GMC

ADDENDUM NO. 1

PROJECT: **GROVE CREEK WPCP**
FOR CITY OF COMMERCE
GMC PROJECT NO. CATL230033

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1. Introduction

1.1 The content included in this addendum is hereby added to the referenced Project Manual and Plans and shall be duly considered when preparing bids.

2. General Information

2.1 **Sealed bid proposals will be received** by City of Commerce; at their offices at **27 Sycamore Street, Commerce, GA 30529** until **2:00 PM, EDT, Tuesday, 29 April, 2025.**

3. Clarifications

3.1 By-pass Pumping Schedule: ***replace schedule in bypass pumping specification section 13 10 00 with the following:***

Location of Proposed Modifications	Pump From	Pump To	Maximum Flow (MGD)
Influent Pump Station	Existing upstream manhole	Bypass Pump Discharge Connection	2.0

3.2 ***Second clarifiers***

Secondary clarifiers shall be of peripheral feed-peripheral take-off type as shown in plans. 16" ML penetration to be as shown on D-901.

3.3 ***Communications***

All communication protocol for Factory (Vendor Supplied) Control panels and VFDs specified with digital (in lieu of hardwired external communication) shall utilize Ethernet IP.

3.4 ***Funding Requirements***

Funding requirements stipulate BABAA. Requirements for BABAA have been included in this addendum. Waivers for BABAA include:

a) ***Justification of waivers.*** A Federal agency may waive the application of the Buy America Preference in any case in which it finds that:

(1) Applying the Buy America Preference would be inconsistent with the public interest (a "public interest waiver");

(2) Types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (a "nonavailability waiver"); or

(3) The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall infrastructure project by more than 25 percent (an "unreasonable cost waiver").

3.5 ***Floating Aerators***

Include 3-point cable mooring as shown in drawings, thermostat and space heaters in motor per electrical drawings, basin as shown D-201, metal tags per 40 05 53.

3.6 ***Valves***

V3119, 3120, 4011, and 4021 to be flanged w/ manual handwheel.

3.7 ***Aeration Basin***

Penetration shown in Section A D-305 to be type B.

3.8 ***Filters***

Effluent TP required is 1.0 mg/L monthly average, 1.5 mg/L weekly average. Average goal 0.5 mg/L – PACL feed separately; no sun-covers required, canopy shall be installed over filters.

3.9 ***Yard Drain Pumping Station***

Bottom elevation of pump station to be 763.00' – all other elevations remain (deeper). Extend pipe to accommodate. Noted 6" x 8" increaser at discharge shall be 6" x 10".

3.10 ***Piping Material***

To be as indicated on drawings and piping schedule on G-009. All DIP containing process water to be ceramic epoxy lined per specifications with the exception of piping downstream of the filters (Reuse Water Line, Filtered Effluent, Final Effuent).

4. Revisions to Drawings

4.1 Drawing sheet [C-302-304]: piping revisions/clarification

5. Revisions to Project Manual

5.1 Section 00 41 13 Bid Form: Delete this section and replace with new Section 00 41 13 Bid Form.

5.2 Section 00 73 00 Supplementary Conditions: Delete this section and replace with new Section 00 73 00 Supplementary Conditions.

5.3 Section 01 15 00 Measurement And Payment: Delete this section and replace with new Section 01 15 00 Measurement And Payment.

5.4 Add the following Sections:

A. Section 33 05 23.13 - Horizontal Directional Drilling

B. Section 33 05 23.16 - Utility Pipe Jacking

C. Section 33 11 13 - Public Water Utility Distribution Piping

D. Section 33 13 00 - Disinfecting of Water Utility Distribution

6. Contractor Questions

Answers to contractor questions are provided below with as much detail as reasonable in the time allowed. Necessary clarifications and additional questions can be submitted for incorporation into a subsequent addendum. All questions and answers are formatted as follows:

[Contractor question]
[GMC answer]

6.1 **Is the intent to bid the division I and II separately?**
No. This will be a single bid.

6.2 **Please consider EcoJet for Or-Equal Equipment – specification requirements all met by EcoJet.**
Acceptable.

6.3 **Please consider adding Rodney Hunt to the list of acceptable suppliers for Spec Section 40 05 59.**
Acceptable.

6.4 **Specify fire hydrants.**
Included in Section 33 11 13 - Public Water Utility Distribution Piping.

6.5 **What is the thickness of the 16" Casing pipe ?**
The thickness of the 16" casing pipe is 0.375".

6.6 **What is the model number of tapping sleeve?**
See added specification 33 11 13 - Public Water Utility Distribution.

6.7 **Is AFC, American Flow Control an acceptable manufacturer of valves and hydrants?**
See added specification 33 11 13 - Public Water Utility Distribution for approved manufacturer.

6.8 **For the Discharge Force Main in Division 2, what is the DR rating for the HDPE Pipe?**
Use C900 DR18 FPVC

6.9 **Is the 16" Material on Plan Pages CU-312, & CU-313 part of Division 2?**
No, 16" Material on Plan Pages CU-312, & CU-313 belongs to Division 1

6.10 **What type of valve are V6116 & V6117 shown on sheet D-611**
6" plug valve, MJ, with valve box and extended nut.

6.11 **Spec Section -Plug Valves 40 05 62, 2.1, A – Please Add Val-Matic as an acceptable manufacturer.**
Acceptable.

6.12 **Spec Section – Butterfly Valves 40 05 64, 2.1, A and 2.2, A – Please add Val-Matic as an acceptable manufacturer.**
Acceptable.

6.13 **Spec Section – Swing Check Valves 40 05 65.23, 2.1, A – Please add Val-Matic as an acceptable manufacturer.**
Acceptable.

6.14 **Are CAD files available?**
No.

6.15 **Specification Section 26 32 13 specifies natural gas generators. Please confirm this is correct.**
Confirmed.

7. Acknowledgement of Receipt

7.1 Receipt of this addendum shall be acknowledged as follows:

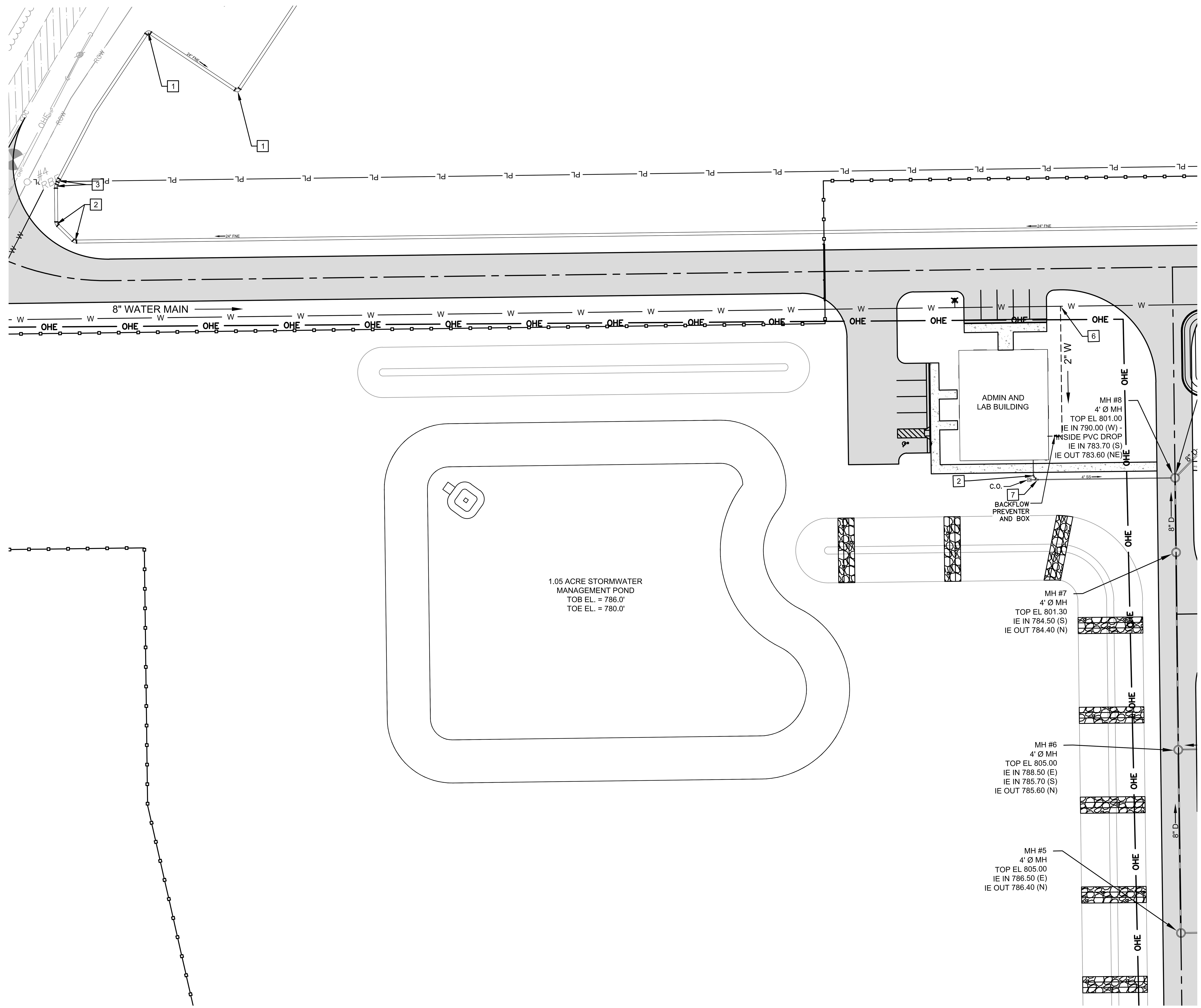
1. On Page 4 of Bid Form of the Project Manual, note the addendum number and date of each addendum received and include this in the bid submittal.

AND

2. Email Goodwyn, Mills & Cawood, Inc. **immediately** at the **Atlanta, GA** office at kim.ross@gmcnetwork.com and confirm that addendum was received and is legible.

8. Conclusion

8.1 This is the end of Addendum No. 1, dated April 17, 2025.



2 SITE PLAN
C-302
SCALE: 1" = 30'

KEY NOTES: #

1. 90° MJ BEND
2. 45° MJ BEND
3. 11.25° MJ BEND
4. 22.5° MJ BEND
5. MJ TEE
6. 6" x 2" TAPPING SADDLE
7. WYE

NOTE:

ALL FITTINGS TO BE RESTRAINED ON RAS, WAS, PD, AND INFLUENT FORCEMAIN TO THE PLANT. PROVIDE RESTRAINED JOINTS 60' ON EACH SIDE OF FITTINGS.

ALL FITTINGS TO BE RESTRAINED ON WATER LINE W/ RESTRAINED JOINTS 60' ON EACH SIDE OF FITTING.

LEGEND

- YARD PIPING
- PROPERTY LINE — PL
- PERIMETER FENCE
- ASPHALT ROAD
- ROAD CENTERLINE
- OFFSITE PROPERTY — PL
- EXISTING ROAD
- FENCE — X
- TREELINE
- OVERHEAD ELECTRIC — OHE
- RIGHT OF WAY — ROW
- EASEMENT
- WATERBODY
- STREAM CENTERLINE

GMC
6120 Powers Ferry Road NW, Suite 200
Atlanta, GA 30339
T 770.952.2481

STATE OF GEORGIA — GOODWYN MILLS CAWOOD, LLC — No.PEF007898 — Exp.06.30.2026 — CERTIFICATE OF AUTHORIZATION

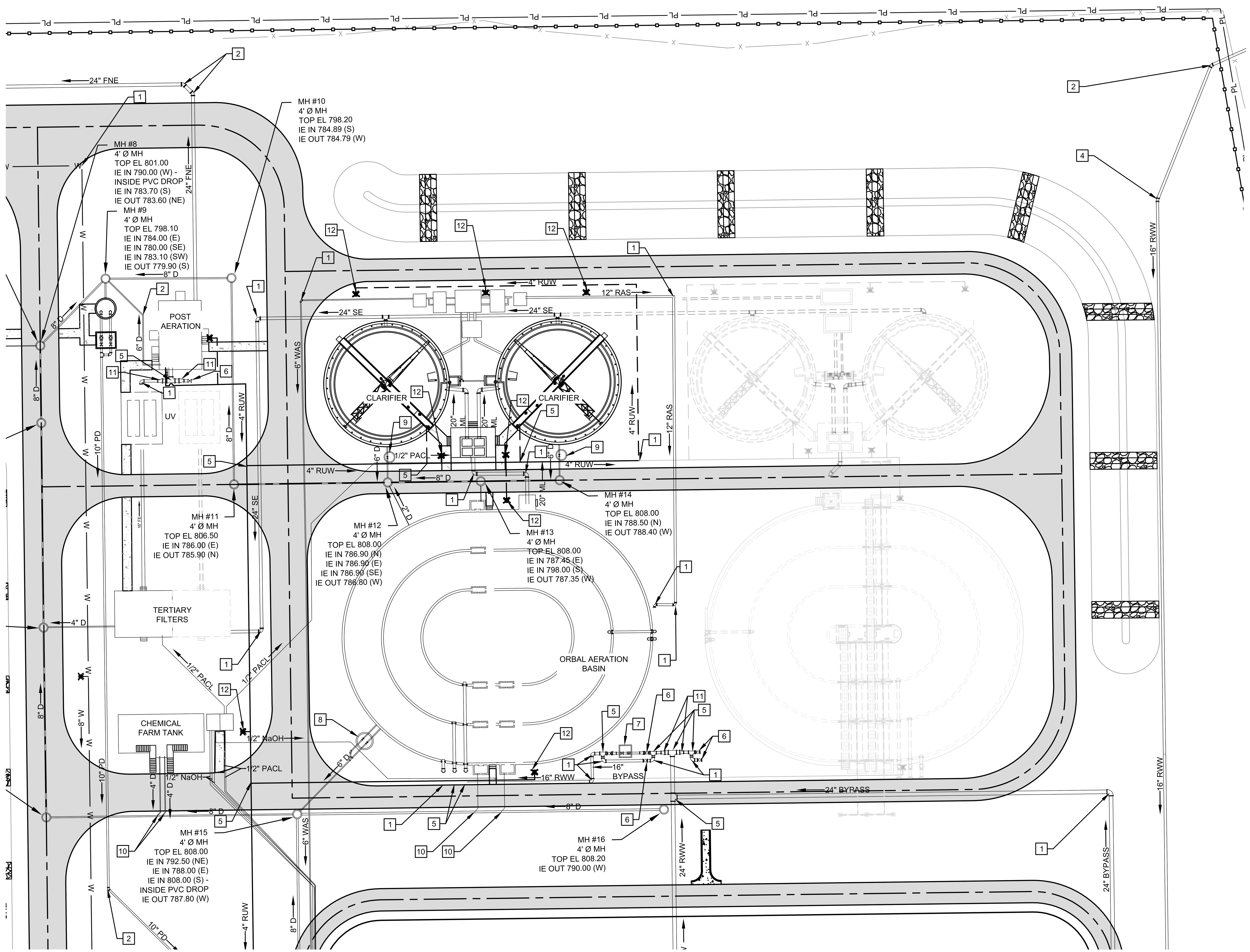
ISSUE	DATE
30% Submittal	05.30.2024
60% Submittal	08.29.2024
90% Submittal	11.27.2024
Bid Set	03.19.2025
REV1	04.17.2025
Project Manager:	CW
Engineer:	GS
Designer:	GS
Drawn By:	

COMMERCE 2.0 MGD
GROVE CREEK WPCP
COMMERCE, GA

CATL230033

CIVIL SITE PLAN - ENLARGED YARD PIPING

C-302



3 **SITE PLAN**
C-303
SCALE: 1" = 30'

