UNIONCOUNTY
north carolina

Invitation for Bid No. 2024-044

FY21 Short Water Line Extensions Phase C

ADDENDUM No. 1
ISSUE DATE: January 4, 2024

Responding Offerors on this project are hereby notified that this Addendum shall be made a part of the above named IFB document.

The following items add to, modify, and/or clarify the IFB documents and shall have the full force and effect of the original Documents. This Addendum shall be acknowledged by the Offeror in the IFB document.

1/4/2024

Union County, NC
FY21 Short Water Line Extensions Phase C
WKD Project Number: 20210024.00.CL

ADDENDUM NUMBER 1 January 4, 2024

BID DATE: January 10, 2024, 2:00 p.m.

TO ALL BIDDERS:

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents and all previous Addenda.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

Below are changes, additions, and/or clarifications to the bid documents for this project.

Specifications

Item 1: Specification 00 01 10 "Table of Contents", Remove and Replace this Section in its entirety with the attached and revised Specification 00 01 10 "Table of Contents". Changes Include:
a. Add "Section 33 05 07.13 Utility Directional Drilling" which includes 11 pages
b. Remove and Replace name of Section 33 05 07 from "Trenchless Install Utility Piping) to "Trenchless Installation of Utility Piping (Jacking)"

Item 2: EJCDC C-410 "Bid Form", Remove and Replace this Section in its entirety with the attached and revised EJCDC C-410 "Bid Form". Changes Include:
a. Article 5 – Basis of Bid; Remove and Replace the Estimated Quantity of "Free Bore of 8" Water Main" from "20" to "120"

Item 3: EJCDC C-520 "Form of Agreement", Remove and Replace this Section in its entirety with the attached and revised EJCDC C-520 "Form of Agreement". Changes Include:
a. Add Article 9.01.A.9.c which states "Appendix A – Permits (pages 1 to 106, inclusive)."

Item 4: Addition of Specification 33 05 07 "Utility Directional Drilling" in its entirety.

Item 5: Specification 33 11 00 "Water Utility Distribution Piping", Remove and Replace this Section in its entirety with the attached and revised Specification 33 11 00 "Water Utility Distribution Piping". Changes Include:
a. Add Section 2.1.D "Polyethylene (PE)"

Questions

Item 6: Question: Reference Sheet C.2 of 10; approximate location STA. 5+00 at front of 1409 W. Lawyers Road (at trees). Can we utilize HDPE and perform a directional bore versus DI pipe and a free bore, due to the bore length being approximately 160'?

Answer: This approach is an acceptable alternative as a means and method of the contractor. Payment shall be based on the unit price of free bore water main.

This addendum and all associated specifications sections and revised Contract Documents will be uploaded to the online plan room and distributed to registered plan holders via email.

Receipt of this addendum must be acknowledged on Page 1 of EJCDC C-410, Bid Form.

Sincerely,

W.K. Dickson & Co., Inc.

Jake Berkshire

Jake Berkshire, P.E.
Project Manager

****

END OF ADDENDUM No.1

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BID FORM

Union County, North Carolina

FY21 Short Water Line Extensions Phase C

WKD Project No. 20210024.00.CL

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Union County Procurement Division
Attn: Corey Brooks
Senior Procurement Specialist
500 N. Main Street, Suite 709
Monroe, NC 28112
(704)-283-3683
corey.brooks@unioncountync.gov

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 – BIDDER'S ACKNOWLEDGEMENTS

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

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum, Date

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

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

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

E. 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 any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. 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.

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

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

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

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

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

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

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

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

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

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

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

ARTICLE 5 – BASIS OF BID

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

FY21 SHORT WATER LINE EXTENSIONS PHASE C

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
1	2" dia. PVC Water Line	LF	1,150		
2	6" dia. PVC Water Line	LF	580		
3	8” dia. PVC Water Line	LF	9,880		
4	6” dia. RJ DIP	LF	260		
5	8” dia. RJ DIP	LF	2,660		
6	16” dia. Steel Casing (t=0.250”), No Carrier Pipe, Open Cut	LF	40		
7	20” dia. Steel Casing (t=0.250”), No Carrier Pipe, Open Cut	LF	20		
8	20” dia. Steel Casing (t=0.250”), No Carrier Pipe, Jack & Bore	LF	200		
9	Stream Crossing – Open Cut	LF	30		
10	2” Gate Valve	EA	1		
11	6” Gate Valve	EA	1		
12	8” Gate Valve	EA	10		
13	2” Blow-Off Assembly	EA	4		
14	Fire Hydrant Assembly	EA	13		
15	Free Bore for 8” Water Main	LF	120		
16	Gravel Road and Driveway	SY	330		
17	Asphalt Driveway/Parking Lot	SY	10		
18	Service Connection	EA	21		
19	¾” Copper Service (Bored)	LF	410		
20	¾” Copper Service (Open Cut)	LF	70		
21	Meter Box & Setting Equipment for ¾” Water Meter	EA	21		
22	Erosion Control	LS	1		
23	Restoration, Seeding, and Mulching	AC	6		
24	Traffic Control	LS	1		

FY21 SHORT WATER LINE EXTENSIONS PHASE C					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Bid Unit Price**	**Bid Price**
				Total Base Bid	$
25	Testing Allowance	LS	1	$5,000	$5,000
26	Mobilization (4% of Base Bid)	LS	1		
27	Contingency Allowance (5% of Base Bid)	LS	1		
				Total Bid (Base Bid + Mobilization + Allowances)	$

TOTAL BID: $ _____

(in words)

_____

(in words)

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 no guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

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

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Proposed Suppliers;

D. List of Project References;

E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

F. Contractor's License No.: _____

G. Required Bidder Qualification Statement with supporting data

H. Non-collusion affidavit of Prime Bidder.

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)

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

THIS AGREEMENT is by and between UNION COUNTY ("Owner") and

("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

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

Furnish all materials, equipment, and labor for installation of approximately 1,150 linear feet of 2-inch water mains, 840 linear feet of 6-inch water mains, 12,540 linear feet of 8-in water mains including, but not necessarily limited to pipe, valves, hydrants, blow offs, tie-ins, bores, directional drilling, traffic control, erosion control, testing, and restoration along Lineview Dr, W Lawyers Rd, Unionville-Brief Rd, and Clontz Long Rd.

