
ENGINEER:	DW	04/2026
DESIGNED BY:	DA	04/2026
DRAWN BY:	AA	04/2026
CHECKED BY:	DK	04/2026
APPROVED BY:	DW	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: GROUND LEVEL PLAN

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO. 0001

DRAWING NO. S-13

SHEET 33 OF 97 SHEETS

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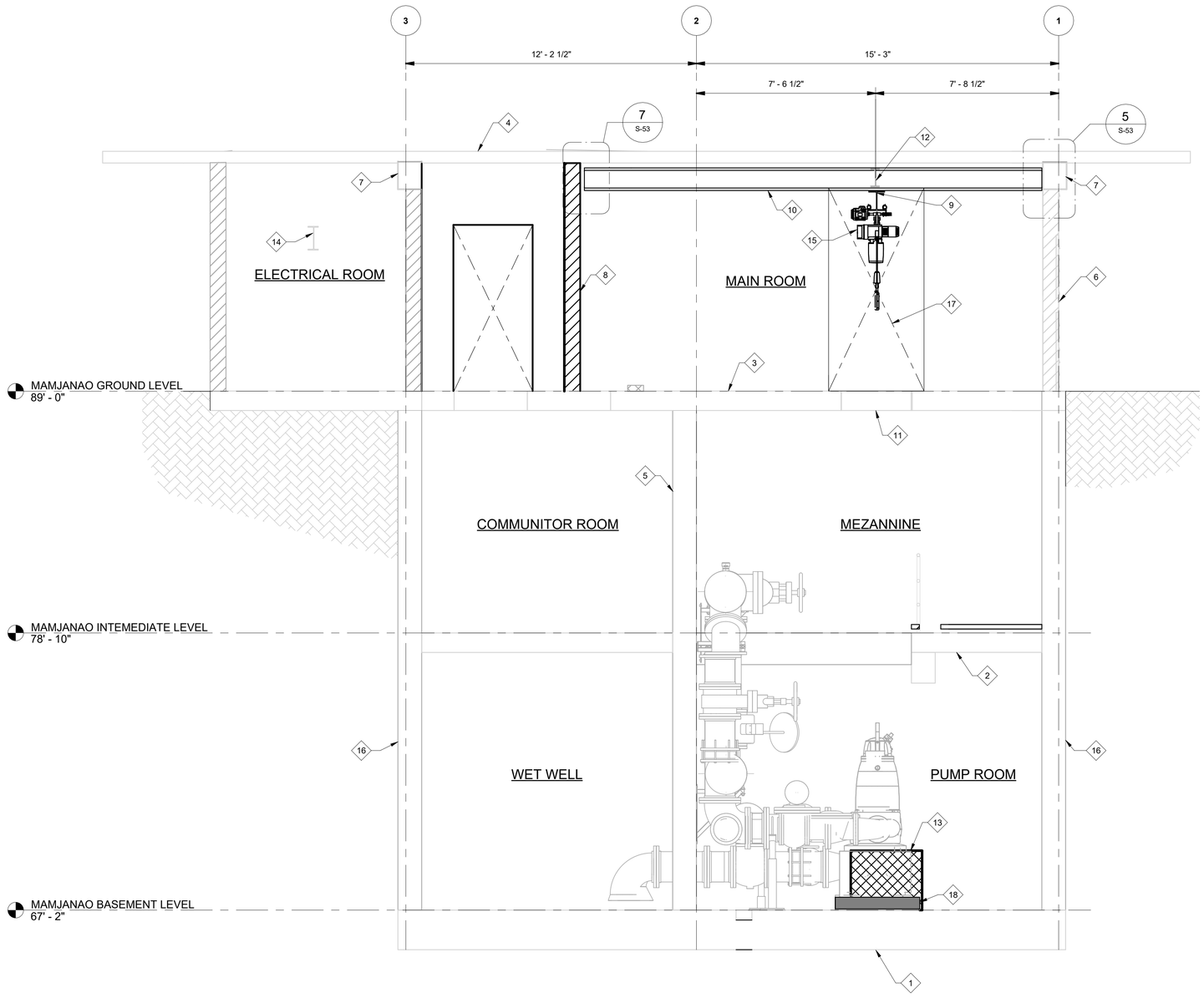
KEYNOTES

1. EXISTING CONCRETE MAT SLAB ON GRADE
2. EXISTING INTERMEDIATE CONCRETE ELEVATED SLAB
3. EXISTING GROUND LEVEL ELEVATED CONCRETE SLAB
4. EXISTING CONCRETE ROOF SLAB
5. EXISTING BELOW GRADE CONCRETE DIVIDER WALL
6. EXISTING CMU ABOVE GRADE WALL
7. EXISTING CONCRETE BOND BEAM
8. NEW INTERIOR CONCRETE CMU WALL
9. NEW STEEL MONORAIL CENTERED ON THE FLOOR OPENING
10. NEW STEEL MONORAIL SUPPORT BEAM
11. EXISTING OPENING THROUGH FLOOR SLAB
12. EXISTING STEEL MONORAIL BEAM TO BE REMOVED
13. EXISTING CONCRETE PUMP BASE TO BE DEMOLISHED
14. ~~EXISTING MONORAIL TO BE REMOVED~~
15. 2-TON MOTOR-DRIVEN TROLLEY AND ELECTRIC CHAIN HOIST
16. ~~EXISTING CONCRETE EXTERIOR WALL~~
17. NEW WALL OPENING BEYOND
18. NEW CONCRETE PUMP PAD

1



A **SECTION A**
S-31 SCALE: 3/8" = 1'-0"

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - REVISED CALLOUT	05/4/26	DA

STRUCTURE NO.

INDEX NO.

EDWARD WAH ★ NO. 19801 ★ STRUCTURAL ★ GUAM ★ PROFESSIONAL ENGINEER ★ DATE CERTIFIED

These plans were prepared by me or under my responsible control
DATE: 04/09/26

CITY ENGINEER

DESIGN GROUP		DATE:
ENGINEER:	DW	04/2026
DESIGNED BY:	DA	04/2026
DRAWN BY:	AA	04/2026
CHECKED BY:	DK	04/2026
APPROVED BY:	DW	04/2026

GUAM WATERWORKS AUTHORITY

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: SECTION A

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO.
0001

DRAWING NO.
S-31

SHEET 35 OF 97 SHEETS

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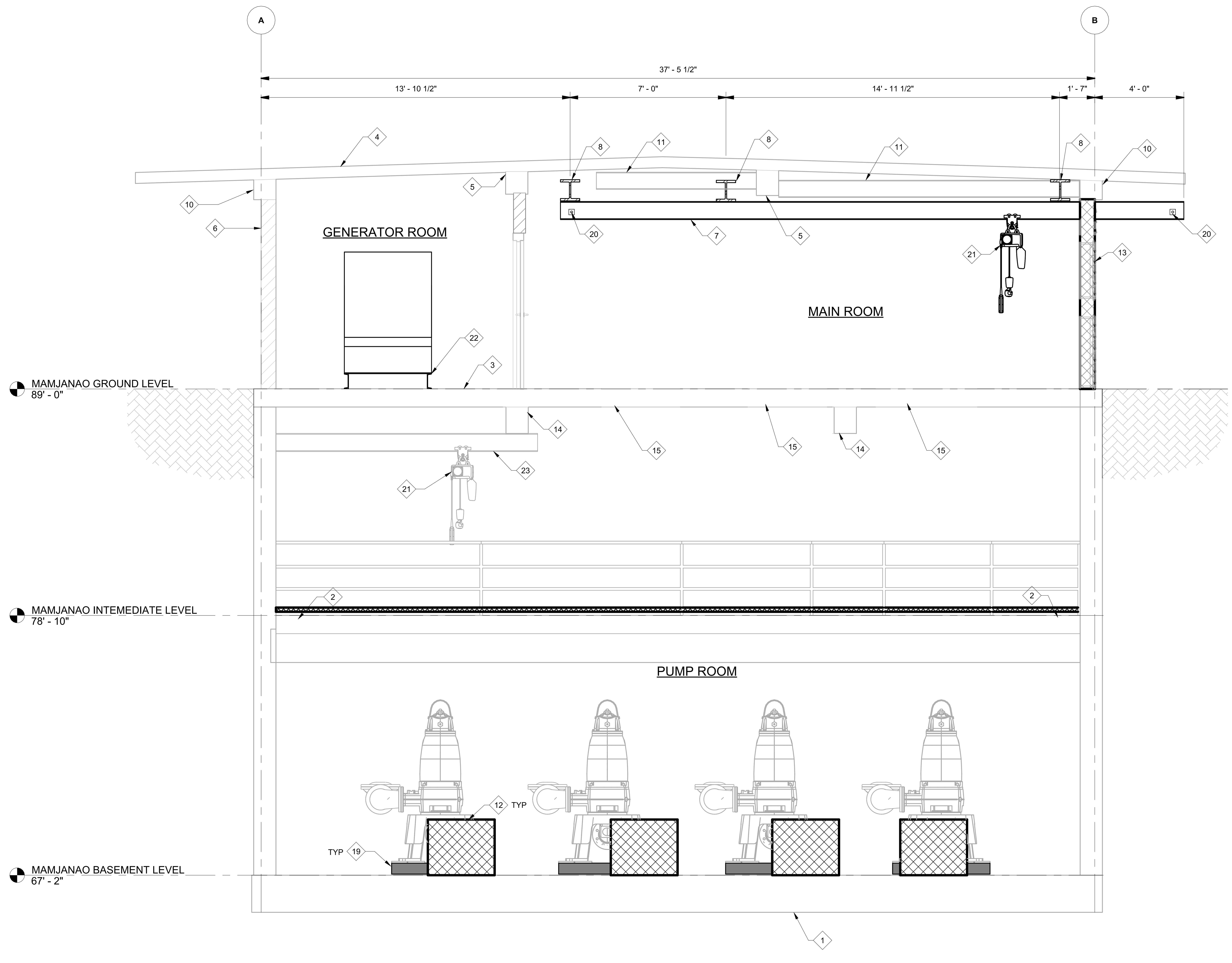

C	SECTION C
S-33	SCALE: 3/8" = 1'-0"

KEYNOTES

1. EXISTING CONCRETE MAT SLAB ON GRADE
2. EXISTING CONCRETE BOND BEAM
3. EXISTING GROUND LEVEL ELEVATED CONCRETE SLAB
4. EXISTING CONCRETE ROOF SLAB
5. EXISTING CONCRETE DROP BEAM
6. EXISTING CMU ABOVE GRADE WALL
7. NEW STEEL MONORAIL BEAM
8. NEW STEEL MONORAIL SUPPORT BEAM
9. EXISTING CMU INTERIOR WALL
10. EXISTING CONCRETE BOND BEAM
11. EXISTING STEEL MONORAIL BEAM TO BE REMOVED
12. EXISTING CONCRETE PUMP BASE
13. REMOVE EXISTING LOUVER AND DEMOLISH WALL TO CREATE A 4'-0" WIDE OPENING FOR NEW CUSTOM DOOR INSTALLATION TO ACCOMMODATE MONORAIL BEAM PASSATE
14. EXISTING CONCRETE DROP BEAM
15. EXISTING OPENING THROUGH FLOOR SLAB
16. L3x3x1/3 (x3") CRANE STOP WITH 5/8" DIA BOLT
17. MOTOR-DRIVEN TROLLEY AND ELECTRIC CHAIN HOIST
18. EXISTING GENERATOR FRAME
19. NEW CONCRETE PUMP PAD
20. L3x3x1/3 (x3") CRANE STOP WITH 5/8" DIA BOTL LOCATED 6" FROM EACH END OF BEAM
21. 2-TON MOTOR-DRIVEN TROLLEY AND ELECTRIC CHAIN HOIST (1)
22. GENERATOR SKID
23. EXISTING W16x MONORAIL BEAM

NO	REVISIONS:	DATE:	BY
1	ADDENDUM NO. 1 - REVISED CALLOUT	05/4/26	DA

STRUCTURE NO.

INDEX NO.

DALE EDWARD WAH — CERTIFICATE NO. 1980 — STRUCTURAL — GUAM — PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.

DATE:

GUAM WATERWORKS AUTHORITY

CITY ENGINEER — DESIGN GROUP

		DATE:
ENGINEER:	DW	04/2026
DESIGNED BY:	DA	04/2026
DRAWN BY:	AA	04/2026
CHECKED BY:	DK	04/2026
APPROVED BY:	DW	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: SECTION C

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO. 0001

DRAWING NO. S-33

SHEET 37 OF 97 SHEETS

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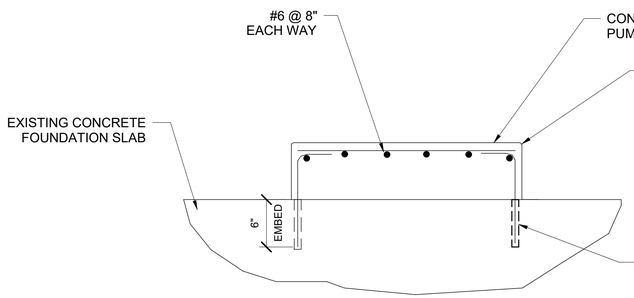
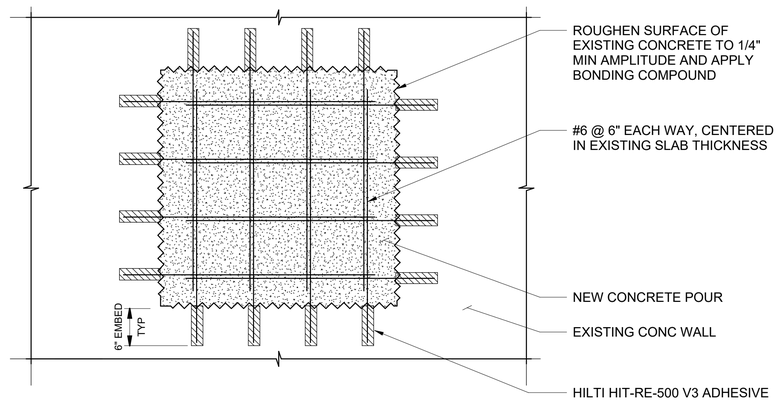


NOTE: ANCHORAGE SHALL BE DESIGNED AND PROVIDED BY MANUFACTURER. SUBMIT CALCULATIONS AND SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION

1 NEW PUMP PAD
S-51 | SCALE: 3/4" = 1'-0"



2 CONCRETE INFILL OPENING
S-51 | SCALE: 1" = 1'-0"

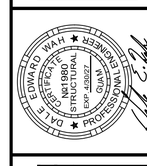
1

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY
1	ADDENDUM NO. 1 - NEW DETAIL	05/4/26	DK

STRUCTURE NO.

INDEX NO.



Dale E. Wah
These plans were prepared by me or under my responsible control
DATE: 04/09/26

CITY ENGINEER	DATE:
DESIGN GROUP	
ENGINEER: DW	04/2026
DESIGNED BY: DA	04/2026
DRAWN BY: AA	04/2026
CHECKED BY: DK	04/2026
APPROVED BY: DW	04/2026

GUAM WATERWORKS AUTHORITY

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: STRUCTURAL DETAIL - 1

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO.
0001

DRAWING NO.
S-51

SHEET 38 OF 97 SHEETS

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DESIGN CRITERIA

INFLUENT WASTEWATER DESIGN VALUES

EXISTING MODEL AVERAGE DRY-WEATHER FLOW	0.69 MGD =	479 GPM
EXISTING PEAK WET WEATHER FLOW	5.50 MGD =	3819 GPM
DESIGN AVERAGE DRY-WEATHER FLOW	0.74 MGD =	514 GPM
DESIGN PEAK WET WEATHER FLOW	5.57 MGD =	3868 GPM

MAMAJANAO PUMP STATION
SUBMERSIBLE DRY-PIT PUMPS

NUMBER OF UNITS	3 DUTY + 1 STANDBY PUMP
TYPE	VERTICAL, NON-CLOG SUBMERSIBLE, DRY-PIT PUMP
CAPACITY (PER PUMP)	1.94 MGD = 1350.00 GPM
STATION FIRM CAPACITY	5.83 MGD = 4050.00 GPM
TOTAL DYNAMIC HEAD (TDH)	90 FT
SPEED (MAX)	1800 RPM
MOTOR HORSEPOWER	100 HP
MOTOR CONTROLLER	SOFT STARTER

MAMAJANAO PUMP STATION
SUMP PUMPS

NUMBER OF UNITS	1 DUTY + 1 STANDBY PUMP
TYPE	SIMLEX, NON-CLOG SUBMERSIBLE
CAPACITY (PER PUMP)	0.07 MGD = 50 GPM
STATION FIRM CAPACITY	0.07 MGD = 50 GPM
TOTAL DYNAMIC HEAD (TDH)	12 FT
SPEED (MAX)	1800 RPM
MOTOR HORSEPOWER	¾ HP
MOTOR CONTROLLER	SOFT STARTER

2

LEGENDS AND SYMBOLS

- GATE VALVE
- GLOBE VALVE
- PLUG VALVE
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- BALL CHECK VALVE
- SOLENOID VALVE
- PRESSURE/AIR RELIEF VALVE
- VACUUM RELIEF VALVE
- PRESSURE/AIR RELIEF AND VACUUM RELIEF VALVE
- KNIFE GATE VALVE
- STRAINER
- QUICK CONNECTOR
- CAP OR PLUG
- CAP OR PLUG
- REDUCER OR INCREASER
- MECHANICAL PIPE COUPLING
- FLEXIBLE PIPE COUPLING (FPC)
- FLEXIBLE COUPLING
- ORIFICE METER
- UNION
- PIPE ANCHOR
- CALIBRATION CHAMBER
- EXISTING PIPELINE/EQUIPMENT
- DEMOLISHED PIPELINE/EQUIPMENT
- NEW PIPELINE/EQUIPMENT
- FLANGE JOINT
- MECHANICAL JOINT
- RESTRAINED JOINT
- SOLVENT WELD JOINT
- WELDED JOINT
- BELL AND SPIGOT JOINT
- GROOVED END JOINT
- THREADED JOINT
- BUTTERFLY VALVE
- SIGHT GLASS
- PULSATION DAMPER
- PI — PRESSURE INDICATOR
- ROTAMETER
- PRESSURE GAUGE AND ISOLATION VALVE
- FS — FLOW SWITCH
- CONCRETE
- MORTAR, GROUT OR PLASTER
- CONCRETE BLOCK
- GRATING SPAN
- CHECKER PLATE
- STEEL OR STAINLESS STEEL
- P-203 — EQUIPMENT DESIGNATION
- 16"-W — PIPING DESIGNATION
- @ — AT
- & OR — AND
- ⌀ — ROUND OR DIAMETER
- ∠ — ANGLE
- X 9.50 — SPOT ELEVATION
- ℄ — CENTER LINE
- P — PLATE OR PROPERTY LINE
- W/ — WITH
- W/O — WITHOUT

NOTE:
SYMBOLS ARE FOR REFERENCE ONLY, NOT ALL SYMBOLS ARE USED IN THESE CONTRACT DRAWINGS

GENERAL NOTES:

1. SEE SPECIFICATIONS FOR PIPING SYSTEM MATERIALS, LINING, COATING AND DESIGN REQUIREMENTS.
2. WHEN EQUIPMENT IS NOTED AS "TYP OF X", "X" DESIGNATES THE TOTAL QUANTITY OF THAT PARTICULAR EQUIPMENT FOR THAT PARTICULAR AREA/BUILDING CODE.
3. SIZE OF FITTINGS SHOWN ON PLANS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FIR ADJACENT RUN OF PIPE.
4. NOT ALL THE REQUIRED FITTINGS ARE SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE FITTINGS SHOWN ON DRAWINGS AND ANY ADDITIONAL FITTINGS AS REQUIRED BY PIPNG ARRANGEMENTS SHOWN ON THE DRAWINGS AND PER EQUIPMENT FURNISHED.
5. PROVIDE ALL PIPE SUPPORTS FOR SUPPORT OF ALL PIPE AND DEVICES PER SPECIFICATION SECTION 40 23 19.01 TO THE SATISFACTION OF THE GWA AND ENGINEER. PIPING AND ACCESSORIES IN THE CONTAINMENT AREA SHALL BE MOUNTED ON NON-METALIC PIPE SUPPORTS.
6. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED PIPE ELEVATIONS.
7. ALL EQUIPMENT AND MATERIALS SHALL BE PER GWA'S AND PROJECT SPECIFICATIONS UNLESS NOTED OTHERWISE.
8. SEE PLUMBING DRAWINGS FOR PLUMBING AND DRAINAGE FIXTURES.
9. VERIFY ALL DIMENSIONS OF THE EQUIPMENT PRIOR TO ORDERING PIPE AND FITTINGS.
10. ALL FLEXIBLE CONNECTORS OR FLANGED COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCK, OR ANCHORS, UNLESS NOTED OTHERWISE. THRUST PROTECTION SHALL BE ADEQUATE FOR TEST PRESSURE SPECIFIED.
11. ALL PIPE PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL REQUIRE FIRESTOPPING.
12. THE CONTRACTOR SHALL VERIFY SUCTION AND DISCHARGE PIPING OF PUMPS ARE INSTALLED AND SUPPORTED TO PREVENT IMPARTING ANY STRAIN ON THE PUMPS.
13. ALL BOLTS AND NUTS SHALL BE 316 STAINLESS STEEL UNLESS NOTED OTHERWISE.
14. WARNING SIGNS SHALL BE PROVIDED PER SPECIFICATIONS ON FRONT AND BACK OF ALL REMOTELY CONTROLLED EQUIPMENT.
15. MOUNT ALL VALVES AND MANUAL VALVE OPERATORS IN ACCESSIBLE LOCATIONS WITH UNOBSTRUCTED VALVE OPERATOR POSITION FOR EASE OF OPERATION.
16. NOT ALL INSTRUMENTATION ANF ELECTRIC MOTOR VALVE OPERATORS ARE SHOWN ON THE MECHANICAL DRAWINGS. REFER TO THE ELECTRICAL AND INSTRUMENTATION DRAWINGS FOR INSTRUMENT AND VALVE OPERATOR LOCATIONS AND DETAILS.
17. ALL AIR/VAC VALVES ARE TO BE PIPED TO A DRAIN (INSIDE) OR THE GROUND (OUTSIDE)
18. CONTRACTOR IS RESPONSIBLE FOR DETERMINING CONSTRUCTION STAGING AREAS AND COORDINATING WITH APPROPRIATE AGENCIES AND PROPERTY OWNERS.
19. INSPECTIONS AND ACCEPTANCE OF WORK SHALL BE COORDINATED WITH THE RESIDENT PROJECT REPRESENTATIVE (RPR). WORK NOT INSPECTED OR NOT MEETING GWA/DPW STANDARDS MAY REQUIRE REMOVAL AND REPLACEMENT AT THE CONTRACTOR 'S EXPENSE.
20. CONTRACTOR SHALL MAINTAIN A COMPLETE SET OF RED-LINED "AS-BUILT" DRAWINGS SHOWING ALL FIELD CHANGES. FINAL AS-BUILT DRAWINGS SHALL BE SUBMITTED TO THE CONTRACTING OFFICER UPON COMPLETION.
21. INSTALL PIPING AND DUCTWORK TO SUIT FIELD CONDITIONS AND COORDINATE WITH OTHER TRADES. DRAWINGS ARE DIAGRAMMATIC AND DO NOT SHOW EXACT ROUTING.
22. ALL MECHANICAL SYSTEM CONTROLS, CONDUIT, AND WIRING SHALL COMPLY WITH ELECTRICAL SPECIFICATIONS AND MANUFACTURER REQUIREMENTS.
23. PROTECT ALL EQUIPMENT, DUCTWORK, AND PIPING DURING CONSTRUCTION TO PREVENT DAMAGE OR DEBRIS INTRUSION.
24. CONTRACTOR SHALL COORDINATE PHASING AND INSTALLATION OF MECHANICAL WORK WITH OTHER TRADES. COSTS ASSOCIATED WITH IMPROPER SEQUENCING SHALL BE BORNE BY THE CONTRACTOR.
25. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY. WORK CALLED FOR IN ONE SHALL BE BINDING AS IF CALLED FOR IN BOTH.
26. CONTRACTOR SHALL PROVIDE ALL INCIDENTAL ITEMS REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM, EVEN IF NOT SPECIFICALLY SHOWN.
27. WHERE EQUIPMENT DIMENSIONS ARE NOT SHOWN, CONTRACTOR SHALL OBTAIN MANUFACTURER SHOP DRAWINGS AND VERIFY CLEARANCE REQUIREMENTS PRIOR TO INSTALLATION.
28. NO MECHANICAL PENETRATIONS, EMBEDS, SLEEVES, OR SUPPORTS SHALL BE INSTALLED THROUGH STRUCTURAL ELEMENTS WITHOUT APPROVAL OF THE STRUCTURAL ENGINEER.
29. COORDINATE FINAL MECHANICAL EQUIPMENT LAYOUT TO PROVIDE ADEQUATE CLEARANCE FOR MAINTENANCE AND REMOVAL.
30. PROVIDE SUPPORTS AND SEISMIC RESTRAINTS FOR ALL WASTE WATER PUMPING SYSTEM EQUIPMENT AND PIPING IN ACCORDANCE WITH STRUCTURAL DRAWINGS AND SPECIFICATIONS.
31. PROVIDE ANCHOR BOLTS OF PROPER SIZE, TYPE, LENGTH, AND EMBEDMENT TO SATISFY EQUIPMENT MANUFACTURER REQUIREMENTS AND STRUCTURAL DESIGN CRITERIA.
32. ALL BURIED PIPING SHALL BE TESTED IN ACCORDANCE WITH PROJECT SPECIFICATIONS PRIOR TO BACKFILL.
33. ALL STAINLESS STEEL COMPONENTS EXPOSED TO WASTEWATER ENVIRONMENT SHALL BE PASSIVATED AFTER FABRICATION.
34. ALL FLANGED JOINTS SHALL BE ALIGNED TO PREVENT BOLT BENDING OR FLANGE DISTORTION.
35. PROVIDE DIELECTRIC ISOLATION BETWEEN DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
36. FIELD VERIFY EXISTING PIPE ELEVATIONS AND TIE-IN LOCATIONS PRIOR TO FABRICATION OF NEW PIPING.
37. CONTRACTOR SHALL PROVIDE TEMPORARY BYPASS PUMPING AS REQUIRED TO MAINTAIN CONTINUOUS WASTEWATER SERVICE.

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NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO. 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.
INDEX NO.

JARETT BROWN — CERTIFICATE Nº1478 — CIVIL — EXP. 4/30/2026 — GUAM — PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER — DATE:
DESIGN GROUP
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: NOTES, LEGEND, AND SYMBOLS
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15, MANGILAO, GUAM 96913

WORK ORDER NO. 6074567
DRAWING NO. W-01

NEW MAMAJANAO PUMP STATION MISC. EQUIPMENT SCHEDULE

TAG NO.	LOCATION	DESCRIPTION	CAPACITY	SPEC SECTION
FE-101	PUMP DISCHARGE HEADER	MAG METER	0-5000 GPM	40 91 00
PI-201	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0 TO 100 PSI	40 91 00
PI-202	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0 TO 100 PSI	40 91 00
PI-203	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0 TO 100 PSI	40 91 00
PI-204	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0-200 PSI	40 91 00
LIT-101	WETWELL RADAR LEVEL TRANSMITTER	PRESSURE GAUGE	0-12 FT	40 91 00
LIT-102	WETWELL RADAR LEVEL TRANSMITTER	PRESSURE GAUGE	0-12 FT	40 91 00
HC-1	PUMP STATION GROUND LEVEL	OVERHEAD HOIST CRANE	2-TON 3 HP	41 22 23.19
HC-2	PUMP STATION BASEMENT LEVEL	OVERHEAD HOIST CRANE	2-TON 3 HP	41 22 23.19

NEW MAMAJANAO PUMP STATION PUMP SCHEDULE

TAG NO.	NO OF UNITS			LOCATION	SERVICE	TYPE	CAPACITY (GPM)	TDH (FT)	NPSHA (FT)	DRIVER (HP)	STATIC[1] HEAD (FT)		ELECTRICAL AREA CLASSIFICATION	SPECIFICATION	REMARKS
	TOTAL	OPERATING	STANDBY				EACH PUMP								
P-1	4	3	1	MAMAJANAO DRY PIT PUMP ROOM	WET WELL PUMPS	VERTICAL, DRYPIT NON-CLOG SUBMERSIBLE	1350	90	33	60	52	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA	43 21 00.06	
P-2							1350	90	33	60	52	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA		
P-3							1350	90	33	60	52	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA		
P-4							1350	90	33	60	52	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA		
SP-1	2	1	1	MAMAJANAO DRY PIT PUMP ROOM	SUMP PUMPS	SIMPLEX SUBMERSIBLE	35	12	34	3/4	10	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA	43 21 14	
SP-2							35	12	34	3/4	10	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA		

(1) MEASURED HALF WAY BETWEEN HIGH AND LOW WATER SETTINGS

NEW MAMAJANAO PUMP STATION PIPING SCHEDULE

ABBREVIATIONS	SERVICE	DIAMETER (in)	MATERIALS	CLASS	JOINTS/ FITTINGS	TEST PRESSURE/ METHOD	INTERIOR LINING	EXTERIOR COATING	PIPE SPEC
WW	SEWER	8	DIP (AWWA C151)	CL53	FLANGE (ANSI 150#)	150 PSI	CERAMIC EPOXY	THERMOSET EPOXY	40 23 19.04
WW	SEWER	10	DIP (AWWA C151)	CL53	FLANGE (ANSI 150#)	150 PSI	CERAMIC EPOXY	THERMOSET EPOXY	40 23 19.04
WW	SEWER	14	DIP (AWWA C151)	CL53	FLANGE (ANSI 150#)	150 PSI	CERAMIC EPOXY	THERMOSET EPOXY	40 23 19.04
DR	SUMP	2	CPVC (ASTM F441)	SCH 80	SOLVENT WELD, FLANGED AT EQUIPMENT	NONE/VISUAL LEAK TEST	NONE	NONE	33 30 00
DR	SUMP	2	REINFORCED EPDM FLEXIBLE HOSE	150 PSI WIN WP	FLANGED, ANSI 150#	NONE/VISUAL LEAK TEST	NONE	NONE	33 30 00

NEW MAMAJANAO PUMP STATION ≥2" VALVE SCHEDULE

TAG NO.	SERVICE /LINE	SIZE (in)	VALVE TYPE	SPEC	END CONNECTION	OPERATING MECHANISM	CLASS	LOCATION/REMARKS
PV-1A	PUMP 1 SUCTION	10	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-2A	PUMP 2 SUCTION	10	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-3A	PUMP 3 SUCTION	10	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-4A	PUMP 4 SUCTION	10	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-1B	PUMP 1 DISCHARGE	8	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-2B	PUMP 2 DISCHARGE	8	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-3B	PUMP 3 DISCHARGE	8	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-4B	PUMP 4 DISCHARGE	8	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL GEAR OPERATOR		DRYWELL PUMP ROOM
PV-5	DISCHARGE HEADER	14	PLUG VALVE	33 30 00	FLANGED	CHAIN GEAR OPERATOR		DRYWELL PUMP ROOM
CV-1	PUMP 1 DISCHARGE	10	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM
CV-2	PUMP 2 DISCHARGE	10	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM
CV-3	PUMP 3 DISCHARGE	10	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM
CV-4	PUMP 4 DISCHARGE	10	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE	BY
1	ADDENDUM NO. 1 - REVISED CALLOUT	5/4/26	BTS

STRUCTURE NO.

INDEX NO.

JARRETT BROWN, REGISTERED PROFESSIONAL ENGINEER, CIVIL, No. 1350, GUAM

This work was prepared by me or under my responsible control.

DATE: 04/02/2026

CITY ENGINEER DATE:

DESIGN GROUP -

ENGINEER:

DESIGNED BY: Designer

DRAWN BY: RAMIL CARPIO

CHECKED BY: Checker

APPROVED BY: Approver

VERTICAL CONTROL: -

HORIZONTAL CONTROL: -

SHEET TITLE: PUMP, PIPING, AND VALVE SCHEDULES

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

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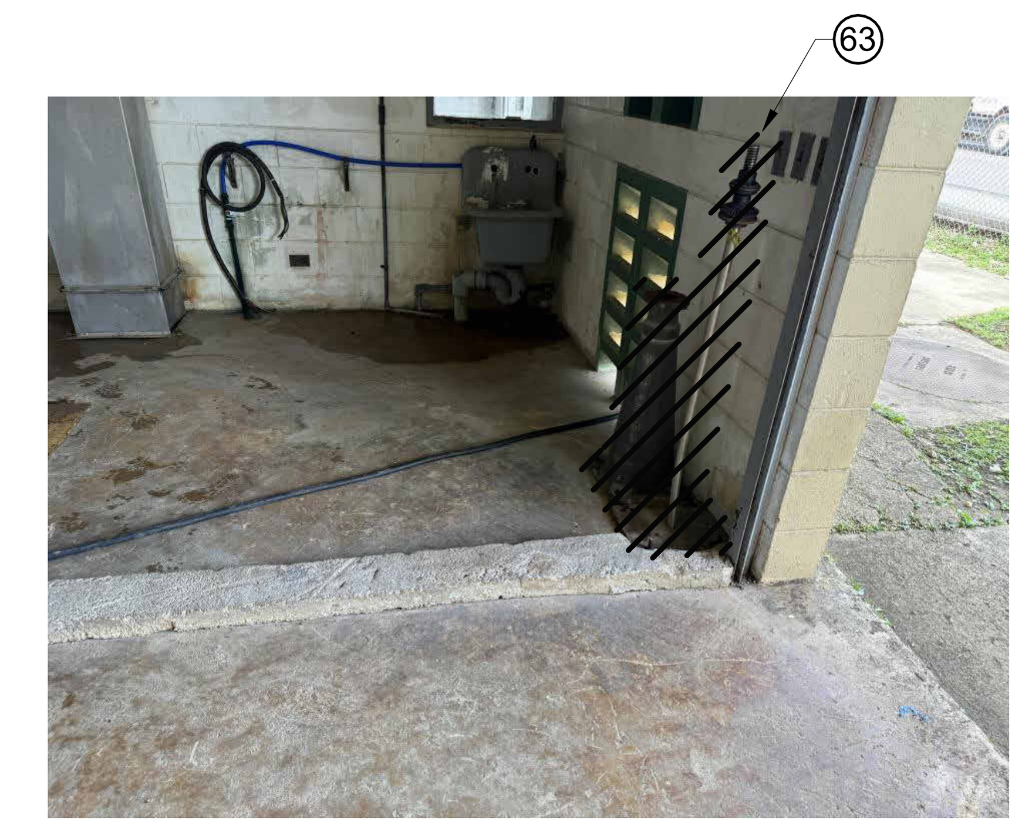
WORK ORDER NO.

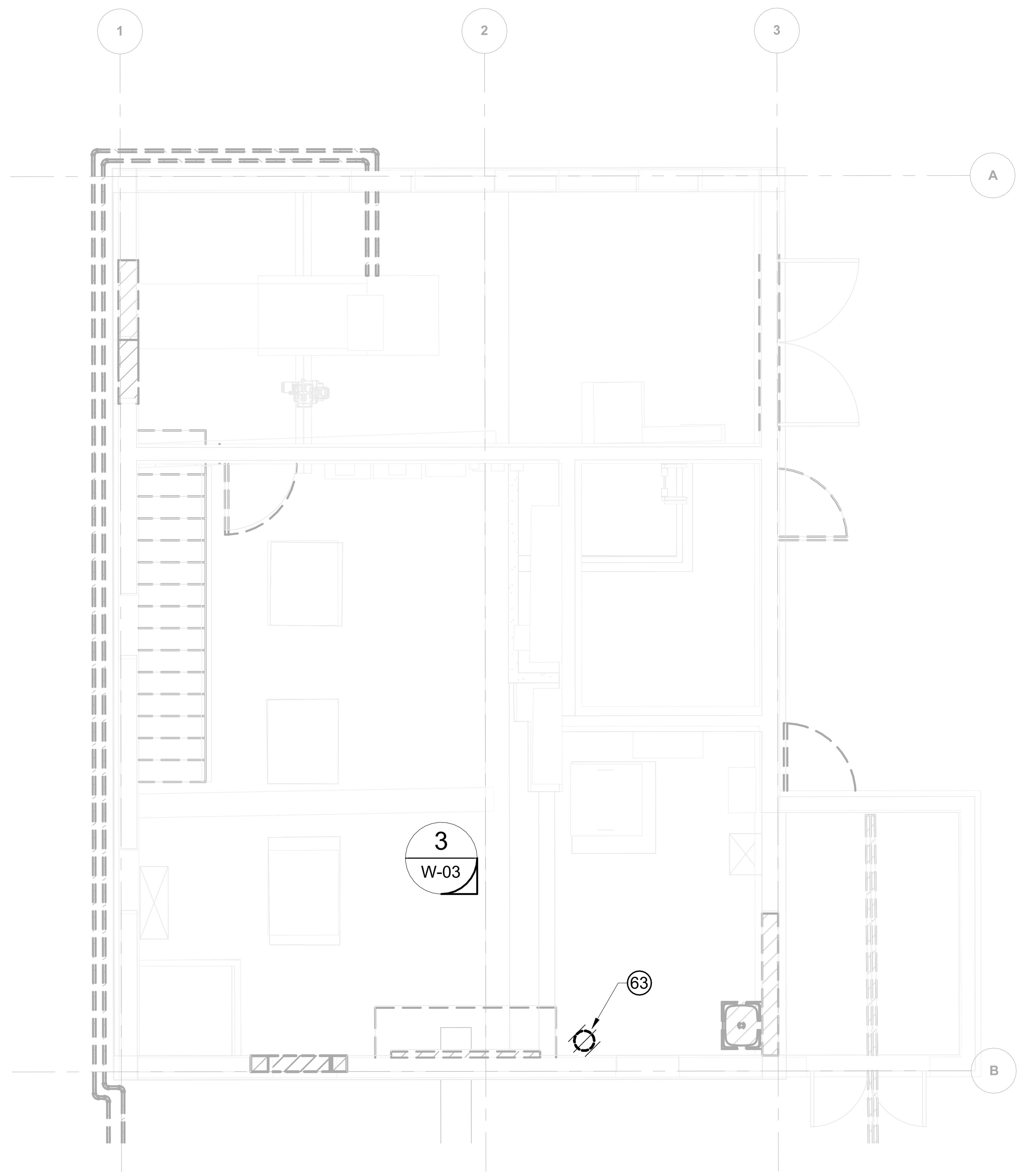
DRAWING NO. W-02

KEYNOTES

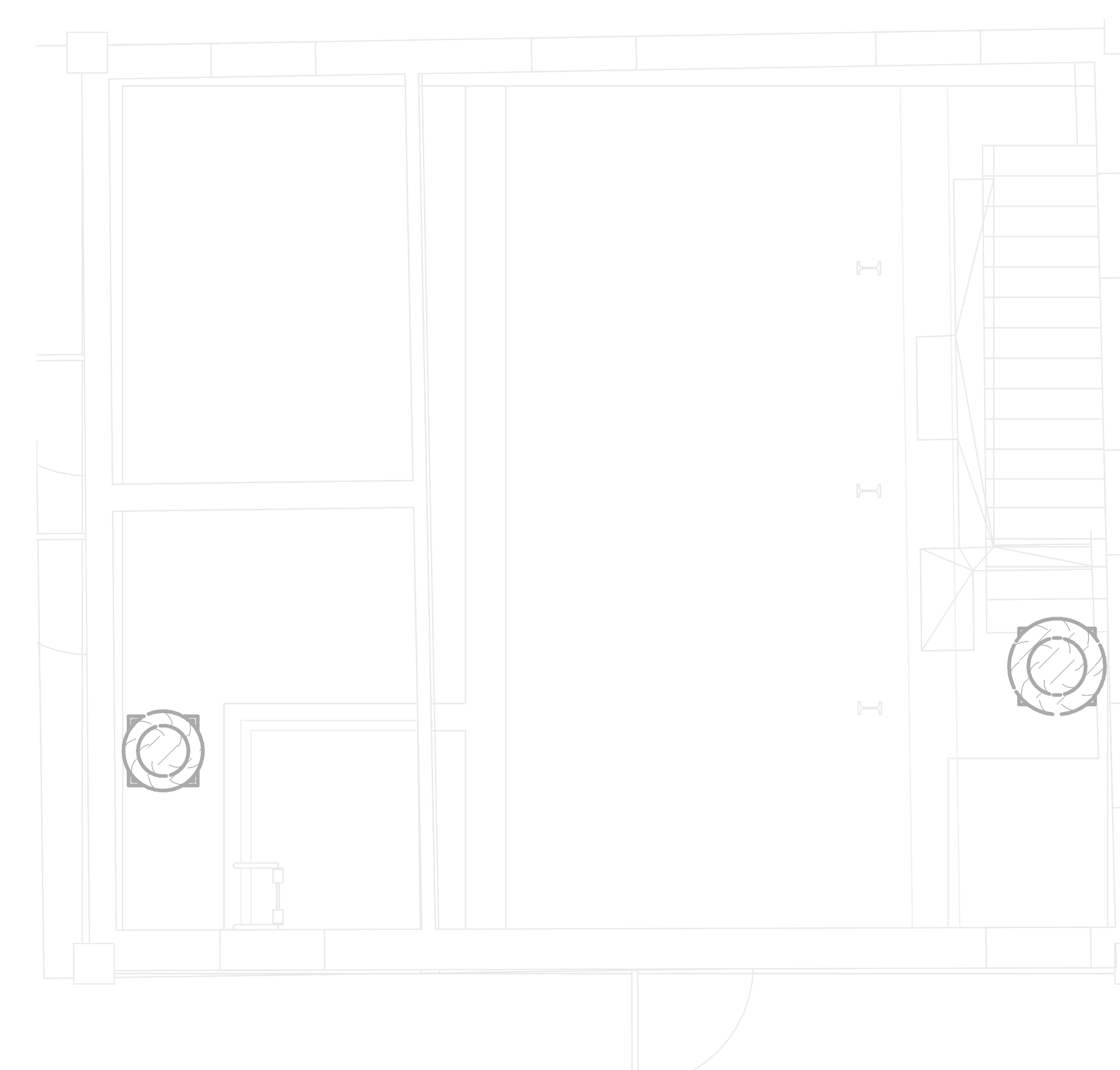
#	KEYNOTES
63	REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90.02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)



