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 To Bid: IFB-04-ENG-2024

Project: Deep Wells D-17, Y-15, and M-4 GAC System Dieldrin Treatment
GWA Project No. 12309

Addendum No.: 03

Date: April 10, 2025

All Potential Bidders:

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

1. **Section 00100 – Invitation to Bid** and other sections of the bid documents where applicable.

    a. Bid Submission deadline has been extended to April 21, 2025, 10:00 a.m. ChST.

    b. Submit one original and one copy of bid documents.

2. **Bid Documents – Form 00520** Agreement shall be replaced in its entirety with following revision Form 00520 Agreement_Addendum No. 3 herein attached.

3. **Plans and Specifications - Revision A** shall be replacing previous version(s) in its entirety herein attached.

    See all changed plans and specifications listed below:

    Plans Sheets TS-1, MP-1.3, C-0.1, C-1.1, C-1.2, C-1.3, C-1.4, C-1.5, C-2.1, C-2.2, C-2.3, C-3.1, C-3.2

    Specification 011000 – Summary, 469999 CBU

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

Christopher M. Budasi
Acting General Manager

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

(Note: This is a SAMPLE of the Final Agreement; therefore, the Final Agreement may not be in the exact form as provided below.)

THIS AGREEMENT is by and between _____ ("Owner") and _____ ("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

Contractor shall complete all Work, for the Project, as specified and indicated in the Contract Documents.

Refer to Article 1 (1.01 & 1.02) in Technical Data document for the Work and Project description(s), which shall be incorporated herein.

ARTICLE 2 – ENGINEER

Refer to Article 2 (2.01,2.02 & 2.03) Technical Data document, which shall be incorporated herein.

ARTICLE 3 – CONTRACT TIMES

3.01 Time of the Essence

A. Time is of the essence for all Milestones, if any, Substantial Completion, and completion and readiness deadlines for work and final payment(s) as stated in the Contract Documents.

3.02 Contract Times: Days

Refer to Article 3.02 Technical Data document, which shall be incorporated herein

3.03 Liquidated Damages

Refer to Article 3.03 Technical Data document, which shall be incorporated herein

3.04 Special Damages

A. In addition to the amount provided for liquidated damages, Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.

B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in

Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

ARTICLE 4 – CONTRACT PRICE

4.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents and the amounts that follow, subject to adjustment under the Contract:

A. For all Work other than Unit Price Work, a lump sum of: $_____.

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item):

Unit Price Work					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					$_____.

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

C. Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) $_____.

D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 5 – PAYMENT PROCEDURES

5.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

5.02 Progress Payments; Retainage

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 15th day of each month

during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract

   a. 90 percent of Work completed (with the balance being retainage). And

   b. 90 percent of cost of materials and equipment not incorporated in the Work

   (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

5.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 6 – INTEREST

6.01 Not applicable.

ARTICLE 7 – CONTRACTOR'S REPRESENTATIONS

7.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 8 – CONTRACT DOCUMENTS

8.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to _9_, inclusive).
2. Performance bond (pages _1_ to _4_, inclusive).
3. Payment bond (pages _1_ to 4_, inclusive).
4. Other bonds.
   a. ____(pages____to____, inclusive).
5. General Conditions (pages _1_ to _64_, inclusive).
6. Supplementary Conditions (pages _1_ to _19_, inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. The Drawings listed on the attached sheet index.
9. Addenda (numbers____to____, inclusive).
10. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (pages____to____, inclusive).

11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed.
    b. Work Change Directives.
    c. Change Orders.
    d. Field Orders.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 9 – MISCELLANEOUS

9.01 Terms

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

9.02 Assignment of Contract

B. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.03 Successors and Assigns

A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

9.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

9.05 Contractor's Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

9.06 Other Provisions

A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or “track changes” (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on_____(which is the Effective Date of the Contract).

OWNER:	CONTRACTOR:
Guam Waterworks Authority	
By: MIGUEL C. BORDALLO, P.E.	By:
Title: General Manager	Title:
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:
Gloria B Nelson Public Service Building	
688 Route 15	
Mangilao Guam 96913	
	License No.: *(where applicable)*
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)	*NOTE TO USER: Use in those states or other jurisdictions where applicable or required.*

CERTIFIED FUNDS AVAILABLE:	APPROVED AS TO FORM:
By:	By:
TALING M. TAITANO, CPA, CGFM GWA Chief Financial Officer	THERESA G. ROJAS, Esq. GWA Legal Counsel
Date:	Date:
Contract Amount: $	
Amount Certified: $	
Funding Source:	

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

TECHNICAL DATA

ARTICLE 1-WORK

1.01 Contractor shall complete all Work for the Project as specified and indicated in the Contract Documents. The Work is generally described as follows:

Installation of GAC treatment systems to address dieldrin contamination at GWA's deep wells D-17, Y-15, and M-4. Relocation of two GAC systems and installation of one new GAC system.

1.02 The Project is generally described as follows: **DEEP WELLS D-17, Y-15, AND M-4 GAC SYSTEMS FOR DIELDRIN TREATMENT CONSTRUCTION**

GWA Project Number**: 12309**

Article 2-ENGINEER

2.01 The part of the Project that pertains to the Work has been designed by **Dueñas, Camacho & Associates, Inc.**

2.02 The Owner has retained **Dueñas, Camacho & Associates, Inc.** as Construction Manager ("Resident Project Representative") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 3- CONTRACT TIMES

3.02 Contract Times: Days

A. The Work for the **DEEP WELLS D-17, Y-15, and M-4 GAC SYSTEM FOR DIELDRIN TREATMENT** will be substantially completed within the following days after the Notice to Proceed issuance as provided in Paragraph 4.01 of the General Conditions and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions.

B. The Work will be substantially completed within **(see below)** calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions:

C. Work shall be substantially completed on or before the following milestone(s):

1. Deep Well Y-15 site:

- Substantial Completion: **365** calendar days from Notice to Proceed.
- Final Completion: **90** calendar days from Substantial Completion.

2. Deep Well D-17 site:

- Substantial Completion: **270** calendar days from Notice to Proceed.
- Final Completion: **90** calendar days from Substantial Completion.

3. Deep Well M-4 site:

- Substantial Completion: **270** calendar days from Notice to Proceed.
- Final Completion: **90** calendar days from Substantial Completion.

3.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner **$4,500.00** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **$ 4,500.00** for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

4. Milestones: Contractor shall pay Owner **$ NA** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved.

GUAM WATERWORKS AUTHORITY

GAC FILTER RELOCATION PROJECT

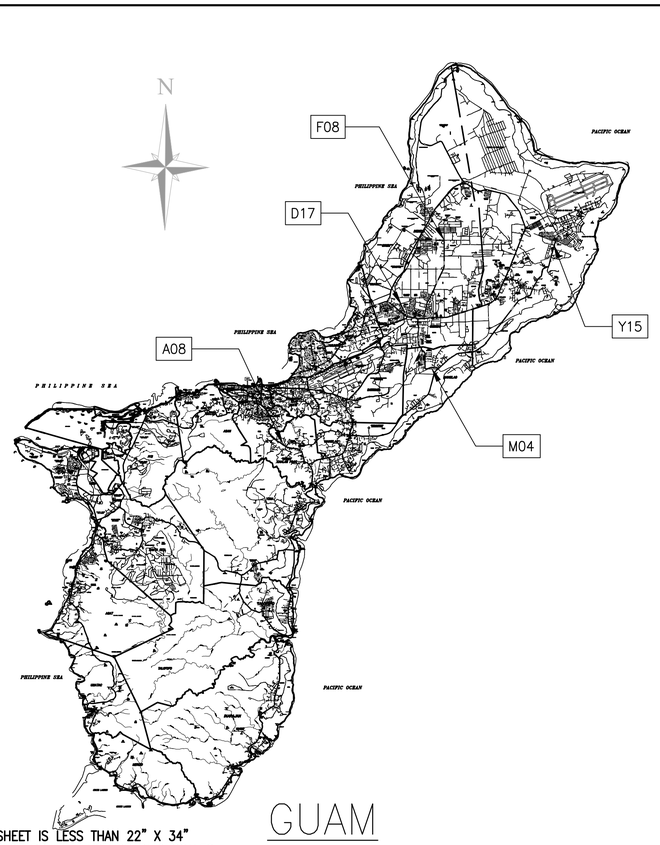
GWA PROJECT NO.: 12309

(BID SET) - REVISION A

1

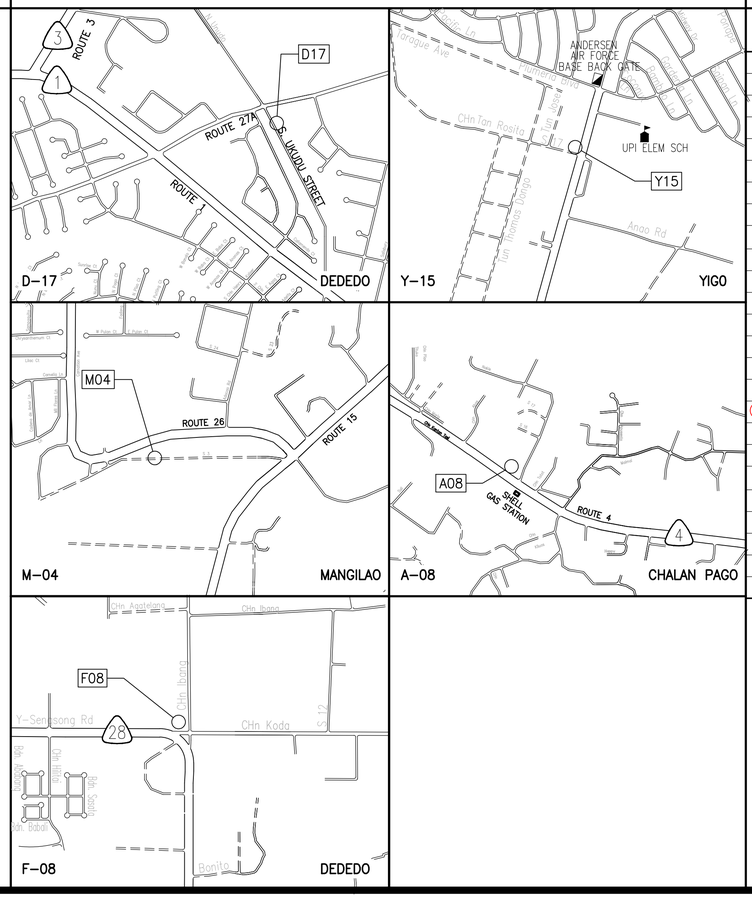
BID SET

LOCATION MAP



IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

VICINITY MAPS



INDEX OF DRAWINGS

DWG. NO.	SHEET NO.	DESCRIPTION
TS-1	1	TITLE SHEET, LOCATION MAP, INDEX OF DRAWINGS
		MECHANICAL PROCESS
MP-1.1	2	WELL D17 – NEW SCHEMATIC
MP-1.2	3	WELL Y15 – NEW SCHEMATIC
MP-1.3	4	WELL M04 – NEW SCHEMATIC
		CIVIL DRAWINGS
C-0.1	5	GENERAL NOTES, LEGENDS, AND SYMBOLS
C-1.1	6	EXISTING CONDITIONS AND DEMOLITION PLAN – D17
C-1.2	7	EXISTING CONDITIONS AND DEMOLITION PLAN – Y15
C-1.3	8	EXISTING CONDITIONS AND DEMOLITION PLAN – M04
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C-1.5	10	EXISTING CONDITIONS AND DEMOLITION PLAN – F08
C-2.1	11	SITE PLAN – D17
C-2.2	12	SITE PLAN – Y15
C-2.3	13	SITE PLAN – M04
C-3.1	14	MISCELLANEOUS DETAILS
C-3.2	15	MISCELLANEOUS DETAILS
		1 MECHANICAL DRAWINGS
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MD-1.1	17	GAC DEMO PLAN WELL SITE "D-17"
MD-1.2	18	GAC DEMO PLAN WELL SITE "Y-15"
M-1.0	19	SCHEMATIC DIAGRAM
M-2.0	20	GAC PIPING PLAN WELL SITE "M-04"
M-2.1	21	GAC PIPING PLAN WELL SITE "D-17"
M-2.2	22	GAC PIPING PLAN WELL SITE "Y-15"

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

DUEÑAS·CAMACHO & ASSOCIATES, INC.
■ ENGINEERING (CIVIL/STRUCTURAL)
■ CONSTRUCTION MANAGEMENT ■ PLANNING
■ ENVIRONMENTAL SERVICES ■ SURVEYING
■ DEVELOPMENT CONSULTATION
■ GEOGRAPHIC INFORMATION SYSTEMS
P.O. Box 8900 Tamuning, Guam 96931

I CERTIFY THAT THIS DRAWING WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION

KENNETH M. REKOMAT CERTIFICATE No 13215 (CIVIL) EXPIRES: 08/31/25 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A 1

GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

TITLE SHEET, LOCATION MAP, PROJECT DESCRIPTION, INDEX OF DRAWINGS

TS-1

SHEET 1 OF 22

LEGEND

- ISOLATION VALVE (NORMALLY OPEN)
- ISOLATION VALVE (NORMALLY CLOSED)
- CHECK VALVE
- FM FLOW METER

EXISTING WELL PUMP

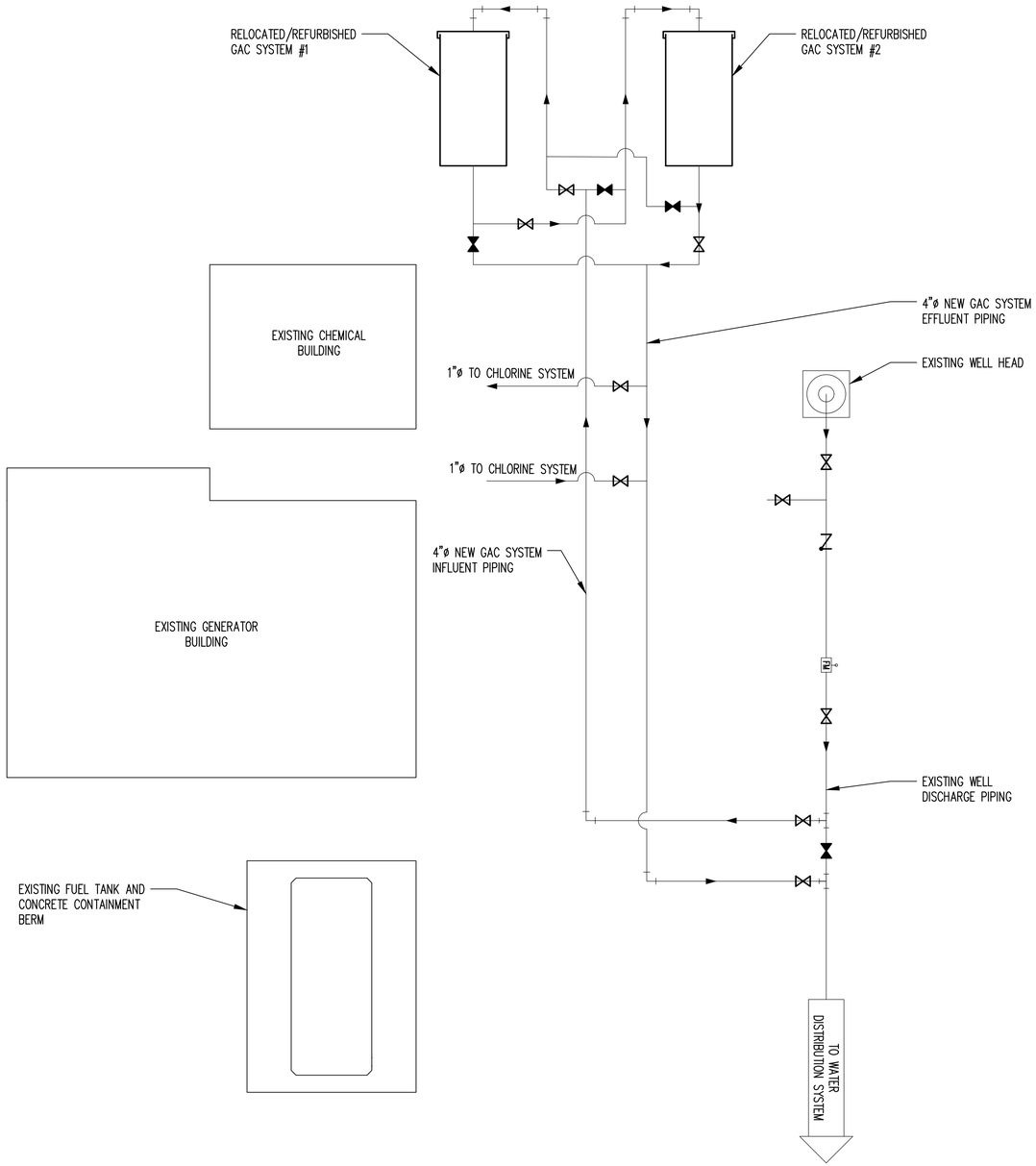
MANF.	TDH	FLOW	MODEL #	STAGE	HP
FRANKLIN ELECTRIC	510 (FT)	200 (GPM)	175SR0F66-1463	13	40

RELOCATED GAC VESSEL

DIAMETER (FT)	HEIGHT (FT)	MATERIAL	NOTES
8'	12'	COATED STEEL	BITUMINOUS COAL-BASED ACTIVATED CARBON.

NOTE

1. RELOCATE GAC VESSELS FROM A-8 TO D-17
2. EXISTING DEEP WELL PUMP AND MOTOR TO REMAIN. CONTRACTOR TO PROVIDE (1) ONE NEW PUMP AND MOTOR FOR WELL SITE.



1 WELL D17 – NEW SCHEMATIC
NOT TO SCALE

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

BID SET

CLIENT

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P.O. Box 8900 Tamuning, Guam 96931

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KENNETH M. REKOMAT CERTIFICATE No 13275 (CIVIL) EXPIRES: 06/30/25 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A

GUAM

REVISIONS

MARK	DATE	DESCRIPTION
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GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

WELL D17 – NEW SCHEMATIC

MP-1.1

LEGEND

- ISOLATION VALVE (NORMALLY OPEN)
- ISOLATION VALVE (NORMALLY CLOSED)
- CHECK VALVE
- FM FLOW METER

EXISTING WELL PUMP

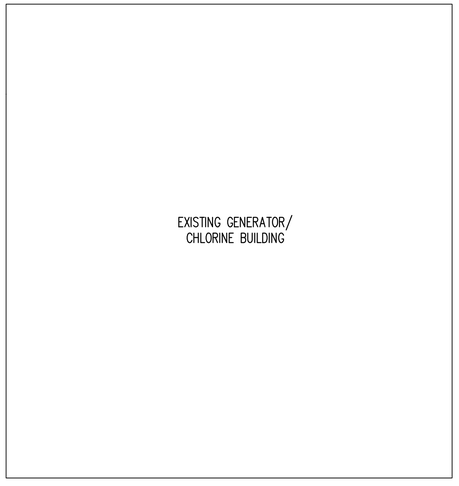
MANF.	TDH	FLOW	MODEL #	STAGE	HP
FRANKLIN ELECTRIC	510 (FT)	600 (GPM)	475SR100F86-1186	11	100

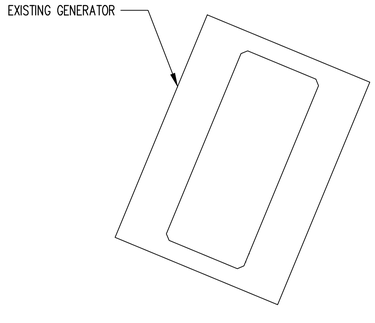
NEW GAC VESSEL

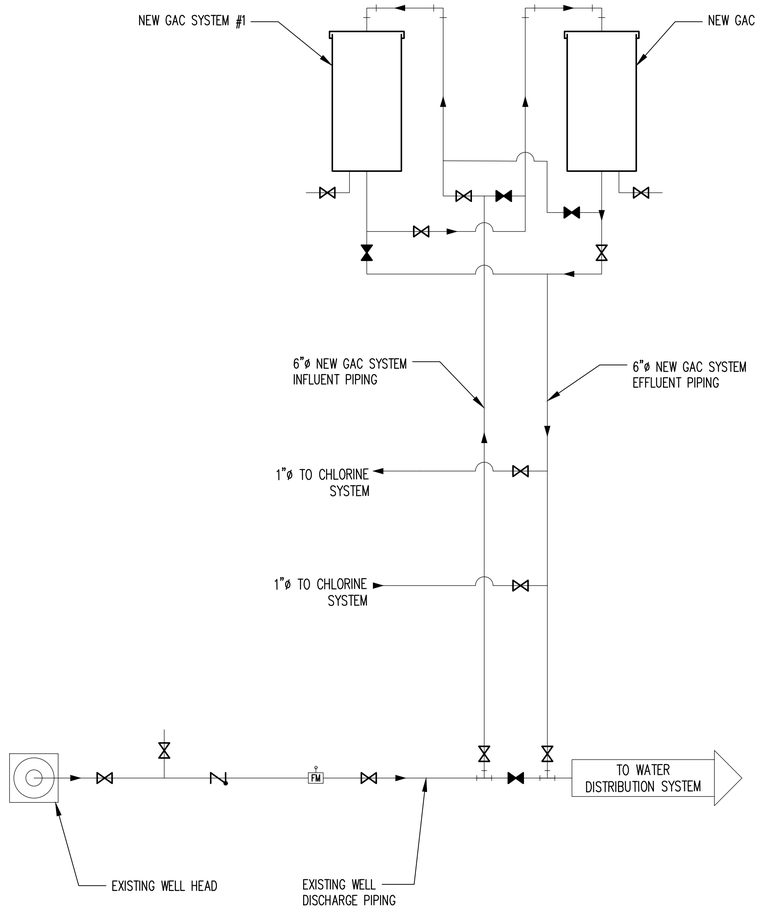
DIAMETER (FT)	HEIGHT (FT)	MATERIAL	NOTES
12' - 2"	18'	COATED STEEL	BITUMINOUS COAL-BASED ACTIVATED CARBON.

NOTE

1. EXISTING DEEP WELL PUMP AND MOTOR TO REMAIN. CONTRACTOR TO PROVIDE (1) ONE NEW PUMP AND MOTOR FOR WELL SITE.







1 WELL Y15 - NEW SCHEMATIC
NOT TO SCALE

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT - USE GRAPHIC SCALES
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BID SET

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DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A

1 GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

WELL Y15 - NEW SCHEMATIC

MP-1.2

LEGEND

- ISOLATION VALVE (NORMALLY OPEN)
- ISOLATION VALVE (NORMALLY CLOSED)
- CHECK VALVE
- FM FLOW METER

EXISTING WELL PUMP

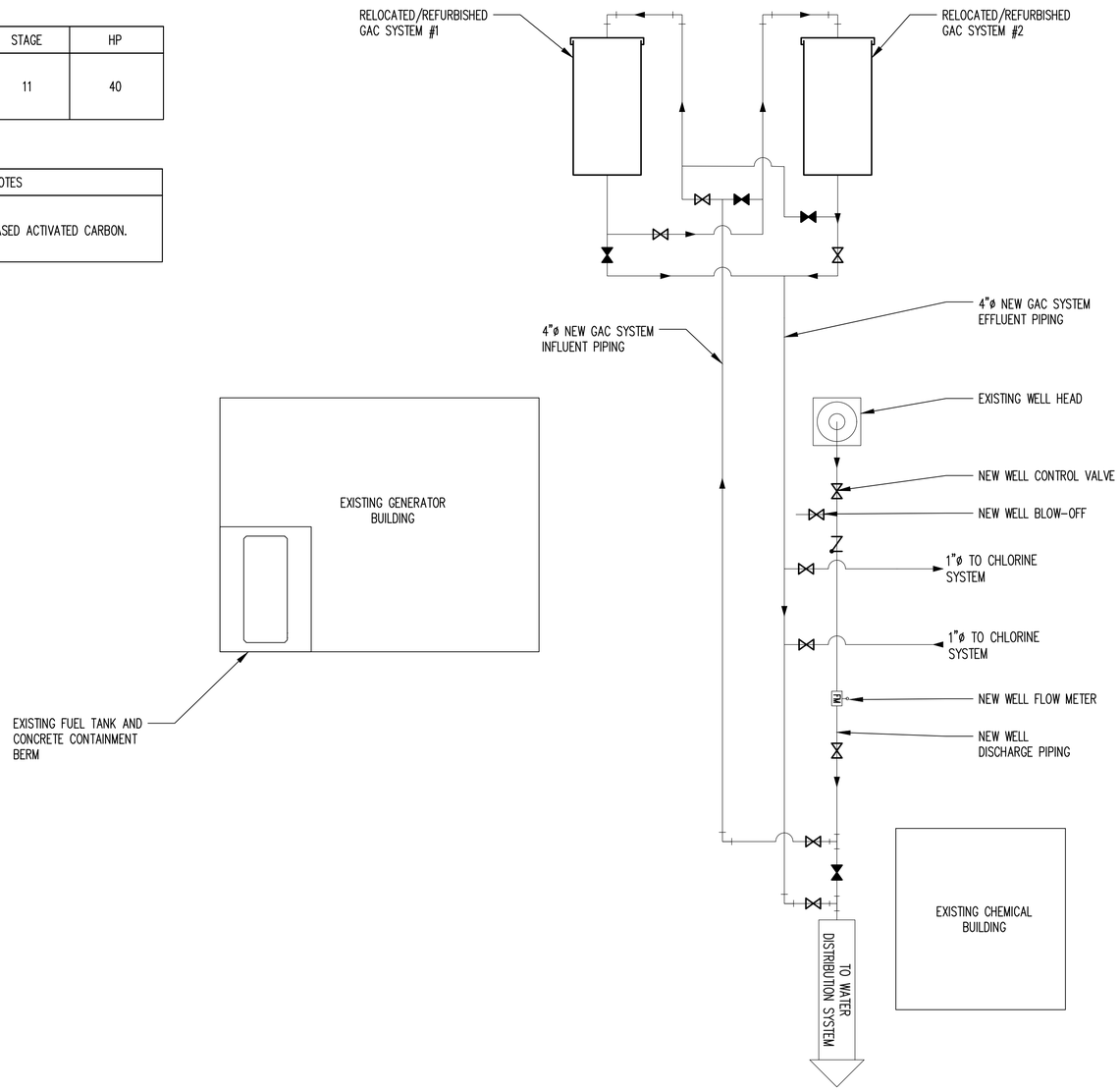
MANF.	TDH	FLOW	MODEL #	STAGE	HP
FRANKLIN ELECTRIC	560 (FT)	140 (GPM)	175SR0F66-1463	11	40

RELOCATED GAC VESSEL

DIAMETER (FT)	HEIGHT (FT)	MATERIAL	NOTES
8'	9' – 4"	COATED STEEL	BITUMINOUS COAL-BASED ACTIVATED CARBON.

NOTE

1. RELOCATE GAC VESSELS FROM F-8 TO M-04 (1)
2. EXISTING DEEP WELL PUMP AND MOTOR TO REMAIN. CONTRACTOR TO PROVIDE (1) ONE NEW PUMP AND MOTOR FOR WELL SITE.



1 WELL M04 – NEW SCHEMATIC
NOT TO SCALE

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

DUEÑAS · CAMACHO & ASSOCIATES, INC.
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P.O. Box 8900 Tamuning, Guam 96931

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KENNETH M. REKDAHL CERTIFICATE No 13215 (CIVIL) EXPIRES: 06/30/25 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A (1)

GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

WELL M04 – NEW SCHEMATIC

MP-1.3

-GENERAL CONSTRUCTION NOTES

1. OBSERVE & COMPLY WITH ALL FEDERAL AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY & ENVIRONMENTAL QUALITY.
2. THE FINISHED GRADE INDICATED HEREON SHALL MATCH OR CONNECT TO ADJACENT EXISTING GROUND AS SHOWN ON THE GRADING PLANS. ANY DISCREPANCY DISCOVERED DURING THE COURSE OF CONSTRUCTION SHALL BE IMMEDIATELY REPORTED TO THE CONSTRUCTION MANAGER.
3. ALL DEBRIS AND TRASH FROM CONSTRUCTION SHALL BE DISPOSED OF TO THE APPROVED LANDFILL SITE AND THE CONTRACTOR SHALL COMPLY WITH ALL THE REQUIREMENTS PERTAINING TO THE USE OF DISPOSAL AREA.
4. THE EXISTENCE AND LOCATION OF EXISTING UNDERGROUND UTILITIES AND STRUCTURES SHOWN IN THE PLANS ARE BASED ON THE LATEST AVAILABLE DATA DURING THE TIME OF SURVEY BUT NO GUARANTY AS TO THEIR ACCURACY. THE CONTRACTOR MUST SECURE UNDERGROUND CLEARANCES TO ALL UTILITY AGENCIES INVOLVE AND SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF EXISTING UTILITIES AND EXERCISE CAUTION WHEN EXCAVATING IN THE AREA. ANY DAMAGES TO EXISTING UTILITIES AND STRUCTURES RESULTING FROM CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT NO ADDITIONAL COST TO OWNER.
5. EXISTING UTILITIES SHALL REMAIN IN SERVICE AND IN PLACE AT ALL TIMES, UNLESS NOTED OTHERWISE. INTERRUPTION OF SERVICE SHALL BE KEPT TO A MINIMUM AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE AND ONLY WITH THE APPROVAL OF THE OWNER'S REPRESENTATIVE AND UTILITY COMPANIES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY SHEETING AND BRACING THE EXCAVATION AND STABILIZING THE EXISTING GROUND TO PROVIDE SAFE AND SECURE FROM POTENTIAL SLIDING, CAVE-INS, SETTLEMENT.
7. THE CONTRACTOR SHALL PROVIDE SAFE ACCESS TO AND FROM ALL DRIVEWAYS AND STREETS NEAR THE PROJECT SITE.
8. RESTORE TO THEIR ORIGINAL CONDITION EQUAL OR BETTER, ALL EXISTING IMPROVEMENTS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES, INCLUDING PAVEMENTS, EMBANKMENTS, DRIVEWAYS, CURBS, SIGNS, LANDSCAPING, STRUCTURES, UTILITIES, FENCES, ETC..
9. PROPERTY CORNERS AND ROAD MONUMENTS SHOWN ON THE PLANS OR DISCOVERED DURING CONSTRUCTION SHALL BE PRESERVED AND NOT TO BE DISTURBED. IN ANY CASE, IF THE CONTRACTOR DISTURBS ANY OF THESE MARKERS OR MONUMENTS, THEY SHALL BE REPAIRED AND RESTORED TO THEIR ORIGINAL OR BETTER CONDITION AT NO ADDITIONAL COST TO OWNER.
10. THE CONTRACTOR MUST SECURE UNDERGROUND TELEPHONE, CABLE, POWER, WATER, AND WASTEWATER CLEARANCES PRIOR TO ANY EXCAVATIONS. ANY DAMAGES AND REPAIRS TO UNDERGROUND UTILITIES SHALL BE BORNE BY THE CONTRACTOR. ALL RELOCATION COSTS OR REQUESTS FOR IMPROVEMENT OF FACILITIES, INCLUDING MATERIAL & LABOR SHALL BE BURDENED BY THE CONTRACTOR OR REQUESTING AGENCY. EITHER PARTY SHALL MAKE APPLICATION & SUBMIT APPROVED RELOCATION PLANS TO RESPONSIBLE AGENCY OR AGENCIES PRIOR TO ANY RELOCATION WORK.
11. EXCAVATIONS WITHIN 5 TO 10 FEET FROM EXISTING POWER POLES AND DEEPER THAN 3 FEET SHALL HAVE TRENCH SHORING. IF EXCAVATION IS DEEPER THAN 3 FEET AND WITHIN 5 FEET FROM AN EXISTING POWER POLE, THE POWER POLE SHALL BE RELOCATED. IN ANY CASE, THE CONTRACTOR SHALL PROTECT THE INTEGRITY OF THE POLE FOUNDATION. ALL RELOCATION COSTS INCLUDING LABOR AND MATERIALS SHALL BE BORNE BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT/MAKE APPLICATION WITH GPA AND SUBMIT GPA APPROVED RELOCATION PLANS PRIOR TO ANY MATERIALS ISSUED OR INSPECTIONS PERFORMED BY GPA. PROVIDE 12 INCHES MINIMUM CLEARANCE BETWEEN GPA POWER CONDUITS AND ALL NEW INSTALLATIONS. THE CONTRACTOR SHALL SECURE WORK CLEARANCE WITH GPA PRIOR TO EXCAVATION.
12. ALL OTHER EXISTING UTILITY APPURTENANCES THAT ARE NOT SHOWN IN THE PLANS SUCH AS MANHOLE, VALVE BOXES, WATER METER, ETC. THAT ARE OR WILL BE AFFECTED BY THE NEW CONSTRUCTION SHALL BE ADJUSTED OR RELOCATED ACCORDINGLY.
13. LOCATION OF OTHER EXISTING UTILITY STRUCTURES THAT ARE NOT SHOWN IN THE PLANS BUT UNCOVERED DURING THE CONSTRUCTION SHALL BE RECORDED OR DOCUMENTED AND MUST BE REFLECTED IN THE AS-BUILT (RECORD) DRAWINGS.

-TRAFFIC CONTROL NOTES, AS NEEDED

1. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES AND SHALL CONFORM WITH THE LOCAL TRAFFIC REGULATIONS AND THE CURRENT U.S. FEDERAL HIGHWAY ADMINISTRATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) FOR STREETS AND HIGHWAYS, PART VI – STANDARDS AND GUIDES FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION, MAINTENANCE, UTILITY, AND INCIDENT MANAGEMENT OPERATIONS.
2. DURING NON-WORKING HOURS, ALL LANES OF ROADWAY SHALL BE OPEN TO TRAFFIC. ALL TRENCHES SHALL BE COVERED WITH A SAFE NONSKID BRIDGING MATERIAL WITH SUITABLE MATERIAL AT THE EDGES TO PROVIDE A SMOOTH TRANSITION.
3. THE CONTRACTOR SHALL REPLACE OR REPAIR ALL TRAFFIC SIGNS, POSTS, AND MARKINGS DISTURBED BY THE CONTRACTOR'S ACTIVITIES TO EXISTING CONDITIONS OR BETTER.
4. THE CONTRACTOR SHALL COORDINATE ALL TRAFFIC CONTROL PLANS WITH THE TELECOMMUNICATION COMPANIES, GUAM'S REPRESENTATIVE AND DEPARTMENT OF PUBLIC WORKS AS NEEDED.
5. COMPLY WITH GOVERNMENT OF GUAM REQUIREMENTS FOR WORK ALONGSIDE PUBLIC HIGHWAYS. SUBMIT TRAFFIC CONTROL PLAN, AS REQUIRED, TO SECURE CLEARANCES AND PERMITS.

-DRAWING UNITS

1. ALL COORDINATES, RADIUS STATIONING, AND DIMENSIONS SHOWN ARE IN FEET, UNLESS OTHERWISE NOTED.
2. CONTROL POINTS REFERENCE (STATION/OFFSET DISTANCE AND COORDINATES)
   - A. MANHOLES: AT CENTER OF STRUCTURE
   - B. INLET: AT CENTER OF INLET
   - C. FENCES/GATES – @ CENTER OF POST
   - D. SWALES – @ CENTER OF SWALE

SURVEY NOTES

1. HORIZONTAL AND VERTICAL CONTROL SURVEY WAS BASED ON GUAM GEODETIC NETWORK (GGN) MONUMENT NO. 1536 AND TBM-1 AS SHOWN ON LOT PARCELING SURVEY MAP PREPARED BY DUENAS, CAMACHO & ASSOCIATES, INC.

   THESE SURVEY REFERENCE POINTS HAVE THE FOLLOWING DATA:

GGN-486	GGN-1175
N 6638767.354	N 651445.5241
E 356936.3124	E 362854.4041
EL. 292.32'	EL. 419.618'

2. BEARINGS AND DISTANCES IN PARENTHESIS ARE RECORD DATA. ALL OTHERS ARE 1993 GRID AND ARE FIELD CONDITIONS.
3. ALL DISTANCES, COORDINATES, DIMENSIONS AND ELEVATIONS AS SHOWN ARE IN FEET AND DECIMALS THEREOF, UNLESS OTHERWISE NOTED.
4. CONTOURS WERE DEVELOPED FROM SPOT ELEVATIONS USING STANDARD GROUND TOPOGRAPHY METHOD.

LEGEND, SYMBOLS, AND ABBREVIATIONS

ABBREVIATION / SYMBOLS	DESCRIPTION
@	AT
CONC.	CONCRETE
CONT.	CONTINUOUS
ø	DIAMETER
EL./ELEV.	ELEVATIONS
EXIST./(E)	EXISTING
– x — x –	EXIST. CHAIN LINK
--385--	EXISTING CONTOUR LINE
FG	FINISHED GRADE
/GGN	GUAM GEODETIC NETWORK
L	LENGTH
MAX.	MAXIMUM
MIN.	MINIMUM
O.C.	ON CENTER
R	RADIUS
THK.	THICK
TYP.	TYPICAL
SS	STAINLES STEEL
EF	EACH FACE
ES	EACH SIDE

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DATE: 04/02/2025

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GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A

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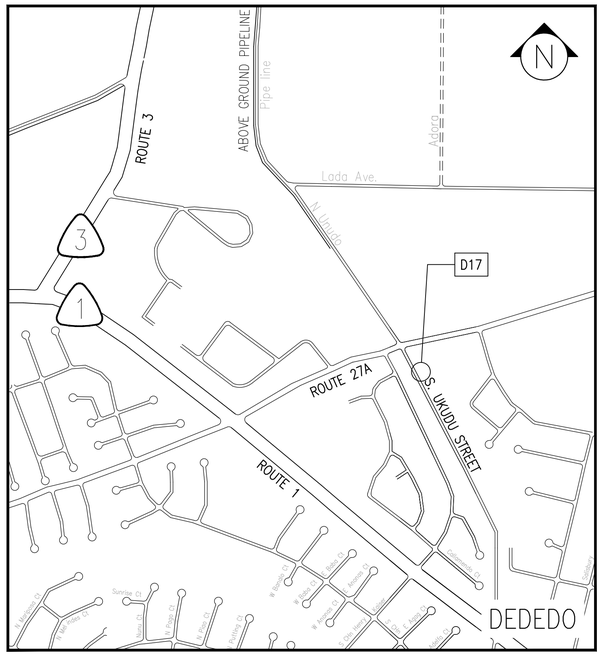
SUPV. BY:	KMR

SHEET TITLE

GENERAL NOTES, LEGENDS AND SYMBOLS

C-0.1



3 PROJECT LOCATION
NOT TO SCALE

DEMOLITION NOTES:

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2. ALL EXISTING PIPING, VALVES, EQUIPMENT, AND OTHER FEATURES NOT HATCHED ARE TO REMAIN. PROTECT THESE ITEMS DURING DEMOLITION ACTIVITIES.
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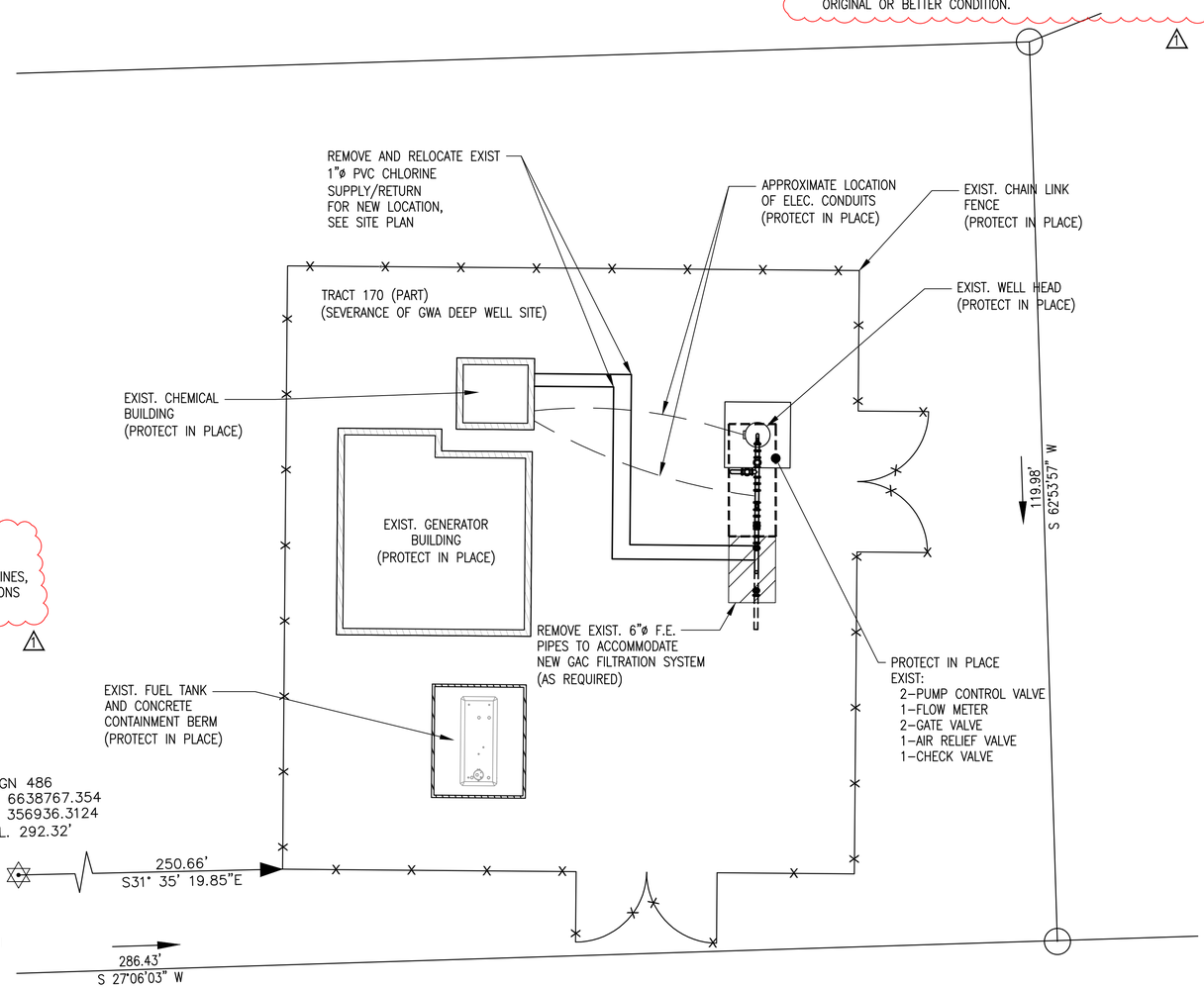
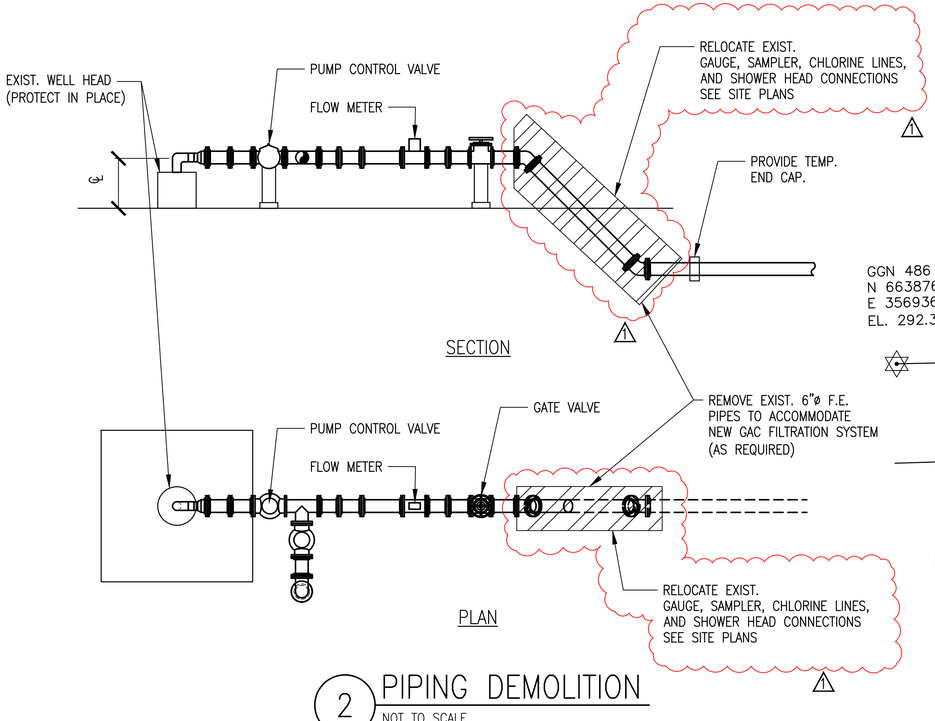
4. OWNER SHALL HAVE FIRST RIGHT OF REFUSAL FOR THE DEMOLISHED EQUIPMENT.
5. WELL OPERATION CONTROL SHALL REMAIN. CNTRATOR SHALL RELOCATE WELL PRESSURE/FLOW CONTROL LINE AS NEEDED AND RESTORE TO ORIGINAL OR BETTER CONDITION.