ARTICLE 2 – THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Union County, North Carolina – FY21 Short Water Line Extensions Phase C

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by W.K. Dickson & Co., Inc. (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Dates for Substantial Completion and Final Payment*

A. The Work will be substantially completed on or before 250 calendar days, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before 290 calendar days.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal ~~**or arbitration**~~ proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner $500.00 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner $250.00 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

B. **In addition to liquidated damages, Contractor shall reimburse Owner all fees and costs paid to or incurred by Engineer in administering the construction of the Project beyond the time specified in Paragraph 4.02 above for Substantial Completion. All fees and costs may be deducted from monies due Contractor for the performance of the Work.**

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraph 5.01.A below:

A. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual quantity of that ~~**item:**~~ **item. Unit Prices are as specified in Contractor's Bid.** Amounts expended pursuant to this Agreement shall not exceed _____ Dollars (**$**_____) without written amendment hereto duly executed by both parties.

~~**UNIT PRICE WORK**~~

~~**Item No.**~~	~~**Description**~~	~~**Unit**~~	~~**Estimated Quantity**~~	~~**Bid Unit Price**~~	~~**Bid Price**~~

~~**Total of all Bid Prices (Unit Price Work)**~~ ~~**$**_____~~

The Bid prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.06 of the General Conditions.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions. **Owner shall make payments within thirty (30) days after presentation of the Application for Payment to Owner by Engineer with Engineer's recommendation for payment.**

6.02 *Progress Payments; Retainage*

A. Owner shall make **monthly** progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment ~~**on or about the _____ day of each month**~~ during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.

   a. **95%** percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

   b. **95%** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to **100%** percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less **200%** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of **4%** percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."

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

F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that 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 Documents.

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

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

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

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 8, inclusive).

2. Performance bond (pages 1 to 3, inclusive).

3. Payment bond (pages 1 to 3, inclusive).

4. General Conditions (pages 1 to 68, inclusive).

5. Supplementary Conditions (pages 1 to 2, inclusive).

6. Technical Specifications as listed in the table of contents of the Project Manual.

7. Drawings consisting of 24 sheets with each sheet bearing the following general title: FY21 Short Water Lines Extensions Phase C ~~[or] the Drawings listed on attached sheet index~~. **Drawings are separately bound and therefore not attached to this Agreement.**

8. Addenda (numbers _____ to _____, inclusive).

9. Exhibits to this Agreement (enumerated as follows):

   a. Contractor's Bid (pages _____ to _____, inclusive).

   b. Documentation submitted by Contractor prior to Notice of Award (pages _____ to _____, inclusive).

   c. Appendix A – Permits (pages 1 to 106, inclusive).

10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

    a. Notice to Proceed (pages _____ to _____, inclusive).

    b. Work Change Directives.

    c. Change Orders.

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

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

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Contractor's Certifications*

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

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

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

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

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

~~10.06 *Other Provisions*~~

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER:	CONTRACTOR
UNION COUNTY	
By:	By:
Title: County Manager	Title:
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:
500 N. Main Street	
Suite 600	
Monroe, NC 28112	
	License No.:
	(Where applicable)
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)	Agent for service of process:

SECTION 33 05 07.13
UTILITY DIRECTIONAL DRILLING

PART 1 GENERAL

1.1 SUMMARY

A. This section shall govern when the use of HDPE via HDD is elected as an allowable alternative to the basis of design.

B. Section Includes:
1. Excavation and backfill for approach trenches and pits.
2. Horizontal directional drilling.
3. Pipe and accessories.
4. Testing of Pipe
5. Drilling fluid system.

C. Related Sections:
1. Section 31 23 16.13 - Trenching: Excavating and backfilling access pits.
2. Section 33 01 10.58 - Disinfection of Water Utility Piping Systems.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. HDD of HDPE:
1. Basis of Measurement: By linear foot measured from entry point to exit point.
2. Basis of Payment: Includes excavation, equipment, pipe, accessories, tests, backfill, and disposal of excess materials.
3. No payment shall be issued for unsuccessful bores or the work associated with the abandonment of an unsuccessful bore.
4. Payment shall be based on the unit price of free bore water main as an allowable alternative to the basis of design.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Water Works Association:
a. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
b. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
c. AWWA C901 – Standard for Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
d. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.

C. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort [12 400 ft-lbf/ft3 (600 kN-m/m3)].
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lbf/ft3 (2,700 kN-m/m3)].
3. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
4. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
5. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
6. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
7. ASTM D2464 - Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
8. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
9. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
10. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
11. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
12. 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.
13. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
14. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
15. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
16. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
17. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
18. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
19. ASTM F1056 - Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings.
20. ASTM F1962 - Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.

D. North American Society for Trenchless Technology:
   1. NASTT - Horizontal Directional Drilling Good Practices Guidelines.

E. Plastics Pipe Institute:
   1. PPI TR-46 - Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe.

F. National Utility Contractors Association:
   1. NUCA - HDD Installation Guidelines.

1.4 DESIGN REQUIREMENTS

A. Design Criteria:
   1. Diameters above 6 inches- Manufacture recommendations.
   2. Drilling Steering System: Remote with continuous electronic monitoring of boring depth and location.
   3. Directional Change Capability: 90 degree with 35 foot radius curve.
   4. Minimum distance for single bores and between boring pits:

Pipe Size	Boring Distance
1 to 1-1/2 inches	400 feet
2 to 2-1/2 inches	350 feet
3 to 6 inches	300 feet

   5. Ratio of Reaming Diameter to Pipe Outside Diameter:
      a. Nominal Pipe Diameter of 6 Inches and Smaller: 1.5 maximum.
      b. Nominal pipe diameter larger than 6 Inches: Submit recommended ratio and reaming procedures for review.

