STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

December 5, 2024

Addendum No. 1
RE: Contract # C204988
WBS # 39001.3.2
STATE FUNDED
Cumberland County (U-3422A)
SR-1003 (CAMDEN RD) FROM PROPOSED FAYETTEVILLE OUTER LOOP TO WEST OF SR-1112 (ROCKFISH RD).

December 17, 2024 Letting

To Whom It May Concern:

Reference is made to the proposal furnished to you on this project.

The following revisions have been made to the proposal.

Page No.	Revision
Proposal Cover	Note added that reads "Includes Addendum No. 1 Dated 12-05-2024".
UC-1 thru UC-57	The Utilities Unit Project Special Provisions have been revised. Review new Utility Provisions in their entirety as there were extensive changes.

Please void the existing Pages UC-1 thru UC-63 in your proposal and staple the new revised Pages UC-1 thru UC-57 thereto.

The contract will be prepared accordingly.

Sincerely,

Signed by:
Ronald Elton Davenport, Jr.
52C46046381F443...

Ronald E. Davenport, Jr., PE
State Contract Officer

RED/cms

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
CONTRACT STANDARDS AND DEVELOPMENT
1591 MAIL SERVICE CENTER
RALEIGH, NC 27699-1591

Telephone: (919) 707-6900
Fax: (919) 250-4127
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
1020 BIRCH RIDGE DR.
RALEIGH, NC 27610

Attachments

cc:
Mr. Wiley W. Jones III, PE
Mr. Wallace "Lee" Jernigan, Jr., PE
Mr. Ken Kennedy, PE
Mr. Malcolm Bell
Mr. Forrest Dungan, PE
Ms. Jaci Kincaid
Mr. Jon Weathersbee, PE
Project File (2)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

PROPOSAL

INCLUDES ADDENDUM No. 1 DATED 12-05-2024

DATE AND TIME OF BID OPENING: **Dec 17, 2024 AT 02:00 PM**

CONTRACT ID	C204988
WBS	39001.3.2

FEDERAL-AID NO.	STATE FUNDED
COUNTY	CUMBERLAND
T.I.P NO.	U-3422A
MILES	1.622
ROUTE NO.	SR-1003
LOCATION	SR-1003 (CAMDEN RD) FROM PROPOSED FAYETTEVILLE OUTER LOOP TO WEST OF SR-1112 (ROCKFISH RD).
TYPE OF WORK	GRADING, DRAINAGE, PAVING, SIGNALS, AND WALLS.

NOTICE:

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS $30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

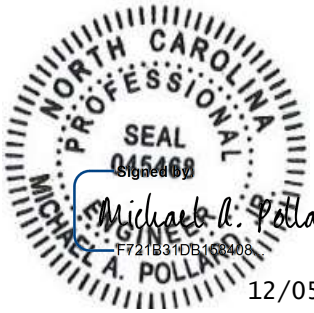
BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A ROADWAY & STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

PROJECT SPECIAL PROVISIONS
Utility Construction

5400 Glenwood Avenue, Suite 400
Raleigh, NC 27612
O: 919-325-3594
www.cdmsmith.com



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Revise the 2024 Standard Specifications as follows:

Where brand names and model numbers are specified in these Special Provisions or in the plans, the cited examples are used only to denote the quality standard of product desired and do not restrict bidders to a specific brand, make, or manufacturer. They are provided to set forth the general style, type, character, and quality of the product desired. Equivalent products will be acceptable.

The utility owner is the Fayetteville Public Works Commission (PWC). The contact person is Kevin Heaphy, P.E. and he can be reached by phone at (910) 223-4740.

The provisions contained within these Utilities Construction Project Special Provisions modify the *Standard Specifications* only for materials used and work performed constructing water or sewer facilities owned by Fayetteville PWC.

Contents

DIVISION 8 INCIDENTALS

SECTION 858-ADJUSTMENT OF CATCH BASINS, MANHOLES, DROP INLETS, METER BOXES AND VALVE BOXES

Page 8-35, ARTICLE 858-2, MATERIALS

Add the following after line 34:

If a meter box or valve box is damaged during adjustment provide a new meter box or valve box.

Page 8-36, ARTICLE 858-3, CONSTRUCTION METHODS

Add the following provisions to the second paragraph:

Adjustment of Valve Boxes:

The top section of the valve box shall be raised or lowered as required to meet the final grade. If the height of the final grade exceeds the length of the existing top section, remove the existing valve box, and install a new one at final grade.

DIVISION 10 MATERIALS

SECTION 1034-SANITARY SEWER PIPE AND FITTINGS

Page 10-65, ARTICLE 1034-1 CLAY PIPE

Add the following paragraph:

Clay pipe shall not be used for sewer pipe.

Page 10-65, ARTICLE 1034-2 PLASTIC PIPE

Add the following sentences:

All materials for the sewer system shall be in accordance with these Special Provisions.

Page 10-65, Sub-article 1034-2 (A) PVC Gravity Flow Sewer

Replace the paragraph with the following:

PVC sewer pipe and fittings 4 to 15 inches shall be in accordance with ASTM D-3034 with a standard dimension ratio (SDR) of 26 for sewer mains and laterals. Larger diameter pipe (18 inches and larger) shall be in accordance with ASTM F-679 with a (SDR) of 26. Both pipe and fittings shall be made of PVC plastic having a cell classification of 12454 as specified in ASTM D-1784.

Pipe joining shall be push on elastomeric gasket joints only and the joints shall be manufactured and assembled in accordance with ASTM D-3212. Elastomeric seals shall meet the requirements

of ASTM F-477. The pipe shall be furnished with integral bells and with gaskets that are permanently installed at the factory and in accordance with ASTM D-3212 and contain a steel reinforcing ring. PVC sewer pipe shall be made by continuous extrusion of prime green unplasticized PVC and contain identification markings as required by the applicable ASTM standard.

The use of restrained joint ductile iron pipe or C900 PVC (DR 18) shall be used for all gravity sewer main or lateral installations (4 to24 inches) within encasements to a point of a minimum of 10 feet outside the casing on each side. The restraint system shall provide uniform circumferential contact thereby eliminating any concerns over point loading.

Ductile Iron Sanitary Sewer Push-on Fittings: Ductile iron sewer fittings on PVC mains shall be deep-bell, gasketed joint, and air test rated. Gasket groves shall be machined in the factory. Material shall be ductile iron, in accordance with ASTM A536, Grade 65-45-12 and ASTM F1336. Wall thickness shall meet the requirements of AWWA C153. Gaskets shall have a minimum cross-sectional area of 0.20 square inches and conform to ASTM F477. All ductile iron fittings shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils on its' interior. All ductile iron fittings on PVC pipe shall provide a flow line that will match the same flow line as the PVC pipe materials.

Mechanical Joint Sanitary Sewer Fittings: Joints shall be installed in accordance with AWWA C-600 and shall conform to AWWA Standard C-111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for 4 inch pipes and larger. Fittings and specials shall be ductile iron and shall be manufactured in accordance with AWWA Standard C-110 (ANSI A21.11). Compact fittings shall be ductile iron in accordance with ANSI A21.53 (AWWA C-153) for 4 to 24 inch sizes only . Note: mechanical joint wyes are not included in the AWWA C-153 specification. Pressure rating shall be not less than 200 psi unless otherwise specified. All ductile iron fittings shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils on its' interior. Mechanical joint fittings shall be utilized on ductile iron mains and ductile iron laterals. Mechanical joint fittings shall not be utilized on PVC mains.

PVC Fittings: PVC fittings shall be manufactured in accordance with ASTM D-3034, F-1336, and F-679. Molded fittings shall be utilized in sizes from 4 to 8 inches (or larger, if available). Fabricated fittings are defined as those fittings that are made from pipe or a combination of pipe and molded components. All PVC fittings shall contain identification markings as required by the applicable ASTM standard. All PVC fittings shall be gasketed joint, except as indicated for interior drop structures. PVC fittings shall be manufactured by GPK Products, Inc., Plasti-Trends, the Harrington Corporation (Harco), or approved equal.

Page 10-65, Sub-article 1034-2 (B) PVC Force Main Sewer Pipe

Replace with the following:

All force main PVC pipe shall be green in color.

Two-inch PVC pipe shall be manufactured using Grade 1 PVC compound material as defined in ASTM D-1784 and shall be SDR21, pressure class 200 in accordance with ASTM D 2241 Fittings for 2 inch PVC shall be solvent welded Schedule 80 PVC. The pipe shall be plainly marked with

the manufacturer's name, size, material (PVC) type and grade or compound, NSF seal, pressure rating and reference to appropriate product standards.

All PVC pipe 4 to 12 inches shall be manufactured using virgin compounds as defined in ASTM D-1784, with a 4000 psi HDB rating and designated as PVC 1120 to be in strict accordance with AWWA C900. The pipe shall be Class 150 and conform to the thickness requirements of DR18. The pipe shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM D-1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D-1598. The pipe joints shall be of the integral bell type with rubber gaskets conforming to the requirements of ASTM D-3139 or ASTM F-477.

Couplings:

Couplings for 2 in. pipe shall be compression, twin gasket type in accordance with ASTM D-3139 for push-on joints and ASTM F-477 for elastomeric seals (gaskets).

PVC fittings are not acceptable for mains other than 2 inch. Fittings and specials for 4 inch mains and larger shall be mechanical joint ductile iron and shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils on its' interior. Fittings and specials for 4 inch mains and larger shall be mechanical joint ductile iron and shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils on its' interior. All fittings shall be adequately supported on a firm trench foundation.

Thrust blocking shall be utilized at all applicable fittings. Fittings requiring thrust blocking shall be full bodied mechanical joint. Compact mechanical joint fittings shall not be allowed where thrust blocking is required.

Mechanical restraining systems shall not be used on PVC pipe.

Page 10-65, Sub-article 1034-2 (C) Polyethylene (PE) Pipe Force Main Sewer Pipe

Replace with the following:

PE pipe shall not be used for force main sewer pipe. All sewer pipes shall be PVC or Ductile Iron as specified herein.

Page 10-65, Add Sub-article 1034-2 (D) High Density Polyethylene (HDPE) Pipe Force Main Sewer Pipe.

Add the following:

The diameter and wall thickness of all high-density polyethylene (HDPE) pipes and fittings shall comply with the appropriate ASTM Specification and the class of pipe designated on the Drawings.

High Density Polyethylene (HDPE) pipe and fittings shall meet the requirements of ASTM F714 and AWWA C906.

HDPE must meet the following minimum Dimension Ratio:

Diameter (inch)	Min Dimension Ratio
4-12	DR13.5
12-48	DR11

The pipes have nominal dimensions shown on Drawings and conform to dimension requirements of the Ductile Iron Pipe Size (DIPS) Sizing System.

Polyethylene pipes to meet requirements of ASTM F714 and AWWA C906.

Pipe to be furnished in standard laying lengths not exceeding 50 feet.

Page 10-65, ARTICLE **1034-3 CONCRETE SEWER PIPE**

Add the following sentence:

Concrete pipe shall not be used for sewer pipe. All sewer pipes shall be PVC or Ductile Iron as specified herein.

Page 10-65, ARTICLE 1034-4 DUCTILE IRON SEWER PIPE

Page 10-65, Sub-article 1034-4 (A) Gravity Flow Sewer Pipe

Add the following paragraphs:

All ductile iron pipe and fittings shall be in strict accordance with ANSI A21.51 and AWWA C151, Class 50 or Class 51, as applicable, in every aspect. The working pressure shall be a minimum of 200 psi. Pipe shall be furnished in 18 or 20-foot lengths. All pipe joints used in open trench construction shall be furnished with "push-on" joints, unless otherwise specified. All joints and fittings shall be in accordance with ANSI A21.11 and AWWA C111. All ductile iron interior surfaces shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils. The exterior pipe surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110.

Mechanical Joint Fittings: Joints shall be installed in accordance with AWWA C600 and shall conform to AWWA C111. Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for 4 inch pipes and larger. Fittings and specials shall be ductile iron and shall be manufactured in accordance with AWWA C110 (ANSI A2l.11). Compact fittings shall be ductile iron in accordance with ANSI A21.53 (AWWA C153) for 4 to 24 inch sizes only. Note: mechanical joint wyes are not included in the AWWA C153 specification. Pressure rating shall be not less than 200 psi unless otherwise specified. All ductile iron fittings shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils. The exterior fitting surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110.

Mechanical joint fittings shall be used on ductile iron mains and ductile iron laterals. Mechanical joint fittings shall not be used on PVC mains.

The interior of pipe and fittings shall be lined with two (2) coats of ceramic epoxy to produce a minimum dry film thickness of 40 mils. The exterior fitting surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110.

Page 10-65, Sub-article 1034-4 (B) Force Main Sewer Pipe and Fittings

Add the following sentences:

The four-inch ductile iron pipe shall be Class 51. Joints shall be mechanical joint or push on joint as specified and installed in accordance with AWWA C600 and shall conform to AWWA C111. All ductile iron pipe and fittings (6 inches and above) shall be in strict accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, Class 50, in every respect. Push on joints, rubber gaskets and lubricant shall conform to ANSI A2 1.11. Fittings and specials shall be mechanical joint ductile iron and shall be manufactured in accordance with AWWA C111 (ANSI A21.11). Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for 4 to 12 inch pipe. All ductile iron pipes and fittings shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils. The exterior pipe and fitting surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110.

Compact fittings shall be manufactured or mechanically restrained, ductile iron in accordance with ANSI A21.53 (AWWA C153) for 4 to 12 inch sizes only. Where thrust blocking is used, fittings shall be full body ductile iron in accordance with ANSI A21.53 (AWWA C110). All ductile iron interior surfaces shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils. The exterior pipe surfaces shall be protected with asphaltic coating as specified in AWWA C151 and C110.

All pipe joints within an encasement shall be furnished with manufactured restrained joints, and as specified in the standard Public Works Commission detail for encasements.

Page 10-66, ADD ARTICLE 1034-5 SLEEVES, COUPLINGS AND MISCELLANEOUS

Add the following provisions for sleeves, couplings and miscellaneous:

Page 10-66, Sub-article 1034-5 (A) Transition Fittings

Ductile Iron Pipe Size x SDR26 Transition Adapter-All ductile-iron x PVC transition adapters shall be one (1) piece, bell x bell (gasket x gasket). Transition adapters shall range in size from 4- through 12 inches. Transition adapters for pipes larger than 12 inches shall be as specified herein. All transition adapters shall have a flow way tapered to allow a smooth transition between the ductile iron and PVC. Transition adapters shall be either PVC or ductile iron, in accordance with the following:

PVC – All PVC transition fittings shall be made from DR 18 C900 pipe stock. The C900 pipe stock shall meet the requirements of AWWA C900/C905 and have a minimum cell classification of 12454 as defined in ASTM D1784. The wall thickness shall meet or exceed DR 18. PVC

transition fittings shall have SBR gaskets in accordance with ASTM F477. All 4 to 12 inch adapters shall be molded and shall have SBR rubber gaskets. Joints shall be 235 psi rated in accordance with ASTM D3139 for the C900(ductile iron) bell, and in accordance with ASTM D3212 for sewer (SDR 26) bell. Molded C900 bell depths shall comply with AWWA C907. Fabricated (4-inch, 10-inch, and 12-inch) bell depths and molded sewer (SDR26) bell depths shall be in accordance with ASTM F1336. Any transitions larger than 12 in. will not be allowed.