1 EXISTING CONDITION AND DEMOLITION PLAN – D17
SCALE: 1"=10'-0"



2 PIPING DEMOLITION
NOT TO SCALE

GRAPHIC SCALE
10' 5' 0' 10' 20'
SCALE: 1"=10'-0"

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PROJECT

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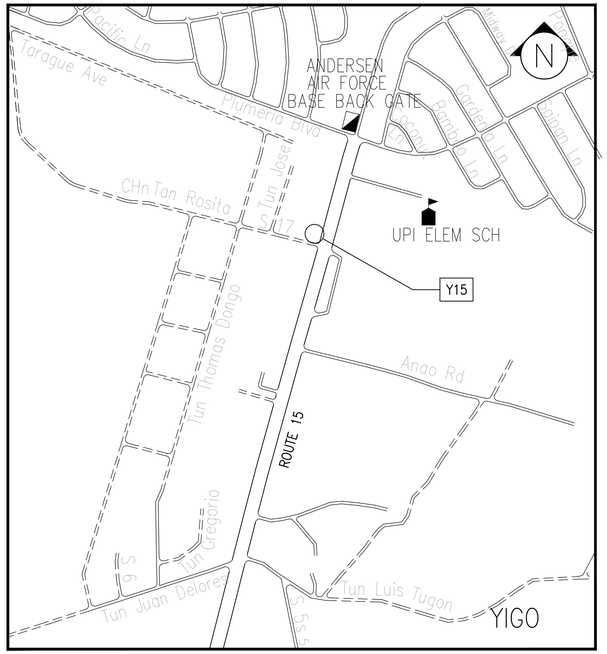
SHEET TITLE

EXISTING CONDITION AND DEMOLITION PLAN D17

C-1.1

SHEET 6 OF 22



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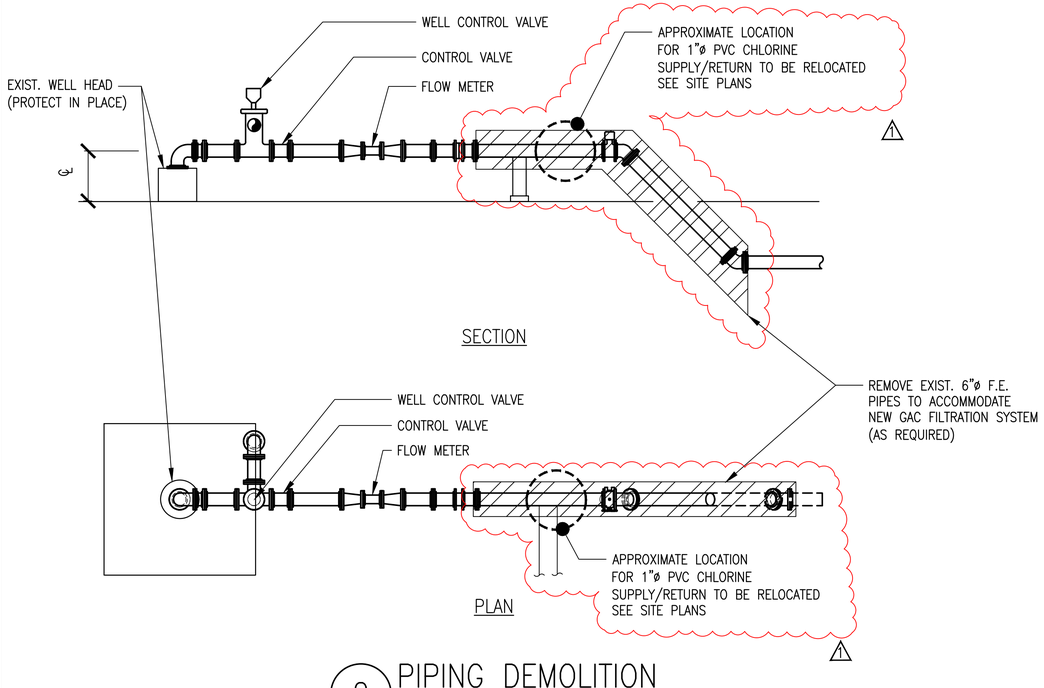
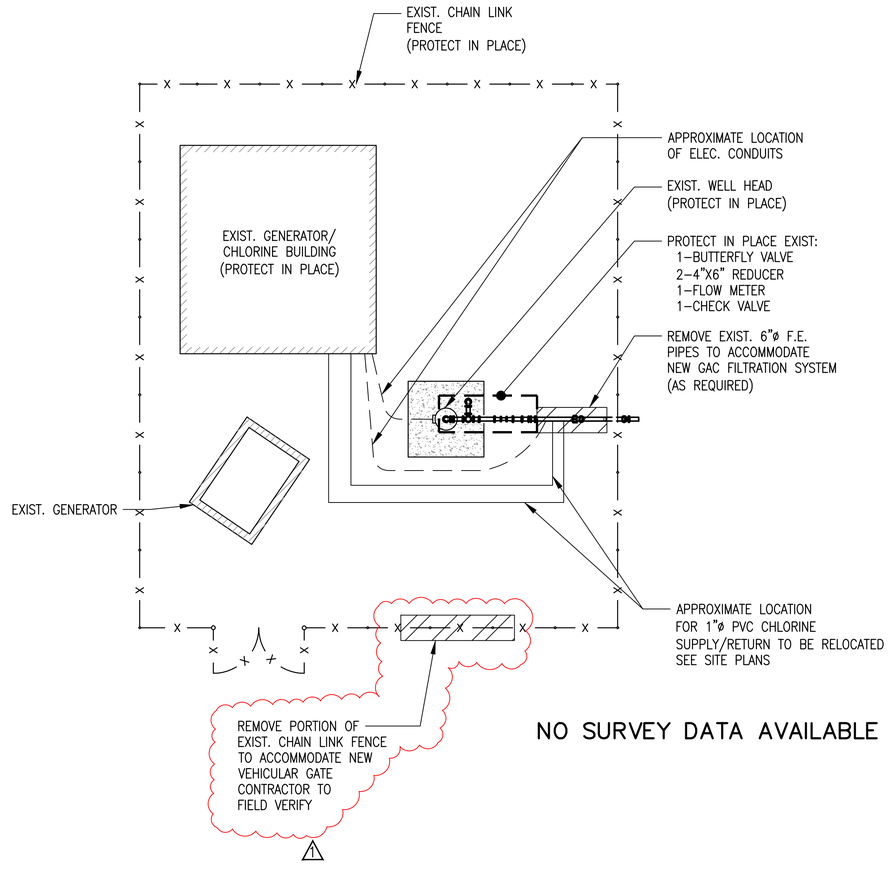
⚠1



2 PIPING DEMOLITION
NOT TO SCALE



NO SURVEY DATA AVAILABLE

1 EXISTING CONDITION AND DEMOLITION PLAN – Y15
SCALE: 1"=10'-0"

GRAPHIC SCALE
10' 5' 0' 10' 20'
SCALE: 1"=10'-0"

BID SET

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PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET)
REVISION A
⚠1
GUAM

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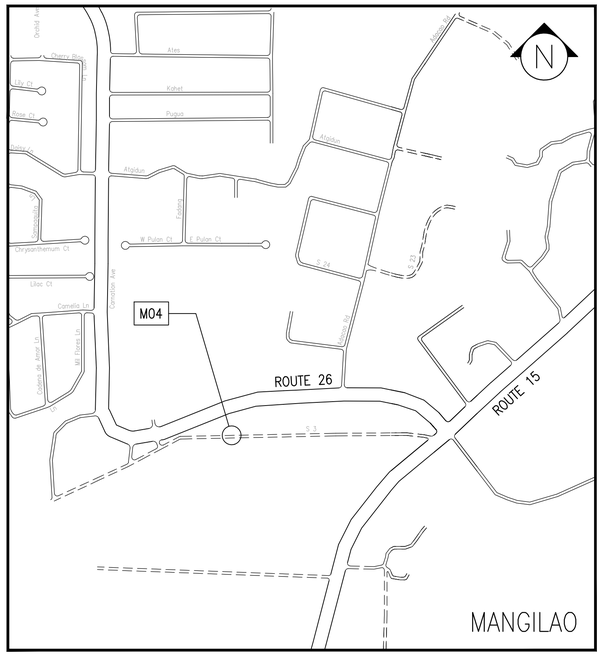
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

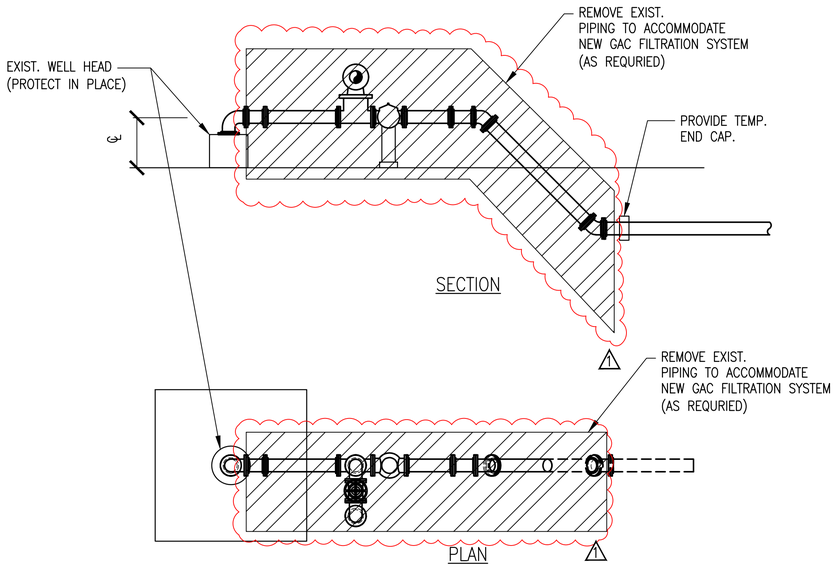
EXISTING CONDITION
AND DEMOLITION PLAN
Y15

C-1.2

SHEET 7 OF 22



3 PROJECT LOCATION
NOT TO SCALE



2 PIPING DEMOLITION
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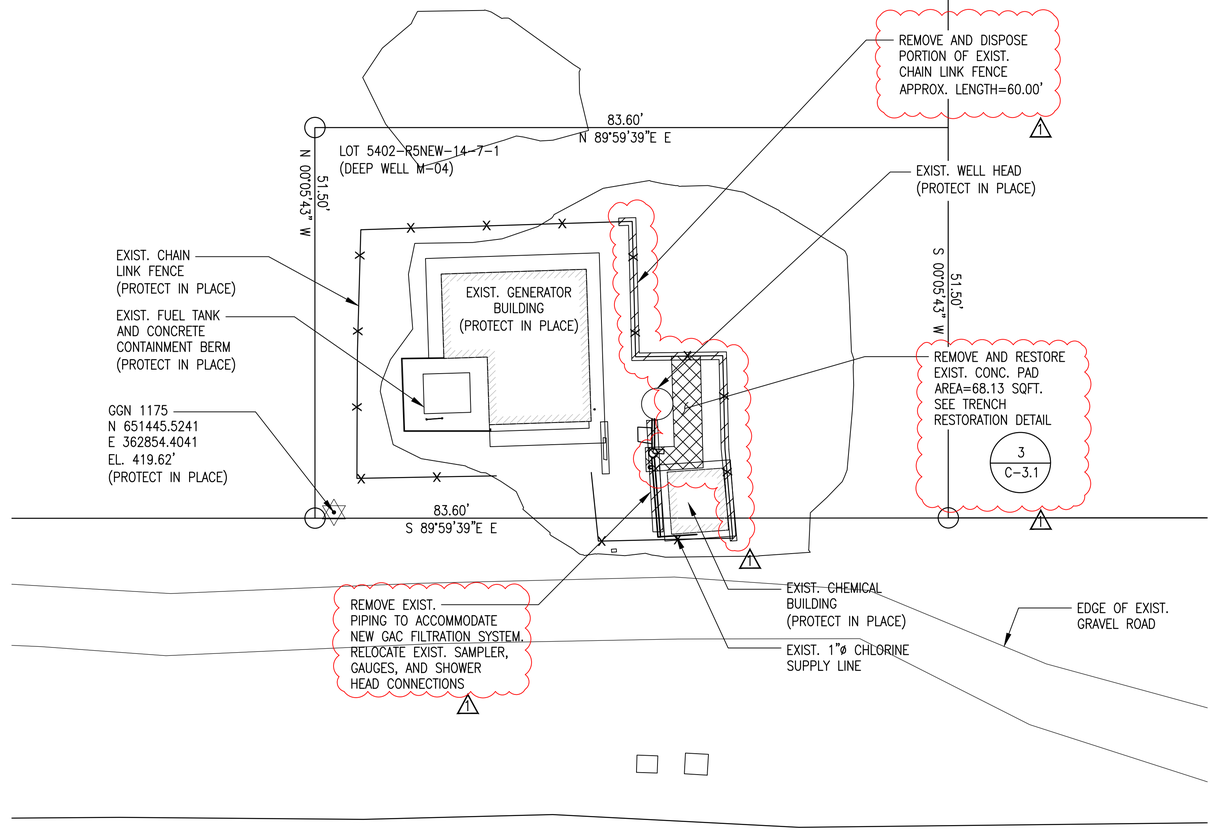

1 EXISTING CONDITION AND DEMOLITION PLAN – M04
SCALE: 1"=5'-0"

N

GRAPHIC SCALE
5' 2.5' 0' 5' 10'
SCALE: 1"=5'-0"

BID SET

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GWA GAC FILTER RELOCATION PROJECT

(BID SET)
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SHEET TITLE

EXISTING CONDITION AND DEMOLITION PLAN M04

C-1.3

DEMOLITION NOTES:

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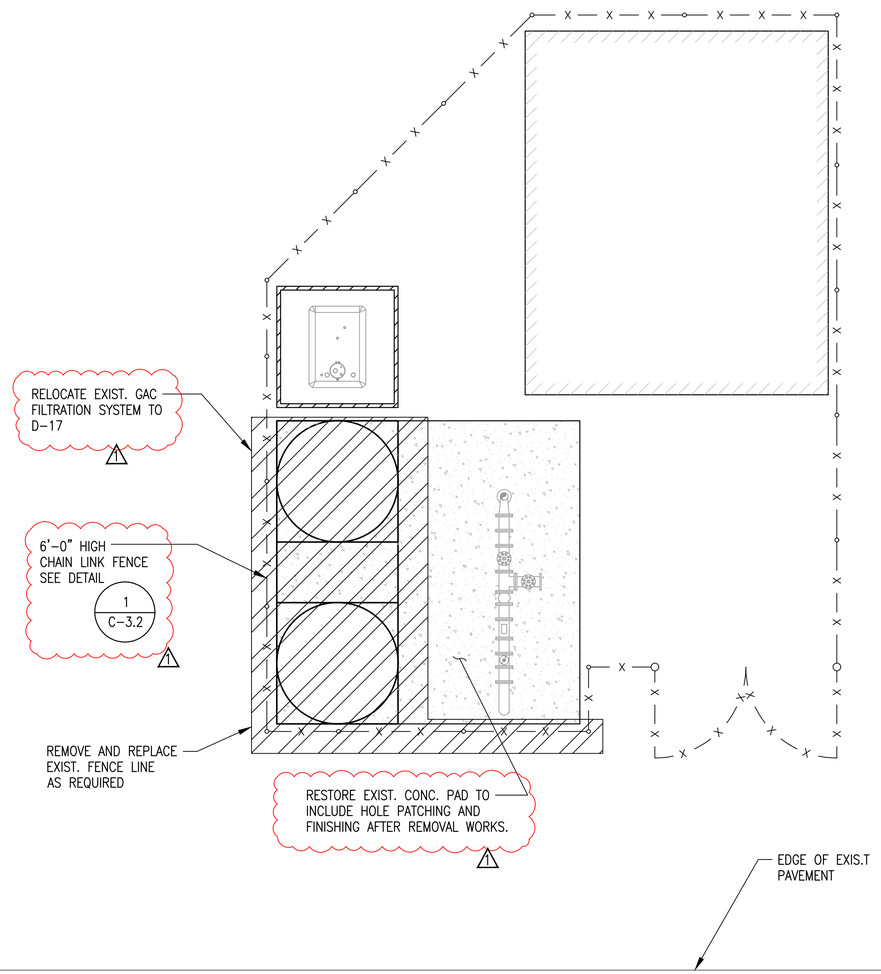
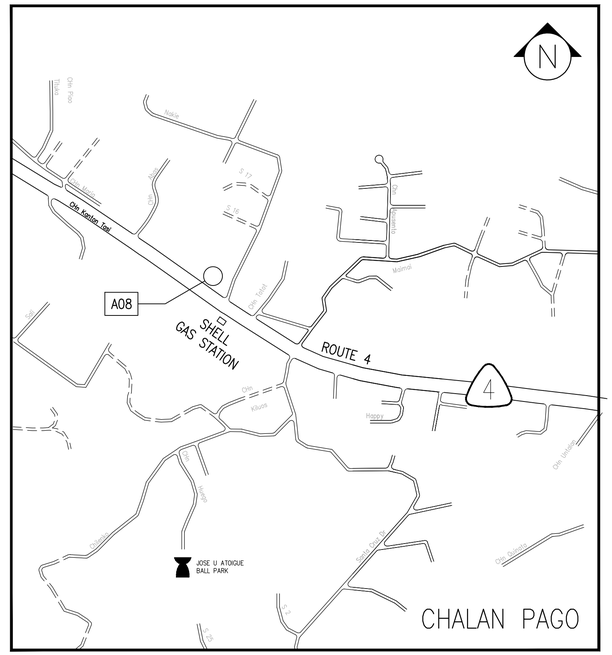


1 EXISTING CONDITION AND DEMOLITION PLAN – A08
NOT TO SCALE



2 PROJECT LOCATION
NOT TO SCALE

BID SET

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(BID SET) REVISION A ⚠1

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SUPV. BY:	KMR

SHEET TITLE

EXISTING CONDITION AND DEMOLITION PLAN A08

C-1.4

SHEET 9 OF 22

DEMOLITION NOTES:

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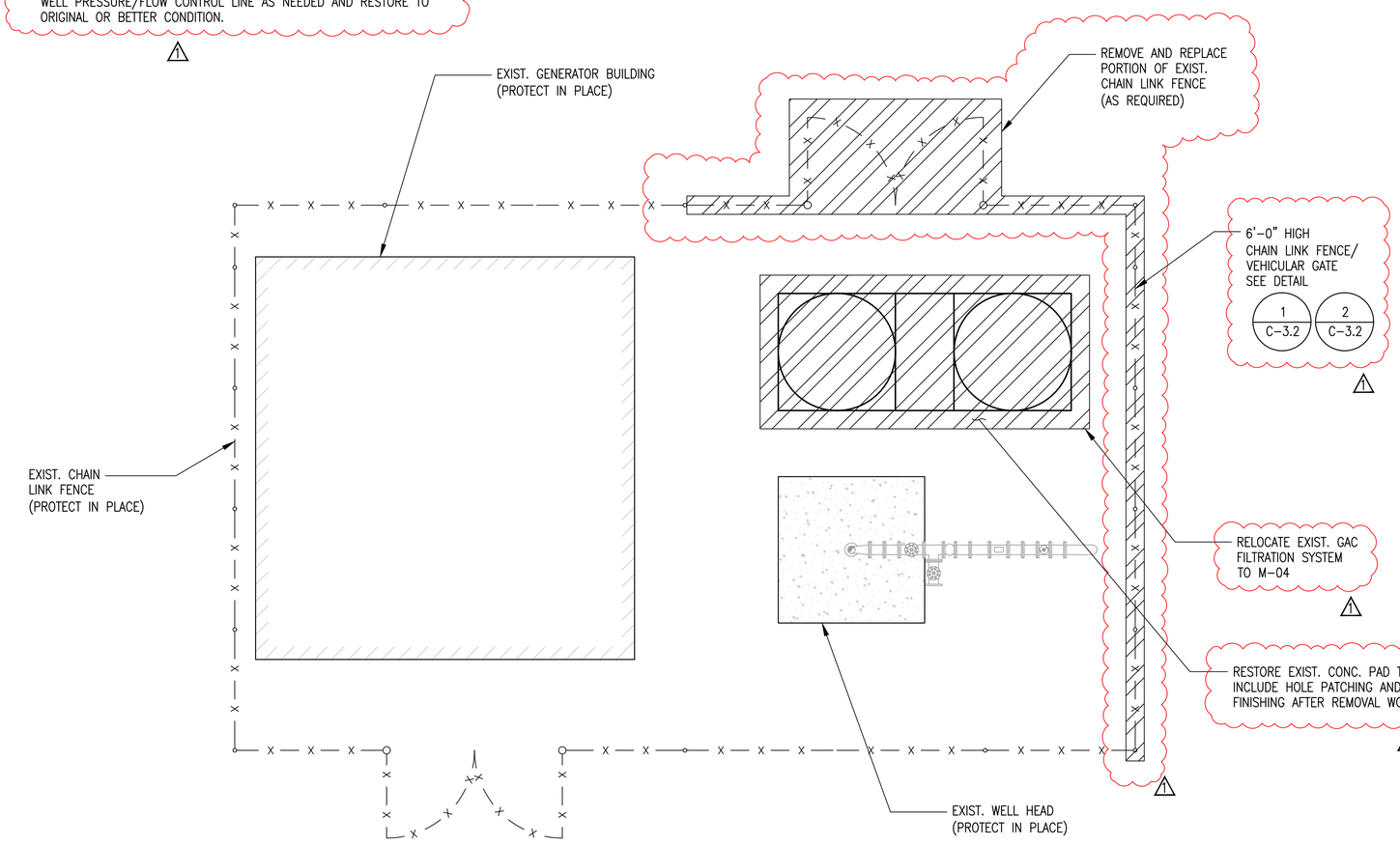
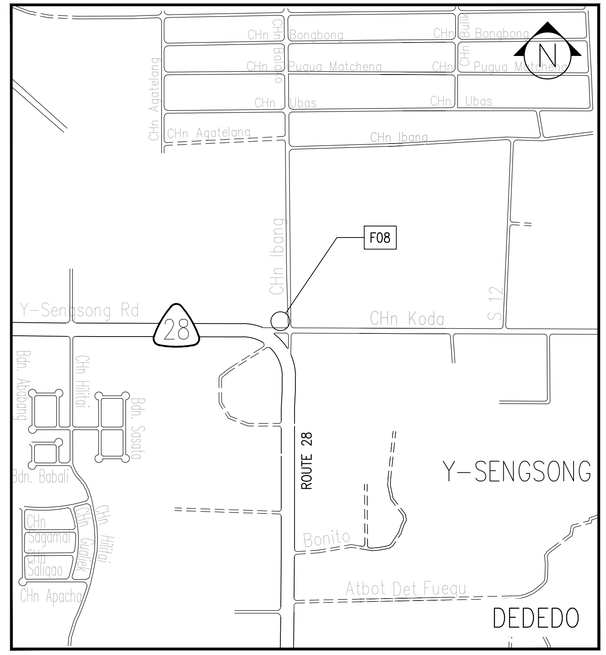
5. WELL OPERATION CONTROL SHALL REMAIN. CONTRACTOR SHALL RELOCATE WELL PRESSURE/FLOW CONTROL LINE AS NEEDED AND RESTORE TO ORIGINAL OR BETTER CONDITION.



1 EXISTING CONDITION AND DEMOLITION PLAN – F08
NOT TO SCALE



2 PROJECT LOCATION
NOT TO SCALE

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

DUEÑAS·CAMACHO & ASSOCIATES, INC.
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KENNETH M. REKOMAT CERTIFICATE No 13217 (CIVIL) EXPIRES: 06/30/25 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A 1

GUAM

REVISIONS

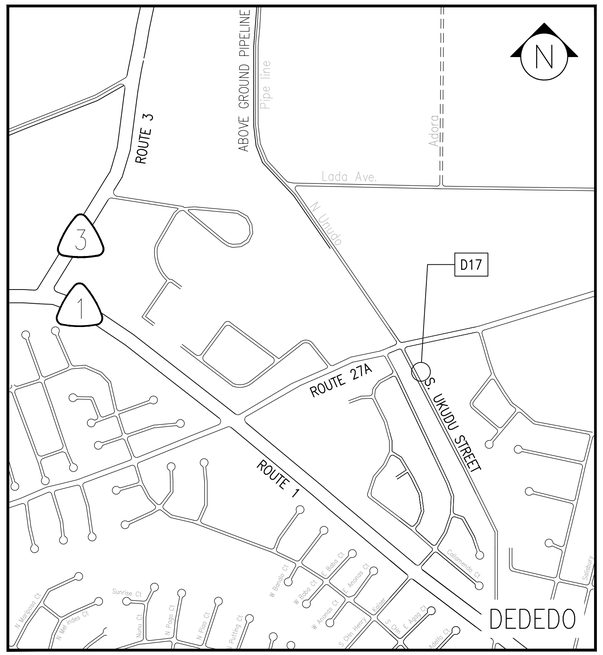
MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

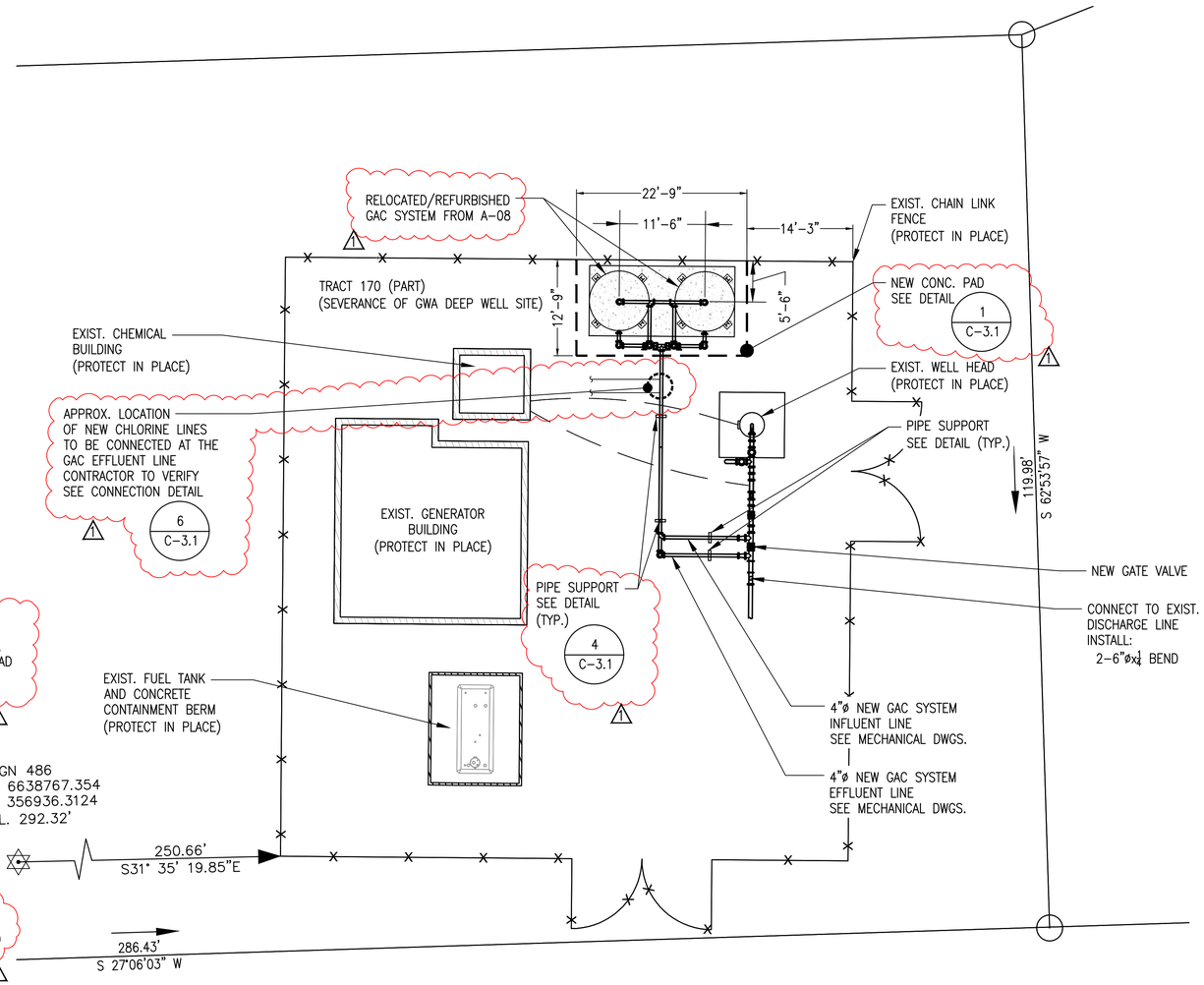
SHEET TITLE

EXISTING CONDITION AND DEMOLITION PLAN F08

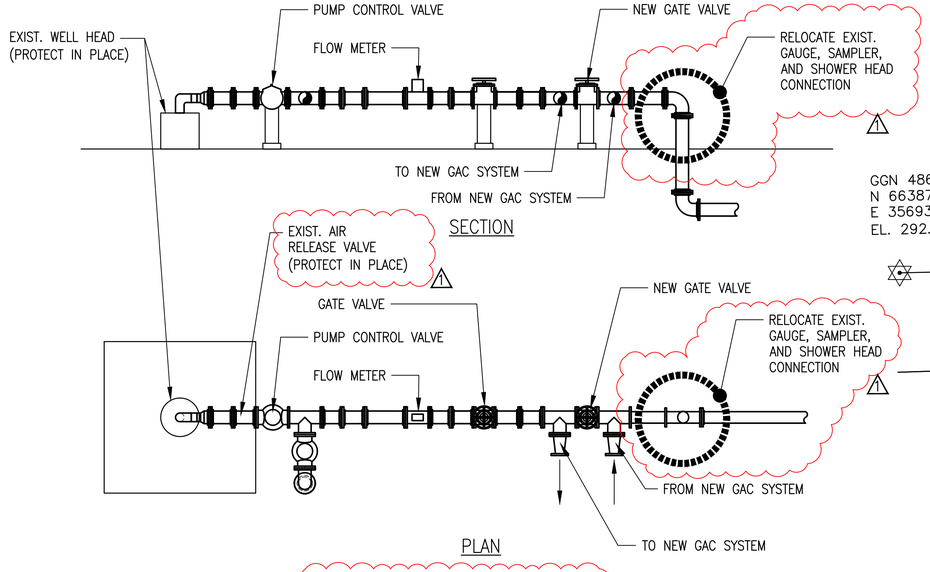
C-1.5



3 PROJECT LOCATION
NOT TO SCALE



1 SITE PLAN – D17
SCALE: 1"=10'-0"



2 PIPING LAYOUT
NOT TO SCALE

GRAPHIC SCALE
10' 5' 0' 10' 20'
SCALE: 1"=10'-0"

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

BID SET

CLIENT

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DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A 1

GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

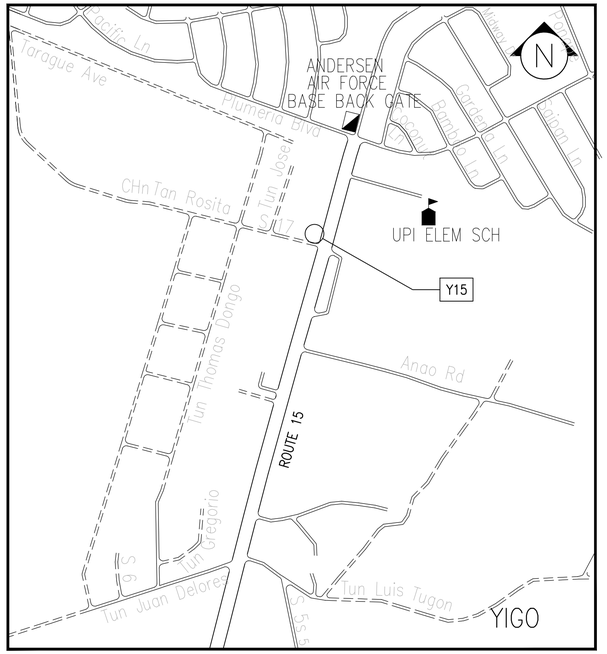
GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

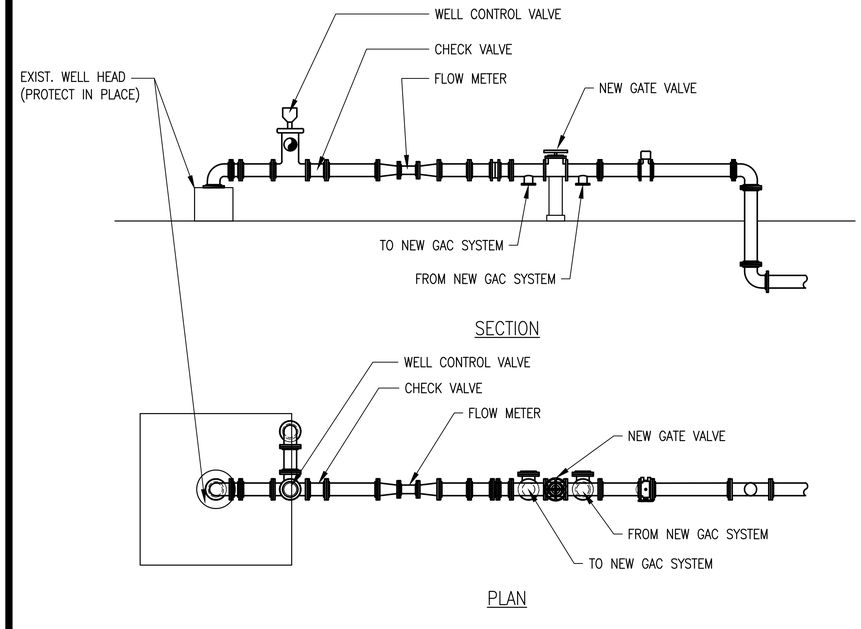
SITE PLAN
D17

C-2.1

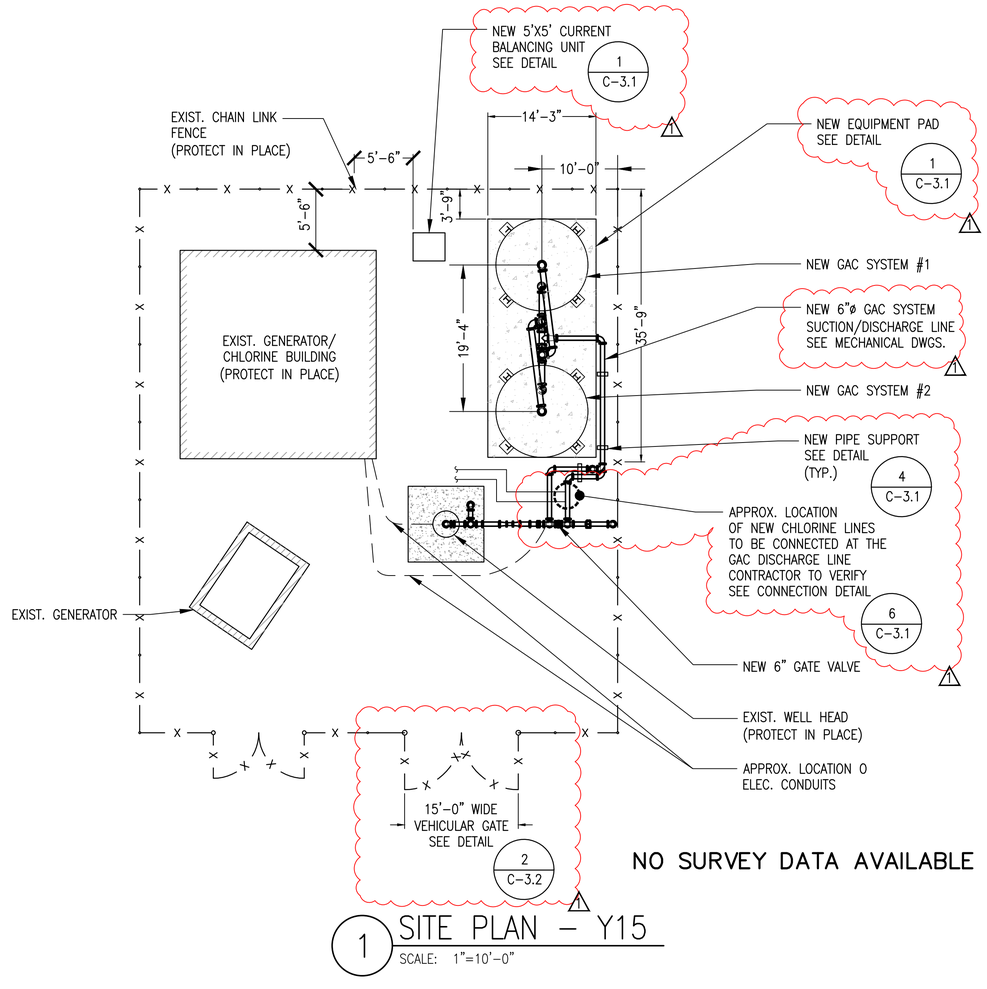
SHEET 6 OF 22



3 PROJECT LOCATION
NOT TO SCALE



2 PIPING LAYOUT
NOT TO SCALE



NO SURVEY DATA AVAILABLE

1 SITE PLAN – Y15
SCALE: 1"=10'-0"

GRAPHIC SCALE
10' 5' 0' 10' 20'
SCALE: 1"=10'-0"

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

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KENNETH M. REKOMAT CERTIFICATE No 13217 (CIVIL) EXPIRES: 06/25 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET)
REVISION A
1
GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

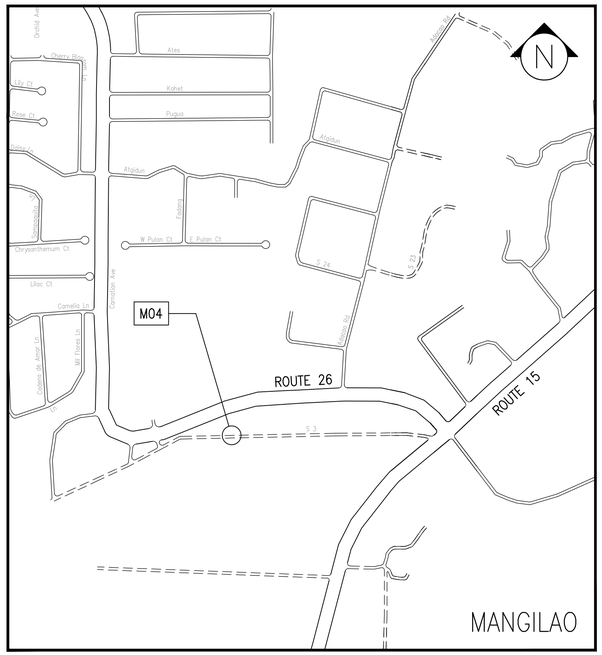
GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

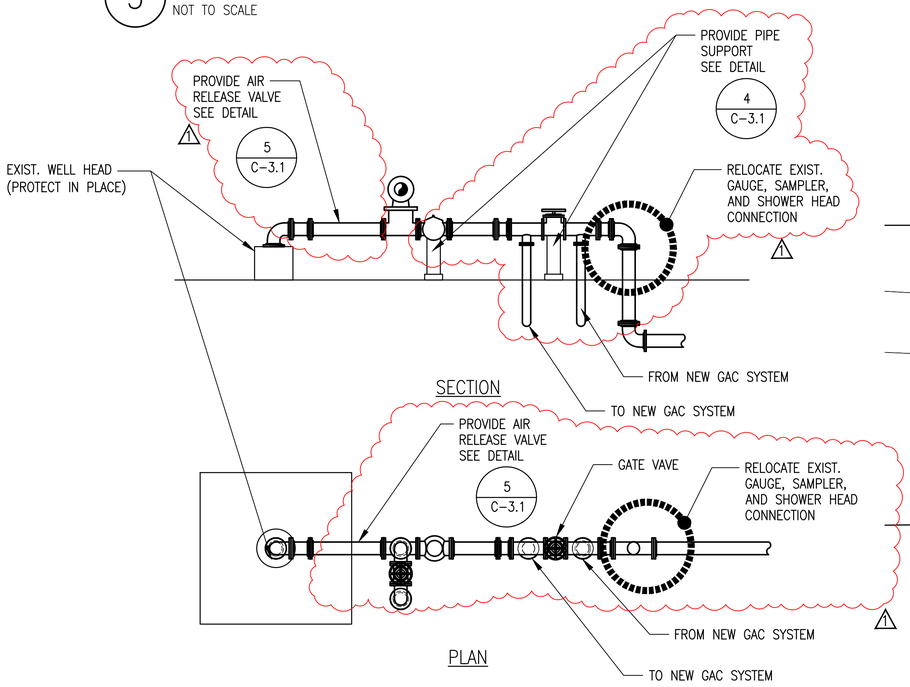
SITE PLAN
Y15

C-2.2

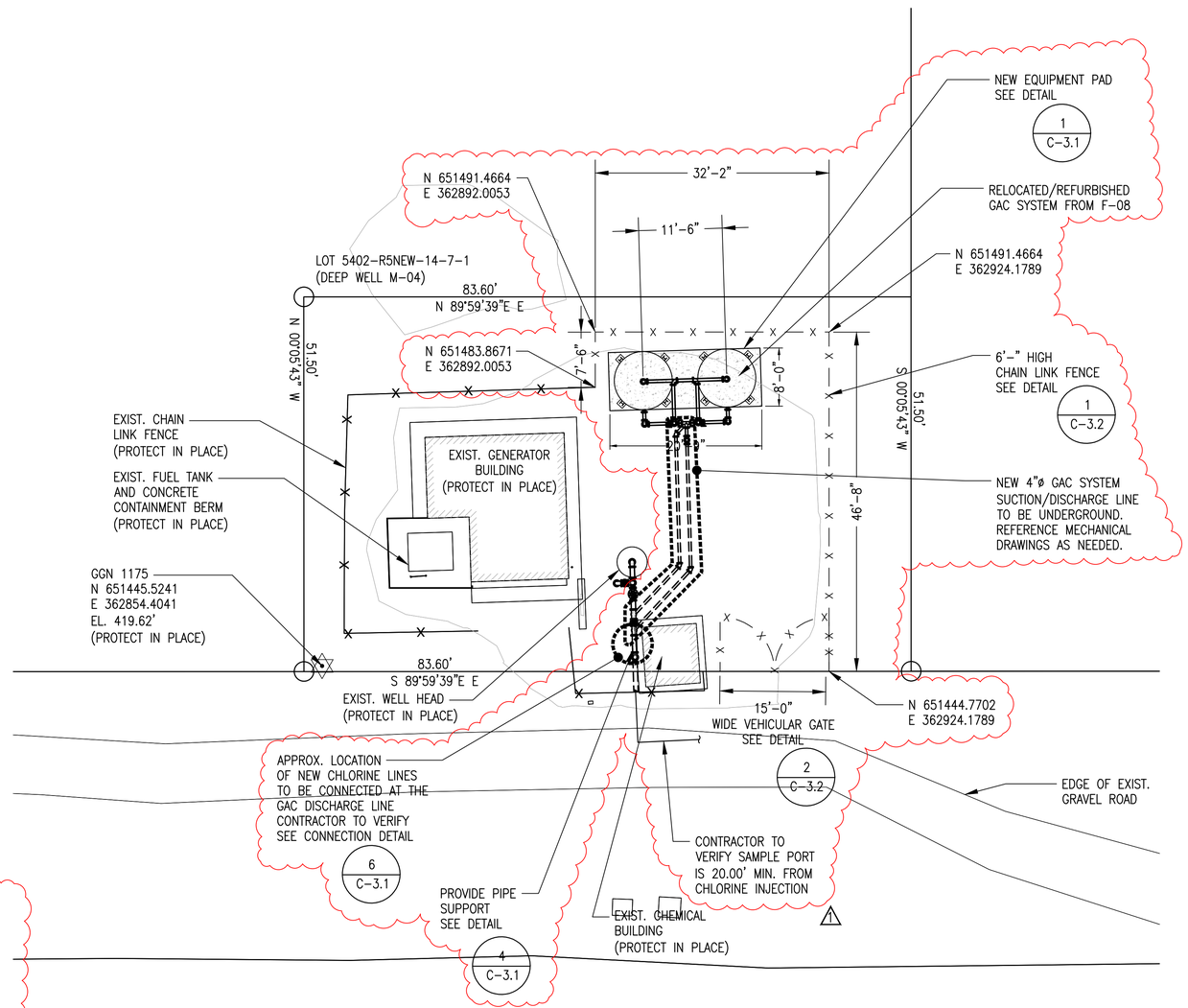
SHEET 7 OF 22



3 PROJECT LOCATION
NOT TO SCALE



2 PIPING LAYOUT
NOT TO SCALE



1 SITE PLAN – M04
SCALE: 1"=10'-0"

N

GRAPHIC SCALE
10' 5' 0' 10' 20'
SCALE: 1"=10'-0"

BID SET

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

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DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A

1 GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

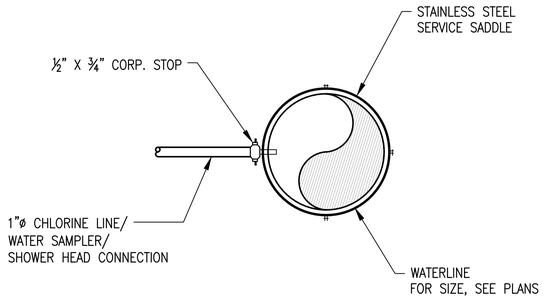
GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

SITE PLAN
M04

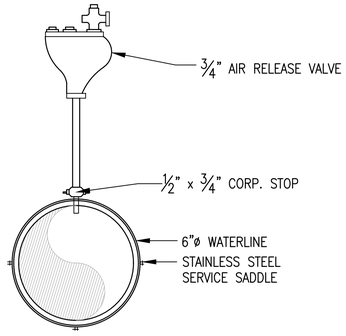
C-2.3

SHEET 8 OF 22



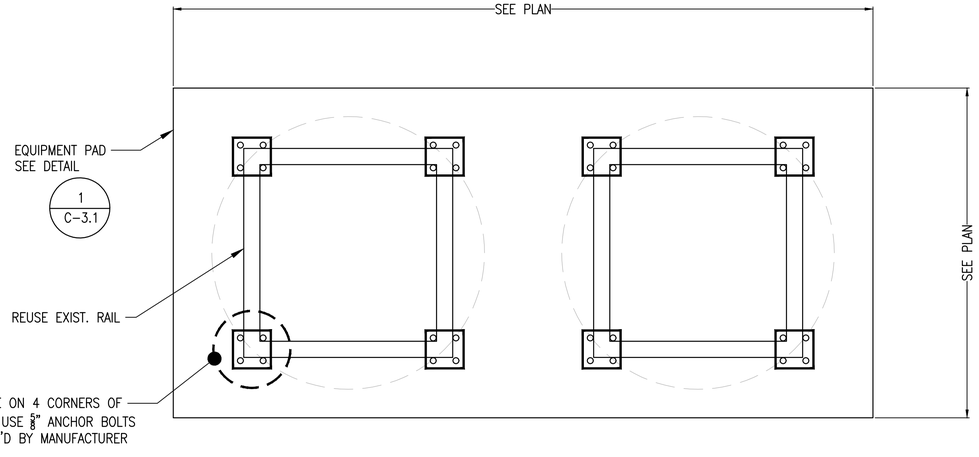
6 WATERLINE TAPPING DETAIL

SCALE: NTS



5 AIR RELEASE VALVE DETAIL

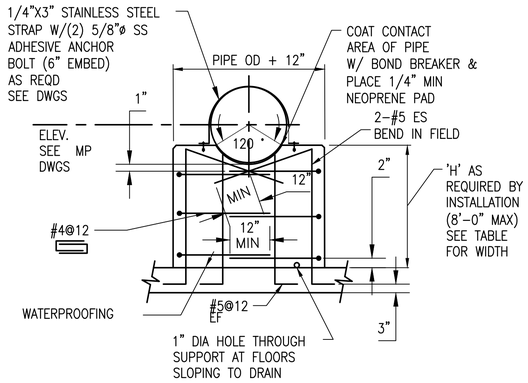
SCALE: NTS



2 EQUIPMENT PAD BASE PLATE TYPICAL LAYOUT

NOT TO SCALE

NOMINAL PIPE SIZE	CONC SUPPORT WIDTH
≤ 30"	12"

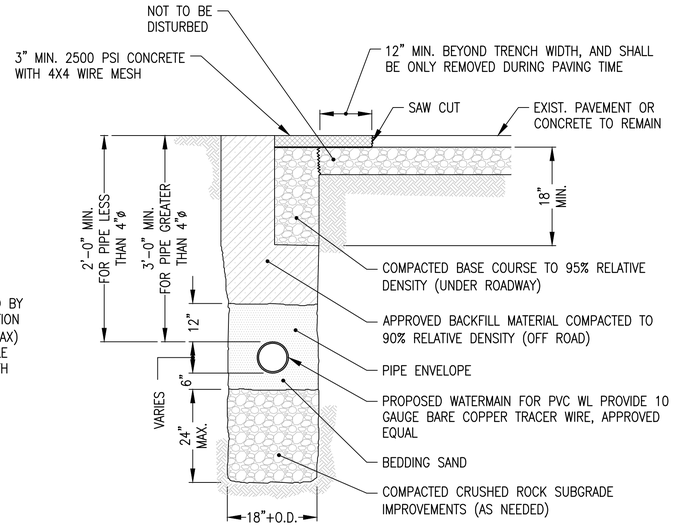


NOTES:

1. PROVIDE CHAMFERS ON ALL CONCRETE EDGES.
2. DRILL AND EPOXY VERTICAL DOWELS FOR EXISTING SLAB.

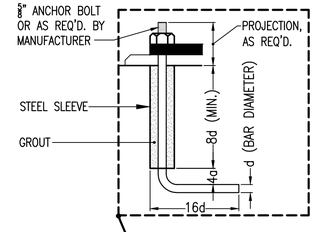
4 PIPE SUPPORT

SCALE: NTS



3 WATERLINE TRENCH DETAIL

NOT TO SCALE



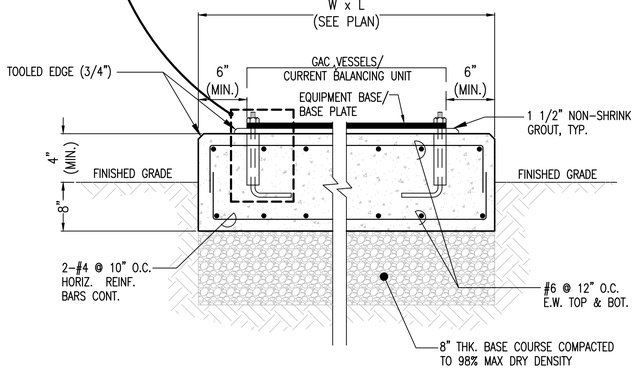
EQUIPMENT PAD NOTES:

1. PAD SIZE SHALL BE MINIMUM INDICATED OR AS INDICATED BY MANUFACTURER AND APPROVED BY THE ENGINEER.

2. THE SIZE, NUMBER, TYPE, LOCATION, AND HREAD PROJECTION OF THE ANCHOR BOLTS SHALL BE DETERMINED BY THE EQUIPMENT MANUFACTURER AND SHALL BE APPROVED BY THE ENGINEER.

3. ANCHOR BOLT SLEEVES SHALL BE USED TO PROVIDE THE ANCHOR BOLT A MINIMUM MOVEMENT OF 1/2" IN ALL DIRECTIONS. THE MINIMUM SLEEVE LENGTH SHALL BE 8 TIMES THE BOLT DIAMETER. SLEEVES SHALL BE FILLED WITH NON-SHRINK GROUT.

4. ANCHOR BOLT SLEEVES SHALL HAVE A MINIMUM INTERNAL DIAMETER 1" GREATER THAN BOLT DIAMETER AND A MAXIMUM INTERNAL DIAMETER 3" GREATER THAN ANCHOR BOLT DIAMETER. SLEEVES SHALL BE FILLED WITH NON-SHRINK GROUT.