1.5 SUBMITTALS

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

B. Shop Drawings:
   1. Submit technical data for equipment, method of installation, and proposed sequence of construction.
   2. Include information pertaining to pits, dewatering, method of spoils removal, equipment size and capacity, equipment capabilities including installing pipe on radius, type of drill bit, drilling fluid, method of monitoring line and grade and detection of surface movement, name plate data for drilling equipment, and mobile spoils removal unit.

C. Product Data:
   1. Identify source of water used for drilling.
   2. Submit copy of approvals and permits for use of water source.

D. Installer Qualifications: Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

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

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

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

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

D. Record actual depth of pipe at 25 feet intervals.

E. Record actual horizontal location of installed pipe.

F. Show depth and location of abandoned bores.

G. Record depth and location of drill bits and drill stems not removed from bore.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with the following:
   1. ASTM F1962
   2. NASST - Horizontal Directional Drilling Good Practices Guidelines.
   3. NUCA HDD Installation Guidelines.
   4. PPI TR-46.

B. Maintain one copy of documents on site.

1.8 QUALIFICATIONS

A. Installer: Company specializing in performing work of this Section with minimum 5 years documented experience.
   1. Work Experience: Include projects of similar scope and conditions.
   2. Furnish list of references upon request.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on piping and fittings until pipe is installed.

B. Protect pipe from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.

C. Accept products on site in manufacturer’s original containers or configuration. Inspect for damage.

D. Use shipping braces between layers of stacked pipe. Stack piping lengths no more than three layers high.

E. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.

F. Support pipes with nylon slings during handling.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

PART 2 PRODUCTS

2.1 HORIZONTAL DIRECTIONAL DRILLING

A. Performance and Design Criteria:
   1. Drilling Steering System: Remote with continuous electronic monitoring of boring depth and location.
   2. Directional Change Capability: 90 degrees with 35-foot radius curve.
   3. Minimum distance for single bores and between boring pits:
      a. Pipe Size 1 to 1-1/2 Inches: 400 feet.
      b. Pipe Size 2 to 2-1/2 Inches: 350 feet.
      c. Pipe Size 3 to 6 Inches: 300 feet.
      d. Pipe Size above 6 inches – Manufacture's recommendation
   4. Ratio of Reaming Diameter to Pipe OD:
      a. Nominal Pipe Diameter of 6 Inches and Smaller: Maximum of 1.5.
      b. Nominal Pipe Diameter Larger Than 6 Inches: Submit recommended ratio and reaming procedures for review by Architect/Engineer.

B. Water Source:
   1. Potable.
   2. Obtained from Union County

C. Underground Pipe Markers: As specified in Section 33 05 97 - Identification and Signage for Utilities.

D. Materials:
   1. Drilling Fluid: Liquid bentonite clay slurry; totally inert with no environmental risk.

E. PVC Piping:

F. Polyethylene (PE) Piping:
   1. Pipe: Comply with AWWA C906, ASTM D3035, for 200 psig pressure rating.
   2. Sizing:
      a. Comply with Dimension Ratio of DR 11
   3. Materials:
      a. Comply with ASTM D3350.
      b. Minimum Cell Classification: 324433-C
   4. Fittings:
      a. Comply with AWWA C906.
      b. Style: Molded or fabricated
   5. Joints:
      a. End Connections: butt fusion

G. Subsoil Fill: excavated and reused soil with no rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.2 DRILLING FLUID

A. Drilling Fluid: Liquid bentonite clay slurry; totally inert with no environmental risk.

2.3 PIPE

A. Polyethylene Pipe: AWWA C906 for 200 psig pressure rating:
   1. Fittings: AWWA C901 molded or fabricated.
   2. Joints: Butt fusion.

2.4 FILL MATERIALS

A. Backfill: Excavated subsoil or granular fill per Section 31 23 16.13 - Trenching.

2.5 WATER SOURCE

A. Water: Potable.

2.6 UNDERGROUND PIPE MARKERS

A. Trace Wire: Electronic detection materials for non-conductive piping products.
   1. Unshielded 10 gage copper wire.
   2. Conductive tape.

2.7 GROUT

A. Fill and Seal Grout at Pipe Ends: Mortar conforming to Section 1040 of NCDOT Standard Specifications, January 2012, proportioned as described below. Do not add more water than is necessary to make a workable mixture.
   1. Mix No. 1: 1 part Portland cement, 1/4 part hydrated lime, 3-3/4 parts mortar sand (maximum).
   2. Mix No. 2: 1 part Portland cement, 1 part masonry cement, 6 parts mortar sand (maximum).

B. Pressure Grout Mix: One part Portland cement, and six parts mortar sand mixed with water to consistency applicable for pressure grouting.

C. Grout: As specified in Section 03 60 00 - Grouting.

D. Flowable Fill: As specified in Section 31 23 23.33 - Flowable Fill

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify connection to existing piping system size, location, and invert elevations are in accordance with Drawings.

3.2 PREPARATION

A. Call Local Utility Line Information service at number shown on Drawings not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Locate, identify, and protect utilities indicated to remain from damage.

C. Notify utility company to remove and relocate utilities.

D. Identify required lines, levels, contours, and datum locations.

E. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.

F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

G. Establish minimum separation between utilities in accordance with applicable code.

H. Establish pipe elevations with not less than 3 feet of cover.

3.3 DEWATERING

A. Intercept and divert surface drainage, precipitation, and groundwater away from excavation through use of dikes, curb walls, ditches, pipes, sumps or other means.

B. Develop and maintain substantially dry subgrade during drilling and pipe installation.

C. Comply with State and Municipal requirements for discharging water to watercourse, preventing stream degradation, and erosion and sediment control.

3.4 EXISTING WORK

A. Maintain access to existing facilities and services indicated to remain. Modify pipe installation to maintain access to existing facilities.

3.5 EXCAVATION

A. Excavate subsoil as specified in Section 31 23 16 - Excavation and Fill and Section 31 23 16.13 - Trenching.

B. Excavate approach trenches and pits in accordance with shop drawings and as site conditions require. Minimize number of access pits.

C. Provide sump areas to contain drilling fluids.

D. Install excavation supports as specified in Section 31 23 16 – Excavation and Fill and Section 31 23 16.13 - Trenching.