KEY NOTES: #

1. 90° MJ BEND
2. 45° MJ BEND
3. 11.25° MJ BEND
4. 22.5° MJ BEND
5. MJ TEE
6. MJ PLUG VALVE
7. EQ BASIN FLOW CONTROL VAULT
8. 8' Ø MANHOLE W/ VALVES V3119 AND 3120 AND FLANGE COUPLING ADAPTERS (2X) - TOP EL 811.00' BOT EL 790.00' - 6" GRAVEL BOTTOM FOR DRAINAGE 10' DIAMETER - FLEXIBLE PIPE BOOT PENETRATIONS W/ MANHOLE STEPS ORIENTED BETWEEN PIPES - PROVIDE CONFINED SPACE ENTRY SIGN ADJACENT TO MANHOLE - PIPING JOINED OUTSIDE OF MANHOLE VIA 45° BEND AND WYE
9. 5' Ø MANHOLES W/ VALVES V4011 AND 4021 AND FLANGE COUPLING ADAPTERS (2X) - TOP EL 806.50' BOT EL 785.5' - 6" GRAVEL BOTTOM FOR DRAINAGE 7' DIAMETER - FLEXIBLE PIPE BOOT PENETRATIONS W/ MANHOLE STEPS ORIENTED OPPOSITE PIPE - PROVIDE CONFINED SPACE ENTRY SIGN ADJACENT TO MANHOLE
10. 8" GRAVITY SEWER PIPE TAP FOR 4" DRAIN LINES FROM CHEMICAL FEED AREA AERATOR GEAR BOX AREAS - FERNCO OR EQUAL
11. 16" x 24" MJ INCREASER
12. 2" NON-FREEZE YARD HYDRANT W/ 4" x 2" TEE

NOTE:

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Project Manager:	CW
Engineer:	GS
Designer:	GS
Drawn By:	

COMMERCE 2.0 MGD GROVE CREEK WPCP
COMMERCE, GA

CATL230033

CIVIL SITE PLAN - ENLARGED YARD PIPING

C-303

KEY NOTES: #

1. 90° MJ BEND
2. 45° MJ BEND
3. 11.25° MJ BEND
4. 22.5° MJ BEND
5. MJ TEE
6. MJ PLUG VALVE
7. BUTTERFLY VALVE
8. INFLUENT FLOW METER AND VAULT
9. FLG TEE

NOTE:

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- RIGHT OF WAY — ROW
- EASEMENT
- WATERBODY
- STREAM CENTERLINE

4 C-304 **SITE PLAN**
SCALE: 1" = 30'

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STATE OF GEORGIA — NOT FOR CONSTRUCTION — CERTIFICATE OF AUTHORIZATION
GOODWYN MILLS CAWOOD, LLC
No. PEO007186
Exp.06.30.2026

1" 0" 5" 1"

ISSUE	DATE
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COMMERCE 2.0 MGD
GROVE CREEK WPCP
COMMERCE, GA

CATL230033

CIVIL SITE PLAN - ENLARGED YARD PIPING

C-304

BID FORM FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to: City of Commerce

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;
B. List of Proposed Subcontractors;
C. List of Proposed Suppliers;
D. Evidence of authority to do business in the State of Georgia;
E. Georgia Utility Contractor's license number as evidence of Bidder's State Contractor's License; and
F. Required Bidder Qualifications Statement with supporting data.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 Lump Sum Bids – Division I

A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:

1. Lump Sum Price (Single Lump Sum – including integration)

Lump Sum Bid Price	$

B. All specified cash allowance(s) are included in the price(s) set forth below, and have been computed in accordance with Paragraph 13.02 of the General Conditions.

Lump Sum for Cash Allowance 1(Testing Laboratory Services)	$90,000
Lump Sum for Cash Allowance 2 (Building Furniture and Phone)	$50,000
Lump Sum for Cash Allowance 3 (Site Maintenance Equipment)	$50,000
Lump Sum for Cash Allowance 4 (Lab Equipment)	$80,000
Total for all Lump Sum for Cash Allowances	$270,000

C. All specified contingency allowances are included in the price(s) set forth below, and have been computed in accordance with Paragraph 13.02 of the General Conditions.

Lump Sum Contingency Allowances	$2,000,000

3.02 Unit Price Bids – Division I

A. Bidder will perform the following Work at the indicated unit prices:

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
1	Mass Rock Excavation and Removal	C.Y	200		$
2	Trench Rock Excavation and Removal	C.Y	200		$
Total of All Unit Price Bid Items					$

B. Bidder acknowledges that:

1. Each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and
2. Estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

3.03 **Total Bid Price (Lump Sum and Unit Prices) – Division I**

Total Bid Price (Total of all Lump Sum and Unit Price Bids)	$

3.04 **Unit Price Bid – Division II**

Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

UNIT PRICE BID PROPOSAL – DIVISION II

Effluent Discharge Force Main and Haggard Rd. Water Main

ITEM No.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL PRICE
MOBILIZATION/CLEARING & TRAFFIC					
1.	Mobilization and Demobilization	1	LS	_____	_____
2.	Clearing and Grubbing	1	LS	_____	_____
3.	Traffic Control	1	LS	_____	_____
WATER MAIN (HAGGARD RD.)					
4.	8" C900 DR 18 PVC Water Main	2,330	LF	_____	_____
5.	8" PC 350 Rest. Jt. DIP Water Main	380	LF	_____	_____
6.	8" Terminal End w/8" GV	1	EA	_____	_____
7.	16" x 8" Tapping Sleeve with 8" Gate Valve	1	EA	_____	_____
8.	Fire Hydrant Assy.	6	EA	_____	_____
9.	16" Welded Steel Casing (Jack & Bore/Open Trench)	130	LF	_____	_____
10.	Sterilization & Pressure Testing	2,710	LF	_____	_____
11.	Cast Iron Specials	1.37	TN	_____	_____

UNIT PRICE BID PROPOSAL – DIVISION II

Effluent Discharge Force Main and Haggard Rd. Water Main

ITEM No.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL PRICE
EFFLUENT DISCHARGE FORCE MAIN					
12.	24" PC 250 DIP Main (Start Sta. 8+47 Sht. CU-314)	7,312	LF		
13.	24" PC 250 Rest. Jt. DIP Main	2,812	LF		
14.	24" DR 18 Fusible PVC by Horizontal Directional Drill	450	LF		
15.	36" Welded Steel Casing (Jack & Bore/Open Trench)	750	LF		
16.	Air Release/Vacuum Valve in 5 ft. Dia. Manhole	6	EA		
17.	24" Effluent Discharge Outlet w/Velocity Reduction	1	EA		
18.	Cast Iron Specials	26.3	TN		
MISCELLANEOUS					
19.	Stabilization Stone	100.0	TN		
20.	Trench Rock Blasting/Breaker and Excavation	500	CY		
21.	Remove and Replace Existing Fence (All Types)	430	LF		
22.	Remove and Replace Existing Asphalt Pavement	2,212	SY		
23.	Remove and Replace Existing Gravel Road	1,135	LF		
24.	Remove and Replace Concrete Curb & Gutter	887	LF		
25.	Channel Stabilization (Rip-Rap)	30	TN		
26.	Construction Exit (Co)	9	EA		
27.	Mulching, Temporary & Permanent Grassing (Ds1, Ds2 & Ds3)	8,353	LF		
28.	Slope Stabilization (Ss)	7,614	SY		
29.	Hay Bales (Sd1)	1,190	LF		
30.	Silt Fence Type "S" Sensitive (Sd1-S)	5,555	LF		
31.	Silt Fence Type "NS" Non-Sensitive (Sd1-NS)	8,114	LF		
32.	Brush Barrier (Sd1-BB)	620	LF		
33.	Storm Water Sampling for NPDES Permit	1	LS		
34.	Monitoring, NOI, NOT, Record Keeping & Reporting NPDES to GA EPD	1	LS		
35.	Cash Allowance (Authorized by Owner & Engineer)	1	LS	$500,000.00	$500,000.00

TOTAL AMOUNT BASE BID _____
(In Figures)

_____
(In Words)

3.05 **Bid Total (Division I + II)**

A competitive selection process has already been completed for integration. The selected integrator shall be Global Control Systems. The contact person for Global Control Systems is Dhrupal Patel (dhrupal@globalcontrolsystems.com). Pricing shall be obtained from Global and included in the lump sum total of Division I and II below:

Global Control Systems Price	$
Total Bid Price (Total of all Lump Sum and Unit Price Bids including Division I, II, and Global Control Systems Price)	$

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

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

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical

Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder 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.
8. Bidder 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 Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:

    a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
    b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
    c. 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.
    d. 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.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

_____
_____

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address:

_____
_____
_____

Bidder's Contractor License No.: (if applicable) _____

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT
TABLE OF CONTENTS

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement Section 00 72 00, Standard General Conditions of the Construction Contract. The General Conditions remain in full force and effect except as amended.
The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.
The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, “Paragraph SC-4.05.”

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A Add the following paragraphs immediate after Paragraph 1.01.A.50:

51. Build America, Buy America Act (BABAA) – Requirements instituted by the Bipartisan Infrastructure Law mandating domestic preference that all iron and steel, manufactured products, and construction materials are produced in the United States.

52. Construction Materials – Those articles, materials, or supply – other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives – that are or consist primarily of: non-ferrous metals, plastic and polymer-based products, glass, lumber or drywall.

53. Manufactured Product – Items assembled out of components, or otherwise made or processed from raw materials into finished products. Manufactured products must be manufactured (assembled) in the United States, and the cost of components that were mined, produced, or manufactured in the United States must be greater than 55 percent of the total cost of all components of the project.

54. Manufacturer’s Certification – Documentation provided by a Manufacturer, certifying that the items provided by Manufacturer meet the domestic preference requirements of BABAA.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. in its entirety and insert the following in their place:

B. *Evidence of Contractor’s Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor one printed copy of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

No Supplementary Conditions in this Article.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.05 *Delays in Contractor's Progress*

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

5. *Weather-Related Delays*
   a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.
   b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with Specification Section 01 10 00 - Summary.
   c. CONTRACTOR has acknowledged to have taken all problems due to normal inclement weather conditions (Rainy Days) into consideration in preparing his proposed Contract Price and in establishing his time for SUBSTANTIAL COMPLETION of the WORK under this Contract. He must be prepared and must take all precautions to protect WORK from normal inclement weather due to precipitation (Rainy Days). CONTRACTOR shall provide approved facilities for protecting against normal inclement weather at all times, to the entire satisfaction of OWNER.

   Completion time will not be extended for normal inclement weather. Time for completion as stated in the CONTRACT DOCUMENTS includes time for calendar days on which work cannot be performed due to normal inclement weather conditions. For the purpose of this Contract, CONTRACTOR agrees that he may expect to lose calendar days due to normal inclement weather (Rainy Days) in accordance with the following table:

January **12 days**	May **10 days**	September **8 days**
February **10 days**	June **11 days**	October **7 days**
March **11 days**	July **13 days**	November **8 days**
April **9 days**	August **11 days**	December **11 days**

Rainy Day data in calendar days for each month in the above table is taken from the Georgia Automated Environmental Monitoring Network. The specific site for this

project is **Madison County Emergency Medical Services Danielsville, Madison County, Georgia** weather station provided by the University of Georgia at http://www.georgiaweather.net/.

If the total number of calendar days lost to inclement weather for any month exceeds the total number to be expected for that month, time for completion will be extended by the difference in number of calendar days lost. Example: For the month of **January** CONTRACTOR claims work could not be performed for **14** calendar days due to excessive inclement weather and the expected number of normal inclement weather is **12** calendar days then the CONTRACTOR is entitled to a time extension of **two (2) calendar days**. All requests for time extensions must be submitted in writing to the OWNER by the 15th day of each month following the month that had excessive inclement weather. No consideration will be given to late requests. No changes in the contract price will be authorized because of adjustment of contract time due to excessive inclement weather.

ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

No Supplementary Conditions in this Article.

ARTICLE 6—BONDS AND INSURANCE

6.03 Add the following new paragraph immediately after Paragraph 6.03.C:

D. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages:
   a. State: Statutory
   b. Applicable Federal (i.e., Longshoreman's): Statutory
   c. Employer's Liability:
      1) Each Accident: $1,000,000
      2) Disease Employee Limit: $1,000,000
      3) Each Employee: $1,000,000

2. Contractor's General Liability under the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:
   a. General per Contract Aggregate: $2,000,000
   b. Products - Completed Operations
      1) Contract Aggregate: $2,000,000
      2) Each Occurrence: $2,000,000
   c. Personal and Advertising Injury: $1,000,000
   d. Each Occurrence (Bodily Injury and Property Damage): $1,000,000
   e. Medical Expense Limit per person: $5,000

f. Excess or Umbrella Liability (Occurrence Form):
   1) General per Contract Aggregate: $10,000,000
   2) Each Occurrence: $10,000,000
   3) Policy shall include Cross Liability (Separation of Insureds) coverage.
   4) Policy shall include endorsement that the policy is excess to the underlying coverage with any coverage exceptions identified.

g. Property Damage liability insurance shall provide Explosion, Collapse, and Underground coverages where applicable.

3. Automobile Liability under the General Conditions:
   a. Bodily Injury:
      1) Each person $1,000,000
      2) Each Accident $1,000,000
      Property Damage:
      1) Each Accident $1,000,000
      or
   b. Combined Single Limit
      (Bodily Injury and Property Damage): $ 1,000,000
      Include applicable No-Fault coverages.
   c. Include all owned vehicles, non-owned vehicles, and hired vehicles.

4. The Contractual Liability coverage required by the General Conditions shall provide coverage for not less than the following amounts:
   a. Bodily Injury:
      1. Each Accident $5,000,0000
      2. Contract Aggregate $10,000,000
   b. Property Damage:
      1. Each Accident $5,000,0000
      2. Contract Aggregate $10,000,000

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 *Labor; Working Hours*

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be 7:00 AM to 10:00 PM local time.
2. Owner's legal holidays are New Year's Day Holiday, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Holidays (Thursday and Friday), Christmas Eve, and Christmas Day. Coordination with Owner on exact dates of observed holidays for each calendar year is required.

SC-7.04 Add the following paragraphs immediate after Paragraph 7.04.C:

D. Justification of waivers. A Federal agency may waive the application of the Buy America Preference in any case in which it finds that:
   1. Applying the Buy America Preference would be inconsistent with the public interest (a "public interest waiver");

2. Types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (a "nonavailability waiver"); or
3. The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall infrastructure project by more than 25 percent (an "unreasonable cost waiver").

SC-7.11 Add the following paragraph immediate after Paragraph 7.11.C:

D. Build America, Buy America Act (BABAA). All Iron and Steel Products, Manufactured Products, and Construction Materials used in this project must be produced in the United States and comply with the Build America, Buy America Act (BABAA) requirements mandated by Title IX of the Infrastructure Investment and Jobs Act (IIJA), Pub. L. 117-58, §§ 70901-70953. Aggregates such as stone, sand, or gravel do not apply to BABAA.

SC-7.16 Add the following paragraphs immediate after Paragraph 7.16.F:

G. All products must meet BABAA requirements. Contractor shall include Manufacturer's Certification for BABAA requirements with all applicable submittals. If a specific manufacture is used in the bidding, a statement that Manufacturer will comply with BABAA must be included with the bid submission. Contractor shall comply with BABAA requirements, including coordination with manufacturers, distributors, and suppliers to correct deficiencies in any BABAA documentation.
H. Engineer/Architect approval of shop drawings or samples shall include review of BABAA documentation.
I. Contractor shall certify upon completion that all work and materials have complied with BABAA requirements.