1 EQUIPMENT PAD DETAIL

NOT TO SCALE

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IF PRINT IS 11" X 17" PRINT IS HALF SCALE

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

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DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A 1

GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

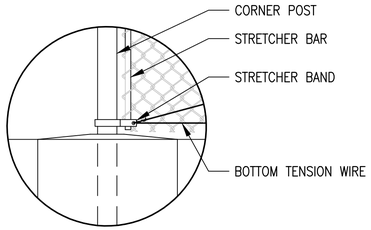
GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

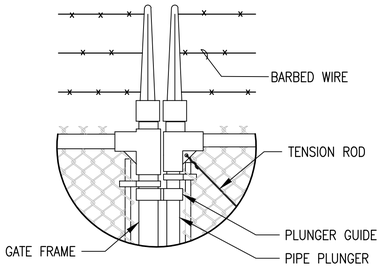
MISCELLANEOUS DETAILS

C-3.1

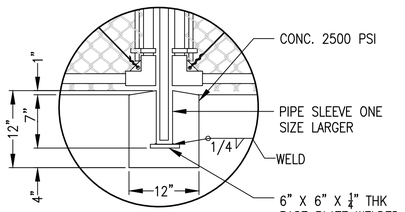
SHEET 14 OF 22 1



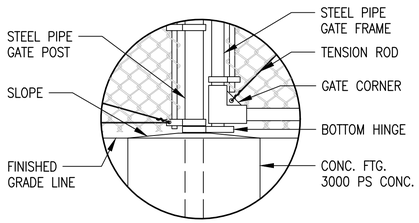
3H DETAIL
SCALE: NTS



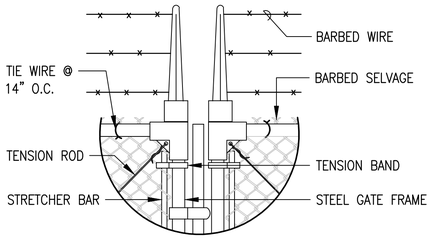
3D DETAIL
SCALE: NTS



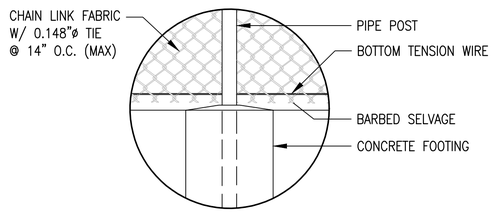
3G DETAIL
SCALE: NTS



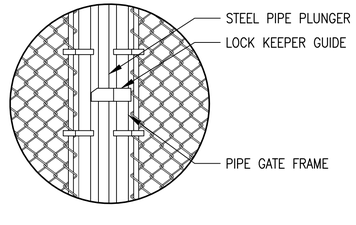
3C DETAIL
SCALE: NTS



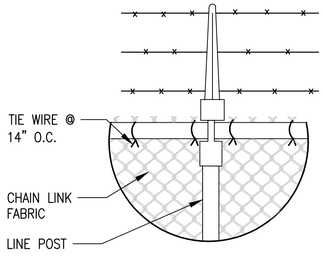
3F DETAIL
SCALE: NTS



3B DETAIL
SCALE: NTS

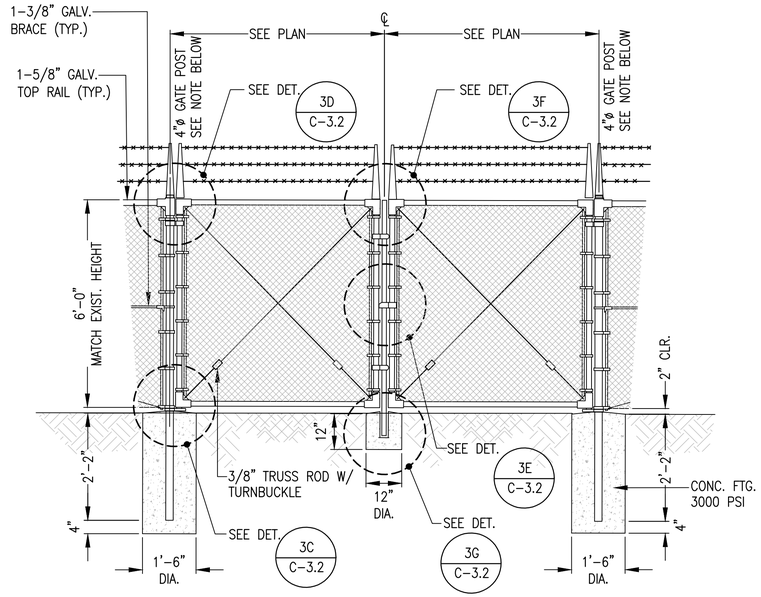


3E DETAIL
SCALE: NTS

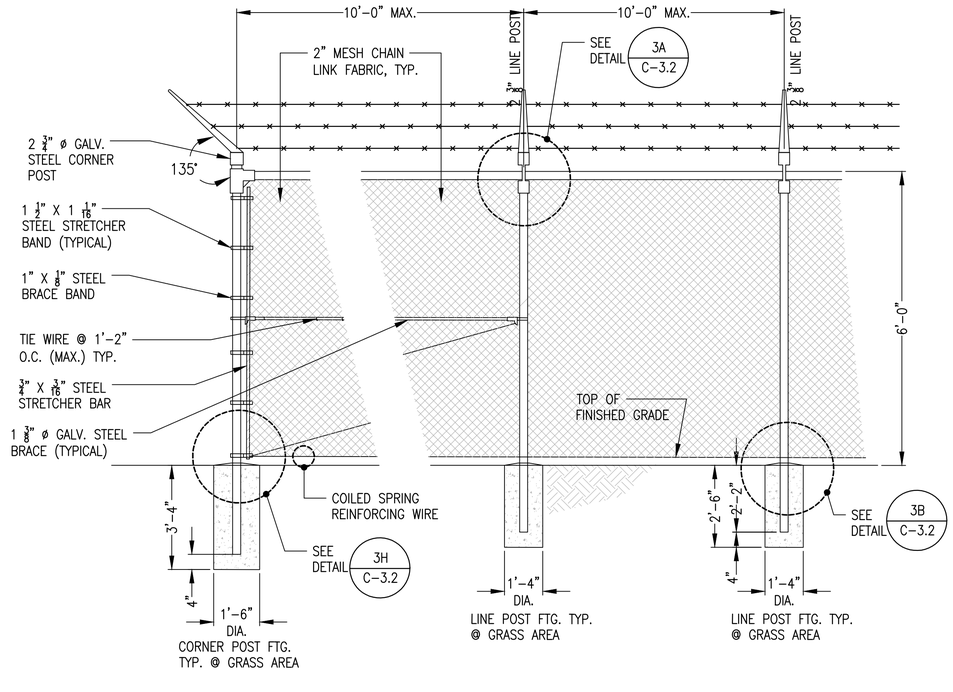


3A DETAIL
SCALE: NTS

3 FENCING DETAILS
SCALE: NTS



2 VEHICULAR GATE
SCALE: NTS



1 CHAIN LINK FENCE DETAIL
SCALE: NTS

BID SET

IF SHEET IS LESS THAN 22" X 34"
REDUCE PRINT – USE GRAPHIC SCALES
IF PRINT IS 11" X 17" PRINT IS HALF SCALE

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

DUEÑAS · CAMACHO & ASSOCIATES, INC.
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DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A

1 GUAM

REVISIONS

MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

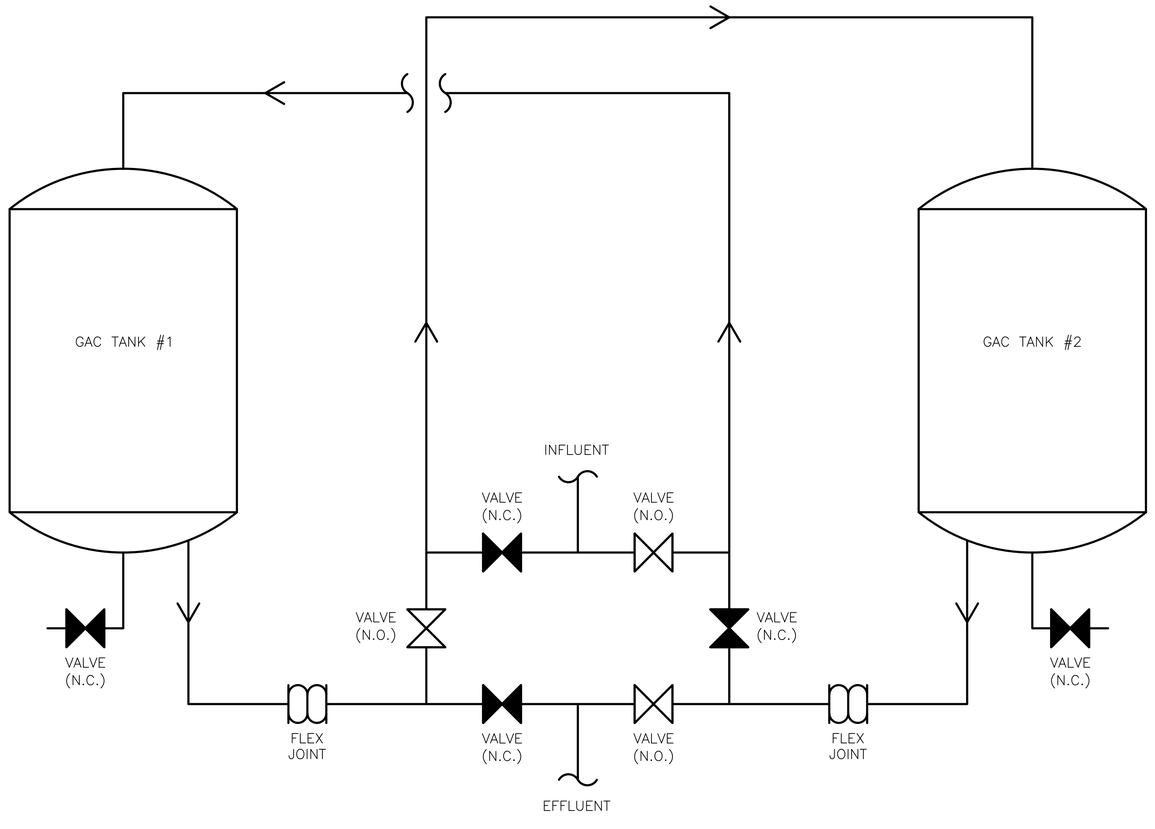
GWA PROJECT NO.:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	BAC
CHECKED BY:	JMC/KMR
SUPV. BY:	KMR

SHEET TITLE

MISCELLANEOUS DETAILS

C-3.2

SHEET 15 OF 22 1



1 GAC SYSTEM SCHEMATIC DIAGRAM
NTS

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

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MARVIC S. ACAMADO CERTIFICATE NO 1923 (MECHANICAL) EXP 04/30/26 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A

MANGILAO, GUAM

REVISIONS

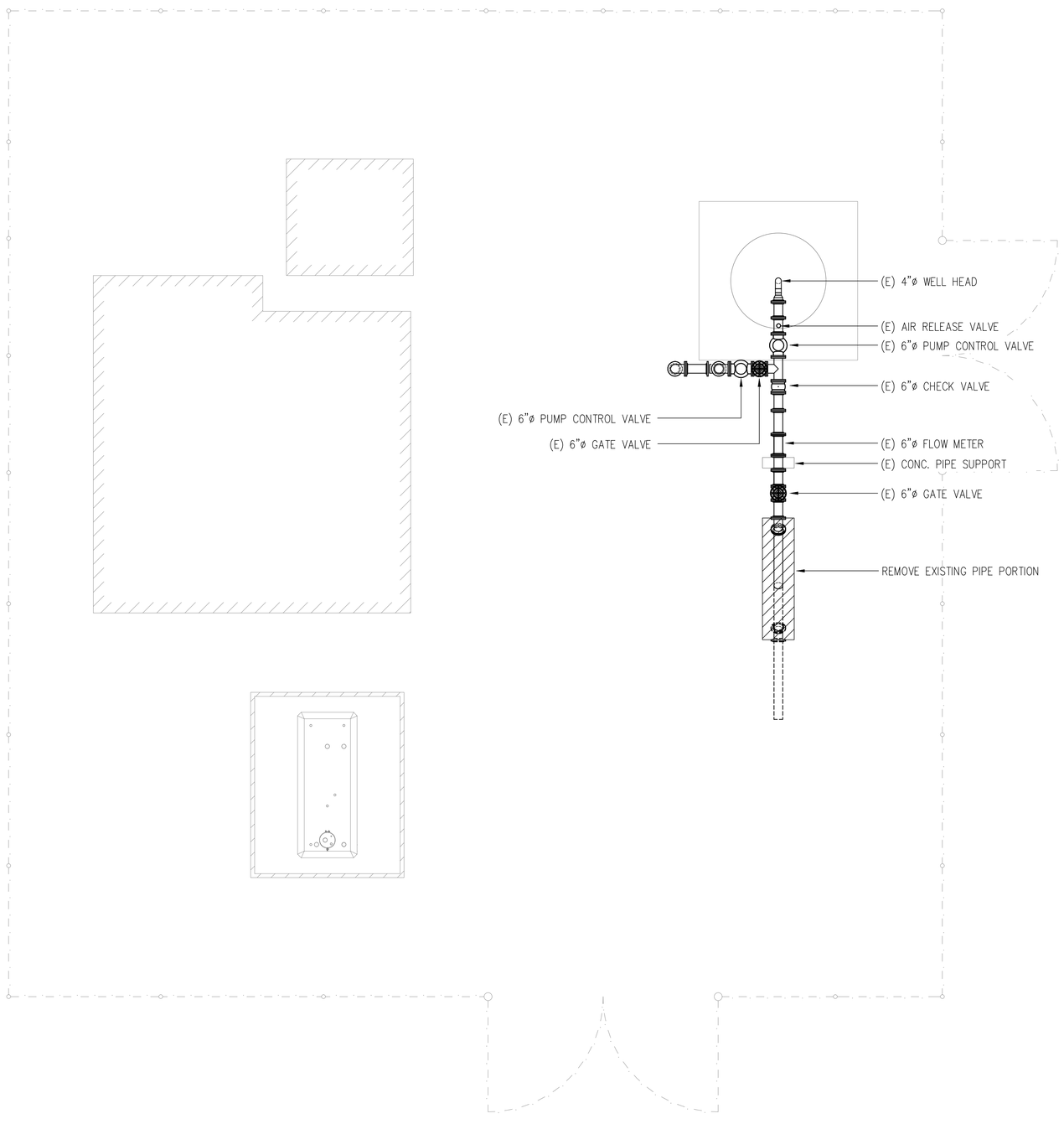
MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

PROJECT NO:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	MSA
CHECKED BY:	MSA
SUPV. BY:	MSA

SHEET TITLE

SCHEMATIC DIAGRAM

M-1.0



1 GAC DEMO PLAN @ WELL SITE "D-17"
1/4" = 1'-0" 0" 2' 4' 8'

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

DCA & A
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MARVIC S. ACAMADO CERTIFICATE NO 19223 (MECHANICAL) EXP 04/30/26 GUAM PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

PROJECT

GWA GAC FILTER RELOCATION PROJECT

(BID SET) REVISION A 1

MANGILAO, GUAM

REVISIONS

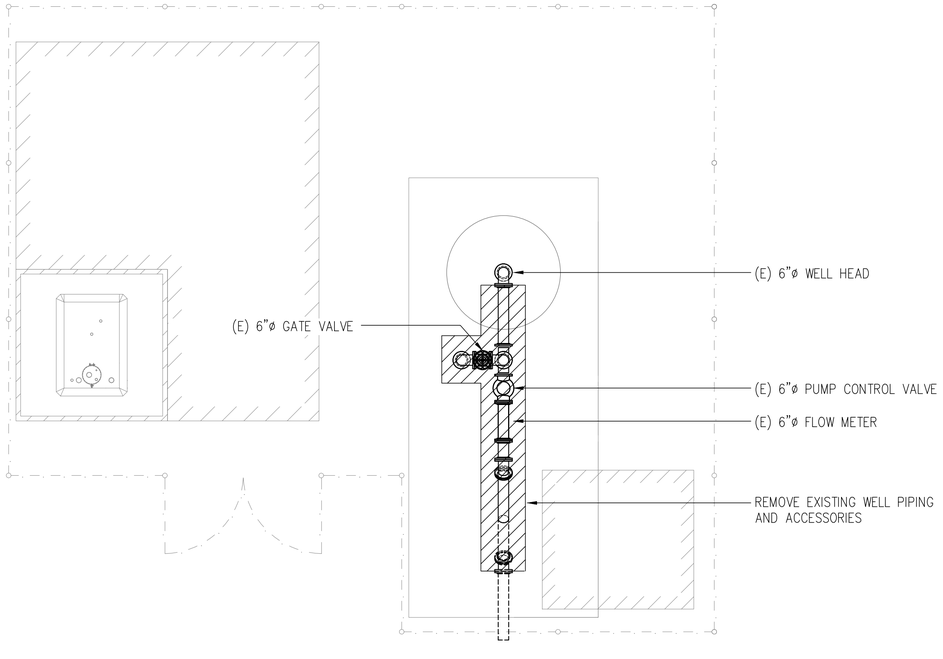
MARK	DATE	DESCRIPTION
1	4/2/25	REVISION A

PROJECT NO:	12309
PROJECT NO:	GG19-02G
CAD DWG FILE:	
DATE:	04/02/2025
DRAWN BY:	MSA
CHECKED BY:	MSA
SUPV. BY:	MSA

SHEET TITLE

GAC DEMO PLAN
WELL SITE "D-17"

MD-1.0



1 GAC DEMO PLAN @ WELL SITE "M-04"
1/4" = 1'-0" 0" 2' 4' 8'

BID SET

CLIENT

GUAM WATERWORKS AUTHORITY

CONSULTANTS

DCA & A
DUEÑAS · CAMACHO & ASSOCIATES, INC.
■ ENGINEERING (CIVIL/STRUCTURAL)
■ CONSTRUCTION MANAGEMENT ■ PLANNING
■ ENVIRONMENTAL SERVICES ■ SURVEYING
■ DEVELOPMENT CONSULTATION
■ GEOGRAPHIC INFORMATION SYSTEMS
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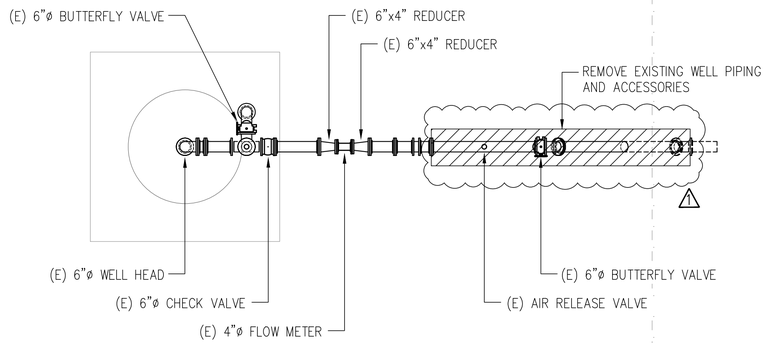
GAC DEMO PLAN
WELL SITE "M-04"

MD-1.1

SHEET 17 OF 22



1 GAC DEMO PLAN @ WELL SITE "Y-15"
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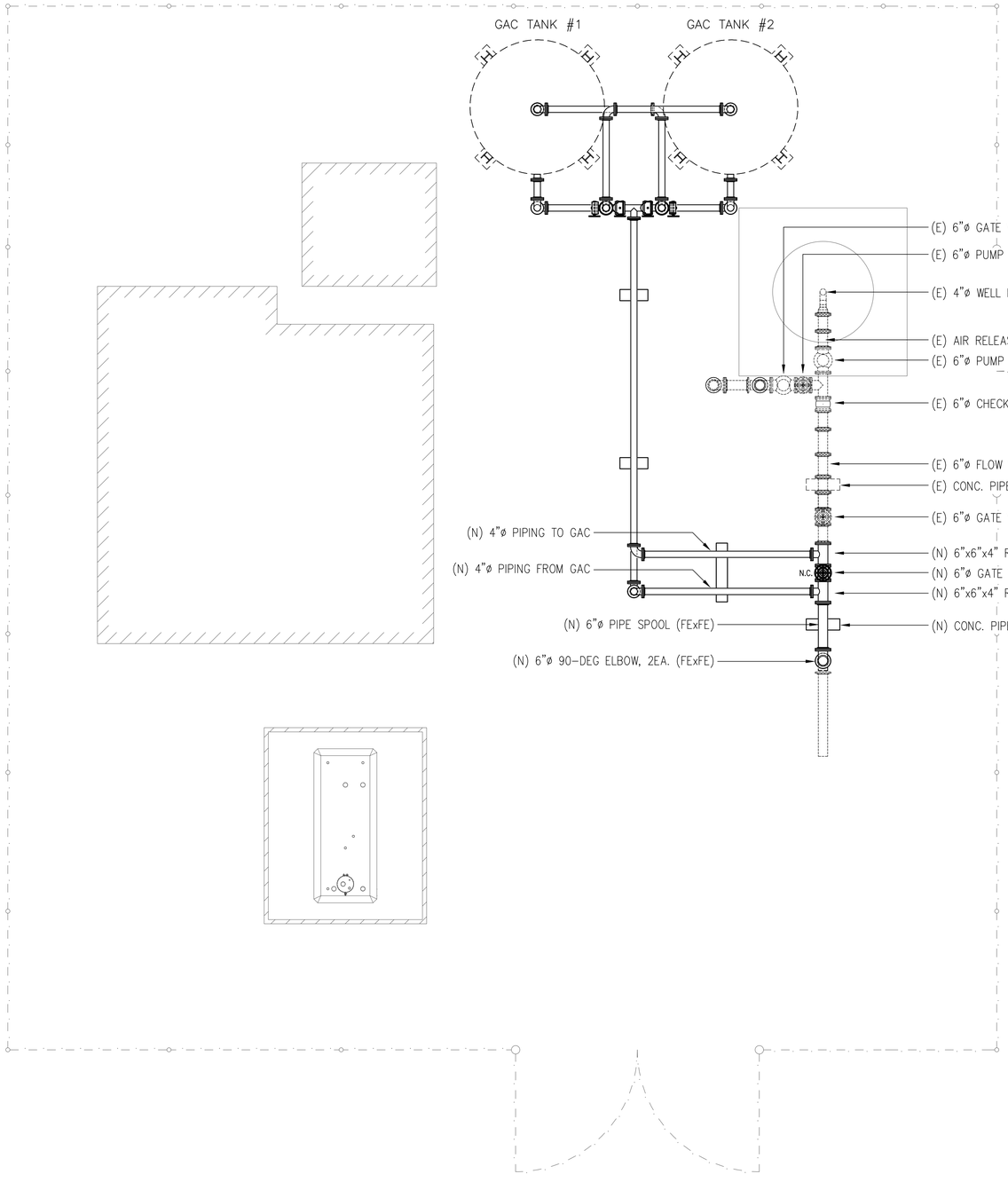
GAC DEMO PLAN
WELL SITE "Y-15"

MD-1.2



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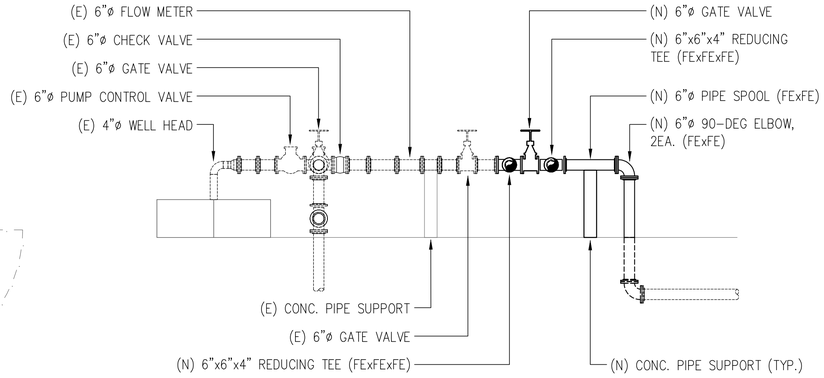

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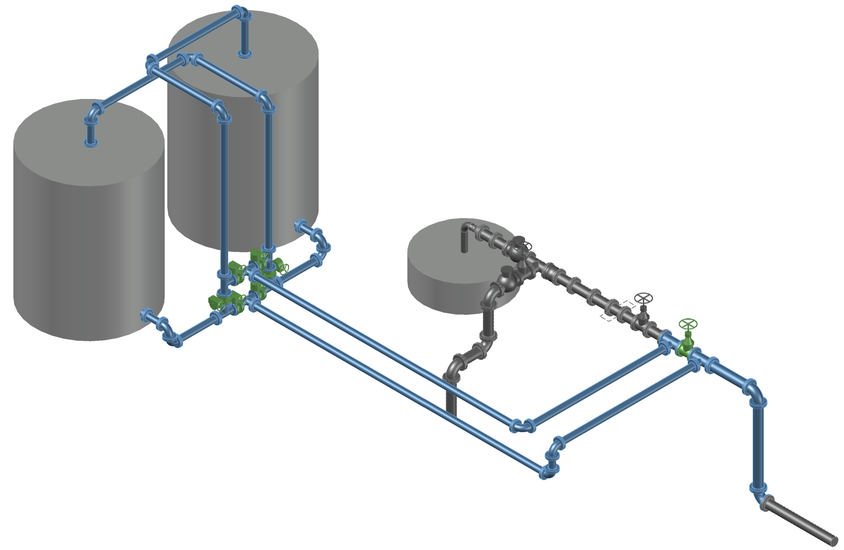

2 GAC PIPING ISOMETRIC @ WELL SITE "D-17"
NTS

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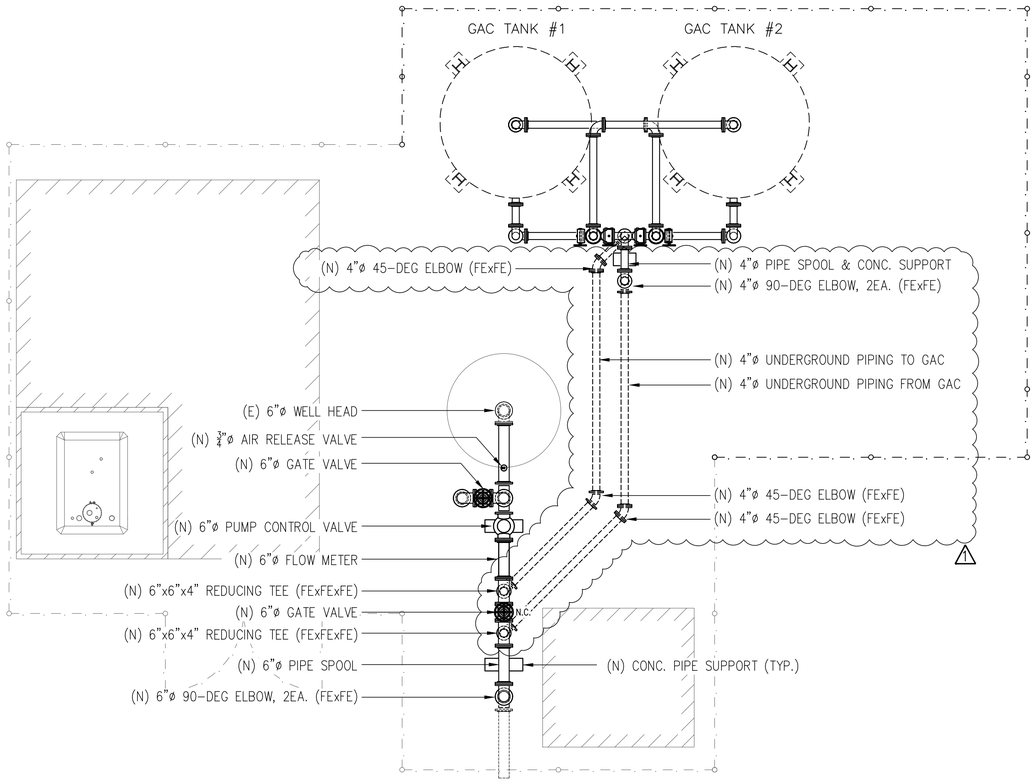
SHEET TITLE

GAC PIPING PLAN
WELL SITE "D-17"

M-2.0

SHEET 20 OF 22



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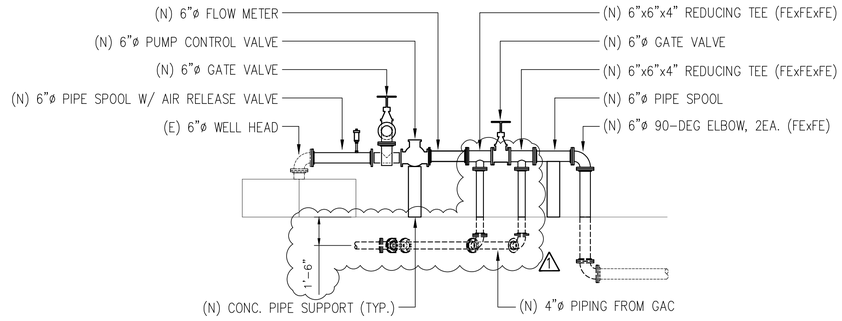

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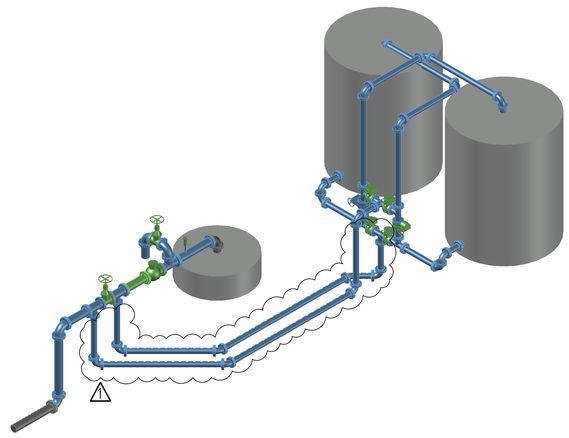

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MARVIC S. ACABADO
CERTIFICATE NO 19223
(MECHANICAL)
EXP 04/30/26
GUAM
PROFESSIONAL ENGINEER

DATE: 04/02/2025

AS DEFINED IN GUAM PUBLIC LAW 30-35, SECTION 32116

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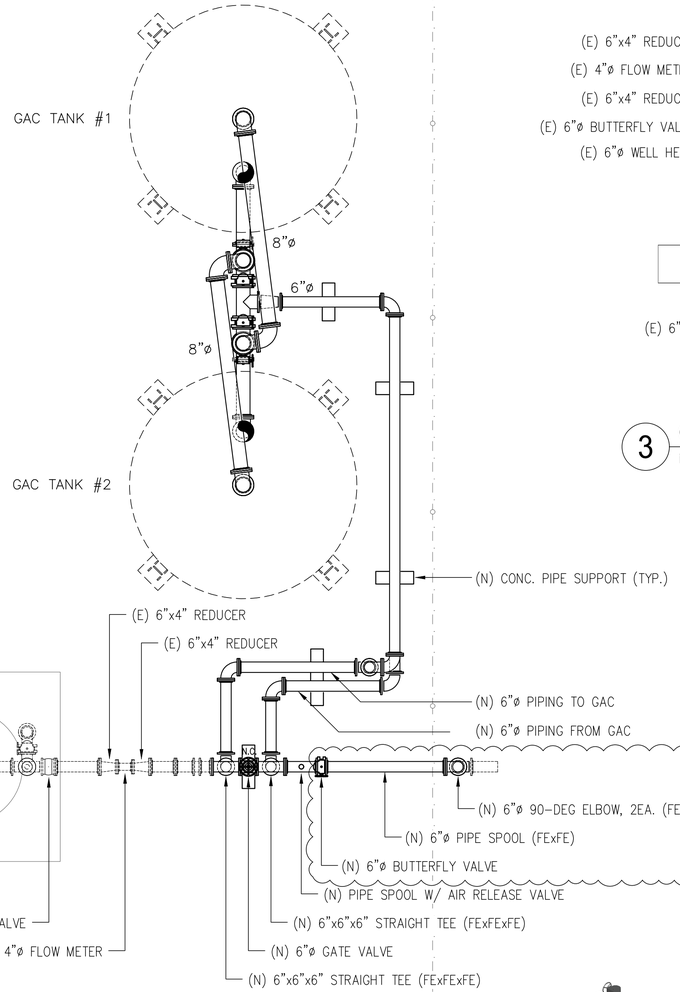
WELL SITE "M-04"

M-2.1

SHEET 21 OF 22



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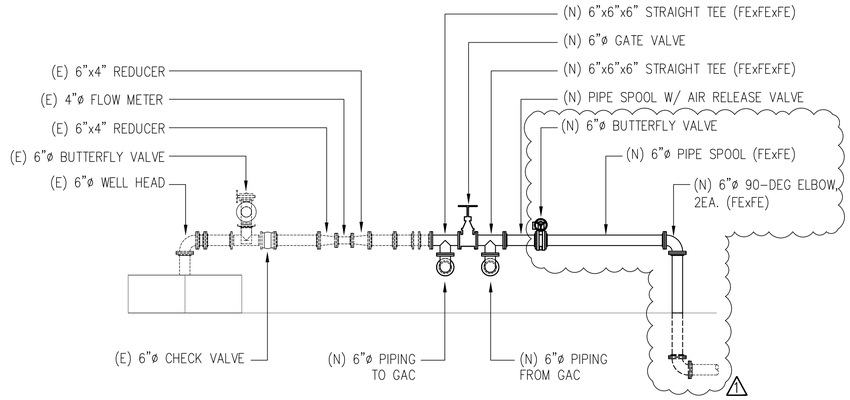

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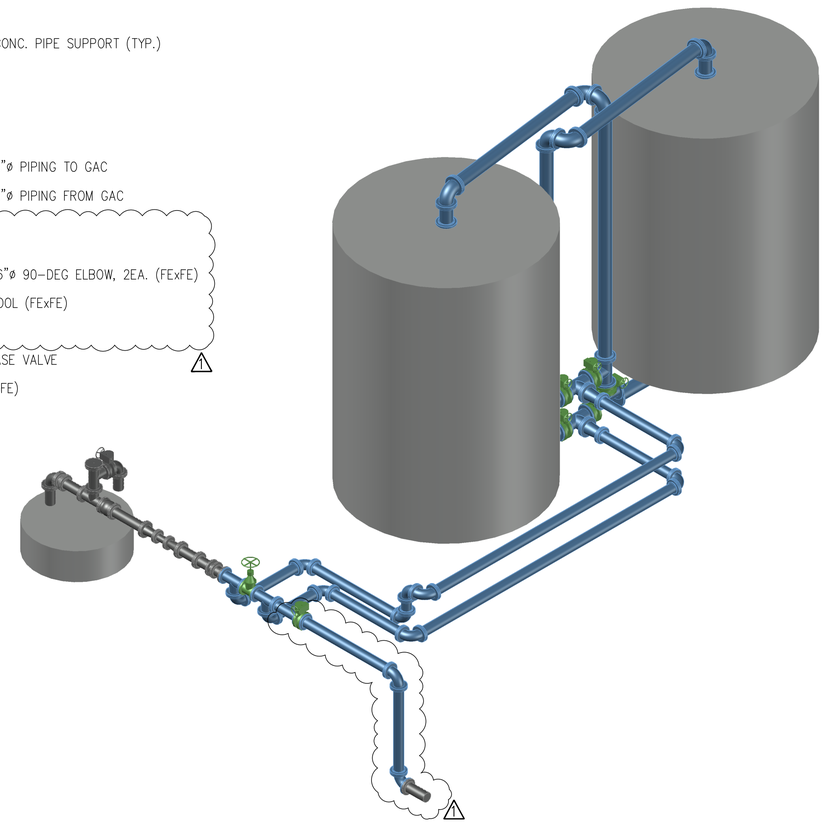

2 GAC PIPING ISOMETRIC @ WELL SITE "Y-15"

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SHEET TITLE

GAC PIPING PLAN
WELL SITE "Y-15"

M-2.2

SHEET 22 OF 22

Guam Waterworks Authority

Deep Well Granular Activated Carbon Relocation

Wells D-17, M-4 and Y-15

PROJECT MANUAL (Revision A)

April 2 2024

Prepared for:

GUAM WATERWORKS AUTHORITY
Gloria B. Nelson Public Service Building
688 Route 15
Mangilao, Guam, 96913

Prepared by:

DUEÑAS · CAMACHO & Associates Inc.

Table of Contents

Division 32 Exterior Improvements

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Division 40 - Process Interconnections

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Division 46 - Water and Wastewater Equipment

Attachments: Current Balancer Unit

SECTION 010200 - SPECIAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section provides for special requirements and controls to be observed during the construction of the Project.

1.2 MAINTAINING ACCESS

A. The Contractor shall conduct operations with minimum interference on roads, and driveways. The Contractor shall assure that traffic flow is continuous in both directions at all times. Driveways and parking areas shall be kept free of dirt and debris at all times. In all areas, the Contractor shall install and maintain appropriate lights, signs, markings, and barricades for the protection of all workers on the project.

1.3 DAMAGE OF BUILDINGS AND OTHER PROPERTY

A. Extreme care shall be exercised to avoid damaging buildings or other structures. Buildings or other property damaged or destroyed shall be replaced or repaired as directed by the Resident Project Representative at no expense to Guam Waterworks Authority (GWA).

1.4 STORM PROTECTION

A. The Contractor, at no additional cost to GWA, shall be responsible for the security and safety of the work and the site, including the Contractor's site and Inspector's field office, when warnings of winds of gale force are issued. Gale force winds are defined as having a sustained velocity of 34 knots or better and include winds of tropical storm or typhoon intensity. Satisfactory job site clean-up is the initial, basic day-to-day, minimal preparation the Contractor can make for winds of destructive force. When warnings of gale force winds are issued, the Contractor shall carry out, without delay, all directives concerning securing action to be taken which may be issued to him by the Resident Project Representative. This preparation is in accordance with the contract terms and every practicable precaution will be taken to minimize danger to persons, to prevent damage to the work in place, materials, supplies, equipment, adjacent structures, and property of others; and is in the public interest.

1.5 ACCIDENT PREVENTION

A. Precaution shall be exercised at all times for the protection of persons (including employees) and property. The safety provisions of applicable laws, building and construction codes shall be observed. Machinery, equipment and all hazards shall be guarded or eliminated in accordance with the safety provisions of the latest edition of the Manual of Accident Prevention in Construction published by the Associated General Contractors of America and EM 385-1-1 to the extent that such provisions are not in contravention of applicable laws.

B. Should typhoon warnings be issued, the Contractor shall take every practicable precaution to minimize damage and/or danger to persons, to the work, and to adjacent property. These precautions shall include closing all openings, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding and all other temporary work. The Contractor shall undertake these precautions at his/her own expense.

1.6 RESPONSIBILITY OF CONTRACTOR TO ACT IN EMERGENCY

A. In case of an emergency, which threatens loss or injury of property and/or safety or life, the Contractor shall act, without previous instructions from the Owner or Resident Project Representative, as the situation may warrant. He shall notify the Resident Project Representative immediately in accordance with section 7 of the Standard General Conditions.

1.7 OBSTRUCTIONS

A. The Contractor shall at his/her own expense remove all obstructions, the removal of which shall be necessary for the proper reception, performance, and completion of all work under this contract.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 010200

SECTION 011000 - SUMMARY

PART 1 - GENERAL

A. Section Includes:
1. Contract description.
2. Work by Owner or other Work at the Site.
3. Contractor's use of Site and premises.
4. Work Sequence and Bypass
5. Owner Use.

1.2 CONTRACT DESCRIPTION

A. Perform Work of Contract under fixed cost Contract with Owner according to Conditions of Contract.

B. Work of Contract is identified in the following and on Drawings:

Well A-8

1. Remove and reinstall fence line.
2. Remove and dispose of existing GAC system piping.
3. Remove and properly dispose of spec GAC Media.
4. Pressure wash vessel interior and perform API inspection.
5. Relocate GAC Vessels and steel support structure to Well D-17.
6. Pressure wash and recoat vessel exterior and support structure.

Well F-8

1. Remove and reinstall fence line.
2. Remove and dispose of existing GAC system piping.
3. Remove and properly dispose of spec GAC Media.
4. Pressure wash vessel interior.
5. Relocate GAC Vessels and steel support structure to Well M-4.
6. Pressure wash and recoat vessel exterior and support structure.

Well D-17

1. New GAC concrete pad.
2. Install relocated GAC Vessel.
3. Install new GAC media support tray within relocated vessels.
4. Install new GAC Media.
5. Provide and install new supply return and GAC vessel piping.
6. Remove well discharge piping and chlorine connection points.
7. Provide and install new well discharge piping and GAC connection Tees.
8. Relocate chlorine new piping.
9. Backwash GAC system.
10. Conduct pressure, disinfection and bacteriological testing.

Well M-4

1. Remove existing fence line.
2. Demolish discharge piping slab.
3. Install new GAC concrete pad.

4. Install relocated GAC Vessel.
5. Install new GAC Media support tray.
6. Install new GAC Media.
7. Install new fence.
8. Provide and install new supply return and GAC vessel piping.
9. Remove well discharge piping, well control valves and chlorine connection points.
10. Provide and install new well discharge piping and GAC connection Tees.
11. Relocate chlorine new piping.
12. Backfill existing slab sub-base.
13. Restore well pad slab.
14. Backwash GAC system.
15. Conduct pressure, disinfection and bacteriological testing.

Well Y-15

1. New GAC concrete pad.
2. Install new GAC Vessel.
3. Install new GAC Media.
4. Provide and install new supply return and GAC vessel piping.
5. Remove well discharge piping and chlorine connection points.
6. Provide and install new well discharge piping and GAC connection Tees.
7. Relocate chlorine new piping.
8. Design Build of new current balancing unit.

1.3 SUBSTANTIAL COMPLETION

A. Substantial Completion for each site is hereby defined as "the time at which the deep well and GAC treatment system as defined in the Bid are operational" and can be used for the purpose which it is intended. The individual well sites will be considered substantial complete upon completion of the pressure testing, disinfection, bacteriological testing, calibration of GAC treatment system instrumentation, and the deep well GAC treatment systems are fully functional and operable, including other preparations and proof of Guam EPA acceptance, as necessary for owner's use of the deep well.

B. Project Milestones: Include the milestones specified herein as part of the progress schedule required under Section 013216 – Construction Progress Schedule. Following is a detailed description of the project milestones, excluding any delays due to abnormal weather in accordance with Paragraph 3.11 of Section 013216.

1. Deep Well Y-15 Substantial Completion: The Contractor shall begin work upon the issuance of the Notice to Proceed (NTP) and the Deep Well Y-15 work shall be substantially complete as specified no later than 365 calendar days from NTP.
2. Deep Well D-17 Substantial Completion: The Contractor shall begin work upon the issuance of the Notice to Proceed (NTP) and the Deep Well D-17 work shall be substantially complete as specified no later than 270 calendar days from NTP.
3. Deep Well M-4 Substantial Completion: The Contractor shall begin work upon the issuance of the Notice to Proceed (NTP) and the Deep Well M-4 work shall be substantially complete as specified no later than 270 calendar days from NTP.

C. GWA shall have the right to utilize or place into service any item of equipment or other usable portion of the Work prior to completion of the Work. Whenever GWA plans to exercise said

right, the Contractor will be notified in writing by GWA, identifying specific portion or portions of the Work to be so utilized or otherwise placed into service.

D. Liquated Damages for Delays relative to the Substantial Completion work: As liquidated damages, and not as a penalty, for Contractor's delays in Substantial Completion of the Deep Wells beyond the dates agreed upon in accordance with the Contract Documents or within such extension of time as may be granted by GWA, the Contractor shall pay GWA fixed liquidated damages for each calendar day(s) delay until said Work is satisfactory completed at rate of $4,500 per day per each site.

E. Final Completion: Final Completion is defined as completing and having GWA accept all Work required under the Bid. Work includes warranty work, replacement work and warranty periods required by law or this bid. Final Completion at each site shall be no later than 90 calendar days following Substantial Completion of each well site as specified in Section 011000, 1.3, Paragraph B. Include the Final Completion date for each site as a project milestone of the progress schedule required under Section 013216 – Construction Progress Schedule.

1.4 WORK BY OWNER OR OTHER WORK AT THE SITE

A. If Owner-awarded contracts interfere with each other due to work being performed at the same time or at the same Site, Owner will determine the sequence of work under all contracts according to "Contractor's Use of Site and Premises" Articles in this Section.

B. Coordinate Work with utilities of Owner and public or private agencies.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limit use of Site to allow:
   1. Work by Owner. Owner staff regular work hours are 7:00 am to 3:30 pm 7 days/week
   2. Ongoing operation of the existing Well sites.
   3. Use of site by the public within all public right of ways.
   4. GWA, or another GWA contractor, may utilize any part of the Sites. The Contractor shall cooperate and coordinate with GWA or their Contractors to facilitate GWA's operations and to minimize interference with the Contractor's operations at the same time. In any event, GWA and their contractors shall be allowed access to the Sites during the period of construction.
   5. See other requirements in Article 5 of the Standard General Conditions of the Construction Contract.

B. Construction Operations:
   1. Limited to areas indicated in the Drawings.
   2. The Contractor's use of the Sites shall be limited to its construction operations, including on-site storage materials, on-site fabrication facilities, and field offices.
   3. Contractor shall be responsible for all areas of the Sites used by him or their Subcontractors in the performance of the Work. Contractor will exert full control over the actions of all employees and other persons with respect to the use and preservation of the property and existing facilities, except such controls as may be specifically reserved to GWA or others. Contractor has the right to exclude from the Site all persons who have no purpose related to the Work or its inspection and may require all persons on the

Site (except GWA's employees and Representatives) to observe the same regulations as he requires of his employees.

4. GWA does not warrant the condition of any existing pipeline or facility. The Contractor is cautioned that any fit-ups and connections to existing facilities may require a substantial amount of fit-up Work. The Contractor shall be solely responsible for performing all the work and for furnishing all materials, labor, and equipment necessary to complete the Work. The Contractor shall make necessary survey measurements of existing facilities prior to the shutdown of stating to ensure proper fit-up.
5. The Contractor shall incorporate the construction and schedule constraints of this Section in preparing the construction schedules required under Section 013216 – Construction Progress Schedule. The schedules shall include the Contractor's activities necessary to satisfy all constraints of the Contract Documents.

C. Time Restrictions for Performing Work:

1. All work shall be performed during regular working hours, unless otherwise approved by GWA.
2. Access to the site is limited to hours between 7:00 AM and 5:00 PM, Monday to Friday except for legal holidays, unless otherwise approved by GWA. The Contractor shall not permit the performance of Work requiring Special Inspections or Quality Assurance (QA) testing on Saturday, Sunday or any legal holidays without GWA's written consent given after submitting prior written request to the Construction Manager/GWA a minimum of 72 hours in advance.
3. The Contractor shall pay for the Construction Manager/GWA's cost for approved general observance, inspection, special inspection, Quality Control (QC) or Quality Assurance (QA) testing that are performed on Saturday, Sunday, or any legal holidays.

1.6 Utility Outages, Bypass, and Shutdown:

1. Limited bypass may be done for up to 4 hours during non-peak times (11pm-5am).
2. Contract must submit bypass work plan to include parts list, work sequence and work schedule for GWA review and approval.
3. Sequencing of Construction Plan: Before start of construction, post electronic file to Project website of construction plan regarding phasing of demolition, and new Work for acceptance by Owner. After acceptance of plan, construction sequencing shall comply with accepted plan unless deviations are accepted by Owner in writing.
4. The Contractor shall schedule and conduct activities to enable the existing facilities to operate continuously, unless other specified.
5. Modifications to existing facilities, the construction of new facilities, and the connection of new to existing facilities may require the temporary outage of existing water system service. In such cases, the Contractor shall coordinate Work with the Contracting Officer and GWA as described below. The Contractor shall competed the GWA Scheduled Outage Request Form.
6. The Contractor shall perform Work continuously during critical connections and changeovers as required to prevent interruption of GWA's operations. When necessary, plan, design and provide various temporary services, utilities, connections, temporary piping, access, and similar items to maintain continuous operations of GWA's facility at no additional.
7. The Contractor shall not close lines, open or close valves, or take other action which would affect the operation of existing systems. Only GWA staff is authorized to operate

existing equipment, valves, and systems; and such request by the Contractor will be considered within 48 hours after receipt of Contractor's written request.

8. In addition to the construction schedule required under Section 013216 - Construction Progress Schedule, the Contractor shall submit a detailed outage plan and time schedule for all construction activities which make it necessary to remove pipeline, electrical circuit, equipment, structure, road or other facilities from service. The Contractor shall schedule all connections to existing facilities with GWA and the interruption to system operations and services shall be held to a minimum. This may require outages to be scheduled at off-peak times. The cost for overtime labor of GWA staff required during an outage shall borne by the Contractor and consider part of the cost of the outage.
9. The outage plans shall be submitted to the Contracting Officer for acceptance and receive favorable review before submitting the outage request to GWA. The outage plan shall describe the Contractor's method; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation or alarms required to maintain control and monitoring for the water system; a detailed shop drawing showing pipe lengths, fittings, couplings, and pipe profiles as a minimum; and the manpower, plant, and equipment which the Contractor shall provide in order to ensure proper operation of associated water system. All costs for preparing and implementing the outage plans shall be at no increase in cost to GWA.
10. The removal of the existing system from service and reconnect the pipelines to resume service shall be completed no more than 4 hours for each shut down. The Contractor shall perform all cutting, patching, and connection to existing facilities with extreme care and take all precautions necessary to ensure that the existing facilities are not damaged. The Contractor shall be responsible for dewatering of the existing lines and disposal of water as required at no additional cost to GWA.
11. The Contractor shall not begin an alteration affecting existing facilities until specific written approval has been granted by GWA in each case. An outage request shall be submitted to GWA a minimum of 14 calendar days in advance of the time that such outages are required. No more than one outage request be considered per week. The Contractor shall coordinate the planned procedures with GWA. GWA has the authority to modify any proposed shutdown procedures if such procedures would adversely impact the water system operations.
12. The Contracting Officer shall be notified in writing at least 7 calendar days in advance of the required outage if the schedule for performing the work has changed or if revisions to the outage plan are required.
13. The Contractor shall provide written confirmation of the shutdown date and time 2 working days prior to the actual shutdown.