E. Restore areas after completion of drilling and carrier pipe installation.

3.6 DRILLING

A. Drill pilot bore with vertical and horizontal alignment as indicated on shop drawings.

B. Surveying:
   1. Survey entire drill path and mark entry and exit locations with stakes.
   2. If a magnetic guidance system is used, survey drill path for surface geomagnetic variations or anomalies.

C. Guide drill remotely from ground surface to maintain alignment by monitoring signals transmitted from drill bit.
   1. Monitor depth, pitch, and position.
   2. Adjust drill head orientation to maintain correct alignment.

D. Inject drilling fluid into bore to stabilize hole, remove cuttings, and lubricate drill bit and pipe.

E. Continuously monitor drilling fluid pumping rate, pressure, viscosity, and density while drilling pilot bore, back reaming, and installing pipe to ensure adequate removal of soil cuttings and stabilization of bore.
   1. Provide relief holes when required to relieve excess pressure.
   2. Minimize heaving during pullback.

F. Calibrate and verify electronic monitor accuracy during first 50 feet of bore in presence of Engineer before proceeding with other drilling. Excavate minimum of four test pits spaced along first 50 feet bore to verify required accuracy. When required accuracy is not met, adjust equipment or provide new equipment capable of meeting required accuracy.

G. After completing pilot bore, remove drill bit.

3.7 DRILLING OBSTRUCTIONS

A. When obstructions are encountered during drilling, notify Engineer immediately. Do not proceed around obstruction without Engineer's approval.

B. For conditions requiring more than 3-foot deviation in horizontal alignment, submit new shop drawings to Engineer for approval before resuming work.

C. Maintain adjusted bore alignment within easement or right-of-way.

3.8 PIPE INSTALLATION

A. After completing pilot bore, remove drill bit. Install reamer and pipe pulling head.
   1. Select reamer with minimum bore diameter required for pipe installation.

B. Attach pipe to pipe pulling head. Pull reamer and pipe to entry pit along pilot bore.

C. Inject drilling fluid through reamer to stabilize bore and lubricate pipe.

D. Install piping with horizontal and vertical alignment as shown on Drawings.

E. Protect and support pipe being pulled into bore so pipe moves freely and is not damaged during installation.

F. Do not exceed pipe manufacturer's recommended pullback forces.

G. Install trace wire continuous with each bore. Splice trace wire only at intermediate bore pits. Tape or insulate trace wire to prevent corrosion and maintain integrity of pipe detection.
   1. Terminate trace wire for each pipe run at structures along pipe system.
   2. Provide extra length of trace wire at each structure, so trace wire can be pulled 3 feet out top of structure for connection to detection equipment.
   3. Test trace wire for continuity for each bore before acceptance.

H. Provide sufficient length of pipe to extend past termination point to allow connection to other pipe sections.

I. Allow minimum of 24 hours for stabilization after installing pipe before making connections to pipe.

J. Mark location and depth of bore with spray paint on paved surfaces, and wooden stakes on non-paved surfaces at 25-foot intervals.

3.9 SLURRY REMOVAL AND DISPOSAL

A. Contain excess drilling fluids at entry and exit points until recycled or removed from site. Provide recovery system to remove drilling spoils from access pits.

B. Remove, transport and legally dispose of drilling spoils off site.
   1. Do not discharge drilling spoils in sanitary sewers, storm sewers, or other drainage systems.
   2. When drilling in suspected contaminated soil, test drilling fluid for contamination before disposal.

C. When drilling fluid leaks to surface, immediately contain leak and barricade area from vehicular and pedestrian travel before resuming drilling operations.

D. Complete cleanup of drilling fluid at end of each work day.

3.10 BACKFILL

A. Install backfill and compact as specified in Section 31 23 23 – Fill and Section 31 23 16.13 - Trenching.

B. Backfill approach trenches and pits with subsoil fill to contours and elevations indicated on Drawings or of surrounding existing grade.

C. Compact subsoil fill as specified in Section 31 23 17 – Trenching.

3.11 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Horizontal Position: 12 inches.

C. Maximum Variation From Vertical Elevation: 2 inches.

D. Minimum Horizontal and Vertical Clearance from Other Utilities: 12 inches.

E. When pipe installation deviates beyond specified tolerances, abandon bore, remove installed pipe, re-bore, and reinstall pipe in correct alignment.

F. Fill abandoned bores greater than 3 inches in diameter with grout or flowable fill material.

3.12 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Leakage Testing: Upon completion of pipe installation, test pipe in accordance with the following:
   1. Water Distribution Pipe Testing: As specified in Section 33 14 13 - Public Water Utility Distribution Piping

C. Disinfection of Water Utility Distribution Piping Systems: As specified in Section 33 01 10.58.

D. Compaction Testing: As specified in Section 31 23 16.13 - Trenching.

E. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for installation, inspection, startup, field testing, and instructing Owner's personnel in maintenance of equipment.

F. Certify that equipment for drilling has been properly set up and is ready for drilling.

G. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.13 CLEANING

A. Upon completion of drilling and pipe installation, remove drilling spoils, debris, and unacceptable material from approach trenches and pits. Clean up excess slurry from ground.

B. Restore approach trenches and pits to original condition.

C. Remove temporary facilities for drilling operations in accordance with Section 01 50 00 - Temporary Facilities and Controls.

END OF SECTION

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SECTION 33 11 00
WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe and fittings for potable water line and fire water line.
   2. Valves and Valve Boxes
   3. Fire Hydrants.
   4. Tapping Sleeves and Valves.
   5. Underground pipe markers.
   6. Thrust Blocking.
   7. Pressure Testing

B. Related Sections:
   1. Section 31 23 17 – Trenching NC: Excavation and backfill requirements.
   2. Section 33 01 10.58 - Disinfecting of Water Utility Distribution
   3. Section 33 05 07 - Trenchless Installation of Utility Piping
   4. Section 33 12 13 – Water Service Connections

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Each unit price includes excavation, bedding, backfill, stockpiling, and disposal of excess material in accordance with Section 31 23 17 – Trenching NC. No payment will be made for over excavated work or for replacement materials. Each unit price includes testing for leakage and disinfection.