Ductile iron – Ductile iron transition fittings 4 to 12 inch shall be deep-bell, push-on joint, and air test rated. The ductile-iron material shall comply with ASTM A536, Grade 65-45-12 or 80-55-06. The bell depth shall be in accordance with ASTM F1336. Gaskets shall be of SBR rubber, in accordance with ASTM F477. Transition gaskets are not allowed. All ductile-iron transition fittings shall be lined with two (2) coats of ceramic epoxy to produce a total minimum dry film thickness of 40 mils. Any transitions larger than 12 in. will not be allowed.

Page 10-66, Sub-article 1034-5 (B)- Pipe to Manhole Connector (Boot)

The connector assembly shall be the sole element to provide a watertight seal of the pipe to the manhole or other structure. The connector shall consist of a rubber gasket, an internal compression sleeve, and one or more external take-up clamps. The connector shall consist of natural or synthetic rubber and Series 300 non-magnetic stainless-steel. No plastic components shall be allowed.

The rubber gasket shall be constructed of synthetic or natural rubber and shall meet or exceed the requirements of ASTM C923. The connector shall have a minimum tensile strength of 1,600 psi. The minimum cross-sectional thickness shall be 0.275 inches.

The internal expansion sleeve shall be comprised of Series 300 non-magnetic stainless-steel. No welds shall be used in its construction.

Installation of the connector shall be performed utilizing a calibrated installation tool furnished by the connector manufacturer. Installation shall require no re-tightening after the initial installation. Installation shall be done in accordance with the manufacturer's instructions.

The external compression take-up clamps shall be Series 300 non-magnetic stainless-steel. No welds shall be used in its construction. The clamps shall be installed using a torque-setting wrench furnished by the connector manufacturer. Installation shall be done in accordance with the manufacturer's instructions.

The Contractor shall utilize the proper size connector in accordance with the connector manufacturer's recommendations.

The finished connection shall provide a sealing to a minimum of 13 psi and shall accommodate a minimum pipe deflection of 7 degrees without the loss of seal.

The pipe to manhole connector shall be PSX: Direct Drive as manufactured by Press-Seal or approved equal.

Page 10-66, ADD ARTICLE 1034-6 SADDLES, CONNECTIONS AND LATERALS

Add the following provisions for saddles and laterals

Page 10-66, Sub-article 1034-6 (A) Saddles

Sewer service saddles may be used for sewer lateral installations. All sewer service saddles shall be ductile iron with stainless-steel straps, bolts, nuts, and washers. The nuts shall be coated to prevent galling. The saddle body shall be ductile iron, in accordance with ASTM A536, Grade 65-45-12. The gasket material shall be SBR, in accordance with ASTM D2000. Saddles for PVC or DI laterals shall have an alignment flange. All stainless-steel straps shall be pre-formed at the factory, to the specified outside diameters of the pipe. Saddles shall be manufactured by Geneco, or an approved equal.

Page 10-66, Sub-article 1034-5 (B) Sewer Laterals

Use fittings meeting the requirements of the following provisions and table:

Mechanical joint fittings shall be used on ductile iron mains and ductile iron laterals. Mechanical joint fittings shall not be used on PVC mains.

The interior of ductile iron pipe and fittings shall be lined with two (2) coats of ceramic epoxy to produce a minimum dry film thickness of 40 mils.

Ductile iron laterals – For ductile iron mains, using mechanical joint fittings or an approved saddle with an alignment flange (Geneco or approved equal). For PVC mains, use an approved saddle with an alignment flange (Geneco or approved equal) or ductile iron fittings as specified above.

PVC laterals – use a saddle with an alignment flange on PVC or ductile iron mains; use a mechanical joint tee with SDR 35 transition gaskets on ductile iron mains; or use PVC fittings as specified within these Special Provisions on PVC sewer mains.

The following table summarizes the materials to be used for sewer main to lateral connections:

	PVC Main	**DI Main**
DI Lateral	**DI fitting or approved saddle**	**MJ fitting or approved saddle**
PVC Lateral	**PVC fitting or approved saddle**	**MJ fitting with transition gasket or approved saddle**

Sewer laterals shall be as specified herein and as indicated on the drawings.

Page 10-66, Sub-article 1034-5 (D) Special Coatings

Add material specifications for ceramic epoxy as follows:

Were ceramic epoxy linings are required, provide lining meeting the requirements contained within these special provisions.

The lining material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quarts pigment.

The epoxy material shall meet the following minimum performance requirements:

Permeability Rating: 0.00 perms when tested according to ASTM E-96 Procedure A with a test duration of 30 days.

ASTM 6-95 Cathodic Disbandment: 1.5 volts at 77°F.

ASTM B-117 Salt Spray: 0.00 undercutting after one year.

Immersion Testing ASTM D-714	Duration
20% Sulfuric Acid	1 Year
25% Sodium Hydroxide at 140°F	1 Year
160°F Distilled Water	1 Year
120°F Tap Water	1 Year

The above requirements shall be verified and tested by an approved testing laboratory. Copies of the laboratory test showing that the lining conforms to the specifications shall be furnished to the Public Works Commission, certified by the Supplier.

SECTION 1036-WATER PIPE AND FITTINGS

Page 10-66 ARTICLE 1036-1 GENERAL

Add the following sentence:

Unless otherwise designated on Drawings all water mains 4 inches and larger in diameter shall be ductile iron as specified herein. Two inch water mains shall be SDR 21 PVC conforming to specifications contained herein.

Page 10-66 ARTICLE 1036-3 COPPER PIPE

Replace second paragraph with the following:

For buried services, use copper water pipe and tube conforming to ASTM B88 soft annealed Type K. The minimum pressure rating for the copper water pipe shall be 655 psi. Use cast brass compression type fittings manufactured for use with copper water pipe and conforming to ANSI/AWWA C800 and local plumbing codes. All brass fittings shall have a 300-psi minimum pressure rating. All services installed in new construction shall be one continuous run of pipe with no splices from the corporation stop to the meter.

Page 10-66 ARTICLE 1036-3 PLASTIC PIPE (A) PVC Pipe Page 10-66, Sub-article 1036-3 (A) (1) Pressure Rated Pipe

Replace with the following:

Pressure rated pipe shall not be used as water pipe.

Page 10-66, Sub-article 1036-3 (A) (2) Pressure Class Pipe

Replace with the following:

Two-inch (2 inch) PVC pipe shall be manufactured using Grade 1 PVC compound material as defined in ASTM D-1784 and shall be SDR-21, pressure class 200 in accordance with ASTM D 2241. Fittings for 2 inch PVC pipe shall be solvent weld Schedule 80 PVC. Brass FIP x pack joint for PVC fittings shall be used to transition from PVC to brass. The pipe shall be plainly marked with the manufacturer's name, size, material (PVC) type and grade or compound, NSF seal, pressure rating and reference to appropriate product standards. All PVC pipe (4 to 12 inch diameter) shall be manufactured using virgin compounds as defined in ASTM D-1784, with a 4000 psi HDB rating and designated as PVC 1120 to be in strict accordance with AWWA C900. The pipe shall be Class 150 and conform to the thickness requirements of DR18. The pipe shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM D-1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D-1598. The pipe joints shall be of the integral bell type with rubber gaskets and shall conform to the requirements of ASTM D 3139 or ASTM F-477.

Mechanical restraining systems (i.e., mega-lug, grip-ring) shall not be used on PVC pipe.

Fittings and specials shall be ductile iron, bell end in accordance with AWWA C110, 200 psi pressure rating unless otherwise shown or specified. Ductile iron fittings and specials shall be cement mortar lined (standard thickness) in accordance with ANSI A21.4.

PVC fittings are not acceptable for water mains 4 inches or greater. Fittings and specials shall be mechanical joint ductile iron, bell end in accordance with AWWA C-110, 150 psi pressure rating unless otherwise shown or specified.

Ductile iron fittings shall be cement mortar lined (standard thickness) and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4. All fittings shall have an outside asphaltic coating as specified in AWWA Standard C-151 and C-110, respectively.

All fittings shall be adequately supported on a firm trench foundation.

Page 10-66, Sub-article 1036-3 (B) Polyethylene Pipe (PE)

Add the following:

The diameter and wall thickness of all high-density polyethylene (HDPE) pipes and fittings shall comply with the appropriate ASTM Specification and the class of pipe designated on the Drawings. HDPE pipe shall not be used.

High Density Polyethylene (HDPE) pipe and fittings shall meet the requirements of ASTM F714 and AWWA C906.

HDPE must meet the following minimum Dimension Ratio:

Diameter (inch)	Min Dimension Ratio
4-12 inches	DR13.5
12-48 inches	DR11

The pipes have nominal dimensions shown on Drawings and conform to dimension requirements of the Ductile Iron Pipe Size (DIPS) Sizing System. The diameter of HDPE shall be such that the inside diameter is at least the size called out on the plans.

Polyethylene pipes to meet requirements of ASTM F714 and AWWA C906.

Pipe to be furnished in standard laying lengths not exceeding 50 feet.

Page 10-67 ARTICLE 1036-4 STEEL PIPE

Add the following sentence:

Steel pipe shall not be used.

Page 10-67 ARTICLE 1036-5 DUCTILE IRON PIPE AND FITTINGS

Replace with the following Sub-Articles:

Page 10-67, Sub-article 1036-5 (A) Pressure Class Pipe

All ductile iron pipes shall be 4 inches and larger. All ductile iron pipes shall be designated as "Pressure Class," unless otherwise specified. The pipe furnished shall have a minimum thickness calculated in accordance with ANSI A21.50 (AWWA C150), with a factor of safety of two (2); a working pressure of 150 psi to 350 psi, plus 100 psi water hammer allowance; and AASHTO H-20 live truck load with 2.5 feet of cover. In no case shall "Pressure Class" pipe's nominal thickness be less than the following:

SIZE (In.)	**PRESSURE CLASS**	**NOMINAL THICKNESS (In.)**
4	**350**	**0.25**
6	**350**	**0.25**
8	**350**	**0.25**

SIZE (In.)	PRESSURE CLASS	NOMINAL THICKNESS (In.)
10	**350**	**0.26**
12	**350**	**0.28**
16	**250**	**0.30**
24	**250**	**0.37**

Page 10-66 Sub-Article 1036-5 (B) Thickness Class Pipe

For aerial crossings and other specific situations designated within these specifications, or were indicated on the drawings, the ductile iron pipe shall be Thickness Class. The minimum thickness class for 4 inch water mains shall be Class 51. The minimum thickness class for pipe diameters 6 inches and larger shall be Class 50. All thickness class pipe shall be in accordance with ANSI A21.51 and AWWA C151, with a minimum working pressure of 200 psi.

Flanges shall be designed for each application specifically. The flange pipe shall be in accordance with ANSI/AWWA C115/A21.15. Threads for threaded flange pipe shall be in accordance with ANSI B2.1, shop fabricated as outlined by AWWA C115 with serrated faces furnished on the pipe, completely factory installed. Welding of flanges to the body of the pipe will not be acceptable.

Ductile iron fittings and flanges shall be in accordance with ANSI/AWWA C110/A21.10 with a minimum working pressure of 250 psi. Flange joint gaskets shall be full faced SBR rubber per ANSI/AWWA C111/A21.11 with a minimum 1/8 inch thickness.

Page 10-66 Sub-Article 1036-5 (C) Joint Types

Pipe Joints (4 x 12 inches) shall be mechanical joint, push on joint, or factory restrained joint, unless otherwise indicated, conforming to AWWA C600 and AWWA C111.

Fitting joints shall be mechanical joint, push on joint without factory restraints. Restraints to be provided by external harnesses or thrust blocks.

Mechanical joints shall be of the stuffing box type and shall conform to ANSI A21.11 for 4 inch pipe through 12 inch pipe. Push on joints, rubber gaskets, and lubricant shall conform to ANSI A21.11.

Factory restrained joint pipe (No fittings) shall be utilized for all pipes 4 to 12 inches in diameter. Factory restrained joint pipe shall be furnished for the locations shown on the approved Contract Drawings. The pipe, joints, and gaskets shall be in accordance with applicable ANSI/AWWA Standards as specified for ductile iron pipe. Factory restrained joints shall be rated for a working pressure of 350 psi for sizes up to 12 inches.

All factory restrained joint pipe shall have the restraints internal to the pipe (i.e., “boltless”). All restrained joint ductile iron pipe up to 12 inches shall be as manufactured by U.S. Pipe’s TR-Flex, HDSS Pipe Griffin Pipe Products SNAP-LOK, American Cast Iron Pipe Company's Flex-Ring Joint, or approved equal. The method of restraining the valves to the factory restrained ductile iron pipe shall be reviewed on a case-by-case basis. The valves shall have the same working pressure as the pipe.

Page 10-66 Sub-Article 1036-5 (D) Fittings

Fittings and specials shall be mechanical joint ductile iron and shall be manufactured in accordance with AWWA C110 (ANSI A21.11). Compact fittings shall be mechanically restrained, ductile iron in accordance with AWWA C153 (ANSI A21.53) for 4 to 12 inch sizes only. Where thrust blocking is used, fittings shall be full body mechanical joint ductile iron in accordance with ANSI A21.53 (AWWA C110). Pressure rating shall be not less than 200 psi.

Tangential welded on outlets (i.e., bosses) shall only be utilized on pipe 24 inches and larger. All bosses shall be factory welded; field fabrication is not allowed. The pipe shall be in accordance with these specifications. Bosses shall be of the size and location indicated on the approved drawings.

The DI/HDPE mechanical joint adaptor shall consist of a molded or fabricated HDPE mechanical joint transition fitting, rubber gasket, a mechanical joint backup drive ring and mechanical joint tee bolts. Pipe stiffeners shall be employed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless-steel, with a wedged style design to fit the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE.

Page 10-66, Sub-Article 1036-5 (E) Linings and Coatings

All ductile iron pipe fittings and specials shall be lined with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI A21.4 (AWWA C104). Pipe and fittings shall have an outside asphaltic coating as specified in AWWA C151 and C110, respectively. The coating shall be strongly adherent to the pipe at all temperatures.

Page 10-66, Sub-Article 1036-5 (F) Quality Assurance

Each joint of pipe and each fitting shall be inspected by an independent domestic testing laboratory, and certification shall be supplied that all pipe and fittings meet project specifications. In addition, upon request, the Contractor shall furnish a six (6) inch test section from each lot of water pipe as per AWWA C104 to be used for additional test of the pipelining by PWC. Satisfactory results of this test must be obtained before acceptance of the pipe.