1.7 OWNER USE

A. Owner's regular use and occupancy of well sites before Substantial Completion does not relieve Contractor of responsibility to maintain specified insurance coverage on a 100 percent basis until date of final payment.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 011000

SECTION 012000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Schedule of Values.

B. Application for Payment.

C. Change procedures.

D. Defect assessment.

E. Alternates.

1.2 SCHEDULE OF VALUES

A. Format:. The minimum detail of breakdown of the Work components shall be the same as those incorporated into the cost loading function of the CPM Schedule and as indicated below. Greater detail shall be provided as directed by the Engineer.

1. Mobilization – The Contractor's attention is directed to the condition that site mobilization is limited to three (3) percent of the contract total, no breakdown required. Include obtaining all permits and approvals, bond and insurance; mobilizing of all equipment onto each work site area; furnishing and erecting temporary field offices and other construction facilities; implementing stormwater pollution prevention plan, erosion and sediment control measures; construction survey; construction progress schedule; and implementing security requirements.
2. Section 013216 – Construction Progress Schedule, broken down by submittal.
3. The electrical work shall be broken down by structure. Each structures electrical work shall be broken down into conduit and raceway installation, cable and wire installation, electrical equipment installation, terminations and lighting. Yard facilities shall be broken down by duct bank designation and substations.
4. The instrumentation and control work shall be broken down by structure.
5. Protective coating work shall be broken down by structure and yard area.
6. Concrete structures shall be broken down into excavation, subgrade preparation, and appurtenant prefoundation work, concrete foundation construction, slabs on grade, walls/columns, suspended slabs, and backfill.
7. The mechanical work shall be broken down within each structure to identify individual piping systems, equipment installation by equipment name and number, and equipment testing and checkout.
8. The civil site work shall be broken down into clearing and grubbing, removal and disposal of existing structures, excavation and backfill, drainage and grading, site concrete, paving, fencing and gates, retaining walls, and any other items determined to be necessary for the establishment of pay and schedule activity items.

9. The yard piping work shall be broken down into individual pipelines running from and to termination points. Each pipeline shall be an individual pay item unless otherwise allowed by the Engineer.
10. Closeout and demobilization – no breakdown needed. This includes as-built plan submittal and occupancy permit is closeout: demolition included within mobilization 5%.
11. All other work not specifically included in the above items shall be broken down as necessary for establishment of pay and schedule activity items as may be directed by the Engineer.

B. Include separately from each line item, direct proportional amount of Contractor's overhead and profit.

C. Once approved by the owner revise schedule to list approved Change Orders with each Application for Payment.

1.3 APPLICATION FOR PAYMENT

A. Submit three copies and electronic file to Project website of each Application for Payment on EJCDC C-620 - Contractor's Application for Payment

B. Content and Format: Use Schedule of Values for listing items in Application for Payment.

C. Submit updated construction schedule with each Application for Payment. Applications submitted without updated progress schedule will be returned unreviewed.

D. Submit updated construction schedule with each Application for Payment.

E. Payment Period: Submit at intervals stipulated in the Agreement

F. Submit submittals with transmittal letter as specified in Section 013300 - Submittal Procedures.

G. Substantiating Data: When owner or Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
1. Affidavits attesting to off-Site stored products.
2. Construction Progress Schedule, revised and current as specified in Section 013300 - Submittal Procedures

1.4 CHANGE PROCEDURES

A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.

C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications. Allow a

minimum of five (5) working days for response to RFIs and a minimum of ten (10) working days for responses requiring coordination with the EOR or EOR's subconsultants.

D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on EJCDC C-942, field order.

E. Contractor may propose changes by submitting a request for change to Engineer in accordance with Article 11 of the Standard General Conditions of the contract, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.

F. Construction Change Directive: Engineer may issue directive, on EJCDC C-940 - Work Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

G. Force Account Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.

H. Maintain detailed records of Work done on force account basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.

I. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.

J. Change Order Forms: EJCDC C-941 - Change Order.

K. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

L. Correlation of Contractor Submittals:
   1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
   2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
   3. Promptly enter changes in Record Documents.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.

C. Defective Work may be partially repaired according to instructions of Owner, and unit sum/price will be adjusted to new sum/price at discretion of Engineer and Owner.

D. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.

E. Authority of Owner to assess defects and identify payment adjustments is final.

F. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely or properly unloaded from transporting vehicle.
   4. Products placed beyond lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected products.

1.6 ALTERNATES

A. Alternates presented on Bid Forms will be reviewed and executed as indicted in the instruction to Bidders. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.

B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.

   1. Coordinate related requirements among Specification Sections as required.
   2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
   3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 012000

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Preinstallation meetings.

F. Closeout meeting.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.

C. Coordinate space requirements, supports, and installation of all mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practical; place runs parallel with lines of building. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

1. Coordination Drawings: Prepare as required to coordinate all portions of Work to include but not limited to water, wastewater, storm drainage yard piping and electrical, communication crossings, vaults, manholes and hand-holes. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important. Coordination drawings shall be considered a pre-construction submittal to be reviewed and accepted prior to execution of subject work. Any and all conflicts shall be bought to the RPR attention as part of this pre-construction submittal.

D. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work as may be requested by the RPR.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.

G. After Owner's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

A. Engineer will schedule and preside over meeting after Notice of Award.

B. Attendance Required: Engineer, Owner, Resident Project Representative, major Subcontractors, and Contractor.

C. Minimum Agenda:
1. Introduction of project team member.
2. Status of Contractor’s bonds and insurance certificates
3. Status of Contractor’s Agreement
    a. Notice of Award (NOA)
    b. Contract documents
    c. Notice to proceed (NTP)
    d. Liquidated damages (LD’s)
    e. Contract documents
4. Construction schedule
    a. Planned operations for first 60 days
    b. Draft preliminary schedule
    c. Preconstruction submittals
    d. Phasing
    e. Critical work sequencing
    f. Procurement of long lead and critical equipment and materials
    g. Preconstruction Submittals
5. Compliance completion
6. Designation of responsible personnel
7. Temporary facilities and controls
8. Procedures and processing
    a. Communication
    b. Requests for interpretations
    c. Field decisions
    d. Submittals
    e. Substitutions
    f. Applications for Payments
    g. Schedule or Values (SOV)
    h. Contract change request (CCR)
    i. Change orders (CO)
    j. Contract closeout procedures
9. Quality assurance & special inspections

D. Resident Project Representative: Record and distribute minutes

1.4 SITE MOBILIZATION MEETING

A. Engineer will schedule and preside over meeting prior to Contractor occupancy.

B. Attendance Required: Engineer, Owner, Contractor, Contractor's superintendent, and special consultants

C. Minimum Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements
3. Construction facilities and controls.
4. Temporary utilities
5. Survey and building/site layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Procedures for testing.
9. Procedures for maintaining record documents.
10. Requirements for startup of equipment.
11. Inspection and acceptance of equipment put into service during construction period.

D. Resident Project Representative: Record and distribute minutes

1.5 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals.

B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, and Engineer, Owner, as appropriate to agenda topics for each meeting.

D. Minimum Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittal schedule and status of submittals.
6. Review of off-Site fabrication and delivery schedules.
7. Maintenance of Progress Schedule.
    a. Provide two week look ahead schedule
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on Progress Schedule and coordination.

13. Other business relating to Work.

E. Resident Project Representative: Record minutes

1.6 PREINSTALLATION MEETINGS

A. The contractor shall schedule, preside and convene preinstallation meetings at Project Site before starting Work of specific Section.

B. Preinstallation meetings are required for the installation or fabrication of all process related equipment as listed below.
1. GAC System Removal
2. GAC System Relocation
3. New GAC System Installation
4. Current Balancing unit design

C. Require attendance of parties directly affecting, or affected by, Work of specific Section.

D. Notify Engineer 5 working days in advance of meeting date.

E. Prepare agenda and preside over meeting:
1. Review conditions of installation, preparation, and installation procedures.
2. Review coordination with related Work.

F. Contractor shall preside, record minutes and distribute copies to participants within 5 working days after meeting.

1.7 CLOSEOUT MEETING

A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.

B. Attendance Required: Contractor, Resident Project Representative, major Subcontractors, Engineer, Owner, and others appropriate to agenda.

C. Notify Engineer 5 working days in advance of meeting date.

D. Minimum Agenda:
1. Start-up of facilities and systems.
2. Operations and maintenance manuals.
3. Testing, adjusting, and balancing.
4. System demonstration and observation.
5. Operation and maintenance instructions for Owner's personnel.
6. Contractor's inspection of Work.
7. Contractor's preparation of an initial "punch list."
8. Procedure to request Engineer inspection to determine date of Substantial Completion.
9. Completion time for correcting deficiencies.
10. Inspections by authorities having jurisdiction.
11. Certificate of Occupancy and transfer of insurance responsibilities.

12. Partial release of retainage.
13. Final cleaning.
14. Preparation for final inspection.
15. Closeout Submittals:
    a. Project record documents.
    b. Affidavits.
16. Final Application for Payment.
17. Contractor's demobilization of Site.
18. Maintenance.

E. Record minutes and distribute copies to participants within 5 working days after meeting.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION 013000

SECTION 013216 – CONSTRUCTION PROGRESS SCHEDULE

PART 1 -- GENERAL

1.1 SUBMITTALS

Submit the following in accordance with the requirements of Section 013300 Submittal Procedures.

A. Project Scheduler Qualifications.

B. Preliminary Project Schedule: Submit the scheduling software file and printed PDF file electronically into the Project website, provide two (2) color printed copies; minimum size 22 inch by 34 inch.

C. Initial Project Schedule: Submit the scheduling software file and printed PDF file electronically into the Project website, provide two (2) color printed copies of accepted the schedule, large enough to show entire schedule for entire construction period, minimum size 30 inch by 42 inch (some tasks may be collapsed as agreed to by the Resident Project Representative (RPR) to manage the printed size).

D. Baseline Project Schedule: Submit the scheduling software file and printed PDF file electronically into the Project website, provide two (2) color printed copies of accepted the schedule, large enough to show entire schedule for entire construction period, minimum size 30 inch by 42 inch (some tasks may be collapsed as agreed to by the RPR to manage the printed size).

E. Periodic (Monthly) Schedule Updates: Submit the scheduling software file and color printed PDF file electronically into the Project website monthly with partial payment request's. Additionally, provide two (2) color printed copies; minimum size 22 inch by 34 inch.

F. As-Built (Final) Project Schedule: Submit the scheduling software file and printed PDF file electronically into the Project website with final payment request. Additionally, provide two (2) color printed copies; minimum size 22 inch by 34 inch.

G. Short Interval Schedules (three (3) week look ahead): Submit at least one (1) work day prior to the weekly construction progress meeting held by the RPR. Submit the Excel or scheduling software file and printed PDF file electronically into the Project website and provide printed 8.5 inch by 11 inch color printed copies for all attendees at the weekly construction progress meeting.

H. Time Impact Analysis Schedules/Recovery Schedules: Submit with any proposed change proposal to predict the delay associated with the change, if any. If it is determined by the Owner that a delay was caused by the Contractor, the Contractor shall submit a Recovery Schedule and plan to the PRP with explicit actions, such as increasing crew size, adding

equipment, increasing working hours, etc. to recover the delay. Submit the scheduling software file and color printed PDF file electronically into the Project website. Additionally, provide two (2) color printed copies; minimum size 22 inch by 34 inch.

I. Startup, Commissioning and Occupancy Schedule: Submit at least 120 calendar days prior to partial, beneficial or final acceptance of any piece of equipment, facility or portion of facility. Submit the scheduling software file and color printed PDF file electronically into the Project website.

J. Daily Construction Production Reports: Complete and submit report electronically into the Project website within one (1) workday of the work performed.

K. Material Location Reports: Submit PDF file electronically into the Project website at monthly intervals.

L. Field Condition Reports: Submit PDF file electronically into the Project website at time of discovery of differing conditions.

M. Special Reports: Submit PDF file electronically into the Project website. Submit two (2) copies at time of unusual event

N. Construction Photographs: Take daily photographs of the work and attach representative photographs to the Contractor's daily construction production reports and submit PDF file electronically into the Project website within one (1) workday of the work performed. Make available to the RPR the native high-resolution images upon request.

1.2 PROJECT SCHEDULER QUALIFICATIONS

A. Designate an authorized and full time representative to be responsible for the preparation of the schedule and all required updating and production of reports.

B. The authorized representative must have a minimum of two (2) years of experience scheduling construction projects similar in size, nature, and complexity to this project with scheduling software that meets the requirements of this specification.

C. Representative must have a comprehensive knowledge of CPM scheduling principles and application, and use of computer facilities capable of delivering detailed graphic printouts within 48 hours of request.

PART 2 -- PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules required herein must be capable of meeting all requirements of this specification.

A. Owner Default Software

1. The CM intends to use Primavera P6 by Oracle.

B. Contractor Software

Scheduling software used by the Contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required “sdef” file must be created and supported by the software manufacturer.

1. Primavera

    a. If Primavera P6 by Oracle is selected for use, provide the "xer" export file in a version of P6 importable by the Owners system.

2. Other Than Primavera P6 by Oracle

    b. If the Contractor chooses software other than Primavera P6, that is compliant with this specification, provide for Owner and the RPR’s use; four (4) licenses, four (4) computers, and a minimum of eight (8) hours of training for four (4) Owner and RPR employees in the use of the software. These computers shall be stand-alone and not connected to the Owner or RPR’s network. Computers and licenses will be returned at project completion.

    c. Importing data into P6 using data conversion techniques or third party software is not allowed and shall be cause for rejection of the submitted schedule.

    d. A list of scheduling software settings and parameters which must be used in preparing the Schedules have been provided in paragraph PRIMAVERA P6 MANDATORY REQUIREMENTS are contained later in this specification section. Deviation from these settings and parameters, without prior consent of the RPR, is cause for rejection of schedule submission.

    e. Provide the “xer” export file in a version of Primavera P6 by oracle importable by the RPR.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Subcontractors and suppliers, Designers, Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project-monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules.

3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

A. Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Construction Manager.

B. Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial, baseline, and periodic progress schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Resident Project Representative (RPR) requests schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the RPR may withhold ten (10) percent from the pay request amount in addition to the retainage from each payment period until such revisions to the project schedule have been made.

C. Prompt Payment

Prompt Payment for construction contracts is contingent upon GWA receiving both acceptable, reviewable, and approvable hard copies of the payment application and a matching electronic copy via the RPR's Project website being utilized for this project.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

A. Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The RPR will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail.

B. Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. All non-procurement activities shall not have Original Durations (OD) greater than 20 work days or 30 calendar days.

C. Permit Activities

Include permit activities with the necessary conferences and follow-up actions and

submission dates. Include the permit schedule in the project schedule, showing the sequence of events involved in carrying out the permitting procurement tasks within the specific contract period. Provide at a detailed level of scheduling sufficient to identify all major permitting tasks, including those that control the flow of work. Also, include review and correction periods associated with each item.

D. Preconstruction Submittals

Include preconstruction submittals that are required prior to start of construction (work), issuance of contract notice-to-proceed, commencing work on site, or the start of the next major phase of the construction on a multi-phase contract. Include the preconstruction submittal schedule in the project schedule. Provide at a detailed level of scheduling sufficient to identify all major submittal or review tasks, including those that control the flow of work. Also, include review and correction periods associated with each item.

E. Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

F. Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

1. Submission, review, and acceptance of Preconstruction Submittals (individual activity for each).

2. Submission, review, and acceptance of features require design coordination or completion submission, review and acceptance.

3. Submission of mechanical/electrical/information systems layout drawings.

4. Long lead procurement activities

5. Submission and approval of O & M manuals.

6. Submission and approval of as-built drawings.

7. Submission and approval of testing and air balance (TAB).

8. Submission of TAB specialist design review report.

9. Submission and approval of fire protection specialist.

10. Submission and approval of Building Commissioning Plan, test data, and reports: Develop the schedule logic associated with testing and commissioning of mechanical

systems to a level of detail consistent with the contract commissioning requirements. All tasks associated with all building testing and commissioning will be completed prior to submission of building commissioning report and subsequent contract completion.

11. Air and water balancing.

12. Building commissioning - Functional Performance Testing.

13. Controls testing plan submission.

14. Controls testing.

15. Performance Verification testing.

16. Other systems testing, if required.

17. Contractor's pre-final inspection.

18. Correction of punch list from Contractor's pre-final inspection.

19. GWA pre-final inspection.

20. Correction of punch list from GWA pre-final inspection.

21. Final inspection.

G. Owner Activities

Show Owner and other agency activities that could impact progress. These activities include, but are not limited to: approvals, acceptance, design reviews, environmental permit approvals by local regulators, inspections, utility tie-in, Owner Furnished Equipment (GFE) and Notice-to-Proceed (NTP) for phasing requirements.

H. Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. Develop and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the QCS web site: http://rms.usace.army.mil.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party

3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work
8	FOW	20	Feature of work*
*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.			

1. Workers Per Day (WRKP)

   Assign Workers per Day for all field construction or direct work activities, if directed by the RPR. Workers per day are based on the average number of workers expected each day to perform a task for the duration of that activity.

2. Responsible Party Coding (RESP)

   Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Owner agency(ies) responsible for performing the activity.

   Activities coded with an Owner Responsibility code include, but are not limited to: Owner approvals, Owner design reviews, environmental permit approvals by State or Local regulators, Owner Furnished Property/Equipment (GFP) and Notice-to-Proceed (NTP) for phasing requirements.

   Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GWA.

3. Area of Work Coding (AREA)

   Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings.

   Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

4. Modification Number (MODF)

   Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by RPR. Key all Code values to the Owner's modification numbering system. An activity can have only one Modification Number Code.

5. Bid Item Coding (BIDI)

   Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

6. Phase of Work Coding (PHAS)

   Assign Phase of Work Code to all activities. Examples of phase of work are design phase, procurement phase, and construction phase. Procurement phase and construction phase. Each activity can have only one Phase of Work code.

   Code proposed fast track construction phases proposed to allow filtering and organizing the schedule by fast track design submittal (shop drawings) and construction packages.

   If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

7. Category of Work Coding (CATW)

   Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to design, design submittal, design reviews, review conferences, permits, construction submittals, construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

8. Feature of Work Coding (FOW)

   Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

   An activity can have only one Feature of Work Code.

I. Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited.

No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the RPR for approval on a case by case basis.

1. Project Start Date Milestone and Constraint

   The first activity in the project schedule must be a start milestone titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

2. End Project Finish Milestone and Constraint

   The last activity in the schedule must be a finish milestone titled "End Project."

   Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Owner is under no obligation to accelerate Owner activities to support a Contractor's early completion.

3. Interim Completion Dates and Constraints

   Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

   a. Start Phase
      Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

   b. End Phase
      Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

J. Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for GWA Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop Seasonal Calendar(s) and assign to seasonally affected activities as applicable.

K. Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP Acknowledged" may have no predecessor logic, and the last activity -"End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the RPR's approval.

L. Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. **Disable program features that calculate one of these parameters from the other.** Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

M. Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the RPR. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

N. Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the RPR. Activity ID and description changes are considered new activities and cannot be changed without RPR approval.

O. Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the RPR.

P. Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the RPR and not used in place of realistic original durations, and must not be in place to artificially absorb float, or to replace proper schedule logic.

1. Leads (negative lags) are prohibited.

2. Starts to Finish (SF) relationships are prohibited.

Q. Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect

sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not allowed.

R. Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

S. Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

T. Cost Loading of Closeout Activities

Cost load the "Correction of punch list from GWA pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the GWA's verification of completion and correction of all punch list work identified during GWA pre-final inspection(s) at the sole discretion of the Project Manager .

1. As-Built Drawings

   If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than $35,000 or 1 percent of the present contract value, whichever is greater, up to $200,000. Activity will be declared 100 percent complete upon the RPR’s approval.

2. O & M Manuals

   Cost load the "Submission and approval of O & M manuals" activity not less than $20,000. Activity will be declared 100 percent complete upon the RPR’s approval and acceptance of all O & M manuals.

U. Anticipated Adverse Weather

See paragraph INCLEMENT WEATHER PROVISIONS OF THE SCHEDULE. Reflect the number of anticipated adverse weather delays allocated to a weather sensitive activity in the activity's calendar.

V. Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and man-hours) and the RPR agreeing that the schedule as reasonable and achievable.

The Owner is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the Contractor's accelerated work.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD/DVD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by Owner or RPR on the schedule(s) does not relieve the Contractor from compliance with requirements of the Contract Documents.

A. Preliminary Project Schedule Submission

Within 15 calendar days after the Notice-to-Proceed is acknowledged submit the Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan, etc.) as well as any Contractor design activities, planned submissions of all early procurement equipment packages, permitting activities, review conference activities, and other non-construction activities intended to occur within the first 90 calendar days.

RPR acceptance of the associated package(s) and all other specified Program and Plan approvals must occur prior to any planned field construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

B. Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after Notice-to-Proceed is acknowledged. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. Include in the detailed schedule, preconstruction and permitting activities; permit submissions and any required Owner actions; and long lead procurement items. Also, cover in the preliminary schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in milestone, including all activity coding and

cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature.

No payment shall be made for work items not fully detailed in the Initial Project Schedule.

C. Baseline Project Schedule Submission

Acceptance of the Contractor's schedule by the Owner and the RPR will be based solely upon compliance with the requirements of the Contract Documents. By way of the Contractor assigning activity durations and proposing the sequence of the Work, the Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule. Upon submittal of final and accepted "Initial Project Schedule", the schedule shall be considered the "Baseline Project Schedule".

D. Periodic (Monthly) Schedule Update Submissions

Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Owner and RPR to assess the Contractor's progress. Update the schedule to include detailed construction activities as the work progresses. This may require submission of detailed schedule activities for any distinct construction that is started prior to submission of Contractor's final design(s) submission(s) if such activity is authorized.

1. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of Owner and/or RPR at the meeting.

2. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for any activity start or finish.

3. Owner and/or the RPR reserves the right to require the Contractor adjusts, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of the Work or approval of partial payment requests. No additional compensation shall be allowed for such adjustments, additions, or clarifications.

4. No progress payment(s) shall be made without conducting a Periodic Schedule Update Meeting to the satisfaction of the RPR prior to submission of the Periodic Project Schedule submittal.

E. Schedule Adjustments

The Owner and RPR reserves the right to require that the Contractor adjust, add, or clarify any portion of the schedule which may later be discovered to be insufficient for monitoring of the Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

F. As-Built (Final) Project Schedule Submittal

As a condition to the release of retention and making final payment, submit an "As-Built Schedule," as the last schedule update showing all activities as 100 percent completion. This schedule must reflect the exact manner in which the project was actually constructed.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, Baseline Schedule, every Periodic Schedule Update, and As-built Schedule throughout the life of the project:

A. Data CD/DVDs

Provide two (2) sets of data CD/DVDs containing the current project schedule and all previously submitted schedules in the format of the scheduling software (e.g. .xer). Also, include on the data CD/DVDs the Narrative Report and all required Schedule Reports. Label each CD/DVD indicating the type of schedule (Preliminary, Initial, Baseline, Periodic, As-Built), full contract number, Data Date and file name. Each schedule must have a unique file name and use project specific settings.

B. Schedule Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to Owner and RPR the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

1. Identify and discuss the work scheduled to start in the next monthly update period.

2. A description of activities along the two (2) most critical paths where the total float is less than or equal to 20 workdays.

3. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.

4. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.

5. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.

6. Identify and discuss out-of-sequence work.

C. Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Construction Manager. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. Provide two (2) sets of hardcopy reports. The following lists typical reports that will be requested:

1. Activity Report

   List of all activities sorted according to activity number.

2. Logic Report

   List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3. Total Float Report

   A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

4. Earnings Report by CLIN

   A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

5. Schedule Log

   Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

D. Network Diagram

The Network Diagram is required for the Preliminary, Initial, Baseline, and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The RPR will use, but is not limited to, the following conditions to review compliance with this paragraph:

1. Continuous Flow

   Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

2. Project Milestone Dates

   Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3. Critical Path

   Show all activities on the critical path. The critical path is defined as the longest path.

4. Banding

   Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

5. Cash Flow / Schedule Variance Control (SVC) Diagram

   With each schedule submission, provide a SVC diagram showing:

   a. Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and

   b. Earned Value to-date.

3.6 PERIODIC SCHEDULE UPDATE

A. Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Narrative Report, Schedule Reports, and Progress Payment. Conduct meetings at least monthly within five (5) days of the proposed schedule data date. Provide a computer with the scheduling software loaded and a projector (or screen) which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Owner, RPR, and/or Contractor. The meeting is a working interactive exchange, which allows Owner, RPR, and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting shall last no longer than eight (8) hours. Provide a draft of the proposed narrative report and schedule data file to the Owner and RPR a minimum of two (2) workdays in advance of the meeting. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the RPR. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by Owner and/or the RPR in the submission and invoice for payment.

Applications for payment submitted prior to or without conducting a monthly construction progress schedule review meeting will not be accepted and returned as un-reviewed.

B. Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, pursuant to paragraph SUBMISSION REQUIREMENTS not later than four (4) workdays after the periodic schedule update meeting.

C. Schedule Revisions

Revision to the monthly schedule update, submittal activities, activity durations, their logical relationships, and the original baseline shall not be allowed. The purpose of the monthly schedule update is to determine the amount of Work completed since the previous month's schedule update as the basis for the application for payment only.

Proposed revision to the schedule shall be completed in coordination with the Owner and the RPR and provided as a proposed recovery schedule. Periodic Update Schedules submitted without accepted revisions will not be accepted and returned as un-reviewed.

3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with GWA and the RPR between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two (2) weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports in accordance with the requirements of specification section 013000 – Administrative Requirements.

3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Owner and RPR in accordance with the appropriate contract provisions and clauses for approval within ten (10) days of a delay occurring. Also, prepare a time impact analysis for each Owner contract change request (CCR) to justify time extensions. Failure to submit any such request for an extension in a timely manner shall constitute a waiver of any claim for extension.

A. Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Owner. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the RPR.

B. Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the RPR based on industry standard AACE 52R-06. Utilize a copy of the last approved progress schedule prior to the first day of the

impact or delay for the time impact analysis. If the RPR determines the period between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Owner, no other changes may be incorporated into the schedule being used to justify the time impact.

C. Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Owner and RPR based on industry standard AACE 29R-03.

D. Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Owner and RPR prior to incorporation into the project schedule.

E. Time Extension

1. The Owner must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

2. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

F. Impact to Early Completion Schedule

1. No extended overhead shall be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the RPR may require provision of a written recovery plan (recovery schedule) for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra workdays, etc.

A. Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

B. Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in corrective action directed by the RPR pursuant to Standard General Conditions and other contract provisions as may be applicable.

C. Recovery Schedule

Should the RPR find it necessary, submit a recovery schedule pursuant to Standard General Conditions, and other contract provisions as may be applicable. No additional compensation shall be provided for a recovery schedule, adjustments, additions, or clarifications.

3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the GWA or the Contractor including activity and/or project float. Activity float is the number of workdays that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of workdays between the projected early finish and the contract completion date milestone.

3.11 INCLEMENT WEATHER PROVISIONS OF THE SCHEDULE

A. See Standard General Conditions and Supplementary Conditions as appropriate.

3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

If Primavera P6 is being used, the following settings are mandatory and required in all schedule submissions to GWA and the CM:

A. Activity Codes must be Project Level, not Global or EPS level.

B. Calendars must be Project Level, not Global or Resource level.

C. Activity Duration Types must be set to "Fixed Duration & Units".

D. Percent Complete Types must be set to "Physical".

E. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to v 8.0 Hour days.

F. Set Schedule Option for defining progressed activities to "Retained Logic".

G. Set Schedule Option for defining Critical Activities to "Longest Path". g. Set Schedule Option for defining progressed activities to "Retained Logic".

H. Set up cost loading using a single lump sum labor resource. The Price/Unit must be $1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.

I. Activity ID's must not exceed 10 characters.

J. Activity Names must have the most defining and detailed description within the first 30 characters.

-- End of Section –

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Definitions.

B. Submittal procedures.

C. Construction progress schedules.

D. Proposed product list.

E. Product data.

F. Use of electronic CAD files of Project Drawings.

G. Shop Drawings.

H. Samples

I. Other submittals.

J. Test reports.

K. Certificates.

L. Manufacturer's instructions.

M. Manufacturer's field reports.

N. Erection Drawings.

O. Contractor review.

P. Construction Photographs

Q. Engineer review.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Resident Project Representative's responsive action.

B. Informational Submittals: Written and graphic information and physical Samples that do not require Resident Project Representative's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. Within 21 calendar days after date of Notice-to-Proceed, the Contractor shall submit the following preconstruction submittal items to the RPR for review:

1. A preliminary schedule of Shop Drawings, Samples, Products and proposed Substitutes ("or approved equivalent") submittals listed.

2. A schedule of submittals based on the Contractor's priority, planned construction sequence and schedule, long-lead items, and size of submittal package.

3. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

4. Warranties on Equipment provided. Note, Contractor is the warranty administrator for all goods/services provided under this Bid.

5. A 60-day plan of operation in accordance with the submittal of the preliminary bar chart schedule in Section 013216 – Construction Progress Schedule.

6. A detailed layout of the field office; the office shall not be shipped to the Site until the layout is reviewed and approved.

B. Within 30 calendar days after date of Notice to Proceed, the Contractor shall submit the following submittal items to the RPR for Review.

C. Transmit each submittal with Resident Project Representative-accepted form.

D. Numbering: Each submittal shall be assigned a unique number, beginning with the specification section most pertinent to the submittal. Submittals shall be numbered sequentially, and the submittal number shall be clearly noted on the submittal. Original submittals shall be assigned a numeric submittal number followed by a hyphen and a numeric digit. To distinguish between the original submittal and each resubmittal, the submittal shall have "RX" following the original submittal number, where X is the revision number. For example if submittal 40100-1 requires resubmittal, the first resubmittal will bear the designation' 49100-1R1" and the second resubmittal will bear the designation "49100-1R2" and so on.

E. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

F. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.

G. Apply Contractor's stamp, signed, certifying that the Contractor has reviewed, approved, and verified that the products required, field dimensions, adjacent construction Work, and coordination of information is in conformance with requirements of the Work and Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified.

H. A separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items in the same specification section using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the RPR. Pages shall be numbered and shall be in order. Submittal for items, materials, or equipment from different specification sections as a single submittal package shall not be allowed unless accepted by the RPR in advance.

I. Format:

1. Minimum sheet size shall be 8 ½ inches by 11 inches, and maximum sheet size shall be 24 inches by 36 inches.

2. Number every page in a submittal in sequence.

3. Collate and staple or bind, as appropriate, each copy of a submittal; the RPR will not collate sheets or copies.

4. Where product data from a manufacturer is submitted, clearly mark and/or notate which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports.

5. Present a sufficient level of detail for assessment of compliance with the Contract Documents.

6. All digital submittals may be directed by the RPR and/or GWA. Digital files shall follow format requirements. Digital files shall be PDF or acceptable file format for the type of submittal, as specified by the RPR.

J. Electronic File Format

1. Provide all submittals in electronic format, with exception of samples items.

2. Name the file in this format, SSSSSS_QQAX, where:

   a. SSSSSS: 6-digit numeric Section Number to which the submittal pertains.

   b. QQ: 2-digit sequential number assigned by contractor unique to each original submittal.

   c. A: revision letter; omit if original.

   d. Example: 262413_01, 262413_01A, 262413_01B, 262413_01C, etc.

3. PDF: provide files in Adobe PDF format.

   a. Compile the submittal file as a single, complete document, to include Transmittal Form described within.

b. Generate PDF files from original documents with bookmarks so that the text included in the PDF files is both searchable and can be copied.

c. If documents are scanned, Optical Character Resolution (OCR) routines are required.

d. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file.

e. When required, the electronic file must include a valid electronic signature, or scan of a signature.

4. Microsoft Excel (MS Excel): where specified, provide files in (.xlsx) format.

5. Microsoft Word (MS Word): where specified, provide files in (.docx) format.

K. Schedule submittals to expedite Project. Coordinate submission of related items.

L. Electronic Submittal: For all electronic communication, Contractor shall strictly adhere to protocol to be provided by RPR at Preconstruction Conference.

1. Email: Submittals via email will not be accepted.

2. Project website: The Owner shall provide access to project website. The Owner will provide training on the use of the system and the process for uploading submittals and other documents for the project.

3. Access: Contractor is responsible for obtaining access to project website for all Contractor and personnel requiring training and access at no additional cost to the Owner.

M. For each submittal for review, allow 10 working days excluding delivery time to and from Contractor.

N. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

O. Allow space on submittals for Contractor and Engineer review stamps.

P. When revised for resubmission, identify changes made since previous submission.

Q. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

R. Submittals not requested will not be recognized nor processed.

S. Incomplete or Disporganized Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Comply with Section 013216 - Construction Progress Schedule

1.5 PROPOSED PRODUCT LIST

A. Within 21 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.

B. Product submittals shall include mechanical process, mechanical, electrical, instrumentation, supports and shop drawings. Individual submittal packages will not be reviewed by the engineer.

C. Post electronic submittals as PDF electronic files to Project website.

D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

E. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

F. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 017000 - Execution and Closeout Requirements.

1.7 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
   1. The Contractor is advised that files provided by the Owner, Engineer, or Construction Manager in electronic format of text, data, graphics, or other types are provided only for convenience. Any conclusions or information obtained or derived from such electronic files will be at the Contractor’s sole risk. If there is a discrepancy from such electronic files use will be at the Contractor’s sole risk. If there is a discrepancy between the information provided by the Owner, Engineer, or Construction Manager in electronic files and printed copies, the printed copies govern.

B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
   1. Use of files is solely at contractor's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve Contractor of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that

in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.

2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Contractor is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
3. Contractor is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
4. Contractor shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
5. Contractor shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
6. Contractor shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.8 SHOP DRAWINGS

A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer licensed in Guam responsible for designing components shown on Shop Drawings.
   1. Include signed and sealed calculations to support design.
   2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
   3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Post electronic submittals as PDF electronic files to Project website. Submit electronic submittals via email as PDF electronic files. Submit three (3) hard full size (22X34) copies of each shop drawing to Resident Project Representative for review.

E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 017890 – Project Record Documents

F. Contractor shall fabricate installations after approved shop drawings have been received.

G. Failure to follow the requirement herein shall be the sole risk of the contractor.

1.9 COORDINATION DRAWINGS

A. Prepare drawings in accordance with the requirements of 013000 – Administrative Requirements.

1.10 SAMPLES

A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Samples for Selection as Specified in Product Sections:

1. Submit to Engineer for aesthetic, color, and finish selection.
2. Submit Samples of finishes, textures, and patterns for Engineer selection.

C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.

D. Include identification on each Sample, with full Project information.

E. Submit number of Samples specified in individual Specification Sections; Engineer will retain one Sample.

F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.

G. Samples will not be used for testing purposes unless specifically stated in Specification Section.

H. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 017000 - Execution and Closeout Requirements.

1.11 OTHER SUBMITTALS

A. Closeout Submittals: Comply with Section 017700 - Closeout Procedures.

B. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.

C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.12 TEST REPORTS

A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents or on a monthly basis which ever is less.

1.13 CERTIFICATES

A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results (no more that 1-year old) on material or product but must be acceptable to Engineer.

1.14 MANUFACTURER'S INSTRUCTIONS

A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.15 MANUFACTURER'S FIELD REPORTS

A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.

B. Submit report within 5 days of observation to Engineer for information.

C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.16 ERECTION DRAWINGS

A. Informational Submittal: Submit Drawings for Engineer's knowledge as Contract administrator or for Owner.

B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.17 CONTRACTOR REVIEW

A. Review for full compliance with Contract Documents and approve submittals before transmitting to Resident Project Representative.

B. Contractor: Responsible for:
   1. Determination and verification of materials including manufacturer's catalog numbers.
   2. Determination and verification of field measurements and field construction criteria.
   3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
   4. Determination of accuracy and completeness of dimensions and quantities.
   5. Confirmation and coordination of dimensions and field conditions at Site.
   6. Construction means, techniques, sequences, and procedures.
   7. Safety precautions.
   8. Coordination and performance of Work of all trades.

C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.

D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.18 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of Site and construction throughout progress of Work produced by photographer acceptable to Engineer.

B. Each month submit photographs with Application for Payment

C. Photographs: One print color 8 x 10-inch

D. Take a minimum of four Site photographs for each feature of work at a minimum per week from different directions and five interior photographs indicating relative progress of the Work.

E. Digital Images: Deliver complete set of digital image electronic files on CD-ROM to Owner with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.
   1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1600 by 1200 pixels.
   2. Date and Time: Include date and time in filename for each image.

1.19 ENGINEER REVIEW

A. The Engineer will review and accept, or take other appropriate action upon, the Contractor’s submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking of general conformance with information given and the design concept expressed in the Contract Documents. Corrections or comments made on the submittal or shop drawings during review do not relieve the Contractor from compliance with the requirements of the Contract Documents, including, without limitation, the plans, specifications and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component.

B. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six (6) or more submittals or items in one (1) day or 20 or more submittals or items in one (1) week. If "mass

submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner. Extended review times resulting from “mass submittals” shall not be grounds for additional compensation or an extension of time.

C. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, may not be reviewed, and may be returned marked “For Information Only.”

D. Incomplete, Disorganized, Unclear, Unannotated, or Improperly Numbered Submittals: Will not be reviewed by the Engineer and will be return to the Contractor marked “Not Reviewed.” Complete submittals for each item are required. Delays resulting from incomplete or disorganized submittals are not the responsibility of RPR and no additional time or compensation will be provided related to the resubmittal.

E. Submittals made by Contractor that are not required by Contract Documents may be returned without action marked “Not Reviewed.”

F. If a submittal is returned to the Contractor marked “Reviewed/ No Exceptions Taken,” formal revision and resubmission of said submittal is not required.

G. If a submittal is returned to the Contractor marked “Reviewed/ Exceptions Noted,” formal revision and resubmission of said submittal will not be required provided the Contractor agrees to comply with the Engineer comments provided.

H. Resubmittals:

1. If a submittal is returned to the Contractor marked “Amend as Noted and Resubmit,” the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

2. Resubmittal of portions of multi-page or multi-drawing submittals will not be accepted: For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as “Amend as Noted and Resubmit,” the submittal as a whole is deemed “Amend as Noted and Resubmit,” and 10 drawings are required to be resubmitted.

3. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

I. Rejected Submittals:

1. If a submittal is returned to the Contractor marked “Rejected/ Resubmit,” the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

2. The resubmittal of rejected portions of a previous submittal will not be accepted.

J. The Contractor shall clearly identify each correction or change made in the resubmittals. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of a submittal item. The Owner reserves the right to

withhold monies due to the Contractor to cover additional costs of the Engineer's review beyond the third submittal.

K. Fabrication of an item shall commence only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either "Reviewed/ No Exceptions Taken" or "Reviewed/ Exceptions Noted." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the Contract requirements.

L. Submittal review does not authorize changes to Contract requirements unless accompanied by Change Order.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Quality control.

B. Contractor Quality Control (QC)

C. Quality Control Program (QCP)

D. Tolerances.

E. References.

F. Labeling.

G. Mockup requirements.

H. Testing and inspection services.

I. Manufacturers' field services.

J. Owner’s quality assurance (QA)

K. Owner inspection.

1.2 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.

B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform Work using persons qualified to produce required and specified quality.

D. Products, materials, and equipment may be subject to inspection by Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.

E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 CONTRACTOR QUALITY CONTROL (QC)

A. Specific quality control requirements for the Work are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the Work beyond furnishing of manufactured products.

B. The term “Quality Control” (QC) includes inspection, sampling, testing, and associated requirements performed by the Contractor, as means by which Contractor ensures that the construction, to include that performed by subcontractors and supplies, complies with the requirements of the Contract Documents.

C. The term “Quality Assurance” (QA) refers to similar inspection and testing performed by GWA or the Engineer to review the quality control process.

D. Contractor shall have the primary responsibility for QC. GWA will perform its own QA for the sole purpose of checking the Contractor’s QC program. The Contractor shall not use GWA’s QA program to satisfy or assist with the Contractor’s QC program and shall perform all necessary testing and other QC functions required for submittals and construction to assure a quality project. If the Contractor does not perform the minimum QC functions as outlined in this Section and the detailed Specifications, GWA will perform said QC and retain sufficient money as required from each pay request to reimburse GWA for performing Contractor’s QC.

E. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.

F. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

G. Perform Work using persons qualified to produce required and specified quality.

H. Products, materials, and equipment may be subject to inspection by Engineer and GWA at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.

I. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.4 QUALITY CONTROL PROGRAM (QCP)

A. Quality Control Program: The Contractor shall develop a detailed written QC Program for all Work required under Divisions 0 thru 43, and it shall be reviewed and accepted by the Engineer prior to commencement of the Work. The QC program shall be submitted to the Engineer for approval per Section 013300 – Submittal Procedures. The Contractor shall appoint a full time QC Officer who will have the sole responsibility for monitoring the implementation of the QC Program and not be assigned any other work or position.

1. QC Program: Contractor shall submit a QC program satisfactory to the Engineer within thirty (30) calendar days after notice-to-proceed and prior to the commencement of Work at the site.

B. The QC program manual as a minimum shall contain the following:

1. Project Organization Chart: Contractor shall provide an organizational flow chart and individual responsibilities with respect to QC, including:

    a. All essential Contractor personnel and Subcontractors shall be outlined by title, function, and name.

    b. Field personnel responsible for QC functions shall be named.

    c. Job functions shall be provided detailing Work responsibilities relating to QC.

    d. Qualifications and experience shall be provided for each individual named in Items a and b above.

2. Contractor shall name the independent testing laboratory/laboratories and show their organizational relationship, including all special inspectors required.

3. Policy for providing training and/or certifications to their personnel to perform QC functions. Contractor shall provide a statement in their QC Program that the Contractor shall submit to the Engineer for approval, the qualifications of any individual proposed as a new or alternate QC Officer during the course of the project.

C. Stop Work Authority: Contractor shall provide the names of the individuals who have authority to stop Work, which does not comply with the Contract requirements. Each location or activity of Work shall have a field Quality Control Representative (who reports to the Quality Control Officer) with the “Stop Work Authority” overseeing the Work.

D. The QC Officer shall report to the Contractor’s General Manager and not the Project Manager or Site Superintendent.

E. Documentation and Records: Contractor shall describe the levels of responsibilities for documentation control and transmittal of records/information to the Engineer, including but not limited to:

1. Submittal procedures,

2. As-built procedures,

3. Material and Equipment delivery and tracking procedures,

4. Test reporting and quantity tracking procedures,

5. Deficiency/Non-compliance reporting, resolution, and tracking procedures,

6. Transmittal procedures and time frames, and

7. Audit procedures and frequencies of QC Program.

F. Quality Control Reports: Contractor shall detail their procedures for reporting the QC testing and inspections activities and problem resolutions performed. The Contractor shall provide a description of each type of report and an example of each report form shall be included as an appendix to the QC program manual. The QC reports shall include at a minimum:

1. Daily QC reports,

2. Monthly reports summarizing all QC, activities, testing, and reports, and

3. Final certified report.

G. Inspection and Testing Notification and Reporting: Contractor shall provide the procedure on how verbal and written notifications shall be issued to the Engineer of inspections and testing to be performed on upcoming activities. Minimum time frames for notifications shall be outlined by the Engineer. Contractor shall utilize 'Inspection Sign-Off' forms which shall be used at a minimum, for each of the major activities of Work. 'Inspection Sign-Off' forms shall include signatures from both the Contractor's QC representative and the Engineer's representative(s). Contractor shall include, as an appendix to the QC Program Manual, copies of the Inspection and Testing Notification forms. At a minimum the Contractor shall include:

1. Notifications of inspections and/or testing forms

2. Inspection Sign-off forms

3. Minimum 1-Work Week schedule of concrete pours, compaction testing, and special inspections, detailing location(s), quantity(ies), date(s), and approximate time(s) of pours.

H. Inspection and Testing Procedures: Contractor shall provide written procedures defining methods of construction, control measures and the performance of inspections and testing for the different types of Work. The procedures shall detail "Hold Points," where Work shall not proceed until the required QC and/or GWA QA functions are performed and documentation shows the Work meets the requirements of the Contract. The procedures shall detail problem resolution steps in the event the Work does not meet the Contract Specifications. Contractor shall state that new procedures shall be submitted to the Engineer for approval, as deemed necessary by either the Engineer or Contractor, during the course of the Work. Procedures shall be provided for all major activities of Work and shall be provided for more specific items of Work, as deemed necessary by either the Engineer or Contractor, to properly control the Work. Major Work activities shall include, but not be limited to:

1. Earthwork
2. Asphalt concrete
3. Portland cement concrete
4. Shotcrete
5. Pipe installations
6. Mechanical installations
7. Equipment installations
8. Electrical installations
9. Instrumentation and control installations
10. Painting and protective coatings
11. All quality control activities required for Divisions 2 through 40 inclusive

I. Failing Inspections or Tests: Contractor shall provide procedure(s) detailing actions to be taken when tests show the Material or item of Work does not meet the minimum Contract requirements. In order to control failing QC and Quality Assurance inspections and/or testing, Contractor shall perform 'informational testing.' Contractor shall detail how informational testing will be utilized prior to requesting any acceptance inspection and/or testing from Engineer. Informational testing shall be performed by the Contractor to determine the amount of effort necessary to provide Work which is in compliance with the Contract Documents. Informational testing shall be performed in addition to the minimum testing required by the Contract and approved QC Program. Passing informational test(s), which represent the Work being performed, may be submitted as part of the minimum testing required by the Contract and approved QC Program, only if GWA was given proper advance notification of the testing. Informational testing is not required to be submitted to Engineer as part of the QC documentation but shall be made available for review at Engineer's request.

J. Conflict Resolution: Contractor shall propose what procedures shall be followed whenever there is disagreement between the Contractor's Quality Control and Engineer's Quality Assurance inspection and/or test results. Third party inspections and/or testing may be proposed under the following conditions:

1. The third party shall be a separate independent laboratory, meeting the minimum qualifications set forth above, not performing any additional Work for the Contractor, Subcontractors and/or Suppliers.

2. The third party shall be agreed to by both the Contractor and Engineer.

3. Costs for the third-party testing shall be paid as follows:

    a. Initial inspection or test for the disputed work in question shall be included as part of Contract, paid for by the Contractor.

    b. If the third party's inspection and/or test results reflect Engineer's results, Contractor shall pay for any additional inspection(s) or testing performed by the third party after the initial inspection or test.

    c. If the third party's inspection and/or test results reflect the Contractor's results, Engineer shall pay for any additional inspection(s) or testing performed by the third party after the initial inspection or test.

4. Compensation for third party conflict resolution, for each instance of conflict between the Contractor's and Engineer's inspections and/or testing, shall be as provided in Items 1 through 3 above.

K. Subcontractor QC Programs: Contractor shall certify in writing that the Contractor is responsible for quality control on the project and the Contractor's QC Program shall govern over all the Work, including all Subcontractors. In the event a Subcontractor has a QC Program, the Contractor shall include it as an appendix to the Contractor's QC Program. The Subcontractor's QC Program shall at a minimum provide the requirements set forth in this specification, tailored to the Subcontractor's scope of Work. The Contractor shall detail each Subcontractor's level of QC responsibilities within the Contractor's QC Program.

L. Testing and Inspection Quantities and Frequencies: Contractor shall include, as an appendix to the Contractor's QC Program, a list of all items of Work and material to be inspected and/or tested for the Work. The Testing and Inspection Quantities and Frequencies list shall be used to verify the minimum frequency of QC testing and/or inspections required are being performed. In all cases the minimum testing frequencies required in the Contract Documents shall maintain precedence. The list shall include the following:

1. Estimated quantity of all Material or Work expected to be incorporated into the project

2. Type(s) of inspections, certifications and/or tests required

3. Expected minimum number of tests and/or inspections to be performed

M. Testing Timetable: Contractor shall provide a list of all tests expected to be performed by the Contractor, Independent testing laboratory, Subcontractor, Special Inspector, or other denoted Quality Control field representative stating the time required to perform the test and/or inspection which includes the time required to obtain the results. The Testing Timetable list shall be referenced within the Contractor's Inspection and Testing Procedures as hold points until the results have been obtained and transmitted to the appropriate Quality Control representative and the Engineer.

N. Program Revisions

1. QC is an on-going process throughout the duration of the Work. Revisions, modifications, additions, and/or deletions to the procedures set forth in the approved QC Program may be necessary at any time during the life of the Contract Work. Such revisions, modifications, additions, and/or deletions to the procedures may be requested by the Contractor or ordered by the Engineer.