B. Pipe and Fittings:
   1. Basis of Measurement: By the linear foot of pipe constructed
   2. Basis of Payment: Includes pipe, fittings, concrete thrust restraints, tied joint restraints, and metal bars and bolts used in thrust restraint.

C. Gate Valves and Box:
   1. Basis of Measurement: By the Unit.
   2. Basis of Payment: Includes valve, valve box, fittings, support, and accessories.

D. Hydrant and Valve Assembly:
   1. Basis of Measurement: By the unit.
   2. Basis of Payment: Includes aggregate, concrete thrust restraint and support, tied joints restraint, hydrant, valve, valve box, fittings, accessories, and pipe from main to valve and pipe from valve to hydrant. If hydrant is located at end of a line, payment will be made for installation from valve to hydrant.

E. Free Boring Concrete Driveways: See Section 33 05 07 – Trenchless Install Utility Piping.

F. Tapping Sleeve and Valve:

1. Basis of Measurement: By the unit.
2. Basis of Payment: Includes sleeves, valve, valve box, fittings, support, accessories, witness by authority having jurisdiction, equipment, and labor required for connection new water lines to existing water lines at the locations shown on the drawings or as determined by the Engineer. Work shall include, but not limited to, locating existing water lines, excavation; including pavement cuts where required, exposure of the existing water line, sleeves, appurtenances, backfill and compaction.

G. Relocate Meter: See Section 33 12 13 – Water Service Connections.

H. Blow Off Assembly:
1. Basis of Measurement: By the unit.
2. Basis of Payment: Includes pipe, fittings, gate valve, and accessories.

I. Underground Pipe Markers and Tracer Wire:
1. Will not be measured for payment but is included in the unit cost for the pipe installed.

J. Pressure Testing: Will not be measured for payment but is to be included in the unit cost for the water line piping installed.

K. Disinfection of Potable Water System Piping:
1. Will not be measured for payment but is included in the unit cost for the pipe installed.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

B. American Water Works Association:
1. AWWA C104 - ANSI Standard for Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C110 - Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm Through 1,219 mm), for Water.
3. AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C115 - Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
5. AWWA C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast.
6. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
7. AWWA C502 - Dry-Barrel Fire Hydrants.
8. AWWA C509 - Resilient-Seated Gate Valves, 3 in. through 12 in. NPS, for Water and Sewage Systems.
9. AWWA C504 - Rubber-Sealed Butterfly Valves.
10. AWWA C550 - Protecting Interior Coatings for Valves and Hydrants.
11. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
12. AWWA C605 - Underground Installation of PVC and PVCO Pressure Pipe and Fittings.
13. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 in. through 12 in. (100 mm through 300 mm), for Water Distribution.

C. ASTM International:
   1. ASTM A36 – Standard Specification for Carbon Structural Steel
   2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   5. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
   6. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
   7. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
   8. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

D. Manufacturer's Standardization Society of the Valve and Fittings Industry:
   1. MSS SP-60 - Connecting Flange Joint between Tapping Sleeves and Tapping Valves.

E. National Sanitation Foundation:
   1. NSF 61 - Drinking Water System Components - Health Effects

F. National Fire Protection Association:
   1. NFPA 281 - Recommended Practice for Fire Flow Testing and Marking of Hydrants.

G. NCDOT Standard Specifications:
   1. Standard Specifications for Roads and Structures, latest edition, published by the North Carolina Department of Transportation.

1.4 DEFINITIONS:

A. Utility Company: Union County.

1.5 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures

B. Shop Drawings: Indicate piping layout, including piping specialties.

C. Product Data: Submit data on pipe materials, pipe fittings, valves, hydrants, and accessories.

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

E. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

F. Written verification of required pressure, leakage, and disinfection tests.

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

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with Section 1510 of NCDOT Standard Specifications, except as modified herein.

B. Perform work in accordance with utility company standards.

C. Maintain one copy of each document on site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with manufacturer's name and pressure rating labeling in place.

B. Materials shall be inspected upon arrival. Examine materials for damage. Remove damaged or rejected materials from site.

C. Observe manufacturer’s directions for delivery and storage of materials and accessories.

D. Block individual and stockpiled pipe lengths to prevent moving.

E. Protect pipe coating during handling using methods recommended by manufacturer. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.

F. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.

G. Store polyethylene materials out of sunlight.

H. All materials which cannot be stored along the length of the project shall be stored for subsequent use when needed. The contractor shall make his own arrangements for the use of storage areas.

I. Fittings and other materials shall be carefully handled so as to prevent damage to the lining in pipe and fittings. Pipe shall not be unloaded by rolling or dropping off truck but shall be handled by carefully lifting and lowering into position using approved slings or clamps.

J. Materials shall be distributed along the project length so as to least interfere with traffic. No street or roadways are to be blocked or closed. The contractor shall furnish and maintain proper warning signs and furnish necessary traffic control devices. When working along streets and roadways no materials shall be strung further than is required for the days work at hand. No materials shall be placed in drainage ditches or outside the right of ways.

PART 2 PRODUCTS

2.1 WATER PIPING

A. Polyvinyl Chloride (PVC): Marked with NSF 61 designation for potable water use.
   1. Diameter 2 inch only
   2. Type 1, Grade 1 resin
   3. Conforming to ASTM D-1784.
   4. Dimensions to be controlled by ASTM D-2241.
   5. Wall Thickness: SDR 21
   6. NSF Logo to be printed on all pipe joints for the type of pipe.
   7. Fittings:
      a. Type 1, Grade 1, PVC resin
      b. Conform to ASTM D-2464
      c. Pressure Rating: 200 psig working pressure
      d. Rubber compression seal within the bell end of the fitting

B. Ductile Iron Pipe (DIP): AWWA C151. Bituminous outside coating: AWWA C151. Cement Mortar Lining: AWWA C104.
   1. Diameters 6 and 8 inch only.
   2. Pressure Rating: 350 psi.
   3. Fittings: Ductile iron, AWWA C110. Compact fittings, Ductile Iron, AWWA C153.
      a. Pressure Rating: 200 psi minimum.
      b. Coating: Bituminous Coating, AWWA C110.
      c. Lining: Cement Mortar Lining, AWWA C104
   4. Joints:
      a. Mechanical Joints: AWWA C111.
      b. Push-On Joints: AWWA C111.
      c. Flanged Joints: AWWA C115.
      d. Boltless Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal. Gripper gaskets/field lock gaskets shall confirm to pipe manufacturers specifications.