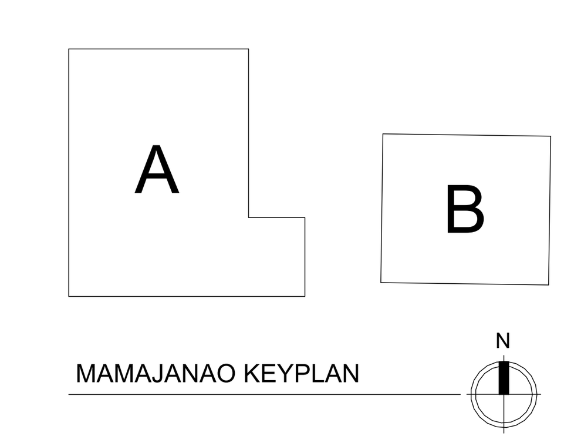
3 SLIDE GATE VALVE STEM
W-03 SCALE:NTS



1 MAMAJANAO - GROUND LEVEL DEMO A
W-03 SCALE: 1/4" = 1'-0"



2 MAMAJANAO - GROUND LEVEL DEMO B
W-03 SCALE: 1/4" = 1'-0"



N

0 1 2 4 8
1/4"=1'-0"

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2	ADDENDUM NO. 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

JARETT BROWN, CERTIFICATE No. 1478, CIVIL, GUAM, PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY
CITY ENGINEER
DESIGN GROUP
DATE:
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: DEMOLITION PLAN -GROUND LEVEL
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567

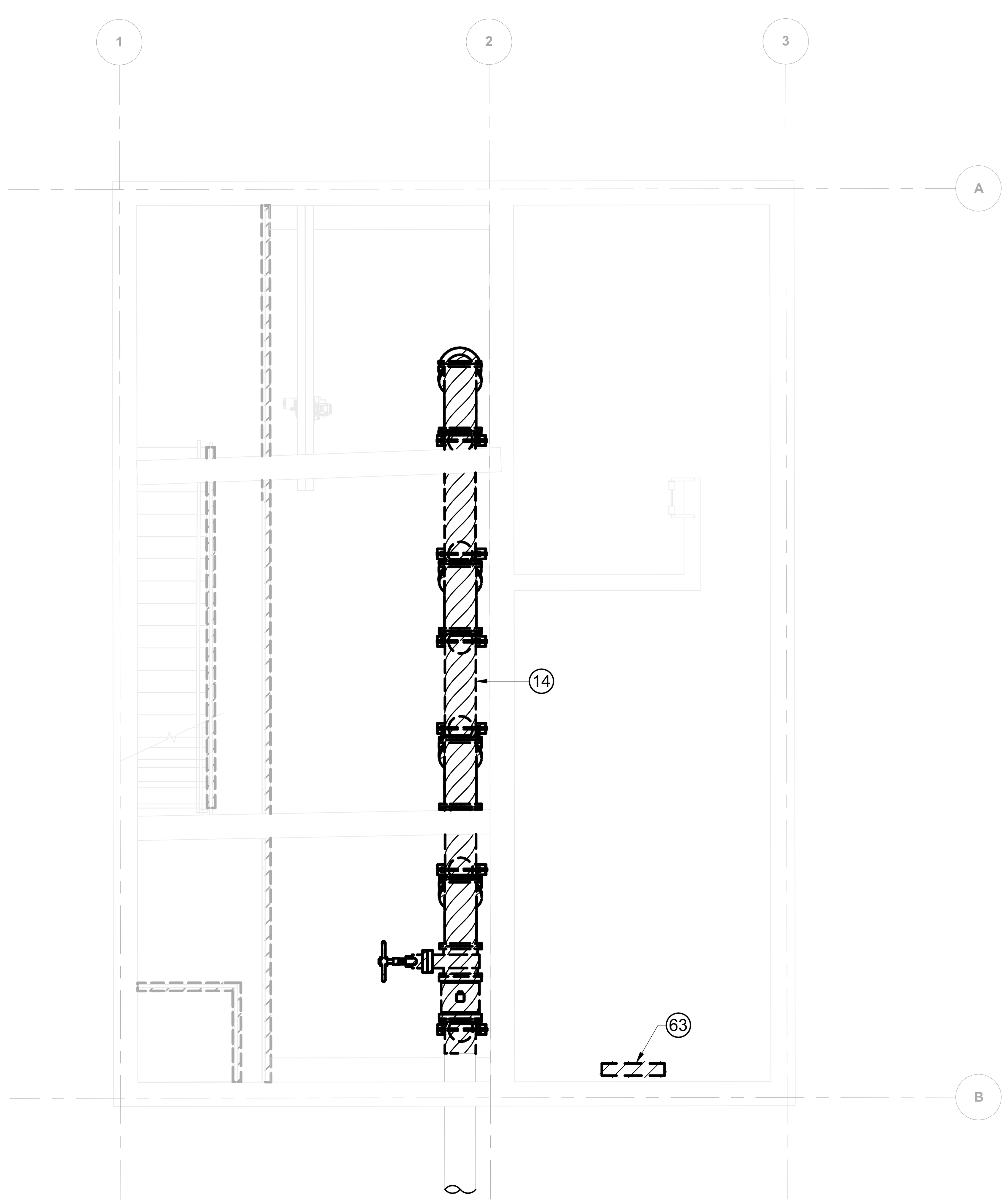
DRAWING NO. W-03

SHEET 49 OF 97 SHEETS

Sheet Version 3.0

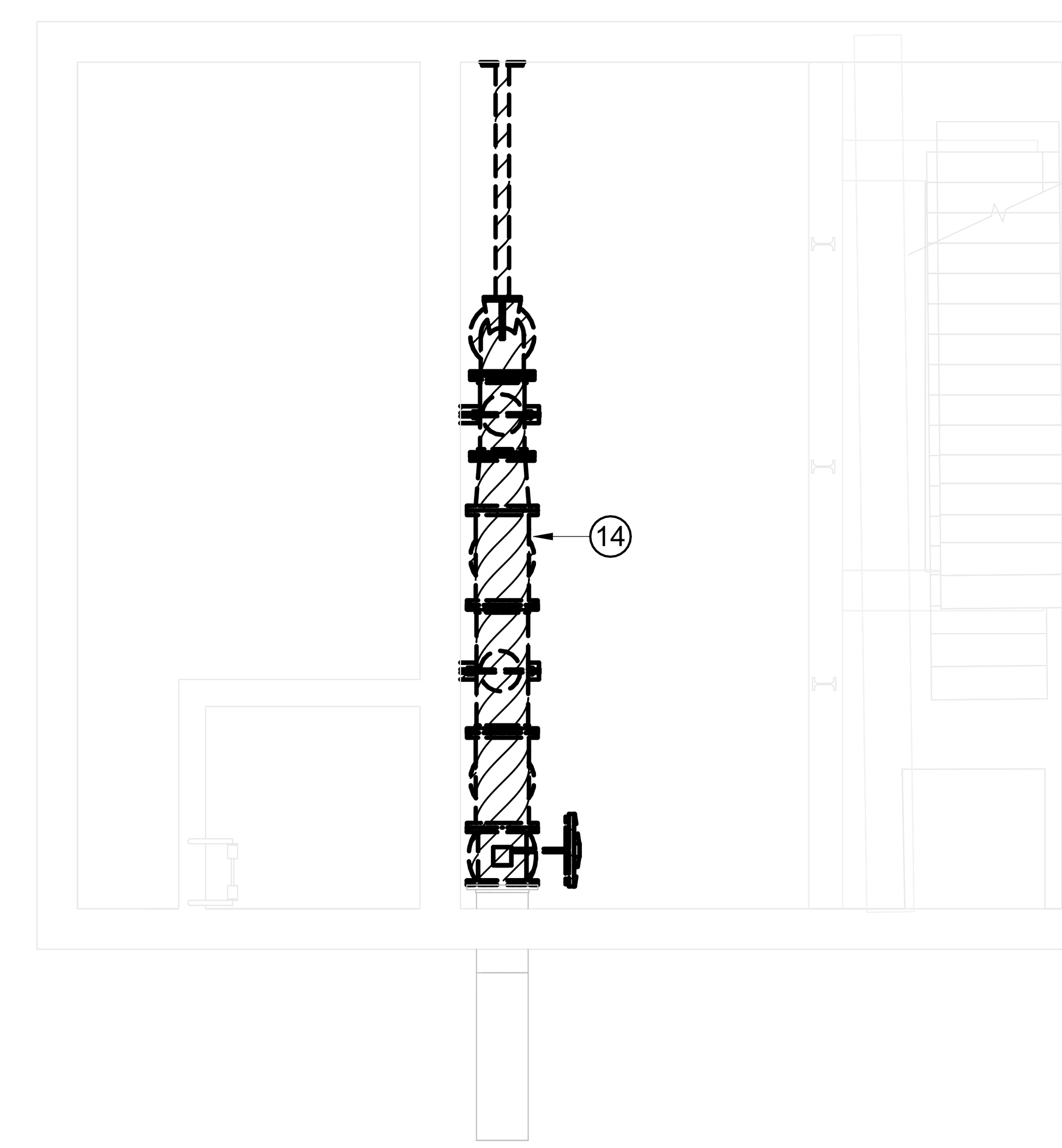
KEYNOTES

#	KEYNOTES
14	DEMOLISH 14" PIPING AND VALVES. SEE NEW HEADER ALIGNMENT ON SHEET M09.
63	REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90.02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)

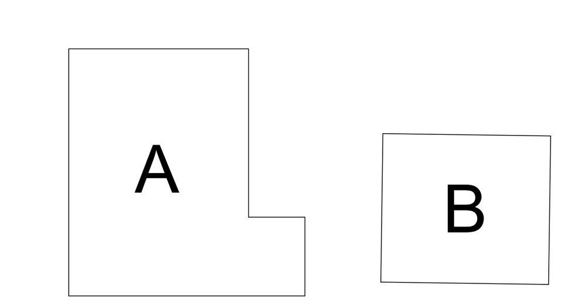


1 MAMAJANAO - INTERMEDIATE LEVEL DEMO A
W-04 SCALE: 1/4" = 1'-0"

3 SLIDE GATE - INTERMEDIATE LEVEL
W-04 SCALE:NTS



2 MAMAJANAO - INTERMEDIATE LEVEL DEMO B
W-04 SCALE: 1/4" = 1'-0"



MAMAJANAO KEYPLAN

N

0 1 2 4 8
1/4"=1'-0"

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STRUCTURE NO.

INDEX NO.

JARRETT BROWN, CIVIL, No1478, GUAM, PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

DESIGN GROUP - CITY ENGINEER DATE:

ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: DEMOLITION PLAN -INTERMEDIATE LEVEL
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567

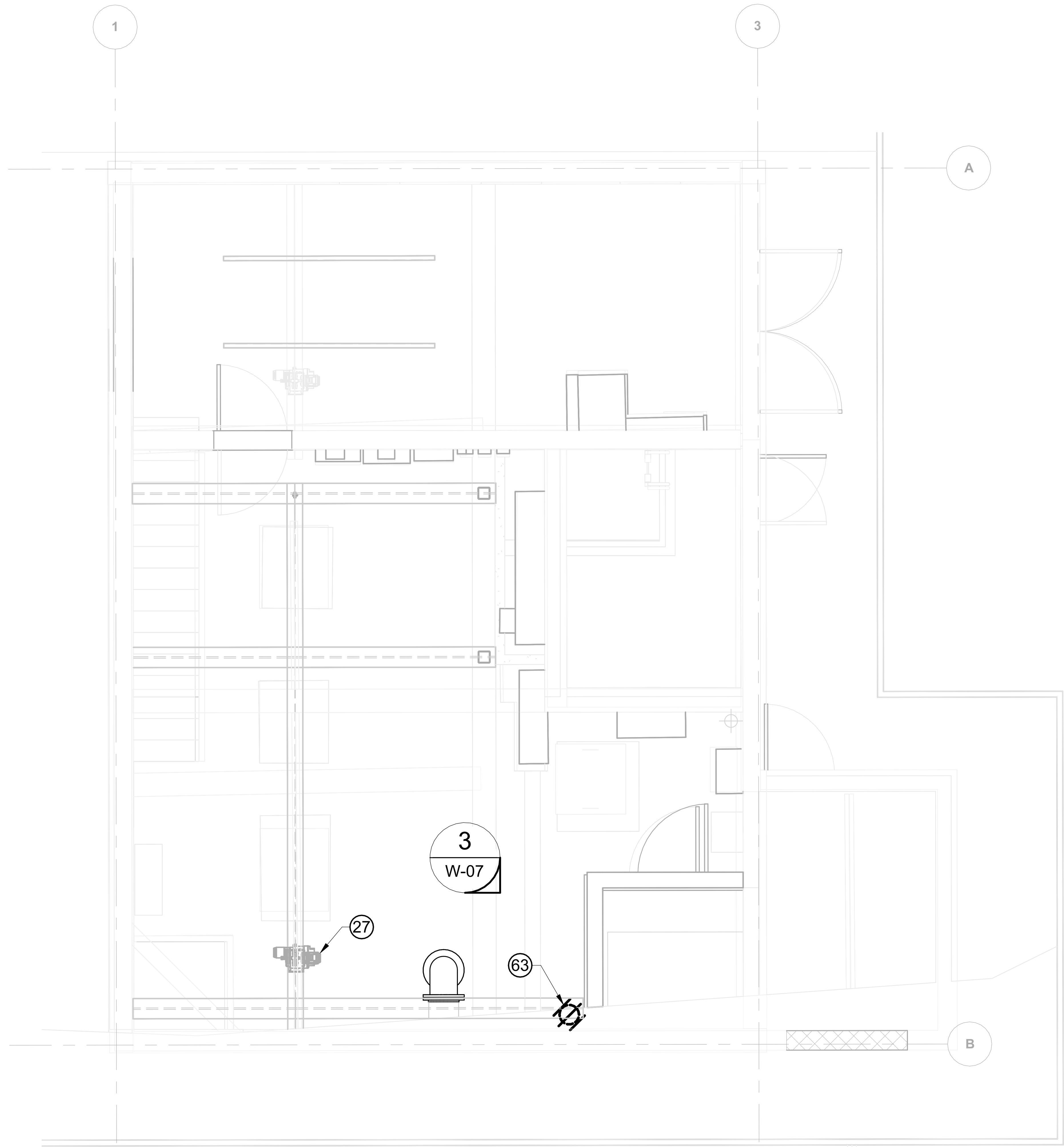
DRAWING NO. W-04

SHEET 50 OF 97 SHEETS

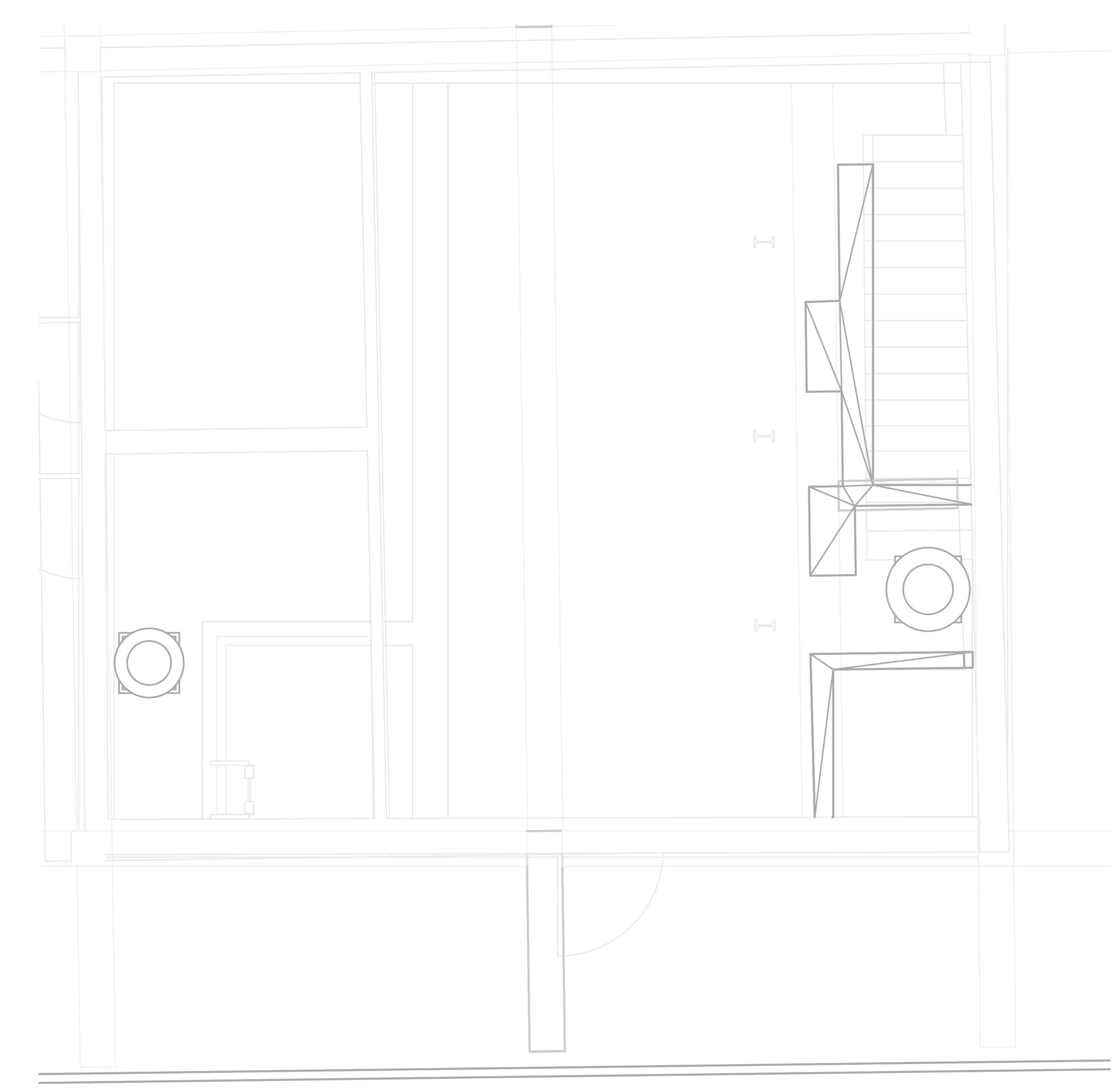
KEYNOTES

#	KEYNOTES
27	NEW OVERHEAD HOIST CRANE PER SPECIFCATION SECTION 43 21 23.19.
63	REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90.02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)

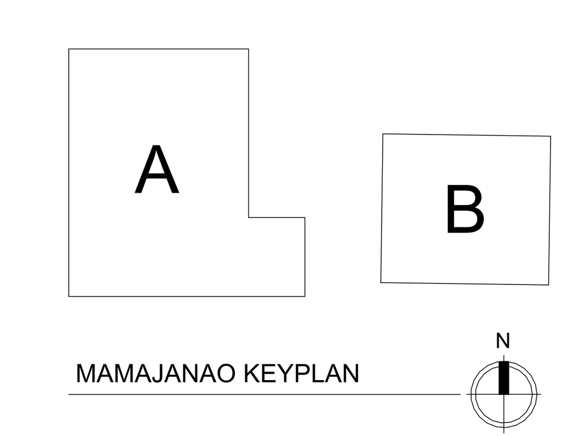
3 W-07 SLIDE GATE VALVE STEM. SCALE:NTS



1 W-07 NEW MAMAJANAO - GROUND LEVEL A PIPING PLAN
SCALE: 1/4" = 1'-0"



2 W-07 OLD MAMAJANAO - GROUND LEVEL B PIPING PLAN
SCALE: 1/4" = 1'-0"



0 1 2 4 8
1/4"=1'-0"

NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO. 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

JARETT BROWN CERTIFICATE №1478 CIVIL EXP. 4/30/2026 GUAM PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER
DESIGN GROUP
DATE:
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: PIPING PLAN - GROUND LEVEL
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

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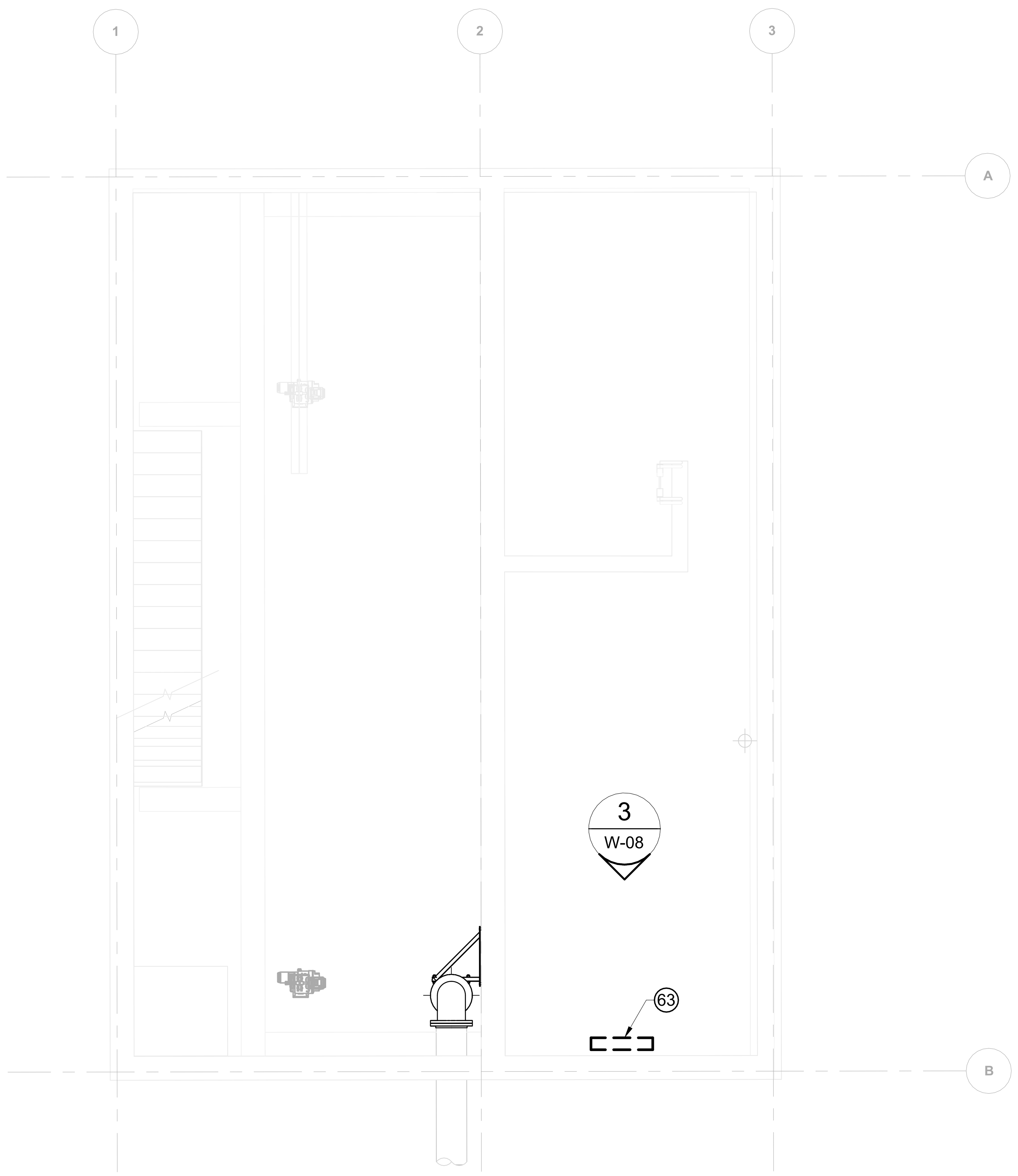
WORK ORDER NO. 6074567
DRAWING NO. W-07
SHEET 53 OF 97 SHEETS

Filename: Autodesk Docs://CI-AMER(US)-60745667-GWA TO2 CCTV Pump Station/6074567_GWA_M_R25_MAMAJANAO.rvt
Last Plotted: 5/7/2026 1:22:52 PM

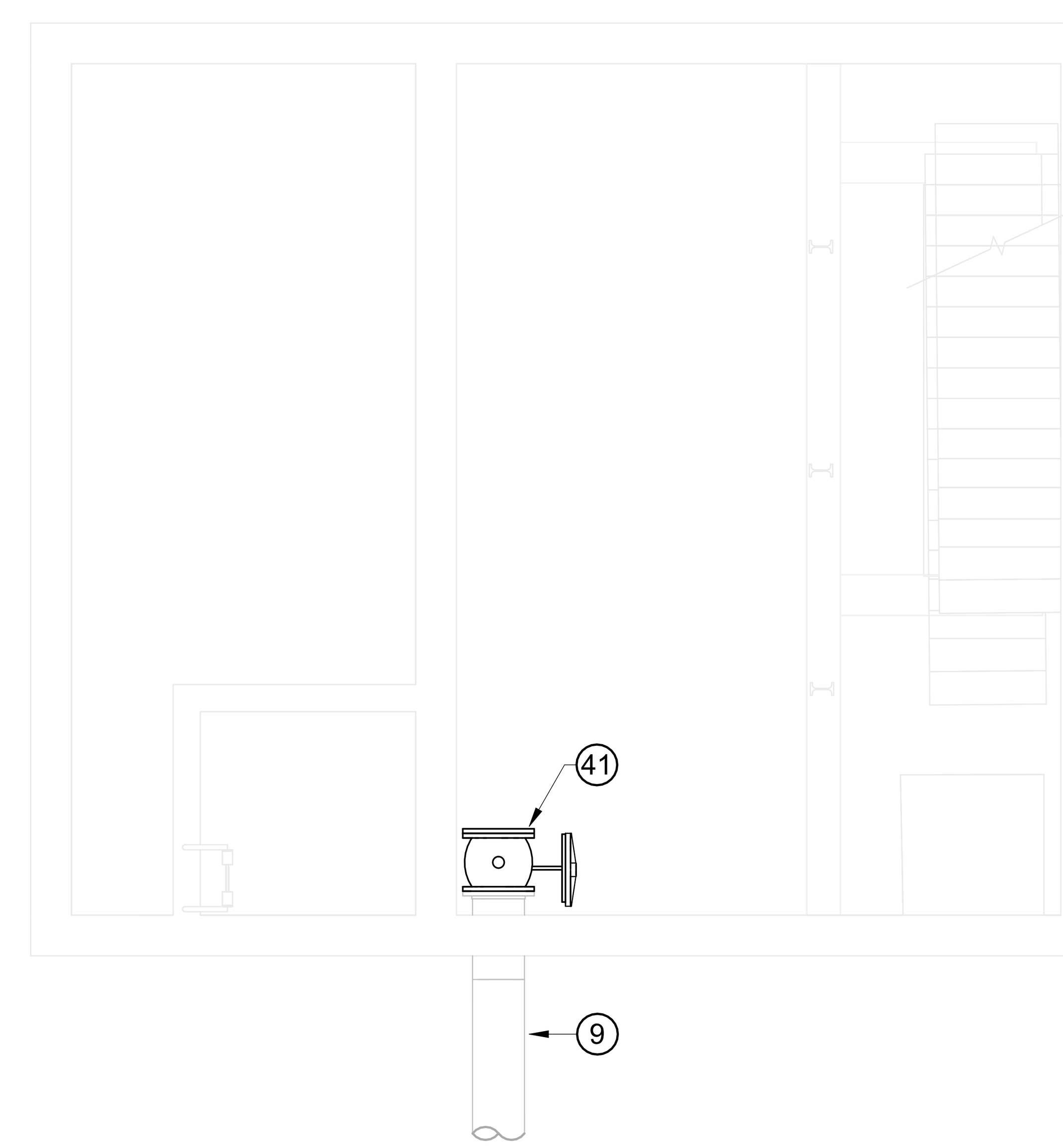
Sheet Version 3.0

#	KEYNOTES
9	ABANDON EXISTING PIPE IN PLACE
41	INSTALL BLIND FLANGE
63	REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90.02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)
67	REMOVE AND REPLACE IN-KIND STAINLESS STEEL MANUAL BARSCREEN (2)

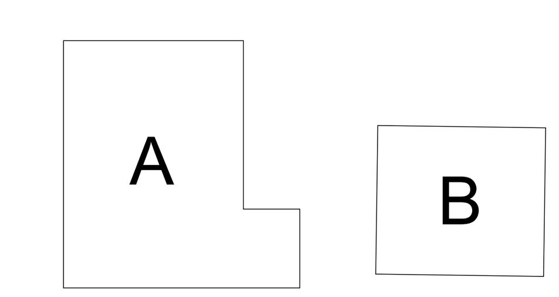
3 INFLUENT SLUICE GATE
W-08 SCALE: 1" = 1'-0"



1 NEW MAMAJANAO - INTERMEDIATE LEVEL A PIPING PLAN
W-08 SCALE: 1/4" = 1'-0"



2 OLD MAMAJANAO - INTERMEDIATE LEVEL B PIPING PLAN
W-08 SCALE: 1/4" = 1'-0"



MAMAJANAO KEYPLAN

N

0 1 2 4 8
1/4"=1'-0"

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NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO. 1 - REVISED CALLOUT	5/11/26	BTS

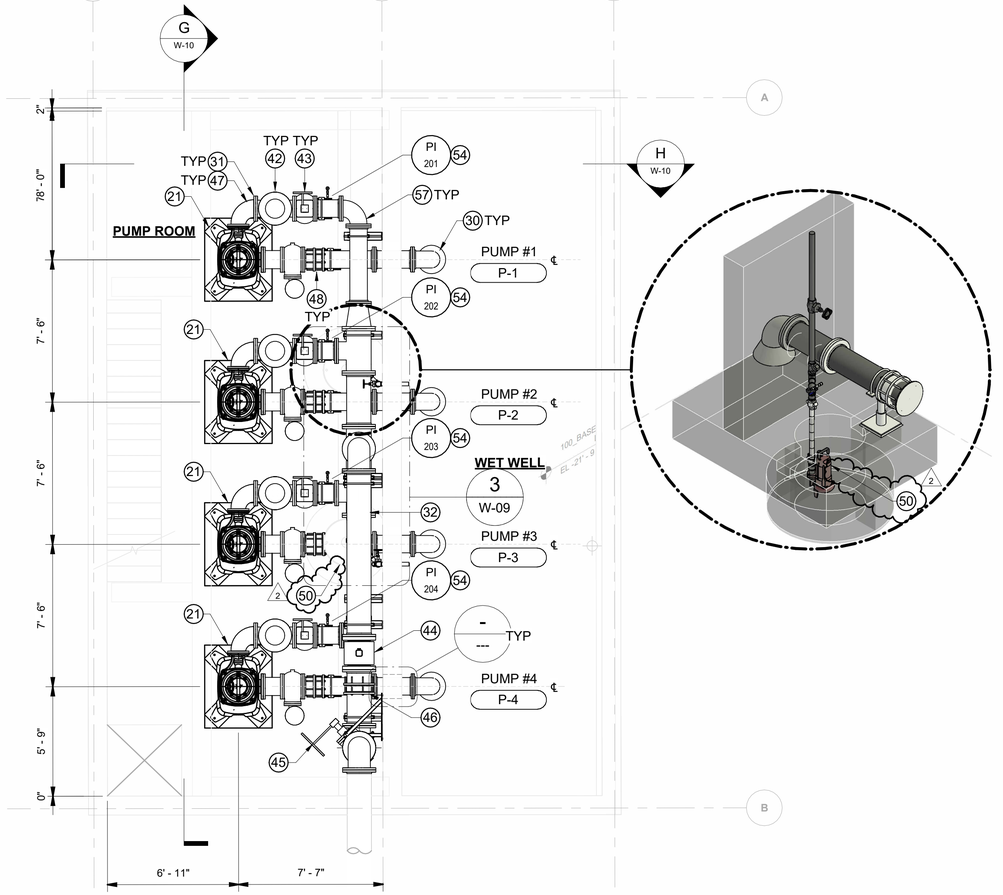
STRUCTURE NO.
INDEX NO.

JARRETT BROWN CERTIFICATE №1478 CIVIL EXP. 4/30/2026 GUAM PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

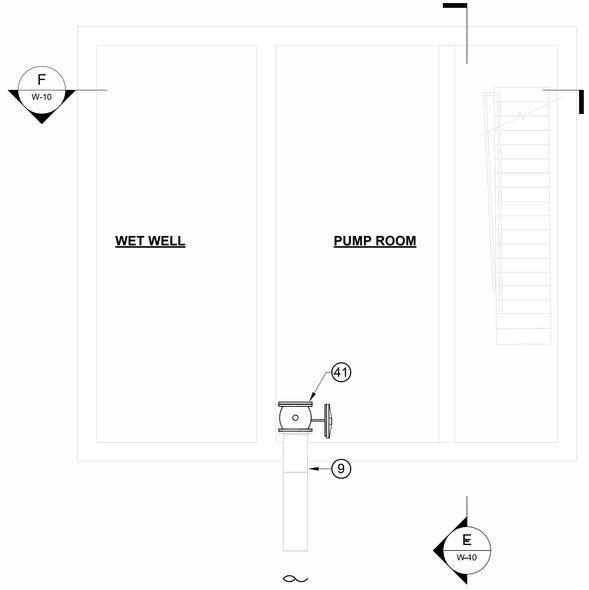
CITY ENGINEER
DESIGN GROUP
DATE:
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: PIPING PLAN - INTERMEDIATE LEVEL
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

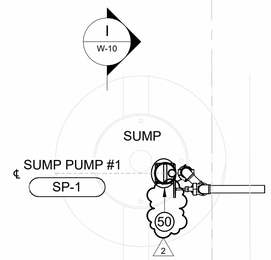
WORK ORDER NO. 6074567
DRAWING NO.
W-08

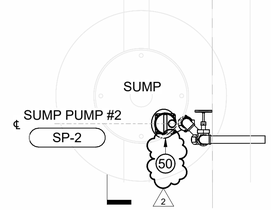


1 NEW MAMAJANAO - BASEMENT LEVEL A PIPING PLAN
W-09 | SCALE: 1/4" = 1'-0"



2 OLD MAMAJANAO - BASEMENT LEVEL B PIPING PLAN
W-09 | SCALE: 1/4" = 1'-0"





3 ENLARGED MAMAJANAO SUMP PUMP PLAN VIEW
W-09 | SCALE: 1/2" = 1'-0"

KEYNOTES

9 ABANDON EXISTING PIPE IN PLACE

21 NEW SELF-CLEANING NON-CLOG PUMP PER SPECIFCATION SECTION 43 21 00.06. (3 TOTAL)

30 NEW 14" PIPING AND VALVES TO EXTENT SHOWN.

31 NEW ALIGNMENT FOR 14" HEADER WITH ISOLATION VALVE.

32 NEW 14" PIPING HEADER WITH NEW ALIGNMENT WITH VERTICAL RUN FOR FLOW METER INSTALLATION.

41 INSTALL BLIND FLANGE

42 NEW 10" FLG RUBBER FLAPPER CHECK VALVE

43 NEW 10" FLG PLUG VALVE

44 NEW 14" FLG MAGNETIC FLOW METER

45 NEW 14" FLG PLUG VALVE

46 NEW 14" FLG DISMANTLING COUPLING

47 NEW 10"x8" FLG RED 90 ELBOW

48 NEW 10" FLG DISMANTLING COUPLING

2 50 NEW SUMP PUMP, (PENTAIR MDC SERIES) VALVES AND PIPING. SEAL WALL OPENING WATERTIGHT, SEE DETAIL.