Page 10-67, ARTICLE 1036-6 FIRE HYDRANTS

Replace with the following:

All fire hydrants shall be dry barrel, traffic type and conform to the latest revision of AWWA C502. All working parts shall be bronzed. The size of the fire hydrants (designated by the nominal diameter of the valve opening) shall not be less than 4 1/2 inches. All hydrants shall be able to deliver 1,000 gallons per minute with a friction loss of not more than 5 pounds per square inch total head loss through the hydrant. Hydrants shall be of compression type (opening shall be of such design that when the barrel is broken off the hydrant valve will remain closed and reasonably tight against leakage). All hydrants shall be mechanical joint to accommodate the spigot end 6 inch Class 350, AWWA Standard, ductile iron pipe. Six (6)-inch bosses may be substituted for tees in pipe sizes exceeding 24 inches in diameter. The boss shall be welded to the bottom of the main to provide effective flushing of the system.

All hydrants shall be furnished with two 2 ½ inches nozzles and one 4 1/2-inch pumper nozzle. Outlets shall have American National Standard fire hose coupling thread, in accordance with the City of Fayetteville standard, and shall be provided with nozzle caps securely chained to the body of the hydrant. The base of the hydrant shall have 2 cast lugs suitable for use in strapping the hydrant to the connecting pipe. The operating nut shall be pentagonal in shape, finished with a slight taper to 1 1/2 inches from point to flat. All hydrants shall open left or counterclockwise. Hydrants shall be suitable for a working pressure of 150 pounds per square inch and test pressure of twice the working pressure. Fire hydrants shall be specific models manufactured by Mueller Company (Model Centurion 200), Clow Corporation (Medallion), American Darling (Model Mark 73-1) or approved equal. The interior of the hydrant shoe shall be coated with a 4-mil-thickness FDA approved epoxy coating. Paint hydrants with one coat of primer paint and two coats of an approved paint. Apply the final coat after hydrant installation. The bonnet of the fire hydrant shall be painted a dark green. The remainder of the fire hydrant shall be painted safety yellow the bonnet of the fire hydrant shall be painted a dark green

Page 10-67, ARTICLE 1036-7 WATER VALVES

Page 10-67, Sub-article 1036-7 (A) Gate Valves

Replace with the following:

All manually operated valves 4 inches and larger shall be ductile-iron body resilient wedge type gate valves conforming to ANSI/AWWA C509 for resilient seat-type valves or to ANSI/AWWA C515 for reduced-wall, resilient seat gate valves. Valve connections shall be as required for the piping in which they are installed and shall conform to ANSI/AWWA C111/A21.11. Gate valves shall have a design working water pressure of 250 psi.

All valves up to and including 36 inch diameter shall have triple "O" ring stem seals**.** The design and machining of valves shall be such as to permit the replacement of the upper two (2) "O" rings without undue leakage while the valve is wide open and in service**.** The wedge shall be ductile iron encapsulated in nitrile rubber (4 to 12 inches) sizes and SBR rubber (14 to 24 inches) sizes**.** All internal and external surfaces of the valve body and bonnet shall have a fusion bonded epoxy coating complying with ANSI/AWWA C550 applied electrostatically prior to assembly, conforming to AWWA C550-90**.** Valves shall have a clear waterway equal to the full nominal diameter of the valve**.** All valves shall be tested for leakage and distortion in strict accordance with the latest revision of ANSI/AWWA C500.

For buried service, gate valves shall have non-rising stems, two (2) inch square operating nuts and shall open by turning counterclockwise. The operating nut shall have an arrow cut in the metal, indicating the direction of opening.

Gate valves installed in meter vaults shall have a wheel in lieu of a square operating nut and shall also have a non-rising stem. The valves shall also open by turning counterclockwise. The wheel shall have an arrow cut in the metal indicating the direction of opening. Flanges shall not be buried. An approved vault shall be provided for all flange connections.

All valves shall be manufactured in strict accordance with the latest specifications of ANSI/AWWA standards. Valves shall be manufactured by: Mueller Company, Clow Corporation, or American Darling Company. Certification shall be furnished with the materials submittals by the manufacturer that all valves are in accordance with these specifications.

Where specified on the plans, resilient valves shall be supplied with gearing. Spur gearing for valves installed in a vertical position and bevel gearing for valves installed in a horizontal position. In cases where valve locations on plans do not designate valve gearing and the proposed depth of water main is not adequate to achieve normal depth above valve bonnet of at least two (2) feet in cover, provide bevel gearing for all large diameter valves (16 inches and larger).

Page 10-67, Sub-article 1036-7 (B) Bronze Gate Valves

Replace with the following:

Bronze gate valves shall not be used. All valves smaller than four (4) inches shall be ball valves.

Page 10-67, Sub-article 1036-7 (C) Tapping Valves

Replace with the following:

Use tapping valves conforming to Sub-article 1036-7(A) with appropriately sized openings, with flanged by mechanical joint ends and pressure rated at 250 psi.

Resilient seated tapping valves shall be furnished with the tapping flange having a raised face or lip designed to engage the corresponding recess in the tapping sleeve flange in accordance with MSS-SP60. Tapping valves without the raised face on the tapping flange are not permitted. The interior of the waterway in the body shall be a full opening and capable of passing a full-sized shell cutter equal to the nominal diameter of the valve.

Page 10-68, Add Sub-article 1036-7 (F) Ball Valves

Add the following provisions:

For all valves smaller than 4 inches, ball valves shall be used. Ball valves shall be installed in accordance with these provisions.

Ball valves shall be all bronze construction, with tee head operator and having a removable disc. Ball valves shall have threaded connections, in accordance with the standard details. Ball valves

shall be manufactured and tested in accordance with ANSI/AWWA C800**.** The valve shall be equipped with packing nuts, gland, and packing material**.** Ball valves shall be of an approved type made from approved materials conforming to ASTM Specifications**.** The turn required to travel from fully closed to fully open on the ball valve shall be 90 degrees.

Page 10-68, ARTICLE 1036-8 SLEEVES, COUPLINGS AND MISCELLANEOUS

Page 10-68, Sub-article 1036-8 (A) Tapping Sleeves

Add the following provisions:

Water tapping sleeves shall be ductile iron mechanical joint or stainless-steel full gasket and have a minimum working pressure of 150 psi for all tapping of mains up to and including 24 inch diameter with a branch less than or equal to 12 inch diameter. Branch diameter greater than 12 inch on 16 inch diameter pipe and larger shall require full body ductile-iron mechanical joint tapping sleeve. Sleeves shall be able to meet the test pressure of 200 psi.

Ductile iron mechanical joint tapping sleeves shall be as manufactured by Clow, M&H, Mueller, American, or an approved equal and shall be furnished with complete joint accessories**.** The mechanical joint sleeve shall be compatible with the type and class of pipe being tapped. The outlet flange shall be class 125 per ANSI B16.1 compatible with approved tapping valves. The sleeve shall have a mechanical joint body with end glands and gaskets. The sleeve shall include a 3/4 NPT test plug.

Stainless-steel tapping sleeves shall be furnished with all accessories. The sleeve, lugs, bolts, and nuts shall be 18-8 type 304 stainless-steel, as provided by the manufacturer. The outlet flange shall be ductile iron or stainless-steel. The sleeve gasket shall be a grid pattern design and shall provide full circumferential sealing around pipe to be tapped**.** The sleeve shall include a 3/4 NPT test plug**.** All welds shall be passivated**.** The outlet flange shall be class case D per AWWA C207-ANSI 150 lb. drilling compatible with approved tapping sleeves.

All tapping sleeves shall be hydrostatically pressure tested prior to the tap being accomplished. Use of air to complete the pressure test is not acceptable. The tapping sleeve shall be tested to 200 psi. The PWC project coordinator shall witness and approve the testing.

Page 10-68, Sub-article 1036-8 (B) Transition Sleeves and Couplings

Add the following material to this sub-article:

Use mechanical joint full body solid sleeves conforming to MJ fittings of this special provision of 1036-5. Sleeves shall be rated for 250 psi working pressure. Sleeves used for water main repairs and/or field adjustments or corrective measures will not be permitted.

Page 10-68, Sub-article 1036-8 (C) Sampling Stations

Add the following provisions:

Above ground sampling stations shall be provided at locations shown on the construction drawings and be NSF 61 certified. Stations shall contain a stainless-steel standpipe with 1 inch fittings and connections with a ¾ inch reducer. All stations shall be enclosed in a lockable, powder-coated nonremovable, aluminum-cast housing and have freeze protection with either internal evacuation rods or manual evacuation pump. Use Kupferle Eclipse #88-SS or approved equal.

Page 10-68, ARTICLE 1036-9 SERVICE LINE VALVES AND FITTINGS

Add the following provisions to the second paragraph:

All water service saddles for use on 2 inch PVC shall be 1 inch brass saddles as manufactured by Ford, McDonald, Mueller or approved equal.

Water service saddles for 1 inch and 2 inch taps on 4 inch, 6 inch, 8 inch, 12 inch and larger size PVC and asbestos-cement (AC) and 4 inch and larger size iron pipe shall be ductile iron with stainless-steel strap(s), bolts, nuts, and washers. Ford Models FS 101, FS 202; Romac Models 101S, 202S; Smith-Blair Model 315, 317 or approved equal shall be used. Stainless-steel straps must be pre-formed at the factory to the specified outside diameters of the pipe.

Water service saddles with a 2 inch outlet shall be double strap.

Water service saddles for pipe sizes 12 to 24 inches shall be double strap.

Add the following provisions to the third paragraph:

Use cast brass compression type fittings manufactured for use with copper or PE water pipe, as applicable, and conforming to AWWA C800. All brass fittings shall have a 300-psi minimum pressure rating.

The Contractor shall be responsible for connecting the new tailpiece to the customer's existing service utilizing brass fittings**.** The Contractor is responsible for all necessary fittings in order to connect the copper tubing to the existing meter**.**

The existing meter boxes shall be replaced as part of the renewal of the water services**.** A composite, HS-20 rated meter box shall be used if the meter is to be in or adjacent to asphalt or concrete pavements, or where vehicles may receive incidental HS-20 traffic. The Contractor shall be responsible for furnishing and installing the meter boxes**.**

Page 10-68, ADD ARTICLE 1036-10 IDENTIFICATION OF PLASTIC OR NON-METALLIC PIPES

For the purpose of locating plastic or non-metallic pipes~~,~~ a continuous "detectable" tracer wire shall be installed. The wire shall be a minimum 12-gauge, single strand, coated copper, suitable for underground use. Splices shall be accomplished utilizing a corrosion proof wire connector. The connectors shall "lock" the wires in place and contain a dielectric sealant to prevent corrosion.

The connector shall be "Snake Bite" connector manufactured by Copperhead Industries, LLC, or approved equal. The wire shall be buried continuously along the pipe. The wire shall be "stubbed"

into the valve boxes and secured. Bolts shall be used to secure the detectable wire, and the attachment location shall be readily available from finished grade without special equipment. The wire shall be installed with all non-metallic pipelines.

Page 10-68, ADD ARTICLE 1036-11 VALVES BOX

Valve boxes shall be "slip-type" made of close-grained, gray cast iron metal painted with a protective asphaltic coating. Construction shall be in three pieces as follows: The lower of base pieces, which shall be flanged at the bottom, the upper part which shall be flanged on the lower end, and of such size as to telescope over the lower part, the upper end being constructed in the form of a socket to receive the cap or cover; and the cover or cap shall have cast on the upper surface, in raised letters, the word "WATER". All valve boxes shall be equal in quality and workmanship to those manufactured by Sigma Corporation (VB-462), Tyler Union (6855 Series), Star Pipe Products (VB-0004), or an approved equal. Valve box shall have a 3/8 inch hole drilled in the upper part 4 to 6 inches from the top of the box to accommodate a ¼ x 1 1/2 inch galvanized bolt for securing tracer wire.

Valve box protector rings shall be installed to protect valve boxes located outside pavements (i.e., roadway shoulders).

DIVISION 15-UTILITY CONSTRUCTION

SECTION 1500-GENERAL UTILITY REQUIREMENTS

Page 25-1 ARTICLE 1500-2 COOPERATION WITH THE UTILITY OWNER

Page 15-1, Sub-article 1500-2 Cooperation with Utility Owner

After Line 24, Add the following:
Fire hydrant accessibility:

Existing fire hydrants shall be accessible to the Fire Department at all times. Fire hydrants shall not be taken out of service without PWC's written approval. The Fire Department shall be notified of any fire hydrant taken out of service.

If the fire hydrants need replacement, relocation, or connected to a new water main, the PWC and the appropriate Fire Department shall be notified and coordinated with prior to commencing work. Fire hydrants shall not be removed from service without prior approval of the PWC. The existing fire hydrants shall be returned to PWC. Fire hydrants not in service shall be covered with burlap bags, whether existing or new.
The Contractor shall notify PWC and the applicable Fire Department of when and what area they will be working. The Contractor shall notify PWC and the Fire Department a minimum of 48 hours prior to commencing work. The Contractor shall coordinate with PWC and the appropriate Fire Department regarding the placement of temporary fire hydrants.

Page 15-1, ARTICLE 1500-3 UTILITY LOCATIONS AND CONTRACTOR'S RESPONSIBILITY

PWC Sewer Work:

(1) Manholes located outside of pavement must have a PWC issued marker.
(2) All manholes having cam-lock ring and covers shall be locked.
(3) Install a PWC issued marker at all valve and combination air valves at manholes outside of pavement as directed by PWC.
(4) Verify all plugs have been removed from the sanitary sewer system.

Water Work:

(1) Verify all valves are fully open.
(2) Verify all valves are accessible and can be operated.

Page 15-1, ARTICLE 1500-5 RELATION OF WATER MAINS TO NON-POTABLE WATER LINES AND OTHER UTILITIES

Add the following paragraph:

Relation of water mains to sewers shall also apply to all sewer lateral crossings (4 inches and 6 inches).

Page 15-1, Add Sub-article 1500-5 (A) Crossing Existing or Proposed Utilities

The Contractor shall conduct their operations so that the following requirements are adhered to:

(1) Underground telephone, cable TV, and gas utilities or conduit banks shall be crossed maintaining a minimum of 12 inches of separation or clearance.

(2) Electrical crossings shall be performed while the conductor is de-energized and at all times in the presence of PWC. Electrical crossings shall be in accordance with NESC requirements. Electrical primary conductor crossings shall be as follows:

a. Crossing over a conductor, maintain a minimum of 12 inches of undisturbed soil encasing the conductor.

b. Crossing under a conductor shall be accomplished by boring, maintaining 12 inches of undisturbed soil encasing the conductor.

Page 15-2, ARTICLE 1500-7 SUBMITTALS AND RECORDS

Revise the third sentence of the first paragraph to read:

Add the following sentences after line 30:

The Contractor shall not perform any portion of the utility work requiring submittal and review until the respective submittal has been reviewed.

The Contractor shall provide submittals on the following:
(1) A sample door hanger, notifying the residents of the project and those times that the resident may not have water service.
(2) Identification of the proposed project superintendent and representative authorized to act on behalf of the Contractor.
(3) Proposed project schedule. The schedule shall include the sequencing and coordination of connections to existing water mains, pipeline inspections, trenchless crossings, temporary water main set up and removal, sewer bypass pumping set up and tear down, and final restoration.
(4) All piping, fittings and structures including that to furnish temporary water during extended service interruptions.
(5) Sewer bypass pumping-as outlined in these Special Provisions.
(6) Contractor personnel emergency contact information.
(7) All piping fittings and structures for use with all new installations.