C. Polyvinyl Chloride (PVC): AWWA C900 and AWWA C905, marked with NSF 61 designation for potable water use.
   1. Diameters 6 and 8 inch only.
   2. Type 1 Grade 1 resin conforming to ASTM D-1784.
   3. Pipe Class: DR 18, 235 psi.
   4. Fittings:
      a. Ductile Iron, Mechanical Joint, AWWA C110.
   5. Joints:
      a. PVC, ASTM D3139 with ASTM F477 flexible elastomeric seals.
      b. Ductile Iron, Mechanical Joint, AWWA C111.
      c. Boltless Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal. Conform to pipe manufacturers specifications.
      d. NSF logo must appear on all joints indicating the type of pipe.

D. Polyethylene (PE):
   1. In accordance with Section 33 05 07.13 Utility Directional Drilling

E. Steel Encasement Pipe
   1. Conform with ASTM A 139 for Grade B welded or seamless pipe
   2. Minimum yield strength shall be 35,000 psi.
   3. Pipe Ends: Shall be furnished beveled for butt welding of circumferential joints.

2.2 TAPPING SLEEVES AND VALVES

A. Manufacturers:
   1. American Flow Control
   2. Clow Valve Company
   3. Mueller Company
   4. Kennedy
   5. US Pipe
   6. Substitutions: Equal per Section 00 21 14 – Instructions to Bidders

B. Tapping Sleeves:
   1. Cast-iron or 304L Stainless Steel with ANSI A21.11/AWWA C111 mechanical joint ends, dual compression type.
   2. Lining: Cement mortar lining with seal coating in accordance with ANSI A21.4/AWWAC104.
   3. Outlet Flange Dimensions and Drilling: MSS SP-60.

C. Tapping Valves:
   1. AWWA C500, double disc with non-rising stem. Inlet flanges shall conform to ASME/ANSI B16.1, Class 125 and MSS SP-60. Mechanical joint outlets shall conform to AWWA C111.

2.3 RESILIENT WEDGE GATE VALVES

A. Sizes- 2 inches
   1. Conform to ANSI A21.11
   2. Cast Iron Bodies, Bronze mounted, parallel double disc, non-rising stem valve
   3. Pressure Rates: 200 psig working pressure, 400 psig test pressure
   4. End Connections: Standard female iron pipe threads or ANSI A 21.11 mechanical joints for buried locations and ANSI B 16.1. Exposed locations shall be flanged.
   5. Operator: 2-inch square nut for buried locations and standard hand wheel for exposed locations. Open counterclockwise.
   6. All valves should be left open.

B. Sizes 6 inches to 16 inches
   1. Conform to AWWA C509
   2. Cast Iron Bodies, Bronze mounted, parallel double disc
   3. Stems: Non rising bronze
   4. Pressure Rating: Valve body: 200 psig working pressure, 400 psig test pressure
   5. Solid wedge with non-rising stem construction.
   6. Sealed with rubber “O” rings, both above and below the thrust ring.
   7. Interior Coating: Conform to AWWA C550
   8. End Connections: ANSI A21.11 / AWWA C111 mechanical joints for buried locations and ANSI B16.1 flanges for exposed locations.

9. Valve operators: 2 inch square nuts for buried locations or standard hand wheel for exposed locations. Open counterclockwise.
10. All valves should be left open.

C. Manufacturers:
1. Mueller
2. American Flow Control
3. Clow Valve Company
4. US Pipe
5. Kennedy
6. Substitutions: Equal per Section 00 21 14 - Instructions to Bidders.

2.4 VALVE BOXES

A. Vales 12-Inch Diameter and Smaller: Cast iron, two-piece, screw type.

B. Valves Larger Than 12-Inch Diameter: Cast iron, three-piece, screw type; round base.

C. Cast iron lid marked "WATER".

2.5 FIRE HYDRANTS

A. Manufacturers:
1. American Flow Control.
2. Clow Valve Company.
3. Mueller Company.
4. Substitutions: Equal per Section 00 21 14 - Instructions to Bidders.

B. Furnish materials in accordance with utility company or governing agency requirements.

C. Dry-barrel Break-away Type: AWWA C502; cast-iron body, compression type valve.
1. Bury Depth: As indicated on the Drawings.
2. Inlet Connection: 4-1/2 inch.
3. Hose Connections: two (2) 2- 2 ½ inch
4. Valve Opening: 4-1/2 inch diameter
5. Ends: Mechanical Joint or Bell End
6. Bolts and Nuts: Corrosion resistant and pentagon patterned.
7. Coating: AWWA C550; interior.
8. Color: Federal Safety Red
9. Direction of Opening: Counterclockwise unless otherwise indicated.
10. Nozzle: Designed for 360 deg rotation
11. Nozzle Caps: Shall have retaining chain
12. Stem: Double “O” ring seal
13. Drain Valve: Shall be brass or bronze.
14. Hardware: Stainless Steel

D. All hydrants shall be designed with a breakage flange.

E. Hydrant Tee: Shall be MJ or MJ swivel.

F. One pumper, two hose nozzles.
   1. Thread type and size: National Standard
   2. Attach nozzle caps by separate chains.

G. Finish: Primer and two coats of enamel, color in accordance with utility company, fire department, or NFPA 281 requirements.
   1. Body: Fire Hydrant Red – Rust-oleum Enamel #1210 Fire Hydrant Red.
   2. Bonnet: High Gloss White – Rust-oleum Enamel #2766.
   3. Caps: High Gloss White – Rust-oleum Enamel #2766.