54 INSTALL PRESSURE GAUGE PER DETAIL 4/M-13.

57 NEW 10" FLG SR 90 ELBOW

MAMAJANAO KEYPLAN

0 1 2 4 8
1/4"=1'-0"

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GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

LARRY B. BROWN CERTIFICATE NO. 14476 CIVIL GUAM PROFESSIONAL ENGINEER
I hereby certify that this work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER	-
DESIGN GROUP	
ENGINEER:	JB
DESIGNED BY:	BTS
DRAWN BY:	RC
CHECKED BY:	JF
APPROVED BY:	BS
VERTICAL CONTROL:	-
HORIZONTAL CONTROL:	-
SHEET TITLE:	PIPING PLAN - BASEMENT LEVEL
PROJECT:	MAMAJANAO WWPS MODIFICATIONS
ADDRESS:	688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567

DRAWING NO. W-09

SHEET 55 OF 97 SHEETS

Filename: Autodesk Docs://CI-AMER(US)-6074596?-GWA TO2 CCTV Pump Station/6074567_GWA_M_R25_MAMAJANAO.rvt
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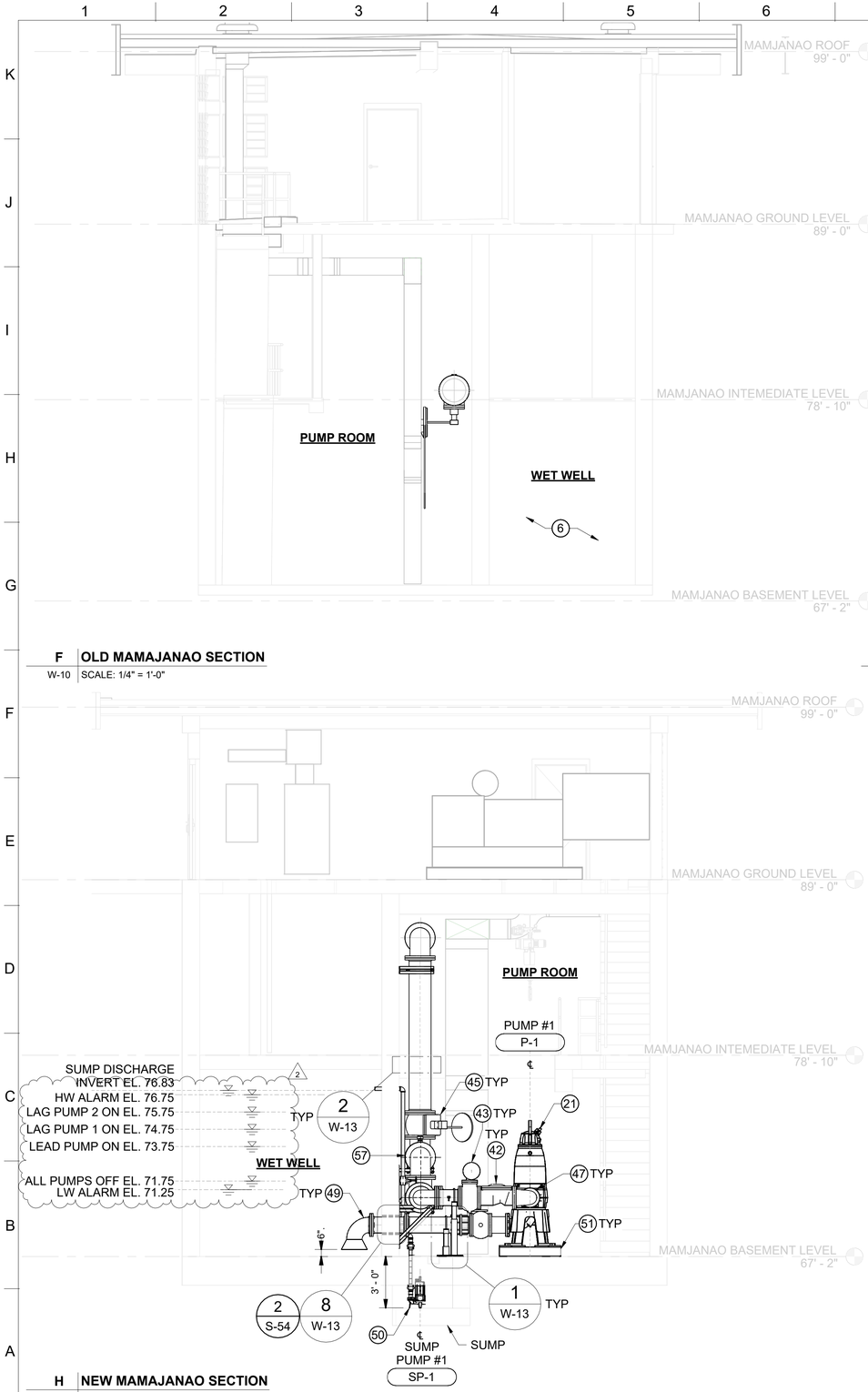
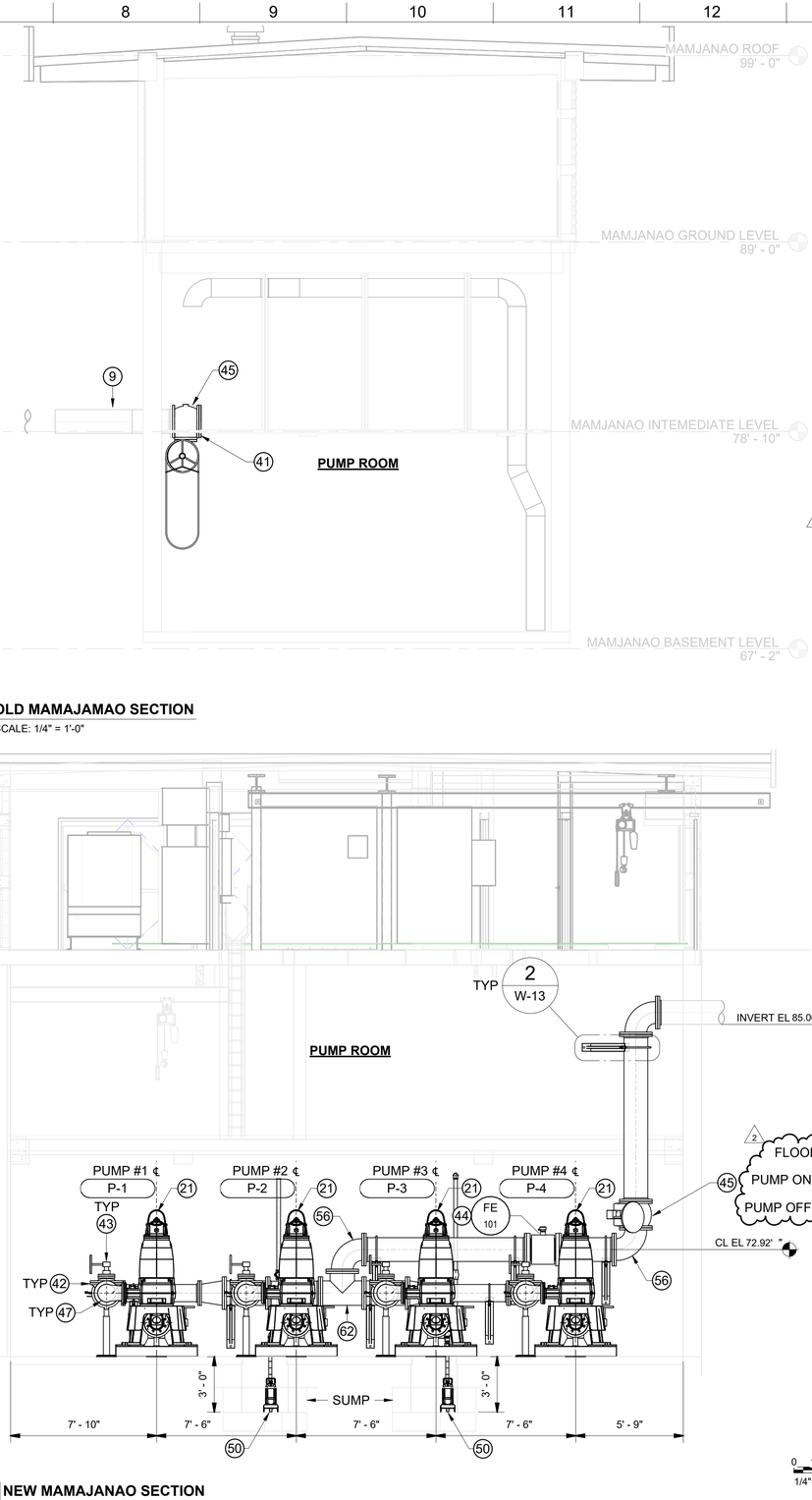
Sheet Version 3.0



F OLD MAMAJANAO SECTION

W-10 | SCALE: 1/4" = 1'-0"



E OLD MAMAJAMAO SECTION

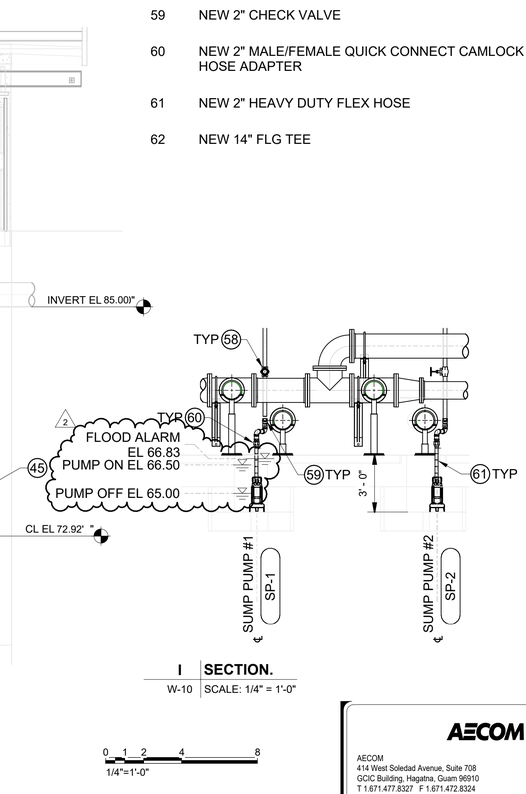
W-10 | SCALE: 1/4" = 1'-0"

H NEW MAMAJANAO SECTION

W-10 | SCALE: 1/4" = 1'-0"

G NEW MAMAJANAO SECTION

W-10 | SCALE: 1/4" = 1'-0"



I SECTION.

W-10 | SCALE: 1/4" = 1'-0"

0 1 2 4 8

1/4"=1'-0"

KEYNOTES

#	
6	ABANDON EXISTING WETWELL: PUMP, PIPING, AND APPURTENANCES SHALL BE REMOVED AND DISPOSED OF PER APPROVED DEMOLITION PLAN. CLEAN AND DEWATER THE WETWELL.
9	ABANDON EXISTING PIPE IN PLACE
21	NEW SELF-CLEANING NON-CLOG PUMP PER SPECIFCATION SECTION 43 21 00.06. (3 TOTAL)
41	INSTALL BLIND FLANGE
42	NEW 10" FLG RUBBER FLAPPER CHECK VALVE
43	NEW 10" FLG PLUG VALVE
44	NEW 14" FLG MAGNETIC FLOW METER
45	NEW 14" FLG PLUG VALVE
47	NEW 10"x8" FLG RED 90 ELBOW
49	NEW 10" ELBOW W/ 18" PUMP SUCTION BELLMOUTH AND 4 VANE FLOOR CONE
50	NEW SUMP PUMP, (PENTAIR MDC SERIES) VALVES AND PIPING. SEAL WALL OPENING WATERTIGHT, SEE DETAIL.
51	NEW EQUIPMENT PAD PER STRUCTURAL DETAIL.
56	NEW 14" FLG LR 90 ELBOW
57	NEW 10" FLG SR 90 ELBOW
58	NEW 2" GATE VALVE
59	NEW 2" CHECK VALVE
60	NEW 2" MALE/FEMALE QUICK CONNECT CAMLOCK HOSE ADAPTER
61	NEW 2" HEAVY DUTY FLEX HOSE
62	NEW 14" FLG TEE

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

LARRETT B. BROWN — No14476 — CIVIL — GUAM — PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.

DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER

-	DESIGN GROUP	DATE:
	ENGINEER: JB	
	DESIGNED BY: BTS	
	DRAWN BY: RC	
	CHECKED BY: JF	
	APPROVED BY: BS	

VERTICAL CONTROL: -

HORIZONTAL CONTROL: -

SHEET TITLE: BASEMENT PIPING SECTIONS

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567

DRAWING NO. W-10

SHEET 56 OF 97 SHEETS

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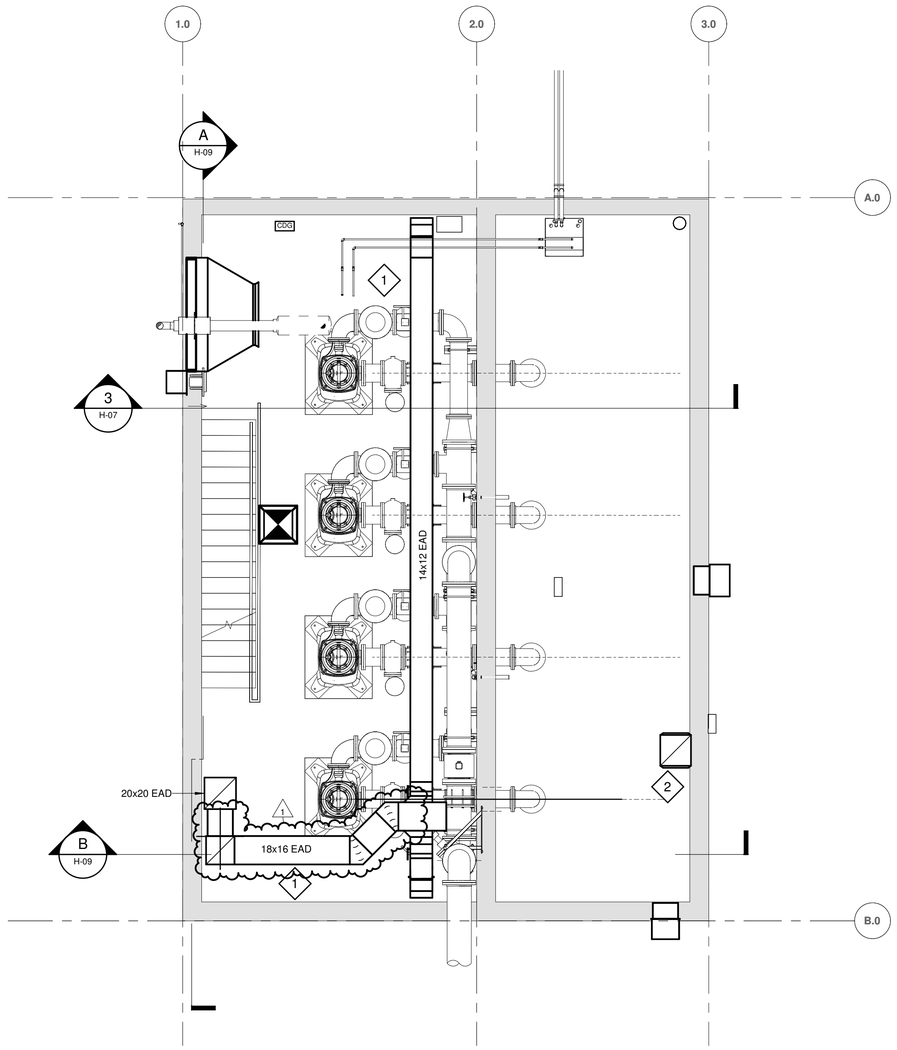

1 BASEMENT HVAC DUCTWORK PLAN
H-06 SCALE: 1/4" = 1'-0"

MECHANICAL NEW WORK NOTES

1	AT DRY WELL AREA, PROVIDE NEW ROOF MOUNTED EXHAUST FAN INCLUDING STAINLESS STEEL EXHAUST DUCTWORK, ROOF CURB, STAINLESS STEEL TIE ROD, CONTROLS, WIRING, SUPPORTS, HANGERS, AND OTHER RELATED ACCESSORIES.
2	AT WET WELL AREA, PROVIDE NEW ROOF MOUNTED EXHAUST FAN INCLUDING STAINLESS STEEL EXHAUST DUCTWORK, ROOF CURB, STAINLESS STEEL TIE ROD, CONTROLS, WIRING, SUPPORTS, HANGERS, AND OTHER RELATED ACCESSORIES.
3	AT NEW ELECTRICAL ROOM, PROVIDE NEW ROOF MOUNTED EXHAUST FAN INCLUDING STAINLESS STEEL EXHAUST DUCTWORK, ROOF CURB, STAINLESS STEEL TIE ROD, CONTROLS, WIRING, SUPPORTS, HANGERS, AND OTHER RELATED ACCESSORIES. PROVIDE THERMOSTATIC CONTROLLER FOR FAN OPERATION TO MAINTAIN 85°F ROOM CONDITION.
4	AT GENERATOR ROOM, PROVIDE NEW RADIATOR EXHAUST WALL LOUVER INCLUDING RADIATOR EXHAUST DUCTWORK, EXHAUST MUFFLER, DOOR LOUVER, CONTROLS, WIRING, SUPPORTS, HANGERS, AND OTHER RELATED ACCESSORIES. PROVIDE NEW WALL MOUNTED EXHAUST FAN WITH THERMOSTATIC CONTROLLER. PROVIDE STAINLESS STEEL WALLCAP AND INSECT SCREEN.
5	PROVIDE NEW ROOF MOUNTED MAKE-UP AIR FAN WITH SUPPLY AIR GRILLE, STAINLESS STEEL DUCTWORK, ROOF CURB, STAINLESS STEEL TIE-ROD, SUPPORTS AND OTHER RELATED ACCESSORIES. INTERLOCK MAKE-UP AIR FAN TO EXHAUST FAN AND PROVIDE MANUAL SWITCH.

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY:
1	Addendum No. 1 Revised Duct	5/6/26	SR

STRUCTURE NO.

INDEX NO.

This work was prepared by me or under my responsible control.
DATE:

GUAM WATERWORKS AUTHORITY

CITY ENGINEER	-
DESIGN GROUP	DATE:
ENGINEER:	
DESIGNED BY:	EDS/SQR
DRAWN BY:	SQR/EDN
CHECKED BY:	JVP
APPROVED BY:	JVP
VERTICAL CONTROL:	-
HORIZONTAL CONTROL:	-
SHEET TITLE:	BASEMENT HVAC DUCTWORK PLAN
PROJECT:	MAMAJANAO WWPS MODIFICATIONS
ADDRESS:	HARMON INDUSTRIAL PARK, GUAM 96913

MAMAJANAO KEYPLAN

0 1 2 4 8
1/4"=1'-0"

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WORK ORDER NO.
6074567

DRAWING NO.
H-06

SHEET 70 OF 97 SHEETS

Filename: Autodesk Docs://CI-AMER(US)-6074567-GWA TC02 CCTV Pump Station/6074567_GWA_H_R25.rvt
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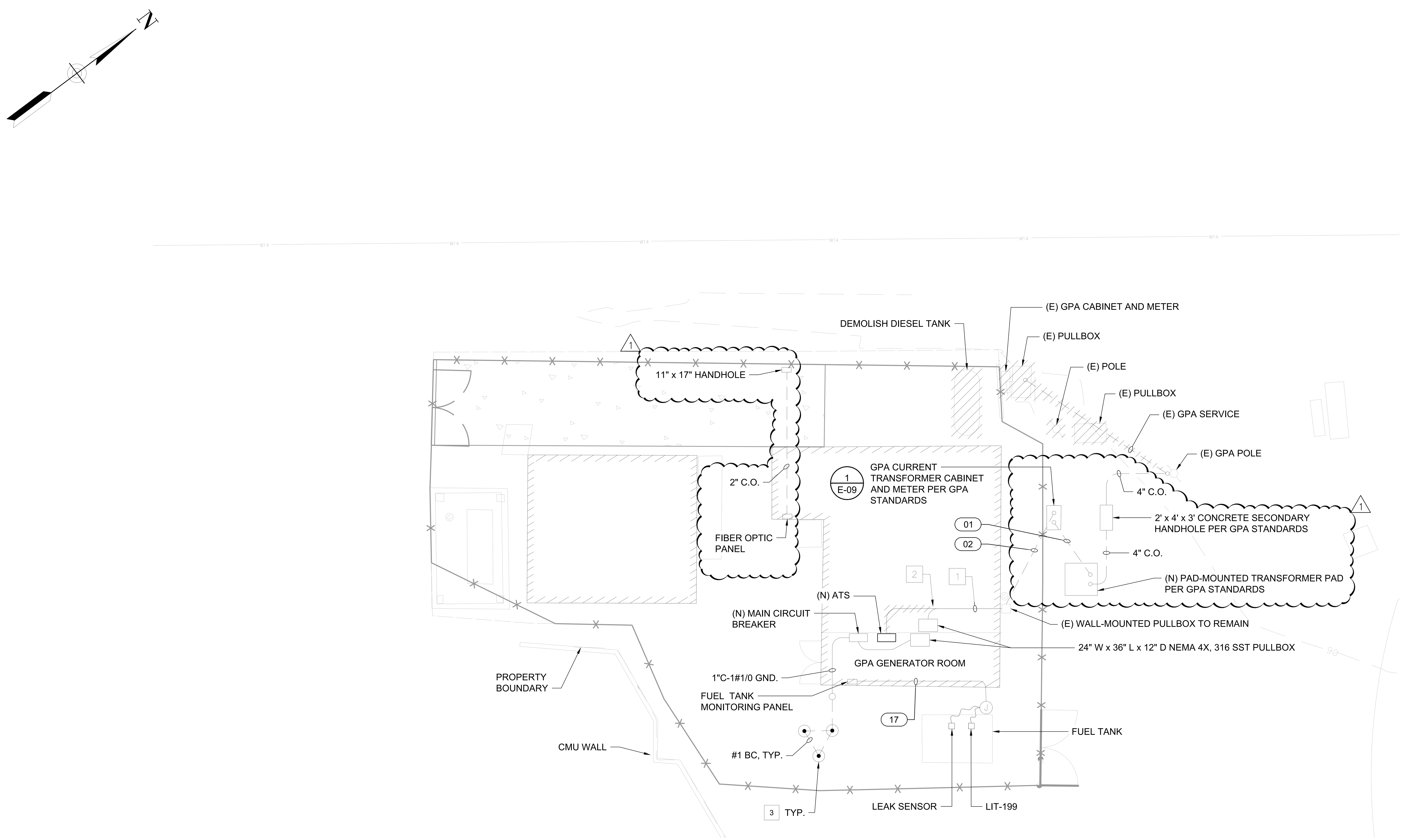
Sheet Version 3.0



NOTES:

1. REMOVE EXISTING CONDUCTORS IN CONDUITS AND REPLACE WITH 3#350 KCMIL, 1#1/0N & 1#1/0G IN TWO CONDUITS FROM CURRENT TRANSFORMER CABINET TO MAIN CIRCUIT BREAKER. THIRD CONDUIT TO REMAIN AS SPARE.
2. INTERCEPT EXISTING 3 x 3-1/2" CONDUITS AND RE-ROUTE TO MAIN CIRCUIT BREAKER WITHOUT ROUTING THROUGH WET WELL ACCESS ROOM
3. GROUND WELL. SEE DETAIL 1/E-07, SPACE 6' APART.

1 — ELECTRICAL SITE PLAN
Scale: 1" = 10'

0 10' 20' 30'
1" = 10'-0"

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NO.	REVISIONS:	DATE:	BY:
1	Addendum No. 1 - Revised GPA Service	5/4/26	AR

STRUCTURE NO.

INDEX NO.

ALLEN J. RANDALL, CERTIFICATE No1403, ELECTRICAL, EXP. 4/30/2026, GUAM, PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.
DATE: 4/2/2026

CITY ENGINEER
DESIGN GROUP

		DATE:
ENGINEER:	AR	04/2026
DESIGNED BY:	AR	04/2026
DRAWN BY:	DD	04/2026
CHECKED BY:	AR	04/2026
APPROVED BY:	AR	04/2026

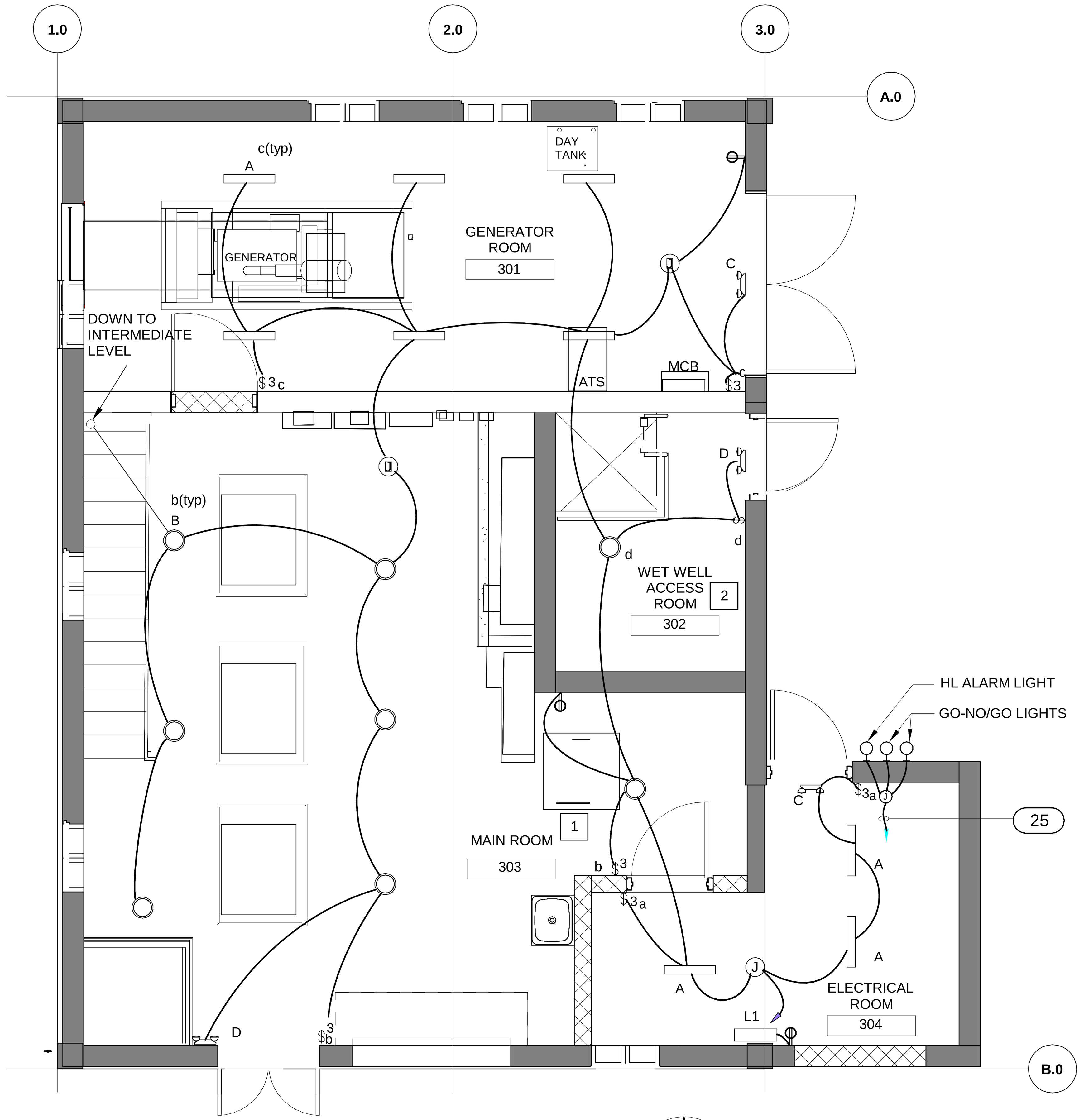
VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: ELECTRICAL SITE PLAN
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

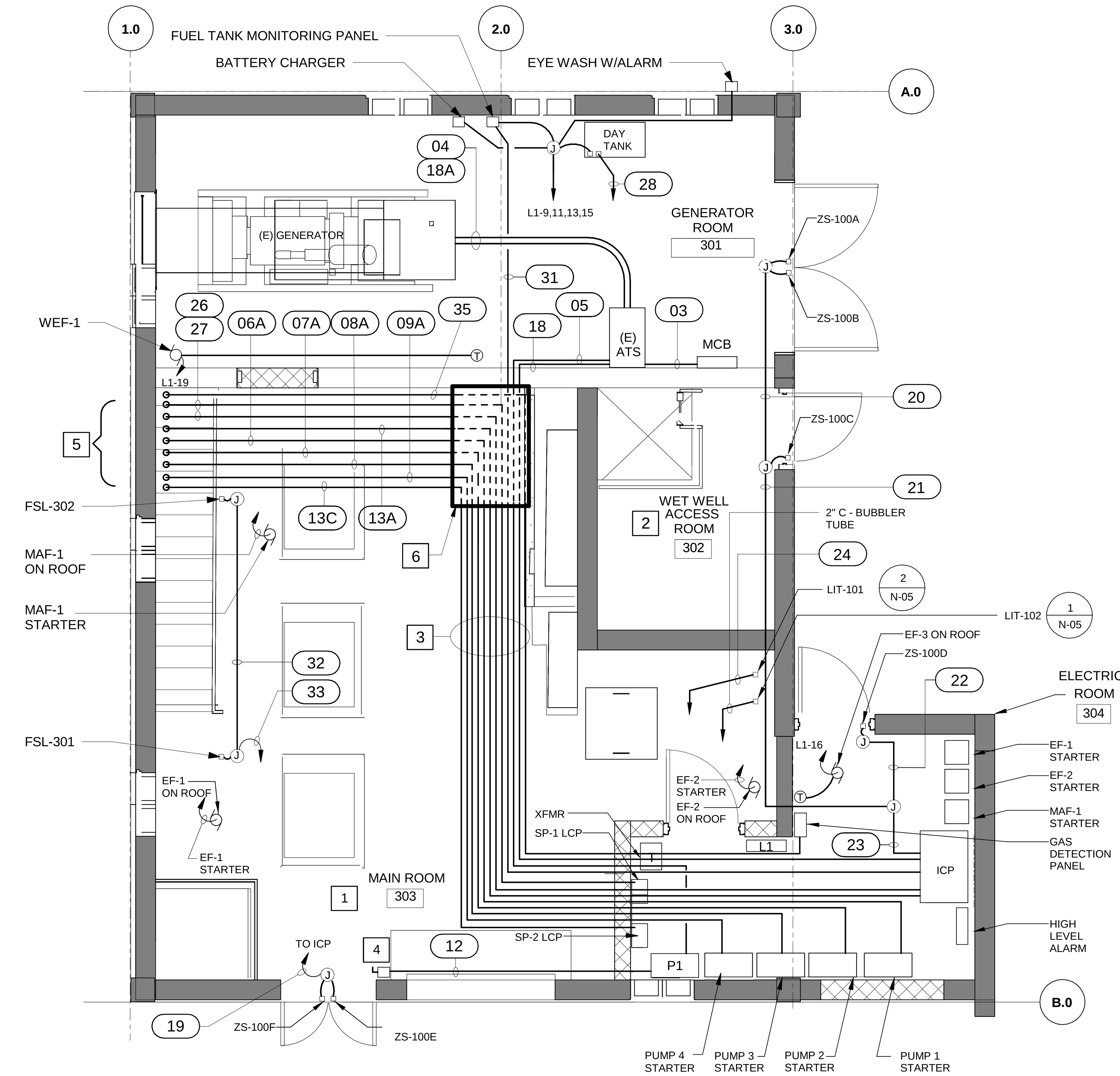
WORK ORDER NO. -

DRAWING NO. E-02

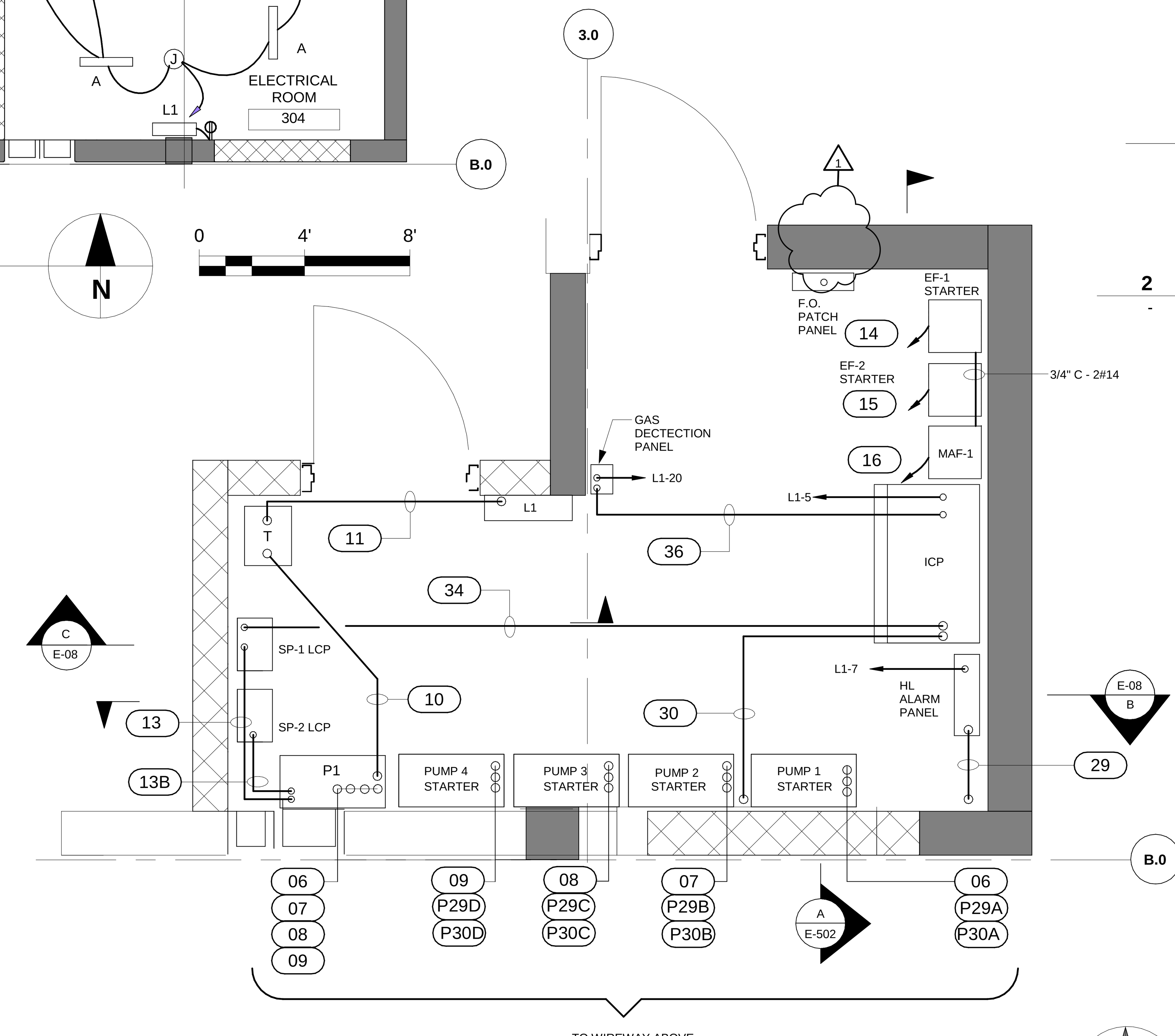
Sheet Version 3.0



1 MAMAJANAO - GROUND LEVEL - LIGHTING PLAN
SCALE: 1/4" = 1'-0"



2 MAMAJANAO - GROUND LEVEL - POWER AND CONTROLS PLAN
SCALE: 1/4" = 1'-0"



3 MAMAJANAO- ENLARGED ELECTRICAL ROOM - POWER AND CONTROLS PLAN
SCALE: 1/2" = 1'-0" - SCALE: 1/2" = 1'-0"

NOTES:

1. CLASS I DIV 2 HAZARDOUS AREA
2. CLASS I DIV 1 HAZARDOUS AREA
3. ROUTE CONDUITS ABOVE BOTTOM OF NEW MONORAIL BEAM
4. CONNECT TO MONORAIL HOIST
5. ROUTE CONDUITS 6'-6" MINIMUM ABOVE STAIRS STEPS
6. 36" x 36" x 12" NEMA 4X, 316 SST PULLBOX

NO	REVISIONS:	DATE:
1	Addendum No. 1 Revised F.O.	05 MAY 2025

STRUCTURE NO.
INDEX NO.

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER
DATE:
DESIGN GROUP
ENGINEER: AR
DESIGNED BY: AR
DRAWN BY: JR
CHECKED BY: AR
APPROVED BY: AR

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: GROUND LEVEL - ELECTRICAL PLANS
PROJECT: MAMAJANAO WWPS MODIFICATIONS
ADDRESS: Harmon Industrial Park, Guam 96913

WORK ORDER NO.
DRAWING NO.
E-04
SHEET 79 OF 95 SHEETS

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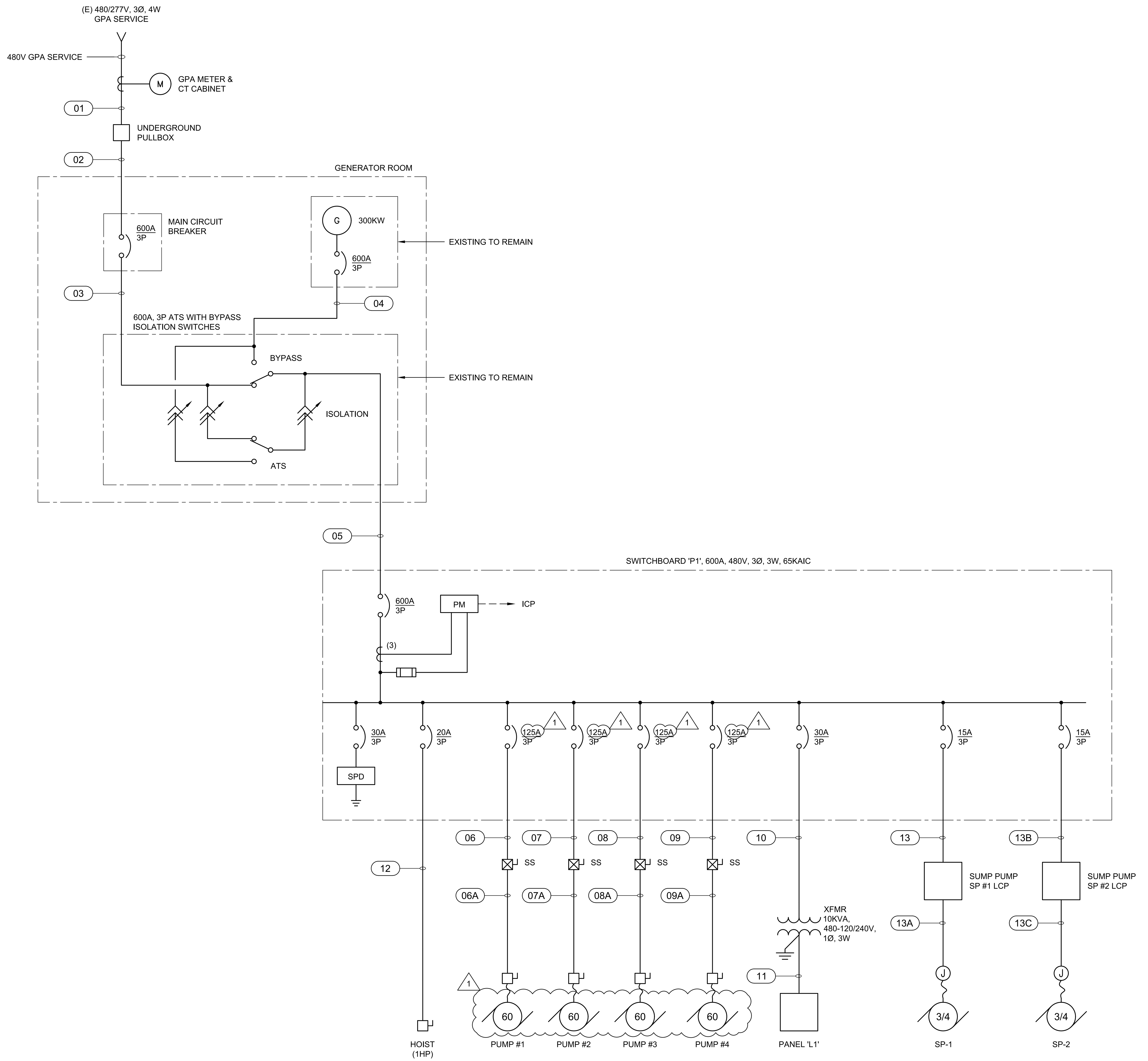

1 | **MAMAJANAO SINGLE LINE DIAGRAM**
-

GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	Addendum No. 1 - Revised Pump HP	5/4/26	JR

STRUCTURE NO.

INDEX NO.

ALLEN J. RANDALL, LICENSED PROFESSIONAL ENGINEER, ELECTRICAL, No. 1403, GUAM

This work was prepared by me or under my responsible control.

DATE: 4/2/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER
DESIGN GROUP

		DATE:
ENGINEER:	AR	04/2026
DESIGNED BY:	AR	04/2026
DRAWN BY:	DD	04/2026
CHECKED BY:	AR	04/2026
APPROVED BY:	AR	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: SINGLE LINE DIAGRAM

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

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WORK ORDER NO.
-

DRAWING NO.
E-10

CONDUIT SCHEDULE

CONDUIT REF.	CONDUIT (QTY.) SIZE	CONDUCTORS IN EACH CONDUIT QTY.	CONDUCTORS IN EACH CONDUIT SIZE	CONDUCTORS IN EACH CONDUIT GND.	FROM	TO	REMARKS
01	4 x 3-1/2"	3	350KCMIL	#1/0	GPA CT CABINET	UNDERGROUND PULLBOX	
02	2 x 3-1/2"	3	350KCMIL	#1/0	UNDERGROUND PULLBOX	MAIN CIRCUIT BREAKER	+ 1#1/0N
03	2 x 3-1/2"	3	350KCMIL	#1/0	MAIN CIRCUIT BREAKER	ATS	
04	2 x 3-1/2"	3	350KCMIL	#1/0	GENERATOR	ATS	(E) TO REMAIN
05	2 x 3-1/2"	3	350KCMIL	#1/0	ATS	SWITCHBOARD 'P1'	
1 06	1 1/4"	3	#2	#8	PUMP P1 STARTER	SWITCHBOARD 'P1'	VIA WIREWAY
1 06A	1 1/4"	3	#2	#8	PUMP P1 DISCONNECT	PUMP P1 STARTER	
1 07	1 1/4"	3	#2	#8	PUMP P2 STARTER	SWITCHBOARD 'P1'	VIA WIREWAY
1 07A	1 1/4"	3	#2	#8	PUMP P2 DISCONNECT	PUMP P2 STARTER	
1 08	1 1/4"	3	#2	#8	PUMP P3 STARTER	SWITCHBOARD 'P1'	VIA WIREWAY
1 08A	1 1/4"	3	#2	#8	PUMP P3 DISCONNECT	PUMP P3 STARTER	
1 09	1 1/4"	3	#2	#8	PUMP P4 STARTER	SWITCHBOARD 'P1'	VIA WIREWAY
1 09A	1 1/4"	3	#2	#8	PUMP P4 DISCONNECT	PUMP P4 STARTER	
10	3/4"	2	#8	#8	TRANSFORMER	SWITCHBOARD 'P1'	
11	1"	3	#6	#8	PANEL 'L1'	TRANSFORMER	
12	3/4"	3	#12	#12	HOIST	SWITCHBOARD 'P1'	
13	3/4"	3	#12	#12	SP-1 LCP	SWITCHBOARD 'P1'	
13A	3/4"	3 6	#12 #14	#12	SUMP PUMP FLOATS	SP-1 LCP	
13B	3/4"	3	#12	#12	SP2 LCP	SWITCHBOARD 'P1'	
13C	3/4"	3 4	#12 #14	#12	SUMP PUMP FLOATS	SP-2 LCP	
14	3/4"	3	#12	#12	EF-1 STARTER	PANEL L1'	
15	3/4"	3	#12	#12	EF-2 STARTER	PANEL L1'	
16	3/4"	3	#12	#12	MAF-1 STARTER	PANEL L1'	
17	3/4"	2	#18 TSP		FUEL TANK	FUEL TANK MONITORING PANEL	
18	1-1/4"	16	#14	#14	ATS & GENERATOR	ICP	
18A	3/4"	8	#14	#14	GENERATOR	ATS	
19	3/4"	2	#14	#14	ZS-100E, ZS-100F	ICP	
20	3/4"	2	#14	#14	ZS-100A, ZS-100B	ZS-100C	
21	3/4"	4	#14	#14	ZS-100C	J-BOX AT ZS-100D	
22	3/4"	6	#14	#14	ZS-100D	J-BOX AT ZS-100D	
23	3/4"	2	#14	#14	J-BOX AT ZS-100D	ICP	
24	1"	1	#18 TSP		LIT-101	HL ALARM PANEL	
25	3/4"	6	#12	#12	ALARM LIGHTING	ICP	

CONDUIT SCHEDULE

CONDUIT REF.	CONDUIT (QTY.) SIZE	CONDUCTORS IN EACH CONDUIT QTY.	CONDUCTORS IN EACH CONDUIT SIZE	CONDUCTORS IN EACH CONDUIT GND.	FROM	TO	REMARKS
26	3/4"	1	#18 TSP		FIT-101	ICP	
26A	1"		MANUF. CABLE		FE-101	FIT-101	
27	3/4"	8	#14	#14	'P1' DISC. SWITCH	ICP	
27A	3/4"	2	#14	#14	'P4' DISC. SWITCH	'P3' DISC. SWITCH	
27B	3/4"	4	#14	#14	'P3' DISC. SWITCH	'P2' DISC. SWITCH	
27C	3/4"	6	#14	#14	'P2' DISC. SWITCH	'P1' DISC. SWITCH	
28	3/4"	2	#14	#14	DAY TANK	ICP	
29	3/4"	8	#14	#14	WIREWAY	HL ALARM PANEL	
29A	3/4"	2	#14	#14	'P1' STARTER	WIREWAY	CIRCUIT CONTINUES IN 29
29B	3/4"	2	#14	#14	'P2' STARTER	WIREWAY	CIRCUIT CONTINUES IN 29
29C	3/4"	2	#14	#14	'P3' STARTER	WIREWAY	CIRCUIT CONTINUES IN 29
29D	3/4"	2	#14	#14	'P4' STARTER	WIREWAY	CIRCUIT CONTINUES IN 29
30	2"	40	#14	#14	WIREWAY	ICP	
30A	1"	10	#14	#14	'P1' STARTER	WIREWAY	CIRCUIT CONTINUES IN 30
30B	1"	10	#14	#14	'P2' STARTER	WIREWAY	CIRCUIT CONTINUES IN 30
30C	1"	10	#14	#14	'P3' STARTER	WIREWAY	CIRCUIT CONTINUES IN 30
30D	1"	10	#14	#14	'P4' STARTER	WIREWAY	CIRCUIT CONTINUES IN 30
31	3/4"	2	#18 TSP		FUEL TANK MONITORING PANEL	ICP	
32	3/4"	2	#14	#14	FSL-302	FSL-301	
33	3/4"	4	#14	#14	FSL-301	ICP	
34	3/4"	2	#14	#14	SP-1 LCP	ICP	
35	1"	4	MANUF. CABLES		GAS SENSORS	GAS DETECTION PANEL	
36	1"	4	#18 TSP		GAS DETECTION PANEL	ICP	

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY:
1	Addendum No. 1 - Revised Pump HP	5/4/26	JR

STRUCTURE NO.