2. Contractor shall submit for approval any revisions, modifications, additions and/or deletions to the procedures. All revisions, modifications, additions, and/or deletions to the QC procedures shall be submitted in accordance with Section 01300 – Contractor Submittals. All Work affected by any revisions, modifications, additions, and/or deletions to the procedures shall not be performed until they are approved by the Engineer for incorporation into the Contractor's QC Program. No increase in Contract Times or Price shall be due the Contractor for any delays to the Contract Work caused by any such revisions, modifications, additions, and/or deletions to the QC procedures whether or not such changes were requested by the Contractor or ordered by the Engineer.

O. Contractor's QC Officer shall input a detailed daily Quality Control Report that summarizes all testing and quality control activities performed that day as part of the Contractor's Daily Report.

P. Progress Pay Estimate: The approval of the initial Progress Pay Estimate is dependent on the acceptance of the Quality Control Program (QCP) by Engineer. Payment will not be processed until the QCP has been accepted by the Engineer.

Q. Noncompliance Report

1. If any Work is not performed in accordance with the Contract Documents, GWA may issue a Noncompliance Report (NCR). With the issuance of an NCR, GWA reserves the

right to withhold payment for the Work in question until such time as that Work has been corrected and is in compliance with the Contract Documents.

2. Noncompliance Reports shall be corrected immediately unless otherwise agreed to in writing with GWA.

R. Final Reporting: Contractor shall submit a final report cataloging all test results prior to final payment. The final report shall contain a certification by the testing laboratory indicating that all reports are included and were performed in accordance with the Contract Documents.

1.5 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents the more stringent shall apply.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.6 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.

C. Obtain copies of standards and maintain on Site when required by product Specification Sections.

D. When requirements of indicated reference standards conflict with Contract Documents the more stringent shall apply.

E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.7 LABELING

A. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:

1. Model number.
2. Serial number.
3. Performance characteristics.

B. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.8 MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.

B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mockups shall be comparison standard for remaining Work.

D. Where mockup has been accepted by Architect/Engineer and is specified in product Specification Sections to be removed, remove mockup and clear area when directed to do so by Engineer.

1.9 TESTING AND INSPECTION SERVICES

A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.
   1. Within 30 days of NTP, submit testing laboratory name, address, and telephone number, and names of full-time specialist and responsible officer.
   2. Submit copy of report of laboratory facilities' inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.

B. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Engineer or Owner.

C. The Contractor shall not use the same independent third party for its QC samples as the Resident Project Representative (RPR) selects for its QA.

D. Reports shall be submitted by independent firm to Engineer, Contractor, and authorities having jurisdiction, indicating observations and results of tests and compliance or noncompliance with Contract Documents.
   1. Submit final report indicating correction of Work previously reported as noncompliant.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

   1. Notify Engineer, RPR, and independent firm a minimum of three (3) full working days before expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.

F. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.

G. QA retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price on a monthly basis.

H. Agency Responsibilities:
1. Test Samples of mixes submitted by Contractor.
2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
3. Perform indicated sampling and testing of products according to specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
6. Perform additional tests required by Engineer.
7. Attend preconstruction meetings and progress meetings.

I. Agency Reports: After each test, promptly submit two copies of report to Resident Project Representative, Contractor, and authorities having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:
1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and Specification Section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

J. Limits on Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency or laboratory may not assume duties of Contractor.
4. Agency or laboratory has no authority to stop the Work.

1.10 MANUFACTURER'S FIELD SERVICES

A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, commissioning as applicable, and to initiate instructions when necessary.

B. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

C. Refer to Section 013300 - Submittal Procedures, "Manufacturer's Field Reports" Article.

1.11 OWNER'S QUALITY ASSURANCE (QA)

A. All Work is subject to GWA's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.

B. GWA's quality assurance inspections and tests are for the sole benefit of GWA and do not:

1. Relieve Contractor of responsibility for providing adequate quality control measures;

2. Relieve Contractor of responsibility for damage to or loss of the material before acceptance;

3. Constitute or imply acceptance; or

4. Affect the continuing rights of GWA after acceptance of the completed Work.

C. Quality assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.

D. Unless otherwise indicated, all sampling and testing will be in accordance with the methods prescribed in the reference standards, as applicable to the class and nature of the article or materials considered; however, GWA reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the Engineer will assure GWA that the quality of the workmanship is in full accord with the Contract Documents.

1.12 OWNER INSPECTION

A. Owner's Access: At all times during the progress of the Work and until the date of final completion, afford GWA and Engineer reasonable, safe, and proper facility for inspecting and performing testing for all Work at the site or at the manufacturer facilities. Any observation, inspections, and/or testing performed by Engineer shall not relieve the Contractor of the Contractor's obligations to perform the QC inspections, sampling and/or testing required under this Contract. Contractor shall replace Work rejected due to faulty design, inferior or defective materials, poor workmanship, improper installation, excessive wear, or nonconformity with the requirements of the Contract Documents, with satisfactory Work at no additional cost to GWA. Contractor shall replace as directed, finished or unfinished Work found not to be in strict accordance with the Contract, even though such Work may have been previously approved and payment made therefore.

B. Rejection: GWA and the Engineer shall have the right to reject materials and workmanship which are defective or require correction. Contractor shall promptly remove rejected Work and materials from the Site.

C. Removal for Examination: Should it be considered necessary or advisable by GWA or GWA's authorized representatives, at any time before final acceptance of the Work, to make examinations of portions of the Work already completed, by removing or tearing out such portions, Contractor shall promptly furnish all necessary facilities, labor, and material, to make such an examination. If such Work is found to be defective in any respect, Contractor shall

defray all expenses of such examination and of satisfactory reconstruction. If, however, such Work is found to meet the requirements of the Contract, the cost of examination and restoration of the Work will be considered a change in the Work to be paid for in accordance with applicable provisions of the Contract.

D. Operation Responsibility: Contractor shall assume full responsibility for the proper operation of equipment during tests, start-up and training sessions. Contractor shall make no claim for damage which may occur to equipment prior to the time when GWA accepts the Work

E. Rejection Prior to Warranty Expiration: If, at any time prior to the expiration of any applicable warranties or guarantees, equipment is rejected by GWA or GWA's authorized representatives, Contractor shall repay to GWA all sums of money received for the rejected equipment on progress certificates or otherwise on account of the Contract lump sum prices, and upon the receipt of the sum of money, GWA will execute and deliver a bill of sale of all its rights, title, and interest in and to the rejected equipment. Contractor shall not remove the equipment from the premises of GWA until GWA obtains from other sources equipment to take the place of that rejected. GWA hereby agrees to obtain other equipment within a reasonable time and the Contractor agrees that GWA may use the equipment furnished by the Contractor without rental or other charge until the other new equipment is obtained. After rejected equipment is replaced, Contractor shall remove rejected equipment from the Site at no cost to GWA.

F. Work buried prior to examination by GWA or the Engineer shall be re-excavated for examination at no additional cost to GWA.

G. Contractor shall reimburse GWA for the costs of any job site inspection and testing between the hours of 4:30 p.m. and 7:00 a.m. Monday through Friday, all day Saturday and all day Sunday, and legal holidays. Payment for referenced additional services will be charged to contractor by deducting charges from contract SLM/Price on a monthly basis. Fee for staff shall be based on ½ day (4 hours) of services.

H. Special Inspection

1. Special inspections shall be provided by and are the responsibility of the Engineer and conducted in accordance with provisions of IBC 2009 Section 1704.

2. In addition to the inspection procedures and requirements of IBC 2009, the Engineer/Owner shall employ one or more DPW-approved special inspector(s), as required by and acceptable to the DPW/Building Official, who shall provide "special inspections" during construction.

3. Special inspection shall cover, but not be limited to, the following type of work:

   a. Concrete
   b. Anchor bolts installed in concrete
   c. Reinforcing steel
   d. Epoxy dowels and anchors
   e. Mechanical anchors
   f. Structural welding and high strength bolting

4. Special Inspector shall furnish signed testing and inspection reports to GWA and the Contractor indicating the work inspected on a daily and/or weekly basis at his/her

discretion. Discrepancies shall be brought to the immediate attention of the Contractor for correction, then, if uncorrected, to GWA.

5. Final Report: Special Inspector shall submit a final report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the construction documents and the applicable provisions of the building code.

6. On a weekly basis, the Contractor shall provide a two-week look-ahead schedule specifically for work requiring special inspections. Special inspection requests shall be provide in writing and received by the RPR a minimum of three (3) full working days prior the desired inspections. Failure to provide three (3) full working days advance notice shall not be grounds for a delay claim or time extension, or increase in contract price.

7. The Contractor shall cause the work to remain accessible and exposed for inspection purposes during the hours of 8:00 a.m. through 5:00 p.m., Monday to Friday unless otherwise agreed to by the Construction Manager.

8. The Contractor shall not permit the performance of Work requiring special inspection or QA testing on Saturday, Sunday or any legal holidays without the written consent after submitting written consent to the Engineer a minimum of three (3) full working days prior.

9. It shall be at the Contractor's expense if removal and replacement of materials are required to allow inspection.

10. The Special Inspector shall not be responsible for the means, methods, techniques, sequences or procedures of construction selected by the Contractor.

11. The Contractor shall be solely responsible for final Quality Control review of work to ensure that items observed by the Special Inspector have not been moved, removed, displaced or dislodged by the various Subcontractors working on the site between inspection and completion of work.

12. Contractor shall pay for all related costs such as re-work, including material replacement, and re-testing when non-conforming work has been found resulting from QA tests and inspections.

13. The special inspection final report shall document the required special inspections and corrections of discrepancies noted in the inspections. It is not a guarantee or warranty that the final construction is in complete conformance with the Construction Documents nor the workmanship provisions of the Building Code.

14. Acceptance as a result of inspection shall not be construed as an acceptance of a violation of building code provisions or other ordinances of the Guam jurisdiction.

15. Substitution as a result of an inspection shall not be allowed. The Contractor shall seek the approval of the Engineer of Record for any changes or substitutions.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:

1. Temporary electricity.
2. Communication services.
3. Temporary water service.
4. Temporary sanitary facilities.

B. Construction Facilities:

1. Field offices and sheds.
2. Vehicular access.
3. Parking.
4. Progress cleaning and waste removal.
5. Traffic regulation.
6. Fire-prevention facilities.

C. Temporary Controls:

1. Barriers.
2. Enclosures and fencing.
3. Security.
4. Water control.

D. Removal of utilities, facilities, and controls.

1.2 SUBMITTALS

A. Provide site layout plan for all temporary offices, fencing, gates, parking and access ways to be reviewed and approved by the engineer.

B. A shop drawing indicating the layout of all temporary construction fencing, barriers and gates shall be provided by the contractor to the RPR for approval. The placement of construction fencing and gates shall comply, throughout the life of the project, to the approved layout.

1.3 TEMPORARY FACILITIES

A. Within 45 calendar days after date established in Notice-to-Proceed, the Contractor shall provide complete and fully functional facilities to include but not limited to all electricity, lighting, communication, water, sanitary services, field offices & sheds, furniture, vehicular access, parking, progress cleaning, waste removal, fire preventions facilities, etc. as specified herein.

B. Temporary Provisions Provided for Resident Project Representative:
   1. Temporary barriers, barricades, covered walkways, fencing, exterior closures, and interior closures.
   2. Temporary field offices.
   3. Cleaning during construction.
   4. Access roads and approaches.
   5. Temporary sanitary facilities.
   6. Temporary ventilating after enclosure.
   7. Temporary electrical service and distribution system for power and lighting.
   8. Temporary telephone and internet service.

C. Coordinate provisions with Resident Project Representative and provide the following items as necessary for execution of the Work including associated costs:
   1. Construction aids.
   2. Temporary fire protection, dust control, erosion and sediment control, water control, noise control, and other necessary temporary controls.
   3. Temporary barriers, barricades, and similar devices as necessary for safety and protection of construction personnel and public.
   4. On Resident Project Representative's approval, provide temporary field office including electrical service and temporary telephone.
   5. Electrical service required in addition to temporary service and distribution provided by Resident Project Representative.
   6. Temporary provisions for protection of installed Work.
   7. Temporary cooling before building enclosure

1.4 TEMPORARY ELECTRICITY

A. Contractor shall pay for all power service use charges at the site, including costs associated with installing a meter, service lines and other necessary infrastructure to the site. Costs include all power used at the site, whether metered or not. The power service use charges include all power used by all entities engaged in construction activities at Project Site

B. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
   1. Install electric power service underground, unless overhead service must be used.
   2. Install power distribution wiring overhead and rise vertically where least exposed to damage.

C. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
   1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
   2. Provide warning signs at power outlets other than 110 to 120 V.
   3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
   4. Provide metal conduit enclosures or boxes for wiring devices.

5. Provide 4-gang outlets, spaced so 100-foot (30-m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

1.5 TEMPORARY COMMUNICATION SERVICES

A. Telephone Service: Provide, maintain, and pay for telephone service to field office and Engineer's field office at time of Project mobilization and until completion of Work.

B. The RPR's telephone shall be separate from the Contractor's (not shared). Each telephone shall have one intercom and two incoming/outgoing lines, touch tone, with conference speaker on each phone, and 12-foot coiled handset cord or wireless.

C. Internet Service: Provide, maintain, and pay for consistent and stable landline Internet service, at 100 Mbs minimum, to field office and RPR's field office. This access must have a minimum of 8 (5 usable) IP address. In addition, it must provide an average round-trip delay of less than 150 ms to the RPR's internet gateway. Provide modem and wireless router compatible with subscribed internet service with no less than 100 gb of monthly data. Should 100 gb of monthly data be insufficient and causes throttling, Contractor shall upgrade monthly data capacity to the satisfaction of the RPR at no additional cost to the Project.

1.6 TEMPORARY WATER SERVICE

A. Provide and pay for suitable quality water service as needed to field office and RPR's field office to maintain specified conditions for constructions. This includes costs associated with installing a meter, service laterals, and other necessary infrastructure to the site. The water service use charges include all water used by all entities engaged in construction activities at Project site including potable water required for water tightness testing on liquid containing structures. Coordinate with GWA for obtaining water service connection to existing water source and install backflow preventer per GWA Standards. Allow a minimum of three (3) weeks' notice to GWA. Provide separate metering and pay GWA for cost of water used. Pay all fees for the water meter and all other charges for water use.

B. Extend branch piping with outlets located so that water is available by hoses with threaded connections.

C. The Contractor shall provide and operate all pumping facilities, pipelines, valves, hydrants, storage tanks, and all other equipment necessary for the adequate development and operation of the temporary water supply system. Water used for domestic purposes shall be free of contamination and shall conform to the requirements of Guam EPA for potable water. The Contractor shall be solely responsible for the adequate functioning of its water supply system and shall be solely liable for any claims arising from the use of same, including discharge or waste of water therefrom.

D. The Contractor shall not operate existing valves or fire hydrants, without the written approval of GWA.

1.7 TEMPORARY SANITARY FACILITIES

A. Provide and maintain a separate and lockable facilities and enclosures for the RPR's team. Use of existing facilities is not permitted. Provide separate and lockable sanitary facilities for RPR.

B. Maintain a clean and sanitary condition daily.

C. Establish a regular weekly collection of all sanitary and organic waste. All waste and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the project site in a manner satisfactory to the RPR and in accordance with local and federal laws and regulations pertaining thereto.

D. At end of construction, return existing facilities used for construction operations to same or better condition as original condition.

E. No permanent sewer connection shall be made by the Contractor, without the approval of Owner.

1.8 FIELD OFFICES AND SHEDS

A. Field Offices: Mobile units or Job-built construction with lockable entrances, operable windows, and serviceable finishes; air conditioned; on foundations adequate for normal loading. Minimum size for Resident Project Representative's Office shall be 320 square feet.

1. Resident Project Representatives Office Equipment and Furnishings:
    a. Six desk 54 x 30 inches, with three drawers.
    b. One drafting or layout table 36 x 72 inches, or similar table.
    c. One metal, double-door storage cabinet under table.
    d. Plan rack to hold working Drawings, shop drawings, and record documents.
    e. One standard four-drawer legal-size metal filling cabinet with locks and two keys for each lock.
    f. Six linear ft. of metal or wooden bookshelves six feet in height
    g. Six swivel arm chairs.
    h. One drafting stool
    i. Electrical Outlets: Minimum eight 110 volt duplex, convenience outlets, four on each wall. Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light. Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
    j. Internet/Telephone/Fax Service: As specified in Part 1.5 A and B
    k. Sanitary Facilities: Convenient access to lavatory toilet facilities.
    l. Drinking Fountain/Water Cooler: Convenient access by workers.
    m. Copy Machine: Full function color copier capable of copying, scanning, stapling, hole punching and printing Letter, legal, and 11"x17" prints.
    n. White Board: One 4'x8' dry erase white board.
    o. Waste Disposal: Three waste baskets.
    p. Minimum 2 cubic foot refrigerator freezer.
    q. One tackboard 36 x 30 inches.

B. Environmental Controls for Resident Project Representative's Office:
   1. Cooling and Ventilating for Offices: Automatic equipment to maintain comfort conditions. 72 degrees F cooling.
   2. Storage Spaces: Ventilation as needed to maintain products in accordance with Contract Documents; lighting for maintenance and inspection of products.
   3. Windows: Minimum two, with operable sash and insect screens and security grill. Locate to provide views of construction area.

C. The contractor's field office shall have a conference room capable of holding up to 20 personnel. Power telephone, and high speed internet service shall be provided for onsite conferences.

1.9 VEHICULAR ACCESS

A. Construct temporary access roads from public thoroughfares to serve construction area, of width and load-bearing capacity to accommodate unimpeded traffic for construction purposes.

B. Construct temporary culverts to span low areas and allow unimpeded drainage.

C. Extend and relocate vehicular access as Work progress requires and provide detours as necessary for unimpeded traffic flow.

D. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the RPR and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the RPR or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent tot the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.

E. Locate as approved by Engineer

F. Provide unimpeded access for emergency vehicles. Maintain 20-foot wide driveways with turning space between and around combustible materials.

G. Provide and maintain access to fire hydrants free of obstructions.

H. Provide means of removing mud from vehicle wheels before entering streets.

1.10 PARKING

A. Provide temporary gravel surface parking areas to accommodate construction personnel.

B. Locate as approved by Engineer.

C. If Site space is not adequate, provide additional off-Site parking.

D. Use of designated areas of existing on-Site streets and driveways used for construction traffic is not permitted. Tracked vehicles are not allowed on paved areas.

E. Use of designated areas of existing parking facilities used by construction personnel is not permitted.

F. Do not allow heavy vehicles or construction equipment in parking areas.

G. Do not allow vehicle parking on existing pavement.

H. Designate six (6) parking spaces for Engineer

I. Maintenance:
   1. Maintain traffic and parking areas in sound condition .
   2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.

J. Removal &Repair:
   1. Remove temporary materials and construction at Substantial Completion.
   2. Remove underground Work and compacted materials to depth of 2 feet; fill and grade Site as indicated.
   3. Repair existing facilities damaged by use, to original condition.

K. Mud from Site vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.11 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, before enclosing spaces.

C. Broom and vacuum clean interior areas before starting surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and rubbish from Site weekly and dispose of off-Site.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 TRAFFIC REGULATION

A. Signs, Signals, and Devices:

1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
2. Traffic Control Signals: As approved by local jurisdictions.
3. Traffic Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
4. Flag Person Equipment: As required by authorities having jurisdiction.

B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

D. Haul Routes:
1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
2. Confine construction traffic to designated haul routes.
3. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.

E. Traffic Signs and Signals:
1. Provide signs at approaches to Site and on Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
2. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
3. Relocate signs and signals as Work progresses, to maintain effective traffic control.

F. Removal:
1. Remove equipment and devices when no longer required.
2. Repair damage caused by installation.
3. Remove post settings to depth of 2 feet.

1.13 FIRE-PREVENTION FACILITIES

A. Prohibit smoking within buildings under construction and demolition. Designate area on Site where smoking is permitted. Provide approved ashtrays in designated smoking areas.

B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B: C UL rating.
1. Provide minimum of one fire extinguisher in every construction trailer and storage shed.

1.14 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas , to allow for Owner's use of Site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

1. Replace trees and plants damaged by construction operations.

B. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.15 ENCLOSURES AND FENCING

A. Construction: Contractor's option
1. Temporary construction fencing and gates shall be of a similar style and color , and maintained in good order.
2. Avoid excavating for fence posts above existing underground utilities. Verify, as required, the location and depth of surrounding utilities prior to excavation.
3. Fence posts shall be securely fastened to the ground or finished surface. Where fencing must be moved or opened frequently, the Resident Project Representative may approve use of portable fencing sections. All other requirements for fencing apply to the portable sections.

B. Provide project fence, minimum 6-foot high, around visible areas of construction site; equip with vehicular gates with locks. Temporary site fence make and material may be contactors option

C. Exterior Enclosures:

1. Provide temporary weathertight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.16 SECURITY

A. Security Program:

1. Protect Work on existing premises from theft, vandalism, and unauthorized entry.
2. Initiate site security system and program at Project mobilization which shall provide adequate 24-hour security for the construction facilities and stored and installed material at the Site. The Contractor shall provide security to the satisfaction of the Owner and RPR. Considerations will include, but not be limited to the following:

a. Protect and maintain existing Site security fencing. Promptly repair any damage made to fencing.
b. Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.
c. Keep gates and doors locked when not working onsite. Secure Site at end of each day.
d. Provide high security locked containers in fenced area for material storage or off-site approved and bonded storage area.
e. Allow permanent lock structures to be capable of being serviced with temporary or permanent high security lock prior to installation.

f. Remove temporary fences and restore Site to original condition at completion of the Work

3. Maintain program throughout construction period until Owner's acceptance precludes need for Contractor's security. This includes non-working hours, weekends, and holidays.
4. Provide the RPR with a list of 24-hour emergency phone numbers.
5. The Contractor is wholly responsible for the security of the construction facilities, storage compound and laydown areas, and for all their plant, material, equipment and tools at all times. This includes the contents of the RPR and Owner field office in the event of theft.
6. The Contractor shall be responsible for the replacement of any stolen, damaged, or vandalism to the RPR Team's materials or equipment.

B. Entry Control:

1. Restrict entrance of persons and vehicles to Project Site and existing facilities.
2. Allow entrance only to authorized persons with proper identification.
3. Maintain log of workers and visitors and make available to Owner on request.
4. Coordinate access of Owner's personnel to Site in coordination with Owner's security forces.
5. Maintain the program throughout the construction period.

C. Security Service:

1. The Contractor shall employ uniformed guard service to provide guards on Site during nonworking hours, weekends and holidays.

2. Provide 24/7 onsite security for the construction facilities and stored and installed material at the Site.

1.17 WATER CONTROL

A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.

1.18 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials before Final Application for Payment inspection.

B. Remove underground installations to minimum depth of 2 feet. Grade Site as indicated on Drawings.

C. Clean and repair damage caused by installation or use of temporary Work.

D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 015000

SECTION 015010 – ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. This Section references the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
   1. EPA 40 CFR 61 Subpart B - National Emission Standards for Asbestos (1979)
   2. OSHA 29 CFR 1910.94 - General Industry Safety and Health Standards, Subpart G
   3. 10 GCA, Chapter 51 - Guam's Solid Waste Management Law and Regulations; and
   4. Guam's Solid Waste Disposal Rules and Regulations

1.2 SUMMARY

A. Section Includes:
   1. Submittals
      a. Environmental Protection Plan
      b. Stormwater Pollution Prevention Plan and Notice of Intent
   2. Special Environmental Protection Requirements
   3. Execution
      a. Protection of Natural Resources
      b. Control and Disposal of Solid, Chemical, and Sanitary Wastes
      c. Disposal
      d. Noise
      e. Pest and Rodent control

1.3 DEFINITIONS

A. Sediment: Soil and other debris that has been eroded and transported by runoff water.

B. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials except hazardous waste resulting from industrial, commercial, and agricultural operations, and from community activities.

C. Rubbish: A variety of combustible and noncombustible wastes such as paper, boxes, glass, crockery, metal, lumber, cans, and bones.

D. Debris: Includes combustible and noncombustible wastes such as ashes, waste materials that result from construction or maintenance and repair work, leaves, and tree trimmings.

E. Chemical Wastes: Includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

F. Asbestos and Asbestos Materials: Asbestos means actinolite, amosite, anthophyllite, chyrysotile, crocidolite, and tremolite. Asbestos material means asbestos or any material containing asbestos such as asbestos waste, scrap, debris bags, containers, equipment, and asbestos-contaminated clothing consigned for disposal. Friable asbestos material means any material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder, when dry, by pressure.

G. Oily Waste: Petroleum products and bituminous materials.

H. Hazardous Waste: Hazardous substances as defined in 40 CFR 261 or as defined by applicable local regulations.

1.4 SUBMITTALS

A. Environmental Protection Plan (EPP):

Submit four copies of the Guam EPA required Environmental Protection Plan not later than 14 days after the preconstruction meeting. The Environmental Protection Plan must be submitted to the Resident Project Representative for review and approval prior to submission to GEPA.

The EPP shall be prepared in accordance with GEPA's Environmental Protection Plans Requirements for Their Application, Preparation and Implementation

1. Environmental Protection Plan Requirements
    a. No requirement in this Section will relieve the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.
    b. Contents: Include in the environmental protection plan, but not limit it to, the following:
        1) Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
        2) Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.
        3) Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
        4) Description of the Contractor's environmental protection personnel training program.
        5) An erosion and sediment control (ESC) plan which identifies the type and location of the erosion and sediment controls to be provided. The plan must include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. The project plans provide template ESC Plans for the contractor to use as appropriate. The contractor may elect to implement their own ESC measures provided the contractors ESC plan is prepared by a professional engineer and reviewed by the Resident Project Representative.
        6) Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas,

structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

7) Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

8) Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

B. Storm water pollution prevention plan (SWPPP) and Notice of Intent (for sites greater then 1 acre each):

Submit two copies of the proposed SWPPP no later than 14 days after the preconstruction meeting. The SWPPP shall include the following requirements:

1. Erosion and Sediment control plan
2. Inspection requirements and frequencies
3. Training
4. Spill prevention and protection measures
5. A draft SWPPP will be made available to the contractor. A sample template for the SWPPP may be found at the following link:

   http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Pollution-Prevention-Plans-for-Construction-Activities.cfm

   Once acceptable to the Resident Project Representative, submit the SWPPP to GEPA and apply for the Notice of Intent (NOI). Provide NOI to Resident Project Representative once received.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

A. Oily Substances: Take special measures to prevent oily or other hazardous sub-stances from entering the ground, drainage areas, or local bodies of water. Surround all temporary fuel oil, petroleum, or liquid chemical storage tanks with a temporary impervious berm or containment system of sufficient size and strength to contain the contents of the tanks in the event of content leakage or spillage.

3.2 CONTROL AND DISPOSAL OF SOLID, CHEMICAL, AND SANITARY WASTES

A. Pick up solid wastes and place in containers which are emptied on a regular schedule. The preparation, cooking, and disposing of food is strictly prohibited on the project site. Conduct

handling and disposal of wastes to prevent contamination of the site and other areas. On completion, leave areas clean and natural looking.

B. Disposal of Rubbish and Debris: Remove rubbish and debris from Government property and dispose of it in compliance with Federal, state and local requirements. Waste manifest tickets may be requested by the Resident Project Representative or Guam EPA.

C. Garbage Disposal: Remove garbage to a pickup point or disposal area as directed by the Resident Project Representative.

D. Absolutely no burning of solid waste.

E. Sewage, Odor, and Pest Control: Dispose of sewage through connection to existing sanitary sewage systems(s). Where such system is not accessible, use chemical toilets or comparably effective units and periodically empty wastes in an approved location. Include provisions for pest control and elimination of odors.

F. Chemical Waste: Store chemical waste in corrosion resistant containers labeled to identify type of waste and date filled. Remove containers from the project site, and dispose of chemical waste in accordance with Federal, State and local regulations. For oil and hazardous material spills which may be large enough to violate Federal, State, and local laws and regulations, notify the Resident Project Representative immediately. Conduct fueling and lubricating of equipment and motor vehicles in a manner that affords the maximum protection against spills and evaporation. Dispose of lubricants to be discarded and excess oil in accordance with approved procedures meeting Federal, State and local regulations.

3.3 NOISE

A. When available, make the maximum use of "low-noise-emission products" as certified by EPA.

B. Provide methods, means, and facilities to minimize noise produced by construction operations.

C. Sound Level Restrictions: Sound pressure level measured at boundary of Site shall not exceed 85 dBA.

3.4 PEST AND RODENT CONTROL

A. Provide methods, means, and facilities to prevent pests and insects from entering facility.

B. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

END OF SECTION 015010

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. At minimum, comply with specified requirements and reference standards.

B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.

C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.

D. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.

E. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products according to manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products according to manufacturer's instructions.

B. Store products with seals and labels intact and legible.

C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.

D. For exterior storage of fabricated products, place products on sloped supports aboveground.

E. Provide bonded off-Site storage and protection when Site does not permit on-Site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to contract requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6-foot long cord and plug including grounding connector for connection to electric wiring system. Cord of longer length may be specified in individual Specification Sections.

PART 3 - EXECUTION - Not Used

END OF SECTION 016000

SECTION 016800 – WATERTIGHTNESS TEST FOR HYDRAULIC STRUCTURES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials and incidentals required and perform watertightness testing of water-containing structures as listed herein and all retesting until the structures meet the requirements as specified herein.

1.2 RELATED WORK

A. Drawings and general provisions of the Contract, including, General and Supplementary Conditions and other Divisions 1 Specification Sections, apply to this Section.

B. Concrete is included in Division 03.

1.3 SUBMITTALS

A. Submit, in accordance with Division 01, the results of each watertightness test of each structure. The submittal format shall be similar to that shown in Figure A attached to end of this Section.

1.4 REFERENCE STANDARDS

A. American Water Works Association (AWWA)

B. American Concrete Institute (ACI)
   1. ACI 350.10 - Tightness Testing of Environmental Engineering Concrete Containment Structures.

1.5 PROJECT/SITE REQUIREMENTS

A. Coordinate timing and procedures for obtaining testing water and structure testing with the Resident Project Representative and Owner a minimum of two weeks in advance of the actual testing.

B. Water Source and Disposal
   1. Contractor shall use clean water. Cost for water used during testing shall be borne by the contractor. Obtain Resident Project Representative’s approval for obtaining water for testing.
   2. Test water shall be disposed of by reintroduction into the existing Plant process or existing plant drain system at the time, rate of flow and location approved by the Resident Project Representative.

PART 2 - PRODUCTS

2.1 Waterproofing Material

A. Interior waterproofing coating concrete Surfaces, Immersed Environments:
   1. Service Conditions: For use with concrete surfaces subjected to raw wastewater
   2. Material: Cementitious crystalline concrete waterproofing, Xypex or approved equal

PART 3 - EXECUTION

3.1 GENERAL

A. The testing of concrete water containment structures shall conform to the following standards and as modified herein:
   1. Reinforced concrete liquid-containing structures - ACI 350.1 and as specified herein.

B. Interior waterproofing coating of the all wetted surface shall be complete for all water bearing processes listed in section 3.6 of this specification. Surfaces include all interior wetted surfaces that are not otherwise coated by other contractor requirements. Interior waterproofing may be done prior to leak testing.

C. Perform watertightness test prior to placing backfill around structure in order to permit observation and detection of leakage points. Walls may be backfilled only when approved in writing by the Resident Project Representative and once the following condition has been met:
   1. Qualitative portion (Part 1) of the leak test has been accepted by the Resident Project Representative.

D. A written request to backfill prior to testing shall include a description of the method proposed to detect leakage points after the backfill is in place. Approval to place backfill prior to testing shall not relieve the Contractor of the responsibility for conducting watertightness tests.

3.2 PREPARATION

A. Thoroughly clean the structure to be tested of dirt, mud and construction debris prior to initiating watertightness tests. The floor and sumps shall be flushed with water to provide a clean surface, ready for testing.

B. Inspect the structure to be tested for potential leakage paths such as cracks, voids, etc. and repair such paths in compliance with the provisions specified herein or as approved by the Resident Project Representative. All crack repair shall be at no additional cost to the Owner and considered incidental to the Work.

C. Confirm adequacy of seals around gates and valves and reset or seal as approved by the Resident Project Representative. Estimates of gate or valve leakage will not be allowed as adjustments to the measured tank or structure leakage.

D. Inlet and outlet pipes not required to be operational for the tests may be temporarily sealed or bulkheaded prior to testing.

3.3 TESTING PROCEDURES

A. Conditions of Testing
   1. Perform tightness testing in conformance with Section 2 of ACI 350.1 (Hydrostatic Tightness Test for Open or covered Containment Structures). The hydrostatic test quantitative criteria shall be 0.050% of volume per day.
   2. Do not begin initial filling of concrete structures until all concrete elements of the structure have attained the design 28-day compressive strength of the concrete, nor less than 14 days after all concrete walls or base slabs have been placed.
   3. Initial filling rate, water depth and waiting period shall conform to the requirements of ACI 350.1.
   4. Fill coated, unlined or partially lined concrete structures to the maximum operating water surface level and maintain the water at that level for a minimum of 72 hours prior to beginning watertightness tests to minimize water adsorption by the concrete during testing.

B. Testing Procedures
   1. Duration of the test shall not be less than that required for a drop in the water surface of 3/8-in based on the calculated maximum allowable leakage rate but need not exceed five (5) days.
   2. Loss of volume measurements shall be taken at 24 hour intervals. The loss of volume is usually determined by measuring the drop in water surface elevation and computing the change in volume of the contained water. Measure water surface elevation at not less than two locations at 180 degrees apart and preferably at four locations 90 degrees apart. Record water temperature 18-in below the water surface when taking the first and last sets of measurements.

C. Reports
   1. Submit to the Resident Project Representative watertightness test results for each structure.
   2. Notify the Resident Project Representative of the scheduling of tests 5 working days prior to the tests. The Resident Project Representative will monitor any watertightness testing performed on the structures.

3.4 ACCEPTANCE

A. The following conditions shall be considered as NOT meeting the criteria for acceptance regardless of the actual loss of water volume from the structure.
   1. Ground water leakage into the structure.
   2. Structures which exhibit water flowing from the containment structure or from beneath the foundation (except for underdrain systems).
   3. Other requirements of ACI 350.1.

3.5 REPAIRS AND RETESTING

A. Structures failing the watertightness test and not exhibiting visible leakage may be retested after an additional stabilization period of 7 days. Structures failing this retest shall be repaired prior to further testing.

B. Repair structures which fail the watertightness test and structures showing visible leakage in compliance with the provisions specified herein, as approved by the Resident Project Representative.

C. Repairs and retesting of tanks shall be accomplished at no additional cost to the Owner.

3.6 SCHEDULE

A. All water bearing structures for the following processes shall be tested for watertightness:
GAC Vessel All new and refurbished welded steel vessels

END OF SECTION 016800

SECTION 017000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.

B. Related Sections include the following:
   1. Division 1 Section "Submittal Procedures" for submitting surveys.
   2. Division 1 Section "Closeout Procedures" for submitting Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Field Engineering: Submit certified plan prepared by a professional land surveyor verifying that all benchmarks, horizontal and vertical control points comply with Project requirements.

B. Landfill/Hardfill Receipts: Submit copy of receipts issued by a landfill/Hardfill facility.

C. Contractor shall bring all inverts along the hydraulic profile to within (+/-) 0.01 feet to that as shown on the plans. All other gravity piping shall be to within (+/-) 0.02 feet unless otherwise indicated. Contractor shall immediately correct all areas that are outside of this tolerance at no expense to the owner.

D. Contractor shall bring the final grade to within (+/-) 0.16 feet to that as shown on the plans. Contractor shall immediately correct all areas that are outside of this tolerance at no expense to the owner.

E. Results shall be provided to the Engineer in both hard copy and AutoCAD forms.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in Guam and who is experienced in providing land-surveying services.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Utilities: The existence and location of site improvements, utilities above and below ground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Resident Project Representative promptly. Failure by the Contractor to complete verification survey prior to starting the Work shall be considered acceptance of the survey control by the Contractor.

B. General: Lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Resident Project Representative when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

3.3 FIELD ENGINEERING

A. Identification: Plan’s existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Resident Project Representative. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Resident Project Representative before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Employ Guam licensed and registered land surveyor, as approved by RPR.

D. Locate, document, and protect survey control and reference points. Promptly notify RPR of discrepancies discovered. Preserve and protect permanent benchmarks and control points during construction operations.

E. Control datum for survey is indicated on Drawings.

F. Verify setbacks and easements; confirm Drawing dimensions and elevations.

G. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

H. At the end of the project, submit copy of Site drawing and certificate signed by a Guam licensed and registered land surveyor certifying elevations and locations of all Work are in conformance with Contract Documents.

I. Maintain complete and accurate logbook of control and survey Work as Work progresses. Provide copies of the logbook to the RPR on a weekly basis.

END OF SECTION 017000

SECTION 017500 – START-UP PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Starting systems.
   2. Demonstration and instructions.
   3. Equipment and system commissioning.
   4. Manufacturer's certificate of proper installation
   5. Training

B. Related Sections include the following:
   1. Division 01 Section "Submittal Procedure".
   2. Division 01 Section "Quality Requirements".
   3. Division 01 Section "Closeout Procedures".
   4. Division 01 Section "Operation and Maintenance Data".

1.2 STARTING SYSTEMS

A. Notify Resident Project Representative 30 days prior to commissioning of each item or system.

B. In addition to the equipment operation maintenance data required in Division 01 Section "Operation and Maintenance Data," two copies of the equipment Operation and Maintenance Manual (O&M Manual) shall accompany the Notice to the Resident Project Representative of the planned commissioning.

C. Certify in writing that each piece of equipment or system has been verified for proper lubrication, drive rotation, belt tension, control sequence, and that related equipment is operational as designed or other conditions which may cause damage.

D. Certify in writing that tests, meter readings, and specified electrical characteristics comply with the requirements of the equipment or system manufacturer.

E. Certify in writing that wiring and support components for equipment, including instrumentation systems, are complete, tested, and comply with the requirements of the equipment or system manufacturer.

F. When specified in individual Specifications Sections, require manufacturer to provide authorized representative to be present at site to inspect and approve equipment or system installation prior to start-up, and to supervise the commissioning of the equipment or system.

1.3 QUALITY ASSURANCE

A. Manufacturer's Certificate: The equipment manufacturers shall submit to the Resident Project Representative, a written report certifying that the equipment or specified system has been

lubricated and that each piece of equipment or system has been properly installed and is functioning correctly.

B. Manufacture's Certificate of Proper Installation: Manufacture shall complete and sign form provided at end of this section documenting proper installation of all equipment in supplier/manufacture's scope.

1.4 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products and equipment to Owner's personnel prior to start-up of each item of equipment.

B. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.

C. Recording of Training Session:
   1. Furnish recording of instruction sessions, including manufacturers' representatives' hands-on equipment instruction and classroom sessions**.**
   2. Use DVD format suitable for playback on standard equipment available commercially in the United States. Blu-ray® DVD format is not acceptable without Engineer's prior approval.

D. The Owner may, at his discretion, videotape the training sessions.

E. Prepare and insert additional data in O&M Manuals when need for additional data becomes apparent during instruction.

1.5 EQUIPMENT AND SYSTEM COMMISSIONING

A. Submit a detailed plan and schedule for commissioning thirty (30) days prior to anticipated start-up of each item. The start-up of each item shall be shown on the CPM Schedule.

B. Commissioning sequence shall be as follows:
   a. Provide O&M Manuals as required in Division 01 Section "Operation and Maintenance Data".
   b. Provide spare parts as required in individual equipment Sections.
   c. Staff and operate equipment which can be placed into continuous operation for a period of fourteen successive 8-hour days. Owner will direct plant operations.
   d. During this period, Contractor shall pay for fuel, chemicals, maintenance, labor, and other related operating costs. Costs of electric power and water will be borne by the Owner.
   e. Perform work involved in starting operation of the equipment items. Arrange for factory-authorized representatives to start equipment when necessary or advisable.
   f. Start, stop, and control equipment.
   g. Open, close, and adjust valves.
   h. Make necessary observations of equipment.
   i. Keep written records on operations, personnel and time log of events.
   j. Maintain and clean equipment and areas.
   k. Do other work necessary for initial start-up and operation.

C. During this period, personnel of Owner and Resident Project Representative will be available for consultation.

D. After fourteen continuous and satisfactory days (in the opinion of the Resident Project Representative) of operation, Owner will assume operation for those facilities that were placed in operation. Repeat commissioning sequence if initial fourteen day operation must be stopped due to equipment or system failure.

E. For those units which because of the nature of the process cannot be placed into operation until a later date, the same commissioning sequence shall be followed.

F. Special start-up procedures as may be required by other sections of the Specifications are in addition to the above requirements and shall be performed prior to initial start-up.

G. Owner will perform all sampling and laboratory analysis required for proper process control and monitoring. Based on these analyses, the Owner, through the Resident Project Representative, will instruct the Contractor as to required control parameters to set for the equipment and systems.

H. To the extent possible, based on control parameters imposed by the process control, the Contractor shall demonstrate that the equipment can be operated at the maximum and minimum extremes specified for the units.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 MANUFACTURER'S CERTIFICATE OF PROPER INSTALATION

A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by equipment manufacturer's representative.

B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

3.2 TRAINING

A. General:
   1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
   2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with opera-

tion and maintenance manual information specified in Section 017820, Operation and Maintenance Data.

3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule
   1. List specified equipment and systems that require training services and show:
      a. Respective manufacturer.
      b. Estimated dates for installation completion.
      c. Estimated training dates.
   2. Allow for multiple sessions when several shifts are involved.
   3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
   4. Coordinate with Section 013216, Construction Progress Schedule,

C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
   1. Title and objectives.
   2. Recommended attendees (such as, managers, engineers, operators, maintenance).
   3. Course description, outline of course content, and estimated class duration.
   4. Format (such as, lecture, self-study, demonstration, hands-on).
   5. Instruction materials and equipment requirements.
   6. Resumes of instructors providing training.

D. Post Start-up Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.

3.3 SUPPLEMENTS

A. The supplement listed below is part of this specification.
   1. Manufacturer's Certificate of Proper Installation.

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER _____ EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

☐ Installed in accordance with Manufacturer's recommendations.

☐ Inspected, checked, and adjusted.

☐ Serviced with proper initial lubricants.

☐ Electrical and mechanical connections meet quality and safety standards.

☐ All applicable safety equipment has been properly installed.

☐ Functional tests.

☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

_____

_____

_____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate their equipment and (iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20___

Manufacturer:_____

By Manufacturer's Authorized Representative: _____

(Authorized Signature)

END OF SECTION 017500

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:

1. Division 1 Section "Price and Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

C. Prerequisites to Substantial Completion: At a minimum complete the following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
1. Submit maintenance manuals, Project record documents, and other similar final record data in compliance with this Section.
2. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
3. Complete facility startup, testing, adjusting, balancing of system and equipment, demonstrations, and instructions to Owner’s operating and maintenance personnel as specified in compliance with this Section.
4. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (pre-final punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
5. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
6. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
7. Make final change-over of locks and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
8. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
9. Submit a digital and signed copy of the final grade confirmation survey.
10. Perform final cleaning according to this Section.

D. Substantial Completion Inspection:
1. When Contractor considers Work to be substantially complete, submit to Engineer:
   a. Written certificate that Work, or designated portion, is substantially complete.
   b. List of items to be completed or corrected (pre-final punch list).
2. Within ten days after receipt of request for Substantial Completion, Engineer will make inspection to determine whether Work or designated portion is substantially complete.
3. Should Engineer determine that Work is not substantially complete:
   a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.

b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Owner.
c. Engineer will reinspect corrected Work only once.
d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

4. When Engineer finds that Work is substantially complete, Engineer will:
   a. Prepare Certificate of Substantial Completion on EJCDC C-625 - Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
   b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
5. After Work is substantially complete, Contractor shall:
   a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
   b. Complete Work listed for completion or correction within 30 calendar days.
6. Owner will occupy all of project as specified.

E. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
1. When Contractor considers Work to be complete, submit written certification that:
   a. Contract Documents have been reviewed.
   b. Work has been examined for compliance with Contract Documents.
   c. Work has been completed according to Contract Documents.
   d. Work is completed and ready for final inspection.
2. Submittals: Submit following:
   a. Final punch list indicating all items have been completed or corrected.
   b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
   d. Accounting statement for final changes to Contract Sum.
   e. Contractor's affidavit of payment of debts and claims.
   f. Contractor affidavit of release of liens
   g. Consent of surety to final payment.
3. Perform final cleaning for Contractor-soiled areas according to this Section.

F. Final Completion Inspection:
1. Within ten days after receipt of request for final inspection, Engineer will make inspection to determine whether Work or designated portion is complete.
2. Should Engineer consider Work to be incomplete or defective:
   a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
   b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
   c. Engineer will reinspect corrected Work only once.
   d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

1.2 PROJECT RECORD DOCUMENTS

A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, product data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates used.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
   1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
   2. Include locations of concealed elements of the Work.
   3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
   4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
   5. Identify and locate existing buried or concealed items encountered during Project.
   6. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   7. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   8. Field changes of dimension and detail.
   9. Details not on original Drawings.

G. Submit marked-up paper copy of the record drawings to Engineer before Substantial Completion.

H. Submit PDF electronic files of marked-up documents to Engineer before Substantial Completion.

I. Submit PDF electronic files and hard copies of operation and maintenance manuals to Engineer before Substantial Completion.

J. An asset management list for each piece of equipment, part of major equipment and spare part valued at over $4,500 shall be provided to the Resident Project Representative. The asset

management list shall include: Manufacturer name/address/contact information, supplier name/address/contact information, model number, serial number, tag number, equipment cost and date of substantial completion. The list shall be provided in an Excel table format similar to the sample provided below.

Parameters	**Description**	**Fields**
Asset Identifier	Data used to identify the asset	***Equipment ID***
Descriptor 1	Name of the equipment	***Equipment***
Descriptor II	Additional description	***Equipment information***
Descriptor III	Define assets in terms of position in asset hierarchy	***Equipment Type (Electrical, mechanical, instrumentation etc)***
Equipment Operability Data	Available; refurbished; disposed; retired; not found; operational; out of service; pending review; removed	***Operating Status***
Technical Data 1	Data which will help individualise this asset from similar assets	***Manufacturer***
Technical Data II	Data which will help individualise this asset from similar assets	***Model#***
Technical Data III	Data which will help individualise this asset from similar assets	***Serial Number#***
Condition Data	Data used to prepare decay curves, revision of effective life and current valuation	***Excellent (1); Good (2); Fair (3); Poor (4); Failed/Near Failure (5)***
Location I	District or Municipality	***Site Location***
Location II	Building Name such as -D22 Building Structure	***Building Location***
Contract Management	Data related to contract management	***Vendor or Contractor; Contract Administration Information and Agreements***
Valuation Data I	Data that allows GWA to value the assets, record and track depreciation, and get an understanding of the actual lives of the asset.	***Install Date***
Valuation Data II	Data that allows GWA to value the assets, record and track depreciation, and get an understanding of the actual lives of the asset.	***Start Value***
Valuation Data III	Data that allows GWA to value the assets, record and track depreciation, and get an understanding of the actual lives of the asset.	***Service Life***
Valuation Data IV	Data that allows GWA to value the assets, record and track depreciation, and get an understanding of the actual lives of the asset.	***Warranty***

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION 017000

SECTION 017820 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Systems and equipment maintenance manuals.

B. Related Requirements:
   1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Resident Project Representative will comment on whether content of operations and maintenance submittals are acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
   1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Engineer.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.
   2. Five paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Resident Project Representative will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Final Completion and at least 20 days before commencing demonstration and training. Resident Project Representative will return copy with comments.
   1. Correct or revise each manual to comply with Resident Project Representative comments. Submit copies of each corrected manual within 20 days of receipt of Resident Project Representative comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent,

and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties, extended warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.
   2. Include manufacture and supplier point of contact information for all warrantied equipment. Point of contact shall include office number, cellular number, physical and Email address of the sales representative and the manufacture.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared record Drawings in Section 01789 "Project Record Documents."

D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017820

SECTION 017890 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.

B. Related Sections include the following:
   1. Section 017700 - "Closeout Procedures" for general closeout procedures.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit to the Resident Project Representative one set of marked-up Record Prints.

B. Record Specifications: Submit to the Resident Project Representative one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit to the Resident Project Representative one copy of each Product Data submittal.
   1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

1.3 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately before Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one full size (22X34) set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
   1. Preparation: Throughout the construction process, mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
      b. Accurately record information in an understandable drawing technique.
      c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Depths of foundations below first floor
      d. Locations and depths of underground utilities.
      e. Changes made by Change Order or Work Change Directive.
      f. Changes made following Resident Project Representative's written orders.
      g. Details not on the original Contract Drawings.
      h. Field records for variable and concealed conditions.
      i. Record information on the Work that is shown only schematically.
   3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
   4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of Work at same location.
   5. Mark important additional information that was either shown schematically or omitted from original Drawings.
   6. Note Work Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
   1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   2. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation "PROJECT RECORD DRAWINGS."
      d. Name of Resident Project Representative.
      e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed and buried products and installations that cannot be readily identified and recorded later.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed and buried products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Resident Project Representative's reference during normal working hours.