Upon completion of the Work, the Contractor shall provide two complete sets of drawings recording all changes to the work to indicate actual installation. The plans shall include coordinates

of utility controls and horizontal and vertical locations of the piping sealed by a North Carolina Professional Land Surveyor (PLS). Changes shall be noted in legible red letters. These changes shall include but are not limited to the following:

(1) Change in lateral location
(2) Change in pipe material (including actual limits of pipe restraints)
(3) Change in manhole location
(4) Location of ductile iron installed on existing AC water mains
(5) Size, depth, and installed elevations of mains, laterals, force mains, and manholes
(6) Location of valves, blow-offs, and other appurtenances

As-built plans provided as PDF formatted files shall be generated from the source electronic files, not scanned facsimiles of paper plan sheets. Provide record drawing as-builts as PDF files and AutoCAD (.dwg) files, version 2018 or later format to the Engineer and utility owner.

Page 15-2, ARTICLE 1500-8 LOCATING AND MARKING

Add the following requirements:

For identification of plastic water services, the tracer wire shall be buried continuously along the water service lateral from the main to the meter box. The wire shall extend a minimum of 12 inches into the meter boxes.

For identification of plastic or non-metallic pipes, a tracer of the wire shall be buried continuously along the pipe. The wire shall be "stubbed" into valve boxes and secured such that a direct/conductive metal detector may be used to trace the pipe location. Bolts shall be used to secure the detectable wire, and the attachment location shall be readily available from finished grade without special equipment. The wire shall be installed above with all non-metallic pipelines.

Page 15-2, ARTICLE 1500-9 PLACING PIPELINES INTO SERVICE

Replace last two sentences with the following:

Obtain approval from PWC prior to placing a new water line into service. Use backflow prevention assemblies for temporary connections to isolate new water lines from existing water lines. A representative from PWC shall witness all tests performed on their water facilities.

Add the following:

Prior to final inspection, all sanitary sewer laterals, mains, and manholes newly installed on the collection system shall be flushed and cleaned. During the flushing operation, the downstream manhole shall be closed with a watertight plug to protect the existing sewer main. All water and debris shall be removed and properly disposed of by the Contractor. This condition shall be maintained until PWC issues acceptance of the work.

(1) Planned service interruptions on PWC-owned lines:

Coordination of temporary interruptions to water and/or sewer services shall be the responsibility of the Contractor. The Contractor shall schedule a coordination meeting with the Department and the PWC Project Coordinator a minimum of three (3) business days prior to any planned service interruption and prior to any notices being issued. The purpose of this coordination meeting is to ensure that the Contractor has a good understanding of the requirements related to the proposed outage, verify that there are no utility conflicts, discuss any necessary contingency plans, and all equipment, materials, tools, and all other incidentals necessary to complete the work are on the project site in good working order. Should, for any reason, the Department and/or PWC deem that the Contractor is not prepared for the proposed outage, the outage notifications will not be distributed, and the outage shall be postponed a minimum of two (2) weeks. The Department will provide written notification to the Contractor of this decision. No additional contract time will be granted for this delay.

The duration of the service interruption shall be coordinated with the Department and PWC. Service interruptions to residents shall be limited to no more than eight (8) hours at any given time. If the service interruption is anticipated to exceed eight (8) hours, temporary service shall be provided. The Contractor shall provide all the necessary equipment and materials for temporary service. The notifications shall describe the work to be undertaken and approximate dates of the work. The text of the notifications shall be approved by the Department and PWC in advance. The Contractor shall furnish a copy of the notification to the PWC Project Coordinator each time such notification is issued to the residents.

Whenever the property owner's use of the water and/or sanitary sewer must be interrupted by the Work, the Contractor shall notify the residents a minimum of 48 hours prior to service interruption. This notification shall be accomplished with door hanger notification cards placed at the addresses of the affected residents. Property owners shall be informed when service interruption takes place and the expected duration. The Contractor shall make every effort to minimize inconvenience to the public and property owners.

The Contractor shall complete the required work and restore water service within the given time period for the outage. PWC reserves the right to cancel or postpone the outage at any time, for any reason.

(1) **Furnishing pressurized, temporary water service:**

Provide and maintain pressurized, temporary water supply to all services connected to water mains that must be depressurized and/or interrupted for any reason related to the Work including cut in construction and ties in. The only exception to this requirement is the performance of emergency repair and if the planned interruption of service is expected to last less than eight (8) consecutive hours. Provide temporary water supply if the interruption extends past eight (8) consecutive hours.

Maintain and operate temporary water supply until completion of required disinfection and flushing procedures and, receipt of confirmation of acceptable bacteriological test results for the section of water main that was interrupted.

The Contractor shall submit a detailed temporary water layout plan prior to the planned outage. The Contractor will be responsible for furnishing, installing, maintaining, and removing all temporary water lines during the course of the work.

The temporary lines shall be leak free and installed in a neat and orderly fashion. The Contractor shall be responsible for protection of the temporary line and shall provide the personnel necessary to immediately respond to all water line breaks, leaks, and outages associated with the project. A 24-hour "hotline" shall be established for PWC to call when a problem arises with the temporary water system. Any leaks on the temporary water service lines shall be repaired immediately. The Contractor shall also take all necessary precautions to protect the temporary water system from freezing and shall include freezing protection procedures in the temporary water layout plan.

The Contractor shall connect the temporary water system directly to the customer's meter, utilizing approved fittings. This may necessitate the meter being placed outside of the meter box. During weather that may result in the meter and/or temporary service lines freezing, the Contractor shall take all reasonable precautions. to prevent the meter and/or temporary bypass lines from freezing.

Fire protection must be maintained at all times during construction. Temporary fire hydrants must meet the approval of the applicable Fire Department, prior to their use.

Prior to installing any temporary service lines, the Contractor shall verify the need for such lines, especially on streets with multiple water mains. Any costs incurred by installing temporary water lines that are not needed shall be at the Contractor's expense.

Backflow prevention measures will be required when the temporary water system is serving any commercial businesses. Backflow prevention measures will not be necessary when the temporary water system is only serving residential homes. Where backflow prevention is required, a reduced pressure device shall be utilized in accordance with PWC's Cross-Connection Control Ordinance. The Contractor shall call PWC's Environmental System Protection Department (910-223-4699) for additional information and requirements and shall notify the PWC Project Manager and Project Coordinator of all information.

Restrained joint PVC piping will be allowed if properly placed so as to prevent its damage by traffic. All temporary service pipe crossing streets and/or commercial driveways must cross in a fashion that will not create a traffic hazard. Boring or punching may be required when crossing streets with high traffic volume or higher speeds. Temporary piping crossing sidewalks or wheelchair access ramps must be ramped or buried. Any temporary water lines crossing a driveway shall be covered with a rubber ramp or bituminous cold patch provided by the Contractor. When temporary paving is used to ramp temporary services lines, it must be compacted by a roller or compaction device to minimize tracking. The Contractor is to maintain ramps and patches to ensure access by public. Piping must be buried when so directed by the Department**.** All temporary water piping connected to fire hydrants shall be constructed in such a manner that, if necessary, it can be easily removed so the fire hydrant can be used for firefighting purposes with minimal effort. All such connections to the fire hydrants must be compatible with applicable Fire Department requirements for each fire hydrant outlet used. Where fire hydrants cannot be used or are not available, the Contractor shall make below ground taps for bypass connections.

Direct connections to the existing water system will not be allowed until disinfection is complete and each section of temporary line, including service lines, has passed bacteriological and turbidity testing. All dead-end temporary service lines shall be equipped with a temporary blow-off.

Temporary service lines longer than 750 linear feet must have a supply at each end. Temporary service lines must have a main line shut off valve at least every 500 feet. Fire protection must be maintained at all times during construction.

Upon activation of the newly relocated or installed pipe, the Contractor shall remove all temporary service lines and shall leave all streets, sidewalks, and adjacent properties in a condition of equal or better than original. Prior to installing the meter and connecting the customer to the new main, the existing service line shall be thoroughly flushed to remove any deposits collected during the work.

The pipe, hoses, and other materials which are to be furnished by the Contractor for use as temporary service pipe shall be clean, watertight, and fully adequate to withstand the existing pressure and all other conditions of use. Care shall be exercised throughout the installation of all temporary pipe and service fittings to avoid any possible contamination of any mains or services.

All piping utilized in the temporary water system shall be NSF Standard 61 certified for use in potable water applications or FDA CFR 177.2600 approved, for use in contact with food articles, if such use is approved by NCDEQ. The Contractor may utilize PVC pipe only if the pipe is equipped with restrained joints.

(3) Testing and Disinfection

The Contractor shall coordinate and fully cooperate with PWC when scheduling testing. The Contractor shall provide a minimum of two (2) business days' notice when scheduling testing with PWC. All testing shall be in accordance with these special provisions.

All temporary water piping, newly lined mains, and newly installed mains shall be flushed and disinfected prior to placing into service. For water samples on PWC's- owned water mains, the PWC Project Coordinator shall take the appropriate sample(s) to the PWC lab for analysis. Upon successful completion of the disinfection process, the water lines can be placed into service. Disinfection shall be in accordance with these Special Provisions. All water samples from PWC's owned mains shall be taken to the PWC Lab by the PWC Project Coordinator.

The Contractor shall provide all equipment, materials, personnel, traffic control and all means necessary to perform all testing and inspection at no additional cost to the Department. If the same line segment fails the required testing more than two (2) times, PWC will charge a fee of $100.00 per test, beginning with the third attempt, until a passing test is achieved.

All environmental regulations governing the release and/or disposal of chlorinated testing water shall be met by the Contractor. AWWA C655 defines "highly chlorinated" water as water having more than 4 ppm. Any water with a chlorine level greater than 4 ppm shall be de-chlorinated by the Contractor prior to being released to the environment.

The disinfection chlorine level will be checked by the PWC Project Coordinator for a minimum of 24 hours. after the initial disinfection. If the chlorine level is found to be acceptable at that time, the Contractor will be required to flush and remove the disinfection chlorine from the main to allow for sample collection. Should the chlorine level be found unacceptable, the disinfection

process shall be repeated. The cost of the system disinfection and disposal of the chlorinated water shall be included in the appropriate measurement and payment item.

SECTION 1505-EXCAVATION, TRENCHING, PIPE LAYING AND BACKFILLING FOR UTILITIES

Page 15-4, ARTICLE 1505-3 CONSTRUCTION METHODS

Page 15-4, Sub-article 1505-3 (C) Bedding

Add the following paragraph:

Gravity Flow Sewer Pipe:

The bottom of the trench shall be excavated to a minimum of four (4) inches below the outside bottom of the pipe being installed to allow adequate placement and compaction of bedding material prior to installation.

Crushed stone bedding material shall be placed a minimum of four (4) inches deep and a maximum of six (6) inches deep under the pipe for full width of the trench and halfway up the pipe on the sides. Bedding material shall be placed in layers not exceeding 6 inch loose thickness for compacting by vibratory mechanical tamps under the haunches and concurrently on each side of the pipe for the full width of the trench. The final result shall be "Class B" bedding for rigid pipe. If the existing material under the pipe bedding material is unsuitable, the unsuitable material shall be removed and replaced with stone bedding material (No. 57 or No. 5 stone).

Page 15-4, Sub-article 1505-3 (D) Pipe Laying

Add the following paragraphs:

All pipes and fittings shall be carefully lowered into the trench in such a manner to prevent damage to the protective coatings and linings. Under no circumstances shall pipe materials be dropped or dumped into the trench. Pipe shall be carried into position and not dragged.

All dust, dirt, oil, tar (other than standard coating), or other foreign matter shall be cleaned from the jointing surfaces, and the gasket, bell, and spigot shall be lubricated with lubricant recommended by the manufacturer**.**

All pipes shall be installed in accordance with the approved plans and cut sheets**.**

For water pipe and sewer force main pipes sizes up to 12 inches, mechanical equipment shall not be used to assemble the pipe. For water pipe and sewer force main pipes sizes over 12 inches, mechanical equipment may be used, in accordance with the pipe manufacturer’s instructions.

Gravity flow sewer pipe shall be laid upgraded, beginning at the lower end with the tongue or spigot ends pointing in the direction of the flow to the correct line and grade, unless otherwise approved by PWC. The sewer pipe section to be installed shall be aligned by batter board or laser

beam with the last installed pipe section. Mechanical equipment should not be used to assemble the pipe. Pipe shall be assembled in accordance with the pipe manufacturer's instructions. Any damage resulting from the use of mechanical equipment shall be replaced as directed by the Department

Adjustments in grade by exerting force on the barrel of the pipe with excavating equipment will not be allowed. The Contractor shall verify line and grade after assembling each joint.

No pipe shall be laid in water or where trench conditions are unsuitable. Every precaution shall be taken to prevent material from entering the pipe while it is being installed.

Page 15-4, Sub-article 1505-3 (E) Thrust Restraint third paragraph

Replace third paragraph with the following:

At locations where restrained joints are shown on the plans, use ductile iron pipe and fittings with push-on factory restrained joints. The pipe, joints, and gaskets shall be in accordance with ANSI/AWWA Standards as previously specified for ductile iron pipe in Sub-article 1036-5, Restrained joints, fittings and valves shall be rated for a working pressure of 350 psi for sizes 4-through 24 inch and 250 psi for larger sizes. All factory restrained joint pipe, valves, and fittings shall have restraints internal to the pipe (i.e., "boltless"). The use of mechanical restraints is not allowed. All valves, pipes, and fittings shall be compatible with the factory restraint system. All push-on factory restrained joint ductile iron pipe, and fittings shall be as manufactured by U.S. Pipe's TR-Flex, Griffin Pipe Products SNAP-LOK, American Cast Iron Pipe Company's Flex-Ring Joint, or approved equal.

Special accessories such as mechanical joint retainer glands or field locking gaskets are acceptable on pipes 4 to 12 inch in diameter. Use concrete reaction blocking and thrust collars only where joint restraint is impractical.

Concrete thrust blocking shall be used on all PVC water mains unless shown otherwise on the plans. When thrust blocking is to be used, backfilling shall not occur until the concrete has time to set. No hydrostatic pressure testing shall occur until the concrete thrust blocking has cured for a minimum of five (5) calendar days.

Page 15-4, Sub-article 1505-3 (F) Backfilling

Add the following paragraph:
Compaction

Backfill shall be compacted in accordance with the following table as a percentage of the maximum density at optimum moisture content as determined by the Standard Proctor Test, ASTM D-698.

Area	Percent ASTM D-698 Area Maximum Dry Density
Around and 1' above top of pipe	95
Remaining trench (within 4' of subgrade)	95
Pavement subgrade and shoulders	
- Last 1' of fill (below subgrade)	100
- Last 3' of fill to 12" below subgrade	98
Base material	100
Adjacent to structures (Areas not paved)	95
Under structures	98
Utility Outfalls (Cross Country)	95

Page 15-5, ARTICLE 1505-5 CONCRETE ENCASEMENT OF UTILITY LINES

Replace with the following:

Water and/or sewer utility lines are not to be encased in concrete.