OTHER WORK AT THE SITE

No Supplementary Conditions in this Article.

ARTICLE 8—OWNER'S RESPONSIBILITIES

No Supplementary Conditions in this Article.

ARTICLE 9—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 *Resident Project Representative*

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but

not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
3. *Liaison*
   a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
   b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
   c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
4. *Review of Work; Defective Work*
   a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
   b. Observe whether any Work in place appears to be defective.
   c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
5. *Inspections and Tests*
   a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
   b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
6. *Payment Requests:* Review Applications for Payment with Contractor.
7. *Completion*
   a. Participate in Engineer's visits regarding Substantial Completion.
   b. Assist in the preparation of a punch list of items to be completed or corrected.
   c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
   d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
5 Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 10—CHANGES TO THE CONTRACT

No Supplementary Conditions in this Article.

ARTICLE 11—CLAIMS

No Supplementary Conditions in this Article.

ARTICLE 12—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

No Supplementary Conditions in this Article.

ARTICLE 13—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCCEPTANCE OF DEFECTIVE WORK

No Supplementary Conditions in this Article.

ARTICLE 14—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

No Supplementary Conditions in this Article.

ARTICLE 15—SUSPENSION OF WORK AND TERMINATION

No Supplementary Conditions in this Article.

ARTICLE 16—FINAL RESOLUTIONS OF DISPUTES

No Supplementary Conditions in this Article.

ARTICLE 17—MISCELLANEOUS

No Supplementary Conditions in this Article.

END OF SECTION 00 73 00

SECTION 01 15 00 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 GENERAL

A. For the information and guidance of bidders, the following explanation of the bid form items is made. The omission or reference to any item in this description shall not, however, alter the intent of the bid form or relieve the Contractor of the necessity of furnishing such as a part of the Contract. The quantities set forth in the bid form are approximate and are given to establish a uniform basis for the comparison of bids. The Owner reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accordance with the terms of the Contract. Unit prices are used as a means of computing the final figures for bid and contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else reasonable.

B. The Contractor shall base his proposal on the materials specified herein and on the drawings. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of materials and equipment required for this installation and is not intended to exclude products equal in quality and similar in design.

C. Payment shall be made on the basis of work actually performed toward the completion of each item in the Contract proposal and construction cost breakdown, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the Drawings and described in the Specifications.

D. The Contractor shall assume responsibility for all materials and equipment stored, protection of his product and compliance with all federal, state and local safety regulations.

E. The Contractor will be paid only for satisfactorily installed and tested quantities. All material order quantities shall be taken from field measurements after approval from the Engineer. The Owner will not pay for excess leftover materials. All quantities derived or measurements taken from project plan sheets shall be considered estimates only.

F. Work includes furnishing all labor, equipment, materials, tools and incidental items which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Plans and Specifications. Material and construction shall be in conformance with requirements of the GDOT Standard Specifications Construction of Transportation Systems, (GDOTSS) latest edition.

PART 2 - PRODUCTS (NOT USED)
PART 3 - EXECUTION

3.1 CASH ALLOWANCE – LUMP SUM AND UNIT PRICES - **DIVISION I**

Refer to Section 01 21 00 - Allowances

3.2 CONTINGENCY ALLOWANCE

Refer to Section 01 21 00 – Allowances

3.3 UNIT PRICE ITEMS

A. Mass Rock Excavation and Removal

1. Measurement: The actual number of Cubic Yards (C.Y.) of excavation of rock material to the limits as directed by the ENGINEER as required for the construction as shown on the Contract Documents and the placement of compacted structural fill material in the excavation.
2. Payment will be made based on multiplying the actual number of Cubic Yards (C.Y.) of rock excavation times the unit price identified in the Bid Schedule. Payment will include proper disposal of the excavated material by the CONTRACTOR, supply and compaction of the structural fill material.

B. Trench Rock Excavation and Removal

1. Work performed under this item shall consist of all labor, materials, and equipment necessary to perform rock excavation in accordance with the contract documents, plans, and specifications.
2. Each cubic yard or fraction thereof of Trench Rock Excavation shall be measured based on the minimum trench/excavation width as specified herein.

    a. The depth measurement for rock excavation will be from the top of the rock to a depth of six (6”) inches below the bottom of the structure or to the bottom of the rock if the rock does not extend to the full depth of the excavation.
    b. The top of the rock will be the rock surface elevation shall be as determined by the Engineer prior to or during excavation.
    c. For open trenches at structures, including manholes, and concrete structures, the measurement of width for rock excavation will be to the outside of the structure foundation plus 2 feet all around.
    d. For open trenches at pipes the measurement of width for rock shall be limited to 18 inches beyond the outside of the pipe.
    e. No payment shall be made for rock removal beyond these limits.

END OF LUMP SUM AND UNIT PRICES - DIVISION I

3.4 UNIT PRICE BID - **DIVISION II (Effluent Discharge Force Main and Haggard Rd. Water Main)**

A. Measurement of an item of work will be by the unit indicated in the Bid.

B. Final payment quantities shall be determined from the record drawings. The record drawing lengths, dimensions, quantities, etc. shall be determined by a survey after the completion of all required work. Said survey shall conform to Section 01 78 39 Project Record Documents of these Specifications. The precision of final payment quantities shall match the precision shown for that item in the Bid. Before any "Estimated Quantity" listed in the bid form is exceeded, the Contractor shall request in writing to the Owner and Engineer reason(s) for additional quantities. No payment shall be made/authorized without prior approval from the Owner and Engineer for exceeding any bid proposal estimated quantity.

C. Payment will include all necessary and incidental related work not specified to be included in any other item of work listed in the Bid.

D. Unless otherwise stated in individual sections of the Technical Specifications or in the Bid Form, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work. The costs for all such items required shall be included in the price bid for item of which it is a part. The Contractor is responsible for locating all existing utilities and shall be responsible for coordinating with utility owner (i.e., power, storm, water, sewer, gas, communication cable, etc.), main, or service that requires removal, replacement, repair and/or relocation at no additional cost to the owner. The Contractor shall prepare the Bid accordingly.

E. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Plans.

F. "Products" shall mean materials or equipment permanently incorporated into the work.

3.5 CASH ALLOWANCE

A. General –

1. The Contractor shall include in the Bid Total all allowances (if stated) in the Contract Documents or in the Bid Proposal. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.
2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.
3. No payment shall be provided for services that fail to verify required results.
4. All requests for use of the "Cash Allowance" if listed in the bid form shall be made

in writing by the Contractor to the Owner and Engineer. No payment shall be authorized without prior approval from the Owner and Engineer for this bid proposal item.

B. Documentation

1. Submit copies of the invoices with each periodic payment request from the firm providing the services.
2. Submit results of services provided which verify required results.

3.6 MOBILIZATION, SITE PREPARATION, BONDING AND INSURANCE

A. CLEARING & GRUBBING: The unit price bid shall include removal of all trees, shrubs and miscellaneous vegetation, roots, leaves, limbs, branches, top soil, rocks and all debris as shown on the plans and/or as directed by the Engineer. Unless otherwise specified, all stumps, roots, and root clusters that have a diameter of 1 inch or larger shall be grubbed out to a depth of at least 2 feet below subgrade for concrete structures and 1 foot below the ground surface at embankment sites and other designated areas. Includes removal and legal disposal of all waste material. The contractor is responsible for complying with all local rules and regulations and the payment of any and all fees that may result from disposal at locations away from the project site. Payment for this item shall be Lump Sum (LS).

B. MOBILIZATION AND DEMOBILIZATION: This item consists of transporting equipment to the site, any other required permits, surveying performed by Contractor to establish or confirm the location of reference points, rights-of-way, or easements, or location and grade of underground utilities, and any other temporary facilities required. Removal of equipment from Site, removal of temporary facilities, and completion of all restoration. Payment for this item shall be Lump Sum (LS) price 50 percent of Bid amount when Work has begun, 50 percent when Work is complete and Site fully restored.

C. TRAFFIC CONTROL: This item includes submitting to the Engineer a Traffic Control Detour Plan prior to construction showing the detour route and appropriate route signage, a complete and approved staging plan, providing, placing, moving, operating, and maintaining the necessary barricades, signs, portable changeable message boards, temporary lane markings and striping, and devices for the life of Project, and removing barricades, signs, and devices when the Work is complete. No separate payment will be made for traffic control or maintaining highways, streets, roadways and driveways. Work also includes keeping roads passable at all times as called out in the contract documents. This item shall be paid for by a Lump Sum (LS) price prorated on a monthly basis. Traffic Control shall be in accordance with Section 150, GDOT Standard Specifications Construction of Transportation Systems, latest edition.

D. No separate payment shall be made for the protection, repair, removal and/or relocation of any utilities.

E. The cost of moving and reestablishing and/or replacing landscape features in kind, including labor and materials, shall be included in the unit price bid for the item to which it pertains.

F. Dewatering Excavations: All costs of equipment, labor and materials required for dewatering shall be included in the price bid for the item to which it pertains.

G. No separate payment shall be made for soft or excessively wet material which, in the opinion of the Engineer, is not suitable, is encountered below the final subgrade elevation of an excavation or underneath any proposed infrastructure/structure, the Engineer may order the removal of this material and its replacement with crushed stone, filter fabric, or other suitable material in order to make a suitable foundation for the construction of the proposed infrastructure/structure.

3.7 EROSION AND SEDIMENTATION CONTROL

A. General

1. No separate payment shall be made for temporary and/or permanent erosion and sedimentation controls, except as noted below. All other temporary and/or permanent erosion and sedimentation control costs shall be included in the unit price bid for the item to which it pertains.
2. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.
3. Payment shall be based upon the minimum installation dimensions required by the Manual for Erosion and Sediment Control in Georgia (1975 and as amended in the latest edition) or actual quantity constructed and authorized by the Engineer.

B. CHANNEL STABILIZATION (Ch): The unit price bid for channel stabilization with rip rap, including filter fabric, maintenance and repair, as shown on the Plans, specified, or directed by the Engineer, shall be measured to the nearest 0.10 Ton (TN) installed. Weight tickets shall be submitted for each load.

C. CONSTRUCTION EXITS (Co): The unit price bid for construction exits, including maintenance, repair, removal and legal disposal, shall be measured per Each (EA) installed.

D. MULCHING, TEMPORARY & PERMANENT GRASSING (Ds1, Ds2 & Ds3)

1. The unit price bid for mulching and grassing shall be for the pipeline route, regardless of width of disturbed area. Those and any other costs for labor, materials, and equipment for clean-up and mulching and grassing of the disturbed area shall be measured to the nearest horizontal Linear Foot (LF) installed.
2. No additional payment will be made for those lengths of pipeline where the Contractor must reseed due to inadequate watering and maintenance; loss of seeds caused by site erosion, e.g., wind and rain; inadequate germination of the seeds; inadequate coverage/density; providing permanent species at the appropriate season after temporary grassing has been performed.
3. No additional payment will be made for providing a temporary species of grass where the seasonal limitations do not allow for the proper germination of a permanent species of grass. Any additional cost anticipated for sowing a temporary species shall be included in the price bid for the item to which it pertains.
4. Measurement for payment for mulching and grassing shall be along the centerline of the pipeline, through fittings and valves. The length of pipe constructed under pavement, through casings and free bores, and the length of pipe associated with services, shall not be included in quantities for payment for mulching and grassing.

E. SODDING (Ds4): The unit price bid for Sodding, including fertilizer, maintenance, repair and re-sodding, shall be included in MULCHING, TEMP. GRASSING & PERM. GRASSING (Ds1, Ds2 & Ds3).

F. SEDIMENT BARRIER (Sd1): The unit price bid for silt fence, whether Type "NS" (Sd1-NS) Non-Sensitive or Type "S" (Sd1-S) Sensitive Silt Fence, & Brush Barrier (Sd1-BB) including maintenance, repair, replacement, removal and legal disposal, shall be measured to the nearest Linear Foot (LF) installed. The unit price bid for hay bales (Sd1-Hb), including maintenance, repair, replacement, removal and legal disposal, shall be measured Each (EA) installed.

G. FORD CROSSING (Ford): All costs for ford crossings, including grading, stone, gravel materials, maintenance, repair, permanent vegetation and grassing, shall be included in other unit price items bid. Ford crossings will not be constructed until after removal of Temporary Stream Crossings (Sr-B) & (Sr-C).

H. TEMPORARY STREAM CROSSING (Sr-B) & (Sr-C): All costs for temporary stream crossings, including installation, pipe, bridges, materials, maintenance, repair and removal, shall be included in other unit price items bid.

I. SLOPE STABILIZATION (Ss): The unit price bid for Slope Stabilization, including photodegradable/biodegradable blankets, matting, straw, jute, mulch, seed, fertilizer, maintenance and repair, shall be measured to the nearest Square Yard (SY) installed. Measurement of the overlap and top and bottom folds will not be made.

J. STORM DRAIN OUTLET PROTECTION (St): The unit price bid for storm drain outlet protection including all rip rap, filter fabric, shown on the Plans, specified, or directed by the Engineer, shall be measured to the nearest 0.10 Ton (TN) installed. Weight tickets shall be submitted for each load.

K. STORM WATER SAMPLING FOR NPDES: The Lump Sum price bid for storm water sampling for NPDES including all materials and accessories required to meet federal and state storm water sampling requirements at the locations shown on the Plans or as directed by the Engineer. Payment for this item shall be Lump Sum (LS). The Contractor shall comply with all requirements of State of Georgia Department of Natural Resources Environmental Protection Division General Permit No. GAR 100001, 2 or 3 Part IV.D.6.

L. MONITORING, NOI, NOT, RECORD KEEPING & REPORTING NPDES TO GA EPD: The Lump Sum price bid for monitoring, filing electronically the NOI & NOT, record keeping & reporting for NPDES to Georgia EPD as required to meet federal and state storm water sampling requirements. Payment for this item shall be Lump Sum (LS). The Contractor shall comply with all requirements of State of Georgia Department of Natural Resources Environmental Protection Division General Permit No. GAR 100001, 2 or 3 Part IV. E.

3.8 TRENCH EXCAVATION AND BACKFILL

A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with these Specifications, regulatory requirements, permits, laws or regulations which govern this Project.

B. Trench Excavation: No separate payment will be made for trench excavation. All costs shall be included in the unit price bid for the item to which it pertains.

C. Sheeting, Trench Boxes, Bracing and Shoring: No separate payment will be made for providing any sheeting, trench boxes, bracing and shoring.

D. TRENCH ROCK BLASTING/BREAKER AND EXCAVATION:

1. The unit price bid for Trench Rock Blasting/Breaker and Excavation will be measured by the Engineer or Owner prior to blasting/breaking rock. Payment shall be measured to the nearest Cubic Yard (CY). Note: All blasting within GDOT right-of-ways will require a blasting permit. Blasting permits require 2 to 4 weeks review by GDOT Atlanta office after district GDOT office review.
2. The unit price bid for Trench Rock Blasting/Breaking and Excavation shall be for including but not limited to extra blasting protection, closer grouping of blasting holes, more detonator caps, more caution, etc.
3. The maximum allowable volume of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 24-inches, but not less than 36-inches, and depth of rock on the pipe horizontal centerline, from the top of the rock to the bottom of the rock of the trench.
4. The Engineer must be given reasonable notice to measure all rock.
5. No allowance shall be made for excavating to extra widths for construction of appurtenances, for excavating to sloping sides, or for excavations made necessary by the physical limitations of the Contractor's equipment. Cost of such additional rock excavation shall be included in the unit price bid for the item to which it pertains.
6. No Payment for blasting monitoring shall be made. The Contractor shall employ an independent, qualified specialty subcontractor to monitor the blasting.