INDEX NO.

ALBERT J. RANDALL JR. CERTIFICATE NO. 18403 ELECTRICAL EXP. 8/31/2026 GUAM PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.
DATE: 4/2/2026

CITY ENGINEER

DESIGN GROUP	DATE:
ENGINEER: AR	04/2026
DESIGNED BY: AR	04/2026
DRAWN BY: DD	04/2026
CHECKED BY: AR	04/2026
APPROVED BY: AR	04/2026

GUAM WATERWORKS AUTHORITY

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: CONDUIT SCHEDULE

PROJECT: MAMAJANAO WWPS MODIFICATIONS

ADDRESS: HARMON INDUSTRIAL PARK, GUAM 96913

WORK ORDER NO.
-

DRAWING NO.
E-15

SHEET 90 OF 97 SHEETS

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SECTION 22 42 16.16

COMMERCIAL SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service sink.
2. Sink faucet.
3. Supply fittings.
4. Waste fittings.
5. Sink supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
2. Include rated capacities, operating characteristics and furnished specialties and accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted sinks.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sinks and faucets to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 SERVICE SINKS

A. Service Sinks - Enameled Cast Iron, Trap Standard Mounted.

1. Fixture:

a. Standard: ASME A112.19.1/CSA B45.2.
b. Type: Service sink with back.
c. Back: Plain.
d. Nominal Size: 24 by 20 inches (610 by 508 mm).

e. Color: White.
f. Mounting: NPS 2 (DN 50) P-trap standard with grid strainer inlet, cleanout, and floor flange.
g. Rim Guard: On front and sides.

2. Faucet: Manual Operated, Single handle.

2.2 MANUALLY OPERATED SINK FAUCETS

A. Sink faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. Sink Faucets - Manual Type: Single-control mixing.

1. Standard: ASME A112.18.1/CSA B125.1.
2. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.

3. Body Type: Single hole.
4. Body Material: Commercial, solid brass.
5. Finish: Chrome plated.

6. Maximum Flow Rate: 1.5 gpm (5.7 L/min).
7. Mounting Type: Deck, concealed.
8. Valve Handle(s): 6-inch (152-mm) wrist blade.
9. Spout Type: Swivel gooseneck.

10. Vacuum Breaker: Required for hose outlet.
11. Spout Outlet: Laminar flow.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle.

F. Risers:

1. NPS 1/2 (DN 15).
2. ASME A112.18.6/CSA B125.6, braided or corrugated stainless steel flexible hose.

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 (DN 40).
2. Material:

a. Chrome-plated, two-piece, cast-brass trap and swivel elbow with 17-gauge brass tube to wall and chrome-plated brass or steel wall flange.

2.5 GROUT

A. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000 psi (34.5 MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply piping and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb in accordance with rough-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install wall-mounted sinks at accessible mounting height in accordance with ICC A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping".
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings.

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Install new batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.16

SECTION 40 91 00
PRIMARY PROCESS MEASUREMENT DEVICES

PART 1 - GENERAL

1.01 DESIGNATIONS OF COMPONENTS:

A. In these specifications and on the plans, all systems, meters, instruments, and other elements are represented schematically and are designated by numbers, as derived from criteria in ISA standards. The nomenclature and numbers designated herein and on the plans shall be employed exclusively throughout shop drawings, data sheets, and the like. Any other symbols, designations, and nomenclature unique to a manufacturer's standard methods shall not replace those prescribed above, as used herein, and on the plans.

1.02 SIGNAL CHARACTERISTICS:

A. Wherever possible and feasible, components shall be of electronic solid-state design and systems shall utilize the same signal characteristics throughout each and all of the several systems; transmission signals shall be 4 mA to 20 mA. The combined power supply and transmitter loops shall, when tested with appropriate precision resistors, present a voltage signal of 1- to 5-volt DC. Signal isolators shall be provided where required.

PART 2 - PRODUCTS

2.01 FUEL TANK LEVEL TRANSMITTER:

A. Provide level sensing probe measuring strain pulse using magnetostrictive principle of operation. Level sensing probe shall provide 4-20mA signal representing the position of float in the tank. Sensing probe housing and float shall be 316 stainless steel.

B. Level sensing probe shall be Omntec MTG420 series with SSF-1-2 float or equal.

2.02 RADAR LEVEL TRANSMITTER

A. Instrument emits radar pulses via a transmitter and antenna, with a frequency range of 6.3 GHz to 26 GHz.

B. The pulses reflect from the surface being measured and are received back at the instrument antenna.

C. The instrument measures the pulse travel time.

D. The instrument shall not generate frequency waves with power levels hazardous to humans.

E. Requirements:

1. Accuracy: 0.25-in.

2. It shall be possible to choose between horn, parabolic, cone, or rod-shaped antennas with threaded or flange mountings to suit the intended service.

3. The design shall be such that product condensation on the antenna shall not affect the transmitter performance or accuracy.

4. Microprocessor-based signal converter/transmitter.

5. Power Supply: 24 VDC - 2-wire loop powered.

6. Power consumption: 15 VA maximum.

7. Outputs: Isolated 4-20 mA DC with HART communication protocol

8. Backlit digital display for level or volume.

9. Self-diagnostics and automatic data checking.

10. Signal integrity:

a. Immune to radio frequency and electromagnetic interference with field strength of 15 volts/meter or less over a frequency range of 50 Hz to 460 MHz.

b. Able to ignore momentary level spikes or momentary loss of echo and indicate loss of echo condition on indicating transmitter unit.

F. Indication: Local or remote - 5-digit display

G. Protected terminals and fuses in a separate compartment, which isolates field connection from electronics.

H. Enclosure rating: NEMA Type 4X.

I. Electrical connection: 1/2-inch male NPT.

J. Radar level transmitter shall be Rosemount 5408 non-contacting, Vegapuls 6X with local display, Vegadis 82, or equal.

K. Spare Equipment:

1. Provide one (1) complete spare radar level transmitter for each type and model furnished under this Contract.

2. Spare unit shall be identical to the specified instrument, including:

   a. Transmitter

   b. Antenna (same type and mounting as provided)

   c. Local display

   d. All electronics and internal components

3. Spare unit shall be factory calibrated and ready for installation.

4. Spare shall be furnished with all required accessories, including gaskets, mounting hardware, and protective covers.

5. Spare unit shall be clearly tagged and packaged for long-term storage and delivered to the Owner at a location designated by the RPR.

2.03 PRESSURE GAUGES

A. Pressure range shall be as designated by the following type numbers shown in the drawings:

Type Number	Description	Pressure Range
1	Pressure	0 to 150 psi

B. If no type number is shown on the drawings, use Type 1 pressure gauges.

C. Type 1: Gauges 4 1/2 inches and larger shall comply with ASME B40.1, Grade 2A. Gauges shall incorporate the following features:

1. Solid or open front with side or rear blowout relief.

2. Pressure tight.

3. 270-degree arc with adjustable pointer.

4. Stem mounted.

5. Hermetically sealed unless specified to be liquid filled.

D. Size of gauge shall be 4 1/2 inches, unless otherwise indicated in the drawings. Stem or connection size shall be 1/2 inch.

E. Type 1: Gauges smaller than 4 1/2 inches shall conform to ASME B40-1, Grade A. Otherwise, construction shall be as described above.

F. Materials of construction for Type 1 gauges shall be as shown in the following table:

Item	Material	Specification
Case	Stainless steel, aluminum, polypropylene, or phenolic plastic	AISI 316, 6061-T6
Bourdon tube	Stainless steel	AISI 316
Windows	Acrylic plastic	---
Ring	Stainless steel	AISI 316
Stem	Stainless steel	AISI 316
Dial face	Aluminum with clear baked-on acrylic coating	ASTM B209, 6061-T6

G. Gauges, diaphgram seals, snubber, and tools shall be manufactured by Ashcroft, Crosby, Marshalltown, Marsh, or equal.

2.04 MAGNETIC FLOWMETER

A. The magnetic flowmeter shall be an obstructionless pipeline-mounted instrument to magnetically measure the flow of the process media. The output signal shall not be affected by changes in fluid viscosity or density and shall have zero point stability and auto zeroing functions. Provide the magnetic flowmeter with the following features:

1. Drip- and splash-proof sensor, capable of withstanding temporary submersion of up to 30 feet of water for 48 hours.

2. Integral terminal box with watertight cable seals.

3. Interconnecting cables.

B. Provide stainless steel grounding rings and grounding straps per manufacturer’s requirements.

C. The flow tube shall be flangeless wafer construction with cast aluminum enclosure. Provide bolting kit. Liner and electrodes shall be as indicated

D. Indicator/Totalizer

1. The indicator/totalizer shall accept the process flow signal from the magnetic flowmeter and convert its electrical output signals directly proportional to the instantaneous metered flow rate. The housing shall be suitable for field mounting.

E. Transmitter

1. The transmitter shall be microprocessor based with flow rate indicator in engineering units, forward, reversed, and net flow totalizer, all in user-selectable engineering units. The display shall also be capable of indicating alarm status and

velocity of fluid. The transmitter shall be mounted as indicated in the instrument list.

2. The preamplifier input impedance shall be a minimum of 10E+11 ohms.

3. Power Requirements: 117-volt ac, ±10%, 60 hertz.

4. Totalized flow and programmed configuration shall be maintained in memory for up to 10 years.

F. Interconnecting Cable

1. The interconnecting cable between the sensor and the transmitter shall be furnished by the magnetic flowmeter manufacturer.

G. Performance

H. Accuracy: 0.5% of flow rate with minimum fluid velocity of 1 fps.

I. Repeatability: ±0.1% of flow rate.

J. The accuracy of each meter shall be verified by calibration in a flow laboratory traceable to the U.S. National Institute of Standards and Technology.

K. Adjustable full-scale range.

L. Outputs: Bidirectional, isolated 4- to 20-mA d-c and either 24-volt d-c scaled pulse, or 0- to 10-KHz frequency.

M. Minimum Conductivity: 5 micromho/centimeter.

N. Power Consumption: 20 watts maximum.

O. Temperature Limits, Ambient: -20°F to +140°F.

P. Temperature Limits, Process: Elastomers +160°F, Teflons +300°F, ceramic 350°F.

Q. Field Selectable Low Flow Cutoff: 0% to 10%.

R. The flowmeter shall have a positive zero return (PZR) input controlled by an external dry contact.

S. Environmental Rating: NEMA 4X, for both sensor and electronics whether remote or sensor mounted.

T. The meter shall have empty pipe detection.

U. A common alarm discrete output (a dry contact or a transistor switch) shall be provided for remote indication of fault conditions.

V. Service Condition

1.	P&ID No.	N-003
2.	Service	Raw sewage

SENSOR		
3.	Tag No.	FE-101
4.	Metering Tube	
	Size Flg.	6 inch
	Rating (psi)	250
5.	Metering Tube Material	Stainless Steel
6.	Liner Material	Polyurethane
7.	Electrode Material	316 SST
8.	Elec. Class.	NEMA 4X

TRANSMITTER		
9.	Tag No.	FIT-101
10.	Flow Rate Ind. Scale	0 – 5,000 gpm
11.	Flow Totalizer Multiplier	1,000 gal
12.	Aux. Output Signal	4 – 20 mA
13.	Aux. Output Signal To	PLC
14.	Elec. Class.	NEMA 4X
15.	Mounting	Wall Mount

W. Manufacturer

1. The magnetic flowmeter and transmitter shall be ABB MagMaster, ABB MFF Series with MFE4 transmitter, Endress+Hauser Promag, or equal.

2.05 GAS MONITORING

A. Provide a gas monitoring system that has electrochemical hydrogen sulfide (H2S), carbon dioxide (CO2), methane (CH4), and oxygen (O2). The gas sensors will have the following characteristics:

B. Hydrogen Sulfide (H2S) Sensor:

1. Sensor Range: 0- 25ppm.
2. Sensor Life Expectancy: 2 Years.
3. Response Time: T90 less than 30 seconds.
4. Repeatability: +/- 2 percent.
5. Linearity: Linear output in proportion to gas concentration.
6. Temperature Compensation: Across the entire range.

C. Carbon Dioxide (CO2) Sensor:

1. Sensor Range: 0-5000ppm.
2. Sensor Life Expectancy: 5 Years.
3. Response Time: T90 less than 30 seconds.
4. Repeatability: +/- 2 percent.
5. Linearity: Linear output in proportion to gas concentration.
6. Temperature Compensation: Across the entire range.

D. Methane (CH4) Sensor:

1. Sensor Range: 0-100% LEL.
2. Sensor Life Expectancy: 5 Years.
3. Response Time: T90 less than 30 seconds.
4. Repeatability: +/- 2 percent.
5. Linearity: Linear output in proportion to gas concentration.
6. Temperature Compensation: Across the entire range.

E. Oxygen (O2) Sensor:

1. Sensor Range: 0-25% vol.
2. Sensor Life Expectancy: 2 Years.
3. Response Time: T90 less than 10 seconds.

4. Repeatability: +/- 2 percent.

5. Linearity: Linear output in proportion to gas concentration.

6. Temperature Compensation: Across the entire range.

F. The gas monitoring system will communicate with the SCADA system via RS485 Modbus RTU. It will have six (6) digital inputs and outputs, and two (2) analog inputs and outputs.

G. The gas monitoring system will be UL 61010-1 certified, and compliant with California Title 24.

H. The gas monitoring system shall operate in the temperature range of -4 to 122 degrees F (-20 to 50 degrees C), and between 15 to 90 percent non-condensing humidity.

I. Housing shall be NEMA 4X enclosure for wall mounting.

J. The power supply shall be 24 VDC with a maximum power consumption of 1.5 W (50mA at 24 VDC).

K. The gas monitoring system shall be Conspec Optio V, or equal.

PART 3 - EXECUTION

Refer to Section 40 00 00.

END OF SECTION

SECTION 43 21 00.06

DRY PIT SUBMERSIBLE SOLIDS HANDLING PUMPS AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide dry pit submersible solids handling pumps, motors, motor starters, and associated appurtenances as indicated on the Contract Drawings and specified herein.

B. Work includes furnishing, installation support, testing, commissioning, and training for pumping equipment required for operation of the Mamajanao Wastewater Pump Station Modifications project.

C. Pumping equipment shall be suitable for continuous duty operation in municipal wastewater service and shall be capable of handling raw wastewater containing suspended solids, fibrous material, and typical sanitary sewer debris without clogging or loss of performance.

D. All pumps shall be non-overloading throughout the entire range of operation above the design static head without employing the motor service factor.

E. Pumps, motors, motor starters, and associated appurtenances shall be provided as a complete integrated system to ensure compatibility, coordinated operation, and compliance with specified performance requirements.

1.02 REFERENCES:

A. ASTM International (ASTM):

1. A36: Standard Specification for Carbo n Structural Steel.

2. A48: Standard Specification for Gray Iron Castings.

3. A576: Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.

4. A743/A743M: Standard Specification for Castings, Iron-Chromium, Iron-Chromium Nickel, Corrosion Resistant, for General Application.

5. D2240: Standard Test Method for Rubber Property – Durometer Hardness.

B. American National Standards Institute (ANSI):

1. B16.1: Standard for Cast Iron Pipe Flanges and Flanged Fittings, 125 lb.

2. S1.11: Standard Octave-Band and Fractional-Octave-Band and Digital Filters.

C. Hydraulic Institute (HI):

1. Current Standards.

2. 11.6: Rotodynamic Submersible Pumps for Hydraulic Performance, Hydrostatic Pressure, Mechanical and Electrical Acceptance Tests

3. 14.6: Rotodynamic Pumps for Hydraulic Performance Acceptance Tests

D. National Electrical Manufacturers Association (NEMA):

1. MG1: Motors and Generators.

E. NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities

F. National Electrical Code (NEC) Article 500 – Hazardous Locations

G. ISO 21940 – Mechanical vibration – Rotor balancing

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01 33 00:

1. Data regarding pump and motor characteristics and performance:

a. Prior to fabrication and testing, provide guaranteed performance curves based on actual shop tests of mechanically duplicate pumps, showing they meet indicated and specified requirements for head, flow rate, horsepower, pump and overall efficiency and NPSH3.

(1) For units of same size and type, provide curves for a single unit only.

(1) Provide ANSI/HI 14.6 1U curves unless otherwise indicated

b. Provide catalog performance curves at maximum pump speed indicated and specified for each service showing maximum and minimum impeller diameters available, best efficiency point (BEP), allowable operating region (AOR) and preferred operating region (POR).

(1) Provide pump curves demonstrating operation at the specified duty point of 1350 GPM at 90 ft TDH.

(2) Combined flow of 3 operating pumps shall be 4,050 gpm at 90 feet TDH.

(3) Provide curves showing:

(a) Best Efficiency Point (BEP)

(b) Allowable Operating Region (AOR)

(c) Preferred Operating Region (POR)

(d) NPSHr curve

c. Provide confirmation that pump passes a minimum 3-inch spherical solid.

d. Results of shop performance tests as specified.

e. Submit curves for guaranteed performance and shop performance tests on 8-1/2-inch by 11-inch sheets, one curve per sheet.

2. Shop drawing data for accessory items.

3. Certified setting plans, with tolerances, for anchor bolts.

4. Manufacturer's literature as needed to supplement certified data.

5. Operating and maintenance instructions and parts lists.

6. Listing of reference installations as specified with contact names and telephone numbers.

7. Certified results of hydrostatic testing.

8. Certified results of dynamic balancing.

9. Bearing temperature operating range for the service conditions specified.

10. List of recommended spare parts other than those specified.

11. Factory and field inspection reports.

12. Bearing Life: Certified by the pump manufacturer. Include design data.

13. Pump factory test results.

14. Motor factory test results.

15. Qualifications of field service engineer.

16. Recommendations for short and long-term storage.

17. Resonant frequency analysis.

18. Factory and field-testing procedures, pump and piping set up, equipment to be used and ANSI/HI testing tolerances to be followed.

19. Special tools.

20. Number of service person-days provided and per diem field service rate.

21. Results of field vibration test data including a vibration signature for each pump and drive assembly. Provide vibration testing procedure for review.

22. Recommended location of suction and discharge pressure gauges.

23. Manufacturer's product data, specifications and color charts for factory painting.

24. Provide a listing of the materials recommended for each service specified and indicated. Provide documentation showing compatibility with process fluid and service specified and indicated.

25. The latest ISO 9001 series certification.

26. Provide a scaled drawing for each pump service showing the pumps, motors, including equipment weights, lifting attachments, sling dimensions for equipment handling and minimum clearances for equipment removal and maintenance.

27. Material Certification:

    a. Provide certification from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.

    b. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated.

B. A copy of the contract mechanical process, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.

1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

C. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.

1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.

2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.04 SPARE PARTS:

A. Comply with the requirements specified in Section 01 61 00.

B. Provide spare parts that are identical to and interchangeable with similar parts installed.

1. For each pump:

a. One complete mechanical seal set

b. One set of casing wearing rings

c. One set of impeller fasteners

2. For each set of pumps of the same size and performance.

a. One set of all special tools required.

1.05 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01 43 00.

B. Pumps shall be the product of one manufacturer.

C. Pumps shall be manufacturer’s standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.

D. Welding: In accordance with latest applicable American Welding Society Code or equivalent.

E. Factory tests as specified.

F. The Contractor shall obtain the pumps, motors and appurtenances from the pump manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.

G. Services of Manufacturer's Representative as stated in Section 01 43 00 and as specified herein.

H. Provide services of factory-trained Service Technician, specifically trained on type of equipment specified:

1. Service Technician must be present on site for all items listed below. Person-day requirements listed are exclusive of travel time, and do not relieve Contractor of the obligation to place equipment in operation as specified.

2. Installation: Inspect grouting, location of anchor bolts; setting, leveling, alignment, field erection; coordination of piping and electrical:

    a. 2 person-days

3. Functional Testing: Calibrate, check alignment and perform a functional test with water. Tests to include all items specified.

    a. 1 person-days

4. Field Performance Testing: Field performance test equipment specified.

    a. 1 person-days

5. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts and preparation to lead and teach classroom sessions.

    a. 1 person-days

6. Credit to the Owner, all unused service person-days specified above, at the manufacturer’s published field service rate.

7. Any additional time required of the factory trained service technician to assist in placing the equipment in operation, or testing or to correct deficiencies in installation, equipment or material shall be provided at no additional cost to the Owner.

I. Manufacturer of pumps shall have a minimum of five (5) operating installations with pumps of the size specified and in the same service as specified operating for not less than five (5) years.

J. If equipment proposed is heavier or taller, different rotation, or discharge arrangement than specified and indicated; provide all structural, architectural, mechanical, electrical and plumbing revisions at no additional cost to the Owner.

1. If equipment is heavier than specified, the Contractor shall provide all hoisting equipment sized to maintain the minimum safety factor between the specified maximum equipment weight and the lifting capacity of the hoisting equipment indicated and specified.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01 66 10.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION:

A. Pump capacities and operating data are indicated in the Process Pump Schedule.

1. The station shall provide a minimum firm pumping capacity of 5.83 mgd with three pumps operating.

B. Pumps shall pump raw municipal wastewater from the wet well of the Mamajanao Wastewater Pump Station. Before entering wet well, wastewater will normally pass through a manually cleaned bar screen with 1/2-inch (13 mm) clear openings. Screens can be bypassed during high flow conditions.

C. Equipment Limitations:

1. Pumps: Vertical dry-pit submersible wastewater pumps

a. Maximum Total Pump and Motor Weight including Power and Control Cables: 3600 lbs.

b. Maximum Rotating Assembly Weight including Power and Control Cables: 1800 lbs.

c. Maximum Height - Top of Motor Lifting Ring to Pump Bottom Inlet Flange: 51 inches.

d. Maximum Pump Base Footprint: 36 inches width x 28 inches length.

D. Coordinate pump dimensions and weights with hoists and bridge crane capacity and as specified in Section 41 22 23.19.

E. Pumps normally operate with a flooded suction.

2.02 MANUFACTURERS:

A. Dry Pit Submersible Solids Handling Pumps

1. Xylem/Flygt (Basis of Design)

2. KSB

3. Sulzer/ABS

4. Or equal.

2.03 SEISMIC DESIGN REQUIREMENTS:

A. Conform to the requirements indicated on the structural drawings and as specified in Section 01 41 20.

B. The Contractor shall conform to the seismic design requirements for this project and for the work of this specification section.

C. Provide all equipment bases, anchorage, supports and foundations designed in accordance with the seismic requirements indicated and specified.

D. Additionally, provide with the Certificate of Unit Responsibility, certification for all equipment signed by a registered structural engineer stating that computations were performed and that all components have been sized for the seismic forces specified and indicated.

2.04 PUMP CONSTRUCTION:

A. Pumps: Solids handling radial and mixed flow single-stage, rotodynamic pumps. Performance requirements shall be as indicated in the Process Pump Schedule.

B. Pump Configuration: As indicated in the Plans.

C. Pump, motor, cable entry system, and power/control cables shall remain fully operable after dry pit flooding and subsequent dewatering without damage to the equipment.

D. Design and proportion all parts of pump specially adapted for the service specified and indicated.

E. Pump Mounting: Provide type as indicated and specified.

1. Vertically Mounted Pumps:

    a. Mount each pump on a steel base suitable for bolting to concrete pier or foundation as indicated in the Plans.

        (1) Provide the rotation and orientation of the suction and discharge connections as indicated.

        (2) Provide separate suction elbow as indicated.

F. Pump Casing, Fronthead and Backhead:

1. Cast iron ASTM A48 Class 35 minimum.

2. Provide casings designed for removal of rotating parts without disconnecting suction and/or discharge piping.

3. Provide lifting devices on casings for handling.

4. Provide ribs or reinforcing if required to withstand the specified hydrostatic test pressure, to prevent deflection caused by hydraulic thrust and to support the motor.

5. Face and drill flanges of suction and discharge connections in accordance with ANSI/ASME B16.1 Class 125.

6. Provide components with machined registered concentric shoulder fits for precision alignment. Equipment without registered fits is not acceptable.

7. Provide high point of casing with a minimum 1/2-inch (13 mm) air vent and low point with a drain.

8. Drill and tap pump suction and discharge nozzles with 1/2-inch NPT connection for installation of piping and pressure gauges. Provide taps in accordance with ANSI/HI Standards. Provide taps with Type 316 stainless steel plugs.

9. Pumps with splitter vanes in casing are not acceptable unless specifically indicated in the Process Pump Schedule.

10. Provide pump feet integral to the casing and provide pump feet designed for the following additional forces:

    a. Hydraulic thrust equivalent to two times the shut-off head times the area of the discharge nozzle and acting at centerline of the discharge nozzle.

    b. Seismic forces acting at center of gravity of the pump. Seismic forces shall be as specified and indicated.

c. The hydraulic thrust and the seismic forces shall be assumed to act simultaneously.

11. Lining

a. Manufacturer:

(1) Belzona Supermetalglide

(2) Or acceptable equivalent product

b. Type: Ceramic filled epoxy

c. Percent Solids by Volume: 100 percent

d. Provide two coats 8 to 15 mils (200 to 380 microns) thick with total minimum DFT of 20 mils (500 microns).

e. Cured Hardness: 90D in accordance with ASTM D2240.

f. Surface preparation, mixing and application and safety requirements shall be in accordance with the lining manufacturer's printed instructions and as specified.

G. Impeller:

1. Type: Solids handling single suction.

a. Enclosed radial or mixed flow

2. Provide vanes having wide suction and waterways that will pass solids and stringy without clogging.

3. Provide impellers not greater than 95 percent or the percentage indicated in the Process Pump Schedule, of the maximum diameter impeller available.

4. Do not design hub with ports for reduction of thrust on impeller.

5. Key-seat and hold impeller to shaft by a streamlined bolt or locknut capable of holding in event of motor reversal under full torque.

a. Impeller Fasteners: Type 416 stainless steel or Type 316Ti stainless steel

6. Statically and dynamically balance each impeller.

7. Enclosed Impellers:

a. Material:

(1) ASTM A 532 Class II Type B (15 percent Cr-Mo) impellers with 540 BHN.

(2) Pump Services: Raw wastewater Pump Station

b. Wearing Rings:

(1) Provide on impeller and in pump casing at suction side.

(2) Impeller and Casing Wearing Rings:

(a) Impeller: Stainless Steel ASTM A743/A743M Grade CA-40 with a 300 to 350 BHN.

(b) Casing Wearing Rings: Stainless Steel ASTM A743/A743M Grade CA-40 with a 450 to 480 BHN.

(c) Provide a minimum 50 BHN difference between casing and impeller wearing rings with the harder ring installed in the casing.

H. Handhole Cleanouts:

1. If available, locate handholes in discharge nozzle of volute and in suction elbow or fronthead for vertically mounted pumps 12-inch (300 mm) and larger to provide access to impeller and interior parts.

2. Equip handholes with covers designed for easy removal.

3. Shape interior surface of cover to maintain contour of interior of casing or elbow to which it is attached to maintain efficiency and to prevent lodging of solids.

4. Gaskets: Neoprene or Buna-N.

5. Hardware: Type 316 Stainless Steel.

2.05 MOTORS:

A. Provide motors designed in accordance with IEC60034 and comply with NEMA MG1 Part 31.

B. Motors shall be rated Class I, Division 2 Group D hazardous location.

C. Horsepower rating of motors: Not less than maximum brake horsepower or kW requirements of pumps under any condition of operation specified and indicated without operating in the motor service factor.

D. Motor enclosure and motor speed: As indicated in the Process Pump Schedule.

E. Provide pump motors with ball or roller bearings. Provide vertical motors with at least one bearing designed for thrust. Provide bearings with a minimum B-10 life of 50,000 hours.

F. Overall sound-pressure level of each motor shall not exceed 88 decibels when measured on flat network using an octave-band frequency analyzer conforming to ANSI S1.11. Determine overall sound-pressure level as average of four or more readings at evenly spaced points, 3 feet (1 meter) from motor.

G. Operate without overheating over the speed ranges required, specified and indicated.

H. Service Factor: 1.15

I. Premium efficiency motors in accordance with NEMA MG1.

J. Rating: 460 V, 3-phase, 60 Hertz.

K. Insulation: Class H with Class F temperature rise, Motor shall be suitable for continuous operation in ambient temperatures up to 50 degree C.

L. Site Altitude: Less than 100 feet (30 meters) above sea level.

M. Dry-Pit Submersible Motors:

1. Provide complete sealed and jacketed electric submersible squirrel cage induction motors in accordance with the above and as specified herein.

2. Provide all components housed in an air or oil filled cast-iron watertight and jacketed electric submersible squirrel cage induction motor in accordance with the above and as specified herein.

3. Provide motor jacket sealed to the motor housing with O-rings. Provide a closed loop cooling system which circulates a non-toxic oil or glycol-water mixture through a cooling jacket surrounding the motor, and through an integrated heat exchanger to transfer the motor heat to the process fluid.

    a. Motor cooled with the pumped liquid is not acceptable.

4. Insulate stator-winding and lead with moisture resistant Class H insulation for continuous duty in 40 degrees C rise liquids.

5. Provide motor capable of thirty (30) starts per hour at maximum speed.

6. Motor shaft: Type 416 or Type 420 stainless steel or ASTM A576 Cr 1040 with Type 420 stainless steel sleeve.

7. Provide seal leakage detector, moisture detector and stator winding temperature sensor.

8. Dynamically balance rotating assembly to meet ISO 2194011 G 2.5 to prevent vibration during pump operation.

9. All hardware: Type 316 stainless steel.

10. Provide all cables of multi-conductor SOW-A, G-GC or W of sufficient length to extend from pump motor to a junction box above motor room elevation as indicated. Cable size shall be in accordance with NEC specifications.

    a. Provide a sufficient length of cables, one piece, to reach from pump to the junction box as indicated plus 10 feet (3 meters).

11. Cable Entry:

    a. Provide all power and control lead wires double sealed entering the motor in a method that prevents cable wicking.

    b. Provide the sealing system consisting of a rubber grommet to seal the cable exterior followed by interior epoxy seal.

    c. Provide each cable wire with a section of insulation removed to establish a window area of bare wire and each wire surrounded by epoxy potting material.

    d. Provide a cable strain relief mechanism as an integral part of this sealing system.

    e. Provide the cable sealing system capable of withstanding an external pressure test of 1200 psi (830 kPa) as well as a cable assembly pull test as required by UL or FM.

    f. Provide the cable entry rated by UL or FM for submerged operating depths to 85 feet (26 meters).

    g. Singular grommet or other similar sealing systems are not acceptable.

12. Seals:

    a. Provide two separate tandem-mounted mechanical seals with the upper and lower seals mounted to rotate in the same direction.

    b. Upper Seals:

        (1) Provide seal completely immersed in an oil or glycol bath sealing the oil chamber and motor housing.

(2) Materials: Silicon carbide or Tungsten-Carbide rotating and stationary faces.

c. Lower Seals:

(1) Provide lower seal with mating faces immersed in the oil or glycol bath sealing the pump volute and oil chamber.

(2) Materials: Silicon carbide or Tungsten-Carbide rotating and stationary faces.

d. Springs: Type 316 stainless steel or DIN 2.4610 Hastelloy® C-4.

e. Elastomers: Viton.

f. Provide one moisture detection probe to detect moisture in stator cavity measuring conductivity.

g. Provide a sensor located at the bottom of the seal cavity to detect leakage.

h. Provide O-ring sealed plugged fill and drain inspection ports.

i. Provide winding over temperature protection.

j. Moisture detection and/or over temperature to shut down pumps, indicate condition and alarm.

13. Motor Sensor Monitoring Relays:

a. All relays are to be installed by the Contractor as indicated on the Electrical drawings and wired in accordance with pump manufacturer's written instructions.

b. Provide relays to mount in standard 12-pin socket bases and operate on available control voltage of 24-240 VAC.

c. Relay power consumption: No more than 2.8 watts and be UL approved.

d. Relays to be modular in design, with each relay monitoring no more than two motor sensor functions.

e. Provide each relay module with a tricolor (red/green/amber) LED to indicate the status of each monitored sensor. Green will indicate "status OK"; amber will indicate a leakage failure or alarm condition; red will indicate a temperature failure or alarm condition.

f. A self-corrected fault will allow the relay output contacts to reset and cause the LED to change from a steady alarm indication to a flashing signal. The LED will continue to flash until locally cleared, providing the operator with an indication of a potential intermittent fault. Provide each relay with a power-on LED and both “test” and “reset” pushbuttons.

g. Provide an independent fail-safe, switch on power loss, form-C output contact rated for 5 amps at 120 volt, for each monitored sensor to provide a normally-open / normally closed dry contact to initiate a remote alarm device or shut down the motor. Provide contacts rated for 3 amps at 240 volt.

14. Bearings:

a. Provide double row, re-greaseable bearings on the pump side and permanently lubricated, maintenance free bearing on the motor end.

b. Minimum B or L-10 bearing life of 50,000 hours.

15. Provide all mating surfaces machined and fitted with O-rings. All fittings shall be metal to metal contact between each machine surface.

16. Provide a Type 316 lifting attachment capable of lifting the entire pump and motor assembly.

17. Motors shall conform to UL or FM quality assurance specifications and be manufactured by an ISO-9001 company.

2.06 DRAIN AND VENT PIPING:

A. Provide casing vent and drain piping and valves to discharge into gutters or sumps as indicated and as directed by the Engineer.

B. Drain and vent piping: Schedule 10S Type 316L stainless steel with VicPress connections or Schedule 40 Type 316L stainless steel with socket welded connections. Provide a sufficient number of unions to permit removal of each valve and in-line device.

C. Provide pipe and fittings in accordance with Section 40 23 19.04 and as indicated.

D. Valves: Provide size and type as indicated and in accordance with Section 33 30 00.

2.07 GAUGES:

A. Provide gauges assemblies for suction and discharge of each pump in accordance with Section 40 91 00 and as indicated.

2.08 HARDWARE:

A. Type 316 stainless steel.

2.09 FACTORY PAINTING:

A. Primer and Finish Paint: Factory apply to all exterior ferrous surfaces; high solids epoxy in accordance with Section 09 91 10.

B. Ferrous surfaces which are not to be painted shall be given a factory applied coat of grease or rust resistant coating.

C. Provide additional factory paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.10 FACTORY TESTING:

A. Conduct mechanical and electrical motor integrity tests in accordance with HI 11.6.

B. Provide motor shop testing as specified.

1. Conduct motor efficiency and power factor tests at full load, seventy-five percent (75%) load and fifty percent (50%) load.

2. Test motor integrity in a submerged condition.

3. Dry run no load test.

4. Motor electrical integrity test.

5. Moisture and temperature sensors integrity test.

C. Pump Tests:

1. Test pump casings under a hydrostatic head of at least 75 psi or one hundred fifty percent (150%) of rated shutoff head, whichever is greater.

2. Provide witness tests as specified herein for all pumps.

3. Certified Performance and Witness Testing:

a. Testing of dry pit submersible pumps submerged is not acceptable.

b. Run pump at full speed rating point for 60-minutes prior to start of any testing.

c. Full Speed Tests:

(1) Test pumps at the conditions specified and indicated and take not less than seven (7) operating points between shutoff and run out. Test points must be at the conditions specified and indicated.

(2) Take readings to determine flow, differential pressure, rpm, horsepower, and efficiency.

(3) Operate each pump for not less than one hour and take readings to determine that the pump will operate as specified and indicated without cavitation at the specified minimum head condition with not more than the specified NPSH available.

4. Conduct Additional Tests as follows:

a. Run each pump at the minimum speed rating point for two (2) hours and continuously record motor temperature. Pumps must be run un-submerged.

b. Run each pump submerged for a minimum of one (1) hour submerged at 5-feet operating at full speed, no performance testing required.

c. Factory Tests on Pumps:

(1) Use factory calibrated test drives.

d. Provide a minimum of thirty (30) days written notice to the RPR prior to shop testing.

5. Run all tests in accordance with the latest standards of the Hydraulic Institute and as specified.

6. Testing Acceptance Grade and Tolerances:

a. HI 14.6 Acceptance Grade: 1U.

b. Efficiency Tolerance: -0 percent (0%).

c. If pumps do not meet the tolerances specified, trim the impeller and retest until the specified results are obtained.

7. In the event that specified tests indicate that pump or motor will not meet specifications, RPR has the right to require additional complete tests for all pumps or motors at no additional cost to the Owner.

8. Repeat tests until specified results are obtained.

9. Correct or replace promptly all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.

10. When pump witness performance testing is specified, provide roundtrip airfare, all transportation and lodging for witness testing for two (2) people. If air travel is more than six (6) hours provide business class airfare.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install items in accordance with accepted shop drawings, manufacturer's printed instructions and as indicated.

B. Install pumping units on a concrete pad and align thereon.

1. Set base on metal shims placed directly under the part of the base carrying the greatest weight and spaced close enough to provide uniform support.

C. After alignment is correct, grout using high grade non-shrink grout.

1. Do not imbed leveling nuts in grout.

3.02 FIELD TESTING:

A. Comply with the requirements specified in Section 01 78 25 and as specified herein.

B. Test piping connections to prove the pump nozzle are installed with the pipe in a free supported state and without need to apply vertical or horizontal pressure to align piping with pump nozzles. This must be performed and the piping acceptable prior to any field performance testing.

C. Field testing will not be conducted without an accepted procedure, calibration certificates for all testing equipment, gauges and flow meters and a completed and signed pretesting check list. See Division 01 for checklist.

D. After installation of pumping equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer’s field service technician, conduct running test for each pump in presence of the Engineer to determine its ability to operate within the vibration and temperature limits specified, and to deliver its rated capacity under specified conditions.

1. During tests, observe and record head, capacity, pump bearing housings and motor bearing temperature, noise and vibration and motor inputs.

a. Provide vibration signature test data for each pump and drive assembly.

(1) Limit: 50 percent of ANSI/HI allowable limits.

b. Bearing Temperature: Bearing temperature not to exceed 180 degrees F (82 degrees C).

c. Test Duration: Determined by the Engineer, but not less than three hours of continuous operation at each condition specified and indicated.

2. Run each pump for minimum four hours prior to taking temperature readings of the pumps, motors, and shafting.

3. Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.

4. Repeat tests until specified results are obtained.

5. Contractor to provide all water labor, piping, testing equipment, equipment, flow meters and test gauges for conducting tests.

a. Contractor shall provide calibrated test gauges for all permanently installed gauges and portable calibrated flow meters for all pumping systems even in those cases where permanent flow meters are installed.

b. All calibrations must be within 30 days of the field testing.

c. The testing will not be started and will not be accepted until the calibrated testing equipment stated above is operational and all certifications have been submitted.

E. Make all adjustments necessary to place equipment in specified working order at time of above tests.

F. Test pump on product only. If product is not available, test with water. Water for testing furnished by Contractor.

G. Remove and replace all equipment at no additional cost to the Owner with equipment that will meet all requirements specified and indicated if unable to demonstrate to the satisfaction of the Engineer that equipment will perform the service specified, indicated and as submitted and accepted.

3.03 FIELD TOUCH-UP PAINTING:

A. After installation and accepted testing by the Engineer, apply touch-up paint to all scratched, abraded and damaged factory painted surfaces. Coating type and color shall match factory painting.

