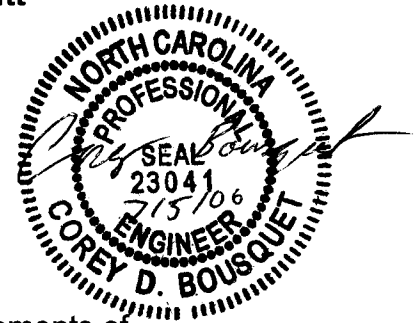


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Project: U 3613B  
County: Pitt

**PROJECT SPECIAL PROVISIONS**  
**Utility Construction**



**I. GENERAL CONSTRUCTION REQUIREMENTS:**

**Specifications:**

The proposed utility construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" dated January 2002, and the following provisions.

All water and sewer construction on facilities to be owned by Greenville Utilities Commission shall conform to the GUC Manual for the design and Construction of Water and Wastewater System Extensions.

Lay water mains at least 10 feet laterally or 18" vertically above the existing or proposed sanitary sewers.

Shoring may be required to install the 12" water line at locations where sprint telephone pedestals were installed at the right of way line. Sprint telephone installed the underground fiber optic cable 10' deep except at the locations where the fiber optic cables come up to the pedestals. There will be approx. 5 pedestals installed along Fire Tower Road.

On new sewer force mains and tie-in sections of sewer force mains, the method of anchoring pipe bends, plugs, caps, tees, reducing sections, valves, and related appurtenances will be the responsibility of the Contractor. Tying into existing sewer force mains may alter such lines to the extent that these pipelines with fittings, valves, and appurtenances may also require reaction backing or restraint; this work shall also be the responsibility of the Contractor.

The Contractor shall submit his proposed method of anchoring to the Engineer for review and approval before any applicable sewer force main construction. Such approval will not relieve the Contractor of his responsibility of properly anchoring the sewer force main system.

In the following provisions, Greenville Utilities Commission can be referred to as either the Commission or GUC.

The Town of Winterville or GUC will provide Representatives for inspections on their facilities only.

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In the following provisions the term owner refers to either the Town of Winterville or GUC.

The depth of pipeline installation may vary to achieve minimum clearance of existing or proposed utilities or storm drainage while maintaining minimum cover specified (whether existing or proposed pipelines, conduits, cables, mains and storm drainage are shown on the plans or not). Unless approved otherwise, all construction shall be performed during the regular office hours of the GUC and the Town of Winterville, i.e. 8:00 a.m. to 5:00 p.m. After hours, holiday, or weekend work may be required. GUC and the Town of Winterville may provide construction observation after hours or on weekends and holidays as needed. Construction observation provided outside regular office hours will be at the contractor's expense.

NC One Call Center shall be contacted a minimum of forty-eight (48) hours prior to any excavation. The utilities contacted shall have the opportunity to take the steps which they deem necessary to protect their utilities. The Contract Documents shall note that utility location by NC One Call Center is not valid after the expiration of a ten (10) day period beginning on the date of such location.

Prior to commencing any gas, water or sewer line construction work, GUC and the Town of Winterville shall be contacted to schedule a separate preconstruction conference. No utility construction shall occur until after the preconstruction conference is held.

Prior to the commencement of hydrostatic testing and chlorination, the owner shall be contacted to request scheduling of inspection and testing. The Owner's Representatives shall visually inspect the completed installation prior to testing to insure that all fire hydrants, valves and other appurtenances have been installed and are operable. All defects disclosed by the inspection shall be corrected prior to testing.

Prior to the commencement of sewer line testing, the owner shall be contacted to request scheduling of inspection and testing. The Owner's Representatives shall visually inspect the completed installation prior to testing to insure that the sewer line and manholes have been installed correctly. All defects disclosed by the inspection shall be corrected prior to testing.

All ductile iron fittings and pipe shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105). The cost for the polyethylene wrap will be incidental to the pay items for DI pipe and fittings.

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## **PROPOSED WATER LINE TESTING PROCEDURES**

### **Hydrostatic Test**

After the installed pipe, fittings, valves, hydrants, corporation stops and end plugs are inserted and secured, the pipe line shall be subjected to a hydrostatic pressure test. Unless otherwise permitted, testing shall be performed between each main line valve in accordance with AWWA C600. The owner will, except when certain circumstances dictate otherwise, permit the lengths of test sections to be a maximum of 1500 feet in subdivisions or other areas where the new main has closely spaced valves. Testing shall be done only in the presence of an Owner's Representative, unless otherwise directed by the owner. Testing shall be performed using a suitable pump and an accurate gauge graduated in 1.0 psi increments. The section of the main to be tested shall be subjected to a test pressure of 150 psi for a period of two (2) hours.