E. No payment for trench stabilization shall be authorized until after the trench has been dewatered. If the pipe is installed in an inadequately prepared trench bottom, the Engineer shall notify the Contractor in writing of the deficiency and will not authorize payment for that portion of that length of pipe, which was improperly installed.

F. STABILIZATION STONE: The unit price bid for stabilization stone shall be measured to the nearest 0.10 Ton (TN) installed. Weight tickets shall be submitted for each load. Payment shall include all costs for the removal and disposal of the unsuitable material and replacement with crushed stone. No additional payment will be made for material required for specified bedding.

G. Bedding and Haunching:

1. The unit price bid for the pipe shall include excavation of the trench to the depth below the pipe necessary to provide specified bedding and to lay the pipe to grade. Measurements for payment will be made only to the pipe invert.
2. No additional payment will be made for additional trench depth.
3. No separate payment will be made for material used to provide specified bedding. The cost of all bedding materials shall be included in the unit price bid for the item to which it relates, except for trench stabilization.
4. No additional payment will be made for improved bedding required to compensate

for over excavation of the trench.

H. J. Initial / Final Backfill:

1. No separate payment shall be made for initial/final backfill.
2. No separate payment shall be made for drying out the initial/final backfill material in order to meet the compaction requirements.
3. No separate payment shall be made for the adding of moisture to the initial/final backfill materials in order to meet the compaction requirements.
4. No separate payment shall be made for providing select material if the insitu material cannot meet the compaction requirements.
5. The unit price bid for CONCRETE ENCASEMENT, (if shown in the Bid Form) including labor, materials, equipment, trench excavation, traffic control and flagmen, shall be measured to the nearest horizontal Linear Foot (LF) installed.
6. Additional Material: No separate payment will be made for additional earth or fill materials imported to the Project site.

3.9 WELDED STEEL CASING; OPEN TRENCH AND JACK & BORE CROSSINGS

A. The unit price bid for WELDED STEEL CASING, whether by JACK & BORE or OPEN TRENCH, including labor, materials, equipment, trench excavation, excavation of bore and receiving pits, dewatering, traffic control, carrier pipe (gravity mains only) and flagmen, shall be measured to the nearest horizontal Linear Foot (LF) installed. In the event that rock is encountered during the installation of the pipe casing rock augers and/or rippers shall be used at no additional cost to the owner. No additional payment shall be made for rock excavation through the casing. Casing spacers shall be included in the unit price bid.

B. All costs for flagmen that may be required by the Railroad, GDOT, City, County or Owner shall be paid by the Contractor.

C. Payment for UNCASED BORES shall be measured to the nearest Linear Foot (LF) of bore. Measurement for payment shall be made along the horizontal centerline of the bore from entry to exit points as approved by the Engineer or as shown on the Plans. Pipe material is not included and will be paid for under the type and class pipe in the bid form.

3.10 PRESSURE/GRAVITY MAINS AND ACCESSORIES

A. Existing Utilities and Obstructions

1. No separate payment will be made for any delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains or services shown or not shown on the Plans.
2. Horizontal Conflict: No separate payment shall be made for changing the horizontal alignment of the pressure main to avoid a horizontal conflict, except where authorized for additional fittings and/or pipe.
3. Vertical Conflict: No separate payment shall be made for lowering the pressure main alignment to avoid a vertical conflict, except where authorized for additional fittings.

B. Construction Along Highways, Streets and Roadways: No separate payment shall be made

for traffic control or maintaining highways, streets, roadways and driveways.

C. Location and Grade

1. No separate payment shall be made for any surveying performed by the Contractor to establish or confirm the location of reference points, right-of-ways or easements or location and grade of the pressure main.

D. Pressure and Gravity Mains

1. Measurement for payment for pressure mains as listed in the bid proposal shall be made along the horizontal centerline of the pipe, through valves and fittings to the nearest Linear Foot (LF) installed. No payment shall be made for locator wire, locate tape, excavation, dewatering, bedding, thrust blocking, backfilling etc.
2. Measurement for payment for gravity mains as listed in the bid proposal, including connecting the pipe to the proposed manholes, shall be made along the horizontal centerline of the pipe, from center to center of manholes by cut classifications determined by the difference in elevation between the original ground elevation and the pipe invert to the nearest Linear Foot (LF) installed. No payment shall be made for gravity mains in casing, locator wire, locate tape, excavation, dewatering, bedding, backfilling etc. Gravity mains in casing shall be paid for under WELDED STEEL CASING, whether by JACK & BORE or OPEN TRENCH.
3. CAST IRON SPECIALS: The unit price bid for cast iron specials shall include the costs of fittings and joint accessories shall be measured to the nearest 0.10 Ton (TN) installed. Weight of fittings for payment shall be AWWA C 110 standard weight for all mechanical joint ends and shall not include the weight of, gaskets, couplings or cement lining.
4. HORIZONTAL DIRECTIONAL DRILLING: The unit price will be for all work specified on the plans & technical specifications, including furnishing and installing pipe or conduit, from plan point of beginning to plan point of ending at plan depth, removal of excavated materials and spoils, all rock, dewatering, removal and disposal of drilling fluids, backfilling, and complete restoration of the site shall be measured to the nearest horizontal Linear Foot (LF) installed.
5. No separate payment shall be made for detection tape and locator wire.

3.11 VALVES AND ACCESSORIES

A. Fire Hydrants and Blow-Offs:

1. FIRE HYDRANT ASSEMBLY: Measurement shall be on the basis of furnishing and installing each fire hydrant assembly, including wrenches as specified and all other costs in connection with the installation of the hydrants and incidental thereto. For the purpose, a fire hydrant assembly shall consist of: fire hydrant, thrust block, fire hydrant extension, gate valve, pipe between gate valve and fire hydrant, pipe from water main tee to gate valve, gate valve box with cover, concrete block, anchor coupling or tie rods, oil for the fire hydrant, fire hydrant wrench, etc., but shall not include the M.J. water main tee. Payment shall be measured per Each (EA) installed.

B. VALVES:

The unit price bid for valves shall include the cost of providing the valve, extension stem, valve box, valve marker, wrenches and all related items. Payment shall be measured per Each (EA) installed.

C. AIR RELEASE VALVE and/or VACUUM VALVE W/MANHOLE: The unit price bid for this item shall include the cost of providing the air release and/or vacuum valve, ball valve, tapping saddle, fittings, precast concrete manhole, frame and cover, crushed stone and all related items as shown on the Plans or as directed by the Engineer. Payment shall be measured per Each (EA) installed.

D. Connections to Existing Water Mains

1. The unit price bid for TAPPING SLEEVE WITH GATE VALVE shall include the cost of providing the sleeve, gate valve, extension stem, valve box, valve marker and related blocking and accessories. Payment shall be measured per Each (EA) installed.

E. Thrust Restraint

1. No payment for thrust collars, concrete blocking and associated costs including concrete, reinforcing, forming and weld-on collars.

3.12 STERILIZATION AND PRESSURE TESTING

A. Payment for STERILIZATION AND PRESSURE TESTING of potable water mains shall be made at the unit price provided in the bid and shall be measured to the nearest horizontal Linear Foot (LF). Any other cost for labor, material and equipment required shall be included in the item to which it pertains.

B. Payment for pressure testing of non-potable mains (Force Main and Gravity Sewer) and vacuum testing of Standard Manholes shall be included in the item to which it pertains. Any other cost for labor, material and equipment required shall be included in the item to which it pertains.

3.13 SITE IMPROVEMENTS

A. The unit price bid to REMOVE AND REPLACE ASPHALT OR CONCRETE PAVEMENT in roadways and driveways, shall include the following as applicable, saw cutting, excavation, bedding, haunching, initial backfill, final backfill, compaction, high early strength concrete, traffic control and temporary measures for maintaining traffic. The width multiplied by actual length (area) removed as shown on the plans, regardless of thickness. Includes removal of existing asphalt and concrete, saw cutting joints, and legal disposal of asphalt and concrete. Payment shall be made only for that area of the pipe is constructed underneath the pavement or concrete and measured to the nearest Square Yard (SY).

B. No additional payment will be made for removing and replacing damaged adjacent pavement.

C. No separate payment shall be made for pavement removal and replacement associated with abandonment of existing water mains or installation of water services.

D. The unit price bid to REMOVE AND REPLACE GRAVEL DRIVEWAY adjacent to roadways, shall include the following as applicable, removal and legal disposal of all debris, excavation, bedding, haunching, initial backfill, final backfill, compaction, gravel, traffic control and temporary measures for maintaining traffic. Payment shall be made only for that length for which measured along the horizontal centerline of the pipe is constructed underneath the existing gravel driveway and measured to the nearest Linear Foot (LF).

E. The unit price bid to REMOVE AND REPLACE CURB AND GUTTER including all form work, saw cutting, excavation, bedding, haunching, initial backfill, final backfill, GAB, compaction, traffic control and temporary measures for maintaining traffic shall be included. Payment shall be measured per Linear Foot (LF) Curb & Gutter installed. Includes all labor, equipment, materials, tools and incidental items necessary to complete the work.

F. The unit price bid for REMOVE AND REPLACE EXISTING FENCE (ALL TYPES), including all fencing, posts, gates and accessories to provide complete removal of existing fence and replacement with new fencing in kind, will be measured to the nearest Linear Foot (LF) installed. Includes all labor, equipment, materials, tools and incidental items necessary to complete the work.

END UNIT PRICE BID - DIVISION II

END OF SECTION 01 15 00

SECTION 33 05 23.13 – HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 SUMMARY

A. The work specified in this section consists of furnishing and installing underground utilities using the directional boring (horizontal directional drilling, HDD) method of installation, also commonly referred to as guided horizontal boring. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.

1.2 RELATED DOCUMENTS

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

B. Related work specified elsewhere includes:
   1. General Conditions
   2. Supplementary Conditions
   3. Sections in Division 1.

1.3 SUBMITTALS

A. Within five days following the preconstruction conference, the Contractor shall submit in writing:
   1. A work plan consisting of a detailed procedure and schedule to be used to execute the project. The work plan is to include:
      a. A complete list of construction materials, equipment and supplies including (when applicable) the name of the manufacturer, for the items listed below:
         1) Pipe and fittings
         2) Electrical conduit to be used
         3) Drilling mud
         4) Drilling fluid additives
      b. Specifications on Type of Drilling Equipment to be used including:
         1) Drilling rig
         2) Mud system
         3) Mud motors
         4) Down-hole tools
         5) Guidance system including calibration records
         6) Rig safety systems

c. A list of personnel and their qualifications and experience,
d. list of subcontractors,
e. a schedule of work activity, and
f. Safety plan (including MSDS of any potentially hazardous substances to be used).

2. The work plan should be comprehensive, realistic and based on actual working conditions for this particular project.
3. A detailed Inadvertent Release (frac-out) Plan, including method of monitoring quantity and capturing the return of drilling fluids with particular attention to variation from proposed plan (i.e. volumes, pressure, ore consistency), and the method of drilling fluid disposal. The Fracture Mitigation (frac-out) Plan must be given to Engineering Inspector before any drilling is to take place.

B. Upon completion of the pilot hole, submit a complete set of "as-built" records. Include in these records copies of the pilot bore path plan and profile record drawing, as well as directional survey reports as recorded during the drilling operation.
C. Shop Drawings, Samples, Designs, Testing Equipment and Methods.
1. The Engineer will review with reasonable promptness shop drawings, samples, and methods, etc., but the Engineer's review shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents.
2. The Engineer's review shall not relieve the Contractor from responsibility for any deviations from the Contract Documents unless the Contractor has in writing called the Engineer's attention to such deviation and the Engineer has given written concurrence and approval to the specific deviation.
3. The Engineer's review shall not relieve the Contractor from responsibility to meet the Acceptance Criteria and warranty requirements specified herein.
D. Additional test and field reports: Submit the following:

1. Pipe fusing log
2. Pressure test per ASTM F2164.

1.4 REFERENCE STANDARDS
A. The latest revisions of standards of AWWA, ASTM, ANSI, and API shall apply as referenced herein. Standards shall include, but are not restricted to the following:
B. ASTM F1962 – Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings.
C. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 300 mm), for Water Transmission and Distribution
D. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
E. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in for Water Works.

F. Plastic Pipe Institute Handbook, Latest Ed.
G. Where reference is made to one of the above standards, the revision in effect at the time of the bid opening shall apply unless a different date is shown.

1.5 QUALITY ASSURANCE

A. All directional drilling operations shall be performed by a qualified directional drilling company who has at least three (3) years' experience involving work of a similar nature.
B. The company must have installed a minimum of 1,000 linear feet of pipe (12-inch diameter or greater) using directional drilling operations or supply a list of project references, prior to job commencement.

1.6 DELIVERY, STORAGE, AND HANDLING

A. All parts and materials shall be properly protected so that no damage, deterioration, or contamination occurs from time of shipment until installation is completed.
B. Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects which could damage the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature.
C. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such widths as not to allow deformation of the pipe at the point of contact with the sleepers
D. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged at night to prevent animals or foreign material from entering the pipe line or pipe section.
E. The handling of the joined pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric, or rubber protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends shall not be used. Slings for handling the pipeline shall not be positioned at butt-fused joints. Sections of the pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined.

1.7 PERMITS

A. Obtain any additional Federal, State, or local permits required for directional drilling, discharging water from the sites, or clearing the sites for work or access.
B. Furnish separate copies of all permits to the Owner and the Engineer as the permits are received.

1.8 UNDERGROUND AND OVERHEAD UTILITIES

A. Secure information concerning the location of underground and overhead utilities in proximity to the pipeline alignment, prior to the start of drilling.

B. The Contractor shall confirm the alignment of all critical utilities, using vacuum excavation or other suitable excavation method, for further detailed confirmations as necessary at no additional cost to the Owner.
C. Damage to underground and overhead utilities resulting from the actions of the Contractor are the sole responsibility of the Contractor.

1.9 NOTIFICATION

A. The Contractor shall attend a pre-construction conference with the Engineer and Owner at least 5 days prior to performing any work on site.
B. Notify the Engineer, in writing, at the preconstruction conference, the number of drilling rigs and personnel to be used on the project. Any change in the number of rigs and personnel shall require written notification of the Engineer, at least 48 hours prior to the change.
C. Notify the Engineer 24 hours prior to start of any drilling activities including pilot hole drilling, pre-reaming or hole enlargement, back pulling, and testing activities.
D. No work shall be performed without completing the notification requirements specified above.

1.10 ACCEPTANCE CRITERIA

A. If, as a result of the hydrostatic and leakage test analysis, the Engineer determines that the pipe is not acceptable, the driller will abandon the line in place by fusing a cap to both ends of the conduit and replace the line at no additional cost to the Owner.
B. Any ground surface disturbance shall be repaired by the Contractor to the satisfaction of the Engineer at no additional cost of the Owner
C. No payment for the drilling will be due the Contractor if he/she fails to meet all above requirements.

1.11 WARRANTY

A. All material supplied under this Section shall be warranted for a period of one year by the Contractor and material manufactures. The manufacturer’s warranty period shall run concurrently with the Contractor’s warranty period. The warranty period shall commence on a date as deemed by the Engineer. If material should fail during the warranty period, the materials shall be replaced and restored to service by the Contractor at no expense to the Engineer and Owner.
B. All workmanship supplied under this Section shall be warranted for a period of one year. The warranty period shall commence on the completion of the final acceptance of the work on the project. If the workmanship should prove faulty during the warranty period, the fault shall be corrected at no expense to the Owner.