2.6 UNDERGROUND PIPE MARKERS

A. Plastic Ribbon and Trace Wire Tape: Brightly colored blue continuously printed with "WATER SERVICE" in large letters, minimum 6 inch wide by 4 mils thick, with 14 gauge stranded copper tracer wire taped to top of all pipes and extended to the surface at all valves, air release valves, and/or all possible extrusions to ground level.

2.7 CONCRETE FOR THRUST RESTRAINT, ENCASEMENT AND CRADLES

A. Concrete: Class B Concrete conforming to Section 1000 of the NCDOT Standard Specifications.
   1. Compressive strength of 2,500 psi at 28 days.
   2. Air entrained.
   3. Water cement ratio of 0.488 with rounded aggregate and 0.567 with angular aggregate.
   4. Maximum slump of 2.5 inch for vibrated concrete and 4 inch for non-vibrated concrete.
   5. Minimum cement content of 508 pounds per cubic yard for vibrated and 545 pounds per cubic yard for non-vibrated concrete.

2.8 BEDDING AND COVER MATERIALS

A. Bedding for Rigid Pipe (DIP, PVC C900, PVC C905, and PCCP): Clean sand, slightly silty sand, or slightly clayey sand having a Unified Soil Classification of SP, SP-SM or SP-SC.

B. Bedding for Flexible Pipe (PVC-IPS): Clean course aggregate Gradation No. 57 conforming to Sections 1005 and 1006 of the NCDOT Standard Specifications.

C. Backfill Around Pipe and Above Pipe: As specified in Section 31 23 17 -Trenching.

2.9 ACCESSORIES

A. Polyethylene Jackets: AWWA C105 polyethylene jacket. Single layer, lapped over pipe joint, and secured with 10 mil polyethylene tape.

B. Steel rods, bolt, lugs and brackets: ASTM A36 or ASTM A307 carbon steel.

PART 3 EXECUTION

3.1 PREPARATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify existing utility water main size, location, and inverts are as indicated on Drawings.

3.2 INTERRUPTION OF SERVICE

A. Interruption of service to water users shall not exceed 4 hours. Notify property owners of interruption a minimum of 24 hours in advance.

B. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.

C. Where connections to existing systems necessitates employment of past installation methods not currently part of trade practice, utilize necessary special piping components.

D. Once tie-in is initiated, work continuously until complete and tested.

3.3 EXCAVATION

A. Excavate pipe trench in accordance with Section 31 23 17 - Trenching NC for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

B. Trenches shall be dug so that pipeline can be laid on the alignment and grade shown on drawings. Trenches shall be dug so that transitions in alignment and grade are within half of manufacturer’s limits for joint deflection and do not put excessive stress on pipe or fittings.

C. Width of trench shall be a minimum of 6 inch clearance on either side of pipe or fitting.

D. Bell holes shall be cut to allow pipe to rest on full length of the barrel.

E. Remove rock in accordance with specification 31 23 17 to the depth required to provide minimum separation of 8 inches from rock and pipe or fittings in all directions.

F. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.

G. Provide sheeting and shoring as required.

H. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 8 inches in compacted depth; compact to 95 percent.

3.4 INSTALLATION – PIPE

A. Install ductile iron pipe and fittings in accordance with AWWA C600 and manufactures' instructions.

B. Install PVC pipe in accordance with AWWA C605 and manufactures' instructions.

C. Field verify depth of utilities that will be crossed well ahead of laying pipe.
   1. Adjust water main elevation as required during construction.
   2. No separate payment will be made for field verification or adjustment of main depths as required.

D. Contractor to coordinate with property owners and utility providers for removal and replacement or repair of existing structures or services.

E. Contractor will restore all existing structures or services damaged by Contractor's operations at no cost to owner.

F. Handle and assemble pipe in accordance with manufacturer's instructions and as indicated on Drawings.

G. Lay pipe as soon as possible after trench is excavated.

H. Pipe shall be kept clean and dry during installation.

I. Joint lubricant may be used provided it is manufactured for use in potable water systems.

J. Steel Rods, Bolt, Lugs, and Brackets: Coat buried steel with one coat of coal tar coating before backfilling.

K. Maintain minimum 10-foot horizontal separation and 18-inch vertical separation of water main from sewer piping or as required by local code.

L. Install pipe to indicated elevation to within tolerance of 1/2 inch.

M. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws will not be permitted. Grind edges smooth with beveled end for push-on connections.

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

O. Flanged Joints: Not to be used in underground installations except within structures.

P. Route pipe in straight line. Relay pipe that is out of alignment or grade.

Q. Install pipe with no high points. If unforeseen field conditions arise which necessitate high points, install air release valves as directed by Architect/Engineer.

R. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.

S. Prevent foreign material from entering pipe during placement.

T. Install pipe to allow for expansion and contraction without stressing pipe or joints.

U. Close pipe openings with watertight plugs during work stoppages and at the end of each work day.

V. Install access fittings to permit disinfection of water system performed under Section 33 13 00 – Disinfecting Water Utility Distribution Piping.

W. Install underground marking tape as noted in Section 2.7 above.

X. Establish elevations of buried piping with not less than 3 feet of cover. Measure depth of cover from final surface grade to top of pipe barrel.

Y. Ensure a minimum cover of at least 30 inches of all ductile iron pipes and 36 inches of all other pipe materials.

Z. Install pipe at a minimum of 1:1 (depth of pipe : distance off edge of pavement) ratio off edge of pavement.

AA. All fittings shall be installed to ensure maximum insertion of pipe. Mechanical joint connections shall be tightened per manufacturer's recommendations. Each fitting shall be wrapped in protective polyethylene and blocked to undisturbed soil with concrete. If it is not practical to block fitting with concrete, steel retaining rods may be used.

3.5 INSTALLATION – FIRE HYDRANTS

A. Install fire hydrants; provide support blocking and drainage gravel; do not block drain hole.

B. Set hydrants plumb with pumper nozzle facing roadway; set hydrants with centerline of pumper nozzle 18 inches above finished grade and safety flange not more than 6 inches or less than 2 inches above grade.