C. Provide services necessary to scan the record drawings and provide an electronic set of record documents (for storage at each of the Owner’s Facilities). Original documents shall remain at the site. Format of electronic copy shall be *.tif. Documents can be separated into multiple .tif files in order to keep file sizes below 20mb. PDF files are acceptable as well.

END OF SECTION 017890

SECTION 024113 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected site elements.
   2. Repair procedures for selective demolition operations.

B. Related Sections include the following:
   1. Division 1 Section "Summary" for use of the premises and phasing requirements.
   2. Division 1 Section "Construction Progress Schedule" for preconstruction photographs taken before selective demolition.
   3. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
   4. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project

names and addresses, names and addresses of architects and owners, and other information specified.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. The contractor shall convene a preparatory meeting 10 days before any demolition works commence. Contractor shall inform the Resident Project Representative of the limits of demolition, safety measures, operational impact (if any), duration and environmental protection procedures taken during demolition activity.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
   1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

D. Owner assumes no responsibility for condition of areas to be selectively demolished.
   1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

E. Storage or sale of removed items or materials on-site will not be permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.
   1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Resident Project Representative.

3.2 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   3. Protect existing site improvements, appurtenances, and landscaping to remain.
   4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

3.4 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3.5 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces matching existing, pre-construction, condition.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials and dispose of at designated spoil areas on Owner's property.

D. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 024113

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

A. The latest issues of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. U.S. Army Corps of Engineers (COE) Waterways Experiment Station Publications:
   a. CRD-C-621, Handbook for Concrete and Cement, Specification for Non-shrink Grout
2. U.S. Department of Commerce Product Standard (PS):
   a. PS 1, Construction and Industrial Plywood
3. American Concrete Institute (ACI) Publications:
   a. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
   b. 301, Specifications for Structural Concrete for Buildings
   c. 302.1R, Guide for Concrete Floor and Slab Construction
   d. 304, Recommended Practice for Measuring, Mixing Transporting, and Placing Concrete
   e. 305R, Hot Weather Concreting
   f. 315, Details and Detailing of Concrete Reinforcing
   g. 318, Building Code Requirements for Reinforced Concrete
   h. 347, Recommended Practice for Concrete Formwork
   i. 350, Code Requirements for Environmental Engineering Concrete Structures
   j. 350.1-10, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures and Commentary
4. American Society for Testing and Materials (ASTM) Publications:
   a. A82, Steel Wire, Plain for Concrete Reinforcement, Specification for
   b. A185, Steel Welded Wire Fabric Plain, for Concrete Reinforcement, Specification for
   c. A496, Steel Wire, Deformed, for Concrete Reinforcement Cement, Specification for
   d. A497, Steel Welded Wire Fabric Deformed for Concrete Reinforcement, Specification for
   e. A615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Specifications for
   f. A616, Rail-Steel Deformed and Plain Bars for Concrete Reinforcement, Specifications for
   g. A617, Axle-Steel Deformed and Plain Bars for Concrete Reinforcement, Specifications for
   h. A706, Low-Alloy Steel Deformed Bars for Concrete Reinforcement, Specification for
   i. A 775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars
   j. C31, Practice for Making and Curing Concrete Test Specimens in the Field
   k. C33, Concrete Aggregates, Specifications for
   l. C39, Compressive Strength of Cylindrical Concrete Specimens, Test Methods for
   m. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

n. C94, Specification for Ready-Mixed Concrete
o. C136, Sieve Analysis of Fine and Coarse Aggregates, Test Method for
p. C143, Slump of Hydraulic Cement Concrete, Test for
q. C150, Portland Cement, Specification for
r. C171, Sheet Materials for Curing Concrete, Specification for,
s. C172, Sampling Freshly Mixed Concrete, Practice for
t. C173, Air Content of Freshly Mixed Concrete by the Volumetric Method, Test Method for
u. C231, Air Content of Freshly Mixed Concrete by the Pressure Method, Test Method for
v. C260, Standard Specification for Air-Entraining Admixtures for Concrete
w. C309, Liquid Membrane-Forming Compounds for Curing Concrete, Specification for
x. C494, Chemical Admixtures for Concrete, Specification for
y. C881, Epoxy-Resin-Base Bonding Systems for Concrete, Specification for
z. C920, Elastomeric Joint Sealants, Specification for
aa. D1190, Concrete Joint Sealer, Hot-Poured Elastic Type, Specification for
bb. D1751, Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types), Specification for
cc. D1752, Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction, Specification for

B. Concrete Reinforcing Steel Institute
1. CRSI, Manual of Standard Practice

C. American Welding Society (AWS) Publication:
1. D1.4, Structural Welding Code-Reinforcing Steel

1.2 RELATED WORK

A. Grout is included in Section 036000.

1.3 DESCRIPTION OF WORK

A. The work includes the provision of cast-in-place concrete. In the ACI publications referred to herein, the advisor provisions shall be considered to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears.

1.4 QUALITY CONTROL

A. The Quality Control provisions of Division 1 apply to this section. All approvals, except those required for field installations, field applications and field tests, shall be before construction is started and before delivery of materials or equipment to the project site.

B. Concrete Pre-Installation Meeting: A meeting will be held between the Resident Project Representative (RPR) and the Contractor to review the detailed requirements of the Contractor's proposed concrete design mixes and to determine the procedures for producing proper concrete

construction. The meeting shall be held no later than 30 days prior to the first concrete placement. All parties involved in concrete work shall attend the conference including the following:

1. Contractor’s superintendent and/or project manager;
2. Contractor's concrete supplier testing laboratory representative;
3. Concrete subcontractor;
4. Reinforcing steel subcontractor and detailer;
5. Concrete supplier;
6. Admixture manufacturer's representative(s).

C. Meeting discussion topics will include, but not be limited to: methods of hot and cold weather concrete placement, concrete placement during rainy weather, cleanliness of rebar before placement of concrete, concrete mix design(s) and source of concrete materials, concrete shrinkage for key structures, waterstop placement, use of admixtures, concrete curing methods, concrete finishes grouts, and rebar submittals.

1.5 SUBMITTALS

A. Shop Drawings: Reproductions of contract drawings are unacceptable.
   1. Shop Drawings for Reinforcing Steel: ACI 315 and CRSI Manual of Standard Practice. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions and details of bar reinforcing, construction joints, accessories, and concrete covering. Do not scale dimensions from structural or detail drawings to determine lengths of reinforcing rods.
   2. Subcontractor Mix Design: Thirty (30) days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Furnish a complete list of materials including type; brand; source and amount of cement. Obtain approval before concrete placement. Obtain acknowledgment of receipt prior to concrete placement. Submit additional data regarding concrete aggregates if the source of aggregate changes.
   3. For liquid containing structures concrete mix design shall allow for minimum shrinkage requirement of 0.04% to 0.03%. Shrinkage test results must be provided prior to approval of the mix design.

B. Certificates of Compliance: Before delivery of materials, certified test reports are required for the following:
   1. Aggregates
   2. Reinforcement
   3. Cement
   4. Admixtures

C. Catalog Data:
   1. Materials for Curing Concrete
   2. Joint Sealant
   3. Joint Filler
   4. Epoxy Grout

D. Concrete Delivery Ticket: Submit delivery ticket for every batch of concrete delivery per requirements of ASTM C94, 14.2.1 through 14.2.10.

1.6 DELIVERY

A. Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement.

1.7 STORAGE

A. ACI 301 for job site storage of concrete aggregates. Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Provide for accurate identification after bundles are broken and tags removed.

PART 2 - PRODUCTS

2.1 CONCRETE

A. Subcontractor-Furnished Mix Design: Concrete shall be designed in accordance with ACI 211.1, ACI 301, and ACI 350. Concrete for Process building structures 1A, 2, 3, 4, 6, 7A, 9, 11, 11A, 11B, and 12 shall have a 28-day compressive strength of 5,000 psi and for all other building structures shall have a 28-day compressive strength of 4,000 psi unless specified otherwise and have a maximum aggregate size of 3/4". Concrete for minor structures for civil elements shall have a 28 day compressive strength of 3,000 psi unless specified otherwise and have a maximum aggregate size of 3/4".
   1. Slump Requirements:

Element	Slump, Inches	
	Minimum	Maximum
Walls, columns, and grade beams	2	4
Floors, exterior slabs, and other building Construction and site structures	1	3

2.2 CONCRETE MATERIALS

A. Cement: Cement shall be Type I or II, conforming to ASTM C150 or approved equal.

B. Water: Water for mixing and curing including free moisture and water in the aggregates, shall be fresh, clean and potable.

C. Water Cement Ratio: Shall not exceed 0.45 for concrete with specified compressive strength of 4000 psi and 0.40 for concrete with specified compressive strength of 5000 psi or more.

D. Aggregates: In general, aggregates shall be free from deleterious coatings, roots, bark, and other extraneous material. All aggregates shall conform to ASTM C33 and shall be thoroughly and uniformly washed before use.

E. Coarse aggregate shall be made from sound, clean coralline limestone in accordance with ASTM C136, conforming to the following gradation requirements:

Nominal Size Range (Inches)	Percent by Weight Passing Square Sieve Sizes							
	1½"	1"	3/4"	1/2"	3/8"	No.4	No.8	No.16
1	100	90-100	---	25-60	---	0-10	0-5	---
3/4	---	100	90-100	---	20-55	0-10	0-5	---
1/2	---	---	100	90-100	40-70	0-15	0-5	---
3/8	---	---	---	100	85-100	0-30	0-10	---

Fine aggregate shall be manufactured from clean coralline limestone in accordance with ASTM C136, conforming to the following grading requirements.

Sieve	Percent Passing
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

F. Proportioning, Measuring and Mixing:

1. Proportioning of Materials: Proportioning of materials shall be accomplished by weighing. Volumetric proportioning may be used subject to approval of the RPR. The Subcontractor shall furnish the necessary equipment and shall establish accurate procedures, subject to the approval of the RPR for determining the quantities of free moisture in the aggregates. Allowable tolerances for measuring cement and water shall be 1 percent, and for aggregates 2 percent.
2. Mixing: All concrete shall be machine mixed. In emergencies, the mixing may be done by hand if so authorized by the RPR. Mixing shall begin within 30 minutes after the cement has been added to the aggregates.

G. Ready-Mixed Concrete: Ready-mixed concrete shall conform to ASTM C94 as modified herein. Ready-mixed concrete is defined in this specification as concrete produced regularly by a commercial establishment and delivered to the purchaser in the plastic state. Cement, aggregates and water shall conform to all applicable requirements of this specification.

H. Skim Coat Cement Finish: Cement based polymer modified, quick setting concrete finishing material; dry powder blend of Portland cement and acrylic additives designed specifically for application to concrete surfaces for Class A finish. Fine finish texture. BONDED PRO-FINISH or LA HABRA ACRYLIC FINISH.

2.3 ADMIXTURES

A. Air Entrainment: ASTM C260; Air entrainment shall be 3.5-5 percent. Air entrainment for slabs may be less than 3 percent.

B. Accelerating: ASTM C494, Type C.

C. Retarding: ASTM C494, Type B, D, or G.

D. Water Reducing: ASTM C494, Type A, E, or F.

2.4 MATERIALS FOR FORMS

A. Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove board, free of raised grain, knotholes, or other surface defects. Plywood: PS1, B-B concrete form panels or better. Steel form surfaces shall not contain irregularities, dents, or sags.

2.5 REINFORCEMENT

A. Reinforcing Bars:. ACI 301 and ACI 318, unless otherwise specified. Deformed reinforcement shall comply with ASTM A706, Grade 60. ASTM A615 Grade 60 reinforcement shall be permitted if:
   1. The actual yield strength based on mill tests does not exceed f_y by more than 18,000 psi and;
   2. The ratio of the actual tensile strength to the actual yield strength is not less than 1.25.

B. Welded Wire Fabric: ASTM A497 or ASTM A185, 6 by 6, W1.4 by W1.4, unless otherwise indicated.

C. Mechanical reinforcing Bar Connectors: ACI 301. Provide 125 percent minimum yield strength of the reinforcement bar.

D. Wire: ASTM A 82 or ASTM A 496. Where epoxy bars are used, use CSI Class 1A wire ties suited for epoxy bars.

E. Reinforcing Bar Supports: Provide bar ties and supports of coated or non-corrodible material. Where epoxy bars are used, use CSI Class 1A bar ties and supports suited for epoxy bars.

2.6 MATERIALS FOR CURING CONCRETE

A. Impervious Sheeting: ASTM C171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

B. Liquid Membrane-Forming Compound: ASTM C309, white-pigmented, Type 2, Class B, free of paraffin or petroleum.

2.7 EXPANSION/CONTRACTION JOINT FILLER

A. ASTM D1751 or ASTM D1752, 1/2 inch thick, unless otherwise indicated.

PART 3 - EXECUTION

3.1 FORMS

A. ACI 301. Provide forms, shoring, and scaffolding for concrete placement unless indicated or specified otherwise. Concrete for footings may be placed in excavations without forms upon inspection and approval by the RPR. Excavation width shall be a minimum of 4 inches greater than indicated. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide forms with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

B. Coating: Before concrete placement, coat the contact surfaces of forms with a non-staining mineral oil, non-staining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

C. Removal of Forms: Prevent concrete damage during form removal. After placing concrete, forms shall remain in place for a minimum time period equal to the curing period. Forms may be removed earlier than specified if ASTM C39 test results of field-cured samples from a representative portion of the structure indicate that the concrete has reached 85 percent (minimum) of the design strength.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

A. ACI 301. Provide bars, wire fabric, wire ties, supports and other devices necessary to install and secure reinforcement. Reinforcement shall not contain rust, scale, oil, grease, clay, and foreign substances that would reduce the bond. Rusting of reinforcement is a basis for rejection if the effective cross sectional area or the nominal weight per foot of the reinforcement has been reduced to less than specified in paragraph entitled "Reinforcing Bars." Remove loose rust prior to placing steel. Tack welding is prohibited.

B. Tolerances: Place reinforcement and secure with galvanized or non-corrodible chairs, spaces, or metal hangers. Use concrete or other non-corrodible material for supporting reinforcement on the ground.

C. Splicing: AWS D1.4, except as otherwise indicated or specified. Splices shall be approved prior to use. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires, plus 2 inches.

D. Future Bonding: Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Bolt threads shall match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt in installed.

E. Cover: ACI 301 for minimum coverage, unless otherwise indicated.

F. Setting Miscellaneous Material: Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location

and elevation. Temporarily fill voids in sleeves with readily removal material to prevent the entry of concrete.

G. Construction Joints: Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

H. Expansion joints and Contraction Joints: For slabs on grade, provide as shown on the drawings or as otherwise specified herein. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

I. Form Ties and Accessories: The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement.

3.3 MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE

A. ASTM C94, ACI 301, ACI 302.1R, and ACI 304, except as modified herein. ASTM C94. Provide mandatory batch ticket information for each load of ready mix concrete.

B. Measuring: Make moisture, weight, and air determinations at intervals as specified in paragraph entitled "Sampling and Testing." Allowable tolerances for measuring cement and water shall be 1 percent; for aggregates, 2 percent; and for admixtures, 3 percent.

C. Mixing: ASTM C94. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of the mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 85 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees F. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

D. Transporting: Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete, which has segregated in transporting, and dispose of as directed.

E. Placing: Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris and water from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10-foot centers maximum in each direction when pouring interior slabs and on 20-foot centers maximum for exterior slabs.

1. Vibration: ACI 301. Furnish a spare vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a

heavy leveling straight edge. Operate vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18-inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

2. Vibration for Epoxy Coated Bars: Comply with the requirements of ACI 309R and ASTM A934/A934M for epoxy-coated bar using vibrators with a minimum frequency of 9000 vibrations per minute (VPM). Use only high cycle or high frequency vibrators. Motor-in-head 60 cycle vibrators may not be used. For walls and deep beams, use a minimum of two vibrators with the first to melt down the mixture and the second to thoroughly consolidate the mass. Provide a spare vibrator at the casting site whenever concrete is placed. Place concrete in 18-inch maximum vertical lifts. Insert and withdraw vibrators approximately 18 inches apart. Penetrate at least 8 inches into the previously placed lift with the vibrator when more than one lift is required. Extract the vibrator using a series of up and down motions to drive the trapped air out of the concrete and from between the concrete and the forms.
3. For slab construction use vibrating screeds designed to consolidate the full depth of the concrete. Where beams and slabs intersect, use an internal vibrator to consolidate the beam. Do not vibrate concrete placed with anti-washout admixtures. Vibrators shall be equipped with rubber vibrator heads.
4. Application of Epoxy Bonding Compound: Apply a thin coat of compound to dry, clean surfaces. Scrub compound into the surface with a stiff-bristle brush. Place concrete while compound is stringy. Do not permit compound to harden prior to concrete placement. Follow manufacturer's instructions regarding safety and health precautions when working with epoxy-resins.

F. Hot Weather: ACI 305R. Provide and maintain required concrete temperature using Figure 2.1.5 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing.

G. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling (where worksite is remote to water source) to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets.

H. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.4 FINISH OF FORMED SURFACES

1. CF-1 Rough Formed Finish: For formed concrete surfaces not exposed-to view in the finished work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/8” in height rubbed down or chipped off.

2. CF-2 Smooth Form Finish: For exterior formed concrete surfaces exposed-to-view other than roofs. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed. For all walls to be painted with (EAHE).
3. CF-3 Skim Coat Finish: For all interior formed surfaces exposed-to-view, provide skim coat finish. Apply over all contiguous surfaces.
4. Related Uniform Surfaces: At top of walls, horizontal offsets, and similar uniformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.5 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

A. ACI 302.1R, unless otherwise specified.

B. Finishing: Place, consolidate and immediately strike off concrete to obtain proper contour, grade, and elevation before bleed water appears. Permit the concrete to attain a set sufficient for floating and sufficient to support the weight of the finisher and equipment. If bleed water is present prior to floating the surface, drag the excess water off or remove by absorption by porous materials. Do not use dry cement to absorb bleed water.
   1. Floated: Provide for machinery pads and other exterior slabs where not otherwise specified. Float the surface by hand with a wood or magnesium float, or use a power-driven float. Floating of any one area shall be the minimum necessary to produce an even finish, level within 1/4 inch in 10 feet for exterior work.
   2. Steel Troweled: First, provide a floated finish. When slab has attained a proper set, hand- or machine-trowel to a smooth, hard, dense finish. Finished surfaces shall be free of troweled marks, uniform in texture, and a have true plane, flat within 0.01 foot (approximately 1/8 inch) in 10 feet. Hand-finish portions of the slab not accessible to power finishing equipment (e.g., edges, corners) to match the remainder of the slab. Power trowel once and finally hand trowel where a finished floor covering (e.g., tile, carpet) is specified. Power trowel twice and finally hand trowel for exposed concrete floors.
   3. Skim Coat Finish: Where indicated, provide skim coat finish to concrete surfaces which are to be painted and which are exposed to view, and which have received smooth form finish. Cement based polymer modified, quick setting concrete finish material, dry powder blend of Portland cement and acrylic additives designed specifically for application to concrete surfaces for Class A finish; fine texture finish. BONDED PRO-FINISH or LA HABRA ACRYLIC FINISH. Apply in accordance with manufacturer’s instructions.

3.6 CURING AND PROTECTION

A. ACI 301 unless otherwise specified. Begin curing immediately following form removal. Protect concrete from injurious action by sun, rain, flowing water, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, or on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period.

B. Moist Curing: Provide for the removal of water without erosion or damage to the structure. Keep surfaces continuously moist for not less than seven days with the following materials:
   1. Ponding or Immersion: Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete.
   2. Fog Spraying or Sprinkling: Provide uniform and continuous application of water throughout the curing period.
   3. Pervious Sheeting: Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously set throughout the curing period.
   4. Impervious Sheeting: Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls and other vertical structural elements from the top down with impervious sheeting, overlap and continuously tape sheeting joints, and introduce sufficient water to soak the entire surface prior to completely enclosing.

C. Liquid Membrane-Forming Compound Curing: Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.
   1. Applications: Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective.

D. Protection of Treated Surfaces: Prohibit foot and vehicular traffic and other sources of abrasion for not less than 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

E. Curing Periods and Minimum Temperatures: After placing concrete, maintain air temperature adjacent to the concrete at 50 degrees F minimum for the specified period, or 70 degrees minimum for a period of 3 days after placing and, and 40 degrees F minimum for the remainder of the specified time period.

3.7 SAMPLING AND TESTING

A. Sampling: ASTM C172. Collect samples of fresh concrete to perform tests specified. ASTM C31 for making test specimens.

B. Testing:

1. Slump Tests: ASTM C143. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) of every 10 cubic yards (maximum) of concrete.
2. Air content: Test for air content shall be made on the fresh concrete samples. Air content test shall be taken at the point of discharge for each set of test cylinders defined below. Air content for concrete made of ordinary aggregates have low absorption shall be made in compliance with either pressure method complying with ASTM C 231 or by the volumetric method complying with ASTM C 173
3. Compressive Strength Tests: ASTM C39. Make five test cylinders for each set of tests in accordance with ASTM C31. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Provide concrete cylinders for compressive tests not less than once a day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5,000 square feet of surface area for slabs and walls. Double the cylinder collection frequency and number of batches sampled when pumping concrete. If the average strength of the 28-day test cylinders is less than the compressive strength and a maximum of one single cylinder is less than f'c is minus 300 psi, take three ASTM C42 core samples and test. If the average strength of the 28-day test cylinders is less than f'c and two or more cylinders are less than f'c minus 300 psi, take six core samples and test. Concrete represented by core tests shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength criteria and provide new, acceptable concrete. Repair core holes with non-shrink grout. Match color and finish of adjacent concrete.

C. Tightness Testing of Environmental Engineering Concrete Containment Structures:
   1. Perform Hydrostatic Tightness on all Open or Covered Containment Structures in accordance with specification 016800 Watertightness Test for Hydraulic Structures. The containment structure shall not be tested before all of the structure is complete and the concrete has attained its specified compressive strength.

END OF SECTION 033000

SECTION 036000 – GROUT

PART 1 - GENERAL

1.1 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes
   2. C579, Standard Test Methods for Compressive Strength of Chemical- Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes
   3. C827, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
   4. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

1.2 SUBMITTALS

A. Submit, in accordance with Division 1, shop drawings and product data showing materials of construction and details of installation for:
   1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working standards and Material Safety Data Sheet.
   2. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.
   3. Cement grout. The submittal shall include the type and brand of the cement, the gradation of the fine aggregate, product data on any proposed admixtures and the proposed mix of the grout.
   4. Concrete grout. The submittal shall include data as required for concrete as delineated in Section 033000. This includes the mix design, constituent quantities per cubic yard and the water/cement ratio.

B. Samples
   1. Samples of commercially manufactured grout products when requested by the Resident Project Representative (RPR).
   2. Aggregates for use in concrete grout when requested by the RPR.

C. Laboratory Test Reports: Submit laboratory test data as required under Section 033000 for concrete to be used as concrete grout.

D. Certifications: Certify that commercially manufactured grout products and concrete grout admixtures are suitable for use in contact with potable water after 30 days curing.

E. Qualifications: Submit documentation that manufacturers of commercially manufactured grout products have at least 10 years' experience in the production and use of the proposed grouts which they will supply.

1.3 QUALITY ASSURANCE

A. Qualifications
   1. Manufacturers of commercially manufactured grout products shall have a minimum of 10 years' experience in the production and use of the type of grout proposed for the work.
   2. The independent testing laboratory shall be a reputable laboratory, acceptable to the RPR, having experience with testing procedures and associated equipment as required by this Section. Laboratories affiliated with the Contractor or in which the Contractor or its officers have a beneficial interest are not acceptable.

B. Pre-installation Conference: Well in advance of grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product proposed for use. Parties concerned with grouting shall be notified of the meeting at least 10 days prior to its scheduled date.

C. Services of Manufacturer's Representative: A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre-installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.

D. Field Testing
   1. All field testing and inspection services required will be provided by the Contractor. The Contractor shall sample materials and shall provide any ladders, platforms, etc., for access to the work. The methods of testing will comply with the applicable ASTM Standards.
   2. The field testing of Concrete Grout will be as specified for concrete in Section 033000.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the

D. Owner.

E. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.

F. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

1.5 DEFINITIONS

A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.

1.6 MEASUREMENT AND PAYMENT

A. Payment for compliance with this section shall be deemed included in other contract items of work associated with all site concrete and the site structures, and no additional compensation shall be allowed therefor.

PART 2 - PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Nonshrink Cementitious Grout
   1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C. Grouts shall be portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.
      a. General purpose nonshrink cementitious grout shall conform to the standards stated above.
         1) SikaGrout 212 by Sika Corp.;
         2) Set Grout by BASF;
         3) NS Grout by The Euclid Chemical Co.;
         4) Or approved equivalent.
      b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above.
         1) Masterflow 928 by BASF;
         2) Hi-Flow Grout by the Euclid Chemical Co.;
         3) SikaGrout 212 by Sika Corp.;
         4) Or approved equivalent.

B. Nonshrink Epoxy Grout
   1. Nonshrink epoxy-based grout shall be a pre-proportioned, three component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 10,000 psi in 7 days when tested in conformity with ASTM C579

and have a maximum thermal expansion of 30 x 10-6 when tested in conformity with ASTM C531.

a. Masterflow 648 CP by DeGussa Building Systems;
b. Five Star HP Epoxy Grout by Five Stars Products, Inc;
c. Sikadur 42 Grout-Pak by Sika Corp.;
d. High Strength Epoxy Grout E3-G by the Euclid Chemical Co.
e. Or approved equivalent.

C. Cement Grout

1. Cement grouts shall be a mixture of one part portland cement conforming to ASTM C150, Types I, II, or III and 1 to 2 parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

D. Concrete Grout

1. Concrete grout shall conform to the requirements of Section 033000 except as specified herein. It shall be proportioned with cement, coarse and fine aggregates, water, water reducer and air entraining agent to produce a mix having an average strength of 4000 psi at 28 days. Coarse aggregate size shall be 3/8-in maximum. Slump should not exceed 5-in and should be as low as practical yet still retain sufficient workability.

E. Water

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 - EXECUTION

3.1 PREPARATION

A. Grout shall be placed over cured concrete that has attained its full design strength unless otherwise approved by the RPR.

B. Concrete surfaces to receive grout shall be clean and sound, free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.

C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.

D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of baseplates prior to the installation of the grout.

E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable

to the RPR. Upon completion of the 24 hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the RPR for each specific location of grout installation.

F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.

G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.
   1. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.

H. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.

I. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the RPR.

3.2 INSTALLATION - GENERAL

A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.

F. Reflect all existing underlying expansion, control and construction joints through the grout.

3.3 INSTALLATION - CEMENT GROUTS AND NONSHRINK CEMENTITIOUS GROUTS

A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the RPR.

B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3-in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.

F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the RPR. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.4 INSTALLATION - NONSHRINK EPOXY GROUTS

A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.

B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.

C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.

E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.

F. Epoxy grouts are self-curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.5 INSTALLATION - CONCRETE GROUT

A. Screed underlying concrete to the grade shown on the Drawings. Provide the surface with a broomed finish, aligned to drain. Protect and keep the surface clean until placement of concrete grout.

B. Remove the debris and clean the surface by sweeping and vacuuming of all dirt and other foreign materials. Wash the surface using a strong jet of water. Flushing of debris into drain lines will not be permitted.

C. Saturate the concrete surface for at least 24 hours prior to placement of the concrete grout. Saturation may be maintained by ponding, by the use or soaker hoses, or by other methods acceptable to the RPR. Remove excess water just prior to placement of the concrete grout.

D. Place concrete grout to slopes and final grade using the scraper mechanism as a guide for surface elevation and to ensure high and low spots are eliminated. Unless specifically approved by the equipment manufacturer, mechanical scraper mechanisms shall not be used as a finishing machine or screed.

E. Provide grout control joints as indicated on the Drawings.

F. Finish and cure the concrete grout as specified for cast-in-place concrete.

3.6 GROUT SCHEDULE

A. The following list indicates where the particular types of grout are to be used:
   1. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the Drawings except for base plates greater in area than 3-ft wide by 3-ft long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.
   2. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3-ft by 3-ft. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may cementitious grout.
   3. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.
   4. Cement grout: Cement grout may be used for grouting of incidental base plates for structural and miscellaneous steel such as post base plates for platforms, base plates for beams, etc. It shall not be used when nonshrink grout is specifically called for on the Drawings or for grouting of primary structural steel members such as columns and girders.
   5. Concrete grout: Use for overlaying the base concrete to allow more control in placing the surface grade. Use for concrete grout fill within liquid-containment structures and other locations where specifically indicated on the Drawings.

END OF SECTION 036000

SECTION 099000 – PAINTING AND COATING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the work of this Section is indicated on the Drawings and Schedules and as specified herein and includes cleaning and preparation of all interior and exterior surfaces to be painted or finished, and finishing of all interior and exterior surfaces, unless hereinafter excluded.

B. This section includes materials and application of painting and coating systems for the following surfaces:

1. Submerged Steel.
2. Exposed Exterior Steel.
3. Exposed Interior Steel.
4. Exterior Ductile and Cast Iron.
5. Interior Ductile and Cast Iron.
6. Buried Ductile and Cast Iron.
7. Polyvinyl Chloride Pipe.
8. Concrete Surfaces Immersed and/or in Corrosive Environments.
9. Concrete Surfaces Immersed and/or in Corrosive and Abrasive Environments.
10. Concrete Surfaces, Exterior Exposed
11. Concrete Surfaces, Interior Exposed
12. Concrete Surfaces, Buried (Soil Side)

1.2 GENERAL

A. All indicated surfaces shall be painted using the appropriate coating system as specified herein. Coating system schedules and finish schedules may be provided herein and/or on the Drawings, which identify specific paint systems and paint colors to be used on specific items and surfaces. However, these schedules do not necessarily cover all items to be painted. Where the selection of a specific painting system for a particular application is not clear, it shall be the responsibility of the Contractor to request clarification from the Engineer.

B. Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primer or factory painted metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

C. The term “Paint” as used herein, means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as primer, intermediate coat or finish coat.

D. Surfaces to Be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from standard colors or finishes available.

E. Do not paint over any code-required labels, such as Underwriter's Laboratories and Factory Mutual, or any other equipment identification, performance rating name, door label or nomenclature plates.

F. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of prefinished aluminum, anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.

G. Operating parts: Unless otherwise indicated, moving parts of operating units, mechanical parts, and electrical parts will not require finish painting.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing the products specified with a minimum of five (5) years documented experience.

2. Applicator: Company experienced in performing the work of this Section with a minimum of five (5) years documented experience.

B. Codes and Standards: Work and materials shall conform to regulations of Fire Department, safety color coding in conformance with OSHA and all other regulatory ordinances having jurisdiction. Conform to the most stringent requirements and authorities having jurisdiction.

C. Single Source Responsibility: Provide primers and other undercoat paint produces by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

D. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system

for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not apply paint during rain, fog or mist when the relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by the paint manufacturer’s printed instructions.

B. Apply paint finishes only when the moisture content of the surfaces to be coated is within the manufacturer's acceptable range for the type of finish to be applied.

C. Painting may be continued during inclement weather if the areas and surfaces to be painted are enclosed and within the humidity limits specified, and allowed by the paint manufacturer’s printed instructions.

D. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from dust and airborne contaminants during coating application and curing.

E. In areas being painted provide a lighting level of, at least 80 foot-candles, measured at mid-height of the surface being painted.

F. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with OSHA standards

1.5 SUBMITTALS

A. Submit shop drawings in accordance with the Section 013300.

B. For each product, furnish a Product Data Sheet (PDS) and the manufacturer's technical data sheets showing the following information:

1. Percent solids by volume.

2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.

3. Recommended surface preparation.

4. Recommended thinners.

5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.

6. Application instructions including recommended equipment and temperature limitations.

7. Curing requirements and instructions.

C. Color Samples: Submit Manufacturer's color samples showing full range of standard colors.

D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.

E. Submit material safety data sheets for each coating.

F. Warranty: Submit a complete description of the warranty to be provided for approval.

G. Painting Schedule: Contractor shall submit a schedule of all items (structures, equipment, pipe, etc.) to be painted prior to beginning painting operations. Schedule shall include, but not be limited to, items to be painted, surface preparation, paint system, and color. The schedule shall be submitted to the Engineer for approval at which time the Engineer and Owner will select the colors to be used that are not specified herein or on the Drawings.

1.6 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material

2. Manufacturer's stock number and date of manufacturer.

3. Manufacturer's name

4. Contents by volume, for major pigment and vehicle constituents

5. Thinning instructions

6. Application instructions

7. Color name and number

B. Store products, not in actual use, in tightly covered containers, off the ground and under cover. Maintain containers used in the storage of paint, in a clean condition, free of foreign materials and residue.

C. Store paint materials at a maximum ambient temperature of 90 degree F, in a ventilated area, and in compliance with the manufacturer's published instructions.

D. Keep storage areas neat and orderly. Remove oily rags and waste daily.

E. Protect against fire hazards and spontaneous combustion.

F. Take all precautions to ensure that workmen and the work areas are adequately protected from health hazards that might result from handling, mixing and application of paints.

1.7 WARRANTY INFORMATION

A. The contractor shall provide a warranty against defective or deficient materials and workmanship for at least one (1) year in accordance with the requirements of Division 01.

B. The equipment manufacturer shall provide a warranty against defective or deficient equipment, workmanship and materials. The warranty shall be provided in accordance with the General Conditions.

1.8 REPLACEMENT STOCK

A. Replacement Materials: After completion of work, deliver to project site replacement materials from same production run as original material. 2% of each type and color; not less than one (1) quart or more than ten (10) gallons of each type and color.

1. Label each container with the color, type and texture, in addition to the manufacturer's label

2. Comply with manufacturer’s written instructions for storage and handling. All parts shall be properly protected per manufacturer’s instructions so that no damage or deterioration occurs during shipping or installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

1. Tnemec Company, Inc.

2. Sherwin Williams Paint Co.

3. Carboline

4. Approved equal.

2.2 MATERIALS

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

B. Color Pigments:

1. Pure, non-fading, applicable types to suit the substrates and service indicated. Manufacturer shall confirm that exterior applied pigments will not fade when exposed to UV light.

2. All exterior colors and interior deep tone colors shall be ground-in at the factory. Shop mixing is not permitted.

3. Lead content in pigment, if any, is limited to not more than 0.06%, based on the total non-volatile (dry film) of paint by weight. This limitation extends to interior surfaces and those exterior surfaces, such as stairs, decks, porches, railings, windows, and doors which are readily accessible to children.

C. Paint:

1. Ready-mixed, pigments fully-ground, maintaining a soft paste consistency, capable of readily and uniformly dispersing to a complete homogeneous mixture.

2. Provide good flowing and brushing properties, and capable of drying or curing free of streaks and sags.

D. Primers and undercoaters: Produced by the same manufacturer as the intermediate and finish coats.

E. Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials not specifically indicated herein, but required to achieve the finishes specified to be of high quality, and by an approved manufacturer.

2.3 PAINTING AND COATING SYSTEMS

A. System No. 1--Submerged Steel—Raw Water:

1. Service Conditions: For use with metal structures (such as scum beaches, floc skirts, or clarifier rakes) alternately submerged in raw sewage or raw water and exposed to a moist saturated hydrogen sulfide atmosphere, as in raw sewage wet wells.

2. Surface Preparation: SSPC-SP10 Near White Metal Blast.

3. Prime Coat: Glass Flake Reinforced Epoxy (72-76% volume solids) at 8.0-12.0 mils DFT

4. Finish Coat: Glass Flake Reinforced Epoxy (72-76% volume solids) at 8.0-12.0 mils DFT.

B. System No. 2 – Exterior Steel, Exposed

1. Service Conditions: Structural, tanks, and miscellaneous steel exposed to salt spray and weather.

2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.

3. Primer: Epoxy (70-75% volume solids) at 3.0 – 5.0 mils DFT.

4. Second Coat: Epoxy (70-75% volume solids) at 3.0 – 5.0 mils DFT.

5. Final Coat: Hi-Solids, High Performance Acrylic Polyurethane (54-58% volume solids) at 2.0 – 4.0 mils DFT.

C. System No. 3 – Interior Steel, Exposed

1. Service Condition: Structural, tanks, and miscellaneous steel exposed to the air within buildings.

2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.

3. Primer: Epoxy (70-75% volume solids) at 3.0 – 5.0 mils DFT.

4. Second Coat: Epoxy (70-75% volume solids) at 3.0 – 5.0 mils DFT.

5. Final Coat: Epoxy (70-75% volume solids) at 3.0 – 5.0 mils DFT.

D. System No. 4—Exterior Ductile and Cast Iron:

1. Service Conditions: For use with structures, valves, piping, or equipment exposed to salt spray and the weather.

2. Surface Preparation: Surface shall be clean and dry. Remove Black Coating in accordance with NAPF 500-03-04. SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.

3. First Coat: Epoxy (70-75% volume solids) at 3.0 - 5.0 mils DFT.

4. Second Coat: Epoxy (70-75% volume solids) at 3.0 - 5.0 mils DFT.

5. Finish Coat: Hi-Solids, High Performance Acrylic Polyurethane (54-58% volume solids) at 2.0- 3.0 mils DFT.

E. System No. 5—Interior Ductile and Cast Iron:

1. Service Conditions: For use with valves, piping, or equipment subjected to water condensation; chemical fumes, such as hydrogen sulfide; and chemical contact.

2. Surface Preparation: Surface shall be clean and dry. Remove Black Coating in accordance with NAPF 500-03-04. SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.

3. First Coat: Epoxy (70-75% volume solids) at 3.0 - 5.0 mils DFT

4. Second Coat: Epoxy (70-75% volume solids) at 3.0 – 5.0 mils DFT

5. Finish Coat: Epoxy (70-75% volume solids) 3.0 - 5.0 mils DFT.

F. System No. 6 – Ductile and Cast Iron, Buried

1. Service Conditions: For use with ductile iron pipe, valves, or other equipment that are in direct contact with soil.

2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain.

3. Primer: None

4. Finish Coat: High build Coal tar epoxy (65-70% volume solids) at 15.0 to 20.0 mils DFT

5. Finish color: Black.

G. System No. 7— Polyvinyl Chloride Pipe, Exposed:

1. Service Conditions: For use with polyvinyl chloride pipe exposed to sunlight.

2. Surface Preparation: SSPC-SP1

3. Surfacer: None

4. Finish Coat: Polyurethane enamel with minimum volume solids of 52% to a minimum thickness of 2.0 mils DFT.

H. System No. 8— Concrete Surfaces, Immersed and/or in Corrosive Environments:

5. Service Conditions: For use with concrete surfaces subjected to raw wastewater; chemical fumes, such as hydrogen sulfide; and chemical contact.

6. Surface Preparation: SSPC-SP13/NACE 6, ICRI CSP 5 or greater.

7. Surfacer: Epoxy Modified Cementitious Mortar (patching, filling voids and bug holes)

8. Finish Coat: Fiber Reinforced Modified Polyamine Epoxy (100% volume solids) at 50.0 to 125.0 mils DFT.

I. System No. 9—Concrete Surfaces, Immersed and/or in Abrasive and Corrosive Environments:

1. Service Conditions: For use with concrete surfaces subjected to raw wastewater; chemical fumes, such as hydrogen sulfide; and abrasive wear from trash and other debris.

2. Surface Preparation: SSPC-SP13/NACE 6, ICRI CSP 5 or greater

3. Surfacer: Epoxy Modified Cementitious Mortar (patching, filling voids and bug holes)

4. Second Coat: Fiber Reinforced Modified Polyamine Epoxy (100% volume solids) at 50.0 to 125.0 mils DFT

5. Final Coat: Modified Polyamine Epoxy (100% volume solids) at 15.0-20.0 mils DFT.

J. System No. 10 – Concrete Surfaces, Exterior Exposed

1. Service Conditions: For use with concrete surfaces exposed to the open environment.

2. Surface Preparation: SSPC-SP13/NACE 6, ICRI CSP 2 or 3

3. Surfacer: Elastomeric Acrylic with Spread Rate of 90-115 sf/gal

4. Second Coat: Elastomeric Acrylic with Spread Rate of 90-115 sf/gal

K. System No. 11 – Concrete Surfaces, Interior Exposed

1. Service Conditions: For use with concrete surfaces exposed in the interior of structures with non-corrosive environments.

2. Surface Preparation: SSPC-SP13/NACE 6, ICRI CSP 2 or 3

3. Surfacer: Waterborne Catalyzed Epoxy (38-44% volume solids) at 3.0 – 5.0 mils DFT.

4. Second Coat: Waterborne Catalyzed Epoxy (38-44% volume solids) at 3.0 – 5.0 mils DFT.

L. System No. 12 – Concrete Surfaces, Buried (Soil Side)

1. Service Conditions: For use with concrete surfaces in direct contact with subsurface soils.

2. Surface Preparation: SSPC-SP13/NACE 6, ICRI CSP 2 or 3

3. Surfacer: None

4. First Coat: High Build Coal Tar Epoxy (65-70% volume solids) at 15.0 to 20.0 mils DFT

5. Finish Color: Black.

2.4 MATERIAL LIST

A. Submit complete and detailed list with Painting Contractor's signature of the materials proposed for use on the work before ordering materials. Obtain Architect's acceptance before proceeding. Materials shall be the best quality of their respective kinds and suitable for the intended purpose, equal to or exceeding the following products, which are hereby set as standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Report, in writing, prevailing conditions that will adversely affect satisfactory and timely execution of the work of this Section. State, in writing, any anticipated problems with using the specified coating systems on substrates primed by others. Do not proceed with the work until the unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

3.2 SURFACE PREPARATION

A. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

B. Perform preparation and cleaning procedures in accordance with the paint manufacturer's published instructions, and as herein specified, for each substrate condition.

1. Provide barrier coats over incompatible primers, or remove and reprime as necessary.

2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be field painted, or provide surface- applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of the painting of each space or area, reinstall all removed items.

3. Clean surfaces to be painted before applying paint or surface treatment. Remove any oil or grease prior to mechanical cleaning.

4. Program cleaning and painting so contaminants from the cleaning process do not fall onto wet, newly painted surfaces.

C. Ferrous Metals: Clean ferrous surfaces not galvanized or shop-coated, of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning.

1. Fabrication Defects:

a. Correct steel and fabrication defects revealed by surface preparation.

b. Remove weld spatter and slag.
c. Round sharp edges and corners of welds to a smooth contour.
d. Smooth weld undercuts and recesses.
e. Grind down porous welds to pinhole-free metal.
f. Remove weld flux from surface.

2. Touch-up shop-applied prime coats where damaged or bare, when required by other Sections of these Specifications. Clean and touch-up with the same type of shop primer.

D. Galvanized Surfaces: Remove oil and other surface contaminants with a non-petroleum based solvent. Apply a coat of etching primer if required by the paint manufacturer.

E. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete blocks, cement plaster and cement-asbestos board to be painted by removing efflorescence, chalk, dust, dirt, grease and oils, and by roughening as required to remove glaze. Wash concrete surfaces scheduled to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush with clean water to neutralize the acid, and allow to dry before painting.

1. Determine the alkalinity and moisture content of surfaces to be painted by performing the appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct the condition before starting the application of paint.

2. Do not paint over surfaces where the moisture content exceeds that permitted in the manufacturer's printed instructions.

3. Clean floor surfaces, scheduled to be painted, with a commercial solution of muriatic acid, or other etching cleaner. Flush the floor with clean water to neutralize the acid, and allow to dry before painting.

F. Wood: Clean wood surfaces to be painted of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as necessary. Sandpaper smooth, finished surfaces exposed to view, and remove dust. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before application of the prime coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sandpaper smooth when dry.

1. Prime, stain, or seal wood required to be field painted, immediately upon delivery to the Project Site. Prime ends, edges, faces, undersides, and backsides of such wood, including cabinets, counters, cases and paneling.

2. When a transparent finish is required, use spar varnish for back priming.

3. Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on the backside.

4. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to the Job Site.

G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

3.4 ABRASIVE BLAST CLEANING

A. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.

B. After abrasive blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour working day. Do not apply coating over damp or moist surfaces. Reclean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.

C. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.

D. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

3.5 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with the manufacturer’s printed instructions.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into the material. Remove the film and, if necessary, strain the material before using.

3.6 PROCEDURES FOR ITEMS SHOP-APPLIED PRIME COATS

A. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.

B. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.

C. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.

D. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

3.7 APPLICATION

A. General:

1. Apply paint products in accordance with the manufacturer's written directions using applicators and techniques best suited for the substrate, type of material being applied, and texture required.

2. Paint finishes are scheduled. Provide prime coats compatible with the finish paints to be used.

3. Apply additional coats, when the undercoats, stains, or other conditions show through the final coat, until the paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment and furniture with prime coat only before final installation of the item.

5. Paint the back sides of access panels, and removable or hinged covers to match the exposed surfaces.

6. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces.

7. Paint tops, edges, and bottoms of wood and hollow metal doors.

8. Sand lightly between each succeeding enamel and varnish coat.

9. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

10. Apply each coat slightly darker than the preceding coat, unless otherwise approved by the Owner’s representative. Sand surfaces lightly between coats, as necessary to achieve the specified finish.

11. Do not apply finishes on surfaces that are not dry.

12. The number of coats and the film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured, as recommended by the paint manufacturer.

13. Paint the interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

14. Apply block filler to concrete masonry units at the rate necessary to provide complete coverage with pores filled.

B. Scheduling Painting: Apply first coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until the paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness: Apply materials at not less than the manufacturers recommended spread rate to provide a total dry film thickness or, if not indicated, as recommended by the coating manufacturer.

D. Prime Coats: Apply a prime coat of material required to be painted or finished and has not been prime coated by others.

1. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in the first coat, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Stipple Enamel Finish: Roll and re-distribute paint to an even and fine texture. Leave no evidence of rolling such a laps, irregularity in texture, skid marks, or other surface imperfections.

F. Pigmented (Opaque) Finishes: Completely cover surfaces to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections are not acceptable.

G. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of an even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, and other imperfections.

H. Provide a satin finish for final coats, unless otherwise indicated.

I. Surfaces to Be Painted: Except where natural finish of material is specifically noted as a surface to not be painted, paint exposed surfaces whether or not colors are designated. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials, or areas. If color or finish is not designated, the Architect will select from the manufacturer's standard colors or finishes.

J. Equipment in Finished Rooms: Unless otherwise authorized, paint wall grilles and diffusers, door louvers, panel board fronts and other equipment having a factory-finish, occurring in rooms other than storage, mechanical and custodial.

K. Do not paint over any code-required labels, such as Underwriter's Laboratories and Factory Mutual, or any other equipment identification, performance rating name, door label or nomenclature plates.

L. Paint exposed interior and exterior plumbing, heating and electrical equipment, apparatus, conduits, pipes and fittings, supports and hangers and all other unfinished surfaces of the mechanical and electrical work.

1. Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primer or factory-painted metal surfaces of equipment installed under the mechanical and electrical work, except as otherwise indicated.

M. Mechanical and Electrical Work: Painting of mechanical and electrical work includes those items exposed in mechanical equipment rooms, in occupied spaces, and equipment on roofs.

1. Exposed Mechanical: Items to be painted include, but are not limited to, the following:

a. Factory pre-painted diffusers at public spaces.

b. Ductwork insulation.

c. Piping, pipe hangers and supports.

d. Sprinkler covers and piping.

e. Heat exchangers.

f. Motors, mechanical equipment and supports.

g. Tanks.

h. Accessory items.

2. Exposed Electrical: Items to be painted include, but are not limited to the following:

a. Panel boards in public spaces.

b. Speaker grilles.

c. Conduit and fittings.

d. Switchgear.

e. Rooftop equipment.

N. Roof Flashings: Paint all exposed roof flashings that are not stainless steel or factory-finished.

O. Completed Work: Match the approved samples for color, sheen, texture and coverage. Remove, re-finish or re-paint work not in conformance with the specified requirements.

P. The following categories of work are not included as part of field-applied painting work.

1. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.

2. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of prefinished aluminum, anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials do not require finish painting.

3. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkage, sinkage, sensing devices, and motor and fan shafts will not require finish painting.

3.8 SURFACES NOT TO BE COATED

A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface

preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

B. Do not paint the following surfaces unless otherwise noted in the drawings or in other specification sections. Protect during the painting of adjacent areas:

1. Mortar-coated pipe and fittings.

2. Stainless steel.

3. Metal letters.

4. Glass.

5. Copper tubing, red brass piping, and PVC piping except where such piping occurs in rooms where the walls are painted, or required for color coding.