1.12 ADDITIONAL WORK

A. At the option of the Engineer or the Owner, additional work may be authorized. Additional work shall be completed at prices not exceeding those of comparable work and materials, as determined by the Engineer and as specified in the Schedule of Valves.

PART 2 - PRODUCT

2.1 CONDUIT PIPE

A. Conduit pipe shall be of the material and size indicated on the drawings.
B. The pipe shall have sufficient strength to withstand the forces subjected during pull back operations.
C. HDPE pipe shall be minimum DR 11 PC 200 pipe meeting AWWA Standard C-906 specifications for water line construction.
D. All HDPE pipe and fittings shall be molded from Virgin PE4710 HDPE resins in accordance with the requirements of ASTM D3035 and Manufactured to Comply with ASTM F714 specifications.
E. Pipe shall be nominal DIPS (Ductile Iron Pipe Size) outside diameter per AWWA C906.
F. Fusible PVC pipe shall be minimum DR 18 pipe meeting AWWA Standard C900/C905.
G. Pipe shall be joined by thermal butt-fusion in accordance with the manufacturer's recommendations and ASTM D3261.

2.2 DIRECTIONAL DRILLING EQUIPMENT

A. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pull back the pipe, a drilling, fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the installation, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused (if required), a Guidance System to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, and trained and competent personnel to operate the system.
B. All equipment must be in good, safe condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project
C. The drilling rig shall consist of a hydraulically powered system to rotate and push hollow drilling pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head.
D. The machine shall be capable of being anchored to the ground sufficiently to withstand the pulling, pushing and rotating pressure required to complete the installation.
E. The hydraulic power system must be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system must be free of leaks.

F. The rig shall have a system to monitor and record maximum pullback pressure during pull- back operations. A system to detect electrical current from the drill string must be in place with an audible alarm that automatically sounds when an electrical current is detected.
G. The drill head shall be steerable by changing its rotation with the necessary cutting surfaces and drilling fluid jets.
H. The mud motor shall have adequate power to turn the required drilling tools.
I. The drill pipe shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tools joints should be hardened to 32-36 RC.
J. Do not use other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections unless approved by the Owner prior to commencement of the work.

2.3 GUIDANCE SYSTEM

A. The guidance systems shall consist of an electronic "walkover" tracking system, wireline system or proven (non-experimental) gyroscopic probe and interface for a continuous and accurate determination of the location of the drill head during the drilling operation.
B. The guidance system must be capable of tracking at all depths up to fifty feet and in any soil condition, including hard rock. It should enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction).
C. The guidance system must be accurate and calibrated to manufacturer's specifications of the vertical depth of the borehole at sensing position at depths up to fifty feet and accurate to 2- feet horizontally.
D. The wire line shall be set up and operated by personnel trained and experienced with the system.
E. The Contractor shall be aware of any geo-magnetic anomalies and consider such influences in the operation of the guidance system.

2.4 MUD SYSTEM

A. A self-contained, closed, mud mixing system of sufficient size to mix and deliver drilling fluid (mud) composed of bentonite clay, potable water, and appropriate additives.
B. The mixing system must be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank must be a minimum of 1,000 gallons. Agitate the drilling fluid during drilling operations.
C. Drilling fluids and additives shall not impart any toxic substances to the water or promote bacterial contamination; and shall have third party certifications of conformance with ANSI/NSF Standard 60, Drinking Water Treatment Chemicals – Health Effects.

D. Use drilling fluid composed of potable water and bentonite clay. Supply water from an authorized source with a pH of 8.5-10. Treat any water of a lower pH or with excessive calcium with the appropriate amount of sodium carbonate or equal. No additional material may be used in drilling fluid without prior approval from the Owner. The bentonite mixture used must have the minimum viscosities as measured by a Marsh funnel:
   1. Rocky Clay 60 seconds
   2. Hard Clay 40 seconds
   3. Soft Clay 45 seconds
   4. Sandy Clay 90 seconds
   5. Stable Sand 80 seconds
   6. Loose Sand 110 seconds
   7. Wet Sand 110 seconds

E. These viscosities may be varied to best fit the soil conditions encountered, or as determined by the operator. No additional fluid shall be used without prior approval from the Owner.

F. The drilling mud shall be delivered by a fluid pumping system with a minimum capacity of 35-500 GPM and capable of delivering drilling fluid at a constant minimum pressure of 1200 psi. Employ filters on the delivery system in-line to prevent solids from being pumped into drill pipe.

G. The Contractor shall contain and convey all used drilling fluid and drilling fluid spilled during operations to the drilling fluid recycling system or remove by vacuum trucks or other methods acceptable to the Owner.

H. Maintain a berm, minimum of 12-inches high, around drill rigs drilling fluid mixing system, entry and exit pits and drilling fluid recycling system to prevent spills into the surrounding environment. Furnish pumping equipment and/or vacuum truck(s) of sufficient size to convey drilling fluid from containment areas, to storage and recycling facilities or disposal. Tracer wire shall be installed on all HDD alignments. Wire shall be a minimum ten (10) gauge solid copper with blue thermoplastic insulation recommended for direct burial. Use watertight underground wire nuts to provide electrical continuity. Provide test station at both ends of HDD consisting of 4” PVC with cleanout cap.

PART 3 - EXECUTION

3.1 DIRECTIONAL DRILLING OPERATION

A. All HDD activities shall conform to the requirements as shown on the Drawings, per ASTM F1962 and Chapter 12 of the PPI Handbook, Latest, Ed.

B. The Contractor shall survey the entire drill path with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If using a magnetic guidance system, survey drill path for any surface geo-magnetic variations or anomalies.

C. It may become necessary, if so determined by the Owner, to open excavate, "pothole" or "daylight" areas to determine location of existing facilities and utilities. Costs of open cutting, "potholing" or "daylighting" are considered incidental to the work and no separate payment shall be made.

D. Place a silt fence between all drilling operations and any drainage, well-fields, wetland, waterway or other area designated for such protection if required by documents, state, federal, and local regulations. Put in place any additional environmental protection necessary to contain any hydraulic or drilling fluid spills, including berms, liners, turbidity curtains, and other measures.

E. Record readings after advancement of each successive drill pipe (no more than 10'), and plot on a scaled drawing of 1" = 2' vertical and 1" = 20' horizontal. Make all recorded readings and plan and profile information available at all times. At no time can the deflection radius of the drill pipe exceed the deflection limits of the carrier pipe as specified herein.

F. Contain all drilling fluids and loose cuttings in pits or holding tanks for recycling or disposal, no fluids should be allowed to enter any unapproved areas or natural waterways. Dispose of all the drilling mud and cuttings after job completion at an approved dumpsite.

G. Drill the pilot hole on the bore path with no deviations greater than 5% of depth over the length of the bore unless previously agreed to by the Owner. In the event that pilot does deviate from the bore path more than 5% of depth over the length of the bore, the pilot must be pulled back and re-drilled from the location along bore path before the deviation. In the event of a drilling fluid fracture, inadvertent returns, or returns loss during pilot hole drilling operations, stop drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and wait another 30 minutes. If mud fracture or returns loss continues, notify the Owner.

    1. The maximum size of the bore hole may not exceed Outside Diameter (O.D.) X 1.5 if O.D. is10” or less. If the O.D. is greater than 10”, the bore hole may not exceed O.D. X 1.3.

H. Upon completion of pilot hole phase of the operation, submit a complete set of "as-built" records. Include in these records copies of the pilot bore path plan and profile record drawing, as well as directional survey reports as recorded during the drilling operation.

I. Upon approval of the pilot hole location, begin the hole opening or enlarging phase. Increase the bore hole diameter to accommodate the pullback operation of the required size of carrier pipe. The type of hole opener or back reamer to be utilized in this phase is to be determined by the types of subsurface soil conditions that have been encountered during the pilot hole drilling operation. Select the proper reamer type with the final hole opening being a maximum of 1.5 times the largest outside diameter pipe system component to be installed in the bore hole.

J. Stabilize the open bore hole by means of bentonite drilling slurry pumped through the inside diameter of the drill rod and through openings in the reamer. The drilling slurry must be in a homogenous/ flowable state serving as an agent to carry the loose cuttings to the surface through the annulus of the borehole. Calculate the volume of bentonite mud required for each pullback based on soil conditions, largest diameter of the pipe system component, capacity of the bentonite mud pump, and the speed of pullback as recommended by the bentonite drilling fluid manufacturer. Contain the bentonite slurry at the exit or entry side of the directional bore in pits or holding tanks. The slurry may be recycled at this time for reuse in the hole opening operation, or hauled off to an approved dumpsite for proper disposal.

K. Fuse or join all pipe sections together according to manufacturer's specifications as applicable. The pipe must be free of any chips, scratches, or scrapes.

L. Upon Successful completion of pilot hole, Contractor will ream bore hole to a minimum of 2 greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more that the boring equipment and mud system are designed to safely handle

M. After successfully reaming the bore hole to the required diameter, the Contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole. During pull-back operations the Contractor will not apply more than the maximum safe pipe pull pressure at any time.

1. In the event that pipe becomes stuck, Contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, Contractor will notify Engineer. Engineer and Contractor will discuss options and then work will proceed accordingly.

3.2 TESTING

A. Clean and flush all equipment and the surrounding site after completion. Use only potable water for flushing and pressure testing.

B. Test directional drilling pipe after pullback for pressure and leakage rate in accordance with ASTM F2164.

C. The maximum permissible test pressure will be determined for the lowest elevation of the test section. The maximum test pressure shall be the lower of: a) 150% of the design operating pressure; b) the pressure rating for the lowest pressure rated component of the test section.

D. Replace any material showing seepage or the slightest leakage as directed by the Engineer and re-test at no additional cost to the Owner.

E. After successful completion of hydro-test, pipe will pigged dry.

F. A temporary ductile plug blind flange shall be required at both ends. The blind flange shall be tapped as needed for the addition of water to pressure test and air release as needed.

3.3 RECORD KEEPING

A. Maintain a daily project log of drilling operations and a guidance system log with a copy available to the Owner at the completion of the project.

B. Record the guidance system data during the actual crossing operation. Furnish "as-built" plan and profile drawings based on these recordings showing the actual location horizontally and vertically of the installation, and all utility facilities found during the installation. Certify the guidance data to the capability of the guidance System.

3.4 SITE CLEAN-UP

A. Immediately upon completion of pipe installation, the Contractor shall remove all of his/her drilling equipment, materials and supplies from the site of the work, remove all surplus materials and debris,
B. All excavations will be backfilled and compacted to 95% of original density.
C. Restore surfaces to conditions equal to or better than the condition prior to start of work. Project warranty will include reseeding where seed does not reach full coverage, replacement of landscape or existing trees damaged by construction and repair of areas that settle during the warranty period.
D. Not more than two weeks will be allowed for this work and the Contractor shall complete all clean up within that time. Failure to comply with these requirements shall be the authority of other Contractors or workers directed by the Engineer to enter upon the site and complete the cleanup, grading, etc. The cost of this work shall be deducted from any money due or to become due the Contractor for construction of the well.

END OF SECTION 33 05 23.13

SECTION 33 05 23.16 – UTILITY PIPE JACKING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, equipment, materials, and incidentals required to install carrier pipe at the design line and grade, inside casing pipe installed by boring and jacking at locations indicated on the drawings. The work shall be performed in accordance with the requirements shown on the Drawings, and requirements specified herein.
B. The Contractor shall be responsible for sizing the shafts. The size of the shafts shall, however, be adequate for construction of any structures indicated on the Drawings and to provide adequate space to meet the Contractor's work requirements for his selected methods of construction.
C. All construction operations shall be planned and performed with full regard to safety and to keep traffic interference to an absolute minimum.
D. Boring operations will be subject to review by the Engineer, and the Owner, as applicable. The Owner will have full authority to stop work if, in its opinion, the work may cause damage or endanger traffic.
E. The Contractor shall be responsible for repair or replacement of any roadway settlement or damage as a result of the work for a period of two (2) years after completion of boring and tunneling operations. Repairs shall be performed at no additional cost to the Owner and shall be completed to the full satisfaction of the Owner.
F. The Contractor shall notify the Owner and Engineer a minimum of 72 hours prior to performing work.

1.2 QUALITY ASSURANCE

A. Perform all work in accordance with current applicable regulations and codes of all Federal, State and local agencies.
B. The Contractor's Engineer shall be a professional engineer, registered in the State of Georgia, and shall have at least 5 years of experience in design of jacked casing, design of temporary shaft supports, design of dewatering, and design of blocking and grouting.
C. The contractor performing boring and jacking shall meet the following minimum experience requirements.
D. All work described in this section shall be supervised at all times by at least one superintendent or foreman in charge of construction meeting the minimum experience requirements, as follows.

E. All casing pipe welding shall be performed by qualified welders in accordance with the requirements of ANSI/American Welding Society (AWS) D1.1/D1.1M.

1.3 SUBMITTALS

A. Experience Submittals: Submit supporting documentation for all experience qualifications required by paragraph 1.02 no later than 14 days after Notice to Proceed (NTP) is issued. Provide references to substantiate all experience and certifications.
B. Shop Drawings & Product Data:

1. Casing pipe details including sizes, connection, and weld details and material certificates.
2. Skids, blocking, casing spacers, spiders, or other proposed methods of installing, locating and blocking carrier.
3. Lubricating / stabilizing products.
4. Daily reports shall be provided to the Engineer by 8:00 a.m. the following workday. These shall be in a standard format to be used throughout the project, and include at least the daily production, total production and ground conditions encountered.

1.4 DEFINITIONS

A. Band – A ring of steel welded at or near the front end of the lead section of casing to cut relief and strengthen casing.
B. Boring – method by which a conduit is pushed or pulled into place, in this case, using Horizontal Auger Bore equipment.
C. Carrier pipe – pipe directly enclosing a transmitted fluid.
D. Casing – outer steel sleeve enclosing a carrier pipe.
E. Exit Shaft – a shored excavation from which the boring and jacking equipment is retrieved from the ground, and from which the carrier pipe emerges from the casing.
F. Launch Shaft – a shored excavation in which the boring and jacking equipment is installed into the ground, and from which the boring and jacking operations are launched and performed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be stored, protected, and handled in accordance with the manufacturer's recommendations, and acceptable to the Engineer.
B. Casing

1. Casing pipe shall be new and unused pipe made from steel plate with smooth interior and exterior walls to reduce jacking force and prevent rotation. Steel casing pipe material

shall have a minimum yield strength of 35,000 psi, and material shall conform to AWWA C200 and ASTM A53 (Type E or S), and/or, ASTM A139, Grade B.

2. Lubrication/stabilizing fluid for use in the excavated annulus shall consist of slurry created from bentonite and potable water. Polymer or other non-clay chemical additives may only be employed with prior acceptance of the Engineer. All polymers or chemical additives must be shown to have no adverse effects on ground water or soil chemistry. Grease shall not be used as a casing lubricant.
3. The steel casing pipe shall have a minimum thickness as shown in the table below, unless greater thicknesses are required to support the bore and/or to withstand jacking loads. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the Owner.
4. Minimum casing pipe diameters are shown and/or described in the contract documents. Larger casings may be provided at no additional cost to the Owner, with the acceptance of the Engineer.

Pipe Diameter, inches	Under Railroads		Under Highways	
	Casing Diameter, inches	Wall Thickness, inches	Casing Diameter, inches	Wall Thickness, inches
6	12	0.250	12	0.250
8	16	0.281	16	0.250
10	18	0.312	18	0.250
12	20	0.375	20	0.375
14	24	0.375	24	0.375
16	24	0.375	24	0.375
18	30	0.469	30	0.375
20	30	0.469	30	0.375
24	36	0.532	36	0.500
30	42	0.625	42	0.500
36	48	0.688	48	0.625

5. Casing pipes shall be joined by welding and shall have machine-cut ends, cut square with the long axis of the casing pipe. At least one end shall be beveled.
6. Any casing pipe damaged during jacking operations shall be repaired in place by the Contractor or filled with grout and abandoned.