The allowable leakage for the new water lines shall not exceed the schedule shown below. The contractor shall accurately determine the leakage and shall repair all visible leaks regardless of the amount.

<b>PIPE SIZE (inches)</b>	<b>ALLOWABLE LEAKAGE (Gallons per hour per 1000 feet of pipe)</b>
2	0.16
4	0.33
6	0.50
8	0.66
10	0.83
12	0.99
14	1.29
16	1.47
18	1.66
20	1.84
24	2.21
30	2.76
36	3.31

If the leakage is greater than the allowable leakage as given by the above table, the Contractor shall replace any defective materials and perform all necessary work to insure that the installation is acceptable and a retest shall be performed subsequent to any repair work performed. Remedial repair work and retesting shall be repeated until the leakage occurring during the test period is less than or equal to the allowable leakage.

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**Chlorination**

Chlorination shall be performed only in the presence of the Owner's Representative and shall be performed only after the line is complete and has tested satisfactorily for leakage.

Chlorination taps will be made within five (5) pipe diameters of the water main control valve at the upstream end of the line and at all extremities of the line.

Sufficient chlorine solution shall be applied to bring the concentration within the main to a minimum of 100 ppm free chlorine residual.

The chlorine solution shall be introduced to the main at a constant rate while regulating the flow of water through the main being chlorinated such that the required concentration of chlorine is achieved throughout.

All valves within the section of main being chlorinated shall be operated once during the contact period.

The chlorine solution shall remain in the lines for no less than twenty-four (24) hours, longer if so directed by the owner.

Services shall be chlorinated at the same time and by the same method utilized for the main.

The owner will advise the Contractor when a suitable period of time has elapsed for chlorine contact. The main shall be flushed thereafter in the presence of an Owner's Representative. The flushing of the main shall be considered complete when the chlorine concentration within the main is less than or equal to the lesser of the following values:

1. part per million (ppm)
2. free chlorine
3. free chlorine concentration within the existing main to which the proposed water main is being connected to.

The Contractor shall be responsible for insuring that high-strength chlorine solution is contained on-site and not allowed to make its way to any watercourse, stream, creek, lake, or other body of water.

Cross connection for flushing and chlorination shall be made by means of a temporary connection from the supply pipe with an approved backflow prevention device. Taps for the cross connection piping shall be made to the portion of the existing water main that will be removed from service. The proposed water main shall be laid to within one pipe length of the point of final connection prior to flushing and testing. All flushing and chlorination

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work shall be performed in accordance with AWWA C651-99. All fittings, valves and backflow prevention devices required for chlorination and testing shall be incidental to the cost of the proposed pipe being tested.

### **Bacteriological Testing**

After completion of chlorination and flushing, the Contractor shall assist GUC and the Town of Winterville as necessary in obtaining sufficient bacteriological samples for complete testing.

GUC and the Town of Winterville shall determine the location of samples and the number of samples necessary to provide a test group which is representative of the section of main being tested.

A failure of any sample of a test group shall constitute failure of the entire test group from which the sample was taken. Such failure shall require two (2) successive passing test groups to substantiate that the main has been satisfactorily chlorinated.

The second of the two successive test groups of samples will not be collected before nor unless the first group has passed. The Contractor may, at his option, rechlorinate and retest the section of water main upon failure of the test group.

If two (2) successive bacteriological test groups fail, the section of main from which the group was taken shall be rechlorinated and retested until the main is shown to be properly chlorinated as mention above.

Contractor shall make such arrangements, as the utility owner requires, for measuring and paying for water required to flush and test water mains.

Copies of bacteriological testing reports shall be provided to the utility owner prior to activating new water mains.

## **PROPOSED SEWER LINE TESTING PROCEDURES**

### **General**

All final testing and inspections shall be performed in the presence of the Owner's Representative unless otherwise directed by the Commission or the Town of Winterville.

The Contractor shall provide all pumps gauges, instruments, test equipment and personnel required for inspection and testing operations.