3.04 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 43 21 14

SUMP PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide submersible sump pumps, motors, controls, and appurtenances as indicated on the Contract Drawings and specified herein.

B. Work includes furnishing, installation support, testing, commissioning, and training for sump pumping equipment required for operation of the Mamajanao Wastewater Pump Station Modifications project.

C. Sump pumps shall remove pump room drainage including washdown water, leakage water, groundwater infiltration, and incidental wastewater entering sump pits.

1.02 PROCESS DESCRIPTION:

A. Service: Provide two sump pump systems for the drywell/pump room sump pits consisting of two submersible sump pumps. Pump operation shall be automatically controlled based on sump liquid level to provide reliable and efficient removal of pump room drainage, including washdown water, leakage water, and incidental wastewater infiltration. The system shall include local alarm indication and shall be fully integrated with the facility SCADA system to provide status monitoring, alarm notification, and operational feedback.

B. Downstream Process Discharge: Mamajanao WWPS Wetwell.

C. Layout shown on the drawings are based on 2-inch submersible pumps. If a different layout and configuration is proposed the Owner shall be reimbursed by the Contractor for all redesign costs that may result from an alternative configuration.

1.03 REFERENCES:

A. ASTM International (ASTM):

1. ASTM A48: Specification for Gray Iron Castings

B. National Electric Code (NEC).

C. National Electrical Manufacturers Association (NEMA):

1. NEMA Design B: Normal-Torque Motors

2. NEMA 4X: Enclosures are Primarily Intended for Outdoor Use and Offer a Superior Level of Protection from Corrosion and Extreme Environments

D. Underwriters Laboratories (UL):

1. UL 508: UL Standard for Safety Industrial Control Equipment

1.04 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01 33 00:

1. Prior to fabrication and testing provide guaranteed performance curves based on actual shop tests of mechanically duplicate equipment showing they meet indicated and specified requirements for flow capacity and head loss.

a. For units of same size and type, provide curves for a single unit only.

b. Submit curves for guaranteed performance on 8-1/2 inch x 11-inch sheets, one (1) curve per sheet.

2. Certified setting plans, with tolerances.

3. Manufacturer's literature as needed to supplement certified data.

4. Motor data and performance characteristics.

5. Schematic control and power wiring diagrams including interconnecting and internal wiring diagrams

6. Control panel layout drawings and elevation views.

7. Shop drawing data for all accessory items.

8. Operations and maintenance manual in accordance with Section 01 78 23 Operation and Maintenance Data.

9. List of recommended spare parts other than those specified.

10. Field inspection reports (when available).

11. Recommendations for short and long-term storage.

12. Equipment weight and lifting points for Contractors installation and transport purposes.

13. Special tools.

14. Material Certifications:

    a. Provide certifications from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified.

B. A copy of the contract mechanical process, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.

    1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

C. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.

    1. If deviations and clarifications from the specifications are indicated, therefore, requested by the Contractor, provide a detailed written justification for each deviation and clarification.

    2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 SERVICE CONDITIONS:

A. Basis of Design:

    1. Influent: Process washwater

B. System Information – Mamajanao WWPS Drywell/Pump Room

    1. Number of Sump Pumps: Two (2).

    2. Number of Sumps: Two (2)

    3. Pump Tag Numbers: SP-1 and SP-2

    4. Sump Dimensions: 2.5-feet diameter x 3-feet deep.

    5. Required Solids Sphere Size Passage: 1/2-inch maximum.

6. Design Flow: 35 gpm.

7. Design Total Dynamic Head (TDH): 12-feet.

8. Electrical Area Classification: Class 1 Division 2 Hazardous Area.

9. Motor Size and Type: 3/4 HP nominal maximum, 1,800 RPM maximum speed, submersible.

10. Motor Voltage: 480-volts, 3-phase, 60-hertz.

C. Comply with the requirements specified in Section 01 61 00.

1.06 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01 43 00.

B. Pumps shall be the product of one manufacturer.

C. Pumps shall be manufacturer's standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01 66 10.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Zoeller

B. Pentair

C. KSB

D. Sulzer/ABS

E. Xylem/Flygt

F. Or approved substitute.

2.02 PUMP CONSTRUCTION

A. General

1. All pumps shall be non-overloading throughout the entire range of operation without employing service factor.

2. The pump shall include a minimum service factor of 1.20.

3. The performance curve shall include design head and capacity, pump efficiency, and solid handling sphere size capability.

B. Construction:

1. Each pump shall be of the sealed submersible type. The pump volute, motor, impeller, and seal housing shall be gray cast iron, ASTM A48, Class 30.

2. The pump discharge shall be fitted with a standard 125-pound flange, faced and drilled. All external mating parts shall be machined and Nitrile O-ring sealed on a beveled edge.

3. All fasteners exposed to the pumped liquids shall be Type 316 stainless steel.

C. Casing:

1. The casing shall be of the end suction volute type having sufficient strength and thickness to withstand all stress and strain from service at full operating pressure and load.

2. The casing shall be of the centerline discharge type equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment.

3. The casing shall be accurately machined and bored for register fits with the suction and casing covers.

4. Pumps shall rest on support legs that are integral with the casing and volute.

5. Casing shall be shop coated inside and out.

D. Impeller:

1. Impeller shall be of the two-vane, semi-enclosed design and have pump-out vanes on the backside of the impeller to prevent grit and other materials from collecting in the seal area.

2. Impeller shall not be coated.

3. Impellers shall be dynamically balanced.

4. The impeller shall be slip fit to the shaft and key driven. A 400 Series stainless steel washer and impeller bolt shall be used to fasten the impeller to the shaft.

E. Bearings and Shaft:

1. An upper radial bearing and lower thrust bearing shall be required. Both the upper radial bearing and the lower thrust bearing shall be heavy-duty single row ball bearings that are permanently lubricated by the dielectric oil that fills the motor housing.

2. The shaft shall be machined from a solid 400 Series stainless steel and be a design that is of larger diameter with minimum overhand to reduce shaft deflection and protect bearings.

F. Seals:

1. The pumps shall have a mechanical single seal.

2. The seal shall be used with the rotating seal face being carbon and the stationary seal face to be ceramic. The seal shall be replaceable without disassembly of the seal plate and without the use of special tools.

3. Pump-out vanes shall be present on the backside of the impeller to keep contaminants out of the seal area.

G. Power Cords:

1. Electrical power cord shall be SOOW or W, water resistant 600V, 194 degrees F, UL and CSA approved and applied dependent on amp draw for size.

2. The pump shall be double protected with compression fitting and an epoxy potted area at the power cord entry to the pump.

3. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to the bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be filled with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.

4. The power cord assembly shall then be connected to the motor leads with insulated butt connectors rather than a terminal board that allows for possible leaks.

5. The cord cap assembly where bolted to the motor housing shall be sealed with a Nitrile O-ring on a beveled edge to assure proper sealing.

H. H. Motors:

1. The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation (311 degrees F) and dielectric oil-

filled motor, NEMA B design. Three (3) phase motors shall use magnetic starters with overload relays located as indicated on the drawings.

2. Stators shall be securely held in place with threaded fasteners so they may be easily removed in the field without the use of special tools.

3. Motors shall be designed and fabricated to operate within a Class 1 Division 2 Hazardous location.

2.03 CONTROLS

A. Description:

1. Sump pump control panels shall be in accordance with the Contract Drawings. The Instrumentation and controls shall be provided as indicated on the Piping and Instrumentation Diagrams (P&IDs), elementary Diagrams (control schematics) and shall be provided.

2. The control panel shall include contacts for the specified seal moisture detector and the over temperature switch configuration used by the manufacturer for the motor.

3. Intrinsically safe devices and wiring shall be in accordance with the National Electrical Code.

4. The control panel shall include dry contacts to provide run and fault status for each pump to the Supervisory Control and Data Acquisition (SCADA) system.

5. Provide a main disconnecting circuit breaker at each control panel rated minimum 65KAIC.

6. Each control panel shall be UL 508 listed and provided with a NEMA 4X enclosure.

7. Provide three (3) float switches for each pump control as follows:

a. Sump Flood Alarm

b. Pump On

c. Pump Off

2.04 SHOP PAINTING:

A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, high solids epoxy in accordance with Section 09 91 10 Shop Painting.

B. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.

C. Provide additional shop paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.05 SPARE PARTS:

A. Spare parts are not required.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install items in accordance with accepted shop drawings, manufacturer's printed instructions and as indicated.

3.02 MANUFACTURERS SERVICES:

A. Provide services of manufacturer's representative as stated in Section 01783 Plant Testing, Startups, and Commissioning and as specified herein.

B. Provide Services of Factory-Trained Service Technician, Specifically Trained on Type of Equipment specified:

1. Service Technician must be present on site for all items listed below. Person-day requirements listed are exclusive of travel time, and do not relieve Contractor of the obligation to place equipment in operation as specified.

2. Installation: Verify location of anchor bolts; setting, leveling, alignment, field erection; coordination of piping, and miscellaneous utility connections:

a. One (1) person-day

3. Functional Testing: Calibrate, check alignment and perform a functional test with water. Tests to include all items specified.

a. One (1) person-day.

4. Field Performance Testing: Field performance test equipment specified.

a. One (1) person-day.

5. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts, and preparation to lead and teach classrooms sessions.

a. One (1) person-days

6. Any additional time required of the factory trained service engineer to assist in placing the equipment in operation or testing, or to correct deficiencies in installation, equipment or material shall be provided at no additional cost to the Owner.

3.03 FIELD TESTING:

A. Comply with the requirements specified in Section 01 78 25 and as specified herein.

B. Field testing will not be conducted without an accepted procedure, calibration certificates for all testing equipment, and a completed and signed pretesting check list.

C. After installation of equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer's field service technician, conduct a dry running test and a performance test for each unit in presence of the RPR to determine its ability to deliver its rated capacity under specified conditions.

1. Performance Test:

a. During tests, observe and record flow rates, water level, and motor voltage and current.

b. Test Duration: Determined by the RPR, but not less than ten (10) cycles.

c. After initial startup sump pump system must demonstrate thirty (30) days of continuous, defect-free operation prior to final acceptance.

d. Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.

2. Repeat tests until specified results are obtained.

D. Make all adjustments necessary to place equipment in specified working order at time of above tests.

3.04 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01 77 00.

END OF SECTION

PROJECT INFORMATION

CLIENT PROJECT NUMBER:	
AECOM PROJECT NUMBER:	60745967
PROJECT NAME	GUAM WATER AUTHORITY YPAO AND MAMAJANAO WASTEWATER PUMP STATIONS REHABILITATION
AUTHORITY HAVING JURISDICTION	GUAM WATER AUTHORITY
	GLORIA B. NELSON PUBLIC SERVICE BUILDING
	688 ROUTE 15, SUITE 200
	MANGILAO, GU 96913-6203
RESPONDING FIRE SERVICE	GUAM FIRE DEPARTMENT
	238 ARCHBISHOP FLORES ST
	HAGATNA, GUAM 96910
APPLICABLE CODES	10 GUAM CODE ANNOTATED (GCA) HEALTH AND SAFETY, CH. 73 FIRE PREVENTION
	21 GCA REAL PROPERTY CHAPTER 66 BUILDING LAW
	21 GCA REAL PROPERTY CHAPTER 67 THE BUILDING CODE
	2009 INTERNATIONAL BUILDING CODE
	2009 INTERNATIONAL EXISTING BUILDING CODE
	2009 IFC, INCLUDING APPENDICES B, C, D, E, F, G, H, AND I
	2009 INTERNATIONAL FUEL GAS CODE
	2009 INTERNATIONAL MECHANICAL CODE
	2009 INTERNATIONAL PLUMBING CODE, INCLUDING APPENDICES C, E, AND F
	2017 GUAM TROPICAL ENERGY CODE
	NFPA 820 - STANDARD FOR FIRE PROTECTION IN WASTEWATER TREATMENT AND COLLECTION FACILITY
	NFPA 70 - NATIONAL ELECTRIC CODE

BUILDING CODE CHART NOTES:
1. ACCESSIBILITY NOT REQUIRED PER THE FOLLOWING EXCEPTIONS:
A. IBC SECTION 1103.2.9 EQUIPMENT SPACES. SPACES FREQUENTED ONLY BY PERSONNEL FOR MAINTENANCE, REPAIR, OR MONITORING OF EQUIPMENT ARE NOT REQUIRED TO BE ACCESSIBLE.
2. AREAS CLASSIFIED AS GROUP B WILL BE DESIGNATED TO BE ACCESSIBLE TO INDIVIDUALS WITH DISABILITES.

BUILDING INFORMATION

CODE ITEM		
CLASSIFICATION	**CODE REFERENCE**	**AREA 1**
USE & OCCUPANCY	IBC 306.3	GROUP F-2
CONSTRUCTION TYPE	IBC SECTION 602.2	I-A (602.2, NON-COMBUSTIBLE, 3-HR PROTECTED)
ALLOWABLE HEIGHT	IBC TABLE 503	UL - UNLIMITED
ACTUAL HEIGHT		9'-6"
ALLOWABLE AREA	IBC TABLE 503	UL
ACTUAL AREA		GROUND LEVEL - 998 GSF
		INTERMEDIATE LEVEL (MECH SPACE) - 998 GSF
		BASEMENT LEVEL (MECH SPACE) - 998 GSF
		TOTAL - 2,994 GSF (998 GSF OCCUPIED)
FIRE RATINGS		
FIRE RATING OF EXTERIOR WALLS	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
PRIMARY STRUCTURAL FRAME	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
BEARING WALLS - EXTERIOR	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
BEARING WALL - INTERIOR	IBC TABLE 601	3-HOUR FIRE-RESISTANCE RATING
NON BEARING - EXTERIOR	IBC TABLE 601	0-HOUR FIRE-RESISTANCE RATING
NON BEARING - INTERIOR	IBC TABLE 601	0-HOUR FIRE-RESISTANCE RATING
FLOOR CONSTRUCTION	IBC TABLE 601	2-HOUR FIRE-RESISTANCE RATING
ROOF CONSTRUCTION	IBC TABLE 601	1 1/2-HOUR FIRE-RESISTANCE RATING
FIRE SEPARATION DISTANCE	IBC TABLE 705.5	**FIRE SEPARATION DISTANCE X FEET**
		X ≥ 30'

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEM	**IEBC SECTION 803.2**	803.2.2 - NO REQUIREMENTS FOR F-2 AND EXEMPT FROM IEBC 803.2.3 PER IBC 903.2.11.1 AREA IS LESS THAN 1500 SF
PORTABLE FIRE EXTINGUISHERS	**IBC SECTION 906**	MIN TRAVEL DISTANCE = 50'-0"
FIRE ALARM DETECTION SYSTEMS	**IEBC SECTION 803.4.1**	EXEMPT 803.4.1 - NO REQUIREMENTS FOR F-2 OCCUPANCIES
STRUCTURAL DESIGN	SEE STRUCTURAL CODE SHEETS	
ELECTRICAL DESIGN	SEE ELECTRICAL CODE SHEETS	
MECHANICAL DESIGN	SEE MECHANICAL CODE SHEETS	
PLUMBING SYSTEMS	SEE PLUMBING CODE SHEETS	

EGRESS COMPONENTS

MEANS OF EGRESS		**FUNCTION OF SPACE**	**OCCUPANT LOAD FACTOR**
DESIGN OCCUPANT LOAD FACTOR	IBC TABLE 1004.1	ACCESSORY STORAGE AREAS, MECHANICAL EQUIPMENT ROOM	300 GROSS / TOTAL BLDG OCC = (10) OCCUPANTS
DEAD END CORRIDOR			
MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY	IEBC 805.3.1	EXEMPT FROM IEBC REQUIREMENTS AS EXITS ARE SERVED BY SINGLE TENANT	
EGRESS WIDTH	IBC TABLE 1020.3	MIN CORRIDOR WIDTH 1020.3	
	IBC TABLE 1010.3.1(1)	IBC TABLE 1010.3.1(1)	
MAX. EXIT ACCESS TRAVEL DISTANCE	IEBC 805.4.1.1		
COMMON PATH OF TRAVEL	IEBC 805.4.1.1	EXEMPT PER IEBC 804.1.1 REQUIREMENTS AS EXITS ARE SERVED BY LESS THAN 50 OCCUPANTS	
MIN. CEILING HEIGHT MEANS OF EGRESS	IBC SECTION 1003.2	NOT LESS THAN 7'-6" ABOVE FINISH FLOOR	
HANDRAILS	IEBC 805.9		
GUARDS	IEBC 805.11		
ENERGY CONSERVATIONS	IEBC 810	ONLY COMPONENTS REPLACED OR INSTALLED TO COMPLY WITH 2017 GUAM TROPICAL ENERGY CODE PER IEBC 810	

EXISTING BUILDING NOTES

IECC (2009) LEVEL OF ALTERATION	**LEVEL 2 (IECC 701 - 711)** - INCLUDES ELIMINATION OF ANY DOOR/WINDOW, RECONFIGURATION OR EXTENSION OF ANY SYSTEM, ROOM LAYOUT ALTERATION, INCLUDING ADDITION OR DEMOLITION OF WALLS, AND WHERE THE WORK AREA IS LESS THAN OR EQUAL TO 50% OF THE BUILDING AREA
703.2.1 - EXISTING VERTICAL OPENINGS	- ALL EXISTING FIRE VERTICAL OPENINGS CONNECTING (2) OR MORE FLOORS SHALL BE ENCLOSED WITH AN APPROVED FIRE-RESISTANCE RATING OF NOT LESS THAN 1-HOUR WITH APPROVED OPENINGS - EXCEPTION 7.1 - IN GROUP F OCCUPANCIES, THE ENCLOSURE SHALL NOT BE REQUIRED FOR VERTICAL OPENINGS NOT EXCEEDING THREE STORIES

LEGEND - LIFE SAFETY

BASED ON 2015 IBC

FIRE WALLS (IBC 706)
- 2 HR RATED FIRE WALL — 2FW
- 3 HR RATED FIRE WALL — 3FW
- 4 HR RATED FIRE WALL — 4FW

FIRE BARRIERS (IBC 707)
- 1 HR RATED FIRE BARRIER — 1FB
- 2 HR RATED FIRE BARRIER — 2FB
- 3 HR RATED FIRE BARRIER — 3FB
- 4 HR RATED FIRE BARRIER — 4FB

FIRE PARTITIONS (IBC 708)
- 1/2 HR RATED FIRE PARTITION — 1/2FP
- 1 HR RATED FIRE PARTITION — 1FP

SMOKE BARRIER (IBC 709)
- 1 HR RATED SMOKE BARRIER — 1SB

FIRE/SMOKE BARRIER (IBC 707 & 709)
- 1 HR RATED FIRE/SMOKE BARRIER — 1FSB

FIRE/SMOKE BARRIER (IBC 709)
- 2 HR RATED FIRE/SMOKE BARRIER — 2FSB

SMOKE PARTITION (IBC 710)
- SMOKE PARTITION — SP

AIR TIGHT PARTITION
- AIR TIGHT PARTITION — AT

EXISTING RATED WALLS
INDICATED WITH "E" AS PREFIX TO WALL RATINGS LISTED ABOVE

ATRIUM ENCLOSURE (IBC 404.6)
PER EXCEPTION 1 - GLASS WALL SMOKE PARTITION WITH SPRINKLER WATER CURTAIN — #D

GLAZED WINDOW SEPARATION (IBC 104.11)
2 HR RATED GLASS WINDOW ASSEMBLY WITH SPRINKLER DELUGE SYSTEM W/ DELUGE — #D

-USE ONLY WITH PRIOR ACCEPTANCE BY AHJ.

APPROVED BY: _____
APPROVAL DATE: _____

LEGEND - LIFE SAFETY SYMBOLS

GENERAL

1
1
1
= PROVIDED OCCUPANT CAPACITY IN DIRECTION OF EGRESS

ACCESSIBLE ENTRANCE / EXIT

OCCUPANCY LOAD & USE GROUP

OCCUPANCY TYPE / USE GROUP AS DESCRIBED BY CODE

X-#	
XXX SF	XX OCC

OCCUPANCY LOAD (CAPACITY)
SQUARE FOOTAGE OF AREA

OCCUPANCY RATING

- ASSEMBLY - A-2
- ASSEMBLY - A-3
- BUSINESS - B
- FACTORY - F-1
- FACTORY - F-2
- HAZARDOUS - H-3
- HAZARDOUS - H-4
- WAREHOUSE - S-1
- WAREHOUSE - S-2
- UTILITY - U

FIRE EXTINGUISHERS

- FEC — FIRE EXTINGUISHER CABINET
- FEW — FIRE EXTINGUISHER WALL MOUNTED
- FE/T — FIRE EXTINGUISHER TEMPORARY
- STP — STANDPIPE

EXIT SIGNS

- CEILING MOUNTED - SINGLE
- CEILING MOUNTED - DOUBLE
- CEILING MOUNTED - SINGLE DIRECTIONAL
- CEILING MOUNTED - DOUBLE DIRECTIONAL
- WALL MOUNTED - SINGLE
- WALL MOUNTED - DOUBLE
- WALL MOUNTED - SINGLE DIRECTIONAL
- WALL MOUNTED - DOUBLE DIRECTIONAL

EGRESS & TRAVEL DISTANCE

EXIT NUMBER
EXIT NO. X
90 / 180 — 1@ 36"
EGRESS CAPACITY REQUIRED
N0. OF DOOR PANELS & PANEL WIDTH
EGRESS CAPACITY PROVIDED
EGRESS DISCHARGE DIRECTION

ESTIMATED TRAVEL DISTANCE

ESTIMATED COMMON PATH OF TRAVEL

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GUAM WATERWORKS AUTHORITY

NO | REVISIONS: | DATE:
1 | ADDENDUM NO. 1 - B&W REISSUE | 5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD — CERTIFICATE — No RA439 — EXP 12/30/2024 — REGISTERED ARCHITECT — GUAM
This work was prepared by me or under my responsible control.
DATE: 12/20/2024

CITY ENGINEER — DATE:
DESIGN GROUP
ENGINEER:
DESIGNED BY: Designer
DRAWN BY: Author
CHECKED BY: Checker
APPROVED BY: Approver

GUAM WATERWORKS AUTHORITY

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: BUILDING CODE ANALYSIS SUMMARY - YPAO
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

WORK ORDER NO.

DRAWING NO. G-20

SHEET 05 OF 100 SHEETS

Filename: Autodesk Docs://CI-AMER(US)/60745967-GWA TO2 CCTV Pump Station/60745967_ACM_GWA_A_R25.rvt
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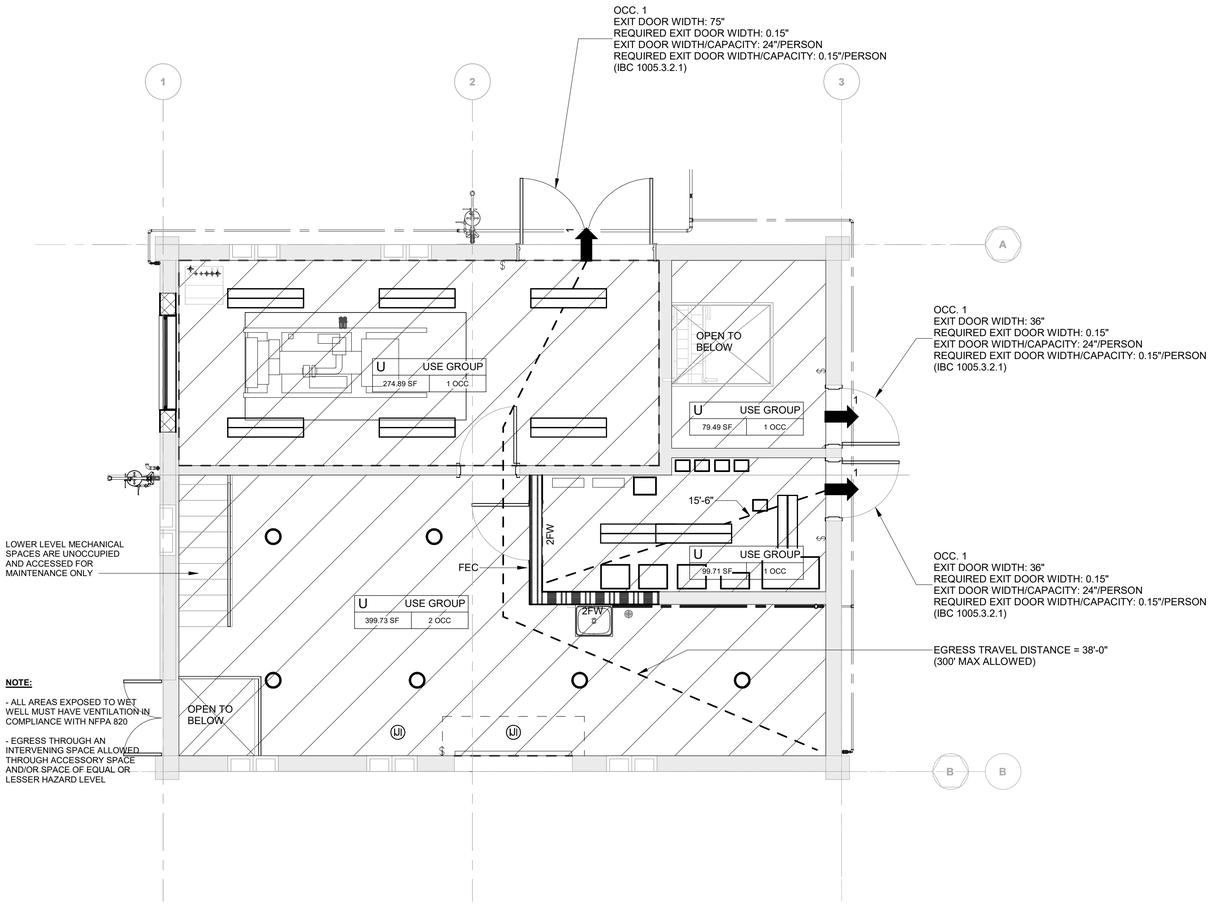
Sheet Version 3.0



YPAO - GROUND LEVEL

GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	ADDENDUM NO. 1 - B&W REISSUE	5/4/26

STRUCTURE NO.

INDEX NO.

DAVID E. BLOOD CERTIFICATE № RA439 EXP.12/31/2024 GUAM REGISTERED ARCHITECT

This work was prepared by me or under my responsible control.
DATE: 12/20/2024

GUAM WATERWORKS AUTHORITY

-	CITY ENGINEER	DATE:
	DESIGN GROUP	
ENGINEER:		
DESIGNED BY:	Designer	
DRAWN BY:	Author	
CHECKED BY:	Checker	
APPROVED BY:	Approver	

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: LIFE SAFETY PLAN - YPAO

PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

WORK ORDER NO.

DRAWING NO. G-21

SHEET 06 OF 100 SHEETS

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Filename: Autodesk Docs://CI-AMER(US)/40745967-GWA TO2 CCTV Pump Station/40745967_ACM_GWA_A_R25.rvt
Last Plotted: 5/6/2026 3:20:30 PM
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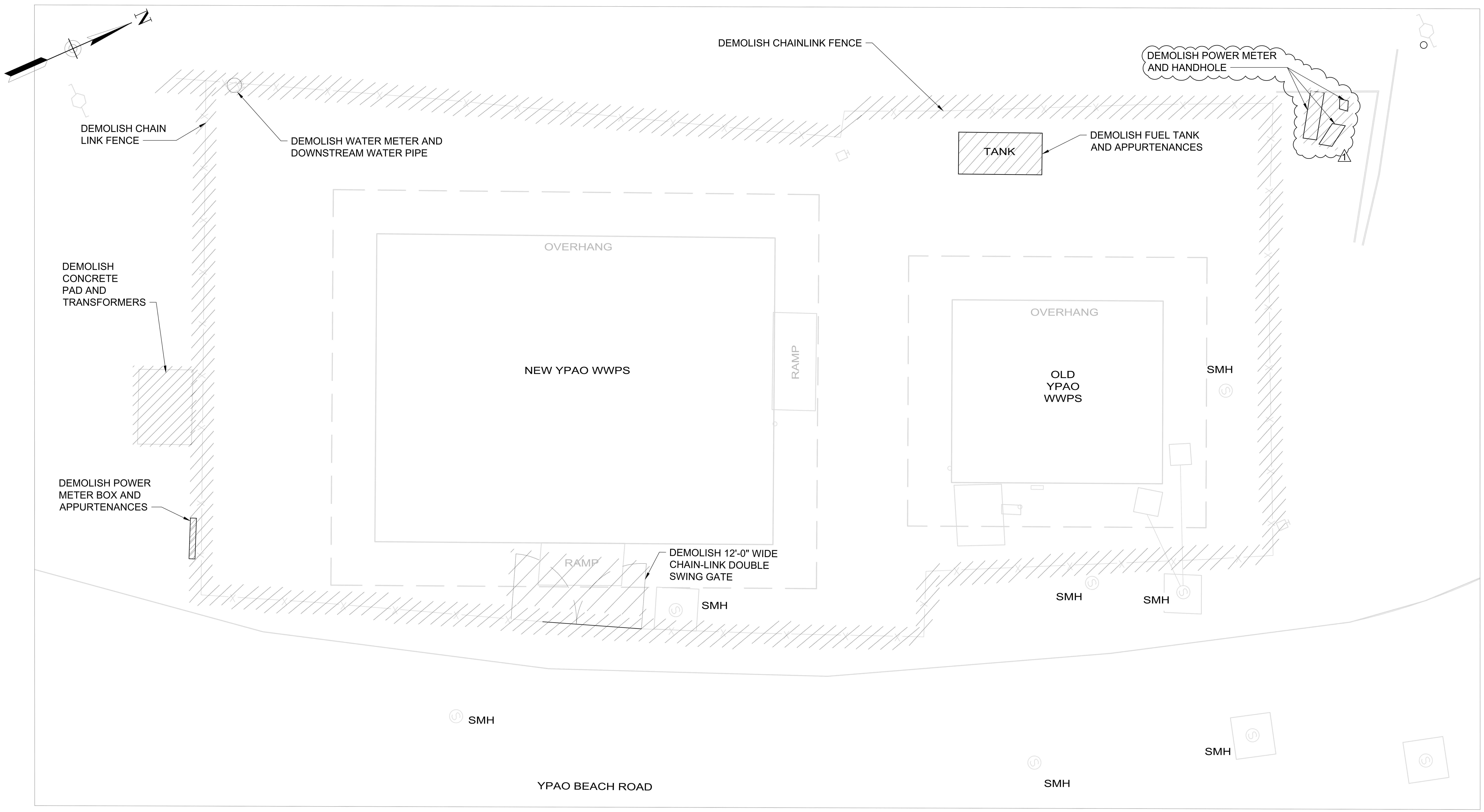

LEGEND:

CHAINLINK FENCE

FORCE MAIN

SEWER LINE

PLAN VIEW 1 / C-01
SCALE: 1" = 5'

0 5' 10' 15'
1" = 5'-0"

GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - ADDED CALLOUTS	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARRETT BROWN, CIVIL, No. 1478, PROFESSIONAL ENGINEER, GUAM
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER DESIGN GROUP

		DATE:
ENGINEER:	JF	04/2026
DESIGNED BY:	JF	04/2026
DRAWN BY:	SI	04/2026
CHECKED BY:	BS	04/2026
APPROVED BY:	BS	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: SITE DEMOLITION PLAN

PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

WORK ORDER NO. -

DRAWING NO. C-01

SHEET 09 OF 100 SHEETS

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DWG: C:\Users\hernan.co\DC\ACCDocs\AECOM\CI-AMER(US)-60745967-GWA T02 CCTV Pump Station\Project Files\900 Design Collaboration\20-SHEETS\C\YPAO WWPS\C-01.dwg USER: hernan.co
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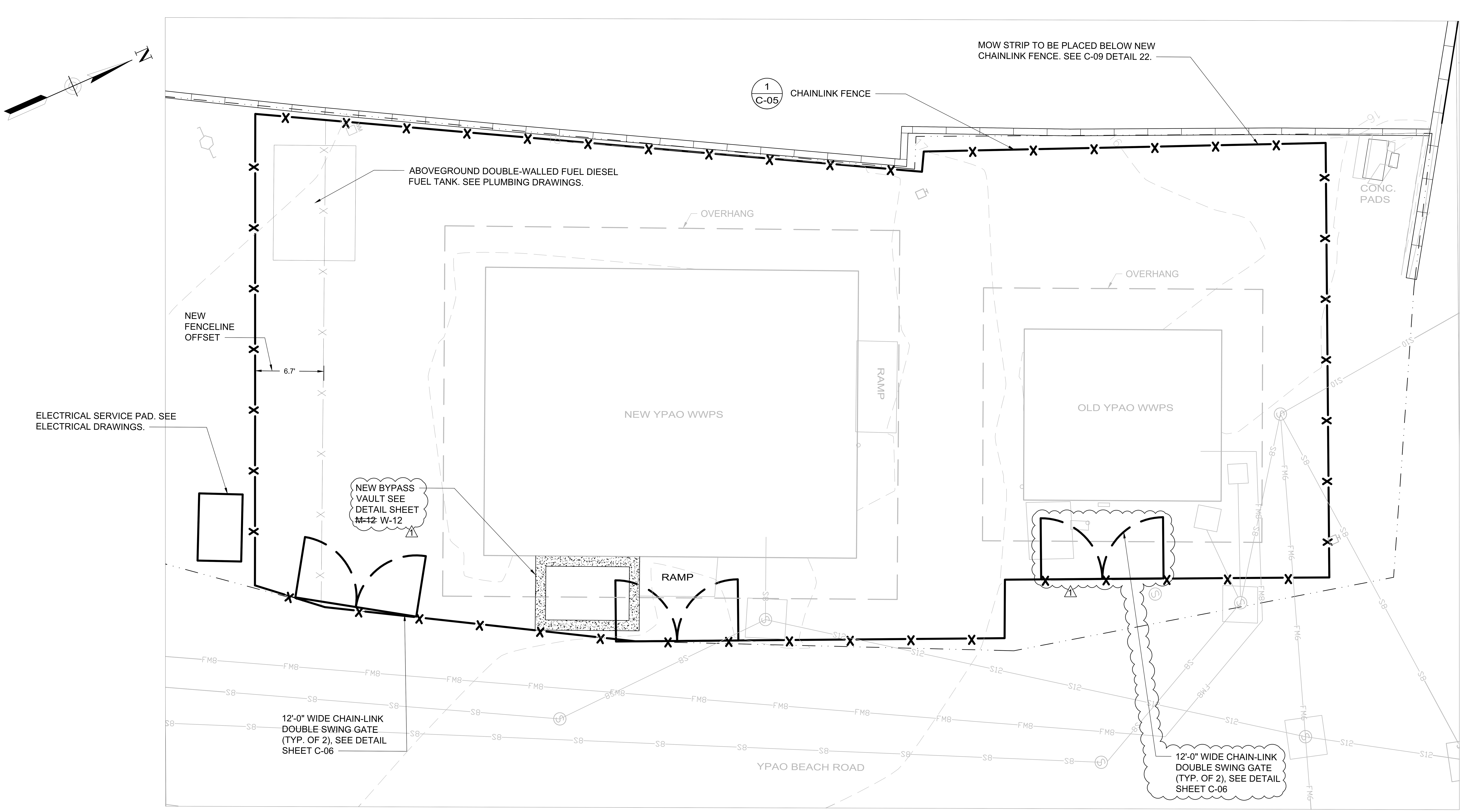

LEGEND:

PROPERTY BOUNDARY

CHAINLINK FENCE

NEW

EXISTING

PLAN VIEW

SCALE: 1" = 5'

1
C-02

0 5' 10' 15'
1" = 5'-0"

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GUAM WATERWORKS AUTHORITY

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1	ADDENDUM NO. 1 - REV. CALLOUTS, ADDED GATE	5/4/26	HC

STRUCTURE NO.

INDEX NO.

GARRETT BROWN, CERTIFICATE No. 1478, CIVIL, GUAM, PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER		
DESIGN GROUP		DATE:
ENGINEER:	JF	04/2026
DESIGNED BY:	JF	04/2026
DRAWN BY:	SI	04/2026
CHECKED BY:	BS	04/2026
APPROVED BY:	BS	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: SITE PLAN

PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

WORK ORDER NO. -

DRAWING NO. C-02

SHEET 10 OF 100 SHEETS

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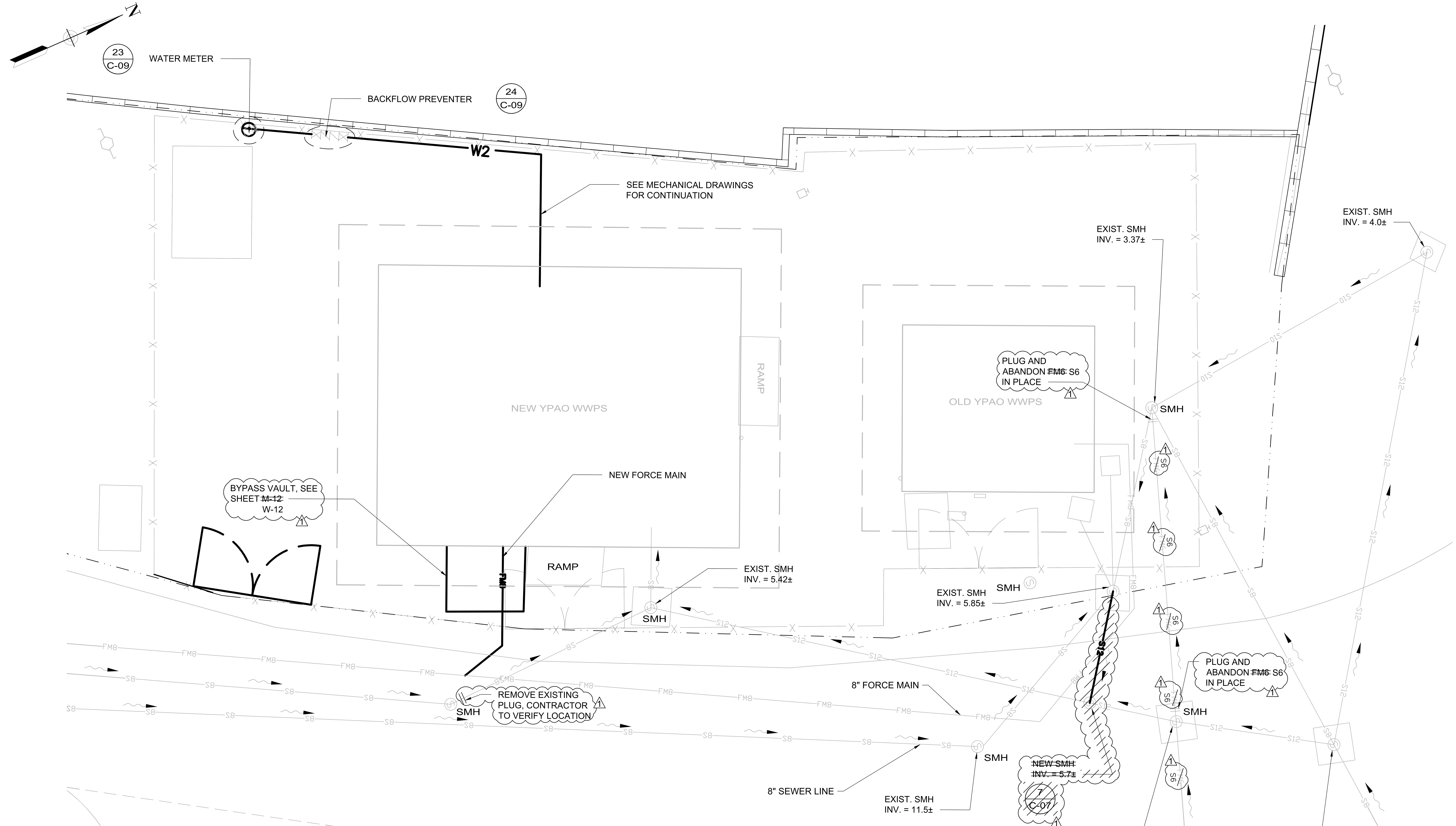

PLAN VIEW
SCALE: 1" = 5'
1
C-03

LEGEND:

- PROPERTY BOUNDARY
- CHAINLINK FENCE
- NEW
- EXISTING
- FORCE MAIN
- SEWER LINE
- ASSUMED SEWER FLOW DIRECTION (CONTRACTOR TO VERIFY)

NOTE:
UTILITIES SHOWN ARE APPROXIMATE AND BASED ON INFORMATION AVAILABLE. CONTRACTOR TO FIELD LOCATE AND CONFIRM EXISTING UTILITIES INVERTS AND FLOWS PRIOR TO EXCAVATION

0 5' 10' 15'
1" = 5'-0"

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GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - REV/ADD CALLOUTS, DELETE OLD FENCELINE	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARRETT BROWN, CERTIFICATE NO. 1478, CIVIL, GUAM PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

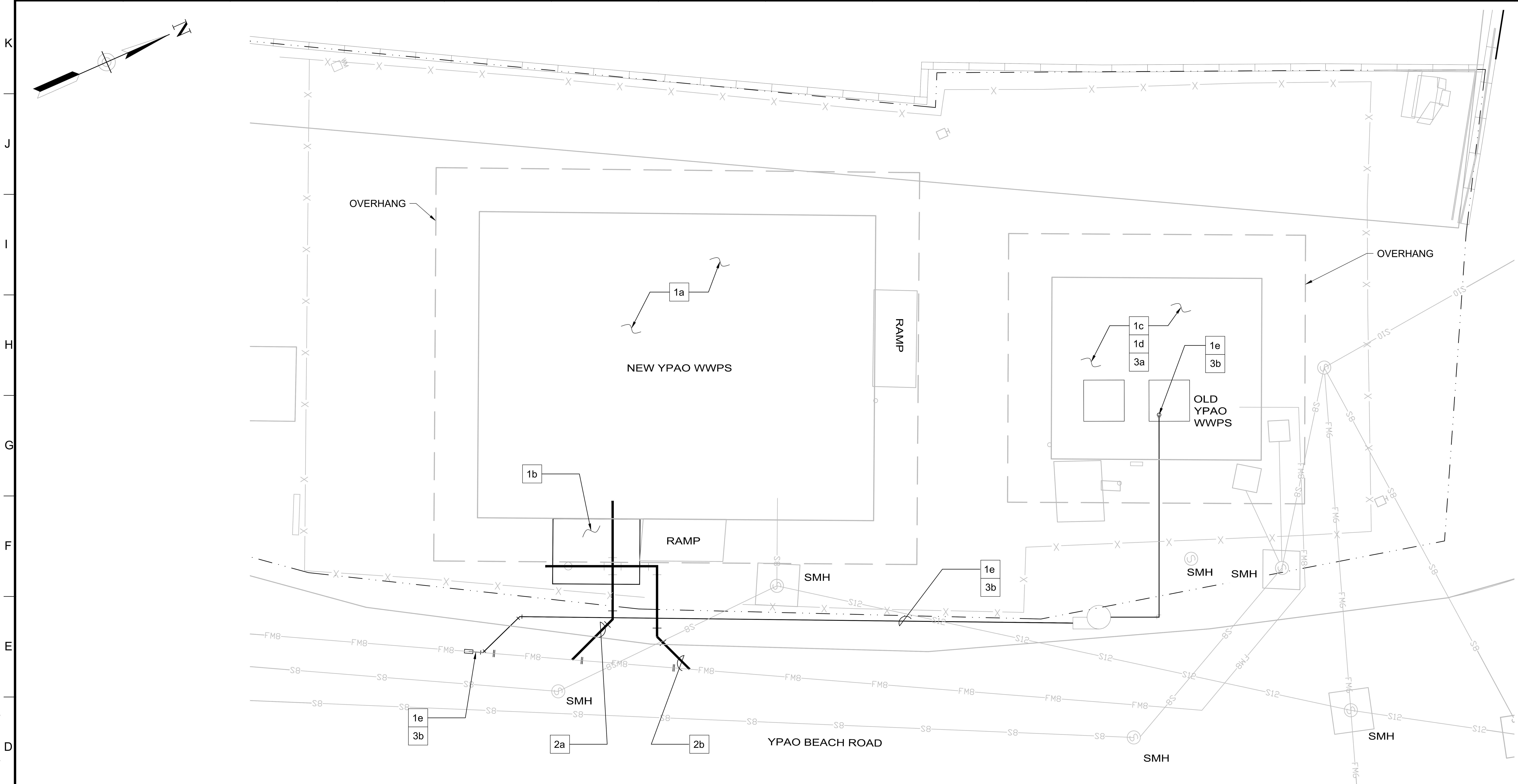
CITY ENGINEER
DESIGN GROUP

		DATE:
ENGINEER:	JF	04/2026
DESIGNED BY:	JF	04/2026
DRAWN BY:	SI	04/2026
CHECKED BY:	BS	04/2026
APPROVED BY:	BS	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: UTILITY PLAN
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

WORK ORDER NO. -
DRAWING NO. C-03



PLAN VIEW 1 / C-04
SCALE: 1" = 5'

SUGGESTED SEQUENCE OF OPERATION:

CONTRACTOR SHALL MAINTAIN FULL FUNCTIONAL OPERATION AT ALL TIMES DURING CONSTRUCTION OF THE WORK.