C. Shoring, Blocking, & Spacers

1. Ground support bulkheads shall be constructed of steel or hardwood, and shall incorporate appropriate filter materials to prevent loss of soil into excavation heading.
2. All blocking and wedges shall be hardwood.
3. Casing spacers or spiders shall be constructed of steel, polymer resin, or hardwood, or other material approved by the Engineer, and shall not result in metal-to-metal contact between the carrier pipe and the casing.

D. Carrier Pipe

1. All pipe installed in casing to be restrained joint ductile iron pipe

PART 3 - EXECUTION

3.1 INSTALLATION

A. Boring and casing installation shall be performed so as not to interfere with, interrupt or endanger the roadway surface and activity thereon, and to prevent settlement of the road surface, structures, and utilities above and in the vicinity of the casing.

B. Casing and Shaft Support Design: Design of the casing and shafts for the site conditions and anticipated jacking forces are the responsibility of the Contractor. The excavation method selected shall be compatible with expected ground conditions. The lengths of the casing shown on the Drawings are the minimum lengths required. The length of the casing may be extended for the convenience of the Contractor, at no additional cost to the Owner. Due to right-of-way width, boring and jacking casing lengths less than 20 feet may be necessary.

C. The casing pipe, as a minimum, shall extend to the shoulder break or six (6) feet beyond the edge of pavement on fill slopes, whichever is greater; three (3) feet beyond the ditch line in cuts; and on curbed sections to the back of the sidewalk area. On freeways, expressways, and other controlled access highways the encasement shall extend to the access control lines, the outside of frontage roads, or a sufficient distance to allow for future highway improvements. Exceptions must be approved by the State Highway Engineer.

D. The Contractor shall support the ground continuously in a manner that will prevent loss of ground and will keep the perimeters and face of the casing and shafts stable. Collapse of soil into the casing shall be prevented.

E. The Contractor shall be responsible for all effects on road traffic resulting from ground loss, including all costs and coordination required to meet the traffic control requirements of GDOT and the Owner, including costs related to traffic control, permit acquisitions, fees, and fines.

F. Activity within GDOT right-of-ways:

1. The Contractor shall be responsible for coordinating and scheduling of all construction work within the highway right-of-way.
2. Boring and jacking work shall not impede the flow of traffic along the roadway being crossed.
3. All installations shall be performed to maintain free flow in existing drainage ditches, pipes, culvers, or other surface drainage facilities of the highway, street or its connections.
4. In no instance will the Contractor be permitted to leave equipment on the pavement or shoulder overnight. When equipment is not in use, equipment and vehicles shall be kept at least 30 feet from the edge of the travel lanes.

3.2 SAFETY

A. Provide all necessary bracing, bulkheads and shields to ensure complete safety to all traffic, persons and property at all times during the work. Perform the work in such a manner as not to damage the roadbed or interfere with normal traffic over it.

B. Observe all applicable safety requirements of the regulations of the authorities having jurisdiction over the site.
C. Perform all activities related to the work in accordance with the applicable Occupational Safety and Health Act underground construction regulations, including but not limited to Part 1926, Section 800 of Title 29 of the Code of Federal Regulations (29 CFR 1926.800).

3.3 LAUNCH AND EXIT SHAFTS

A. No open excavation will be allowed within the limits of the encasement without the Engineers approval. All sheeting, shoring and bracing shall be provided as necessary for the satisfactory and safe performance of the work. All work areas shall be maintained in a suitable dry condition at all times.
B. All launch and exit shafts for boring and jacking shall be completely positively shored. Shoring designs shall be designed for all potential loads, including but not limited to earth and water loads, surcharge loads, and any jacking thrust loads.
C. Shafts shall allow ample working room for the Contractor's operations. All temporary shaft supports shall be removed to a depth of at least five feet below ground surface after the work is completed.
D. Shafts shall be established safely beyond the surfaced area of the highway so as to avoid impairing the roadway during installation of the pipeline. The near edge of the shaft shall be no closer to the edge of pavement than its depth below the pavement surface unless bulkheaded. Under no conditions shall the near edge of the shaft be closer than five (5) feet to the edge of pavement. Adequate protection and warning devices will be provided while the portal is open.
E. Shafts shall not be left open during hours of darkness when work is not ongoing. Backfilling shall be accomplished as soon as practicable upon completion of grouting between the casing and carrier pipe.

3.4 BORING AND JACKING OPERATIONS

A. Casing pipes shall be installed to the limits shown on the Contract Drawings.
B. Boring and jacking shall be performed in a continuous 24-hour-per-day operation when the auger head is within GDOT or Railroad rights-of-way. The requirement to perform boring and jacking on a continuous 24-hour-per-day basis shall not relieve the Contractor of compliance with all applicable noise ordinances.
C. Lubrication/stabilizing fluid shall be injected to completely fill the excavated annulus continuously throughout all boring operations. Bore collars shall be sealed to prevent leakage of the lubrication/stabilizing fluid into the shafts. In no event shall jacking or lubricant injection be discontinued for a sufficient period to cause the casing pipe to "freeze" in place.
D. Thrust blocks shall be designed to transfer jacking loads to the ground without causing excessive deflection of the shoring, or disturbance to adjacent structures or utilities.

E. The cutting head shall not protrude more than 12 inches past the end of the casing and shall remain centered at all times while boring. All augers shall be greater than 75% of the casing pipe inside diameter. Overcut shall not exceed more than 1 inch.

F. Alignment and grade of the casing pipe shall be consistently maintained throughout boring and jacking operations. Tolerances for installation of the casing pipe shall be plus or minus 6 inches in the Horizontal and plus or minus 6 inches in the Vertical.

G. Development of voids outside the casing pipe shall be prevented. Spoils removal rates shall be monitored for potential over excavation. All suspected or potential void locations shall be recorded and reported to the Engineer. Upon completion of casing installation, the Contractor shall note all locations where voids may have developed, and shall pump grout to fill voids until refusal.

H. If boring is stopped for any reason, the exposed face of the excavation shall be fully protected with a steel or hardwood ground support bulkhead designed and installed to prevent any movement of ground into the excavation. The bulkhead shall incorporate appropriate filter materials to prevent loss of soils into the excavation, and shall incorporate weep holes or other means to prevent buildup of ground water pressure against the bulkhead.

3.5 CARRIER PIPE INSTALLATION

A. Carrier pipe shall be positioned within the casing pipe by sliding on spiders or casing spacers custom-designed and fabricated by or for the Contractor. There shall be no metal-to-metal contact between the carrier pipe and any part of the skid, spider, spacer, blocking, or banding. Carrier pipe shall not be slid directly on the casing pipe or on any rail, centralizer, cradle or backfill installed within the casing pipe.

B. Carrier pipe shall be supported by skids, spiders, or spacers spaced no further than 10 feet apart, minimum 2 per joint.

C. Lubricant shall be applied between the skid, spider, or spacer and the casing pipe or rail, centralizer, cradle or backfill material installed within the casing pipe.

D. Carrier pipe, casing pipe, and joints shall not be deformed or damaged during carrier pipe installation. Carrier pipe joints for pressure pipelines shall be fully extended and restrained through the casing.

E. Carrier pipe coating and linings shall be protected throughout installation, and shall be repaired in a manner acceptable to the Engineer prior to blocking within the carrier pipe.

F. Carrier pipe shall be tested as specified. The ends of the carrier pipe shall be extended from the casing to where it intersects the proposed alignment, the edge of right-of-way or if outside of the right-of-way five (5) feet from the end of the casing, as applicable. The ends of the carrier pipe shall be plugged or sealed until final connection with upstream and downstream lines have been made.

G. Each end of the Casing pipe shall be sealed with pull on or wrap around end seal or brick and mortar as required by Owner.

H. Maximum allowable deflection of the casing after installation shall be 1 percent of the inside diameter of the casing.

3.6 RESTORATION

A. All areas disturbed by construction shall be restored to existing or better than original condition and maintained until accepted by the Owner.
B. The Contractor shall place readily identifiable and suitable markers at the rights-of-way-lines to mark the casing crossing.

END OF SECTION 33 05 23.16

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SECTION 33 11 13 – PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Pipe and fittings for water lines, including domestic/potable water lines.
2. Tapping sleeves and valves.
3. Valves and boxes.
4. Fire hydrants and yard hydrants.
5. Reduced-pressure backflow preventers.
6. Pipe support systems.
7. Bedding and cover materials.

B. Related Requirements

1. Section 03 30 00 - Cast-in-Place Concrete: Concrete for cradles and encasements.
2. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 31 23 16.13 – Excavation & Trenching: Execution requirements for trenching.

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 B88 - Standard Specification for Seamless Copper Water Tube.
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 the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
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.

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 C200 - Steel Water Pipe, 6 In. (150 mm) and Larger.
6. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipe.
7. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied.
8. AWWA C206 - Field Welding of Steel Water Pipe.
9. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).
10. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.
11. AWWA C213 - Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
12. AWWA C300 - Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
13. AWWA C301 - Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.
14. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
15. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
16. AWWA C606 - Grooved and Shouldered Joints.
17. 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.
18. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm) for Water Service.
19. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Waterworks.

F. American Welding Society

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

G. Manufacturers Standardization Society of the Valve and Fittings Industry

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

H. NSF International

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, and hydrants.

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

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

E. Qualifications Statements:

1. Submit qualifications for manufacturer and installer.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - 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.

1.5 QUALITY ASSURANCE

A. Valves: Mark valve body with manufacturer's name and pressure rating.

B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

1.6 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' experience in installation of Work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

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

B. Storage

1. Store materials according to manufacturer instructions.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
4. Store PE and PVC materials out of direct sunlight.

C. 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.

PART 2 - PRODUCTS

2.1 GENERAL

A. All material or products which come into contact with drinking water shall be third party certified as meeting the specifications of the American National Institute/National Sanitation Foundation Standard 61, Drinking Water System Components – Health Effects. The certifying party shall be accredited by the American National Standards Institute.

B. All pipe, fittings, packing, jointing materials, valves and fire hydrants shall conform to Section C of the AWWA Standards.

C. Natural rubber or other material which support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to water.

D. Any pipe, solder, or flux which is used in the installation or repair of any public water system, used in any plumbing which provides water through connection to a public water system, for human consumption, shall be lead free. Lead free, for solder and flux, means those containing not more than 0.2% lead. Lead free, for pipes and pipe fittings, as those containing not more than 8.0% lead. Leaded joints necessary for the repair of CIP shall be exempt from the above.

2.2 PIPING

A. Ductile Iron Pipe

1. Manufacture in accordance with ANSI 31.50/AWWAC150 & ANSI A21.51/AWWA C151, latest revision.
2. Diameter and Class: As indicated below:

Pipe Size (in)	Pressure Class
12” and Smaller	350
14” – 24”	250
30” and Larger	150

3. Interior Coating

   a. Cement-mortar lining, AWWA C104; standard thickness.

4. Outside Coating

   a. Buried: Asphaltic; 1-mil thick, minimum, in accordance with AWWA C151 / ANSO A21.51.
   b. Exposed: Shop primed and painted as specified in Drawings

5. Joints

   a. Provide ductile iron pipe with push-on joints conforming to ANSI A21.11/AWWA C111, latest revision.
   Joints shall be restrained wehre indicated on the drawings. Use American Fast-Grip® Gaskets, or approved equal for restrained joints. Provide a boltless, integral restraining system rated for the design pressure in accordance with the performance requirements of ANSI/AWWA C111/A21.11, unless noted otherwise on the Drawings.
   b. Gauge pipe ends (spigot end, bell, and socket) for all pipe with suitable gauges at sufficiently frequent intervals to ensure compliance to the standard dimensions of ANSI/AWWA C151/A1.5, latest addition. Manufacturer must have a recommended ovality tolerance for 18 inches and larger size pipe. Each end of each pipe 18 inches and larger shall be measured and approved by manufacturer’s quality assurance inspector to meet such out of round tolerances. Provide manufacturer’s certification that ovality has been measured and controlled in accordance with manufacturer's standard.

B. PVC Pipe

1. 4 inches and larger

   a. Pipe shall be AWWA C900 PVC pipe with a pressure class as indicated on the drawings. The pipe shall conform to the requirements of ASTM F4771 and ASTM D1784, latest revision,
   b. Provide PVC water pipe with rubber ring type joints consisting of integral, thickened, solid wall bells that maintain the same D.R. as the pipe barrel. Install joints in accordance with the manufacturer's instructions and recommendations.
   c. elastomeric gasket bell ends and elastomeric seals shall meet the requirements of ASTM D3139.
   d. Furnish pipe in standard 20-foot lengths. Ensure that pipe bears the National Sanitation Foundation seal for potable water pipe and is marked with SDR and Class Number.

e. Provide adaptor fittings where plastic pipe is connected to pipes or fittings of other materials.
f. The use of solvent-weld PVC pipe and fittings in water mains 4 inches and larger is prohibited.

2. 1-1/2" through 3 inches

a. Provide IPS SDR-21, Class 200 PVC pipe conforming to the requirements of ASTM D2241 and ASTM D1784, having elastomeric gasket bell ends and elastomeric seals meeting the requirements of ASTM D3139 and ASTM F477.
b. Provide pipe that bears the National Sanitation Foundation seal for potable water pipe and is marked with SDR and class number.
c. Provide PVC water pipe with rubber ring type joints consisting of integral, thickened, solid wall bells which maintain the same D.R. as the pipe barrel. Use joint lubrication as furnished by the manufacturer of the pipe, which meets the requirements of NSF 61. Install joints in accordance with the manufacturer's instructions and recommendations.

3. Smaller than 1-1/2"

a. Provide Schedule 80 PVC pipe, conforming to the requirements of ASTM D1785, latest revision.
b. Provide pipe which bears the National Sanitation Foundation seal for potable water pipe and is marked with SDR and class number.
c. Provide fittings for Schedule 80 PVC which meet the requirements of ASTM D2467, latest revision, with ASTM D2564, latest revision, solvent cement.

4. PVC joints shall be restrained where specified on the drawings.

a. Restrained joints shall be provided by a clamping ring and an additional ring designed to seat on the bell end of the pipe. The rings shall be connected with T-Head bolts or rods.
b. Restraining devices shall provide full (360°) support around the circumference of the pipe. No point loading shall be permitted. Restraint of mechanical joint fittings shall be provided by a clamping ring installed on the PVC pipe and connected to the mechanical joint fitting with T-Head bolts or rods.
c. Restraining devices shall be EBAA Series 1600 or approved equal.
d. For PVC lines smaller than 4 inches, use thrust blocks or additional restraint as shown on Drawings.

C. Steel Pipe

1. Comply with AWWA C200.
2. Type: Fabricated pipe.
3. Minimum Wall Thickness:

a. Pipe Diameters 8 Inches and Smaller: 0.375 inches.
b. Pipe Diameters Greater than 8 Inches: 0.50 inches.

4. Fittings and Special Sections: Comply with AWWA C208.
5. Flanges

a. Comply with AWWA C207, Class D.
b. Type: Slip-on.

6. Field Welding Materials: Comply with AWWA C206.
7. Interior Cement Mortar Lining: Comply with AWWA C205.
8. Buried Steel Pipe Exterior Lining

a. Description: Fusion-bonded epoxy coating.
b. Comply with AWWA C213.