SECTION 1510-WATER LINES

Page 15-5, ARTICLE 1510-S2 MATERIALS

Page 15-5, Sub-article 1510-2 Materials

Add the following sentences to Paragraph 5:

Clay pipe, PE pipe, steel pipe and concrete pipe shall not be used for water pipe unless as described below. All water pipes shall be Ductile Iron or PVC with ductile iron fittings as specified herein unless otherwise indicated on the drawings.

For subsurface water crossings (i.e., streams, wetlands) via Horizontal Directional Drilling (HDD), Fused HDPE or FPVC shall be used.

Pipe Markings:

- Meet the minimum requirements of AWWA C906. Minimum pipe markings shall be as follows:
  - Manufacturer's name or trademark and production record.
  - Nominal pipe size.
  - DIPS.
  - Dimension Ratio.
  - AWWA C906.
  - Seal of testing agency that verified the suitability of the pipe.
  - Resin type (PE4710).

Color identification to identify pipe service is required:

- The pipe interior shall be gray for visual inspection.
- Permanent identification of piping shall be provided by co-extruding multiple equally spaced color stripes into the pipe outside surface or by solid colored pipe shell.
- The striping material shall be the same material as the pipe material except for the color.
- Plain black HDPE pipe without color code markings may not be used.

Only smooth wall HDPE will be permitted.

Joining system:

Pipe to be joined with butt, heat fusion joints. Joints to be made in strict compliance with manufacturer's recommendations and ASTM D2657. Where required, flange connections, mechanical joint connections and butt connections using bolted mechanical couplers to be provided from a pipe stub with a polyethylene and steel stiffener. Flanged connections to be provided from a pipe stub and a steel backup flanged. Back-up flanges to be primed and painted in a corrosion protected paint recommended and supplied by manufacturer. Bolts, nuts, and hardware to be Type 316 stainless steel.

Transition between ductile iron pipe and HDPE shall be accomplished using mechanical restraints.

Page 15-6 ARTICLE 1510-3 GENERAL

Page 15-6, Sub-article 1510-3 (A) General

In the sixth paragraph, replace the words “36 to 42 inches of cover” with “a minimum of 42 inches of cover:”

Add the following construction method where concrete thrust blocking is required:

When thrust blocking is to be used, backfilling shall not occur until the concrete has time to set. No hydrostatic pressure testing shall occur until the concrete thrust blocking has cured for a minimum of five (5) calendar days.

Add the following construction methods for service interruptions and cut ins:

(1) Coordinate all service interruptions with PWC and submit a shut down or service interruption work plan for review and approval by PWC a minimum of 30 calendar days prior to service interruption. Service interruption shall address all facets of the planned outage and how the Contractor will adhere to service interruption policies and critical items defined herein. PWC will schedule a test shut down to ensure existing valves are in proper working order. Where existing valves are determined to be non-functional or unable to isolate the work area, a field directive may will be issued to insert a valve or cut in a valve if allowed by PWC and if other existing valves will not accommodate a service interruption that does not disrupt significant number of customers. A cut in valve installation shall follow these same measures.

(2) Perform customer notification adhering to customer notification procedures as contained in these Special Provisions.

(3) Provide sufficient construction staff or crews, certified site superintendent present, pumps of sufficient size to quickly dewater and ensure all equipment is present and functional.

(4) Provide sufficient lighting for night operations.
(5) Provide dual purpose sleeves, retainers glands, fittings, etc. to complete the tie in expediently.
(6) Perform the following tasks in advance of the shutdown:
   a. Evaluate vertical depth of existing main and any conflicting utilities.
   b. Provide detailed layout plan with dimensions and fittings as part of the shutdown plan.
   c. Complete excavation to pipe.
   d. Preassemble fittings above ground when possible.
   e. Place crushed rock in excavation to provide footing and minimize contamination.
   f. Verify notification of customers has been completed.
   g. Perform the following tasks after shutdown:

      i. Relieve pressure off existing main through use of existing hydrants or blow-offs which are within the isolated part of the system

      ii. Cut pipe on bottom and sides in manner to dewater pipe quickly and to avoid water spray

      iii. Use cut out section for measurement when possible

      iv. Disinfect fittings and pipes with chlorine solution adhering to Cut in Construction requirements of AWWA C651-14, Section 4.11.

Page 15-6, Sub-article 1510-3 (B), Testing and Sterilization

Rename to 1510-3 (B) Testing and Disinfection and replace the third paragraph with:

Perform tests using clean water and provide certified results demonstrating no loss of pressure when pressurized at 200 psi (plus or minus five (5) psi) for two (2) hours.

In the fifth paragraph revise the flushing velocity from 2.5 feet per second to 3.0 feet per second.

Replace the sixth paragraph (beginning at line 39) with the following:

Disinfection shall be in accordance with the requirements of NCDEQ, the North Carolina Rules Governing Public Water Supply, AWWA C651, and AWWA C655 (most recent editions). The Contractor shall furnish all disinfection equipment, solution, materials, excavation, barricades, backfilling, and any taps and corporations necessary to complete the work. The Contractor shall fully cooperate with the PWC Project Coordinator, furnish any needed assistance, and schedule the testing.

Prior to performing the hydrostatic test, water mains, laterals, and appurtenances shall be flushed to remove air, sediment, contaminants, and/or foreign matter. After completion of a successful hydrostatic test, the water system shall be disinfected by the thorough dispersion of a chlorine solution. The chlorine level shall be between 50 parts per million (ppm) and 100 ppm throughout the water system. In no case shall the chlorine level exceed 300 ppm. If the chlorine level is over

300 ppm, the system shall be completely flushed and re-chlorinated. In no case shall chlorine be introduced into the water system in a dry solid state.

The chlorine solution shall remain in contact with the interior surfaces of the water system for a minimum period of 24 hours and shall result in not less than 10 ppm of chlorine throughout the system. Then the water system shall be flushed with water from the existing PWC water system until the chlorine solution is dispelled. The Contractor shall take all necessary measures to prevent downstream erosion caused by flushing the lines. All erosion/damage shall be repaired at no additional expense to the Public Works Commission. All environmental regulations governing the release and/or disposal of chlorinated testing water shall be met by the Contractor. AWWA C655 defines "highly chlorinated" water as water having more than four (4) ppm. Any water with a chlorine level greater than four (4) ppm shall be de-chlorinated by the Contractor prior to being released to the environment.

If any disruption to the disinfection process occurs, or if any repair procedure is necessary, then the disinfection process shall start over.

After disinfection, the water supply shall not be accepted or placed into service until bacteriological tests results or representative water samples analyzed in the Public Works Commission's laboratory are found to be satisfactory. The disinfection shall be repeated until tests indicate the absence of pollution for at least two (2) full days. The PWC Project Coordinator shall be responsible for collecting the sample(s) and transporting them to the PWC laboratory.

If the initial sample taken after disinfection and flushing does not indicate that the water main is sterilized, the Contractor shall, in conjunction with the PWC Project Coordinator, flush the lines. Once flushing is complete, another sample will be collected and taken to the Public Works Commission's laboratory for analysis. Should this second sample also fail to indicate that the main is sterilized; the Contractor shall repeat the disinfection process. This process shall be repeated until the samples are satisfactory. The Contractor shall fully cooperate with the PWC Project Coordinator, furnish any needed assistance, and schedule the testing.

Each valved section shall be tested individually. Where any section of a water line is installed with concrete thrust blocking for fittings or hydrants, the hydrostatic test shall not be made until at least five (5) days after installation of the blocking.

Each valved section of pipe shall be slowly filled with water and to the specified test pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to PWC. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow offs are not available at the high places, taps shall be made to provide blow offs.

Any taps which are not to be used in the final build out (i.e., testing and/or blow off taps) shall be killed out at the main. If these taps are converted to irrigation taps, they must be installed according to the drawings and be witnessed by PWC. PWC shall be present and observe all valve operation by the Contractor. Under no circumstances shall a Contractor tamper with any valves not installed by him unless it is an emergency.

Damaged or defective materials discovered as a result of the pressure test shall be removed and replaced with new material, and the test shall be repeated until the test results are satisfactory.

All repairs shall be reviewed and approved prior to backfill. The use of couplings, fittings, sleeves, etc. shall be reviewed and approved prior to use. The system must successfully pass the hydrostat**ic** test prior to disinfection.

Page 15-6, Add Sub-article 1510-3(C) Alignment and Grade

All pipes shall be installed to the required lines and grades. Structures shall be installed at the designed locations. The lines of the pipe will generally be indicated by stakes parallel to the line of the pipe. The Contractor shall be responsible for installing the pipe to proper line and grade.

If alignment requires deflection in excess of the specified limitations, bends shall be used. Joint deflection shall not exceed 80% of the limits recommended by the pipe manufacturer.

Page 15-6, Add Sub-article 1510-3(D) Piping and Fittings

All ductile iron pipes and fittings shall be installed in accordance with ANSI / AWWA C110 / A21.10. All C900 PVC pipes shall be installed in accordance with ASTM D-2321. The PVC pipe shall be installed in a manner that will ensure that external loads will not subsequently cause a decrease of more than five percent (5%) in the vertical cross section dimension (deflection). Whenever it is necessary to deflect pipe, the amount of deflection allowable shall not exceed seventy five percent of the maximum values represented in the AWWA standards and the manufacturer's recommendations.

When the pipe is field cut, the cut end shall be smooth and at right angles to the axis of the pipe. All sharp edges shall be removed. All field cut pipe shall be beveled. The beveled end of PVC pipe shall be removed, when installing into mechanical joint ductile iron fittings.

Pipe passing through the walls of meter vaults, valve pits, and storm drainage structures shall be restrained joint ductile iron

When connecting unlike (class, material, etc.) pipe, ~~an~~ a fitting shall be used. All pipes shall be installed in accordance with AWWA C600 for buried lines and the manufacturer's recommendations. For mechanical joint pipe and fittings, all nuts shall be tightened with a suitable (preferable torque-limiting) wrench. The torque for various sizes of bolts shall be in accordance with the manufacturer's instructions.

SECTION 1515-UTILITY CONTROLS

Page 15-7 ARTICLE 1515-2 MATERIALS

Add and/or revise the following:

Page 15-8, After Line 4-Add the following paragraphs:

Combination Air Release Vacuum Valves shall be of the single housing style that combines the operation features of both an air/vacuum and air release valve. All air and vacuum combination release valves shall be Crispin Model UX20, ARI D-020, H-Tec Model 986, or approved equal. All air release valves shall be installed in accordance with the manufacturer's recommendations.

The valve body, cover flange, and all internal parts shall be 316 stainless-steel or reinforced nylon with the only exception being the Buna-N Rubber seat and gasket. Valves shall be provided to the Contractor.

The valve shall have a 2 inch inlet and 1 inch outlet connections, and 3/16 inch diameter orifice or determined by the Engineer for a maximum working pressure of 200 psi. Valve shall have a single float design.

The valve shall be installed using a 2 inch ball valve, and a 2 inch by 1 inch brass tee with a quick connect attachment. Ball valves shall be all bronze construction, with a handle operator. Ball valves shall be manufactured and tested in accordance with ANSI/AWWA C800. The valve shall be equipped with packing nuts, gland, and packing material. Ball valves shall be of an approved type made from approved materials conforming to ASTM specifications. The turn required to travel from fully closed to fully open on a ball valve shall be 90 degrees.

Service saddles for 2 inch taps on 4 inch and larger size iron pipe shall be ductile iron with stainless-steel double straps, bolts, nuts, and washers. Saddles shall be manufactured by Geneco or an approved equal. Saddles for pipe sizes 8 inch through 24 inch shall be double strap.

For water lines, lid shall indicate "WATER."

Air relief and vacuum valve manholes shall be 60 inch diameter precast concrete units conforming to ASTM C-478. The combination air relief vacuum valve manhole shall be cast with an anti-microbial admixture, in accordance with manufacturer's instructions.

Cast iron manhole frames and covers shall conform to the drawings in all essentials of design with vent holes. The frames and covers shall have a combined weight of not less than 310 pounds and shall conform to ASTM A-48, Class 30 frame, and Class 35 cover. Unless otherwise shown in the drawings, the frames and covers shall be so set that the top of the cover will be flush with finished grade.

The valve shall be centered in the manhole for water mains and offset 12 inches from the center of the manhole for sewer mains. The top of the water or sewer main shall be a minimum of four (4) feet deep at Air Release Valve, unless otherwise required due to the main and/or combination air release valve size.

The force main shall consist of one full length PVC C-900 (DR18) pipe centered at the air relief valve and a minimum of 4 feet deep.

Page 15-8, Line 5- Replace paragraph beginning "Double check valves…" with the following:

Page 15-8, Line 15-Remove "screw or". Only slip type valve boxes are permissible.

Page 15-8, After Line 17-Add the following paragraphs:

Use Type K copper tubing for all 1 inch water services installed, repaired, or relocated. Use a continuous run, without splices, from the corporation stop to the meter for all water services.

If a two (2) inch meter box is located less than five (5) feet away from the main, the two (2) inch pipe and fittings shall be brass from the tap to the meter. Otherwise, use a two (2) inch PVC SDR 21 pipe.

Page 15-8, ARTICLE 1515-3 CONSTRUCTION METHODS

Page 15-8, Sub-article 1515-3 Construction Methods

Add the following to the second paragraph:

Provide four (4) NCDOT concrete blocks at each valve box section and two (2) inch meter box. Provide NCDOT concrete brick as a meter box base for 1 inch services.

Page 15-8, Sub-article 1515-3 (A) Valves

Replace the first paragraph as follows:

Valves in water mains shall be located as shown on plans. Install all valves with an approved valve box set flush with the finished ground or finished pavement elevation. Place a 24 inch diameter 2,500 psi precast concrete ring flush with the finished ground around all valve boxes not in pavement. Place a 24 inch diameter 3,000 psi poured in place concrete collar flush with the finished pavement around all valve boxes in a traffic area.

Add the following after the second paragraph (Line 30):

The valve shall be fully opened and fully closed to ensure that all parts are in working condition. A valve box shall be provided for every valve. The valve box shall be centered and plumbed over the operating nut of the valve. It shall not transmit shock or stress the valve.

All tapping sleeves shall be hydrostatically pressure tested prior to the tap being accomplished. Use of air to complete the pressure test is not acceptable. The tapping sleeve shall be tested to 200 psi. PWC shall witness and approve the testing.

All dead ends on new mains shall have a 2 inch blow-off assembly installed as indicated on the drawings.

Page 15-8, Sub-article 1515-3 (B) Meters

Add the following:

Connect or reconnect meter to the customer's plumbing using brass fittings. A composite, H-20 rated meter box shall be used if the meter is to be located in asphalt or concrete pavement or a traffic area.

Page 15-8, Sub-article 1515-3(C) Backflow Prevention Assembly

Add the following:

Provide a minimum of five (5) feet between the meter and the backflow preventer.