C. Each hydrant shall be placed on a slab of concrete not less than 6 inch thick and 18 inches squared.

D. Restrained joints are to be provided at all joints between main tee, gate valve, and hydrant. Restrained joints may be IS retainer glands with mega-lugs.

E. A minimum of 7 CF of crushed stone is to be placed around the base of the hydrant.

F. Select backfill is to be firmly tamped around the hydrant to surface of ground and to a distance of 5 feet in front of hydrant.

G. Paint above grade with color conforming to Appendix B "Uniform Color Scheme for Fire Hydrants" as part of the AWWA C502 and as selected by the Owner (Federal Safety Red with White bonnet and caps).

H. After hydrostatic testing, flush hydrants and check for proper drainage.

I. Apply one finish coat after hydrant is installed and testing complete. Finish coat shall be silicon alkyd, Tnemec, or equal.

3.6 INSTALLATION - VALVES

A. Install valves in conjunction with pipe installation; set valves plumb.

B. Provide buried valves with valve boxes installed flush with finished grade.

C. Pipe exhaust air release valves to a suitable disposal point. Localized fine-grading may be required. Grade to drain.

3.7 INSTALLATION - TAPPING SLEEVES AND VALVES

A. Install tapping sleeves and valves in accordance with utility company requirements, as indicated on Drawings, and in accordance with manufacturer's instructions.

B. Have Engineer witness tap.

3.8 SERVICE CONNECTIONS

A. Install service connections in accordance with Section 33 12 13 – Water Service Connections.

3.9 BACKFILLING

A. Backfill and compact around sides and to top of pipe in accordance with Section 31 23 17 – Trenching NC.

B. Maintain optimum moisture content of material to attain required compaction density.

3.10 DISINFECTION OF POTABLE WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Section 33 13 00 - Disinfection Water Utility Distribution.

3.11 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Compaction Testing: Perform soil compaction tests in accordance with Section 31 23 17 – Trenching NC.

C. Pressure Tests: Perform pressure test on potable water distribution system in accordance with AWWA C600.
   1. Furnish all necessary apparatus to run pressure test.

D. Notification: Notify Project Engineer and County Representative at least 72 hours in advance of test and have witness test.

E. Test Pressure: Not less than 200 psi or 50 psi in excess of maximum static pressure, whichever is greater.

F. Pressure Test Procedure:
   1. Shall conform to AWWA C605 for PVC and AWWA C 600 for ductile iron.
   2. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct concurrent pressure and leakage tests.
   3. Provide equipment required to perform leakage and pressure tests.
   4. Conduct tests for at least two-hour duration and no more than 24 hours.
   5. No pipeline installation will be approved when pressure varies by more than 5 psi at completion of hydrostatic pressure test.
   6. Design pressures for pipe and thrust restraint are not to be exceeded.
   7. Shall not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants.
   8. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air has been expelled, close corporation cocks and apply test pressure. At conclusion of tests, remove corporation cocks removed and plug resulting piping openings.
   9. Where any section of main is provided with concrete reaction blocking for fittings or hydrants, the hydrostatic pressure test shall not be made until at least 5 days after installation of the concrete reaction block unless otherwise approved.
   10. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.
   11. Examine exposed piping, fittings, valves, hydrants, and joints carefully during pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.
   12. No pipeline installation will be approved when leakage is greater than that determined by the following formula:

$L = (SD\sqrt{P}) / 148,000$
L = allowable, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during leakage test, in pounds per square inch (gauge)

   13. But not more than 12.1 gallons per inch of diameter mile of pipe per 24 hours based on 200 psi test pressure.
   14. Leakage is the amount of water that must be supplied to newly laid lines to maintain the test pressure within 5 psig range over a specified period of time.

15. When leakage exceeds specified acceptable rate, locate source and make repairs. Repeat test until specified leakage requirements are met.
16. Cost of water used for pressure and leak testing shall be the responsibility of the Contractor.

G. Disinfect water distribution piping per Section 33 01 10.58

3.12 SEWER CROSSINGS

A. Lateral Separation of Sewer and Water Mains:
   1. Water mains shall be laid at least 10 ft laterally from existing or proposed sewers unless location conditions or barriers prevent a 10 ft lateral separation in which case:
      a. The water main is laid in a separate trench with the elevation of the bottom of the water main at least 18 inch above the top of the sewer; OR
      b. The water main is laid in the same trench as the sewer with the water main located one side on a bench of undisturbed earth and with the elevation of the bottom of the water main at least 18 inch above the top of the sewer.

B. Water mains crossing sewer service connections, storm sewers, or sanitary sewers shall be laid to provide a vertical separation of at least 18 inches between the bottom of the water main and the top of the sewer, whenever possible.
   1. In the even that 18 inches of vertical separation cannot be provided at the sewer crossing, the sewer shall be removed for a distance of 10 ft on each side of the water main and replaced with one 20 foot length of ductile iron pipe of the same size, and the water main shall be of DIP for 10 feet on each side of sewer.

C. Payment for crossings shall be included in the bid unit price of the water main.

3.13 TRAFFIC CONTROL

A. Warning signs and flagmen must be provided in accordance with NC DOT's "Uniform Traffic Control Devices". Traffic control will be strictly enforced in order to provide fire and police protection, maintain efficient traffic patterns, and access to drives while construction is in progress.

B. Contractor shall provide all appropriate signage, barricades, detours, and shall provide flag persons at all times and places necessary. Occupants must be notified a minimum of 2 hours in advance of private drive closing. Closure times will be limited to a maximum of 24 hours. Where businesses have only one means of access, the Contractor shall provide an alternative means of access or perform work during hours when the business is closed.

3.14 SURFACE RESTORATION

A. All surface disturbances included but not limited to manicured lawns, gravel drives, paved asphalt, or concrete pavement shall be restored according to material specific specifications to an equal or greater condition than prior to construction activities.

B. Restore all damaged fences, signs, mailboxes, etc. to their original conditions. No separate payment will be made for these items.

3.15 EXISTING DRAINAGE FEATURES RESTORATION

A. Remove and replace any existing drainage features, including but not limited to culverts or headwalls, etc. to their original conditions. No separate payment will be made for these items.

END OF SECTION

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