D. Copper Tubing

1. Comply with ASTM B88.
2. Type K – below ground, L – above ground, annealed.
3. Fittings: ASME B16.18, cast copper or ASME B16.22, wrought copper.
4. Joints: Compression connection or AWS A5.8/A5.8M, BCuP silver braze.

E. PE Pipe

1. Pipe: Comply with AWWA C906, ASTM D2239 and ASTM D3035, DR and pressure rating as shown on the drawings.

2. Unless otherwise specified PE pipe shall be ductile iron size.
3. Fittings

a. Comply with AWWA C901.
b. Type: Molded or fabricated.
c. Fittings shall be fully pressure rated

4. Joints: Butt fusion welded in accordance with ASTM 3261_____.
5. Provide pipe stiffeners at connections to fittings if required by manufacturer or Owner.

2.3 FITTINGS

1. Welded on Outlets

a. Welded-on outlets may be used in lieu of the tees shown on the plans. Provide welded-on outlets rated for a working pressure of 250 psi, with a minimum safety factor of 2.0. Welded-on outlets may be provided as a radial (tee) outlet, a tangential outlet, or a lateral outlet. Parent pipe and branch pipe shall meet hydrostatic test requirements in accordance with AWWA C151, section 51-9, prior to fabrication.
b. Provide joints on welded-on branch outlets in accordance with the latest revision of ANSI/AWWA C111/A21.11 and/or ANSI/AWWA C115/A21.15, as applicable. Fabricate all outlets from centrifugally cast ductile iron pipe designed in accordance with ANSI/AWWA C150/A21.50 and manufactured in accordance with ANSI/AWWA C151/A21.51. Produce all welds using 55 percent nickel iron welding rod or wire. Carbon steel electrodes are not acceptable. Use class 53 pipe for both branch and parent outlet pipe. After fabrication, air test each outlet pipe to 15 psi to insure weld integrity. Apply a soap and water solution during the testing procedure to inspect the weld for leakage. Re-fabricate and retest any welds that show air seepage. Do not use welded-on bosses. Install all welded-on outlets at manufacturer's plant.

c. Provide the type of pipe end for the branch outlet as specified or indicated on the drawings. Provide the size and laying length of the welded-on branch outlet as recommended by the pipe manufacturer and acceptable to the Engineer for the field conditions and connecting pipe or valve. Place and compact pipe embedment material and trench backfill under and around each side of the outlet to hold the pipe in proper position and alignment during subsequent pipe jointing, embedment, and backfilling operations.

2. Mechanical Joints

a. Smaller than 4”

1) Fittings for pipes smaller than 4” shall be determined by the Owner or specified on the Drawings.

b. 4” and Larger

1) Provide mechanical joint type below ground fittings manufactured of ductile iron and conforming to the requirements of ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53, latest revision. Provide fittings compatible with the pipe and designed for 150 psi working pressure, unless noted otherwise on the Drawings. Provide linings and coatings of the fittings as specified for the pipe.
2) Provide stainless T-head bolts and nuts in sufficient quantities for each fitting or valve.
3) Restrain mechanical joint fittings using EBAA Iron, Inc., Megalug, Tyler Union TUFGrip or equal. Use twist-off nuts to insure proper actuation of mechanical joint restraining devices.

3. Flanged Joints

a. Provide flange fittings as required for above ground applications or exposed piping in vaults.
b. Flanges conforming to AWWA C110 can be joined with Class 125 B16.1 flanges shown in ANSI B16.1 but not with Class 250 B16.1 flanges.
c. Flange joints should be fitted so that the contact faces bear uniformly on the gasket. The joint should be made with relatively uniform bolt stress.
d. Bolts and nuts shall be type 316 stainless steel, conforming to ASTM A 193, Grade B8M, for bolts and ASTM A 194, Grade 8M, for nuts.
e. Set flange bolts beyond finger tightness with an indicating torque wrench to insure equal tension in all bolts. Tighten bolts such that those 180 degrees apart or directly opposite are torqued in sequence.
f. Provide at minimum one (1) restrained dismantling joint or flange coupling adaptor for disassembly in each linear run of flanged piping.

2.4 DISTRIBUTION VALVES

A. Gate Valves

1. Manufacturers

a. Mueller Co: Chattanooga, TN
b. NIBCO, Inc.: Elkhart, IN
c. Or Approved Equal

2. Description

a. Comply with AWWA C509.
b. Body: Ductile iron.
c. Seats: Resilient.
d. Style

1) Buried service: Mechanical joint ends in accordance with AWWA C111.
2) Above ground service: Flanged ends with 125 lb. flanged ends faced and drilled per ANSI B16.1 standard for cast iron flanges.

e. Stem

1) Type: Non-rising for buried service. Non-rising for above ground service, unless otherwise indicated on Drawings
2) Material: Bronze.

f. Operation

1) 2-inch operating nut for buried applications
2) Handwheel for above ground applications
3) Opening Direction: Counterclockwise, unless otherwise indicated on the Drawings

3. Provide gate valves smaller than 3 inches in diameter that are all bronze, threaded, meeting the requirements of Federal Specification WW-V-54C, as manufactured by Crane, or Walworth, or equivalent, and suitable for the service required.

B. BUTTERFLY VALVES

1. Manufacturers

a. Mueller
b. Henry Pratt Company
c. Or approved equal

2. Description

a. Comply with AWWA C504, Class 150
b. Minimum Working Pressure: 200 psig
c. Syle

1) 6 inch and smaller – Wafer
2) Larger than 6 inch – Short bodied Design
3) Buried service: Mechanical joint ends in accordance with AWWA C111.

4) Above ground service: Flanged ends with 125 lb. flanged ends faced and drilled per ANSI B16.1 standard for cast iron flanges.

d. Shaft: Bearings shall be non-metallic and permanently lubricated.
e. Seats

1) Mounting: On body for valves 24 inches and smaller
2) Type: Field replaceable for valves larger than 30 inches.

f. Packing: V-type packing with minimum of 4 sealing rings.

3. Operator

a. 2-inch operating nut for buried applications
b. Handwheel for above ground applications
c. Opening Direction: Counterclockwise.

4. Materials

a. Body: Cast iron, ASTM A126
b. Stem: Stainless Steel
c. Disc: Cast iron, ASTM A48, Class 4C
d. Seats

1) Type: Resilient and replaceable
2) Material: Buna N for water, or as required for other services

e. Seating Surfaces: Type 316 stainless steel
f. Bearings: Aluminum Bronze, ASTM B148, C954
g. Connecting Hardware: Type 316 stainless steel

5. Finishes

a. Factory epoxy unless specified in Drawings.

C. CHECK VALVES

1. Manufacturers

a. GA Industries, Inc.
b. Henry Pratt Company
c. Or Approved Equal

2. Description

a. Comply with AWWA C508
b. Minimum Working Pressure: 200 psig for 2” - 12” and 150 psig for 14” - 30”
c. Check valves 6 inches and larger: Furnish with adjustable air cushion chambers.
d. Type: Swing, resilient seated with outside lever and adjustable weight.
e. Mounting: Horizontal or vertical.

f. End Connections: Integral flange ends shall be ANSI B16.1 Class 125, suitable for horizontal or vertical installation

3. Materials

a. Body and Cover: Ductile iron, ASTM A536.
b. Disc, Disc Arm: Ductile iron, ASTM A536
c. Body Seat: Replaceable, Type 316 ASTM A276 with Buna-N renewable seat ring
d. Shaft: Type 303 Stainless Steel ASTM A582
e. Disc Seat: Buna-N
f. Lever and Counterweight: Ductile Iron, ASTM A536
g. Hinge Pin and Key: Type 316 Stainless Steel
h. Rubber Components: Buna-N
i. Connecting Hardware: Type 304 stainless steel.

4. Finishes: As specified in Section 09 96 00 High-Performance Coatings.

D. TAPPING SLEEVES AND VALVES

1. Manufacturers

a. Romac
b. Smith-Blair
c. Or approved equal

2. Stainless steel tapping sleeves shall be used to make “wet” taps into the existing water mains where shown on the drawings. The tapping sleeve shall provide a full circumferential seal and integrated threaded fastners, and flanged outlet for connection to the tapping valve. Contractor shall verify type of existing main before ordering sleeve. The tapping sleeve shall be pressure tested in the field to verify pressure rating. The tapping valve shall have an inlet flange to match the sleeve. Tapping valve and tapping sleeve shall be rated for 150 psi working pressure, open counter-clockwise with nonrising stem and have BUNA-N O-rings. Provide valve with box.
3. Tapping saddles shall be used to make “wet” taps into the existing water mains where shown on the drawings. Tapping saddle bodies shall be made of malleable iron conforming to ASTM A 47 Grade 32510, or ductile iron conforming to ASTM A 536. Straps shall be made of carbon steel conforming to ASTM A 307, electro-galvanized with Di-Chromate Seal. Nuts shall be cold formed, semi-finished, heavy hex steel electro-galvanized with Di-Chromate Seal. Gaskets shall be made of synthetic rubber and shall be suitable for service at maximum operating temperature of piping system, and as specified in individual piping specification sections.
4. Tapping saddles shall be Rockwell 313 double strap iron service saddles, or equal.

2.5 FIRE HYDRANTS

A. Manufacturers

a. Mueller Co: Chattanooga, TN
b. American Cast Iron Pipe Company: Birmingham, AL

c. Or Equal

B. Dry-Barrel, Breakaway Type

1. Comply with AWWA C502.
2. Body: Cast iron.
3. Valve: Compression type.
4. Burial Depth: As indicated on Drawings.
5. Inlet Connection Size: 6 inches.
6. Valve Opening: 5-1/4 inches in diameter.
7. End Connections: Mechanical joint.
8. Bolts and Nuts: Galvanized steel.
9. Interior Coating: Comply with AWWA C550.
10. Opening Direction: Counterclockwise.

C. Wet-Barrel Type

1. Comply with AWWA C503.
2. Body: Cast iron.
3. Valve Openings: Individual for pumper and hose nozzles.
4. End Connections: Mechanical joint.
5. Bolts and Nuts: Galvanized steel.
6. Interior Coating: Comply with AWWA C550.
7. Opening Direction: Counterclockwise.

D. Hose Connections

1. One pumper, two hose nozzles.
2. Obtain thread type and size from local fire department.
3. Attach nozzle caps by separate chains.

E. Finishes

1. Primer and coating of enamel as specified in Section 09 96 00 – High-Performance Coatings.
2. Color: Comply with requirements of utility company.

2.6 YARD HYDRANTS

1. Description

a. Automatic-draining, non-freezing yard hydrant for hose connection.
b. Inlet:

1) Size: 1 inch NPT.
2) Fitting: Female.

c. Nozzle

1) Size: 3/4 inch.

2) Material: Brass.
3) Fitting: Male.
4) Type: Removable.

d. Casing

1) Description: Galvanized-steel pipe.
2) Size: 1-1/4 inch.

e. Drain Hole: Tapped, 1/8 inch NPT.
f. Operating Rod

1) Description: Galvanized-steel pipe.
2) Size: 3/8 inch.

g. Working Pressure: 125 psig.

2.7 AIR VACUUM VALVES

A. All air release and vacuum valves shall be sized per the manufacturer and approved by the engineer prior to installation based on the Owner's preferences and the anticipated line pressures.

B. Potable water air and vacuum valves shall permit unrestricted passage of air during filling of the distribution piping. The valve body shall be stainless steel with stainless steel screws, unless indicated (stainless steel) in the plan set. The float and all internal metal parts shall be stainless steel, and the valve shall be designed so that the venting mechanism does not come into contact with sewage. The air release valve shall be connected to the distribution main by a threaded connection on the top of the pipe and, if necessary, a tapped tee shall be used for this connection. Between the main connection and the air release valve a shut off valve matching the size of the valve and 1" blow off valve shall be furnished and installed.

C. Nipples shall be stainless steel, no galvanized nipples shall be used.

D. Manufacturers

1. ARI Flow Control Accessories
2. Or Approved Equal

2.8 SURGE ANTICIPATING VALVE

A. Manufacturers

1. Cla-Val
2. Singer
3. Or Approved Equal

B. Description

1. The valve shall be a pilot operated surge anticipating pressure relief control valve, which will open in response to a low surge pressure condition as associated with a sudden pump shut down due to power loss or pump failure.
2. The control valve shall also open quickly when the inlet pressure meets or exceeds a predetermined high surge pilot pressure setting.
3. The control valve shall open to dissipate a return pressure surge and remain open to relieve damaging overpressure.
4. The valve shall close smoothly at an adjustable speed when system pressure is recovered above the low surge pressure pilot setting and below the high surge pressure pilot setting.
5. Confer with Engineer to determine high and low set pressure.
6. Above ground installations shall have heat tracing of pilot tubing to prevent freezing.

C. Materials

1. Type: Globe or Angle
2. Main Valve Body, Bonnet and Stem: ASTM A536 ductile iron.
3. Pilot Valves: Ductile iron, Steel, or Stainless Steel.
4. Seat Ring and Stem: AISI 316 S.S.
5. Elastomers (diaphragm, disc, seals): EPDM or Buna-N
6. Fasteners (304 Stainless Steel)

D. End Connections

1. Flanged, ASME B16.5 or B16.42, Class 150.

2.9 PRESSURE REDUCING VALVE

A. Manufacturers

1. Cla-Val.
2. Singer Valve.
3. Flomatic Corporation.
4. Or Approved Equal.

B. Description

1. Normally open or closed valves to maintain constant downstream pressure regardless of changing flow rate or varying inlet pressure, and to prevent backflow.
2. Type: Pilot operated.
3. Furnish V-ports for pressure control at low flows.
4. Indicator Rod: Attached to piston for visual position indication.

C. Pilot Valves

1. Type: Globe or Angle
2. Body: Cast iron, Ductile iron, Steel, or Stainless steel.

D. End Connections

1. Flanged, ASME B16.5 or B16.42, Class 150.

E. Performance and Design Criteria

1. Flow Rate: as shown on drawings
2. Maximum Upstream Pressure: 200 psig
3. Set Point Downstream Pressure:

    a. As indicated on Drawings.
    b. Range: Field adjustable from near zero to 110 percent.

F. Materials

1. Body: Cast iron, ASTM A126, Class B or Ductile iron, ASTM A536
2. Disc and Diaphragm

    a. Buna-N rubber.
    b. Disc Retainer and Diaphragm Washer: Cast iron or Cast steel or Bronze

3. Trim: Bronze or Stainless steel
4. Stem, Nut, and Spring: Stainless steel
5. Packing: PTFE
6. Control Piping: Brass or Bronze with stainless-steel wetted trim.

G. Interior Coating: Coat cast-iron and ductile-iron surfaces with epoxy coating according to AWWA C550.

H. Accessories

1. Externally mounted strainer with cocks.
2. Isolation valve.
3. Check valves.
4. Low-flow bypass.

2.10 REDUCED-PRESSURE BACKFLOW PREVENTERS

A. Description

1. Provide Reduced pressure backflow preventer that is approved by Owner.
2. Install backflow preventer in vault or meter box as indicated on the drawings.
3. If above ground installation is required, install backflow device in hot box.

2.11 MATERIALS

A. Bedding and Cover

1. Bedding

    a. A continuous and uniform bedding shall be provided in the trench for all buried pipe.
    b. Ductile Iron Pipe – Type 2 or Type 3 Trench as required.

c. PVC/HDPE – Type 2 Trench

2. Cover: Provide a minimum of 4 feet of cover unless shown otherwise on Drawings.
3. Soil Backfill from Above Pipe to Finish Grade:

a. Subsoil with no rocks greater than 6 inches in diameter, frozen earth, or foreign matter.
b. Back-fill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe.