Page 15-9, Sub-article 1515-3 (D) Fire Hydrants

Add the following:

Fire hydrants shall be located and installed as shown on the approved drawings. Each fire hydrant shall have a minimum of 42 inches of cover. Fittings between the valve and fire hydrant may be used. The valve shall be located at the main. Hydrants shall be set plumb with pumper nozzle facing the roadway. Each fire hydrant shall be restrained to the pipe with suitable mechanical joint restraint. Concrete thrust blocking shall be placed. The hydrant branch shall not be backfilled until inspected.

Page 15-9, Sub-article 1515-3(E) Line Stops

Add the following:

Do not use line stops.

Page 15-9, Sub-article 1515-3 (F) Air Release Valves and Combination Air Valves

Add the following:

Combination Air Release Vacuum Valves shall be installed in accordance with the standard details.

Page 15-9, ARTICLE 1515-4 MEASUREMENT AND PAYMENT

Page 15-9, after line 35- Add the following:

Payment for Combination air release valve shall be per each valve and paid under the contract price for Combination Air Valve". Such price and payments will be full compensation for all labor, materials, excavation, backfilling, and any incidentals necessary to complete the work, as required. The contractor shall furnish all accessories and fittings for complete installation.

All Combination air valves furnished by PWC shall be installed at the locations shown in the drawings.

Page 15-9, After Line 40-Add the following after the *Relocate* paragraph:

Relocate all existing automated meter (AMI) assemblies to new location. Where existing meters to be relocated are non-AMIs, PWC will provide and install the new AMIs. PWC Project Coordinator will coordinate the connection of the old new meters to the new system.

Page 15-9, Line 43- Revise *Reconnect Water Meter* paragraph as follows:

Reconnect Water Meter means to replace the piping from a new water line to an existing water meter that is not relocated. New lateral shall be provided from new water main to existing and/or relocated water meter.

Page 15-10, After Line 3-Add the following after *Valve boxes* paragraph:

Meter box, meter setter, connection of new lateral to meter setter and reconnection of existing plumbing to tailpiece utilizing brass fittings are incidental items.

SECTION 1520-SANITARY SEWER

Page 15-10, ARTICLE 1520-2 MATERIALS

Page 15-11, After Line 10-Add the following:

Force Main Sanitary Sewer Tracer and Markers:

For PVC force main sewer pipes, the tracer wire shall be "stubbed" into marker posts and air release valve manholes and secured such that a "direct"/conductive metal detector may be used to trace the pipe location.

The marker posts shall be green with a “Sewer Force Main” warning and have internal terminals. The marker posts shall use an anchor for direct bury installations. The identification wire shall be attached to the marker posts in accordance with these Special Provisions. Tracing wire marker posts shall be located no more than 500 feet apart.

When the force main is located in unpaved areas such as easements the marker posts shall be installed along the centerline of the force main. When the force main is located in paved areas the marker posts may be offset from the centerline of the force main in a uniform manner.

Pipe Materials and Fittings

Clay pipe, PE pipe and concrete pipe shall not be used for sewer pipe unless approved in writing by PWC and are described below. All sewer pipes shall be Ductile Iron or PVC with ductile iron fittings as specified herein unless otherwise indicated on the drawings.

If an expansion coupling is required, it shall be installed as indicated on the drawings. The expansion coupling shall not be buried.

For subsurface water crossings (i.e., streams, wetlands) via Horizontal Directional Drilling (HDD), Fused HDPE or FPVC shall be used.

Pipe Markings

Meet the minimum requirements of AWWA C906. Minimum pipe markings shall be as follows:
(1) Manufacturer’s name or trademark and production record.
(2) Nominal pipe size.
(3) DIPS.

(4) Dimension Ratio.
(5) AWWA C906.
(6) Seal of testing agency that verified the suitability of the pipe.
(7) Resin type (PE4710).

Color identification to identify pipe service is required.
(1) Stripes or colored exterior pipe product shall be green for wastewater/sewage.
(2) The pipe interior shall be gray for visual inspection.
(3) Permanent identification of piping shall be provided by co-extruding multiple equally spaced color stripes into the pipe outside surface or by solid colored pipe shell.
(4) The striping material shall be the same material as the pipe material except for the color.
(5) Plain black HDPE pipe without color code markings may not be used.

Only smooth wall HDPE will be permitted.

Joining system:

Pipe to be joined with butt, heat fusion joints. Joints to be made in strict compliance with manufacturer's recommendations and ASTM D2657. Where required, flange connections, mechanical joint connections and butt connections using bolted mechanical couplers to be provided from a pipe stub with a polyethylene and steel stiffener. Flanged connections to be provided from a pipe stub and a steel back-up flanged. Back-up flanges to be primed and painted in a corrosion protected paint recommended and supplied by manufacturer. Bolts, nuts, and hardware to be Type 316 stainless steel.

Transition between ductile iron pipe and HDPE shall be accomplished using mechanical restraints.

The same material pipe shall be used from manhole to manhole. If the section of pipe between manholes is 250 feet or less, no transitions will be allowed (either all PVC or all ductile iron). Should the length between manholes exceed 250 feet, only one transition will be allowed. Ductile iron shall be installed from the lower manhole to the transition location. Use of a C900 x SDR 26 adaptor shall be used to accomplish the transition. A transition is defined as the use of one C900 x SDR26 adaptor. No more than one (1) adaptor shall be used in any given manhole to manhole segment.

PAGE 15-11, ARTICLE 1520-3, CONSTRUCTION METHODS

Page 15-11, Delete Line 21 and replace with the following:

The maximum use ductile iron where sewer is required to be installed on maximum grade. Use ductile iron were indicated on Drawings and where the following "protected" conditions are encountered:
(1) Sewers entering or crossing streams
(2) Sewers located less than 100 feet from any public or private water supply source
(3) Where the minimum 18 inch vertical and 10 foot horizontal separation cannot be maintained between sewers (main and laterals) and water mains.

Page 15-11, Sub-article 1520-3(A)(2) Testing

Replace the second paragraph with the following:

Test all gravity sewer lines not specified to be hydrostatically tested for leakage using the air test. Perform visual inspection on all installed gravity sewer lines and the gravity sewer lines repaired or reconnected to existing and or new manholes. Perform line and grade testing and deflection testing on all gravity sewer lines.

Page 15-12, Sub-article 1520-3(A)(2)(c) Air Test

Replace Table 1520-1 with:

PART 1. AIR TEST TIME			
PART 2. PIPE DIA (IN)	PART 3. MINIMUM TIME (MINUTES)	PART 4. LENGTH FOR MIN TIME (FEET)	PART 5. TIME FOR LONGER LENGTH (SEC)
PART 6. 4	**PART 7.** 3:46	**PART 8.** 597	**PART 9.** 0.380L
PART 10. 6	**PART 11.** 5:40	**PART 12.** 398	**PART 13.** 0.854L
PART 14. 8	**PART 15.** 7:34	**PART 16.** 298	**PART 17.** 1.520L
PART 18. 10	**PART 19.** 9:26	**PART 20.** 239	**PART 21.** 2.374L
PART 22. 12	**PART 23.** 11:20	**PART 24.** 199	**PART 25.** 3.418L
PART 26. 15	**PART 27.** 14:10	**PART 28.** 159	**PART 29.** 5.342L
PART 30. 16	**PART 31.** 15:06	**PART 32.** 149	**PART 33.** 6.078L
PART 34. 18	**PART 35.** 17:00	**PART 36.** 133	**PART 37.** 7.692L
PART 38. 21	**PART 39.** 19:50	**PART 40.** 114	**PART 41.** 10.470L
PART 42. 24	**PART 43.** 22:40	**PART 44.** 99	**PART 45.** 13.674L
PART 46. 27	**PART 47.** 25:30	**PART 48.** 88	**PART 49.** 17.306L
PART 50. 30	**PART 51.** 28:20	**PART 52.** 80	**PART 53.** 21.366L

PART 54. 33	**PART 55.** 31:10	**PART 56.** 72	**PART 57.** 25.852L
PART 58. 36	**PART 59.** 34:00	**PART 60.** 66	**PART 61.** 30.768L

Page 15-12, Sub-article 1520-3(A)(2)(d) Visual Inspection:

Add the following after line 29:

Visually inspect all installed gravity sewer lines and the gravity sewer lines repaired or reconnected to existing and or new manholes from the inside using approved cameras.

Page 15-13, Sub-article 1520-3 (B) (1) Installation

Replace paragraph 2 (Line 19) with the following:

All sewer force mains shall have automatic combination air release vacuum valves installed at all high points, as indicated on the plans, and as specified herein.

Add the following sentences:

Maintain sewer flow at all times. Use temporary diversions or pumping to maintain flow when connecting proposed sewers to existing sewers. Use engineered temporary pumping systems capable of handling full pipe flow. Use pumping systems with automatic reliable operation or constantly tended manual operation. By-pass pumping assemblies shall be installed in accordance with these Special Provisions.

All pipes shall be installed to the required lines and grades. Structures shall be installed at the design locations. The alignment of the pipe will generally be indicated by stakes parallel to the line of the pipe. The grades of the pipe will be provided by cut sheets that coincide with the provided staking. Grades shall not be provided on the survey staking. The Contractor shall be responsible for installing the pipe to proper line and grade.

Threaded PVC and cemented joints will not be permitted. The ends of push on joints shall be beveled to facilitate assembly. The pipe shall be marked by the manufacturer to indicate when the pipe is fully seated, and the gasket lubricated to prevent displacement. Care shall be exercised to ensure that the gasket remains in the proper position in the bell or coupling.

All pipe installations shall be properly restrained, using either thrust blocks or approved restraint systems. The thrust blocking shall be in accordance with the drawings. The approved restraint system shall be installed in accordance with the manufacturer's instructions.

Page 15-13, Sub-article 1520-3 (B) (2) Testing

Add the following sentences:

Where any section of a force main is provided with concrete thrust blocking for fittings, the hydrostatic test shall not be made until at least five (5) days after installation of the blocking unless otherwise approved. PWC's representative shall be present for all testing. Properly dispose of the test water from the system. If blow offs are not available at the high places, taps shall be made to provide blow offs.

Page 15-13, Add Sub-article 1520-3 (C) Additional Bypass Pumping Requirements:

The Contractor shall provide all pumps, piping, and other equipment to accomplish this task; perform all construction; obtain all permits; pay all costs; and perform complete restoration of all existing facilities to equal or better condition to the satisfaction of the Department. The Contractor shall be responsible for the design, installation, operation, and maintenance of the temporary bypass pumping system. The Contractor shall provide sufficient documentation to demonstrate that he, or his designated subcontractor, has experience in the design, installation, and maintenance of temporary bypass pumping systems.

The Contractor shall be responsible for all aspects of the bypass operation, including but not limited to: providing access to install, move, and maintain the pumps in the proper position, traffic control, installation and removal of bypass equipment, pump monitoring, testing of the bypass system, re-fueling, maintenance, notification of property owners (should access to private property be necessary), wastewater and fuel spill containment, and removal and replacement of manhole cones (if necessary). The bypass system (pumps and piping) shall be monitored by Contractor personnel at all times when the bypass operation is in effect.

The Contractor shall have all materials and equipment on site to immediately respond to any emergencies or other event that could impact the bypass system (i.e., leak in the discharge piping, pump failure, flooding, etc.). The Contractor shall have sufficient staff and equipment to mobilize to repair and/or service any equipment within 1 hour of notification, 24 hours a day, seven (7) days a week. In the event of an emergency, the Contractor shall provide an immediate response and fully cooperate with PWC and the Department.

The Contractor shall install the bypass pumps, equipment, and discharge lines to minimize impacts to the property owners, residents, and environment. The Contractor shall be responsible for determining the best location for the bypass equipment, and the need for any special provisions to ensure access for the customers. Such special provisions include, but are not limited to installation of ramps, excavation and burial of the bypass lines, temporary fencing, etc. The Contractor bears all responsibility for the maintenance and restoration of any trenches, ramps, access, etc. necessary for the temporary bypass pumping operation.

The Contractor shall take appropriate steps to ensure that all pumps, piping, and hoses that carry raw sewage are protected from traffic and the public. The Contractor shall identify the proposed methods to protect the temporary bypass pumping system from traffic and the public as part of the detailed temporary bypass pumping plan. Traffic control shall be performed in accordance with the Department's traffic control plan and measures.

The bypass pumping system shall be monitored by Contractor personnel at all times (24 hours a day, 7 days a week), when the bypass operation is in effect. The Contractor's personnel shall be

on-site at all times (24 hours a day, 7 days a week), and stationed at the primary bypass pumps. Depending on the location and system set-up, it may be necessary for the Contractor to station personnel at each of the various bypass pump locations. Unless otherwise approved by the Fayetteville Public Works Commission, one (1) person cannot monitor multiple bypass pump locations. All bypass pumps, regardless of their location (primary or on secondary lines), shall be equipped with an automatic dialer (or other similar device). The Contractor personnel shall immediately respond to any issue regarding the temporary bypass pumping system. All temporary bypass piping shall be periodically monitored (patrolled from pumps to discharge), but no less frequently than once every 12 hours. The bypass pumping equipment shall be automated and capable of functioning without the assistance of an operator.

Submittals

The Contractor shall submit a detailed bypass pumping plan for approval, prior to initiating the bypass operation.

The detailed temporary bypass pumping plan shall include the following information:

(1) Method of monitoring the pumps to ensure proper operation, to include method of notifying personnel (PWC and Contractor) in the event of an emergency, activation of back-up pumps, etc.
(2) Method of monitoring upstream system levels to ensure surcharging does not result in back-ups into buildings, overflows, etc.
(3) The amount, if any, of any required surcharging.
(4) Method to initiate back-up pumps.
(5) Map showing general location of the pumps and bypass lines. This shall include means to maintain access to driveways, etc.
(6) Measures to secure the bypass system (lines, pumps, etc.) from traffic, vandalism, high stream flows, etc.
(7) Method of plugging (and securing the plug(s)) and type of plugs.
(8) Size and location of manholes or other access points for suction and discharge piping.
(9) Size of pipeline(s) or conveyance system(s) to be bypassed.
(10) Number, size, material, location, and method of installation of suction piping.
(11) Number, size, material, location, and method of installation of discharge piping.
(12) Bypass pump sizes, capacities, and number of each size to be provided on-site, including all primary, secondary, and spare pumping units.
(13) Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted). Calculations shall be signed and sealed by a licensed Professional Engineer registered in the State of North Carolina.
(14) Measures to protect discharge manhole(s) or structure(s) from erosion and damage due to the bypass operation.
(15) Erosion control measures.
(16) Emergency contact information for the personnel responsible for the pump operation.
(17) Emergency contact information for Contractor personnel to respond in the event of an emergency.
(18) List of available resources (equipment, materials, personnel) and contact information for emergency response.
(19) Method to contain potential releases of sewer flow from combination air release valves.

(20) Contingency plan for responding to potential sewer spills caused by weather, vandalism, acts of God, etc. The plan shall include communication protocols, available resources, and the steps to be taken in the event of an emergency.