The Contractor shall be required to clean and pretest the sewer system extension prior to notifying the owner and arranging final inspections and tests.

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Materials removed to correct deficiencies revealed by tests and inspections shall not be reused. Pipe removed due to faulty grade shall be replaced with new pipe.

**IF BYPASS PUMPING IS REQUIRED FOR SEWER LINE RELOCATIONS USE THE FOLLOWING GUIDELINES**

1. The Contractor is to notify owner at least 24 hours in advance of beginning construction.
2. The Contractor is to submit a copy of his proposed bypass pumping to the owner and the Engineer for review and approval prior to the beginning of construction.
3. Bypass pumping equipment is to be manned, i.e., 24 hours per day.
4. Back-up pumps must be provided on site to facilitate quick change over in accordance with the State of North Carolina Department of Environmental Health and Natural Resources.
5. Bypass pumping equipment must be tested and approved prior to being placed into service.

**Test Sequence**

The Contractor shall adhere to the test sequence for all wastewater system extensions unless otherwise permitted by the owner.

- (1) Perform a visual inspection.
- (2) Correct defects revealed by visual inspection.
- (3) Perform leakage testing.
- (4) Make any necessary repairs.
- (5) Make the necessary retests.

**Visual Inspection for Gravity Sewers**

Gravity sewers shall be visually inspected from every manhole by use of mirrors, television cameras, or other devices. The lines shall appear circular in cross section with no noticeable deflection. Lines which do not meet specified tolerances or which have structural defects shall be replaced to meet the requirements of the Commission prior to leakage testing.

**Leakage Testing for Gravity Sewers**

Unless otherwise permitted or required by the owner, leakage testing for gravity sewers shall be by low pressure air test. Infiltration or exfiltration testing of the lines in lieu of air testing shall not be accepted without prior written approval of the owner. All visible leaks shall be corrected regardless of the results of testing.

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All services, including those which discharge directly into manholes, shall be leakage tested.

### **Air Test**

All air used for testing shall pass through a single, above ground control panel visible to the Owner's Representative during testing.

Determination of groundwater elevation shall be made by vertically installing a six inch diameter pipe beside the manhole such that the pipe extends into the stone bedding of the manhole. The test pressure shall be increased 0.43 psig per foot of groundwater head above the pipe invert.

The test pressure shall be 4.0 psig, plus the adjustment for groundwater. The air pressure shall be maintained for a minimum of two (2) minutes by throttling the air supply. The air supply shall then be disconnected and the pressure allowed to drop. At any convenient point at which internal air pressure is greater than 3.5 psig, (plus groundwater adjustment), timing shall commence with a stop watch or other timing device that is at least 99.8% accurate. The time required for the pressure to drop 1.0 psi shall be recorded. The leakage rate shall be considered acceptable if the pressure does not drop over 1 psi in the time prescribed for the test in Table 4-4. Otherwise, the leakage rate shall be considered unacceptable.

Manhole entry shall be prohibited during the test. The internal pressure on the system shall not exceed 9.0 psig.

Sewer service lengths shall be ignored for computing required test times for mains. In the event a test section, having a total surface area less than 625 square feet, fails to pass the air test when services have been ignored, the test time shall be recomputed to include all services using the following formula:

$$T = 0.085 \frac{(D1)(D1)L1 + (D2)(D2)L2 + \dots + (Dn)(Dn)Ln}{D1L1 + D2L2 + \dots + DnLn} \frac{K}{Q}$$

Where T = Shortest allowable time, in seconds for the air pressure to drop 1.0 psig;

K = 0.000419 (D1L1 + D2L2 + ... DnLn), but not less than 1.0;

Q = 0.0015 cu. ft./min./sq. ft. of internal surface;

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D1, D2, ...Dn = Nominal diameters of the different size pipes being tested in inches.

L1, L2, ...Ln = Respective lengths of the different size pipes being tested in feet.

If the recomputed test time is short enough to allow the section to pass, the section undergoing the test shall have passed.

TABLE 4-4

MINIMUM TEST TIME FOR VARIOUS PIPE SIZES

1 Pipe Diameter (inch)	2 Minimum Time (min:sec)	3 Length for Maximum Time (ft)	4 Time For Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33

**Infiltration Test**

Infiltration testing shall be an acceptable test method only when the ground is fully saturated and the area is not subject to flooding. Immediately prior to performance of the line acceptance test, the groundwater level shall be determined by the same method used for the air test. The allowable infiltration rate shall be fifty (50) gallons per inch of pipe diameter, per mile of pipe, per twenty-four (24) hours.