2.12 ACCESSORIES

A. Polyethylene Encasement

1. Where indicated on the drawings ductile iron pipe shall be wrapped in 6 mil polyethylene encasement in accordance with AWWA C105. All fittings shall be wrapped in 6 mil polyethylene encasement extending 6" beyond the connection.

B. Zinc Coating

1. Where indicated on the drawings, ductile iron pipe for buried service shall be coated with a layer of arc-sprayed zinc. The mass of the zinc applied shall be 200 g/m^2 of pipe surface area. A finishing layer topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local minimum not less than 2 mils.

a. The zinc coating system shall conform to ISO 8179 standard.
b. All pipe shall be manufactured and zinc coated in the United States at the pipe manufacturer's facility.

C. Tracer Wire

1. Insulated copper wire shall be installed on all water mains. The wire shall be 10 gauge stranded type TW copper marker wire with electronically continuous joints with blue or purple thermoplastic insulation recommended for direct burial.
2. The marker wire shall be brought up to all in-line valves and at 500' increments along the waterline alignment to be readily available to system operators.
3. All wire connections and splices shall be connected with underground wire nuts, tied, and tightly taped with insulated electrical tape. All costs associated with the installation of the marker wire shall be included in the price bid for the pipe.

D. Detection Tape

a. Blue metallic detection tape shall be provided for all PVC pipes.
b. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tape shall be marked "CAUTION WATER MAIN BURIED BELOW."
c. Tape shall be permanently printed with no surface printing allowed. Tape width shall be a minimum of 3-inches and have a minimum thickness of 5 mil.

E. Valve boxes

1. Manufacturers

a. Mueller Co: Chattanooga, TN
b. Ford Meter Box Company, Inc.: Wabash, IN
c. Sigma
d. Tyler Union
e. Or approved equal

2. Description

a. Material: Cast iron
b. Type: One Piece

1) Material: Cast iron.
2) Provide 6-inch Class 200 PVC riser

c. Installation: Support valve box and PVC riser on minimum of 2 cement bricks. Install tracer wire on outside of riser pipe and loop inside of valve box.

3. Lid Inscription: WATER.

F. PRESSURE GAUGES

1. Gauges shall be furnished as shown on the drawings. Gauges shall be bourdon tube type, with bronze movement, plexiglass covers and shall be 4½ inches in diameter with not less than 90 percent glycerin filled cast phenolic cases. Each gauge shall have a range such that the normal operating pressure shall be approximately at half the range. The gauges shall be provided with diaphragm protectors and ¼ inch NPT liquid flushing connection with brass lever handle blow-off pet cock. The diaphragm and surfaces exposed to the liquid shall be of stainless steel. Gauges shall be calibrated in pounds per square inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - 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. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

D. Protect and support existing distribution piping and appurtenances as Work progresses.

3.3 INSTALLATION

A. Conduct installation of waterlines and all appurtenances in accordance with the appropriate Section C of the AWWA Standards, and/or manufacturer's recommended installation procedures.

B. Begin installation of the pipe immediately after the excavation is started, and keep pipe operation laying close behind the trenching. Install pipe in accordance with the manufacturer's instructions and recommendations. Remove damaged or unsound pipe or fittings and replace at no additional cost to the Owner. Before jointing of the pipe, remove all lumps, blisters, excess coating material or oil from the bell and spigot ends of the pipe.

C. Joint Lubricants

1. Provide joint lubrication as recommended by the manufacturer of the pipe and meeting the requirements of NSF 61.
2. Do not use lubricants which support microbiological growth, including vegetable shortening, for pipe joints.

D. Seal and protect field cut ends in accordance with manufacturer's instructions.

E. Restrain water lines 2.5 inches in diameter and larger to prevent movement under pressure. Furnish mechanical joint restraint devices, as specified in the individual Specification Sections and as shown on the Drawings. Install thrust restraints at all bends, tees, crosses, wyes, plugs, and reducers, or as shown in details of typical thrust restraint on the Drawings. Additionally, install restraints for valves, as shown on the Drawings and specified herein.

1. Where mechanical joint restraint devices are used, provide a restraining mechanism, which imparts multiple wedging actions against the pipe, increasing its resistance as the pipeline pressure increases. Use twist-off nuts to ensure proper actuation of mechanical joint restraining devices. Provide mechanical joint restraining devices by EBAA Iron, Inc., Megalug, Tyler Union TUFGrip or approved equal.
2. Thrust blocks shall only be used in specific instances when indicated on Drawings, provide concrete thrust blocks of 2,500 psi concrete in accordance with Thrust Block Schedule, Detail B-1, sheet 99-C-3, unless otherwise shown on drawing.

F. Where there is no adequate natural foundation upon which to construct a pipe bed, install the pipe on a prepared stabilized subgrade or rock bedding of Class I materials as defined in ASTM D2774. Replace or stabilize unsuitable subgrade materials as described in Section 31 23 16.13 – Excavation & Trenching. Payment for gravel or graded stone used for pipe bedding, when ordered in writing, will be according to the bid item for such material. Where dewatering is required, use Class I materials as described in ASTM D2774.

G. Place pipe and fittings along the route of construction with the spigot ends pointing in the direction of flow. Place pipe where it will cause least interference with traffic. Handle pipe with mechanical equipment. Before it is lowered into the trench, swab or brush out the pipe to insure that no dirt or foreign material gets into the finished line. Provide a test plug to close the

pipe and to keep out trench water whenever work is not in progress. Provide the means of dewatering the trench, the cost of which is included in the price of installing the pipe.

H. Do not exceed the manufacturer's recommendations regarding deflections from a straight line or grade made necessary by vertical curves, horizontal curves or offsets. If the specified or required alignment requires deflection in excess of those recommended, either provide special bends as approved by the Engineer or a sufficient number of shorter lengths of pipe to provide a greater number of angular deflections within the required limit.

I. Insure that all joints are watertight and immediately repair any leaks or defects discovered to the satisfaction of the Engineer. Remove, clean and properly relay any pipe that has been disturbed after being installed. Flush or remove any superfluous material inside the pipe by means of an approved follower or scraper after joints are made. Install fittings and pipe joints in strict accordance with the manufacturer's recommendations.

J. Where water mains are stubbed out with a reducer and valve, provide restrained joints in addition to thrust blocks from the valve back to the tee.

K. For the protection of exposed reinforcing in anchor blocks, furnish and apply two coats of Koppers Bitumastic No. 505 protective coating, or approved equal.

L. Install plastic pipe in strict accordance with the provisions of ASTM D2774, including those provisions addressing compaction of bedding and haunching material.

M. No flushing device shall be directly connected to any sewer

N. Chambers, pits, or manholes containing valves, blow-offs, meters, air relief valves, or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer.

3.4 MISCELLANEOUS INSTALLATION CONDITIONS

A. Sewer and Water Main Crossing

1. Install water mains at least 10 feet horizontally from any existing or proposed sanitary sewer. Measure the distance from edge to edge.
2. Install water mains crossing sanitary sewers, either above or below, to provide a minimum vertical separation of 18 inches between the outside of the water main and the outside of the sewer. Whenever possible, install the water main above the sewer. Provide adequate structural support for water mains crossing under sewers.
3. Where water mains and sanitary sewers cross, install a 20-foot section of ductile iron pipe, centered over the point of crossing. For waterlines less than 4-inches, encase the pipe in concrete.
4. Where water mains are laid within 10 feet horizontally of a sanitary sewer, install the water main in a separate trench or on an undisturbed earth shelf located on one side of the sewer at an elevation such that the bottom of the water main is at least 18 inches above the top of the sewer.
5. Do not install water mains in such a manner that they come in contact with or penetrate sewer manholes, storm sewers or catch basins.

6. Do not locate potable water mains within 25 feet horizontally of a wastewater tile field or spray field.
7. Special Conditions: When it is impossible to obtain the distances specified above, Owner may allow an alternative design. Include the following guidelines in any alternative design or conditions.

    a. Maximize the distances between the water main and sewer line and the joints of each.
    b. Use materials for the sewer line which meet the requirements specified herein for waterlines.
    c. Allow enough distance to make repairs to one of the lines without damaging the other.

8. Above-water crossings: The pipe shall be adequately supported and anchored, protected from damage and freezing, accessible for repair or replacement.
9. Underwater crossings: A minimum of 2 feet of cover shall be provided over the pipe. When crossing water courses that are greater than 15 feet in width, the following shall be provided:

    a. The pipe material and joints shall be designed appropriately.
    b. Valves shall be located so the section can be isolated for testing or repair, the valves (on both sides of crossing) shall be easily accessible and not subject to flooding.
    c. A blow-off shall be provided on the side opposite of the supply service sized in accordance with Section R.61-58.4.(D)(7). Direct away from streams, over ground.
    d. Use DIP with mechanical joints for any lines being installed in rock

B. Connection to Existing Mains

1. Where connections are required between new work and existing water mains, make connections in a thorough and workmanlike manner, using proper specials and fittings to suit the actual conditions.
2. Where a connection is to be made to an existing fitting in the line, schedule the work so that digging and locating the existing fittings can be completed prior to starting trench work on the line. Perform cut-ins into lines at a time approved by the Owner's representative. Verify the dimensions of all pipe before ordering special fittings and couplings.

C. Contaminated Areas

1. Do not locate waterlines in areas of known contamination.

3.5 FLUSHING OF PIPING SYSTEM

A. Flush piping systems in accordance with Section 33 13 00 - Disinfecting of Water Utility Distribution.

3.6 DISINFECTION

A. Disinfect and test piping systems in accordance with Section 33 13 00 - Disinfecting of Water Utility Distribution.

3.7 CROSS CONNECTION CONTROL

A. Insure that there are no connections between the distribution system and any pipes, pumps, hydrants, or tanks from which unsafe water or other contaminated materials may be discharged or drawn into the water system.

B. Do not include any bypasses, unless the bypass is equipped with an approved backflow prevention device.

C. Provide an air gap separation or an approved reduced pressure backflow preventer for any high hazard category cross connections.

D. Do not install reduced pressure principle backflow prevention assemblies in any area or location subject to possible flooding. This includes pits or vaults which are not provided with a gravity drain to the ground's surface that is capable of exceeding the discharge rate of the relief valve. If the device is installed in a pit, provide a drain that is a minimum of two times the size of the line entering the backflow prevention device. Do not discharge the drain into any ditch or storm drain which could flood water back into the pit.

E. Insure that all inlet piping to the backflow prevention device is approved for potable water service, and is AWWA or NSF approved.

F. Protect potable waterlines from contamination by fire line sprinkler systems and dedicated fire lines, except those in high hazard category, by an approved double check valve assembly.

G. Bedding

1. Excavate pipe trench as specified in Section 31 23 16.13 – Excavation & Trenching
2. Placement

    a. Place bedding material
    b. Level fill materials in one continuous layer not exceeding 6 inches of compacted depth.
    c. Compact to 95 percent maximum density.

3. Backfill around sides and to top of pipe as specified in Section 31 23 16.13 – Excavation & Trenching .
4. Maintain optimum moisture content of fill material to attain required compaction density.

H. Pipe and Fittings:

1. Group piping with other Site piping work whenever practical.
2. Install pipe to elevations indicated on Drawings.
3. Install ductile-iron piping and fittings according to AWWA C600.
4. Route pipe in straight line.

5. Install access fittings to permit disinfection of water system performed under Section 33 13 00 - Disinfecting of Water Utility Distribution.
6. Thrust Restraints:

    a. Form and place concrete for pipe thrust restraints at each elbow or change of pipe direction.
    b. Place concrete to permit full access to pipe and pipe accessories.

7. Establish elevations of buried piping with not less than 4 feet of cover.

3.8 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.

B. Install pipe within tolerance of 5/8 inch.

3.9 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

B. Testing:

1. Pressure test piping system according to AWWA C600 and following:

    a. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
    b. Conduct hydrostatic test for a minimum of two hours.
    c. Slowly fill section to be tested with water; expel air from piping at high points.
    d. Install corporation cocks at high points.
    e. Close air vents and corporation cocks after air is expelled.
    f. Raise pressure to specified test pressure.
    g. Observe joints, fittings, and valves under test.
    h. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage, and retest.
    i. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
    j. Maintain pressure within plus or minus 5 psi of test pressure.
    k. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
    l. Compute maximum allowable leakage using following formula:

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

m. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

n. Leakage:

1) If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.

2) Correct visible leaks regardless of quantity of leakage.

2. Tracer Wire

a. Test tracer wire for continuity along length of pipeline

END OF SECTION 33 11 13 (Form Follows)

PRESSURE PIPING / LEAKAGE TEST

Name of Project: _____ Project Number: _____

Contractor / Foreman: _____ Owner: _____

AWWAC600 Table 4.A Hydrostatic Testing Allowance per 1,000 ft of pipeline* -- gph

Avg. Test Pressure (psig)	Nominal Pipe Diameter (inches)																	
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64
350	0.38	0.51	0.76	1.01	1.26	1.52	1.77	2.02	2.28	2.53	3.03	3.79	4.55	5.31	6.07	6.83	7.58	8.09
300	0.35	0.47	0.7	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62	6.32	7.02	7.49
275	0.34	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38	6.05	6.72	7.17
250	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13	5.77	6.41	6.84
225	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86	5.47	6.08	6.49
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59	5.16	5.73	6.12
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29	4.83	5.36	5.72
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97	4.47	4.97	5.30
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63	4.08	4.53	4.83
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24	3.65	4.05	4.32

*If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

Date/Time of Test: _____

Start Time: _____ **End Time:** _____

Test Pressure: _____ psi. **Test Length**: _____ feet

Diameter (nominal): _____ inches

Allowable Leakage: _____ gal. **Actual Leakage:** _____ gal.

Result (Pass or Fail): _____

Comments: _____

_____

I certify that I witnessed the referenced pressure and leakage test and that the documented results are satisfactory.

Inspector's Name and Title _____

Signature of Inspector: _____

SECTION 33 13 00 - 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 33 11 13 – Public Water Utility Distribution Piping 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 B302 - Ammonium Sulfate.
3. AWWA B303 - Sodium Chlorite.
4. AWWA C651 - Disinfecting Water Mains.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
B. Product Data: Submit procedures, proposed chemicals, and treatment levels.
C. Certify that water conforms or fails to conform to bacterial standards of authority having jurisdiction.

D. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.
E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - 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. Testing Firm: Company specializing in testing potable water samples, certified and approved by the State of Georgia.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals

1. Hypochlorite: Comply with AWWA B300.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.
B. 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. Chlorine solution shall be slowly fed through a suitable device within 10 feet of the point of filling the new main. Care should be taken in filling the mains so that all air pockets are eliminated so as to permit complete contact of the disinfection agent with the entire inside diameter of the pipe.
C. The water and chlorine solution should be slowly fed until 25 mg/l (25ppm) free chlorine is throughout the main.
D. Maintain disinfectant in the system for at least 24 hours.
E. At the end of the 24-hour period, all portions of the main shall show a chlorine residual of not less than 10 mg/l.
F. Disinfection of the new mains and the disposal of the heavily chlorinated water, following the disinfection, shall be accomplished in accordance with the latest edition of AWWA Standard C651. The heavily chlorinated water shall be neutralized prior to discharging into a sanitary sewer manhole. There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water and other contaminating materials may be discharged or drawn into the system.
G. Following chlorination all water shall be flushed from the lines until the replacement water has a chlorine content not more than 0.1 ppm. in excess of the residual in the water from the supplying main. Water samples shall be taken by the Contractor and sent to an approved laboratory for bacteriological examination. The lines shall not be placed into service until a satisfactory bacteriological report is received.
H. Replace permanent system devices that were removed for disinfection.
I. The “tablet method” of disinfection which consists of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water when installation is complete is not allowed.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

END OF SECTION 33 13 00

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