Coordination:

The Contractor shall fully coordinate their temporary bypass pumping operations with PWC. It is the Contractor's responsibility to fully determine the scope and location of the temporary bypass pumping system. All coordination (including location of the pumps and discharge lines) shall be fully discussed and agreed to prior to commencement of bypass operations.

The Contractor shall schedule a coordination meeting with PWC and other personnel (Department, Contractor, bypass sub-contractor, etc.) a minimum of three (3) business days prior to starting the temporary bypass pumping system. The purpose of this coordination meeting is to ensure that the Contractor and their sub-contractors have a good understanding of the requirements and expectations of operating the temporary bypass pumping system, discuss contingency plans (to include protocols for emergency contacts), identify location(s) of pumps, verify necessary materials (repair sleeves, containment devices, etc.) are on-site and available, and any other items necessary to ensure that PWC has confidence that the appropriate personnel can operate and maintain the temporary bypass pumping system. Should, for any reason, the Department and/or PWC deem that the Contractor and/ or their sub-contractor is not prepared to operate and maintain the temporary bypass pumping system, the temporary bypass pumping system shall not be started. The Contractor shall take all necessary steps to address any concerns to the satisfaction of PWC. Upon completion of those actions, another coordination meeting shall be held, in order for PWC to confirm that the Contractor and their sub-contractor is prepared to operate and maintain the temporary bypass pumping system. This process will be repeated until the Department and PWC are satisfied that the Contractor and their sub-contractor are prepared to operate and maintain the temporary bypass pumping system. No additional contract time will be granted for this delay.

The temporary bypass pumping system shall run for a minimum of 24 hours, or longer as deemed by PWC, prior to any activity occurring within the main(s) being bypassed.

Flow Control Processes:

Where the raw sewage flow will be blocked during the Work as a result of the temporary bypass pumping operation, the Contractor shall take all necessary precautions to protect the public health. No septic conditions shall be allowed due to Contractor's operations. The sewer system (mains, manholes, laterals, etc.) shall also be protected from damage. The following occurrences shall not be allowed:

(1) No sewage shall be allowed to back up into any homes or buildings.
(2) No sewage shall overflow any manholes, cleanouts, or any other access to the sewers.
(3) Users upstream of the project area shall be able to use all their water and sewer utilities without interruption or limitations.

If any of the above occur or are expected to occur, the Contractor shall take immediate action to alleviate one or all of the conditions. Additionally, the Contractor is required to observe the conditions upstream of the plug and be prepared to immediately increase bypass pumping or

release the flows, as required. Any damage claims resulting from the Contractor's failure to properly maintain sewer flows shall be the Contractor's responsibility.

All sump pumps, bypass pumps, trash pumps or any other type of pump which pulls sewage or any type of material out of the sanitary sewer system shall discharge into another sanitary sewer manhole, or appropriate vehicle or container acceptable to PWC. Under no circumstances shall untreated sanitary sewer be discharged, stored, or deposited on the ground, swale, road, or open environment. The Contractor shall not allow any flow of sewage onto private property, streets, or into creeks and drainage systems.

Plugging and Blocking:

In some applications, the wastewater flow may be plugged and contained within the capacity of the collection system. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact. The Contractor has the sole responsibility for determining whether the system can accommodate surcharging. If this option is selected, the Contractor shall be responsible for continuously monitoring the system to ensure no sewer spills or overflows occur.

A sewer line plug shall be inserted into the line at a manhole upstream from the section being surveyed or repaired. The plug shall be so designed that all or any portion of the operation flows can be released. The Contractor shall secure the plug, to prevent it from being dislodged and moving downstream. Flows shall be bypassed throughout the duration of the work. Flows shall be bypassed in accordance with the approved temporary bypass pumping plan. Upon acceptance of the work by PWC, the temporary bypass pumping system shall be removed, and flows restored.

Pumping and Bypassing:

The Contractor, when and where required, shall divert sewer flows for the sewer pipe rehabilitation process, cleaning, television inspection, pipe repairs, manhole replacement and/or rehabilitation, obstruction removals, or other related as required to complete the Work. The pumps and bypass lines shall be of adequate capacity and size to handle and prevent backup or overflow for all flows. The temporary bypass pumping system shall be designed to maintain the flows necessary to meet the requirements of each particular site. The Contractor shall be responsible for furnishing the necessary labor and supervision to set up, operate, and maintain the temporary bypass pumping system. A "set up" consists of the necessary pumps, conduits, and other equipment to divert the flow of sewage, from the start to finish of work performed. The temporary bypass pumping system shall include:

(1) A minimum of one (1) redundant pump so that the temporary bypass pumping system is capable of transmitting the peak flow with the largest duty pump out of service.
(2) Pumps shall be provided with a means of automatic control via floats or level sensing. Systems requiring manual starting and/or stopping shall not be allowed.
(3) All equipment (primary and secondary pumps) shall be equipped in a manner to keep noise to a maximum of 65 dBA at 30 feet.
(4) An automatic dialer (or similar) to immediately notify (in a sequential operation) Contractor and PWC personnel in the event of equipment failure. The automatic dialer shall be set to issue notifications prior to flow level reaching critical elevations and having

a spill occur. All bypass pumps (regardless of location) shall be equipped with an automatic dialer (or similar).

The temporary bypass pumping system shall be provided in such a way as to maintain access for businesses and residences. The Contractor shall be responsible for determining the best location for the bypass equipment, and the need for any special provisions to ensure access for the residents and businesses. Such special provisions include, but are not limited to installation of ramps, excavation, and burial of the bypass lines, etc. The Contractor shall use bridges over the bypass lines, temporary lines under driveways, alternate routes, or other means to accomplish this item. The bypass plan submittal shall indicate the means of maintaining access. The Contractor bears all responsibility for the maintenance of any trenches, ramps, etc. necessary for the bypass operation.

Pumps, equipment, and bypass lines shall be continuously (24 hours a day, 7 days a week) monitored by on-site Contractor personnel capable of starting, stopping, refueling, and maintaining these pumps during the Work. The temporary bypass pumping system shall be provided with an automatic dialer (or other similar device) that will immediately notify (in a sequential operation) the Contractor and PWC in the event of equipment failure. All bypass pumps (regardless of location) shall be equipped with an automatic dialer. This automatic dialer (or similar) shall be set to issue notifications prior to flow levels reaching critical elevations and having a spill occur.

The automatic dialer shall be set to issue notifications through a sequential operation. Automatic dialers that are not set up for sequential notifications shall not be acceptable. The Contractor's personnel shall be the first to receive any notifications from the automatic dialer. The automatic dialer shall only notify the PWC personnel after all Contractor notifications have been ignored and/or not responded to. The Contractor shall properly adjust the level at which the automatic dialer initiates notification to provide adequate time for the sequential notification to occur. If the PWC personnel are notified by the automatic dialer, the PWC personnel shall assume that a spill is occurring or is imminent and respond accordingly. The Contractor shall be responsible for all costs for the PWC to mobilize and respond to the notification, regardless of if a spill occurred or not.

In some applications, it may be necessary to surcharge the system in order to ensure proper pump operation. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact. The Contractor has the sole responsibility for determining whether the system can accommodate surcharging. In the event surcharging is necessary, the Contractor shall be responsible for continuously monitoring the system to ensure no sewer spills occur.

All bypass piping shall successfully pass a hydrostatic test prior to bypassing the sewer flows. The hydrostatic test pressure shall be no less than the expected discharge pressures and shall be held for a minimum of one (1) hour. All testing shall be observed by PWC. Testing shall be coordinated with PWC a minimum of 48 hours in advance.

Spill Response:

The Contractor shall not discharge or pump any sewage, solids, or debris on the ground, streets, storm water system, ditches, or streams. Any sewage spills shall be immediately reported to the PWC's Construction Department, (910) 223-4716, PWC Project Coordinator & the Department. After normal business hours, the Contractor shall contact the Fayetteville Public Works Commission Dispatch Center, (910) 678-7400 or (910) 323-0178. The Contractor shall take complete responsibility for all costs related to the clean-up of the spill, including any fines issued by the North Carolina Department of Environmental Quality (NCDEQ).

In the event that raw sewage (in any quantity) is spilled, discharged, leaked, or otherwise deposited in the open environment, due to the Contractor's work, the Contractor is responsible for any cleanup of solids and disinfection of the area affected. This work will be performed at the Contractor's expense with no additional cost to the Department and/or Fayetteville Public Works Commission. The Contractor is also responsible for complying with any and all regulatory requirements in regard to the size spill with no additional cost to the Department and/or Fayetteville Public Works Commission. The Contractor shall cooperate fully with the Fayetteville Public Works Commission and the applicable State agencies in responding to and cleaning up the spill. The Contractor is responsible bearing all costs associated with the cleanup of a spill caused by the Contractor's operations.

Where sewage has been returned up into property due to any aspect of the Contractor's operation, the Contractor shall immediately notify PWC, and the Department inspect the property with the Department and PWC and agree on remedial measures. The Contractor shall be responsible for all cleaning, repair and/or replacement of damaged property, temporary relocation of all occupants of the affected properties, if required, all to the satisfaction of the property owner. These actions shall be undertaken immediately upon learning of the backup. Cleaning shall be performed by firms specializing in this type of work. All costs associated with the cleaning, repair, replacement of damage, occupant accommodation, insurance and spill remediation shall be borne by the Contractor. All remediation measures required as part of a spill response are part of acceptance of the project, and final payment shall not be made until such time all required measures are addressed and approved by the appropriate regulatory agency.

Page 15-13, Sub-article 1520-4, Measurement and Payment

Add the following paragraphs to each respective item:

For Sanitary Gravity Sewer, removal, and disposal of existing main shall be incidental to the installation of the new pipe and no separate payment will be made.

Sewer Service Line will be paid per linear foot and by size (four (4) inch or six (6) inch). All fittings will be incidental to Sewer Service Line. Removal and disposal of existing sewer service lateral shall be incidental to the installation of the new sewer service lateral and no separate payment will be made.

1525-UTILITY MANHOLES

Page 15-14, ARTICLE 1525-2 MATERIALS

Add the following sentences to the end of the section paragraph (Line 20):

The frame and cover shall be manufactured by the same manufacturer. Any defective casting shall be removed and replaced.

In unpaved areas, cam-lock ring and cover shall be used. Camlock bolt head shall be compatible with the required tool for turning camlock mechanism. The contractor shall provide one tool to open the cam locks at the end of the project. Camlock ring and covers shall be installed as indicated on the drawings.

Page 15-14, Add Sub-article 1525-2 (A) Precast Concrete Sanitary Sewer Manholes

All manholes shall be constructed to these Special Provisions. Installation shall be in accordance with ASTM C-891 and these Special Provisions. An eccentric cone shall be utilized on all manholes.

Manhole steps shall be placed in all manholes and shall be steel reinforced (½ inch grade 60) copolymer polypropylene plastic steps in accordance with ASTM C-478 for material and design. The steps shall be made with serrated treads and wide enough to stand on with both feet.

All reinforced concrete precast manholes shall include a liquid anti-microbial admixture to render the concrete uninhabitable for bacterial growth. The admixture shall be included in the fabrication of the manhole by an approved concrete precast manhole manufacturer. Coatings applied to the interior walls of the manhole shall not be acceptable. A color identifier shall be applied to the interior of each concrete piece fabricated with the anti-microbial admixture. Each piece shall also be plainly stenciled with the name of the anti-microbial admixture on the exterior of each.

Further, all field mixed mortar, utilized in concrete precast manholes, shall include the same anti-microbial admixture. Any defects shall be the cause for the replacement and correction of such defect, at no additional expense.

Any special linings and coatings that are specified for a manhole and installed at the production facility, in the field, or during repairs, shall be applied in accordance with the applicable special coating's specification and the manufacturer's specifications for that material.

Page 15-14, Add Sub-article 1525-2 (B) Special Coatings, Anti-Microbial Admixture

The anti-microbial admixture shall be ConShield, ConBlock, or approved equal. The ConShield liquid anti-microbial admixture can be obtained from ConShield Technologies, Inc. or an approved precast facility. TheConBlock liquid anti-microbial admixture can be obtained from ConSeal Concrete Sealants, Inc., or an approved precast facility.

Product data, certifications, and product data, to include the following:

1. U.S. Environmental Protection Agency (EPA) registration number.

2. Documentation that the product has a minimum of 10 years of successful prevention of microbial induced corrosion in sanitary sewers.

3. Documentation that the precast facility is certified by the anti-microbial manufacturer.

4. Documentation from the precast facility stating that the correct amount and correct mixing procedure was followed for all anti-microbial concrete.

The liquid anti-microbial admixture shall be used in accordance with the manufacturer's recommendations. The amount of the admixture shall be included in the total water content of the concrete or mortar mix design. The admixture shall be added to the concrete or mortar mix water, to ensure even distribution of the admixture throughout the concrete or mortar mix. When properly prepared, the anti-microbial admixture shall render the concrete or mortar uninhabitable for bacterial growth.

The cost of the admixture shall be included in the fabrication of all sewer manhole sections.

Page 15-14, Add Sub-article 1525-2 (C) Sanitary Sewer Manhole Vents

Sewer manhole vent shall be fabricated from three (3) inch Schedule 40 aluminum pipe. Vent shall be threaded into manhole lid. Manhole lid shall be drilled and tapped to accommodate three (3) inch diameter threaded pipe. Minimum height shall be four (4) feet to crest of vent. Vent shall extend to two (2) feet above the 100-year flood elevation where manholes are located in a FEMA flood hazard zone. Vent opening shall be protected with stainless-steel screen. Vents shall be placed every 1,000 feet.

Page 15-14, Sub-article 1525-2, Materials

Page 15-14, Add Sub-article 1525-2 (D) Fittings and Connections

Pipe connections to a manhole shall be by gasketed flexible watertight connections.

A watertight, flexible pipe-to-manhole connector shall be used on all pipe to manhole connections, for both new and existing manholes and pipes.

The internal expansion sleeve shall be comprised of Series 300 non-magnetic stainless-steel. The external compression take-up clamps shall also be Series 300 non-magnetic stainless-steel. No welds shall be utilized in the sleeve and clamp construction.

Page 15-15 ARTICLE 1525-3 CONSTRUCTION METHODS

Page 15-15, Line 1, Replace paragraph with:

Provide an inside drop assembly on manholes for sewer pipes entering with 2.5 feet or more vertical drop. Inside drop assemblies shall be used for connections to existing manholes when the drop exceeds 2.5 feet. New installation, the manhole diameter shall be 5 feet or larger. Provide a pipe slide where vertical separation between inverts is less than 2.5 feet.

Page 15-15, Line 4, Replace paragraph with:

In all sewer manholes, provide steps spaced 16 inches on center. Install steps in line with the effluent opening unless otherwise specified.