PROPOSED PHASE 1: INSTALLATION OF PUMPS, PIPING, VALVES AND NEW BYPASS VAULT AT NEW YPAO

1a. INSTALL NEW PUMPS, PIPING AND VALVES AT NEW YPAO.
1b. INSTALL NEW BYPASS VAULT STRUCTURE, PIPING AND VALVES
1c. DRAWDOWN OLD YPAO WETWELL.
1d. ALLOW BACKFLOW OF EXISTING 8" FORCE MAIN BY SECURING CHECK VALVES IN THE OPEN POSITION. IT IS RECOMMENDED TO THROTTLE BACKFLOW INTO THE WETWELL BY CONTROLLING GATE VALVE OPENING POSITION. DURATION TO EMPTY EXISTING 8" FORCE MAIN MAY VARY DEPENDING ON INFLOW FROM COLLECTION SYSTEM. PROVIDE VACTOR TRUCKS TO CONTROL SEWER INFLOW.
1e. MAKE TEMPORARY CONNECTION TO EXISTING 8" FORCE MAIN DOWNSTREAM OF THE NEW YPAO FORCE MAIN CONNECTION POINT. CONNECT TEMPORARY BYPASS LINE AND PORTABLE PUMPSTO EXISTING SPARE SUCTION BELL WALL PIPE AT OLD YPAO.

PROPOSED PHASE 2: OLD YPAO AND NEW YPAO FORCE MAINS CONNECTION TO NEW BYPASS VAULT

2a. MAKE CONNECTION FROM NEW BYPASS VAULT EAST BRANCH TO EXISTING 8" FORCE MAIN.
2b. MAKE CONNECTION FROM NEW BYPASS VAULT NORTH BRANCH TO EXISTING 8" FORCE MAIN FROM OLD YPAO.

SUGGESTED SEQUENCE OF OPERATION (CONT.):

PROPOSED PHASE 3: INSTALLATION OF PUMPS, PIPING, VALVES AND NEW BYPASS VAULT AT OLD YPAO

3a. INSTALL NEW PUMPS, PIPING AND VALVES AT OLD YPAO.
3b. REMOVE TEMPORARY BYPASS LINE AND PORTABLE PUMPS. REPAIR 8" FORCE MAIN. OLD YPAO CAN CONTINUE NORMAL OPERATIONS.

~~PROPOSED PHASE 4: SEWER INFLUENT REALIGNMENT/REROUTE FROM OLD YPAO TO NEW~~ 1

~~4a. PENDING.~~

0 5' 10' 15'
1" = 5'-0"

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GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	ADDENDUM NO. 1 - REVISED SEQUENCE OF OPERATIONS	5/4/26	HC

STRUCTURE NO.

INDEX NO.

JARRETT BROWN, CIVIL, PROFESSIONAL ENGINEER, GUAM, NO. 1478
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER

DESIGN GROUP		DATE:
ENGINEER:	JF	11/2025
DESIGNED BY:	JF	11/2025
DRAWN BY:	SI	11/2025
CHECKED BY:	BS	11/2025
APPROVED BY:	BS	11/2025

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: CONSTRUCTION SEQUENCING AND BYPASS PLAN

PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

WORK ORDER NO. -

DRAWING NO. C-04

SHEET 12 OF 100 SHEETS

DWG: C:\Users\hernon.co\DC\ACCDocs\AECOM\CI-AMER(US)-60745967-GWA T02 CCTV Pump Station\Project Files\900 Design Collaboration\20-SHEETS\C\YPAO WWPS\C-04.dwg USER: hernon.co
DATE: May 05, 2026 3:57pm XREFS: G-BORDER-YPAO 2025-008_topo_ypao_prelim_(04-08-2025) IMAGES:

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DESIGN CRITERIA

INFLUENT WASTEWATER DESIGN VALUES

EXISTING MODEL AVERAGE DRY-WEATHER FLOW	0.28 MGD =	194 GPM
EXISTING PEAK WET WEATHER FLOW	0.64 MGD =	444 GPM
DESIGN AVERAGE DRY-WEATHER FLOW	0.31 MGD =	215 GPM
DESIGN PEAK WET WEATHER FLOW	0.70 MGD =	486 GPM

YPAO PUMP STATION SUBMERSIBLE DRY-PIT PUMPS

NUMBER OF UNITS	2 DUTY + 1 STANDBY PUMP
TYPE	VERTICAL, NON-CLOG SUBMERSIBLE, DRY-PIT PUMP
CAPACITY (PER PUMP)	0.36 MGD = 250 GPM
STATION FIRM CAPACITY	0.72 MGD = 500 GPM
TOTAL DYNAMIC HEAD (TDH)	150 FT
SPEED (MAX)	3350 RPM
MOTOR HORSEPOWER	35 HP
MOTOR CONTROLLER	SOFT STARTER

YPAO PUMP STATION SUMP PUMPS

NUMBER OF UNITS	1 DUTY + 1 STANDBY PUMP
TYPE	DUPLEX, NON-CLOG SUBMERSIBLE
CAPACITY (PER PUMP)	0.07 MGD = 50 GPM
STATION FIRM CAPACITY	0.07 MGD = 50 GPM
TOTAL DYNAMIC HEAD (TDH)	12 FT
SPEED (MAX)	1800 RPM
MOTOR HORSEPOWER	¾ HP
MOTOR CONTROLLER	SOFT STARTER

2

LEGENDS AND SYMBOLS

GATE VALVE
GLOBE VALVE
PLUG VALVE
BALL VALVE
BUTTERFLY VALVE
CHECK VALVE
BALL CHECK VALVE
SOLENOID VALVE
PRESSURE/AIR RELIEF VALVE
VACUUM RELIEF VALVE
PRESSURE/AIR RELIEF AND VACUUM RELIEF VALVE
KNIFE GATE VALVE
STRAINER
QUICK CONNECTOR
CAP OR PLUG
CAP OR PLUG
REDUCER OR INCREASER
MECHANICAL PIPE COUPLING
FLEXIBLE PIPE COUPLING (FPC)
FLEXIBLE COUPLING
ORIFICE METER
UNION
PIPE ANCHOR
CALIBRATION CHAMBER
EXISTING PIPELINE/EQUIPMENT
DEMOLISHED PIPELINE/EQUIPMENT
NEW PIPELINE/EQUIPMENT

FLANGE JOINT
MECHANICAL JOINT
RESTRAINED JOINT
SOLVENT WELD JOINT
WELDED JOINT
BELL AND SPIGOT JOINT
GROOVED END JOINT
THREADED JOINT
BUTTERFLY VALVE
SIGHT GLASS
PULSATION DAMPER
PI — PRESSURE INDICATOR
ROTAMETER
PRESSURE GAUGE AND ISOLATION VALVE
FS — FLOW SWITCH
CONCRETE
MORTAR, GROUT OR PLASTER
CONCRETE BLOCK
GRATING SPAN
CHECKER PLATE
STEEL OR STAINLESS STEEL
P-203 — EQUIPMENT DESIGNATION
16"-W — PIPING DESIGNATION
@ — AT
& OR — AND
⌀ — ROUND OR DIAMETER
∠ — ANGLE
X 9.50 — SPOT ELEVATION
℄ — CENTER LINE
P — PLATE OR PROPERTY LINE
W/ — WITH
W/O — WITHOUT

NOTE:
SYMBOLS ARE FOR REFERENCE ONLY, NOT ALL SYMBOLS ARE USED IN THESE CONTRACT DRAWINGS

GENERAL NOTES:

1. SEE SPECIFICATIONS FOR PIPING SYSTEM MATERIALS, LINING, COATING AND DESIGN REQUIREMENTS.
2. WHEN EQUIPMENT IS NOTED AS "TYP OF X", "X" DESIGNATES THE TOTAL QUANTITY OF THAT PARTICULAR EQUIPMENT FOR THAT PARTICULAR AREA/BUILDING CODE.
3. SIZE OF FITTINGS SHOWN ON PLANS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FIR ADJACENT RUN OF PIPE.
4. NOT ALL THE REQUIRED FITTINGS ARE SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE FITTINGS SHOWN ON DRAWINGS AND ANY ADDITIONAL FITTINGS AS REQUIRED BY PIPNG ARRANGEMENTS SHOWN ON THE DRAWINGS AND PER EQUIPMENT FURNISHED.
5. PROVIDE ALL PIPE SUPPORTS FOR SUPPORT OF ALL PIPE AND DEVICES PER SPECIFICATION SECTION 40 23 19.01 TO THE SATISFACTION OF THE GWA AND ENGINEER. PIPING AND ACCESSORIES IN THE CONTAINMENT AREA SHALL BE MOUNTED ON NON-METALIC PIPE SUPPORTS.
6. LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED PIPE ELEVATIONS.
7. ALL EQUIPMENT AND MATERIALS SHALL BE PER GWA'S AND PROJECT SPECIFICATIONS UNLESS NOTED OTHERWISE.
8. SEE PLUMBING DRAWINGS FOR PLUMBING AND DRAINAGE FIXTURES.
9. VERIFY ALL DIMENSIONS OF THE EQUIPMENT PRIOR TO ORDERING PIPE AND FITTINGS.
10. ALL FLEXIBLE CONNECTORS OR FLANGED COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCK, OR ANCHORS, UNLESS NOTED OTHERWISE. THRUST PROTECTION SHALL BE ADEQUATE FOR TEST PRESSURE SPECIFIED.
11. ALL PIPE PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL REQUIRE FIRESTOPPING.
12. THE CONTRACTOR SHALL VERIFY SUCTION AND DISCHARGE PIPING OF PUMPS ARE INSTALLED AND SUPPORTED TO PREVENT IMPARTING ANY STRAIN ON THE PUMPS.
13. ALL BOLTS AND NUTS SHALL BE 316 STAINLESS STEEL UNLESS NOTED OTHERWISE.
14. WARNING SIGNS SHALL BE PROVIDED PER SPECIFICATIONS ON FRONT AND BACK OF ALL REMOTELY CONTROLLED EQUIPMENT.
15. MOUNT ALL VALVES AND MANUAL VALVE OPERATORS IN ACCESSIBLE LOCATIONS WITH UNOBSTRUCTED VALVE OPERATOR POSITION FOR EASE OF OPERATION.
16. NOT ALL INSTRUMENTATION ANF ELECTRIC MOTOR VALVE OPERATORS ARE SHOWN ON THE MECHANICAL DRAWINGS. REFER TO THE ELECTRICAL AND INSTRUMENTATION DRAWINGS FOR INSTRUMENT AND VALVE OPERATOR LOCATIONS AND DETAILS.
17. ALL AIR/VAC VALVES ARE TO BE PIPED TO A DRAIN (INSIDE) OR THE GROUND (OUTSIDE)
18. CONTRACTOR IS RESPONSIBLE FOR DETERMINING CONSTRUCTION STAGING AREAS AND COORDINATING WITH APPROPRIATE AGENCIES AND PROPERTY OWNERS.
19. INSPECTIONS AND ACCEPTANCE OF WORK SHALL BE COORDINATED WITH THE RESIDENT PROJECT REPRESENTATIVE (RPR). WORK NOT INSPECTED OR NOT MEETING GWA/DPW STANDARDS MAY REQUIRE REMOVAL AND REPLACEMENT AT THE CONTRACTOR 'S EXPENSE.
20. CONTRACTOR SHALL MAINTAIN A COMPLETE SET OF RED-LINED "AS-BUILT" DRAWINGS SHOWING ALL FIELD CHANGES. FINAL AS-BUILT DRAWINGS SHALL BE SUBMITTED TO THE CONTRACTING OFFICER UPON COMPLETION.
21. INSTALL PIPING AND DUCTWORK TO SUIT FIELD CONDITIONS AND COORDINATE WITH OTHER TRADES. DRAWINGS ARE DIAGRAMMATIC AND DO NOT SHOW EXACT ROUTING.
22. ALL MECHANICAL SYSTEM CONTROLS, CONDUIT, AND WIRING SHALL COMPLY WITH ELECTRICAL SPECIFICATIONS AND MANUFACTURER REQUIREMENTS.
23. PROTECT ALL EQUIPMENT, DUCTWORK, AND PIPING DURING CONSTRUCTION TO PREVENT DAMAGE OR DEBRIS INTRUSION.
24. CONTRACTOR SHALL COORDINATE PHASING AND INSTALLATION OF MECHANICAL WORK WITH OTHER TRADES. COSTS ASSOCIATED WITH IMPROPER SEQUENCING SHALL BE BORNE BY THE CONTRACTOR.
25. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY. WORK CALLED FOR IN ONE SHALL BE BINDING AS IF CALLED FOR IN BOTH.
26. CONTRACTOR SHALL PROVIDE ALL INCIDENTAL ITEMS REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM, EVEN IF NOT SPECIFICALLY SHOWN.
27. WHERE EQUIPMENT DIMENSIONS ARE NOT SHOWN, CONTRACTOR SHALL OBTAIN MANUFACTURER SHOP DRAWINGS AND VERIFY CLEARANCE REQUIREMENTS PRIOR TO INSTALLATION.
28. NO MECHANICAL PENETRATIONS, EMBEDS, SLEEVES, OR SUPPORTS SHALL BE INSTALLED THROUGH STRUCTURAL ELEMENTS WITHOUT APPROVAL OF THE STRUCTURAL ENGINEER.
29. COORDINATE FINAL MECHANICAL EQUIPMENT LAYOUT TO PROVIDE ADEQUATE CLEARANCE FOR MAINTENANCE AND REMOVAL.
30. PROVIDE SUPPORTS AND SEISMIC RESTRAINTS FOR ALL WASTE WATER PUMPING SYSTEM EQUIPMENT AND PIPING IN ACCORDANCE WITH STRUCTURAL DRAWINGS AND SPECIFICATIONS.
31. PROVIDE ANCHOR BOLTS OF PROPER SIZE, TYPE, LENGTH, AND EMBEDMENT TO SATISFY EQUIPMENT MANUFACTURER REQUIREMENTS AND STRUCTURAL DESIGN CRITERIA.
32. ALL BURIED PIPING SHALL BE TESTED IN ACCORDANCE WITH PROJECT SPECIFICATIONS PRIOR TO BACKFILL.
33. ALL STAINLESS STEEL COMPONENTS EXPOSED TO WASTEWATER ENVIRONMENT SHALL BE PASSIVATED AFTER FABRICATION.
34. ALL FLANGED JOINTS SHALL BE ALIGNED TO PREVENT BOLT BENDING OR FLANGE DISTORTION.
35. PROVIDE DIELECTRIC ISOLATION BETWEEN DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
36. FIELD VERIFY EXISTING PIPE ELEVATIONS AND TIE-IN LOCATIONS PRIOR TO FABRICATION OF NEW PIPING.
37. CONTRACTOR SHALL PROVIDE TEMPORARY BYPASS PUMPING AS REQUIRED TO MAINTAIN CONTINUOUS WASTEWATER SERVICE.

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NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO. 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

JARRETT BROWN — CERTIFICATE NO. 1478 — CIVIL — GUAM — PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER — DATE:
DESIGN GROUP
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: NOTES, LEGEND, AND SYMBOLS
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567
DRAWING NO.
W-01

NEW YPAO PUMP STATION MISC. EQUIPMENT SCHEDULE

TAG NO.	LOCATION	DESCRIPTION	CAPACITY	SPEC SECTION
FE-101	PUMP DISCHARGE HEADER	MAG METER 1	0 TO 1000 GPM	40 91 00
PI-201	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0-200 PSI	40 91 00
PI-202	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0-200 PSI	40 91 00
PI-203	PUMP DISCHARGE PRESSURE GAUGE	PRESSURE GAUGE	0-200 PSI	40 91 00
HC-1	PUMP STATION GROUND LEVEL	OVERHEAD HOIST CRANE	1-TON 1 HP	41 22 23.19

NEW YPAO PUMP STATION PUMP SCHEDULE

TAG NO.	NO OF UNITS			LOCATION	SERVICE	TYPE	CAPACITY (GPM)	TDH (FT)	NPSHA (FT)	DRIVER (HP)	STATIC[1] HEAD (FT)	MAX SPEED	ELECTRICAL AREA CLASSIFICATION	REMARKS
	TOTAL	OPERATING	STANDBY				EACH PUMP							
P-1	3	2	1	YPAO DRY PIT PUMP ROOM	WET WELL PUMPS	VERTICAL, DRYPIT NON-CLOG SUBMERSIBLE	250	153	29	35	100	3600	CLASS 1, DIVISION 2 HAZARDOUS AREA	
P-2							250	153	29	35	100	3600	CLASS 1, DIVISION 2 HAZARDOUS AREA	
P-3							250	153	29	35	100	3600	CLASS 1, DIVISION 2 HAZARDOUS AREA	
SP-1	2	1	1	YPAO DRY PIT PUMP ROOM	SUMP PUMPS	DUPLEX SUBMERSIBLE	35	12	34	3/4	9	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA	
SP-2							35	12	34	3/4	9	1800	CLASS 1, DIVISION 2 HAZARDOUS AREA	

1 (1) MEASURED HALF WAY BETWEEN HIGH AND LOW WATER SETTINGS

1 1 1 1

NEW YPAO PUMP STATION PIPING SCHEDULE 1

ABBREVIATIONS	SERVICE	DIAMETER (in)	MATERIALS	CLASS	JOINTS/ FITTINGS	TEST PRESSURE/ METHOD	INTERIOR LINING	EXTERIOR COATING	PIPE SPEC
WW	SEWER	6	DIP (AWWA C151)	CL53	FLANGE (ANSI 150#)	150 PSI	CERAMIC EPOXY	THERMOSET EPOXY	40 23 19.04
WW	SEWER	4	DIP (AWWA C151)	CL53	FLANGE (ANSI 150#)	150 PSI	CERAMIC EPOXY	THERMOSET EPOXY	40 23 19.04
WW	SEWER	8	DIP (AWWA C151)	CL53	FLANGE (ANSI 150#)	150 PSI	CERAMIC EPOXY	THERMOSET EPOXY	40 23 19.04
DR	SUMP	2	CPVC (ASTM F441)	SCH 80	SOLVENT WELD, FLANGED AT EQUIPMENT	NONE/VISUAL LEAK TEST	NONE	NONE	33 30 00
DR	SUMP	2	REINFORCED EPDM FLEXIBLE HOSE	150 PSI WIN WP	FLANGED, ANSI 150#	NONE/VISUAL LEAK TEST	NONE	NONE	33 30 00

NEW YPAO PUMP STATION ≥2" VALVE SCHEDULE

TAG NO.	SERVICE /LINE	SIZE (in)	VALVE TYPE	SPEC	END CONNECTION	OPERATING MECHANISM	CLASS	LOCATION/REMARKS
PV-1A	PUMP 1 SUCTION	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
PV-2A	PUMP 2 SUCTION	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
PV-3A	PUMP 3 SUCTION	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
PV-1B	PUMP 1 DISCHARGE	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
PV-2B	PUMP 2 DISCHARGE	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
PV-3B	PUMP 3 DISCHARGE	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
PV-4	DISCHARGE HEADER	6	PLUG VALVE	33 30 00	FLANGED	HANDWHEEL OPERATOR		DRYWELL PUMP ROOM
CV-1	PUMP 1 DISCHARGE	6	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM
CV-2	PUMP 2 DISCHARGE	6	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM
CV-3	PUMP 3 DISCHARGE	6	CHECK VALVE	33 30 00	FLANGED	FLAPPER		DRYWELL PUMP ROOM

GUAM WATERWORKS AUTHORITY

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STRUCTURE NO.

INDEX NO.

JARRETT BROWN CERTIFICATE NO. 1350 CIVIL GUAM PROFESSIONAL ENGINEER
This work was prepared by me or under my supervision.
DATE: 12/20/2024

GUAM WATERWORKS AUTHORITY

CITY ENGINEER	-
DESIGN GROUP	DATE:
ENGINEER:	
DESIGNED BY:	Designer
DRAWN BY:	RAMIL CARPIO
CHECKED BY:	Checker
APPROVED BY:	Approver

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: PUMP, PIPING, AND VALVE SCHEDULES

PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567

DRAWING NO. W-02

SHEET 51 OF 100 SHEETS

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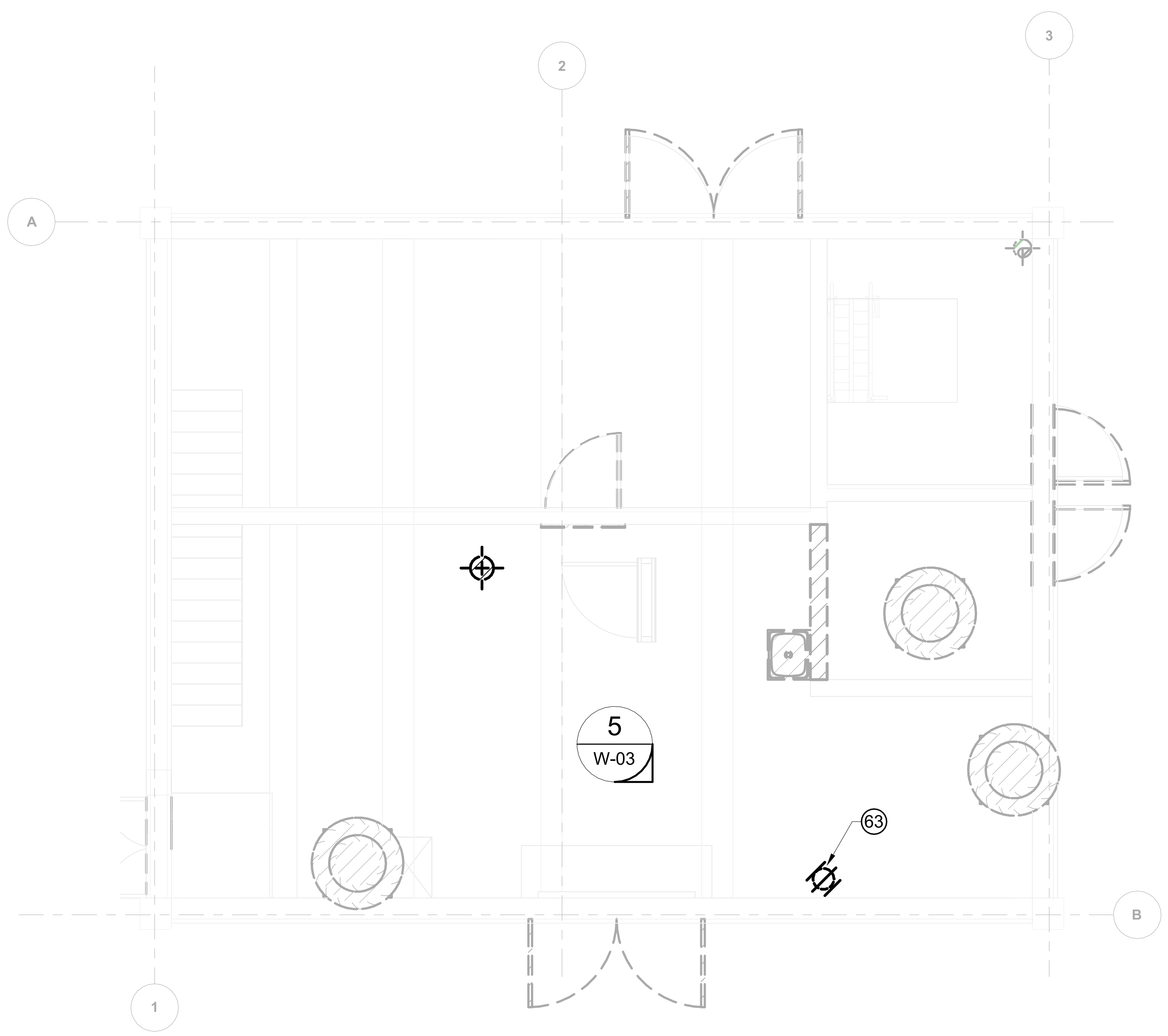
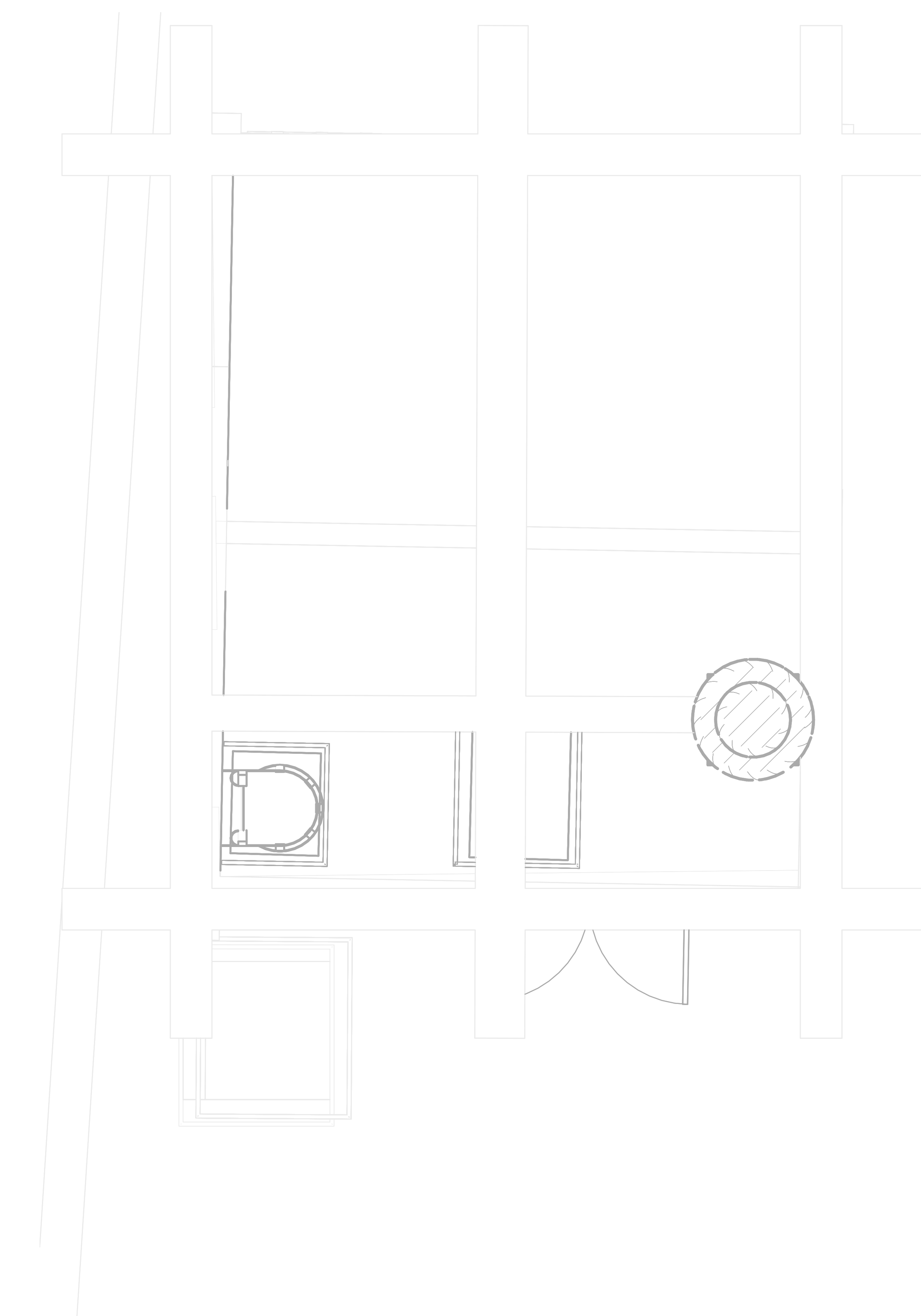
KEYNOTES

#	
63	REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90.02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)

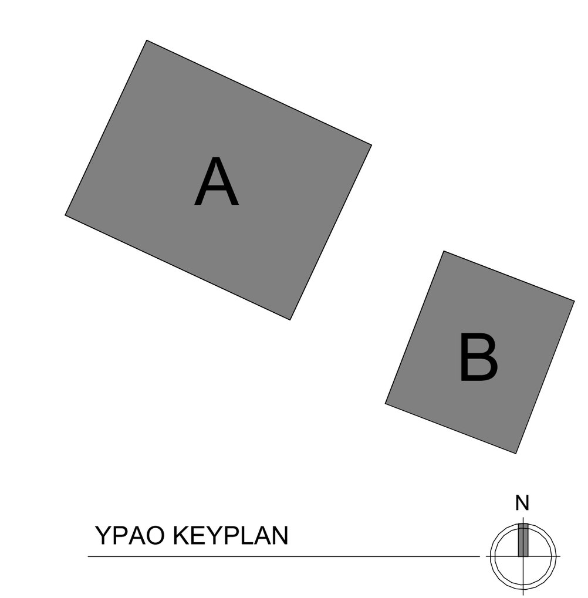
5 SLIDE GATE VALVE AND STEM
W-03 SCALE:NTS



3 NEW YPAO - GROUND LEVEL DEMO A
W-03 SCALE: 1/4" = 1'-0"



4 OLD YPAO - GROUND LEVEL B
W-03 SCALE: 1/4" = 1'-0"



YPAO KEYPLAN

N

0 1 2 4 8
1/4"=1'-0"

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2	ADDENDUM NO. 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

JARETT BROWN, CERTIFICATE №1478, CIVIL, EXP. 4/30/2026, GUAM, PROFESSIONAL ENGINEER

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER
DESIGN GROUP — DATE:
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: DEMOLITION PLAN - GROUND LEVEL
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15, MANGILAO, GUAM 96913

WORK ORDER NO. 6074567
DRAWING NO. W-03
SHEET 52 OF 100 SHEETS

5 NEW YPAO MANUAL SLIDE GATE
W-04 | SCALE:NTS

6 NEW YPAO INFLUENT SLIDE GATE
W-04 | SCALE:NTS

KEYNOTES

2 DEMOLISH BLIND FLANGE AND REPLACE 10" PIPING AND VALVES. AS REFERENCED ON SHEET M101 FOR ADDITIONAL PUMP.

4 DEMOLISH 10" PIPING AND VALVES. SEE NEW HEADER ALIGNMENT ON SHEET M09

7 DEMOLISH AND REPLACE EXISTING OVERHEAD HOIST CRANE.

8 CUT EXISTING HEADER PIPE FLUSHED TO WALL, PATCH AND SEAL WALL OPENING WATER TIGHT BY STRUCTURAL.

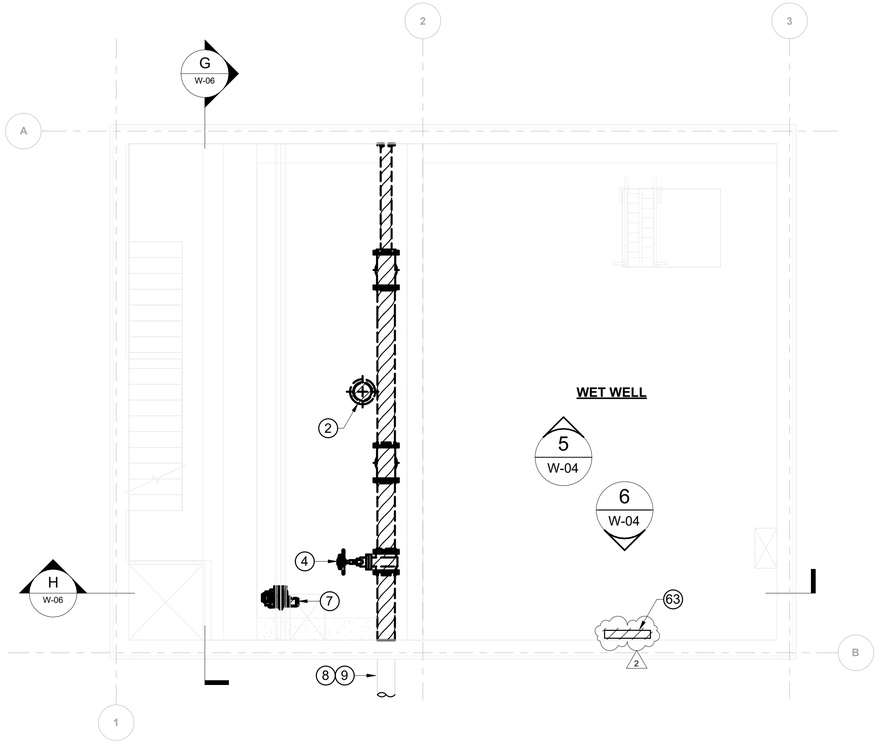
9 ABANDON EXISTING PIPE IN PLACE

63 REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90 02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)

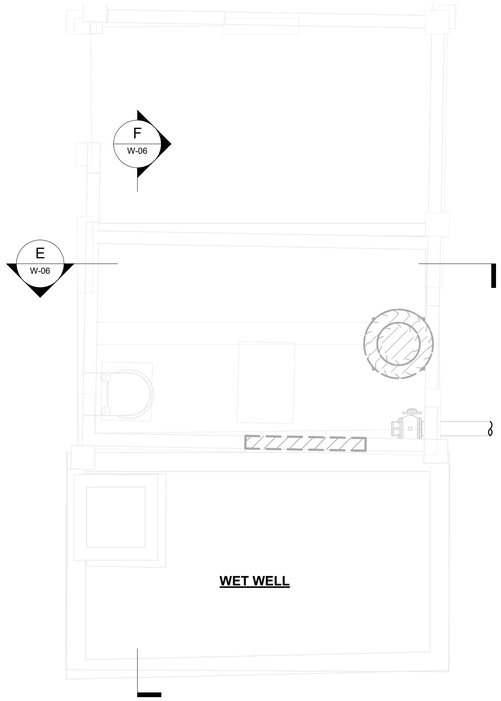
64 REMOVE PIPE PIECES BLOCKING CHANNEL

65 REMOVE AND REPLACE MANUAL SLIDE GATES IN-KIND WITH STAINLESS STEEL MANUAL SLIDE GATE

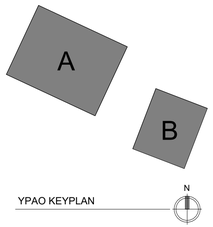
(2) 67 REMOVE AND REPLACE IN-KIND STAINLESS STEEL MANUAL BARSCREEN



3 NEW YPAO - INTERMEDIATE LEVEL DEMO A
W-04 | SCALE: 1/4" = 1'-0"



4 OLD YPAO - INTERMEDIATE LEVEL B
W-04 | SCALE: 1/4" = 1'-0"



YPAO KEYPLAN

N

0 1 2 4 8
1/4"=1'-0"

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STRUCTURE NO.

INDEX NO.