6. Electrical fixtures except for factory coatings.

7. Nameplates.

8. Grease fittings.

9. Brass and copper, submerged.

10. Buried pipe, unless specifically required in the piping specifications.

11. Fiberglass items, unless specifically required in the FRP specifications.

12. Aluminum handrail, stairs, and grating.

13. Insulated pipe.

3.9 FIELD TOUCH-UP OF SHOP APPLIED PRIME COATS

A. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.

B. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Before applying intermediate or finish coats to inorganic zinc primers, remove any soluble zinc salts that have formed by means of scrubbing with a stiff bristle brush. Rinse scrubbed surfaces with clean water.

C. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

D. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Areas smaller than 1 square inch may be prepared per SSPC SP-11. Remaining primers shall be firmly bonded to the steel surfaces with cleaned edges feathered.

E. Use repair procedures on damaged primer that protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.

F. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.

3.10 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following material testing procedures at any time, and any number of times during the field painting work:

1. Engage the services of an independent testing laboratory to sample the paint being used. Samples of materials delivered to the Project Site will be taken, identified and sealed, and certified in the presence of the Contractor.

2. A testing laboratory will perform appropriate tests for any or all of the following characteristics: abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, re-coating, skinning, color retention, alkali resistance and quantitative materials analysis.

3. If the test results show that the material being used does not comply with the specified requirements, the Contractor may be directed to stop the painting work, remove the non-complying paint, pay for the testing, re-paint surfaces where the rejected paint has been applied, and remove the rejected paint from the previously painted surfaces if, upon re-painting with the specified paint, the two coatings are not compatible.

B. Inspect painting and coating applications for the scheduled materials, color, sheen, texture, thickness, and coverage.

3.11 REPAIR OF IMPROPERLY COATED SURFACES

A. If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

3.12 CLEAN-UP

A. Section 017000 - Execution Requirements: Cleaning the installed work.

B. As work proceeds, and upon completion, promptly remove paint where spilled, splashed, and spattered.

C. During progress of the work keep the premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris.

D. Remove from the site discarded paint materials, rubbish, cans and rags at the end of each work day.

E. Collect waste, cleaning cloths, and materials which may constitute a fire hazard, place in closed metal containers, and remove from the site daily.

F. Upon completion of the work, leave the premises neat and clean. Clean metal door and window frames, glass, and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, taking care to not scratch or otherwise damage finished surfaces.

3.13 PROTECTION

A. Protect the work of other trades, whether to be painted or not, against damage by the painting and finishing work.

B. Place a Wet Paint sign as required as a warning of newly painted surfaces.

C. Remove temporary protective wrappings provided by other trades for the protection of their work, after completion of the painting operations.

D. Upon completion of the work of other trades, touch-up and restore all damaged and defaced painted surfaces.

E. Correct any damage by cleaning, repairing or replacing and re-painting, as acceptable to the Owner’s representative.

F. Repair any damage resulting from inadequate and unsuitable protection

3.14 SCHEDULE OF PAINT TREATMENTS

END OF SECTION 099000

SECTION 310513 - EARTHWORK

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The latest issues of the publications listed below referred to thereafter by basic designation only, as a part of this specification to the extent indicated by references thereto.

A. American Society for Testing and Materials ("ASTM") Publications:
1. C 136, Sieve or Screen Analysis of Fine and Coarse Aggregates
2. D 1140, Amount of Material in Soils Finer than the No. 200 Sieve
3. D 1556, Density of Soil in Place by the Sand Cone Method
4. D 1557, Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. Rammer and 18-in Drop
5. D 2419, Test for Sand Equivalent Value of Soils and Fine Aggregate
6. D 2487, Classification of Soils for Engineering Purposes
7. D 2922, Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)
8. D 3017, Moisture Content of Soil and Soil Aggregate In Place by Nuclear Methods (Shallow Depth)
9. D 4318, Liquid Limit, Plastic Limit and Plasticity Index of Soils

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 SUMMARY

A. This Section includes the following:
1. Excavating and backfilling.
2. Structural excavation and foundation preparation including the construction and subsequent removal of all bracing, shoring and sheeting; all pumping; all backfilling and the disposal of excess unsuitable material.
3. Related Sections include the following:
4. Division 31 Section 312230 "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the sub-base course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Revise heading in first paragraph below to read "Capillary Water Barrier" or a similar title if required.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Resident Project Representative.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Resident Project Representative. Unauthorized excavation, as well as remedial work directed by Resident Project Representative, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Retain one of two "rock" definitions below for classified excavation. See Evaluations for further discussion.

I. Retain paragraph and subparagraphs below if performance of Contractor's equipment is used to define "rock."

J. Retain first paragraph below if standard penetration values are used to define "rock." Revise number of blows or penetration resistance to suit office practice. No correlation is intended between equipment- and geotechnical-based definitions of "rock"; both are arbitrary values chosen to standardize criteria for defining "rock."

K. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent geotechnical testing agency, according to ASTM D 1586.

L. Structural Excavation: Removal of material encountered below foundation subgrade elevations as indicated in the Geotechnical Report or as directed by the Geotechnical Engineer retained by the Contractor and approved by the Resident Project Representative.

M. Structural Fill:Fill material used within the limits of structural excavation and raised to grades below foundations of building structures.

N. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

O. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

P. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

Q. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

A. Qualification for Contractor's Geotechnical Engineer

B. Certified Test Reports: Submit certified test reports before starting work for the following:
   1. Fill and backfill tested in accordance with ASTM C136 and ASTM D2487.

C. Certified Test Reports: Before delivery of materials and equipment, four (4) certified copies of the reports of all tests required in referenced publications or specified herein shall be submitted for review and approval by the Resident Project Representative. The testing shall have been performed in a laboratory meeting the requirements specified. The testing shall have been performed within three (3) years of submittal of the reports for approval. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material and equipment is of the same type, quality manufacture, and make as that proposed to be supplied.

D. Dewatering Plan (If Applicable): Before commencing earthwork operation, four (4) copies of the proposed dewatering plan shall be submitted to the Resident Project Representative for review and approval. Dewatering plan shall include provisions for the control of all forms of surface and subsurface water that may be encountered during construction. Contractor shall receive GEPA approval for all dewatering activities

1.6 DELIVERY AND STORAGE

A. Deliver and store materials in a manner to prevent contamination or segregation.

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Resident Project Representative and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Resident Project Representative not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Resident Project Representative's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Surface elevations are as indicated.

D. Refer to project's soils report for type of material expected to be encountered at the project site(s) during excavation works.

E. All earthworks are unclassified and that no special or additional compensation will be made for any class of excavation whatsoever, regardless of the type of material or quantity encountered. No extra compensation will be made by reason of any misunderstanding or error on the part of the Contractor with regards to the site, the conditions thereof or the amount and kind of earthwork to be performed.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. In general, shall be free of debris, roots, wood scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.

B. Select Fill: Material for select/structural fill shall be select granular materials classified as GW, GP, SW, SP, GM, SM, GP-GM, GW-GM, SP-SM or SW-SM by ASTM D 2487 and shall be free of objectionable materials and of fragments no larger than three (3) inches in any dimension.

1. Material shall meet the following requirements:

Sieve Size	Percent Passing by Weight
3 inches	100
No. 4	10 - 100
No. 40	20 - 60
No. 200	8 - 25

Liquid Limit = 25 Maximum
Plasticity Index = 6 Maximum
California Bearing Ratio (CBR) = 20 Minimum
Swell = 1% Maximum

C. General Fill: All fill and backfill soils should be free of organic matter, debris, and rock fragments or lumps larger than 4 inches or one-half the compacted layer thickness, whichever is less, in greatest dimension.

1. Liquid Limit (minus #40 mesh material): Not more than 35.
2. Plasticity Index: Not more than 12.
3. Material Passing No. 200 mesh sieve: 35 percent maximum.
4. Maximum particle size (in any dimension): 4 inches

D. Fill and backfill materials should have adequate sand for dense compaction.

E. On-site excavated materials or materials obtained from designated borrow areas meeting the above requirements may be used.

F. Unsuitable Materials: In general, unsuitable materials consist of soft soils that cannot meet the compaction requirements after reconditioning by approved methods, and of other objectionable materials.

G. Material Sources: The Contractor shall be responsible for procuring materials from sources approved by the Contractors geo-technical engineer and reviewed by the Resident Project Representative. Unless otherwise indicated by the drawings, all borrow or imported materials for earthwork shall be obtained from approved sources. Materials shall be selected, mixed and or blended thoroughly to conform to the required specifications for each class of material and stored in stockpiles that are segregated from other materials. Representative samples of each stockpile must be taken by the Independent Laboratory employed by the Contractor in the presence of the Resident Project Representative or his authorized representative. No material shall be used in the work or placed in any other location on the project site without the written approval of the Resident Project Representative.

2.2 TOPSOIL

A. Material from the areas to be excavated or graded which are suitable for topsoil, shall be deposited in piles separate from other excavated material. Piles of topsoil shall be located so that the material can be used readily for the finished surface grading: topsoil shall be protected with appropriate erosion control measures and maintained until needed. Any surplus of topsoil shall be stockpiled as directed by the Resident Project Representative. When used for finished surface grading, topsoil shall be spread uniformly over the areas indicated.

B. The Contractor shall provide additional topsoil from approved sources off the site, if stockpiled top soil material is insufficient to complete the work indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section 312230 “Site Clearing.”

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section 312230 “Site Clearing,” during earthwork operations.

3.2 SHORING, SHEETING AND BRACING

A. Shore, brace or slope banks of excavation based on recommendations from the Geotechnical Report and found acceptable to the Resident Project Representative.

B. Design temporary support of excavation is the responsibility of the Contractor.

C. Shoring, bracing, and sheeting shall be removed as excavations are backfilled, in a manner to prevent caving.

D. The Contractor is required to hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction.

3.3 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

C. Underground seepage, if found during construction, shall be treated the same as groundwater.

3.4 EXPLOSIVES

A. Explosives: Do not use explosives.

3.5 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
   2. Unless otherwise indicated elsewhere, all cut and fil slopes should not be steeper than 2 Horizontal to 1 Vertical (2H:1V) slope ratio.

3.6 SUBGRADE INSPECTION

A. Notify Resident Project Representative when excavations have reached required subgrade.

B. If Contractor’s Geo-technical Engineer and/or Resident Project Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Revise locations for proof-rolling in paragraph below if required.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct sub-grades damaged by rain, accumulated water, or construction activities, as directed by Resident Project Representative, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi may be used when approved by Resident Project Representative.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Resident Project Representative.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpiling or equipment should be kept away from the top of the excavation at a distance equals to 1.5 times the depth of the nearest excavation, or 10 feet minimum, whichever is more.. Do not store within drip line of remaining trees.

3.9 GRADING

A. Utilization of Excavated Materials: All suitable material removed from excavation shall be used as far as practicable in the formation of the embankment, filling, sub-grade, and backfill for structures, and for other purposes shown on the drawings or as directed. Only approved materials shall be used in the construction of embankments and backfills. All unsuitable material shall be properly disposed of at the Contractor’s expense at designated and/or approved disposal areas. All excess materials, including rock and boulders that cannot be used in fill areas shall be disposed of as directed by the Resident Project Representative on or off the project site at the Contractor’s expense. Material encountered in the excavation and determined by the Resident Project Representative as suitable for topping or fill, or other purposes shall be conserved and utilized as directed.

B. Drainage Ditches and Swales: If any drainage ditches and swales required or to be restored after construction shall conform to the slope, grade, and shape of the required cross-section, with no projections of roots, stumps, rock or similar matter. The Contractor shall maintain and keep open and free from leaves, sticks, and other debris all ditches dug by him until final acceptance of the work.

C. Placing General Fill: Unless otherwise permitted by the Resident Project Representative, fills and backfills shall not contain mulch, roots, sod, or other deleterious matter.

D. Fill material shall be placed in horizontal layers not exceeding 10 inches (loose measurement) and shall be compacted as specified before the next layer is placed, except as otherwise directed by the Resident Project Representative. Effective spreading equipment shall be used on each lift to obtain uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. Removal of water shall be accomplished through aeration by plowing, blading, disking, or other methods satisfactory to the Resident Project Representative. Hauling equipment shall be dispersed uniformly over the entire surface of the previously constructed layer to minimize rutting or uneven compaction.

E. Compaction: Refer to Project Geotechnical Investigation for preparation requirements

3.10 FIELD SAMPLING AND TESTING

A. Samples: Submit one (1) 50-pound composite sample for fill or backfill material taken from one source or from excavated materials of a similar, uniform character. Samples in the number directed, shall be submitted whenever the source or character of the material changes. Where imported material is used, a sample shall be taken which is representative of each source. Samples shall be placed in a clean container, which shall be secured to prevent loss of material, and tagged for identification. The tag shall contain the following information:

Contract No.:	Source:
Sample No.:	Intended Use:
Date of Sample:	Sampler:

B. Tests:

1. Fill and backfill shall be tested in accordance with ASTM C136 and for conformance to ASTM D2419, and D2487 gradation limits. Test fill and backfill for material finer than the No. 200 sieve in accordance with ASTM D1140. Test fill and backfill for liquid limit, plastic limit, and plasticity index in accordance with ASTM D4318. Test fill and backfill materials for moisture density relations in accordance with ASTM D1557 Method D. Perform one (1) of each of the required tests for each material used when directed by the Resident Project Representative. Provide additional tests as specified above for each source change. Perform density tests in randomly selected locations and in accordance with ASTM D1556 or D2922 as follows:
   a. One test per 2,000 square feet in each layer of lift on fill areas or per 2,000 square feet of sub-grade area in cut; one test per layer of lift per 150 linear feet of utility trench, or per utility trench section, whichever is less.
2. Determine moisture content of soil material in place in accordance with ASTM D3017 as follows: One test per 2,000 square feet in each layer of lift at fill areas or one test per layer of lift per 150 linear feet of utility trench, or per utility trench section, whichever is less. A change in testing frequency or other requirements may be effected only upon the written approval of the Resident Project Representative.

3.11 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. The Contractor is responsible for protecting his excavations and shall take every precaution to maintain the excavations intact.

D. The Contractor shall maintain site soil stabilization for a period up to 6 months past substantial completion. Continued site stabilization and maintenance shall take place from the Contractor’s

off-site office. Under no condition shall the Contractor be allowed to maintain physical presence the site once final completion is given.

3.12 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 310513

SECTION 310516 - EARTHWORK FOR UTILITIES

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

A. The latest issues of the publications listed below referred to thereafter by basic designation only, as a part of this specification to the extent indicated by references thereto.

B. American Society for Testing and Materials (ASTM) Publications:
   1. C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
   2. D 1140, Amount of Material in Soils Finer than the No. 200 Sieve
   3. D1556, Test Method for Density of Soil in Place by the Sand-Cone Method.
   4. D1557, Moisture-Density Relations of Soils Using 10-lb. Rammer and 18 inch Drop.
   5. D2922, Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   6. D 2487, Classification of Soils

1.2 QUALITY CONTROL

A. The Quality Control provisions of Division 1, Section 014000 applies to this section. All approvals except those required for field installations, field applications, and field tests shall be obtained before construction is started and before delivery materials or equipment to the project site.

1.3 DESCRIPTION OF WORK

A. This Section covers all earthworks for utilities required by the project and incidental improvements, as shown on the drawings.

1.4 SUBMITTALS

A. Certified Test Reports: Submit certified test reports before starting work for the following:
   1. Fill and backfill tested in accordance with ASTM C136 and ASTM D2487.

B. Certified Test Reports: Before delivery of materials and equipment, four (4) certified copies of the reports of all tests required in referenced publications or specified herein shall be submitted for review and approval by the Resident Project Representative. The testing shall have been performed in a laboratory meeting the requirements specified. The testing shall have been performed within three (3) years of submittal of the reports for approval. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material and equipment is of the same type, quality manufacture, and make as that proposed to be supplied.

C. Dewatering Plan (if applicable): Before commencing earthwork operation, four (4) copies of the proposed dewatering plan shall be submitted to the Resident Project Representative for review

and approval. Dewatering plan shall include provisions for the control of all forms of surface and subsurface water that may be encountered during construction. Contractor shall receive GEPA approval for all dewatering activities

1.5 DELIVERY AND STORAGE

A. Materials shall be delivered to and stored at the site in a manner, which will maintain different materials in segregated piles and preclude the introduction of deleterious materials.

1.6 PROTECTION OF EXISTING FACILITIES

A. Existing utilities and facilities shall be protected from damage during excavation operations. The Contractor shall seek and obtain written clearances from utility agencies prior to undertaking any excavation operations. As part of obtaining such clearances, the Contractor shall specifically request to stake out the location of each utility prior to undertaking any excavation or filling work. Any damages to existing facilities shall be promptly repaired by the Contractor at their own expense.

B. Excavation near or around known utilities shall be by careful hand excavation. Hand excavation shall start at a reasonable distance from each side of the indicated obstruction and shall be continued until the obstruction is uncovered or until clearance for the new line is assured. The Contractor shall properly secure all uncovered lines or other existing work as affected by the contract excavation.

1.7 PREVAILING WORK CONDITIONS

A. Bids on the following criteria and be fully prepared to work under the following prevailing conditions:
   1. Surface elevations are as indicated.
   2. Pipes, cables and/or other artificial obstructions in addition to those indicated will likely be encountered.
   3. Abandoned pipes (other than Asbestos cement pipe) or other artificial obstructions encountered are to be demolished and removed at the direction of the Resident Project Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bedding Material: Manufactured sand free of organic substances and/or rubbish. When tested in accordance with ASTM C136, the material shall conform to the following gradation limits.

Sieve Size	Percent Passing
3/8 inch	100
No. 4	85 – 100
No. 16	45 - 80
No. 50	10 - 30

No. 100	0 - 10
No. 200	0 - 5

Note: Mining of beach sand is not permitted on the island of Guam.

PART 3 - EXECUTION

3.1 LOCATION OF EXISTING UNDERGROUND UTILITY LINES

A. Location of existing water, sewer, electrical, telephone, television, and storm drain lines are approximate and may vary in the field; the Contractor shall be responsible for verifying the exact location of these utilities by using suitable detecting devices and shall exercise caution during operations to avoid damage to these utilities.

3.2 EXCAVATING, BACKFILLING, AND COMPACTION

A. General: Excavations shall be carried to grades and dimensions indicated or necessary. Excavations shall be kept free from water while construction is in progress. The bottom of the trench excavation shall be compacted to 90 percent ASTM D1557, Method D, density.

B. Grading: The Contractor shall perform all grading in the areas so indicated. Fill shall be brought to finished grades indicated within one-tenth (1/10) of a foot and shall be graded to drain water away from structures. Grades under areas to receive topsoil shall be brought to acceptable elevation.

C. Disposition of Surplus Material: Surplus material not required for filling, backfilling, or grading and other material shall be wasted by disposition in the area indicated or hauled at the Contractor's expense to an approved disposal site in compliance with federal and local requirements.

D. If Contractor uses manufactured sand (Commonly known as Penn Sand, which is 100% passing 3/8” Sieve) for pipe bedding, the material shall be compacted until it is dense and non-yielding. No compaction tests are required.

E. Backfill for/Fill against Structures: Backfill for or fill against structures shall be select fill, placed simultaneously on both sides of the structure, except where conditions require that backfill or embankment is to be placed on only one side or be higher on one side. In such circumstances, backfill shall be placed only with the permission of the Engineer or after the structure has attained sufficient strength. All backfill and embankments adjacent to structures shall be placed in horizontal layers having 10-inch maximum loose thickness, and then compacted as specified herein.

3.3 DEWATERING

A. Dewatering During Construction: Dewatering shall include the control of all forms of surface and subsurface water that may be encountered in the course of construction.

3.4 CUTTING EXISTING PAVEMENTS

A. Saw cut with neat, parallel, straight lines, one foot wider than trench width on each side, or as indicated in the drawings. When saw cut is within three (3) feet of an existing pavement, joint, remove them to the existing joint.

3.5 FIELD SAMPLING AND TESTING

A. Sampling: the Contractor at his expense shall conduct all sampling. A 50-lb. sample of bedding material shall be taken at every five hundred (500) cubic yards for sieve analysis of aggregate. Duplicate samples shall be provided to the Resident Project Representative on an average of one sample a month. The duplicate samples shall be taken at the same time and in the same manner.

B. Sample Identification: Each sample shall be contained in a clean container which shall be securely fastened to prevent loss of material. Each sample shall be tagged for identification. The tag shall contain the following information:

Contract No.:	Sampler:
Sample No.:	Source:
Date of Sample:	Intended Use:
Quantity:	For Testing:

C. Testing: All testing shall be conducted by the Contractor as specified herein at the Contractor's expense.

1. Bedding and Select Fill Material Testing: Gradation test shall be made on each sample in accordance with ASTM C136.
2. Compaction Testing: Compaction shall be made in randomly selected locations in accordance with ASTM D1556 or ASTM D2922 as follows:

Material	Test Frequency
Bedding	1 per 600 linear feet/2,000 sq. ft.
Select Fill Materials	1 per lift per 2,500 sq. ft.

3. The Resident Project Representative may reduce, at his discretion the Sampling and Testing frequency if he is assured that quality control is being carefully observed.

END OF SECTION 310516

SECTION 312230 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Adjust list below to suit Project.
   2. Removing existing trees shrubs groundcovers plants and grass.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Removing above- and below-grade site improvements.
   6. Disconnecting, capping or sealing, and removing site utilities.
   7. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:
   1. List below only construction that the reader might expect to find in this Section but is specified elsewhere.
   2. Division 1 Section 015000 "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures.
   3. Division 31 Section 310513 "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Provide photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.6 QUALITY ASSURANCE

A. Delete this Article if Work of this Section is not extensive or complex enough to justify a preinstallation conference. If retaining, coordinate with Division 1.

B. Pre-Clearing Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Administrative Requirements."

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 SENSITIVE AREA PROTECTION

A. Erect and maintain temporary fencing around sensitive protection zones before starting site clearing. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within fenced area.
   2. Do not permit vehicles, equipment, or foot traffic within fenced area.
   3. Maintain fenced area free of weeds and trash.

B. Do not excavate within sensitive area protection zones.

C. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
   1. Arrange with utility companies to shut off indicated utilities.

D. Retain subparagraph above or below.

E. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

A. Topsoil shall be stripped and removed and or stored. The depth of stripping will range between 1-2 feet or more depending on Root depth.

B. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
   1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
   2. Grind stumps and remove roots, obstructions, and debris extending to a depth of 12-24 inches below exposed subgrade.
   3. Chip removed tree branches and dispose of off-site. As an alternative, chipped material may be used for erosion control provided the chipped material depth is less than or equal to 2 inches

C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers in accordance with earthworks specification.

D. The Contractor shall avoid, as much as possible, unnecessary clearing of vegetation and maximize the use of existing cleared area for staging of equipment and material. Areas of particular concern, such as wetland, shall be avoided and appropriate protection measures shall be implemented.

3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated on plans.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.6 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 312230

SECTION 312316 - EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavating for building foundations.
   2. Excavating for paving, road
   3. Excavating for slabs-on-grade.
   4. Excavating for site structures.
   5. Excavating for landscaping.

1.2 REFERENCES

A. Local utility standards when working within 24 inches of utility lines.

1.3 SUBMITTALS

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

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

C. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

1.4 QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Geotechnical Engineer experienced in design of this Work and licensed at Project location.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Call Local Utility Line Information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Protect utilities indicated to remain from damage.

D. Protect plant life, lawns and other features remaining as portion of final landscaping.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic not otherwise indicated on drawings.

3.2 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work.

B. Excavate subsoil to accommodate building foundations, slabs-on-grade paving and site structures, construction operations,

C. Excavate to working elevation for piling work.

D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 310513 and Section 310516.

E. Slope banks with machine to angle of repose or less until shored.

F. Do not interfere with 45 degree bearing splay of foundations.

G. Grade top perimeter of excavation to prevent surface water from draining into excavation.

H. Trim excavation. Remove loose matter.

I. Notify Engineer of unexpected subsurface conditions.

J. Correct areas over excavated with structural fill

K. Remove excess and unsuitable material from site.

L. Repair or replace items indicated to remain damaged by excavation.

3.3 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION 312316

SECTION 312316.13 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavating trenches for utilities
   2. Compacted fill from top of utility bedding to grade elevations
   3. Backfilling and compaction.

B. American Association of State Highway and Transportation Officials:
   1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

C. ASTM International:
   1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
   2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
   3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).
   4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.2 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.3 SUBMITTALS

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

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

1.4 QUALIFICATIONS

A. Prepare work under direct supervision of Geotechnical Engineer experienced in design of this Work and licensed at Project location.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.6 COORDINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Bedding Material: Type as specified in Section 310516.

B. Select Fill: Type as specified in Section 310516

C. General Fill: Type as specified in Section 310513.

D. Concrete: Structural concrete as specified in Section 033000

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.
   1. Resident Project Representative reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Do not advance open trench more than 200 feet ahead of installed pipe.

C. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

D. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe and utilities

E. Do not interfere with 45 degree bearing splay of foundations.

F. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.

G. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Resident Project Representative until suitable material is encountered.

H. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent backfill material.

I. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by engineer.

J. Remove excess subsoil not intended for reuse, from site.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces.

C. Employ placement method that does not disturb or damage, utilities in trench,

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Do not leave more than 50 feet of trench open at end of working day.

F. Protect open trench to prevent danger to

3.6 TOLERANCES

A. Section 014000 - Quality Requirements: Tolerances.

B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 PROTECTION OF FINISHED WORK

A. Section 017000 - Execution Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 312316.13

SECTION 312500 – EROSION AND SEDIMENT CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work shall consist of control measures as required by local regulations and by the Resident Project Representative, specified herein, and shown on the Drawings during the life of the contract to control erosion, sedimentation, and dust.

B. Establish, construct, and maintain erosion and sediment control measures. Siltation control devices shall be installed in the appropriate locations before construction begins. The erosion control structures shall be maintained until temporary ground cover is established to stop all sediment and erosion. All fines imposed for improper erosion and sedimentation and control shall be paid by the Contractor responsible for the work.

C. Temporary erosion and pollution control shall include construction work off-site where such work is necessary as a result of borrow pit operations, haul roads or equipment storage sites.

D. Install temporary erosion and sediment controls which will ensure that the stormwater, other water, and drainage from job site areas which will be stripped or modified of its naturally existing or artificially established stabilization or protection against erosion shall pass through some type of filter system before being discharged and that these areas shall be kept sufficiently moist to control dust.

1.2 SUBMITTALS

A. Material and product information for erosion control devices

B. Proposed Dust-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

1.3 SLOPE PROTECTION AND EROSION CONTROL

A. Whenever steeper slopes or abrupt changes in grade are required, a diversion or berm ditch shall be constructed at the top of the slope to cause the surface water to flow along the diversion to a controlled down slope. The diversion shall be protected against erosion with sandbags, and hardened inverts where needed.

B. Silt barriers shall be constructed around all inlets and maintained throughout construction. Sediment accumulated behind silt barriers shall be removed when the ponding capacity is reduced by one-half.

1.4 SILTATION FENCES/ SAND BAGS

A. Siltation fences shall be installed in the locations as indicated on the Drawings and wherever necessary to facilitate erosion control. Siltation fences shall be installed prior to clearing operations. Siltation fences shall be kept in good repair and maintained throughout construction. Sediment shall be removed when the ponding capacity is reduced by one-half.

Siltation fences shall be constructed around all inlets to the stormwater system. They shall be repaired and maintained throughout construction. Sediment shall be removed before the ponding capacity is reduced by one-half.

B. Sand Bags shall be installed at locations as indicated on the Drawings and wherever necessary to facilitate erosion control. Sand shall be kept in good repair and maintained throughout construction. Sand bags shall be placed upstream of clearing and grading activities and around stormwater inlets. Sand bags may be used to control run off velocities.

1.5 DUST CONTROL

A. The Contractor shall exercise precautionary measures to minimize dust emissions, which will include, but shall not be limited to, periodic sprinkling or wetting of the site. The Contractor has the option of using a dust palliative. The Contractor must comply with all local requirements, which includes Division 1, Chapter 1, Guam Air Pollution Control Standards and Regulations, Section 1304.

B. Execute Work by methods that minimize raising dust from construction operations.

C. Provide positive means to prevent airborne dust from dispersing into atmosphere and into occupied areas.

PART 2 - PRODUCTS

All products shall meet the requirements identified in the Guam Erosion and Sediment Control Field Guide Version 1.0 or most recent

2.1 SILT FENCE

A. Silt fence shall be nylon reinforced filter cloth inert to chemicals commonly found in soil, and resistant to mildew, rot, insects, and rodent attack. Posts shall be 42-inch minimum length driven 18 inches into the ground. Silt fence shall have the following properties, as follows:
1. Tensile Strength 100 lbs.
2. Trapezoidal Shear 50 lbs.
3. Permittivity 0.10
4. UV Resistance Percent @ 500 Hours 80
5. SAND BAGS

B. Sand bags shall be made of woven material and shall be capable of withstanding UV from sun rays and weathering. Sand bags shall be filled with clean sand and not weigh more than 25 lbs. each.

2.2 EROSION CONTROL BLANKETS

A. Install erosion control blankets in accordance with manufacture requirements.

2.3 CHECK DAMN ROCK

A. Limestone solid and non-friable, 3 inch minimum size and 6 inch maximum size.

PART 3 - EXECUTION

All installation and maintenance activities shall meet the requirements of the Guam Erosion and Sediment Control Field Guide Version 1.0 or most recent

3.1 INSTALLATION

A. Silt fences shall be installed by securely fastening silt fence fabric using wire ties. The silt fence fabric panels shall be installed loosely with adjacent panels overlapped a minimum of 12 inches.

B. Accumulated silt and debris shall be removed by the Contractor from behind the face of the silt fence as needed to provide proper silt fence operation. Clogged or damaged fabric shall be immediately replaced at no additional cost.

C. Accumulated silt and debris and damaged or deteriorated bales shall be removed by the Contractor at no additional cost.

D. Temporary construction exits shall be maintained in a condition that will prevent tracking or flow of mud out of the work area or onto public roads.

3.2 PROVISIONS FOR EROSION CONTROL DURING CONSTRUCTION

A. The Contractor shall implement erosion control measures around all areas to be disturbed prior to disturbing ground in the area, to the satisfaction of the Resident Project Representative. The Resident Project Representative will periodically and after rainfall events inspect erosion control structures to confirm that the Contractor is maintaining these features.

B. The Contractor shall take sufficient precautions during construction to eliminate run-off of polluting substances such as silt, clay, wastes, fuels, oils, and bitumen into water supplies and surface waters. Special precautions shall be taken in the use of construction equipment to conduct operations in a manner that reduces erosion.

C. The temporary drainage ditches, silt fences, and other erosion and sediment control features shall be maintained at locations identified by the Resident Project Representative.

D. Disposal of drainage from the site shall be at a location as shown on plans. Drainage shall not be disposed of until silt and other sedimentary materials have been removed. Particular care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.

E. Vehicle wash-down shall occur for all equipment involved with earth moving activities or equipment that has accumulated soil. Wash-down shall occur on site at a location suitable and set up for equipment wash-down.

3.3 DIVERSION CHANNELS

A. Windrow excavated material on low side of channel.

B. Compact to 95 percent maximum density.

C. On entire channel area, apply soil supplements and seed as specified in 329200 Turf and Grasses

END OF SECTION 312500

SECTION 323113 – CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

Provide chain link fence system where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.2 APPLICABLE PUBLICATIONS

A. The latest issues of the following publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. American Society for Testing and Materials (ASTM)
      a. A121, Standard Specification for zinc coated (Galvanized) steel barbed wire.
      b. A153, Standard Specification for zinc coating (Hot-Dip) on iron and steel hardware.
      c. A116, Standard Specification for zinc-coated (Galvanized) steel woven wire fence fabric.
      d. A392, Standard Specification for zinc-coated Steel Chain-Link Fence Fabric.
      e. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
      f. A824, Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence
      g. D1187, Standard Specification for Asphalt-Base Emulsion for use as protective coating for metals.
      h. F626, Standard Specification for fence fittings.
      i. F1083, Standard specification for pipe, steel, hot-dipped zinc coated (Galvanized) welded, for fence structures.

1.3 RELATED SECTIONS

A. Section 310513 – Earthwork

B. Section 033000 - Cast-In-Place Concrete

1.4 SUBMITTALS

A. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section;
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
   3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades;

4. Manufacturer's recommended installation procedures which, when approved by the Contractor, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.5 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 - PRODUCTS

2.1 STEEL PIPES AND STRUCTURAL TUBING

A. General: Pipe sizes indicated are commercial pipe sizes.

B. Fence Posts and Other Components, ASTM F1083, Minimum Fy 25 ksi.

C. Tubular Frames and Supports, ASTM A500, Grade B, Minimum Fy 46 ksi.

2.2 GALVANIZING

A. On steel framework and appurtenances, provide galvanized finish with not less than the following weight of zinc per square feet.
   1. Steel Pipes and Structural Tubing: 1.8 oz./square foot, complying with ASTM F1083
   2. Hardware and Accessories: Comply with Table I of ASTM F626-96a.
   3. Fabric: 1.20 oz/square foot, complying with Class 1 of ASTM A392.

2.3 FABRIC

A. Provide 9 gage or 0.148" wires in 2" galvanized mesh, with top and bottom selvages twisted.

B. Provide fabric in one-piece widths.

2.4 POSTS, RAILS, AND ASSOCIATED ITEMS

A. End, corner, slope, and anchor posts: Unless specified in drawings, provide the following minimum sizes and weights as indicated on the plan.

1. Material and dimensions: Lbs per linear foot:
2. Pipe, 4" outside dimension: 18.97
3. Schedule 40

B. Line posts: Unless specified in drawings, provide minimum sizes and weights as follows:
1. Material and dimensions: Lbs per linear foot:
2. Pipe, 2" outside dimension 12.50
3. Schedule 40

C. Gate posts: Provide gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:
1. Material and dimension: Lbs per linear foot:
2. Pipe, 4"
3. Schedule 40

D. Top rails:
1. Use 1 5/8" outside diameter pipe weighing 2.72 lbs per linear ft; or
2. Provide in manufacturer's longest lengths, with expansion type couplings approximately 6" long for each joint.
3. Provide means for attaching top rail securely to each gate, corner, pull, slope, and end post.

E. Post brace assemblies:
1. Provide at end and gate posts, and at both sides of corner, slope, and pull posts, with the horizontal brace located at mid-height of the fabric.
2. Use 1 5/8" outside diameter pipe weighing 2.72 lbs per linear ft for horizontal brace.
3. Use 3/8" diameter rod with turnbuckle for diagonal truss.

F. Wire Ties and Tension wire: Provide number 7 gage galvanized tension wire at bottom of fabric, conforming to ASTM A824.

G. Post tops:
1. Provide steel, wrought iron, or malleable iron, designed as watertight closure cap.
2. Provide one cap for each post.
3. Provide caps with openings to permit through passage of top rail.

H. Stretcher bars:
1. Provide one-piece lengths equal to full height of fabric, with a minimum cross-section of 3/16" x 3/4".
2. Provide one stretcher bar for each gate and end post, and two for each corner, slope, and pull post, except where baric is woven integrally into the post.

I. Stretcher bar bands:
1. Provide steel, wrought iron, or malleable iron, spaced not over 15" on centers, to secure stretcher bars to end, corner, pull, slope, and gateposts.
2. Bands may be used also with special fittings for securing rails to end, corner, pull, slope, and gateposts.

J. Barb Wire Arm
1. Barb wire arm shall be 45 degrees; one-piece line arm pressed steel-galvanized suitable for three (3) strands barb wires.

2. Barb wire arm shall be able to accommodate a 1.5” outside diameter top rail and compatible with size of fence posts, as shown in the drawings.

2.5 GATES

A. General:
1. Fabricate gate perimeter frames of tubular members.
2. Provide additional horizontal and vertical members to assure proper operation of the gate, and for attachment of fabric, hardware, and accessories.
3. Space so frame members are not more than 8 feet apart.
4. Fabricate gate frames from:
   a. Material and dimensions: Lbs per linear ft:
   b. Pipe 2.375" outside diameter: 3.65

B. Fabrication:
1. Assemble gate frames by welding with special malleable or pressed steel fittings and rivets for rigid connections.
2. Use same fabric as used in the fence.
3. Install fabric with stretcher bars at vertical edges as a minimum.
4. Attach stretchers to gate frame at not more than 15" on centers.
5. Attach hardware with rivets or by other means which will provide security against removal and breakage.
6. Provide diagonal cross bracing consisting of 3/8" diameter adjustable length truss rods on gates where required to provide frame rigidity without sag or twist.

C. Gate hardware: Provide following for each gate:
1. Hinges:
   a. Pressed or forged steel, or malleable iron, to suit the gate size; non-lift-off type, offset to permit 180 degree opening.
   b. Provide 1-1/2 pair of hinges for each leaf over 6 feet in nominal heights.
2. Latches:
   a. Provide forked type or plunger-bar type to permit operation from either side of the gate.
   b. Provide padlock eye as integral part of latch.
3. Keeper: Provide keeper for vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
4. Double gates:
   a. Provide gate stops for double gates consisting of mushroom or flush plate, with anchors.
   b. Set in concrete to engage the center drop rod or plunger bar.
   c. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.

2.6 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Wire ties:
1. For tying fabric to line posts, use number 9-gage wire ties spaced 12" on centers.
2. For tying fabric to rails and braces, use number 9-gage wire ties spaced 24" on centers.
3. For tying fabric to tension wire, use number 9 gage hog rings spaced 24" on centers.

4. Manufacturer's standard wire ties will be acceptable if of equal strength and durability.
5. Concrete: Comply with provisions of Section 033000, entitled “Cast-in-Place Concrete”.

B. Bituminous Coatings: Galvanized fence posts and fencing hardware embedded in concrete shall receive two (2) coats of bituminous material as per ASTM D1187.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:
1. Install posts at a maximum spacing of 10 feet on centers.
2. Install corner or slope posts where changes in line or grade exceed a 30-degree deflection.

B. Excavating:
1. Drill holes for post footings in firm, undisturbed or compacted soil, strictly adhering to the dimensions and spacing shown.
2. Post footing dimensions: Refer to post footing schedule in drawings.
3. Some fence post foundations will require excavation or drilling through existing asphalt or concrete pavements. The cost of working on this type of field condition will not constitute a pay item but shall be considered incidental to the fence construction.

C. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the site if so directed.

D. When solid rock is encountered near the surface, drill into rock at least 24" for line posts and at least 36" for end, pull, gate, and corner posts. Drill hole at least 1" greater diameter than the largest dimension of the post footing to be placed.

E. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed minimum depths specified above.

F. Setting posts:
1. Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
2. Center and align posts in holes.
3. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation.
4. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
5. Trowel tops of footings, and slope or dome to direct water away from posts.
6. Extend footings for gateposts to the underside of bottom hinge.

7. Set keeps, stops, sleeves, and other accessories into concrete as required.
8. Keep exposed concrete surfaces moist for at least seven days after placement, or cure with membrane curing material or other curing method approved by the Resident Project Representative.
9. Grout-in those posts that are set into sleeved holes, concrete constructions, or rock excavations, using non-shrink Portland cement grout or other grouting material approved by the Resident Project Representative.

G. Concrete strength:
1. Unless specified, concrete shall have compressive strength of not less than 2,500 psi after 28 days. Allow concrete to attain at least 75% of its minimum 28-day strength before rails, tension wires, and/or fabric is installed.
2. Do not, in any case, install such items in less than seven days after placement of concrete.
3. Do not stretch and tension fabric and wire, and do not hang gates, until concrete has attained its full design strength.

H. Rails and bracing:
1. Install fence with a top rail and bottom tension wire.
2. Install top rails through post caps, extension arms, line rail clamps, or as shown in drawings (whichever applies), and bending to radius for curved runs (If necessary).
3. Provide expansion couplings as recommended by the fencing manufacturer.
4. Provide bracing to the midpoint of the nearest line post or posts at all end, corner, slope, pull, and gateposts.
5. Install tension wires (where applicable) parallel to the line of fabric by weaving through the fabric, and tying to each post with not less than number 6 gage galvanized wire, or by securing the wire to the fabric.
6. All corner, anchor, end, and gate posts shall be braced as shown in the plans. Anchor posts shall be set at every 250 feet intervals and braced to the adjacent posts.

I. Installing fabric:
1. Leave approximately 2" between finish grade and bottom selvage.
2. Excavate high points in the ground to clear the bottom of the fence.
3. Place and compact fill to within 1" of the bottom of the fabric in depressions.
4. Pull fabric taut and tie to posts, rails, and tension wires.
5. Install fabric on outward side facing side of fence, and anchor to framework so that the fabric remains in tension after pulling force is removed.
6. Install stretcher bars by threading through or clamping to fabric on 4" centers, and secure to posts with metal bands spaced 15" on centers.
7. Install fence fabric to provide approximately 2-inch deflection at center of fabric span between two posts, when a force of approximately 30 pounds is applied perpendicular to the fabric. Fabric should return to its original position when force is removed.

J. Installing gates:
1. Install gates plumb, level, and secure for full opening without interference.
2. Install ground-set items in concrete for anchorage in accordance with the fence manufacturer's recommendations as approved by the Resident Project Representative.
3. Lubricate and adjust the hardware for smooth operation.

K. Clearing Fence Line
1. All trees, brush, stumps, logs, and other debris which would interfere with the proper construction of the fence in the indicated locations shall be removed to a minimum width

of 5 feet on each side of the fence centerline before starting fencing operations. The cost of removing and disposing of the materials shall not constitute a pay item but shall be considered incidental to the fence construction.

L. Miscellaneous:
   1. Use U-shaped tie wires, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns.
   2. Bend ends of wire to minimize hazards to persons and clothing.
   3. Fasteners:
      a. Install nuts for tension band and hardware bolts on side of fence opposite fabric side.
      b. Peen the ends of bolts to prevent removal of nuts.
   4. Repair coatings damaged in the shop or field erection, using a hot-applied repair compound applied in accordance with its manufacturer's recommendations as approved by the Resident Project Representative.

END OF SECTION 323113

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Seeding.
   2. Hydroseeding.
   3. Sodding.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Green Zone: Area consisting of native plant species required by the departmentof Agriculture.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

G. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

H. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

I. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

J. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 ACTION SUBMITTALS

A. Product Data: Provide for each type of product to be used.

B. Land Scapping Plan: Provide a plan layout of all locations to be landscapped. Landscapping areas includes ALL areas within the project site(s) that consists of soil and not otherwise hardened by exsting or new concrete or asphalt.

1.5 INFORMATIONAL SUBMITTALS

A. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
   1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

B. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than two months.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

C. Seed of grass as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

2.2 TURFGRASS SOD

A. Turfgrass Species: Bermudagrass (Cynodon dactylon)

B. Not less than with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.
   2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

2.4 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.
   2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.5 Native Plants

A. The Guam Depatment of Agriculture may be contacted to supply native plant stock for establishing the Green Zone

B. Contractor shall collect, transport and plant all native plant species on the designated Green Zone.

PART 3 - EXECUTION

3.1 Landscapping and turf shall be provided for all areas that have not been hardened by existing or new asphalt or concrete. This shall include all open graded/ungraded and disturbed areas, swales and access ways within the project site.

3.2 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.

3.3 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.4 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 3 inches Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Spread planting soil to a depth of 3 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
a. Retain first subparagraph below to knit planting soil to subsoil and to improve soil drainage. Retain for caliche or hardpan subgrades, poorly drained subgrades, or subgrades that heavily compact during construction. Usually delete if planting soil exceeds a depth of 8 inches (200 mm).

b. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
c. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Engineer's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph . Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
   1. Do not use wet seed or seed that is moldy or otherwise damaged.
   2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 2 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with erosion-control mats on steep slopes not otherwise protected.

3.7 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
   1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
   2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.8 SODDING

A. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
   1. Lay sod across angle of slopes exceeding 1:3.

2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

B. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.9 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.10 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Engineer:
1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

SECTION 331116 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe and fittings for Site water line, including domestic water line
2. Tapping sleeves and valves.
3. Valves: Gate, ball, swing check, and butterfly.
4. Positive displacement meters.
5. Pressure Gauges

B. Related Requirements:
1. Section 033000 - Cast-in-Place Concrete: Concrete for thrust restraints.
2. Section 099000 - Painting and Coating: Painting requirements for fire hydrants.
3. Section 310513 – Earthwork.
4. Section 310516 – Earthwork for Utilities.
5. Section 312316 - Excavation: Product and execution requirements for excavation and backfill.
6. Section 331300 - Disinfecting of Water Utility Distribution: Disinfection of Site service utility water piping.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:
1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Society of Mechanical Engineers:
1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B16.18 - Cast Copper Alloy Solder-Joint Pressure Fittings.
3. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

C. American Society of Sanitary Engineering:
1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

D. ASTM International:
1. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3).
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).

4. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
6. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
7. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
8. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
9. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
10. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

E. American Water Works Association:
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
5. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
6. AWWA C504 - Rubber-Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm).
7. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS.
8. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
9. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
10. AWWA C606 - Grooved and Shouldered Joints.
11. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
12. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
13. AWWA C702 - Cold-Water Meters - Compound Type.
14. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
15. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
16. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In.(13 mm) Through 3 In.(76 mm) for Water Service.
17. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.
18. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

G. UL:
1. UL 246 - Hydrants for Fire-Protection Service.

1.3 SUBMITTALS

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

B. Product Data: Submit data on pipe materials, pipe fittings, valves, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements Include separate Paragraphs for additional certifications.

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

1.4 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

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

PART 2 - PRODUCTS

2.1 Underground WATER PIPING (See specifcation 400519 for exposed piping)

A. PVC Pipe:
   1. Comply with AWWA C900, Class 165 (DR 25)
   2. Fittings:
      a. Material: Ductile Iron.
      b. Comply with AWWA C111.
   3. Joints:
      a. Comply with ASTM D3139.
      b. Provide compression gasket ring.

2.2 TAPPING SLEEVES AND VALVES

A. Description:
   1. Material: Ductile or cast iron.
   2. Type: Dual compression.
   3. Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class 125 and MSS SP-60.

B. Description:
   1. Comply with AWWA C500.
   2. Type: Double disc with non-rising stem.
   3. Inlet Flanges: Comply with ASME B16.1, Class 125 and MSS SP-60.
   4. Mechanical Joint Outlets: Comply with AWWA C111.
   5. Mark manufacturer's name and pressure rating on valve body.

2.3 GATE VALVES

A. 3 Inch and Larger: AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged (for above ground service) and mechanical joint (for below grade), valve box and valve key.

B. Mark manufacturer's name and pressure rating on valve body.

2.4 RUBBER-SEATED BUTTERFLY VALVES

A. Description:

1. Comply with AWWA C504, Class 150
2. Minimum Working Pressure: 80 psig
3. Maximum Process Fluid Temperature: 90 deg. F
4. Style: Wafer
5. Shaft: Self-lubricating.
6. Packing: Replaceable without dismantling valve.
7. End Connections: Comply with ASME B16.1.

B. Operator:

1. Ten-position lever handle
2. Gear Actuators for Manual Valves: Comply with AWWA C504.

C. Materials:

1. Body: Ductile iron, ASTM A536
2. Stem: Stainless steel
3. Disc: Cast iron, ASTM A126 or Ductile iron, ASTM A536
4. Seats:

    a. Type: Resilient and replaceable.
    b. Material: EPDM rubber

5. Seating Surfaces: Type 316 stainless steel
6. Connecting Hardware: Type 316 stainless steel.

2.5 POSITIVE DISPLACEMENT METERS

A. Owner will furnish the flow metes for the site service.

B. Description
1. Type: Positive displacement disc.
2. Case Material: Bronze.
3. Bottom Cap:
    a. Material: Cast iron.
4. Register: Hermetically sealed.
5. Remote Reading: Comply with AWWA C706.

2.6 PRESSURE GAGES

1. Nominal Diameter: 4-1/2 inches
2. Face: White, laminated plastic dials with black graduations.
3. Scale: Extend over arc not less than 270 degrees.
4. Ranges and Graduation Units: 0-150 psi
5. Weatherproof
6. high-impact polypropylene.
7. Accuracy:
   a. Comply with ASME B40.100.
8. Provide for zero-reading adjustment.
9. Pressure Snubber:
   a. Material: Type 316 stainless steel.
   b. Provide isolation valve.

2.7 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type as specified in Section 033000 - Cast-in-Place Concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on Drawings.

3.2 PREPARATION

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

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

E. Protect and support existing distribution piping and appurtenances as Work progresses.

3.3 INSTALLATION

A. Bedding:
   1. Excavate pipe trench as specified in Section 312316 - Excavation
   2. Place bedding material at trench bottom.
   3. Level fill materials in continuous layers not exceeding 6 inches compacted depth.
   4. Compact to 95 percent of maximum density.
   5. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 95 percent of maximum density.