Page 15-15, Line 6, Replace paragraph with:

The manhole invert shall be constructed of brick and mortar. Precast inverts are not allowed. The invert channel shall be smooth and semicircular in shape conforming to the inside of the connecting sewer section. Changes in direction of flow shall be made with a smooth curve as large as a radius as the size of the manhole will permit without a decrease in flow velocity. Changes in the size and grade of the channel shall be made gradually and evenly. The invert channel walls shall be constructed to three quarters (3/4) of the height of the crown of the outlet sewer and in such a manner not to obstruct maintenance, inspection, or flow in the sewers. The inverts shall have a minimum slope of 1% across the bottom of the manhole. A shelf shall be provided on each side of any manhole invert channel. Inverts in manholes with standing water will not be acceptable. The shelf shall be sloped not less than 1:12 (min) and no more than 2:12 (max). When connecting to an existing manhole, the bottom of the boot for the new sewer main or lateral shall be set 1 inch above existing shelf unless otherwise indicated.

Page 15-15, Line 12, Replace Table 1525-1 with:

TABLE 1525-1
MANHOLE CONSTRUCTION

Location	**Top height above finished grade**	**Ring and Cover Type**
Roadway pavement, Driveways, Sidewalks, Parking lots	Flush ± ¼" with concrete collar	Standard Traffic Area Manhole Ring and Cover (H-20 Rated)
Vehicle Recovery Area	Flush ± 3"	Standard Traffic Area Manhole Ring and Cover with Wiper Gasket and Cam Lock
Manicured Areas	Flush to +2"	Standard non-Traffic Area Manhole Ring and Cover with Wiper Gasket and Cam Lock
Flood Zones less than 3 ft above finished grade	Minimum 18" Above Ground with Vent Extending to 2 feet above 100-year Flood Elevation	Standard non-Traffic Area Manhole Ring and Cover with Wiper Gasket and Cam Lock
Flood Zones greater than 3 ft above finished grade	Minimum 18" Above Ground with Vent Extending to 2 feet above 100-year Flood Elevation	Standard non-Traffic Area Manhole Ring and Cover with Wiper Gasket and Cam Lock
Outfall Areas outside of Flood Zones	Minimum 18" Above Ground	Standard non-Traffic Area Manhole Ring and Cover with Wiper Gasket and Cam Lock

Add additional provisions:

The manhole size shall be in accordance with the following table, unless otherwise specified:

Pipe Size (inches) Manhole Diameter (inches)**

24 and less	48
27 to 36	60*
42	72

*Where one main line or multiple lateral interiors drop structures are required, use 60 inch diameter.

* * Where multiple connections or acute angles are required, larger diameter manhole may be required as indicated on the Drawings.

Page 15-15, Sub-article 1525-3 (B), Installation of Precast Units

Add the following paragraph:

All exterior manhole section joints shall be sealed with an external rubber sleeve. The sleeve shall be made of stretchable, self-shrinking rubber, with a minimum thickness of 30 mils. The back side of each wrap shall be coated with a cross-linked reinforced butyl adhesive. The butyl adhesive shall be a non-hardening sealant, with a minimum thickness of 30 mils.

Page 15-15, Sub-article 1525-3 (C) Fittings and Connections

Page 15-15, Line 33-Add the following after the last paragraph:

Installation of the connector shall be performed using a calibrated installation tool furnished by the connector manufacturer. Installation shall require no re-tightening after the initial installation. Installation shall be done in accordance with the manufacturer's instructions.

The external compression take-up clamps shall be installed in accordance with the manufacturer's instructions.

The Contractor shall use the proper size connector in accordance with the connector manufacturer's recommendations.

All dead-end pipe stubs shall be restrained in accordance with ASTM C-923.

Page 15-16, Sub-article 1525-3 (D) Testing

Add the following:

All precast sanitary sewer manholes installed by the Contractor shall be vacuum tested for leakage. This test shall be done in accordance with ASTM C-1244 and in the presence of PWC. Provide all the necessary labor, materials, equipment, testing apparatus, and all other incidentals necessary to complete the vacuum test. All testing equipment used shall be approved for use in vacuum testing manholes.

Each manhole shall be tested after assembly. All lift holes shall be plugged with an approved non-shrink grout. All lines, including laterals, entering the manhole shall be temporarily plugged.

Ensure that the pipes and plugs are secure in place to prevent them being drawn into the manhole. The test head shall be placed directly on top of the concrete surface of the manhole following the manufacturer's recommendations, rather than to the cast iron seating ring.

Manholes may be tested either prior to backfill or post backfill at the contractor's option. For pre-backfill testing, a vacuum of 10 inches of Mercury (inches Hg) shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of Mercury (inches Hg). The manhole is acceptable if the time for the vacuum reading to drop from 10 inches of Mercury to 9 inches of Mercury meets

Diameter of Manhole			
Manhole Depth	**4' Diameter**	**5' Diameter**	**6' Diameter**
10' or less	**25 sec**	**33 sec**	**41 sec**
11' to 15'	**38 sec**	**49 sec**	**62 sec**
16' to 20'	**50 sec**	**65 sec**	**81 sec**
21' to 25'	**62 sec**	**82 sec**	**101 sec**
25' to 30'	**74 sec**	**98 sec**	**121 sec**

or exceeds the values indicated below:

Vacuum testing backfilled manholes is not recommended in the presence of groundwater. Vacuum testing a backfilled manhole that is subjected to hydrostatic pressure may exceed the design limits of the flexible connecters and could lead to failure of the structure, joints, and/or connectors. Where groundwater is present a reduction in the vacuum pressure applied to the manhole will be required. The vacuum shall be reduced by 1 inch of Mercury for every 1 foot of hydrostatic head between 12 feet and 21 feet. A vacuum test should not be performed when the hydrostatic head exceeds 22 feet. See the chart below:

Hydrostatic Head (feet)*	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Vacuum Pressure (in Hg)	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**

*Hydrostatic head above the critical connector (critical connector is bottom most flexible connector)

**Do not perform vacuum test

If the manhole fails the initial test, the manhole shall be repaired by an approved method until a satisfactory test is obtained. All repair methods shall be approved prior to being used. Retesting shall be performed until a satisfactory test is accomplished.

SECTION 1530 -ABANDON OR REMOVE UTILITIES

Page 15-16, ARTICLE 1530-3 CONSTRUCTION METHODS

Page 15-16, Sub-article 1530-3 (A) Abandoning Pipe

Add the following paragraphs:

Perform kill-outs of existing mains to be abandoned as designated on the Drawings. Kill-outs shall consist of the following requirements.

(1) Kill out shall be done a minimum of five (5) feet from any fitting on the existing water main that is to remain in service.
(2) Ductile iron pipe stiff knee shall be four (4) inch diameter for mains 12 inches or less. Utilize eight (8) inch ductile iron pipe or larger for mains larger than 12 inches. Minimum length of five (5) feet of stiff knee shall be provided. Stiff knee shall be encased in concrete. Concrete shall cover the abandoned pipe, but it shall not come in contact with the active water main or any fittings on the active water main. Place blocks rated as the same compressive strength as the concrete under the stiff knee to provide support during concrete placement.
(3) On the active water main side of the stiff knee, provide full body mechanical joint sleeve with restraining gland and restraining plug or cap.
(4) On the abandoned water main side, provide minimum one-quarter (¼) inch steel plate or ductile iron cap or plug.
(5) Coordinate outages with PWC and other work to minimize the number of planned outages.
(6) Abandoned pipe shall be grout filled or removed in accordance with Section 1530.

Remove valves, or close valves and remove the top of the valve box to an elevation two (2) feet below the roadway subgrade or finished grade and backfill.

Page 15-17, ARTICLE 1530-4 MEASUREMENT AND PAYMENT

Add the following sentence to the first paragraph:

Kill out of existing water mains to be abandoned shall be incidental to the other work and will not be measured and paid.

SECTION 1540-ENCASEMENT

Page 15-18, ARTICLE 1540-2 MATERIALS

Page 15-18 Add Sub-Article 1540-2 (A) Encasements for Railroad Crossings

The Contractor may substitute larger size casing pipe (particularly for sewer mains where grade and alignment are critical) with the proper wall thickness. All additional costs shall be included in the cost of the encasement. Furthermore, the Contractor will be responsible for all engineering costs to update the 100-year design service life for the larger encasement at their expense.

Page 15-18 Add Sub-Article 1540-2 (A) Encasements for Water and Sewer Mains

The material for the gravity sanitary sewer carrier pipe shall be CL 50 ductile restrained joint pipe iron or C-900 PVC (DR 18) for all pipe 4 to 12 inch diameter. All sanitary sewer ductile iron carrier pipe shall have specified lining and coating. Use of restraining gaskets (i.e., field-lock gaskets) is an acceptable means of restraint for gravity sewer mains. Use of iron MJ retaining glands are not approved for restraint within casings.

All ductile iron pressure pipes (4 to 12 inch diameter) within casings shall be factory restrained, in accordance with these specifications and as indicated on the drawings. The use of mechanical restraints shall not be used on pipe within casings for pressure pipe.

Add the following paragraphs for specifying the carrier pipe brace or spider assembly for ductile iron carrier pipes:

Provide carbon steel carrier pipe brace with the band being made from 12-gauge minimum thickness with 4 inch width and riser being made from eight (8) gauge minimum thickness. Runners shall be minimum 2 inches wide.

Add the following paragraphs for specifying the carrier pipe brace or spider assembly for 8 inch C900 PVC carrier pipe.

Provide carbon steel carrier pipe brace with the band being made from fourteen (14) gauge minimum thickness with 8 inch width and riser being made from fourteen (14) gauge minimum thickness. Runners shall be minimum two (2) inch width with UHMW Polymer coasting. Legs shall be minimum fourteen (14) gauge thickness with six (6) inch width.

Page 15-18, ARTICLE 1540-3 CONSTRUCTION METHODS

Page 15-18, Sub-article 1540-3. (C) Encasements for Future Use

Add the following paragraph:

Mark encasements for future use with a manufactured three (3) sided fiberglass utility marker

(color green for sewer and blue for water). Marker shall be anchored in the ground using U-channel Post minimum of two (2) feet in depth. Place a marker at the right of way or at the ends of the encasements if encasements extend beyond the right of way.

Page 15-18, Sub-article 1540-3 (D), Carrier Pipe Installation

Add the following sentences to the first paragraph for ductile iron carrier pipes:

Minimum spacing for carrier pipe brace or spider assemblies shall be at 3 feet prior to and 3 feet after each joint of ductile iron carrier pipe. Fasten brace or spider to pipe with heavy duty studs, nuts, and washers.

SECTION 1550-TRENCHLESS INSTALLATION OF UTILITIES

Page 15-20, ARTICLE 1550-3 CONSTRUCTION METHODS

Page 15-20, Sub-article 1550-3 (B) Design

Add the following sentences to the last paragraph:

For boring and tunneling operations, the certified calculations shall include a geotechnical analysis to confirm the selected method will not result in road settlement or upheaval, a road movement monitoring plan and remediation plan should the work result in settlement or upheaval. For drilling operations, appropriate calculations shall be provided to evaluate hydraulic fracturing and to develop a Fraction Mitigation Contingency Plan.

Page 15-20, ARTICLE 1550-4 MEASUREMENT AND PAYMENT

Page 15-20, Sub-article 1550-4 (A) Bore and Jack

Add the following paragraphs:

Locate all existing utilities in the proposed location of the jack and bore.

Pilot Tube Guided Auger Bore and Jack

The Pilot Tube Guided Auger Bore and Jack system shall utilize a two or three phase system as described below:

1) **Three Pass System**

A. Phase 1 - A rigid steel pilot tube approximately one-meter in length shall be installed through the ground from the drive shaft to the receiver shaft by earth displacement with the jacking frame. The alignment of the pilot tube shall be established with a theodolite mounted at the rear of the drive shaft and accurately set to the desired line and grade. The theodolite shall view a lighted target in the lead or steering pilot tube. A camera shall be fitted to the theodolite and shall transmit the image of the crosshair and the target onto a monitor screen to be viewed in the drive shaft by the operator. As the operator advances the pilot tube through the earth the center of the target will drift from the crosshair as a result of the biased or slanted leading tip of the pilot tube. The operator shall rotate the pilot tube as required to orient the slanted steering tip toward the crosshair and continue to advance the pilot tube until it reaches the receiver shaft.

B. Phase 2 -An enlargement casing with an outside diameter up to one and a half (1 ½) inches larger than the product pipe shall be rigidly connected to the final pilot tube and advanced into the earth behind the pilot tube. An auger shall be used inside the enlargement casing to remove the material being excavated. The auger shall be contained inside the limits of the enlargement casing as it progresses along the proposed alignment. A train of temporary steel casings with an outside diameter very similar to the enlargement casing and used to move the enlargement casing from the drive shaft to the receiver shaft. The enlargement casing will cut a bore

hole from the drive shaft to the receiver shaft and the temporary casings will case the hole as it is cut. Each temporary casing shall be fitted with an internal auger to transport the excavated material to the drive shaft where it shall be removed from the shaft and disposed of at an approved location. The pilot tubes shall be recovered in the receiver shaft as the temporary casings are installed.

C. Phase 3-The product pipe shall then be installed directly behind the final temporary casing pipe with the jacking frame. The casing pipes and augers shall be recovered in the receiver shaft as the product pipe is installed.

2) Two Pass System

A. Phase 1 - The pilot tube shall be installed in the same manner described in Phase 1 of the Three Pass System.

B. Phase 2 - The enlargement casing shall be installed in the same manner described in Phase 2 of the Three-Phase System. Each product pipe shall be fitted with an internal protective-casing pipe to house the auger and prevent damage to the product pipe. The product pipe shall be installed directly behind the enlargement casing with the internal casing rigidly connected to the auger chamber of the enlargement casing. The internal casing shall be manufactured such that the excavated material does not leak excessively into the product pipe. The internal casing shall be fitted with a protective shoe to protect the product pipe from damage and to support the casing and auger at the centerline of the pipe.

C. Phase 3 - The product pipe shall be advanced along the proposed alignment with the jacking frame thus progressing the enlargement casing from the drive shaft to the receiver shaft with the pilot tubes being recovered in the receiver shaft. The excavated material shall be funneled into and conveyed through the internal casing to the drive shaft where it shall be removed from the shaft and disposed of at an approved location. Upon reaching the receiver shaft the enlargement casing shall be removed and the internal casings and augers retracted and recovered at the drive shaft.

Page 15-21, Sub-article 1550-4 (B), Directional Drilling

Add the following paragraph:

At the horizontal directional drill locations and prior to drilling, remove the upper 18 inches of the bearing soil and place a geotextile (Mirafi 140 N or equivalent) over the entire bearing location. Backfill the excavation with clean, washed, NCDOT #57 stone to the bearing level of the working platform. The thickness of the NCDOT #57 stone should not exceed two feet in thickness before being compacted with a vibratory plate compactor. Have a qualified geotechnical engineer provide written approval of the working platform bearing grades once final locations are selected and prior to starting the advancement of the directional drills.

Page 15-21, Sub-article 1550-4 (C), Tunneling

Add the following paragraph:

The Contractor shall locate all existing utilities in the proposed location of the jack and bore.

Page 15-21, Sub-article 1550-4 (D), Pipe Ramming

Add the following paragraph:

The Contractor shall locate all existing utilities in the proposed location of the jack and bore.