LARRY B. BROWN CERTIFICATE NO. 14476 CIVIL GUAM PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

CITY ENGINEER	
-	DESIGN GROUP
ENGINEER:	JB
DESIGNED BY:	BTS
DRAWN BY:	RC
CHECKED BY:	JF
APPROVED BY:	BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: DEMOLITION PLAN - INTERMEDIATE LEVEL

PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: 688 ROUTE 15
MANGILAO, GUAM 96913

WORK ORDER NO.
6074567

DRAWING NO.
W-04

SHEET 53 OF 100 SHEETS

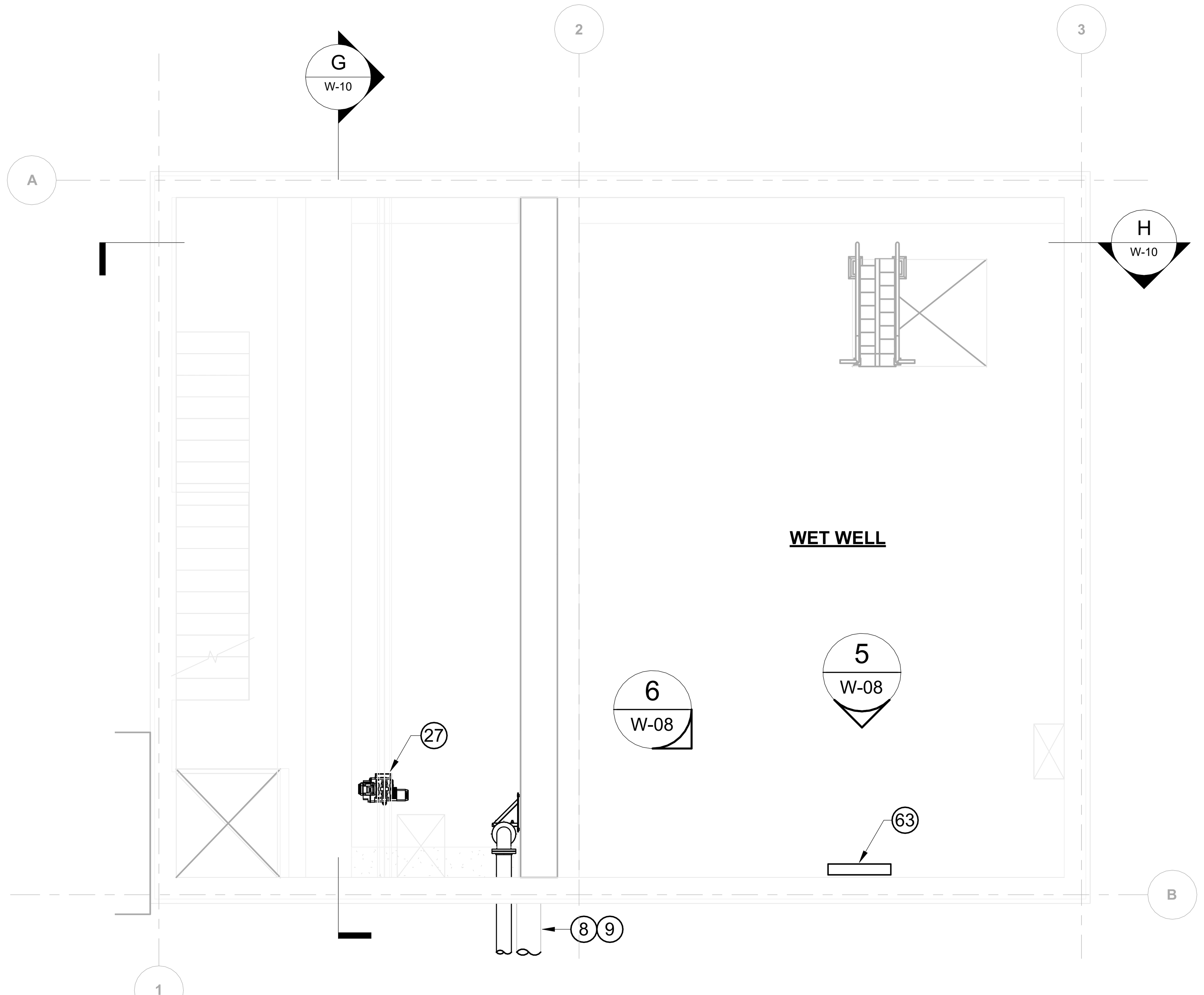
Filename: Autodesk Docs://CI-AMER(US)-6074567-GWA TO2 CCTV Pump Station/6074567_GWA_M_R25.rvt
Last Plotted: 5/7/2026 1:21:27 PM
Sheet Version 3.0

KEYNOTES

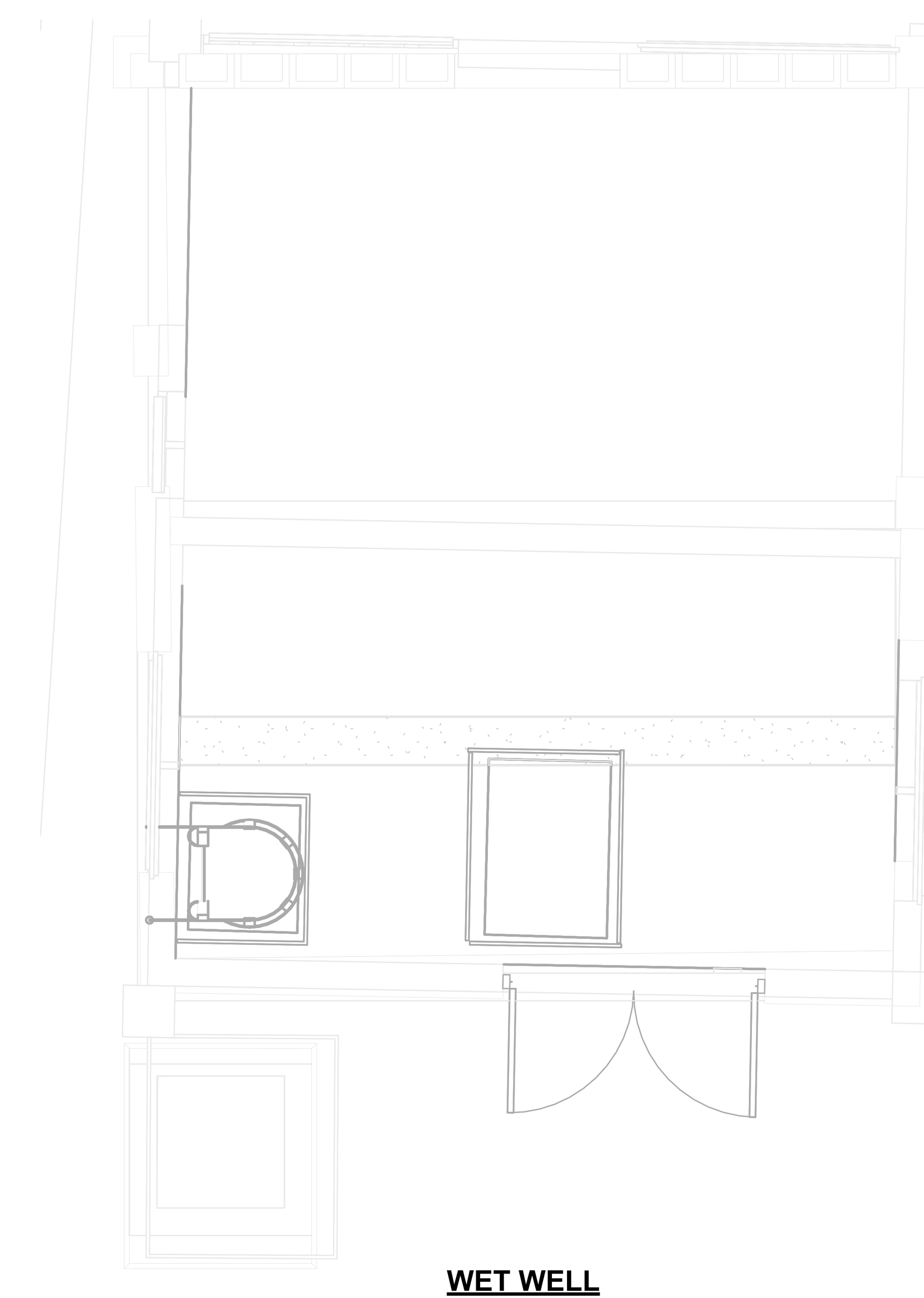
#	KEYNOTES
8	CUT EXISTING HEADER PIPE FLUSHED TO WALL, PATCH AND SEAL WALL OPENING WATER TIGHT BY STRUCTURAL.
9	ABANDON EXISTING PIPE IN PLACE
27	NEW OVERHEAD HOIST CRANE PER SPECIFCATION SECTION 43 21 23.19.
63	REMOVE AND REPLACE SLUICE GATE AND VALVE STEM PER SPECIFICATION 40 05 90.02. CONTRACTOR SHALL VERIFY GATE DIMENSIONS, ATTACHMENT HARDWARE LOCATIONS, AND ACTUATOR SIZING PRIOR TO SUBMITTING SHOP DRAWINGS. (2)
65	REMOVE AND REPLACE MANUAL SLIDE GATES IN-KIND WITH STAINLESS STEEL MANUAL SLIDE GATE

5 | NEW YPAO INFLUENT SLIDE GATE AND MANUAL SLIDE GATE
W-08 | SCALE:NTS

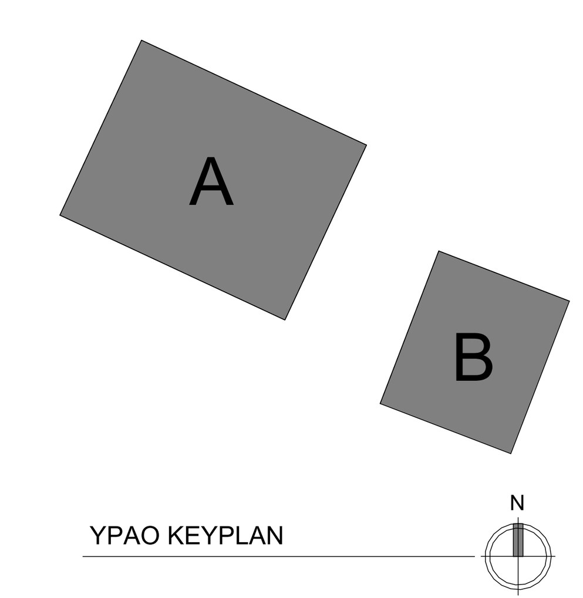
6 | NEW YPAO SLIDE GATE
W-08 | SCALE:NTS



3 | NEW YPAO - INTERMEDIATE LEVEL A PIPING PLAN
W-08 | SCALE: 1/4" = 1'-0"



4 | OLD YPAO - INTERMEDIATE LEVEL B PIPING PLAN
W-08 | SCALE: 1/4" = 1'-0"



YPAO KEYPLAN

0 1 2 4 8
1/4"=1'-0"

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STRUCTURE NO.

INDEX NO.

This work was prepared by me or under my responsible control.
DATE: 04/02/2026

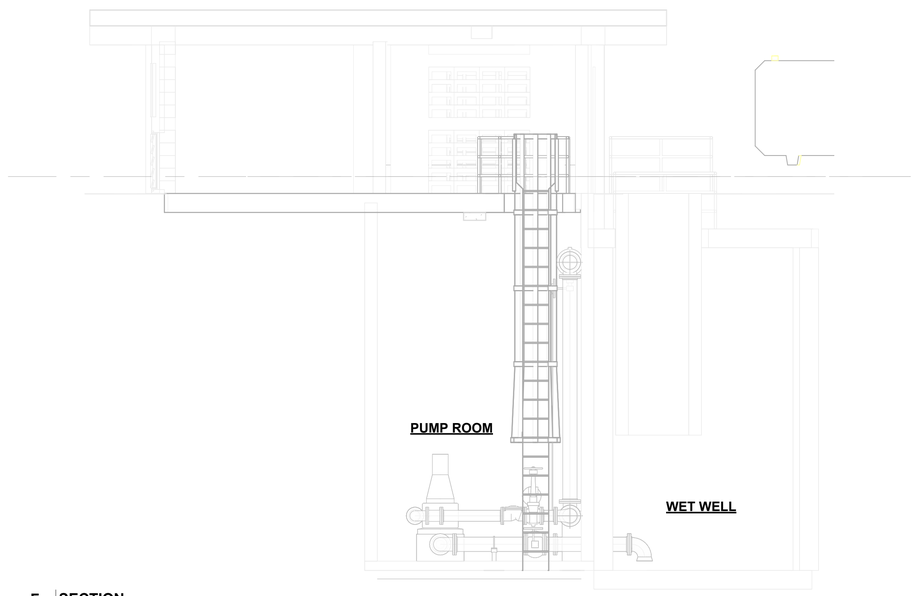
CITY ENGINEER
DATE:
DESIGN GROUP
ENGINEER: JB
DESIGNED BY: BTS
DRAWN BY: RC
CHECKED BY: JF
APPROVED BY: BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: PIPING PLAN - INTERMEDIATE LEVEL
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

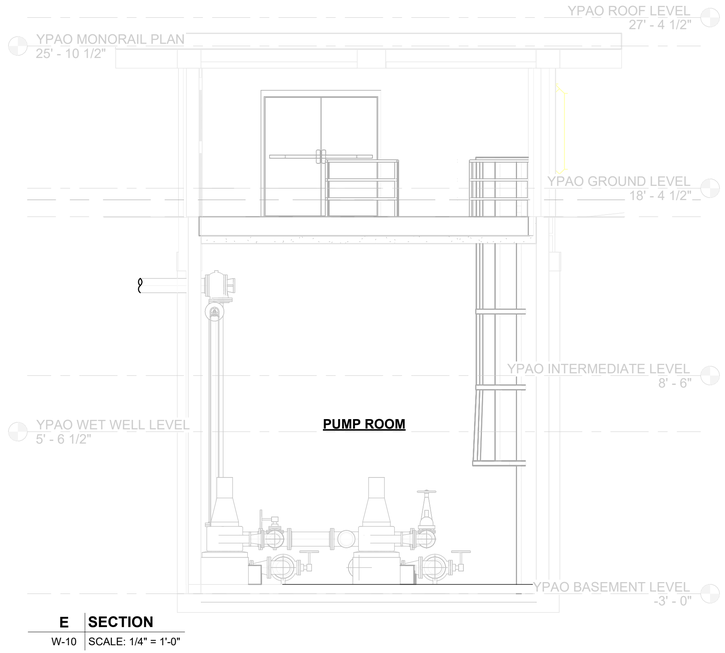
WORK ORDER NO. 6074567
DRAWING NO. W-08

SHEET 57 OF 100 SHEETS

Sheet Version 3.0



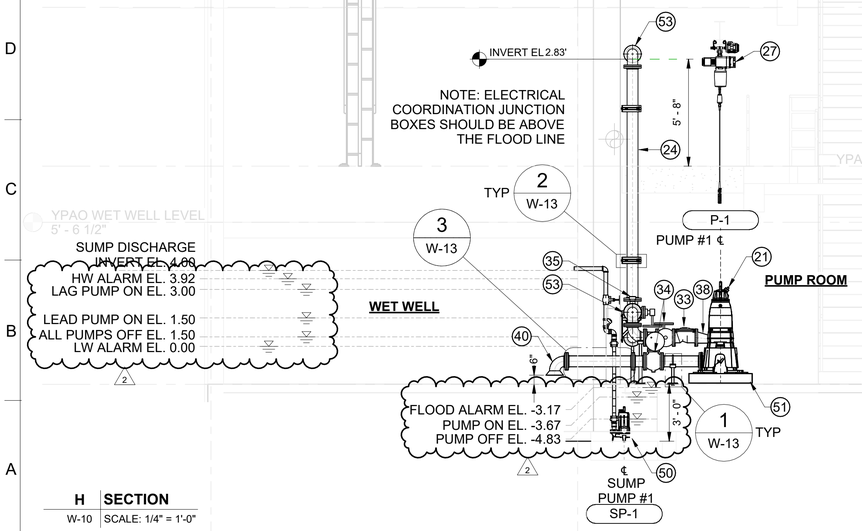
F SECTION
W-10 | SCALE: 1/4" = 1'-0"



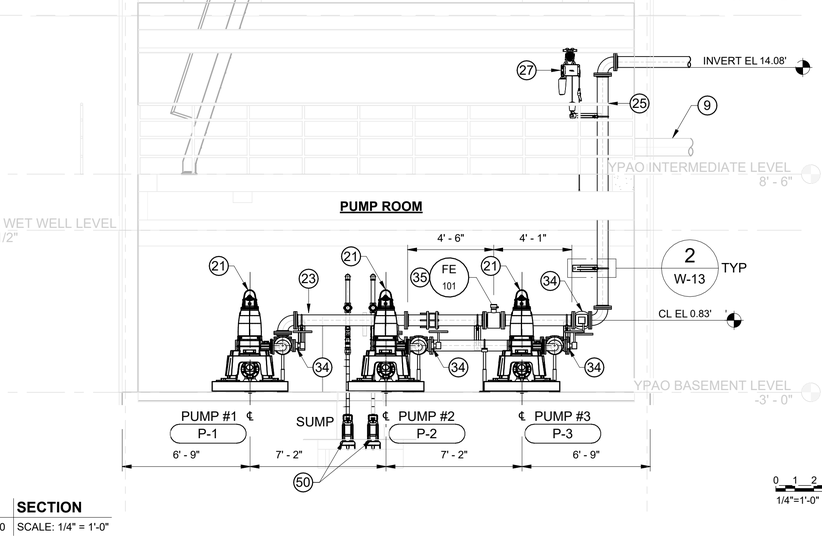
E SECTION
W-10 | SCALE: 1/4" = 1'-0"

KEYNOTES

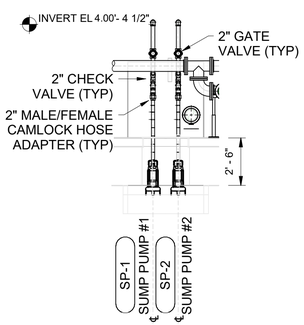
#	KEYNOTES
9	ABANDON EXISTING PIPE IN PLACE
21	NEW SELF-CLEANING NON-CLOG PUMP PER SPECIFCATION SECTION 43 21 00.06. (3 TOTAL)
23	NEW 6" HEADER PIPING ALIGNMENT AND VALVES.
24	NEW 6" PIPING HEADER WITH NEW ALIGNMENT WITH VERTICAL RUN FOR FLOW METER INSTALLATION.
25	NEW ALIGNMENT FOR 6" HEADER WITH ISOLATION VALVE.
27	NEW OVERHEAD HOIST CRANE PER SPECIFCATION SECTION 43 21 23.19.
33	NEW 6" FLG RUBBER FLAPPER CHECK VALVE
34	NEW 6" FLG PLUG VALVE
35	NEW 6" FLG MAGNETIC FLOW METER
38	NEW 4"x6" FLG ECCENTRIC REDUCER
40	NEW 6" FLG LR ELBOW W/ 11" PUMP SUCTION BELLMOUTH AND 4 VANE FLOOR CONE
50	NEW SUMP PUMP, PENTAIR MDC SERIES
51	NEW EQUIPMENT PAD PER STRUCTURAL DETAIL.
53	NEW 6" FLG LR 90 ELBOW



H SECTION
W-10 | SCALE: 1/4" = 1'-0"



G SECTION
W-10 | SCALE: 1/4" = 1'-0"



I SECTION
W-10 | SCALE: 1/4" = 1'-0"

0 1 2 4 8
1/4"=1'-0"

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GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:	BY
2	ADDENDUM NO 1 - REVISED CALLOUT	5/11/26	BTS

STRUCTURE NO.

INDEX NO.

LARRY B. BROWN CERTIFICATE NO. 14476 CIVIL GUAM PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

GUAM WATERWORKS AUTHORITY

-	CITY ENGINEER
	DATE:
	DESIGN GROUP
ENGINEER:	JB
DESIGNED BY:	BTS
DRAWN BY:	RC
CHECKED BY:	JF
APPROVED BY:	BS

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -

SHEET TITLE: BASEMENT PIPING SECTIONS

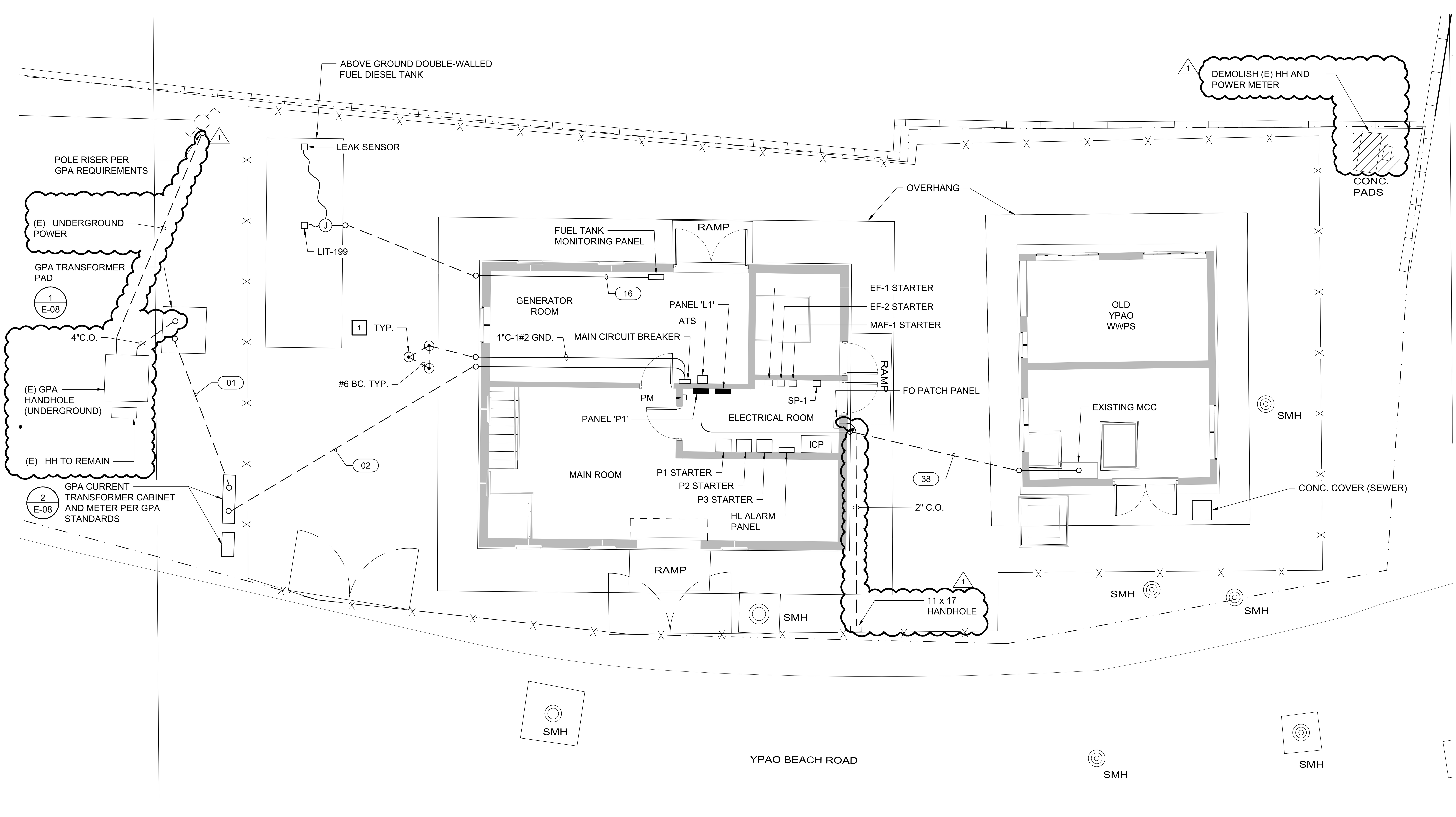
PROJECT: YPAO WWPS MODIFICATIONS

ADDRESS: 688 ROUTE 15 MANGILAO, GUAM 96913

WORK ORDER NO. 6074567

DRAWING NO. W-10

SHEET 59 OF 100 SHEETS



1 ELECTRICAL SITE PLAN
SCALE: 1" = 5'-0"

NOTE:

1. GROUND WELL. SEE DETAIL 1/E-07, SPACE 6' APART.

0 5' 10' 15'
1" = 5'-0"

AECOM
AECOM Technical Services, Inc.
415 Chalan San Antonio Road, Ste. 112
Baltej Pavillion Bldg., Tamuning, Guam 96910
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GUAM WATERWORKS AUTHORITY

NO.	REVISIONS:	DATE:	BY:
1	Addendum No. 1 - Revised GPA Service	5/4/26	JR

STRUCTURE NO.
INDEX NO.

ALLEN J. RANDALL, ELECTRICAL, GUAM PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 4/2/2026

CITY ENGINEER		DATE:
DESIGN GROUP		
ENGINEER:	AR	04/2026
DESIGNED BY:	AR	04/2026
DRAWN BY:	DD	04/2026
CHECKED BY:	AR	04/2026
APPROVED BY:	AR	04/2026

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: ELECTRICAL SITE PLAN
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: YPAO BEACH ROAD, TUMON, GUAM 96913

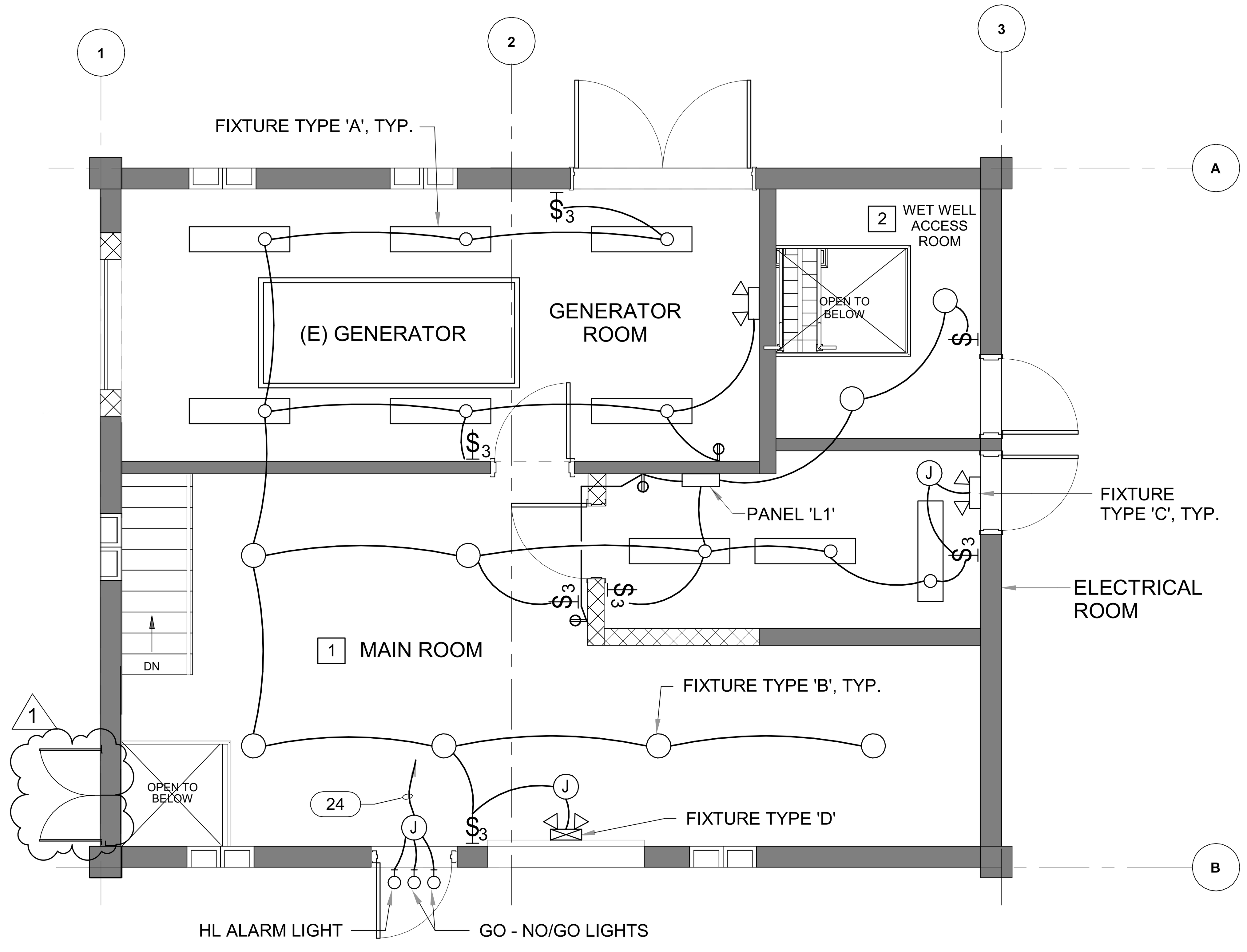
WORK ORDER NO. -
DRAWING NO. E-02
SHEET 82 OF 100 SHEETS

DWG: C:\Users\RobinJ\DC\ACCDocs\AECOM\CI-AMER(US)-60745967-GWA T02 CCTV Pump Station\Project Files\900 Design Collaboration\20-SHEETS\E\Ypao\E-02 - ELECTRICAL SITE PLAN.dwg
DATE: May 06, 2026 10:58am XREFS: G-BORDER-YPAO IMAGES: USER: RobinJ

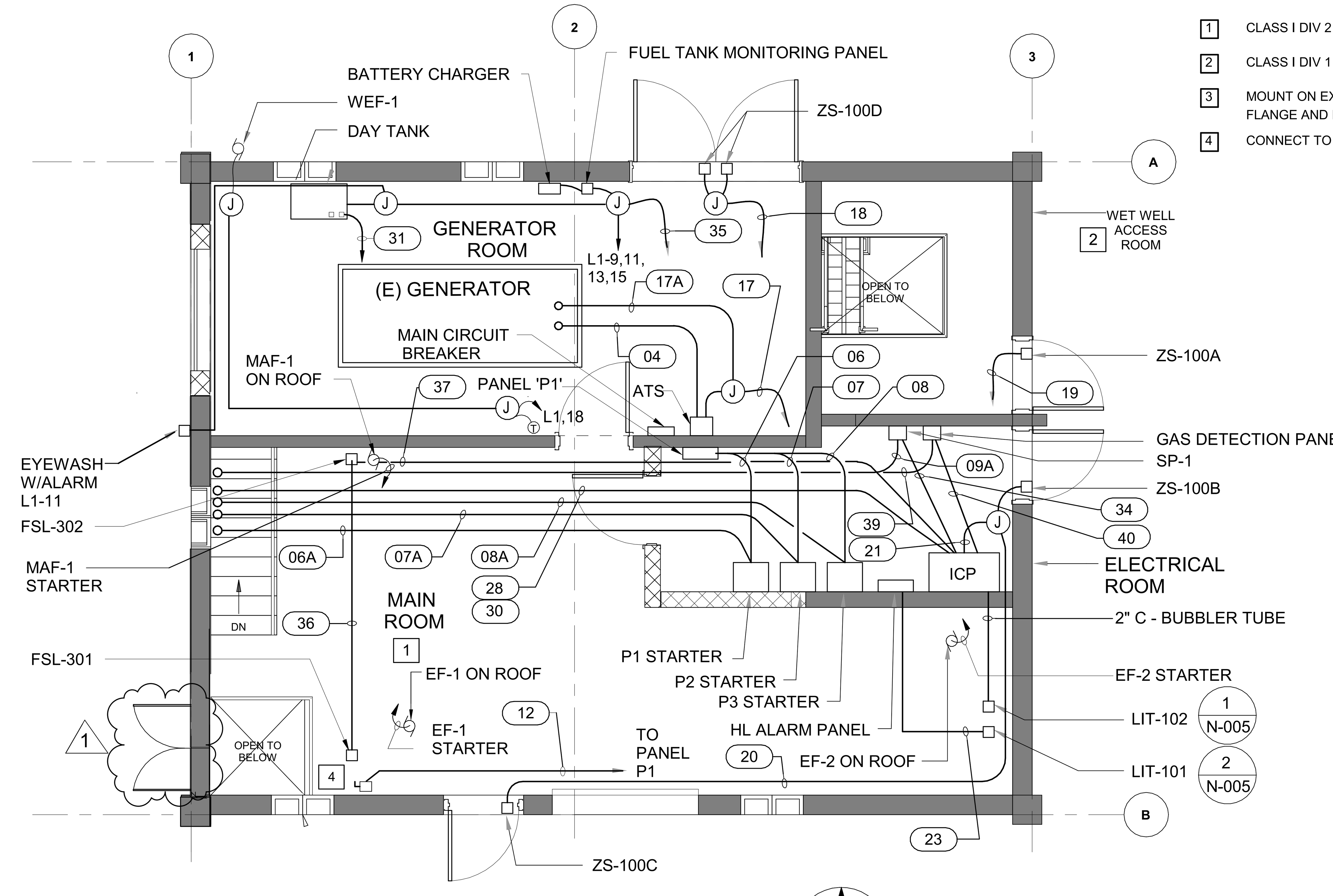
Sheet Version 3.0

NOTES:

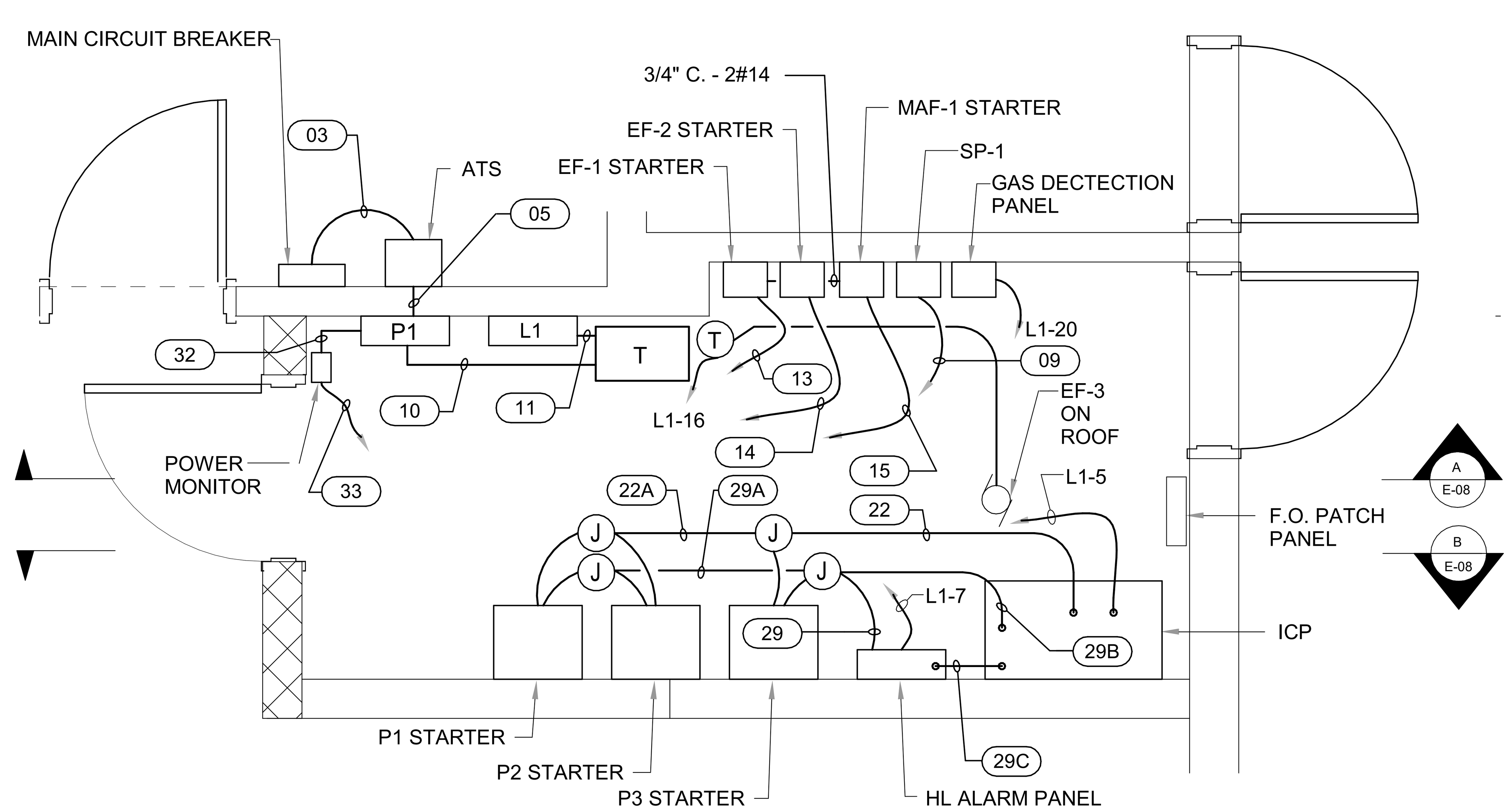
1. CLASS I DIV 2 HAZARDOUS AREA
2. CLASS I DIV 1 HAZARDOUS AREA
3. MOUNT ON EXISTING STILLING WELL REPLACE FLANGE AND REMOVE ANY PIPE BELOW SLAB
4. CONNECT TO MONORAIL HOIST



1 YPAO - GROUND LEVEL - LIGHTING PLAN
SCALE: 1/4" = 1'-0"



2 YPAO - GROUND LEVEL - POWER AND CONTROLS PLAN
SCALE: 1/4" = 1'-0"



3 YPAO - ELECTRICAL ROOM - POWER AND CONTROLS PLAN
SCALE: 1/2" = 1'-0"

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GUAM WATERWORKS AUTHORITY

NO	REVISIONS:	DATE:
1	Addendum No. 1 Shift Door	05 MAY 2025

STRUCTURE NO.
INDEX NO.

ALLEN J. RANDALL — CERTIFICATE №1403 ELECTRICAL GUAM EXP 4/30/2026 — PROFESSIONAL ENGINEER
This work was prepared by me or under my responsible control.
DATE: 04/02/2026

CITY ENGINEER — DESIGN GROUP — DATE:
ENGINEER: AR
DESIGNED BY: AR
DRAWN BY: DD
CHECKED BY: AR
APPROVED BY: AR

VERTICAL CONTROL: -
HORIZONTAL CONTROL: -
SHEET TITLE: GROUND LEVEL - ELECTRICAL PLANS
PROJECT: YPAO WWPS MODIFICATIONS
ADDRESS: Tumon Beach Road, Tumon, Guam 96913

WORK ORDER NO. 6074567
DRAWING NO. E-04

SECTION 22 42 16.16

COMMERCIAL SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service sink.
2. Sink faucet.
3. Supply fittings.
4. Waste fittings.
5. Sink supports.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
2. Include rated capacities, operating characteristics and furnished specialties and accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted sinks.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sinks and faucets to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 SERVICE SINKS

A. Service Sinks - Enameled Cast Iron, Trap Standard Mounted.

1. Fixture:

a. Standard: ASME A112.19.1/CSA B45.2.
b. Type: Service sink with back.
c. Back: Plain.
d. Nominal Size: 24 by 20 inches (610 by 508 mm).

e. Color: White.
f. Mounting: NPS 2 (DN 50) P-trap standard with grid strainer inlet, cleanout, and floor flange.
g. Rim Guard: On front and sides.

2. Faucet: Manual Operated, Single handle.

2.2 MANUALLY OPERATED SINK FAUCETS

A. Sink faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. Sink Faucets - Manual Type: Single-control mixing.

1. Standard: ASME A112.18.1/CSA B125.1.
2. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.

3. Body Type: Single hole.
4. Body Material: Commercial, solid brass.
5. Finish: Chrome plated.

6. Maximum Flow Rate: 1.5 gpm (5.7 L/min).
7. Mounting Type: Deck, concealed.
8. Valve Handle(s): 6-inch (152-mm) wrist blade.
9. Spout Type: Swivel gooseneck.

10. Vacuum Breaker: Required for hose outlet.
11. Spout Outlet: Laminar flow.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Wheel handle.

F. Risers:

1. NPS 1/2 (DN 15).
2. ASME A112.18.6/CSA B125.6, braided or corrugated stainless steel flexible hose.

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 (DN 40).
2. Material:

a. Chrome-plated, two-piece, cast-brass trap and swivel elbow with 17-gauge brass tube to wall and chrome-plated brass or steel wall flange.

2.5 GROUT

A. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000 psi (34.5 MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply piping and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb in accordance with rough-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install wall-mounted sinks at accessible mounting height in accordance with ICC A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping".
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings.

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Install new batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.16

SECTION 40 91 00
PRIMARY PROCESS MEASUREMENT DEVICES

PART 1 - GENERAL

1.01 DESIGNATIONS OF COMPONENTS:

A. In these specifications and on the plans, all systems, meters, instruments, and other elements are represented schematically and are designated by numbers, as derived from criteria in ISA standards. The nomenclature and numbers designated herein and on the plans shall be employed exclusively throughout shop drawings, data sheets, and the like. Any other symbols, designations, and nomenclature unique to a manufacturer's standard methods shall not replace those prescribed above, as used herein, and on the plans.

1.02 SIGNAL CHARACTERISTICS:

A. Wherever possible and feasible, components shall be of electronic solid-state design and systems shall utilize the same signal characteristics throughout each and all of the several systems; transmission signals shall be 4 mA to 20 mA. The combined power supply and transmitter loops shall, when tested with appropriate precision resistors, present a voltage signal of 1- to 5-volt DC. Signal isolators shall be provided where required.

PART 2 - PRODUCTS

2.01 FUEL TANK LEVEL TRANSMITTER:

A. Provide level sensing probe measuring strain pulse using magnetostrictive principle of operation. Level sensing probe shall provide 4-20mA signal representing the position of float in the tank. Sensing probe housing and float shall be 316 stainless steel.

B. Level sensing probe shall be Omntec MTG420 series with SSF-1-2 float or equal.

2.02 RADAR LEVEL TRANSMITTER

A. Instrument emits radar pulses via a transmitter and antenna, with a frequency range of 6.3 GHz to 26 GHz.

B. The pulses reflect from the surface being measured and are received back at the instrument antenna.

C. The instrument measures the pulse travel time.

D. The instrument shall not generate frequency waves with power levels hazardous to humans.

E. Requirements:

1. Accuracy: 0.25-in.

2. It shall be possible to choose between horn, parabolic, cone, or rod-shaped antennas with threaded or flange mountings to suit the intended service.

3. The design shall be such that product condensation on the antenna shall not affect the transmitter performance or accuracy.

4. Microprocessor-based signal converter/transmitter.

5. Power Supply: 24 VDC - 2-wire loop powered.

6. Power consumption: 15 VA maximum.

7. Outputs: Isolated 4-20 mA DC with HART communication protocol

8. Backlit digital display for level or volume.

9. Self-diagnostics and automatic data checking.

10. Signal integrity:

a. Immune to radio frequency and electromagnetic interference with field strength of 15 volts/meter or less over a frequency range of 50 Hz to 460 MHz.

b. Able to ignore momentary level spikes or momentary loss of echo and indicate loss of echo condition on indicating transmitter unit.

F. Indication: Local or remote - 5-digit display

G. Protected terminals and fuses in a separate compartment, which isolates field connection from electronics.

H. Enclosure rating: NEMA Type 4X.

I. Electrical connection: 1/2-inch male NPT.

J. Radar level transmitter shall be Rosemount 5408 non-contacting, Vegapuls 6X with local display, Vegadis 82, or equal.

K. Spare Equipment:

1. Provide one (1) complete spare radar level transmitter for each type and model furnished under this Contract.

2. Spare unit shall be identical to the specified instrument, including:

   a. Transmitter

   b. Antenna (same type and mounting as provided)

   c. Local display

   d. All electronics and internal components

3. Spare unit shall be factory calibrated and ready for installation.

4. Spare shall be furnished with all required accessories, including gaskets, mounting hardware, and protective covers.

5. Spare unit shall be clearly tagged and packaged for long-term storage and delivered to the Owner at a location designated by the RPR.