B. Piping:
   1. Install grooved and shouldered pipe joints according to AWWA C606.
   2. Route pipe in straight line.
   3. Install access fittings to permit disinfection of water system performed under Section 331300 - Disinfecting of Water Utility Distribution
   4. Thrust Restraints:
      a. Provide bearing area as indicated on Drawings.
   5. Pipe Markers:
      a. Install trace wire continuous buried 6 inches below finish grade, above piping
      b. Coordinate with trench Work as specified in Section 312317 - Trenching.
   6. Backfill trench as specified in Section 310516

C. Valves and Hydrants:
   1. Set valves on compacted soil
   2. Valve Box:
      a. Center and plumb valve box over valve.
      b. Set box cover flush with finished grade.
   3. Set hydrants plumb.
   4. Locate pumper nozzle perpendicular to and facing roadway.
   5. Do not connect drain opening to sewer.
   6. Paint hydrants as specified in Section 099000 - Painting and Coating

D. Meters:
   1. Installation Standards: Install Work according to Guam Waterworks Authority standards.

E. Disinfection:
   1. Flush and disinfect system as specified in Section 331300 - Disinfecting of Water Utility Distribution

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

B. Install pipe within tolerance of 5/8 inch

3.5 FIELD QUALITY CONTROL

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

B. Pressure test system according to AWWA C600 and following:
   1. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
   2. Conduct hydrostatic test for at least two hours.
   3. Slowly fill with water section to be tested and expel air from piping by installing corporation cocks at high points.
   4. Close air vents and corporation cocks after air is expelled and raise pressure to specified test pressure.
   5. Observe joints, fittings, and valves under test. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage and retest.
   6. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
   7. Maintain pressure within plus or minus 5 psi of test pressure.
   8. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
   9. Compute maximum allowable leakage using following formula:
      a. L = SD x sqrt(P)/C.
         1) L = testing allowance, gph
         2) S = length of pipe tested, feet
         3) D = nominal diameter of pipe, inches
         4) P = average test pressure during hydrostatic test, psig
         5) C = 148,000
      b. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.
   10. If test of pipe indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
   11. Correct visible leaks regardless of quantity of leakage.

END OF SECTION 331116

SECTION 331300 - DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Disinfection of potable water distribution and transmission system.
   2. Testing and reporting of results.

B. Related Requirements:
   1. Section 331116 - Site Water Utility Distribution Piping: Product and execution requirements for installation and testing of site domestic water distribution piping.

1.2 REFERENCE STANDARDS

A. American Water Works Association:
   1. AWWA B300 - Hypochlorites.
   2. AWWA C651 - Disinfecting Water Mains.

1.3 SUBMITTALS

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

B. Product Data: Submit procedures, proposed chemicals, and treatment levels.

C. Qualifications Statements:
   1. Submit qualifications for water treatment firm and testing firm.

1.4 CLOSEOUT SUBMITTALS

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

B. Disinfection Report:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and time of completion.
   3. Test locations.
   4. Name of person collecting samples.
   5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
   6. Date and time of flushing start and completion.
   7. Disinfectant residual after flushing in ppm for each outlet tested.

C. Bacteriological Report:
   1. Date issued, project name, and testing laboratory name, address, and telephone number.
   2. Time and date of water sample collection.
   3. Name of person collecting samples.

4. Test locations.
5. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Submit bacteriologist's signature and authority associated with testing.

1.5 QUALITY ASSURANCE

A. Perform Work according to AWWA C651.

1.6 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years' documented experience.

B. Testing Firm: Company specializing in testing potable water systems

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals:
1. Hypochlorite: Comply with AWWA B300.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that piping system has been cleaned, inspected, and pressure tested.

C. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

3.2 INSTALLATION

A. Provide and attach required equipment to perform Work of this Section.

B. Perform disinfection of water distribution system and installation of system and pressure testing as specified in Section 331116 - Site Water Utility Distribution Piping.

C. Introduce treatment into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved using municipal domestic water.

F. Replace permanent system devices that were removed for disinfection.

3.3 FIELD QUALITY CONTROL

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

B. Disinfection, Flushing, and Sampling:
   1. Disinfect pipeline installation according to AWWA C651.
   2. Use of liquid chlorine is not permitted.
   3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
   4. Disposal:
      a. Legally dispose of chlorinated water.
      b. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
   5. After final flushing and before pipeline is connected to existing system or placed in service, employ an approved independent testing laboratory to sample, test, and certify that water quality meets quality standards of authority having jurisdiction

END OF SECTION 331300

SECTION 400519 - DUCTILE IRON PROCESS PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ductile-iron pipe.
2. Ductile-iron, malleable-iron, and cast-iron fittings.
3. Accessories.

B. Related Requirements:

1. Section 331116 - Site Water Utility Distribution Piping: Installation requirements for buried piping.
2. Section 331300 - Disinfecting of Water Utility Distribution: Disinfection requirements for potable water systems.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
8. AWWA C153 - Ductile-Iron Compact Fittings.

B. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B31.3 - Process Piping.

C. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

D. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

E. Society for Protective Coatings:

1. SSPC SP 6 - Commercial Blast Cleaning.

1.3 COORDINATION

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

B. Coordinate Work of this Section with piping and equipment connections specified in other Sections and indicated on Drawings.

1.4 PREINSTALLATION MEETINGS

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

1.5 SUBMITTALS

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

B. Product Data: Submit manufacturer information regarding pipe and fittings.

C. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, sizes, and materials lists.

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

E. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for pipe sizing methods and calculations used.

F. Source Quality-Control Submittals: Indicate results of shop tests and inspections.

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

H. Qualifications Statements:

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.6 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and centerline elevations.

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

1.7 QUALITY ASSURANCE

A. Permanently mark each length of pipe with manufacturer's name or trademark and indicate conformance to standards.

B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 10 years' experience.

B. Installer: Company specializing in performing Work of this Section with minimum 10 years' experience

1.9 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect piping and appurtenances by storing off ground.
3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

A. Field Measurements:

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

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

A. Piping:

1. Comply with AWWA C151
2. Pressure Rating: 150psi or greater

B. Fittings:

1. Material: AWWA C153, ductile iron.
2. Pressure Rating: Same as that of connected piping or no less than 175psi
3. Mechanical Joints:

   a. Comply with AWWA C110 and AWWA C111.
   b. Glands: Ductile iron with asphaltic coating.
   c. Push-on Joints: Comply with AWWA C111.

4. Restrained Joints: Comply with AWWA C111.
5. Flanged Fittings: Comply with AWWA C110

C. Cement-Mortar Lining:

1. Comply with AWWA C104.
2. Thickness: Standard

D. Outside Coating:

1. Buried Service:

   a. Type: Asphaltic.
   b. Thickness: 0.04inch

2. Exposed Service: As specified in Section 099000 - Painting and Coating

2.2 ACCESSORIES

A. Gaskets: EPDM

2.3 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

C. Owner Inspection:

1. Make completed piping components available for inspection at manufacturer's factory prior to packaging for shipment.

D. Owner Witnessing:

1. Allow witnessing of factory inspections and test at manufacturer's test facility.
2. Notify Owner at least 5 working days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. Submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that field dimensions are as indicated on Shop Drawings.

C. Inspect existing flanges for nonstandard bolt hole configurations or design, and verify that new pipe and flange mate properly.

3.2 PREPARATION

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

B. Thoroughly clean pipe and fittings before installation.

C. Surface Preparation:

1. Clean surfaces to remove loose rust, mill scale, and other foreign substances by power wire brushing
2. Touch up shop-primed surfaces with primer as specified in Section 099000 - Painting and Coating
3. Solvent-clean surfaces that are not shop primed.

3.3 INSTALLATION

A. Buried Service Piping: As specified in Section 331116 - Site Water Utility Distribution Piping.

B. Exposed Service Piping:

1. According to ASME B31.3.
2. Run piping straight along alignment as indicated on Shop Drawings, with minimum number of joints.

C. Fittings:

1. According to manufacturer instructions.
2. Clean gasket seats thoroughly, and wipe gaskets clean prior to installation.
3. Tighten bolts progressively, drawing up bolts on opposite sides until bolts are uniformly tight; use torque wrench to tighten bolts to manufacturer instructions.

4. Provide required upstream and downstream clearances from devices as indicated on Drawings.

D. Make taps to ductile iron piping only with service saddle, tapping boss of a fitting or valve body, or equipment casting.

E. Install piping with sufficient slopes for venting or draining liquids and condensate to low points.

F. Disinfection: Disinfect potable water piping as specified in Section 331300 - Disinfecting of Water Utility Distribution.

G. Dielectric Fittings: Provide between dissimilar metals.

H. Field Cuts: According to pipe manufacturer instructions.

I. Finish primed surfaces according to Section 099000 - Painting and Coating

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

3.5 FIELD QUALITY CONTROL

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

B. Inspection:

1. Inspect for damage to pipe lining or coating and for other defects that may be detrimental as determined by Architect/Engineer.
2. Repair damaged piping or provide new, undamaged pipe.
3. After installation, inspect for proper supports and interferences.

C. Disinfection: See Section 331300

D. Pressure Testing:

1. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
2. Conduct hydrostatic test for minimum two hours.
3. Filling:

    a. Fill section to be tested with water slowly and expel air from piping at high points.
    b. Install corporation cocks at high points.
    c. Close air vents and corporation cocks after air is expelled.
    d. Raise pressure to specified test pressure.

4. Observe joints, fittings, and valves under test.
5. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage and retest.
6. Leakage:

a. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
b. Maintain pressure within plus or minus 5 psi of test pressure.
c. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
d. Compute maximum allowable leakage by following formula:

    1) L = SD x sqrt(P)/C.
    2) L = testing allowance in gph.
    3) S = length of pipe tested in feet .
    4) D = nominal diameter of pipe in inches.
    5) P = average test pressure during hydrostatic test in psig.
    6) C = 148,000.
    7) If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

e. If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
f. Correct visible leaks regardless of quantity of leakage.

3.6 CLEANING

A. Section 017000 - Execution and Closeout Requirements specifies requirements for cleaning.

B. Keep pipe interior clean as installation progresses.

C. After installation, clean pipe interior of soil, grit, and other debris.

END OF SECTION 400519

SECTION 400567 - SPECIALIZED PRESSURE AND FLOW-CONTROL VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Globe Type Check Valve
   2. Deep Well Pump Control Valve

1.2 REFERENCE STANDARDS

A. ASME International:

   1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
   2. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
   3. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded.
   4. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.
   5. ASME B1.20.1 - Pipe Threads, General Purpose (Inch).

B. ASTM International:

   1. ASTM A536 - Standard Specification for Ductile Iron Castings.

1.3 SUBMITTALS

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

B. Product Data: Submit manufacturer information, indicating materials of construction and compliance with indicated standards.

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

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

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

G. Qualifications Statement:

   1. Submit qualifications for manufacturer.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 15 years' documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.6 EXISTING CONDITIONS

A. Field Measurements:

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

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 Globe Type Check Valve

A. Manufacturers: Cla-Val 81-02 or approved Equal

A. Description:

1. Type: Pilot-operated globe valve.
2. Outlet Pressure: 150 psig at 90 degrees F
3. Minimum Working Pressure: 80 psig at 90 degrees F
4. Flow Area:

a. Equal to connecting nominal pipe diameter.

5. Operation:

    a. Normally OPEN.
    b. Type: Hydraulic.
    c. Actuation: Diaphragm.
    d. Control: Pilot.

6. Downstream Pressure Set Point:

    a. Zero to 110 percent.
    b. Field adjustable.

7. Internal Access: Flanged cover piece.
8. Furnish piston position indicator.

9. End Connections:

    a. Flanged.
    b. Comply with ASME B16.42.

B. Materials:

1. Body:

    a. Ductile iron.
    b. Comply with ASTM A536.
2. Body: Ductile Iron epoxy coated at Factory.
3. Diaphragm: Bruna-N
4. Control Trim:

    a. Fittings: Type 316 stainless steel
    b. Tubes: Type 316 stainless steel

5. Valve Components: Stainless steel
6. Seals: Buna-N

2.2 Deep Well Control Valve

A. Manufacture: Cla-Val Model 61-02, or approved equal

B. Description:

1. Type: Pilot-operated globe valve.
2. Outlet Pressure: 150 psig at 90 degrees F
3. Minimum Working Pressure: 80 psig at 90 degrees F
4. Flow Area:

    a. Equal to connecting nominal pipe diameter.

5. Operation:

a. Normally CLOSED.
b. Type: Hydraulic.
c. Actuation: Diaphragm.
d. Control: Pilot

6. Downstream Pressure Set Point:

a. Zero to 110 percent.
b. Field adjustable.

7. Internal Access: Flanged cover piece.
8. Furnish piston position indicator.

9. End Connections:

a. Flanged.
b. Comply with ASME B16.42.

C. Materials:

1. Body:

a. Ductile iron.
b. Comply with ASTM A536.
2. Body: Ductile Iron epoxy coated at Factory.
3. Diaphragm: Buna-N
4. Control Trim:

a. Fittings: Type 316 stainless steel
b. Tubes: Type 316 stainless steel

5. Valve Components: Stainless steel
6. Seals: Buna-N

2.3 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Valves:

1. Leakage Testing:

a. Test each assembled valve hydrostatically at 1-1/2 times rated working pressure for minimum five minutes.
b. Test each valve for leakage at rated working pressure against closed valve.
c. Permitted Leakage: None.

2. Functional Testing:

a. Test each valve to verify specified performance.

C. Certificate of Compliance:

1. Submit Certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install protective strainers upstream of solenoid valves, pressure-reducing valves, and pressure-sustaining valves.

END OF SECTION 400567

SECTION 407113 - MAGNETIC FLOW METERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Magnetic flow meters.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.
2. AWWA M33 - Flowmeters in Water Supply.

B. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

C. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 COORDINATION

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

B. Coordinate Work of this Section with piping Work.

1.4 SUBMITTALS

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

B. Product Data: Submit manufacturer information for system materials and component equipment, including connection requirements.

C. Shop Drawings:

1. Indicate system materials and component equipment.
2. Submit installation requirements and other details.

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

E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

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

G. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

H. Qualifications Statement:

1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Section 0133000 : Requirements for submittals.

B. Project Record Documents: Record actual locations and final orientation of equipment and accessories.

1.6 QUALITY ASSURANCE

A. Ensure that materials of construction of wetted parts are compatible with process liquid.

B. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

C. Perform Work according to Guam Water Authority standards.

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

1.7 QUALIFICATIONS

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

1.8 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store equipment according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.9 WARRANTY

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

B. Furnish two-year manufacturer's warranty for magnetic flow meters and appurtenant devices.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Furnish sensors, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, interconnecting cables, and unit conversions and algorithms as required for application.

B. Meter and all components in touch with water shall be NSP-61 certified.

C. Suitable for wastewater service and capable of maintaining specified accuracy with less than 2 X OD pipe diameters upstream and downstream of installed meter.

2.2 MAGNETIC FLOW METERS

A. Manufacturers:

1. Endress Houser Promag W 400
2. Approved Equal

B. Description: Low-frequency, electromagnetic induction-type flow meter, producing a linear signal directly proportional to flow rate, consisting of flow tube, signal cable, and transmitter.

C. Performance and Design Criteria:

1. Design: According to AWWA M33.

D. Flow Rate Range: 0 to 1 MGD.

E. Pressure rating: 175psi or greater

F. Size: As indicated on Drawings.

G. Flow Tubes:

1. Material: Type 316 stainless steel with polyurethane liner.
2. Length: As indicated on Drawings.
3. End Connections: Flanged, ASME B16.1, carbon steel.

H. Electrodes:

1. Type 316L stainless steel.
2. Self-cleaning.

I. Accuracy: Plus or minus 0.25 percent of actual flow rate over a 10:1 range.

J. Provide adjustment for zero and span.

K. Accessories:

1. Furnish cable between transmitter and receiver.

2.3 TRANSMITTERS

A. Metering Tube (Detector): - Consists of stainless steel tube lined with a nonconductive material connected to a remote signal amplifier (Contractor shall verify distance for each reservoir site).

B. Signal Amplifier and Display Unit: - The amplifier receives, amplifies, and processes the detector's analog signal. Signal is converted to both analog and digital signals that are used to display rate of flow and totalization. Integrated LCD display indicates rate of flow, forward and reverse totalizers and diagnostic messages.

C. In general, there shall be no cable or wire splices between the terminals of the equipment, unless approved by the Owner. The Contractor shall order the appropriate cable or wire lengths appropriate cable or wire lengths to eliminate cable or wire splicing. If splices are necessary in underground and in manholes for installation of cables, the Contractor shall submit, for Owner's review and approval, the request for cable splices locations supported by cable pull calculations or other splice requirements.

D. Components
1. Metering Tube

E. Transmitter Output:

1. 4- to 20-mA dc analog signal.
2. Accuracy: Plus or minus 0.5 percent of actual flow.

F. Housing Material: Cast aluminum.

G. HMI:

1. Touch control and guided menus, functioning through enclosure window without opening enclosure.
2. Display:

a. Size: Four lines.
b. Type: Backlit digital display.
c. User-selectable engineering units.
d. Readout of diagnostic error messages.
e. Display instantaneous flow in either gallons per minute or cubic feet per second.
f. Display totalized flow in million gallons

H. Mounting:

1. Integral or remote mounting up to 32 feet from flow meter.

2. Mounting Locations Less Than 4 Feet above Grade: Provide stainless-steel mounting posts.

I. Transmitter Communication Interface: Ethernet/IP.

J. Accessories:

1. Current signal output simulation.
2. Empty pipe detection.
3. Self-diagnostics.
4. Signal Cable: Provided by flow meter manufacturer.
5. Integrated Data Logger

2.4 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of meters according to AWWA M6.

C. Owner Inspection:

1. Make completed flow meter available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.

D. Owner Witnessing:

1. Allow witnessing of factory inspections and tests at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that items provided by other Sections of Work are ready to receive Work of this Section.

3.2 INSTALLATION

A. Installation Standards: Install Work according to Guam Water Authority standards.

3.3 FIELD QUALITY CONTROL

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

B. Testing:

1. Test and calibrate flow meter to demonstrate that it meets specified accuracy requirements.
2. Comply with AWWA M6.

C. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than four hours on Site for installation, inspection, startup, field testing, and instructing Owner's personnel in operation and maintenance of equipment.

D. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

E. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.4 DEMONSTRATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for demonstration and training.

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

END OF SECTION 407113

SECTION 407313 - PRESSURE AND DIFFERENTIAL PRESSURE GAUGES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Pressure gages.

1.2 REFERENCE STANDARDS

A. ASME International:

1. ASME B40.100 - Pressure Gauges and Gauge Attachments.

B. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 COORDINATION

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

1.4 SUBMITTALS

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

B. Product Data: Submit manufacturer information for system materials and component equipment, including connection requirements.

C. Shop Drawings:

1. Indicate system materials and component equipment.
2. Submit installation requirements and other details.

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

E. Source Quality-Control Submittals: Indicate results of [**shop**] tests and inspections.

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

G. Qualifications Statement:

1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

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

B. Project Record Documents: Record actual locations of equipment and accessories.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for maintenance materials.

1.7 QUALITY ASSURANCE

A. Ensure that materials of construction of wetted parts are compatible with process liquid.

B. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 20 years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.10 WARRANTY

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

PART 2 - PRODUCTS

2.1 PRESSURE GAGES

A. Manufacturers

Gauges, diaphragm seals, snubbers, and tools shall be as manufactured by Ashcroft, Crosby, Marshalltown, Marsh, or equal.

B. Gauge Designations

1. Pressure range shall be as designated in the drawings pr as directed by owner

C. Gauge Design

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

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

   b. Pressure tight.

   c. 270-degree arc with adjustable pointer.

   d. Stem mounted.

   e. Liquid filled.

   Size of gauge shall be 4-1/2 inches, unless otherwise indicated in the drawings. Stem or connection size shall be 1/2 inch, except that gauges connected to gauge protector spools or rings shall have 1/4-inch connections.

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

D. Materials of Construction for Gauges

Materials of construction shall be as shown in the following table:

	Item	Material	Specification
1	Case	Stainless steel, aluminum, polypropylene, or phenolic plastic	AISI 316, 6061-T6
2	Bourdon tube	Stainless steel	AISI 316
3	Windows	Acrylic plastic	-----
4	Ring	Stainless steel	AISI 316
5	Stem	Stainless steel	AISI 316
6	Dial face	Aluminum with clear baked-on acrylic coating	ASTM B 209, 6061-T6

E. Pressure Snubbers

Provide pressure snubbers with gauge assemblies where shown in the drawings. Material of construction shall be Type 316 stainless steel. Snubber design shall incorporate a porous metal disc for use with the process fluid in the pipeline. Inlet and outlet connections shall be NPT female and shall match the connection size of the attached pressure gauge.

F. Pipe Nipples and Fittings

1. Nipples for connecting gauges to piping shall be Schedule 80S, Grade TP 316 seamless stainless steel, conforming to ASTM A 312. Fittings shall conform to ASTM A 403, Class WP 316. Threads shall conform to ANSI B1.20.1. Size of pipe nipple shall match the gauge connection size.

2. Shutoff Cocks: Furnished by gage manufacturer.

2.2 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify that items provided by other Sections of Work are ready to receive Work of this Section.

3.2 INSTALLATION

A. According to manufacturer instructions.

B. Coordinate location and orientation of gages and seal assemblies with final piping and equipment installations.

C. Ensure that gages are located to be easily read during operation and easily accessible for maintenance.

3.3 FIELD QUALITY CONTROL

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

B. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

3.4 DEMONSTRATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for demonstration and training.

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

END OF SECTION 407313

SECTION 434221 - WELDED STEEL PRESSURE TANKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Welded steel pressure tanks.

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME Boiler and Pressure Vessel Code (BPVC) Section VIII - Pressure Vessels.
2. ASME BPVC Section IX - Welding, Brazing, and Fusing Qualifications: Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators.

B. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 COORDINATION

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

B. Coordinate Work of this Section with Work of other Sections.

1.4 PREINSTALLATION MEETINGS

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

1.5 SUBMITTALS

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

B. Shop Drawings: Indicate tank dimensions, materials of construction, tank lining methods, anchors, attachments, lifting points, taps, and drains.

C. Manufacturer's Certificate:

1. Certify that tanks and appurtenances meet or exceed specified requirements.
2. Submit certified list of tank installations storing same liquid and concentration, in service for period of not less than 5 years.

D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying ASME qualification within previous 12 months.

E. Test and Evaluation Reports: Submit installation certificate from equipment manufacturer's representative as described in PART 3.

F. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

G. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

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

I. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

J. Qualifications Statements:

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.
3. Welder Certificates: Submit welder certification of compliance with ASME BPVC-IX.

1.6 QUALITY ASSURANCE

A. Perform Work according to ASME BPVC-IX for welding materials and procedures.

B. Provide tanks registered with National Board of Boiler and Pressure Vessel Inspectors.

C. Materials in Contact with Potable Water: Certified to NSF Standards 61 and 372.

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

1.7 QUALIFICATIONS

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

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

C. Welders: ASME qualified within previous 12 months for employed weld types.

1.8 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect valve ends from entry of foreign materials by providing temporary covers and plugs.
3. Provide additional protection according to manufacturer instructions.

1.9 EXISTING CONDITIONS

A. Field Measurements:

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

1.10 WARRANTY

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

B. Furnish 5 year manufacturer's warranty for welded steel pressure tanks.

PART 2 - PRODUCTS

2.1 WELDED STEEL PRESSURE TANKS

A. Description:

1. Welded steel tank, ASME-labeled for working pressure of 125 psig
2. Furnish steel support saddles, taps for accessories, threaded connections, and access way, and other appurtenances.
3. Configuration: Vertical
4. Overall Length, Diameter, Nominal capacity: See plans

B. Supports:

1. Tank Saddles:

a. Quantity: 2 per tank
b. Size: Not less than 4 inches wide by 1/4 inch thick.
c. Mounting: 2-inch-diameter pipe stand with minimum four cross-braced legs.
d. Furnish sheet PTFE isolation strip between tank and saddle and dielectric unions between tank and piping.

C. Insulation:

1. Material: Glass fiber.

2. Thickness: 3 inches
3. Jacket: Steel

D. Fabrication:

1. Welded steel shell with inspection port.
2. Furnish fittings to accept gages and safety controls, threaded or flanged inlet and outlet connections, and lifting lugs.
3. Comply with ASME Section VIII.

E. Accessories:

1. Pressure Relief Valve:

a. ASME rated.
b. Setting: 20 psig above measured field pressure.

2. Pressure Gage: As specified in Section 407313 – Pressure and Differential Pressure Gauge

2.2 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Provide shop inspection and testing of completed assembly.

C. Owner Inspection:
1. Notify Owner at least 5 working days before inspection is allowed.

D. Certificate of Compliance:

1. Submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
2. Specified shop tests shall be submitted

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify layout and orientation of tank accessories and piping connections.

3.2 INSTALLATION

A. Install tanks plumb and level.

B. Maintain manufacturer's recommended clearances around and above tanks.

C. Piping:

1. Connect piping to tank.
2. Install relief valve piping to nearest floor drain.

D. To complete installation, install tank accessories not factory mounted.

3.3 FIELD QUALITY CONTROL

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

B. Arrange with local authorities having jurisdiction for inspection of tank, piping, and accessories, and for certificate of operation.

C. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

D. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

END OF SECTION 434221

SECTION 460101 - GRANULAR ACTIVATED CARBON EXCHANGE

PART 1 - GENERAL

1.1 SCOPE OF WORK

This specification section is for the turnkey exchange of spent Granular Activated Carbon (GAC) with new virgin GAC as follows:

a. Furnish all labor, materials, equipment, and supervision for the removal, transport, and reactivation of spent GAC from the filters.
b. Furnish all labor, materials, equipment, and supervision for the supply, and installation of virgin GAC into the filters.

Whenever a brand name is mentioned in the bid request, the naming of the item is intended to establish the type, function, performance, and quality required.

1.2 BID CHECKLIST

All bids must include the following:

1. Mandatory Pre-Bid Site Inspection Sign-off Sheet. The incumbent supplier is exempt from this requirement
2. Affidavit of Compliance: 20 Year virgin GAC manufacturing experience
3. Affidavit of Compliance: Owner of two (2) exclusively dedicated potable reactivation facilities
4. Confirmation of comprehensive general liability insurance
5. Ten (10) references for GAC to be supplied
6. Source of coal, carbon manufacturing location, and description of the reagglomeration/thermal process
7. Affidavit of Compliance: GAC is 100% virgin, 100% bituminous coal-based reagglomerated material
8. Pricing Sheet

1.3 PRE-BID SITE INSPECTION

1.3.1 Each bidder shall visit the site and inform themselves of all existing conditions. Proof of site visitation is mandatory and must be attached to bid documents. Incumbent supplier is excluded from this requirement.

1.3.2 Failure to comply with site inspection requirements is considered “non–responsive” and will result in a rejection of the bid.

1.4 BIDDER’S QUALIFICATIONS

1.4.1 Bids shall only be accepted from manufacturers of bituminous coal-based reagglomerated activated carbon. Manufacturing facility must be located in the United States.

1.4.2 Bidders shall have a minimum of 20 years' experience manufacturing virgin granular activated carbon and shall submit proof via a Manufacturer's Certificate and/or an Affidavit of Compliance.

1.4.3 The bidder shall certify that it is the owner and operator of a minimum of two (2) NSF certified reactivation facilities exclusively dedicated to the receiving and production of potable reactivated GAC and shall submit proof via the reactivation facility's NSF Certificate and/or an Affidavit of Compliance. This requirement demonstrates the manufacturer's commitment to sustainable GAC use.

1.4.4 Bidder shall furnish evidence of comprehensive general liability insurance in the minimum amount of $2,000,000 to provide protection from claims that may arise from the supplier's products, shipment, installation, removal, and reactivation/disposal of the spent carbon.

1.4.5 Field Service personnel supervising the exchange must be directly employed by the bidder.

1.4.6 Bidder's virgin and reactivation manufacturing processes shall produce NSF/ANSI/CAN 61 certified products.

1.4.7 Failure to comply with any of the above qualification requirements will be considered "non–responsive" and the bid will be rejected.

PART 2 - PRODUCTS

2.1. PRODUCT SPECIFICATION – VIRGIN GAC

The bidder shall supply 100% virgin GAC for the replacement of spent GAC in the filters. The virgin GAC shall meet the following specifications:

a. Virgin GAC shall be one of the following:
    a. FILTRASORB 400M as manufactured by Calgon Carbon Corporation
    b. TIGG 5D 0830 NSF or 5D 1240 HM as manufactured by Newterra
    c. Approved equal
        i. Approved equal products (substitution) must be approved by the engineer/owner prior to order. A rapid small-scale column testing (RSSCT) by a third party testing facility shall be performed and results provided to the engineer/owner as part of this request.
b. The coal shall be mined and the corresponding GAC manufactured in the United States.
c. The GAC product designated by the bidder as the material to be supplied for this bid shall have twenty (20) years of history of use in municipal drinking water facilities in North America with a minimum of ten (10) installations. Bidder shall submit references per the Reference List requirements in Section 7.
d. The GAC shall be manufactured in a facility certified to conform to the Management System Standard ISO 9001:2000 or later. A copy of the valid certificate must be submitted with the bid. ISO 9001:2000 or later certification assures that the GAC manufacturing is of consistent conformance to stated product quality and standards listed in the specifications.
e. The GAC shall comply with AWWA B604, latest edition.

f. The GAC shall conform to the requirements of NSF/ANSI/CAN 61 Drinking Water System Components – Health Effects standard.
g. The GAC shall comply with the requirements for activated carbon as defined by the Food Chemical Codex (FCC), latest edition, as published by the U.S. Pharmacopeia.
h. The GAC must be a 100% reagglomerated bituminous coal-based product, sized to a granular form prior to thermal activation. The following materials shall not be accepted if submitted in lieu of the required product, nor may any amount of these materials be blended into a mix with the required reagglomerated, bituminous coal-based product:
    a. Broken pellets, regardless of base material
    b. Direct activated GAC, regardless of base material
    c. Lignite-based GAC
    d. Peat-based GAC
    e. Wood-based GAC
    f. Coconut-based GAC
    g. Sub-bituminous-based GAC
    h. Anthracite-based GAC
i. The GAC shall be capable of removing color, tastes, odors, and other organic contaminants from water.
j. Bidder shall indicate the source of coal, carbon manufacturing location and a description of the reagglomeration/thermal process. The engineer/owner reserves the right to inspect the GAC manufacturing and thermal processing facility.
k. Product as packaged shall meet the following specifications:

Product Specification:	Value	Test Method
Iodine Number (mg/g), min.	900	TM-4, ASTM D4607
Moisture, weight %, max.	2	TM-1, ASTM D2867
Abrasion No., min.	75	TM-9, AWWA B604
Screen Size (US Sieve), weight 90%	12 x 40	TM-8, ASTM D2862
Apparent Density, g/cc, min.	0.42	TM-7, ASTM D2854

l. The Certificate of Analysis shall certify that the GAC is in full compliance with the specifications stated herein.
m. The successful bidder must provide a signed Affidavit of Compliance stating that the GAC being supplied is:
    a. 100% virgin, with no reactivated carbon content whatsoever, and
    b. 100% bituminous coal-based, reagglomerated material made in the United States of America.

PART 3 - EXECUTION

3.1 CARBON EXCHANGE PROCEDURES

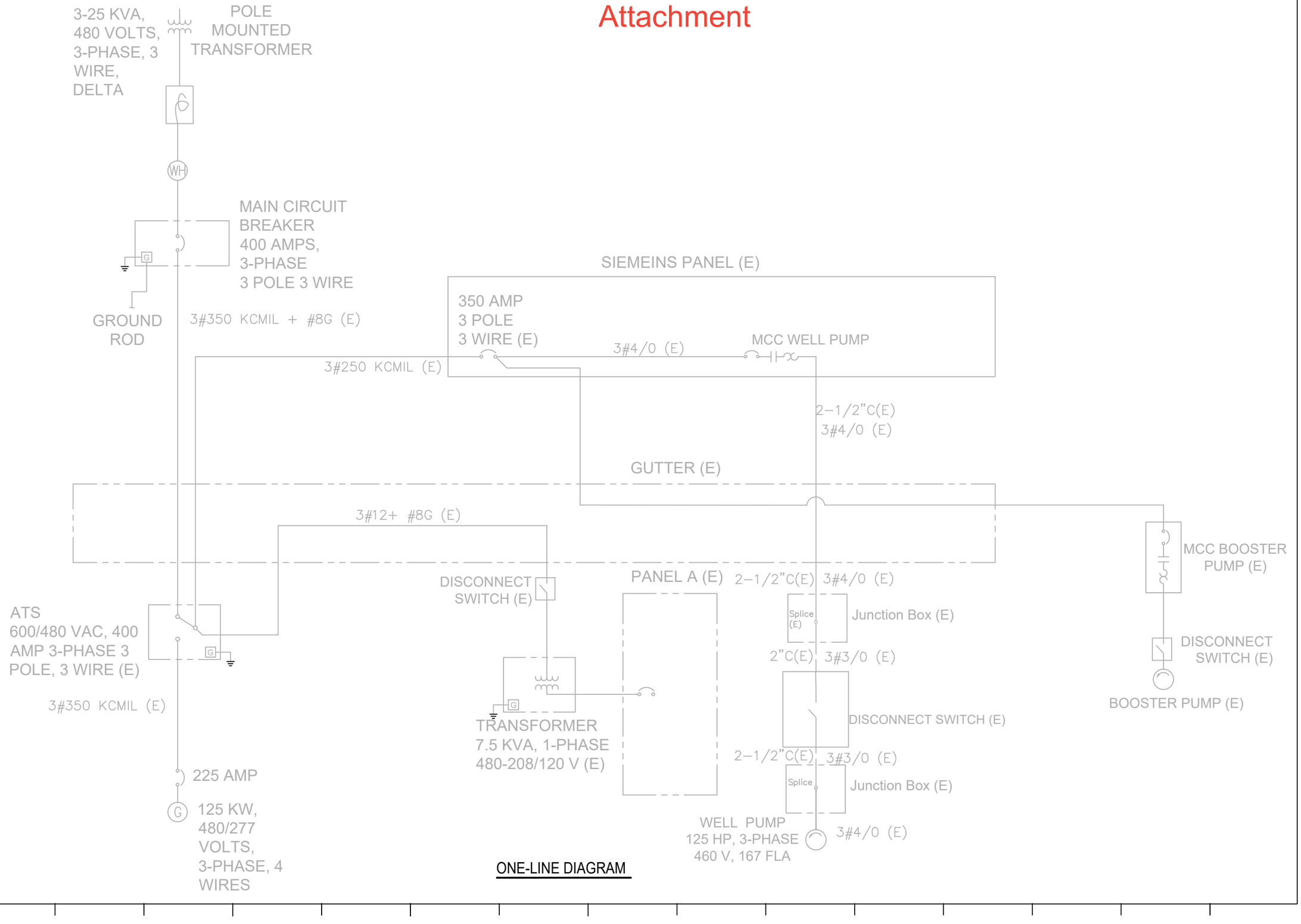
a. Field Service personnel supervising the GAC exchange must be directly employed by the manufacturer of the GAC

i. The GAC manufacturer's supervisor must have a minimum of 5 years' experience in performing carbon exchanges.
ii. Supervision of the GAC exchange by a third party or sub-contractor shall not be allowed.

b. Bidder shall submit a detailed carbon exchange procedure.
    i. The preferred method for installation of virgin GAC shall be by hydraulic water education. Owner shall be responsible for water and air supply, if necessary.
    ii. The preferred method for spent GAC removal shall be hydraulic education. Owner shall be responsible for water and air supply, if necessary.
c. Spent GAC removed from filters shall be transported to a carbon reactivation facility for reactivation for either pool or custom reactivation subject to carbon acceptance testing. A spent carbon sample shall be analyzed for acceptance by the Supplier and if deemed unacceptable by the Supplier the spent GAC shall be sent for disposal via landfill, incineration, or by another means mutually acceptable by the Supplier and Owner.
d. Failure to provide the information requested will be considered non-responsive and the bid rejected.

END OF SECTION 460101

Attachment



ONE-LINE DIAGRAM

REVISION			
NO.	DESCRIPTION	BY:	DATE:

CITY ENGINEER		
DESIGN GROUP	W.E.	04/08/24
ENGINEER:	-	
DESIGNED BY:	W.E.	04/08/24
DRAWN BY:	-	
CHECKED BY:	-	
APPROVED BY:		

SHEET TITLE: ONE LINE DIAGRAM EXISTING CONDITION

PROJECT NO.: 32201

PROJECT TITLE: CURRENT BALANCING UNIT FOR DEEP WELL Y-15

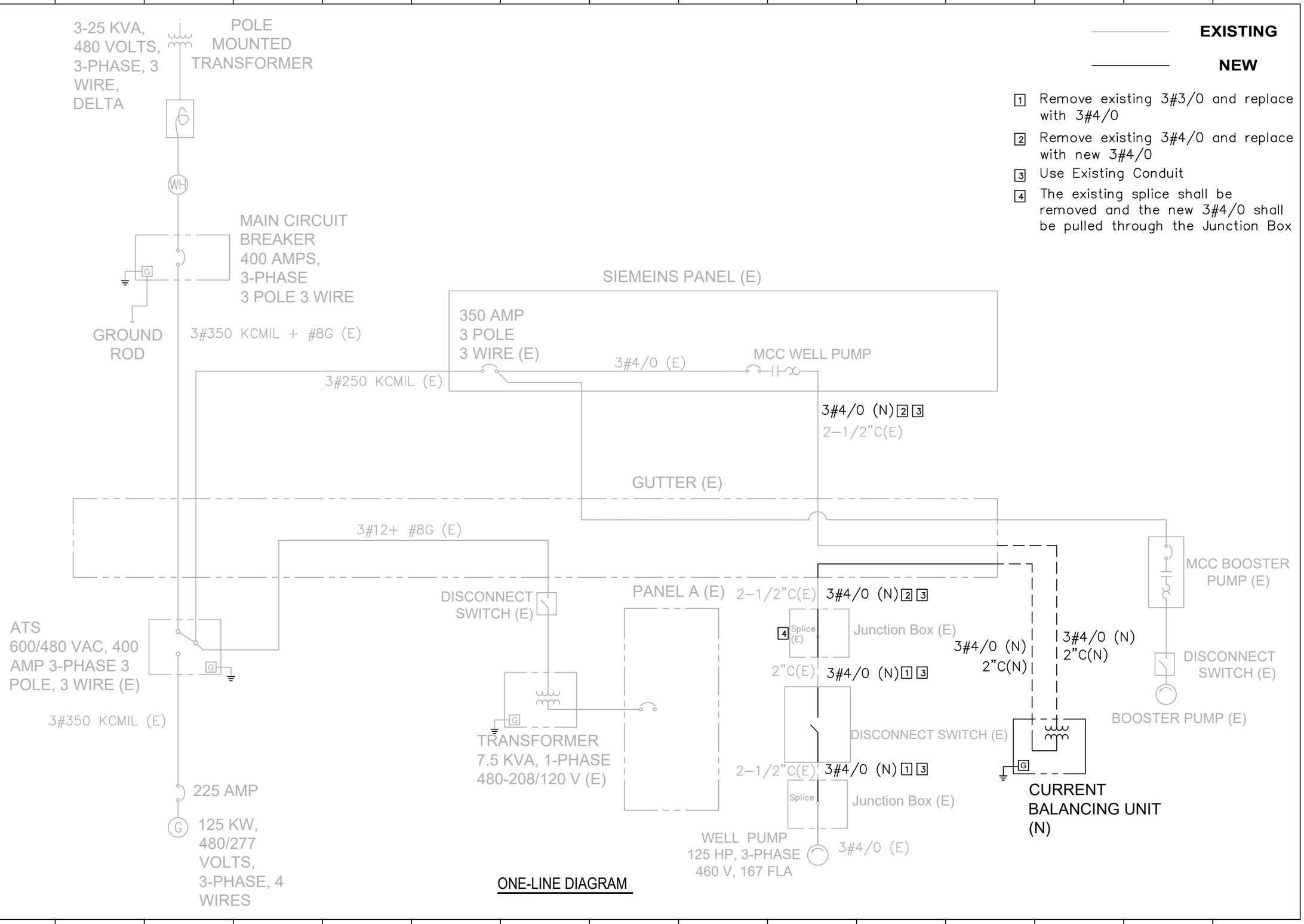
ADDRESS:

SHEET COUNT

SHEET 2 OF 3

DRAWING NO.

E-01



ONE-LINE DIAGRAM

EXISTING

NEW

1 Remove existing 3#3/0 and replace with 3#4/0

2 Remove existing 3#4/0 and replace with new 3#4/0

3 Use Existing Conduit

4 The existing splice shall be removed and the new 3#4/0 shall be pulled through the Junction Box

REVISION	NO.	DESCRIPTION	BY:	DATE:

CITY ENGINEER

DESIGN GROUP	DATE
ENGINEER: W.E.	04/08/24
DESIGNED BY: -	
DRAWN BY: W.E.	04/08/24
CHECKED BY: -	
APPROVED BY: -	

SHEET TITLE: ONE LINE DIAGRAM NEW CONDITION

PROJECT NO.: 32201

PROJECT TITLE: CURRENT BALANCING UNIT FOR DEEP WELL Y-15

ADDRESS:

SHEET COUNT

SHEET 3 OF 3

DRAWING NO.

E-02

TECHNICAL REQUIREMENTS FOR
Current Balancer Unit (Addendum)

1.0 SCOPE

1.1 Purpose

This document defines the requirements and responsibilities for design, manufacturing and documentation for Current Balancing Units.

2.0 RESPONSIBILITIES

It is not the intent to specify herein all the details of design and construction. It shall be the responsibility of the Seller to ensure that the equipment has been engineered, fabricated and tested in accordance with design specifications.

2.1 Seller's Responsibilities

a. The Seller shall have full responsibility for compliance with the requirements of this document.
b. The Seller shall design, fabricate and supply the equipment completely assembled, wired, tested and ready for installation in accordance with this document.
c. The Seller shall be responsible for providing documents and drawings as required by this document.

2.2 Buyer's Responsibilities

a. Providing source voltage (input to CBU) within IEEE-519 voltage limits.
b. Provide proper clearances around CBU as dictated by installation documentation.

2.3 Delegated Design Scope

The contractor shall be responsible for the delegated design, installation, and integration of the Current Balancing Unit (CBU). This includes, but is not limited to, the design and installation of underground conduits, surface mount conduits, boxes, fittings, and all necessary electrical connections to ensure the CBU is fully operational and integrated into the existing system. The contractor shall also be responsible for the design of the physical installation of the CBU, including the design of a concrete mounting pad and the anchoring of the unit to meet the seismic requirements of Guam. The contractor shall provide detailed design drawings, calculations, and specifications for review and approval by the GWA prior to commencement of installation. All work shall comply with NFPA 70 and applicable codes, standards, and best practices to ensure a safe, reliable, and efficient installation.

3.0 TECHNICAL REQUIREMENTS

3.1 Functional Requirements

The functionality and performance of the equipment shall be as follows:

3.1.1	Unit Rating:	The units shall have a continuous rating of "200" kVA
3.1.2	Phase:	The unit shall be 3 phase
3.1.3	Frequency:	60 Hz

TECHNICAL REQUIREMENTS FOR
Current Balancer Unit (Addendum)

3.1.4	Input/Output Voltage:	The nominal voltage shall be “480” V
3.1.5	Input Voltage Rage	Nominal +/-10% with 5% or less phase to phase voltage unbalance
3.1.6	Current Balance Duration:	The unit shall be capable of continuous current balancing, sampling the incoming voltage level continuously.
3.1.7	Balance Correction Time	Less than 5 seconds typical (manual adjustment provided).
3.1.8	Output Current Balance	3% phase to phase, or less (typical). Manual target adjustment provided from 2% to 5%.
3.1.9	Tap Switching Transients:	The unit shall not interrupt the load current when switching taps
3.1.10	Harmonic Distortion:	The unit shall add no harmonic distortion to the output voltage waveform for any load, load power factor or for linear or non-linear loads
3.1.11	Surge Suppression:	Surge suppression shall be incorporated with the unit and shall be in accordance with ANSI/IEEE standard C62.41
3.1.12	Overload Capacity:	The overload capacity of the unit shall be at least 1,000% for one second; 500% for five seconds; 200% for one minute
3.1.13	Fault Clearing:	The unit shall provide a minimum 1000% fault clearing capacity to permit downstream and load protective devices to operate properly
3.1.14	Minimum Load	Current balance requires minimum 10% load. Unit will run any load from 0% to 100% rated.
3.1.15	Load Power Factor Limitation:	There shall be no minimum or other limitations on load power factor
3.1.16	Load compatibility:	The unit shall be designed to power a single three-phase motor with no parallel loads.
3.1.17	Current Zero Crossing Sensitivity:	Initiation of tap switching shall be independent of the load current zero crossing
3.1.18	Efficiency	99% typical
3.1.19	Internal Bypass:	The unit shall have an internal automatic electronic bypass that actuates automatically on malfunction or component failure and maintains load current while protecting the unit. Unit shall be capable of operation on internal bypass indefinitely. Include digital input from Automatic Transfer Switch indicating that the site is on secondary power source; and the unit shall go into Bypass mode when secondary power source is in use.
3.1.20	Operating Frequency:	±3% of nominal frequency
3.1.21	Audible Noise:	Audible noise of the unit shall be less than 65 dBA at one meter

3.2 Physical Requirements

Construction and features of the equipment shall be as follows:

3.2.1	Technology:	The unit shall be of the microprocessor-controlled, tap switching, series transformer design type
3.2.2	Switching Semiconductors:	Switches controlling the taps (semiconductors or otherwise) shall not be required to carry full unit current or overload or fault current; full power semiconductors are not permitted
3.2.3	Transformer:	Transformer insulation shall be designed for a maximum temperature rise of 115 C. The transformer shall be a dry-type, auto-transformer, copper wound, 3-PH (delta-delta).
3.2.4	Input Connection:	The input shall be a 3 phase delta (3W+G) hardwired to the input circuit breaker included with the unit.
3.2.5	Output Connection:	The output shall be a 3 phase delta (3W+G) hardwired to lug-type connector(s)
3.2.6	Grounding Connection:	The unit shall have an internal grounding connection.
3.2.7	Cooling:	Standard configuration shall be by natural convection.
3.2.8	Input Circuit Breaker:	An input circuit breaker rated no less than 100% of unit full load current shall be included in the unit enclosure. An external handle or pushbuttons shall be provided to open, close and, if necessary, charge the circuit breaker
3.2.9	Remote Alarm Contacts:	One set of remote alarm contacts, rated at 0.5A @ 125VAC; 0.3A @ 110VDC; 2A @ 30VDC, normally closed shall be provided. The alarm contacts shall indicate the unit has entered internal bypass, lost voltage regulation, tripped the input circuit breaker, lost input power, or is in an over-temperature condition.
3.2.10	Display:	The unit shall include a front mounted LCD 4 line backlit display indicating buck/boost display and unit status. The maximum allowable height of the display shall be 5’ above the base of the Current Balancer Unit and the minimum allowable height of the display shall be 4’ – 6” above the base of the Current Balancer Unit.
3.2.11	Enclosure:	The unit enclosure shall be freestanding, NEMA 4X, ANSI 61 gray
3.2.12	Logging:	Historical tap change data available through the user interface
3.2.13	Power Meter:	The unit shall include two front mounted Shark 200 V6 Digital Power Meters, one to display the input and one to display the output. The maximum allowable height of the display shall be 5’ and the minimum allowable height of the display shall be 4’ – 6” above the base of the CBU.

3.2.14	Display Covering:	The display and meters shall be protected by an opaque cover that is painted stainless steel.

3.3 Environmental Requirements

The equipment shall operate within the following ambient environmental conditions:

3.3.1	Ambient Temperature:	Normal Operating Conditions: The unit shall be capable of continuous operation with an ambient air temperature of 32 to 104°F (0 to 40°C).
3.3.2	Relative Humidity:	The unit shall be capable of continuous operation with a relative humidity of 0-95% non-condensing.
3.3.3	Operating Altitude:	The unit shall be capable of continuous operation at full load without de-rating at altitudes from 0 to 3,300 ft (1,000m) – Typical derating of .3% for everyone 100m over 1,000m.

3.4 Installation Requirements

Following are the general requirements for installation:

3.4.1	Assembly:	The unit shall be shipped fully assembled.
3.4.2	Setup:	The unit shall require no setup other than installing the appropriate input, output, neutral and grounding conductors. Installation of the unit shall not require field measurements, adjustment, programming or modification of settings
3.4.3	Special Tools:	No special tools shall be required for installation or maintenance of the unit

4.0 DOCUMENTATION REQUIREMENTS

Following are the general requirements for documentation:

4.1	Installation, Operation and Maintenance Manual:	One reproducible hard copy and PDF versions shall be supplied.
4.2	Drawings	Complete set of as-built electrical and mechanical drawings shall be supplied.
4.3	Spare Parts	Include spare parts kit. Spare parts kit typically includes control board with processor, SCR Assembly, MOV, Snubbers, and fuses where appropriate.

5.0 WARRANTY

Following are the warranty requirements for the equipment:

5.1	Warranty:	The standard equipment shall be covered by the manufacturer's standard warranty for eighteen (18) months from the date of shipment or twelve (12) from the date of first operation, whichever occurs first.