2.03 PRESSURE GAUGES

A. Pressure range shall be as designated by the following type numbers shown in the drawings:

Type Number	Description	Pressure Range
1	Pressure	0 to 150 psi

B. If no type number is shown on the drawings, use Type 1 pressure gauges.

C. Type 1: Gauges 4 1/2 inches and larger shall comply with ASME B40.1, Grade 2A. Gauges shall incorporate the following features:

1. Solid or open front with side or rear blowout relief.

2. Pressure tight.

3. 270-degree arc with adjustable pointer.

4. Stem mounted.

5. Hermetically sealed unless specified to be liquid filled.

D. Size of gauge shall be 4 1/2 inches, unless otherwise indicated in the drawings. Stem or connection size shall be 1/2 inch.

E. Type 1: Gauges smaller than 4 1/2 inches shall conform to ASME B40-1, Grade A. Otherwise, construction shall be as described above.

F. Materials of construction for Type 1 gauges shall be as shown in the following table:

Item	Material	Specification
Case	Stainless steel, aluminum, polypropylene, or phenolic plastic	AISI 316, 6061-T6
Bourdon tube	Stainless steel	AISI 316
Windows	Acrylic plastic	---
Ring	Stainless steel	AISI 316
Stem	Stainless steel	AISI 316
Dial face	Aluminum with clear baked-on acrylic coating	ASTM B209, 6061-T6

G. Gauges, diaphgram seals, snubber, and tools shall be manufactured by Ashcroft, Crosby, Marshalltown, Marsh, or equal.

2.04 MAGNETIC FLOWMETER

A. The magnetic flowmeter shall be an obstructionless pipeline-mounted instrument to magnetically measure the flow of the process media. The output signal shall not be affected by changes in fluid viscosity or density and shall have zero point stability and auto zeroing functions. Provide the magnetic flowmeter with the following features:

1. Drip- and splash-proof sensor, capable of withstanding temporary submersion of up to 30 feet of water for 48 hours.

2. Integral terminal box with watertight cable seals.

3. Interconnecting cables.

B. Provide stainless steel grounding rings and grounding straps per manufacturer’s requirements.

C. The flow tube shall be flangeless wafer construction with cast aluminum enclosure. Provide bolting kit. Liner and electrodes shall be as indicated

D. Indicator/Totalizer

1. The indicator/totalizer shall accept the process flow signal from the magnetic flowmeter and convert its electrical output signals directly proportional to the instantaneous metered flow rate. The housing shall be suitable for field mounting.

E. Transmitter

1. The transmitter shall be microprocessor based with flow rate indicator in engineering units, forward, reversed, and net flow totalizer, all in user-selectable engineering units. The display shall also be capable of indicating alarm status and

velocity of fluid. The transmitter shall be mounted as indicated in the instrument list.

2. The preamplifier input impedance shall be a minimum of 10E+11 ohms.

3. Power Requirements: 117-volt ac, ±10%, 60 hertz.

4. Totalized flow and programmed configuration shall be maintained in memory for up to 10 years.

F. Interconnecting Cable

1. The interconnecting cable between the sensor and the transmitter shall be furnished by the magnetic flowmeter manufacturer.

G. Performance

H. Accuracy: 0.5% of flow rate with minimum fluid velocity of 1 fps.

I. Repeatability: ±0.1% of flow rate.

J. The accuracy of each meter shall be verified by calibration in a flow laboratory traceable to the U.S. National Institute of Standards and Technology.

K. Adjustable full-scale range.

L. Outputs: Bidirectional, isolated 4- to 20-mA d-c and either 24-volt d-c scaled pulse, or 0- to 10-KHz frequency.

M. Minimum Conductivity: 5 micromho/centimeter.

N. Power Consumption: 20 watts maximum.

O. Temperature Limits, Ambient: -20°F to +140°F.

P. Temperature Limits, Process: Elastomers +160°F, Teflons +300°F, ceramic 350°F.

Q. Field Selectable Low Flow Cutoff: 0% to 10%.

R. The flowmeter shall have a positive zero return (PZR) input controlled by an external dry contact.

S. Environmental Rating: NEMA 4X, for both sensor and electronics whether remote or sensor mounted.

T. The meter shall have empty pipe detection.

U. A common alarm discrete output (a dry contact or a transistor switch) shall be provided for remote indication of fault conditions.

V. Service Condition

1.	P&ID No.	N-003
2.	Service	Raw sewage

SENSOR		
3.	Tag No.	FE-101
4.	Metering Tube	
	Size Flg.	6 inch
	Rating (psi)	250
5.	Metering Tube Material	Stainless Steel
6.	Liner Material	Polyurethane
7.	Electrode Material	316 SST
8.	Elec. Class.	NEMA 4X

TRANSMITTER		
9.	Tag No.	FIT-101
10.	Flow Rate Ind. Scale	0 – 1,000 gpm
11.	Flow Totalizer Multiplier	1,000 gal
12.	Aux. Output Signal	4 – 20 mA
13.	Aux. Output Signal To	PLC
14.	Elec. Class.	NEMA 4X
15.	Mounting	Wall Mount

W. Manufacturer

1. The magnetic flowmeter and transmitter shall be ABB MagMaster, ABB MFF Series with MFE4 transmitter, Endress+Hauser Promag, or equal.

2.05 GAS MONITORING

A. Provide a gas monitoring system that has electrochemical hydrogen sulfide (H2S), carbon dioxide (CO2), methane (CH4), and oxygen (O2). The gas sensors will have the following characteristics:

B. Hydrogen Sulfide (H2S) Sensor:

1. Sensor Range: 0- 25ppm.
2. Sensor Life Expectancy: 2 Years.
3. Response Time: T90 less than 30 seconds.
4. Repeatability: +/- 2 percent.
5. Linearity: Linear output in proportion to gas concentration.
6. Temperature Compensation: Across the entire range.

C. Carbon Dioxide (CO2) Sensor:

1. Sensor Range: 0-5000ppm.
2. Sensor Life Expectancy: 5 Years.
3. Response Time: T90 less than 30 seconds.
4. Repeatability: +/- 2 percent.
5. Linearity: Linear output in proportion to gas concentration.
6. Temperature Compensation: Across the entire range.

D. Methane (CH4) Sensor:

1. Sensor Range: 0-100% LEL.
2. Sensor Life Expectancy: 5 Years.
3. Response Time: T90 less than 30 seconds.
4. Repeatability: +/- 2 percent.
5. Linearity: Linear output in proportion to gas concentration.
6. Temperature Compensation: Across the entire range.

E. Oxygen (O2) Sensor:

1. Sensor Range: 0-25% vol.
2. Sensor Life Expectancy: 2 Years.
3. Response Time: T90 less than 10 seconds.

4. Repeatability: +/- 2 percent.

5. Linearity: Linear output in proportion to gas concentration.

6. Temperature Compensation: Across the entire range.

F. The gas monitoring system will communicate with the SCADA system via RS485 Modbus RTU. It will have six (6) digital inputs and outputs, and two (2) analog inputs and outputs.

G. The gas monitoring system will be UL 61010-1 certified, and compliant with California Title 24.

H. The gas monitoring system shall operate in the temperature range of -4 to 122 degrees F (-20 to 50 degrees C), and between 15 to 90 percent non-condensing humidity.

I. Housing shall be NEMA 4X enclosure for wall mounting.

J. The power supply shall be 24 VDC with a maximum power consumption of 1.5 W (50mA at 24 VDC).

K. The gas monitoring system shall be Conspec Optio V, or equal.

PART 3 - EXECUTION

Refer to Section 40 00 00.

END OF SECTION

SECTION 43 21 00.06

DRY PIT SUBMERSIBLE SOLIDS HANDLING PUMPS AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide dry pit submersible solids handling pumps, motors, motor starters, and associated appurtenances as indicated on the Contract Drawings and specified herein.

B. Work includes furnishing, installation support, testing, commissioning, and training for pumping equipment required for operation of the Ypao Wastewater Pump Station Modifications project.

C. Pumping equipment shall be suitable for continuous duty operation in municipal wastewater service and shall be capable of handling raw wastewater containing suspended solids, fibrous material, and typical sanitary sewer debris without clogging or loss of performance.

D. All pumps shall be non-overloading throughout the entire range of operation above the design static head without employing the motor service factor.

E. Pumps, motors, motor starters, and associated appurtenances shall be provided as a complete integrated system to ensure compatibility, coordinated operation, and compliance with specified performance requirements.

1.02 REFERENCES:

A. ASTM International (ASTM):

1. A36: Standard Specification for Carbon Structural Steel.

2. A48: Standard Specification for Gray Iron Castings.

3. A576: Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.

4. A743/A743M: Standard Specification for Castings, Iron-Chromium, Iron-Chromium Nickel, Corrosion Resistant, for General Application.

5. D2240: Standard Test Method for Rubber Property – Durometer Hardness.

B. American National Standards Institute (ANSI):

1. B16.1: Standard for Cast Iron Pipe Flanges and Flanged Fittings, 125 lb.

2. S1.11: Standard Octave-Band and Fractional-Octave-Band and Digital Filters.

C. Hydraulic Institute (HI):

1. Current Standards.

2. 11.6: Rotodynamic Submersible Pumps for Hydraulic Performance, Hydrostatic Pressure, Mechanical and Electrical Acceptance Tests

3. 14.6: Rotodynamic Pumps for Hydraulic Performance Acceptance Tests

D. National Electrical Manufacturers Association (NEMA):

1. MG1: Motors and Generators.

E. NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities

F. National Electrical Code (NEC) Article 500 – Hazardous Locations

G. ISO 21940 – Mechanical vibration – Rotor balancing

1.03 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01 33 00:

1. Data regarding pump and motor characteristics and performance:

a. Prior to fabrication and testing, provide guaranteed performance curves based on actual shop tests of mechanically duplicate pumps, showing they meet indicated and specified requirements for head, flow rate, horsepower, pump and overall efficiency and NPSH3.

(1) For units of same size and type, provide curves for a single unit only.

(1) Provide ANSI/HI 14.6 1U curves unless otherwise indicated

b. Provide catalog performance curves at maximum pump speed indicated and specified for each service showing maximum and minimum impeller diameters available, best efficiency point (BEP), allowable operating region (AOR) and preferred operating region (POR).

(1) Provide pump curves demonstrating operation at the specified duty point of 250 GPM at 153 ft TDH.

(2) Combined flow of 2 operating pumps shall be 500 gpm at 153 feet TDH.

(3) Provide curves showing:

(a) Best Efficiency Point (BEP)

(b) Allowable Operating Region (AOR)

(c) Preferred Operating Region (POR)

(d) NPSHr curve

c. Provide confirmation that pump passes a minimum 3-inch spherical solid.

d. Results of shop performance tests as specified.

e. Submit curves for guaranteed performance and shop performance tests on 8-1/2-inch by 11-inch sheets, one curve per sheet.

2. Shop drawing data for accessory items.

3. Certified setting plans, with tolerances, for anchor bolts.

4. Manufacturer's literature as needed to supplement certified data.

5. Operating and maintenance instructions and parts lists.

6. Listing of reference installations as specified with contact names and telephone numbers.

7. Certified results of hydrostatic testing.

8. Certified results of dynamic balancing.

9. Bearing temperature operating range for the service conditions specified.

10. List of recommended spare parts other than those specified.

11. Factory and field inspection reports.

12. Bearing Life: Certified by the pump manufacturer. Include design data.

13. Pump factory test results.

14. Motor factory test results.

15. Qualifications of field service engineer.

16. Recommendations for short and long-term storage.

17. Resonant frequency analysis.

18. Factory and field-testing procedures, pump and piping set up, equipment to be used and ANSI/HI testing tolerances to be followed.

19. Special tools.

20. Number of service person-days provided and per diem field service rate.

21. Results of field vibration test data including a vibration signature for each pump and drive assembly. Provide vibration testing procedure for review.

22. Recommended location of suction and discharge pressure gauges.

23. Manufacturer's product data, specifications and color charts for factory painting.

24. Provide a listing of the materials recommended for each service specified and indicated. Provide documentation showing compatibility with process fluid and service specified and indicated.

25. The latest ISO 9001 series certification.

26. Provide a scaled drawing for each pump service showing the pumps, motors, including equipment weights, lifting attachments, sling dimensions for equipment handling and minimum clearances for equipment removal and maintenance.

27. Material Certification:

    a. Provide certification from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.

    b. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated.

B. A copy of the contract mechanical process, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.

1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

C. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.

1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.

2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.04 SPARE PARTS:

A. Comply with the requirements specified in Section 01 61 00.

B. Provide spare parts that are identical to and interchangeable with similar parts installed.

1. For each pump:

a. One complete mechanical seal set

b. One set of casing wearing rings

c. One set of impeller fasteners

2. For each set of pumps of the same size and performance.

a. One set of all special tools required.

1.05 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01 43 00.

B. Pumps shall be the product of one manufacturer.

C. Pumps shall be manufacturer’s standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.

D. Welding: In accordance with latest applicable American Welding Society Code or equivalent.

E. Factory tests as specified.

F. The Contractor shall obtain the pumps, motors and appurtenances from the pump manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.

G. Services of Manufacturer's Representative as stated in Section 01 43 00 and as specified herein.

H. Provide services of factory-trained Service Technician, specifically trained on type of equipment specified:

1. Service Technician must be present on site for all items listed below. Person-day requirements listed are exclusive of travel time, and do not relieve Contractor of the obligation to place equipment in operation as specified.

2. Installation: Inspect grouting, location of anchor bolts; setting, leveling, alignment, field erection; coordination of piping and electrical:

   a. 2 person-days

3. Functional Testing: Calibrate, check alignment and perform a functional test with water. Tests to include all items specified.

   a. 1 person-days

4. Field Performance Testing: Field performance test equipment specified.

   a. 1 person-days

5. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts and preparation to lead and teach classroom sessions.

   a. 1 person-days

6. Credit to the Owner, all unused service person-days specified above, at the manufacturer’s published field service rate.

7. Any additional time required of the factory trained service technician to assist in placing the equipment in operation, or testing or to correct deficiencies in installation, equipment or material shall be provided at no additional cost to the Owner.

I. Manufacturer of pumps shall have a minimum of five (5) operating installations with pumps of the size specified and in the same service as specified operating for not less than five (5) years.

J. If equipment proposed is heavier or taller, different rotation, or discharge arrangement than specified and indicated; provide all structural, architectural, mechanical, electrical and plumbing revisions at no additional cost to the Owner.

1. If equipment is heavier than specified, the Contractor shall provide all hoisting equipment sized to maintain the minimum safety factor between the specified maximum equipment weight and the lifting capacity of the hoisting equipment indicated and specified.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01 66 10.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION:

A. Pump capacities and operating data are indicated in the Process Pump Schedule.

1. The station shall provide a minimum firm pumping capacity of 500 GPM with two pumps operating.

B. Pumps shall pump raw municipal wastewater from the wet well of the Ypao Wastewater Pump Station. Before entering wet well, wastewater will normally pass through a manually cleaned bar screen with 1/2-inch (13 mm) clear openings. Screens can be bypassed during high flow conditions.

C. Equipment Limitations:

1. Pumps: Vertical dry-pit submersible wastewater pumps

a. Maximum Total Pump and Motor Weight including Power and Control Cables: 900 lbs.

b. Maximum Rotating Assembly Weight including Power and Control Cables: 600 lbs.

c. Maximum Height - Top of Motor Lifting Ring to Pump Bottom Inlet Flange: 42 inches.

d. Maximum Pump Base Footprint: 38 inches width x 30 inches length.

D. Coordinate pump dimensions and weights with hoists and bridge crane capacity and as specified in Section 41 22 23.19.

E. Pumps normally operate with a flooded suction.

2.02 MANUFACTURERS:

A. Dry Pit Submersible Solids Handling Pumps

1. Xylem/Flygt (Basis of Design)

2. KSB

3. Sulzer/ABS

4. Or equal.

2.03 SEISMIC DESIGN REQUIREMENTS:

A. Conform to the requirements indicated on the structural drawings and as specified in Section 01 41 20.

B. The Contractor shall conform to the seismic design requirements for this project and for the work of this specification section.

C. Provide all equipment bases, anchorage, supports and foundations designed in accordance with the seismic requirements indicated and specified.

D. Additionally, provide with the Certificate of Unit Responsibility, certification for all equipment signed by a registered structural engineer stating that computations were performed and that all components have been sized for the seismic forces specified and indicated.

2.04 PUMP CONSTRUCTION:

A. Pumps: Solids handling radial and mixed flow single-stage, rotodynamic pumps. Performance requirements shall be as indicated in the Process Pump Schedule.

B. Pump Configuration: As indicated in the Plans.

C. Pump, motor, cable entry system, and power/control cables shall remain fully operable after dry pit flooding and subsequent dewatering without damage to the equipment.

D. Design and proportion all parts of pump specially adapted for the service specified and indicated.

E. Pump Mounting: Provide type as indicated and specified.

1. Vertically Mounted Pumps:

    a. Mount each pump on a steel base suitable for bolting to concrete pier or foundation as indicated in the Plans.

        (1) Provide the rotation and orientation of the suction and discharge connections as indicated.

        (2) Provide separate suction elbow as indicated.

F. Pump Casing, Fronthead and Backhead:

1. Cast iron ASTM A48 Class 35 minimum.

2. Provide casings designed for removal of rotating parts without disconnecting suction and/or discharge piping.

3. Provide lifting devices on casings for handling.

4. Provide ribs or reinforcing if required to withstand the specified hydrostatic test pressure, to prevent deflection caused by hydraulic thrust and to support the motor.

5. Face and drill flanges of suction and discharge connections in accordance with ANSI/ASME B16.1 Class 125.

6. Provide components with machined registered concentric shoulder fits for precision alignment. Equipment without registered fits is not acceptable.

7. Provide high point of casing with a minimum 1/2-inch (13 mm) air vent and low point with a drain.

8. Drill and tap pump suction and discharge nozzles with 1/2-inch NPT connection for installation of piping and pressure gauges. Provide taps in accordance with ANSI/HI Standards. Provide taps with Type 316 stainless steel plugs.

9. Pumps with splitter vanes in casing are not acceptable unless specifically indicated in the Process Pump Schedule.

10. Provide pump feet integral to the casing and provide pump feet designed for the following additional forces:

    a. Hydraulic thrust equivalent to two times the shut-off head times the area of the discharge nozzle and acting at centerline of the discharge nozzle.

    b. Seismic forces acting at center of gravity of the pump. Seismic forces shall be as specified and indicated.

c. The hydraulic thrust and the seismic forces shall be assumed to act simultaneously.

11. Lining

a. Manufacturer:

(1) Belzona Supermetalglide

(2) Or acceptable equivalent product

b. Type: Ceramic filled epoxy

c. Percent Solids by Volume: 100 percent

d. Provide two coats 8 to 15 mils (200 to 380 microns) thick with total minimum DFT of 20 mils (500 microns).

e. Cured Hardness: 90D in accordance with ASTM D2240.

f. Surface preparation, mixing and application and safety requirements shall be in accordance with the lining manufacturer's printed instructions and as specified.

G. Impeller:

1. Type: Solids handling single suction.

a. Enclosed radial or mixed flow

2. Provide vanes having wide suction and waterways that will pass solids and stringy without clogging.

3. Provide impellers not greater than 95 percent or the percentage indicated in the Process Pump Schedule, of the maximum diameter impeller available.

4. Do not design hub with ports for reduction of thrust on impeller.

5. Key-seat and hold impeller to shaft by a streamlined bolt or locknut capable of holding in event of motor reversal under full torque.

a. Impeller Fasteners: Type 416 stainless steel or Type 316Ti stainless steel

6. Statically and dynamically balance each impeller.

7. Enclosed Impellers:

a. Material:

(1) ASTM A 532 Class II Type B (15 percent Cr-Mo) impellers with 540 BHN.

(2) Pump Services: Raw wastewater Pump Station

b. Wearing Rings:

(1) Provide on impeller and in pump casing at suction side.

(2) Impeller and Casing Wearing Rings:

(a) Impeller: Stainless Steel ASTM A743/A743M Grade CA-40 with a 300 to 350 BHN.

(b) Casing Wearing Rings: Stainless Steel ASTM A743/A743M Grade CA-40 with a 450 to 480 BHN.

(c) Provide a minimum 50 BHN difference between casing and impeller wearing rings with the harder ring installed in the casing.

H. Handhole Cleanouts:

1. If available, locate handholes in discharge nozzle of volute and in suction elbow or fronthead for vertically mounted pumps 12-inch (300 mm) and larger to provide access to impeller and interior parts.

2. Equip handholes with covers designed for easy removal.

3. Shape interior surface of cover to maintain contour of interior of casing or elbow to which it is attached to maintain efficiency and to prevent lodging of solids.

4. Gaskets: Neoprene or Buna-N.

5. Hardware: Type 316 Stainless Steel.

2.05 MOTORS:

A. Provide motors designed in accordance with IEC60034 and comply with NEMA MG1 Part 31.

B. Motors shall be rated Class I Division 1 Group D hazardous location.

C. Horsepower rating of motors: Not less than maximum brake horsepower or kW requirements of pumps under any condition of operation specified and indicated without operating in the motor service factor.

D. Motor enclosure and motor speed: As indicated in the Process Pump Schedule.

E. Provide pump motors with ball or roller bearings. Provide vertical motors with at least one bearing designed for thrust. Provide bearings with a minimum B-10 life of 50,000 hours.

F. Overall sound-pressure level of each motor shall not exceed 88 decibels when measured on flat network using an octave-band frequency analyzer conforming to ANSI S1.11. Determine overall sound-pressure level as average of four or more readings at evenly spaced points, 3 feet (1 meter) from motor.

G. Operate without overheating over the speed ranges required, specified and indicated.

H. Service Factor: 1.15

I. Premium efficiency motors in accordance with NEMA MG1.

J. Rating: 460 V, 3-phase, 60 Hertz.

K. Insulation: Class H with Class F temperature rise, Motor shall be suitable for continuous operation in ambient temperatures up to 50 degree C.

L. Site Altitude: Less than 100 feet (30 meters) above sea level.

M. Dry-Pit Submersible Motors:

1. Provide complete sealed and jacketed electric submersible squirrel cage induction motors in accordance with the above and as specified herein.

2. Provide all components housed in an air or oil filled cast-iron watertight and jacketed electric submersible squirrel cage induction motor in accordance with the above and as specified herein.

3. Provide motor jacket sealed to the motor housing with O-rings. Provide a closed loop cooling system which circulates a non-toxic oil or glycol-water mixture through a cooling jacket surrounding the motor, and through an integrated heat exchanger to transfer the motor heat to the process fluid.

    a. Motor cooled with the pumped liquid is not acceptable.

4. Insulate stator-winding and lead with moisture resistant Class H insulation for continuous duty in 40 degrees C rise liquids.

5. Provide motor capable of thirty (30) starts per hour at maximum speed.

6. Motor shaft: Type 416 or Type 420 stainless steel or ASTM A576 Cr 1040 with Type 420 stainless steel sleeve.

7. Provide seal leakage detector, moisture detector and stator winding temperature sensor.

8. Dynamically balance rotating assembly to meet ISO 2194011 G 2.5 to prevent vibration during pump operation.

9. All hardware: Type 316 stainless steel.

10. Provide all cables of multi-conductor SOW-A, G-GC or W of sufficient length to extend from pump motor to a junction box above motor room elevation as indicated. Cable size shall be in accordance with NEC specifications.

    a. Provide a sufficient length of cables, one piece, to reach from pump to the junction box as indicated plus 10 feet (3 meters).

11. Cable Entry:

    a. Provide all power and control lead wires double sealed entering the motor in a method that prevents cable wicking.

    b. Provide the sealing system consisting of a rubber grommet to seal the cable exterior followed by interior epoxy seal.

    c. Provide each cable wire with a section of insulation removed to establish a window area of bare wire and each wire surrounded by epoxy potting material.

    d. Provide a cable strain relief mechanism as an integral part of this sealing system.

    e. Provide the cable sealing system capable of withstanding an external pressure test of 1200 psi (830 kPa) as well as a cable assembly pull test as required by UL or FM.

    f. Provide the cable entry rated by UL or FM for submerged operating depths to 85 feet (26 meters).

    g. Singular grommet or other similar sealing systems are not acceptable.

12. Seals:

    a. Provide two separate tandem-mounted mechanical seals with the upper and lower seals mounted to rotate in the same direction.

    b. Upper Seals:

        (1) Provide seal completely immersed in an oil or glycol bath sealing the oil chamber and motor housing.

(2) Materials: Silicon carbide or Tungsten-Carbide rotating and stationary faces.

c. Lower Seals:

(1) Provide lower seal with mating faces immersed in the oil or glycol bath sealing the pump volute and oil chamber.

(2) Materials: Silicon carbide or Tungsten-Carbide rotating and stationary faces.

d. Springs: Type 316 stainless steel or DIN 2.4610 Hastelloy® C-4.

e. Elastomers: Viton.

f. Provide one moisture detection probe to detect moisture in stator cavity measuring conductivity.

g. Provide a sensor located at the bottom of the seal cavity to detect leakage.

h. Provide O-ring sealed plugged fill and drain inspection ports.

i. Provide winding over temperature protection.

j. Moisture detection and/or over temperature to shut down pumps, indicate condition and alarm.

13. Motor Sensor Monitoring Relays:

a. All relays are to be installed by the Contractor as indicated on the Electrical drawings and wired in accordance with pump manufacturer's written instructions.

b. Provide relays to mount in standard 12-pin socket bases and operate on available control voltage of 24-240 VAC.

c. Relay power consumption: No more than 2.8 watts and be UL approved.

d. Relays to be modular in design, with each relay monitoring no more than two motor sensor functions.

e. Provide each relay module with a tricolor (red/green/amber) LED to indicate the status of each monitored sensor. Green will indicate "status OK"; amber will indicate a leakage failure or alarm condition; red will indicate a temperature failure or alarm condition.

f. A self-corrected fault will allow the relay output contacts to reset and cause the LED to change from a steady alarm indication to a flashing signal. The LED will continue to flash until locally cleared, providing the operator with an indication of a potential intermittent fault. Provide each relay with a power-on LED and both “test” and “reset” pushbuttons.

g. Provide an independent fail-safe, switch on power loss, form-C output contact rated for 5 amps at 120 volt, for each monitored sensor to provide a normally-open / normally closed dry contact to initiate a remote alarm device or shut down the motor. Provide contacts rated for 3 amps at 240 volt.

14. Bearings:

a. Provide double row, re-greaseable bearings on the pump side and permanently lubricated, maintenance free bearing on the motor end.

b. Minimum B or L-10 bearing life of 50,000 hours.

15. Provide all mating surfaces machined and fitted with O-rings. All fittings shall be metal to metal contact between each machine surface.

16. Provide a Type 316 lifting attachment capable of lifting the entire pump and motor assembly.

17. Motors shall conform to UL or FM quality assurance specifications and be manufactured by an ISO-9001 company.

2.06 DRAIN AND VENT PIPING:

A. Provide casing vent and drain piping and valves to discharge into gutters or sumps as indicated and as directed by the Engineer.

B. Drain and vent piping: Schedule 10S Type 316L stainless steel with VicPress connections or Schedule 40 Type 316L stainless steel with socket welded connections. Provide a sufficient number of unions to permit removal of each valve and in-line device.

C. Provide pipe and fittings in accordance with Section 40 23 19.04 and as indicated.

D. Valves: Provide size and type as indicated and in accordance with Section 40 23 13.01.

2.07 GAUGES:

A. Provide gauges assemblies for suction and discharge of each pump in accordance with Section 40 23 19.04 and as indicated.

2.08 HARDWARE:

A. Type 316 stainless steel.

2.09 FACTORY PAINTING:

A. Primer and Finish Paint: Factory apply to all exterior ferrous surfaces; high solids epoxy in accordance with Section 09 91 10.

B. Ferrous surfaces which are not to be painted shall be given a factory applied coat of grease or rust resistant coating.

C. Provide additional factory paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.10 FACTORY TESTING:

A. Comply with the requirements specified in Section 01 75 13 and as specified herein.

B. Provide factory testing in accordance with Section 43 21 00.90.

C. Factory performance tests shall be conducted in accordance with ANSI/HI 14.6 Grade 1U tolerance.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install items in accordance with accepted shop drawings, manufacturer's printed instructions and as indicated.

B. Install pumping units on a concrete pad and align thereon.

1. Set base on metal shims placed directly under the part of the base carrying the greatest weight and spaced close enough to provide uniform support.

C. After alignment is correct, grout using high grade non-shrink grout.

1. Do not imbed leveling nuts in grout.

3.02 FIELD TESTING:

A. Comply with the requirements specified in Section 01 75 13 and as specified herein.

B. Test piping connections to prove the pump nozzle are installed with the pipe in a free supported state and without need to apply vertical or horizontal pressure to align piping

with pump nozzles. This must be performed and the piping acceptable prior to any field performance testing.

C. Field testing will not be conducted without an accepted procedure, calibration certificates for all testing equipment, gauges and flow meters and a completed and signed pretesting check list. See Division 01 for checklist.

D. After installation of pumping equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer's field service technician, conduct running test for each pump in presence of the Engineer to determine its ability to operate within the vibration and temperature limits specified, and to deliver its rated capacity under specified conditions.

1. During tests, observe and record head, capacity, pump bearing housings and motor bearing temperature, noise and vibration and motor inputs.

    a. Provide vibration signature test data for each pump and drive assembly.

        (1) Limit: 50 percent of ANSI/HI allowable limits.

    b. Bearing Temperature: Bearing temperature not to exceed 180 degrees F (82 degrees C).

    c. Test Duration: Determined by the Engineer, but not less than three hours of continuous operation at each condition specified and indicated.

2. Run each pump for minimum four hours prior to taking temperature readings of the pumps, motors, and shafting.

3. Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.

4. Repeat tests until specified results are obtained.

5. Contractor to provide all water labor, piping, testing equipment, equipment, flow meters and test gauges for conducting tests.

    a. Contractor shall provide calibrated test gauges for all permanently installed gauges and portable calibrated flow meters for all pumping systems even in those cases where permanent flow meters are installed.

    b. All calibrations must be within 30 days of the field testing.

    c. The testing will not be started and will not be accepted until the calibrated testing equipment stated above is operational and all certifications have been submitted.

E. Make all adjustments necessary to place equipment in specified working order at time of above tests.

F. Test pump on product only. If product is not available, test with water. Water for testing furnished by Contractor.

G. Remove and replace all equipment at no additional cost to the Owner with equipment that will meet all requirements specified and indicated if unable to demonstrate to the satisfaction of the Engineer that equipment will perform the service specified, indicated and as submitted and accepted.

3.03 FIELD TOUCH-UP PAINTING:

A. After installation and accepted testing by the Engineer, apply touch-up paint to all scratched, abraded and damaged factory painted surfaces. Coating type and color shall match factory painting.

3.04 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 43 21 14

SUMP PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide submersible sump pumps, motors, controls, and appurtenances as indicated on the Contract Drawings and specified herein.

B. Work includes furnishing, installation support, testing, commissioning, and training for sump pumping equipment required for operation of the Ypao Wastewater Pump Station Modifications project.

C. Sump pumps shall remove pump room drainage including washdown water, leakage water, groundwater infiltration, and incidental wastewater entering sump pits.

1.02 PROCESS DESCRIPTION:

A. Service: Provide a duplex sump pump system for the drywell/pump room sump pit consisting of two submersible sump pumps configured for lead/lag operation with automatic alternation. Pump operation shall be automatically controlled based on sump liquid level to provide reliable and efficient removal of pump room drainage, including washdown water, leakage water, and incidental wastewater infiltration. The system shall include local alarm indication and shall be fully integrated with the facility SCADA system to provide status monitoring, alarm notification, and operational feedback.

B. Each duplex sump pump system shall be designed such that full required sump pumping capacity can be maintained with one pump out of service, ensuring continuous operation and redundancy during maintenance or equipment failure.

C. Downstream Process Discharge: Ypao WWPS Wetwell.

D. Layout shown on the drawings are based on 2-inch submersible pumps. If a different layout and configuration is proposed the City shall be reimbursed by the Contractor for all redesign costs that may result from an alternative configuration.

1.03 REFERENCES:

A. ASTM International (ASTM):

1. ASTM A48: Specification for Gray Iron Castings

B. National Electric Code (NEC).

C. National Electrical Manufacturers Association (NEMA):

1. NEMA Design B: Normal-Torque Motors

2. NEMA 4X: Enclosures are Primarily Intended for Outdoor Use and Offer a Superior Level of Protection from Corrosion and Extreme Environments

D. Underwriters Laboratories (UL):

1. UL 508: UL Standard for Safety Industrial Control Equipment

1.04 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01 33 00:

1. Prior to fabrication and testing provide guaranteed performance curves based on actual shop tests of mechanically duplicate equipment showing they meet indicated and specified requirements for flow capacity and head loss.

a. For units of same size and type, provide curves for a single unit only.

b. Submit curves for guaranteed performance on 8-1/2 inch x 11-inch sheets, one (1) curve per sheet.

2. Certified setting plans, with tolerances.

3. Manufacturer's literature as needed to supplement certified data.

4. Motor data and performance characteristics.

5. Schematic control and power wiring diagrams including interconnecting and internal wiring diagrams

6. Control panel layout drawings and elevation views.

7. Shop drawing data for all accessory items.

8. Operations and maintenance manual in accordance with Section 01 78 23 Operation and Maintenance Data.

9. List of recommended spare parts other than those specified.

10. Field inspection reports (when available).

11. Recommendations for short and long-term storage.

12. Equipment weight and lifting points for Contractors installation and transport purposes.

13. Special tools.

14. Material Certifications:

    a. Provide certifications from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified.

B. A copy of the contract mechanical process, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.

    1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

C. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.

    1. If deviations and clarifications from the specifications are indicated, therefore, requested by the Contractor, provide a detailed written justification for each deviation and clarification.

    2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 SERVICE CONDITIONS:

A. Basis of Design:

    1. Influent: Process washwater

B. System Information – Ypao WWPS Drywell/Pump Room

    1. Number of Sump Pumps: Two (2).

    2. Pump Tag Numbers: SP-1 and SP-2

    3. Sump Dimensions: 2.5-feet diameter x 2.5-feet deep.

    4. Required Solids Sphere Size Passage: 1/2-inch maximum.

    5. Design Flow: 35 gpm.

6. Design Total Dynamic Head (TDH): 12-feet.

7. Electrical Area Classification: Class 1 Division 2 Hazardous Area.

8. Motor Size and Type: 3/4 HP nominal maximum, 1,800 RPM maximum speed, submersible.

9. Motor Voltage: 480-volts, 3-phase, 60-hertz.

C. Comply with the requirements specified in Section 01 61 00.

1.06 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01 43 00.

B. Pumps shall be the product of one manufacturer.

C. Pumps shall be manufacturer's standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01 66 10.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Zoeller

B. Pentair

C. KSB

D. Sulzer/ABS

E. Xylem/Flygt

F. Or approved substitute.

2.02 PUMP CONSTRUCTION

A. General

1. All pumps shall be non-overloading throughout the entire range of operation without employing service factor.

2. The pump shall include a minimum service factor of 1.20.

3. The performance curve shall include design head and capacity, pump efficiency, and solid handling sphere size capability.

B. Construction:

1. Each pump shall be of the sealed submersible type. The pump volute, motor, impeller, and seal housing shall be gray cast iron, ASTM A48, Class 30.

2. The pump discharge shall be fitted with a standard 125-pound flange, faced and drilled. All external mating parts shall be machined and Nitrile O-ring sealed on a beveled edge.

3. All fasteners exposed to the pumped liquids shall be Type 316 stainless steel.

C. Casing:

1. The casing shall be of the end suction volute type having sufficient strength and thickness to withstand all stress and strain from service at full operating pressure and load.

2. The casing shall be of the centerline discharge type equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment.

3. The casing shall be accurately machined and bored for register fits with the suction and casing covers.

4. Pumps shall rest on support legs that are integral with the casing and volute.

5. Casing shall be shop coated inside and out.

D. Impeller:

1. Impeller shall be of the two-vane, semi-enclosed design and have pump-out vanes on the backside of the impeller to prevent grit and other materials from collecting in the seal area.

2. Impeller shall not be coated.

3. Impellers shall be dynamically balanced.

4. The impeller shall be slip fit to the shaft and key driven. A 400 Series stainless steel washer and impeller bolt shall be used to fasten the impeller to the shaft.

E. Bearings and Shaft:

1. An upper radial bearing and lower thrust bearing shall be required. Both the upper radial bearing and the lower thrust bearing shall be heavy-duty single row ball bearings that are permanently lubricated by the dielectric oil that fills the motor housing.

2. The shaft shall be machined from a solid 400 Series stainless steel and be a design that is of larger diameter with minimum overhand to reduce shaft deflection and protect bearings.

F. Seals:

1. The pumps shall have a mechanical single seal.

2. The seal shall be used with the rotating seal face being carbon and the stationary seal face to be ceramic. The seal shall be replaceable without disassembly of the seal plate and without the use of special tools.

3. Pump-out vanes shall be present on the backside of the impeller to keep contaminants out of the seal area.

G. Power Cords:

1. Electrical power cord shall be SOOW or W, water resistant 600V, 194 degrees F, UL and CSA approved and applied dependent on amp draw for size.

2. The pump shall be double protected with compression fitting and an epoxy potted area at the power cord entry to the pump.

3. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to the bare wire, at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be filled with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.

4. The power cord assembly shall then be connected to the motor leads with insulated butt connectors rather than a terminal board that allows for possible leaks.

5. The cord cap assembly where bolted to the motor housing shall be sealed with a Nitrile O-ring on a beveled edge to assure proper sealing.

H. H. Motors:

1. The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation (311 degrees F) and dielectric oil-filled motor, NEMA B design. Three (3) phase motors shall use magnetic starters with overload relays located as indicated on the drawings.

2. Stators shall be securely held in place with threaded fasteners so they may be easily removed in the field without the use of special tools.

3. Motors shall be designed and fabricated to operate within a Class 1 Division 2 Hazardous location.

2.03 CONTROLS

A. Description:

1. Sump pump control panels shall be in accordance with the Contract Drawings. The Instrumentation and controls shall be provided as indicated on the Piping and Instrumentation Diagrams (P&IDs), elementary Diagrams (control schematics) and shall be provided.

2. The control panel shall include contacts for the specified seal moisture detector and the over temperature switch configuration used by the manufacturer for the motor.

3. Intrinsically safe devices and wiring shall be in accordance with the National Electrical Code.

4. The control panel shall include dry contacts to provide run and fault status for each pump to the Supervisory Control and Data Acquisition (SCADA) system.

5. Provide a main disconnecting circuit breaker at each control panel rated minimum 65KAIC.

6. Each control panel shall be UL 508 listed and provided with a NEMA 4X enclosure.

7. Provide three (3) float switches for each pump control as follows:

a. Sump Flood Alarm

b. Pump On

c. Pump Off

2.04 SHOP PAINTING:

A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, high solids epoxy in accordance with Section 09 91 10 Shop Painting.

B. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.

C. Provide additional shop paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.05 SPARE PARTS:

A. Spare parts are not required.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install items in accordance with accepted shop drawings, manufacturer's printed instructions and as indicated.

3.02 MANUFACTURERS SERVICES:

A. Provide services of manufacturer's representative as stated in Section 01783 Plant Testing, Startups, and Commissioning and as specified herein.

B. Provide Services of Factory-Trained Service Technician, Specifically Trained on Type of Equipment specified:

1. Service Technician must be present on site for all items listed below. Person-day requirements listed are exclusive of travel time, and do not relieve Contractor of the obligation to place equipment in operation as specified.

2. Installation: Verify location of anchor bolts; setting, leveling, alignment, field erection; coordination of piping, and miscellaneous utility connections:

a. One (1) person-day

3. Functional Testing: Calibrate, check alignment and perform a functional test with water. Tests to include all items specified.

a. One (1) person-day.

4. Field Performance Testing: Field performance test equipment specified.

a. One (1) person-day.

5. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts, and preparation to lead and teach classrooms sessions.

a. One (1) person-days

6. Any additional time required of the factory trained service engineer to assist in placing the equipment in operation or testing, or to correct deficiencies in installation, equipment or material shall be provided at no additional cost to the Owner.

3.03 FIELD TESTING:

A. Comply with the requirements specified in Section 01 78 25 and as specified herein.

B. Field testing will not be conducted without an accepted procedure, calibration certificates for all testing equipment, and a completed and signed pretesting check list.

C. After installation of equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer's field service technician, conduct a dry running test and a performance test for each unit in presence of the RPR to determine its ability to deliver its rated capacity under specified conditions.

1. Performance Test:

a. During tests, observe and record flow rates, water level, and motor voltage and current.

b. Test Duration: Determined by the RPR, but not less than ten (10) cycles.

c. After initial startup sump pump system must demonstrate thirty (30) days of continuous, defect-free operation prior to final acceptance.

d. Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.

2. Repeat tests until specified results are obtained.

D. Make all adjustments necessary to place equipment in specified working order at time of above tests.

3.04 CONTRACT CLOSEOUT:

A. Provide in accordance with Section 01 77 00.

END OF SECTION