**Exfiltration Test**

The exfiltration test pressure shall be the greater of the following:

- (1) The maximum depth of the sewer test section as measured from the ground surface, plus the groundwater height above the lowest invert of the test section, or;
- (2) The 100 year flood elevation minus the lowest invert elevation of the test section, plus the ground water height above the lowest invert of the test section.



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The exfiltration of the line shall not exceed fifty (50) gallons per inch of pipe diameter, per mile of pipe, per twenty-four (24) hours. The length of the test period shall be as required by the owner, but in no case less than fifteen (15) minutes. Where a stream is not readily available as a source of water to use for testing, the commission may agree to provide water. Proper procedures for requesting operation of valves and hydrants will be required.

### **Manhole Testing**

Each manhole shall be tested for leakage after assembly and prior to backfilling. The test method shall be the vacuum test.

The Contractor shall provide all materials, labor, and equipment necessary to perform the testing. Testing equipment shall be subject to approval by the owner.

The owner shall be contacted prior to testing to schedule the test time for Owner's Representative to be present. The Owner's Representative shall be present during all testing unless otherwise approved by the owner.

All lift holes shall be plugged from the outside with an approved non-shrink grout. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.

The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturers' recommendations.

A vacuum of ten inches (10") of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine inches (9"). The manhole shall pass if the time is greater than sixty (60) seconds for forty-eight-inch (48") diameter, seventy-five (75) seconds for sixty-inch (60"), and ninety (90) seconds for seventy-two-inch (72") diameter manholes.

If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

All visible leaks shall be corrected regardless of the results of testing.

All leaks shall be repaired in a manner approved by the Commission.

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### **Testing and Cleaning of Force Mains**

Force mains shall be cleaned and tested in accordance with the procedures for cleaning and testing water mains. The allowable leakage shall not exceed the limits given for water mains and any visible leaks shall be repaired regardless of the results of testing. When repair work is necessary to correct leakage, the hydrostatic test shall be repeated upon completion of the work.

### **Owner and Owner's Requirements:**

The existing utilities belong to Greenville Utilities Commission (GUC) – (Water, Sewer and Gas) and the Town of Winterville (Water and Sewer). The Contractor shall provide access for the Owner's Representatives to all phases of construction. The contractor shall notify the owner two weeks before commencement of any work and one week before service interruption.

### **Greenville Utilities Commissions (GUC) - (Gas)**

GUC must insure that any contractor performing work on the gas line operates in compliance with DOT CFR 49, Parts 192 and 199, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards". As such the contractor must have: A.) A drug and alcohol testing program that meets the regulations, and B.) An Operator Qualification Program that complies with Part 192, Subpart N, "Qualification of Pipeline Personnel". GUC must review and have sole approval rights of the programs of the contractor.

The Contractor shall have evidence of successful completion of similar work and references to help determine the experience of the contractor.

GUC will supplies all materials for the proposed 4" MDPE Gas Pipe, SDR 11, 160# WP

No gas services will be changed over during the winter months (November – March) unless approved by Greenville Utilities Gas Department Representative.

GUC will have final authority over contractor methods and practices pertaining to the gas line installation. GUC will also have final approval over acceptance of the work. GUC will provide an inspector to oversee the contractor's work for all phases of the gas line installation.

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No work on the existing gas facilities may occur without a GUC inspector present, and the work must be coordinated with GUC, with two weeks notice given in writing.

Upon completion of construction, the Contractor shall contact the Resident Engineer to schedule a pre-final inspection with GUC. At the scheduled pre-final inspection, a GUC Representative shall perform a visual inspection of the work in the presence of the Contractor. Any deficiencies discovered shall be recorded by the GUC Representative and the Contractor. Any defective items noted shall be corrected prior to the final inspection.

Upon approval of the work, the Contractor shall submit as built plans to the GUC Gas Department either in a reproducible mylar or digital copy format. Two (2) print of the final as-built plans shall also be provided. The gas main as-built plans do not require a profile. The minimum sheet size for as-built drawings shall be 18" x 24". The as built plans shall be signed and sealed by a Register North Carolina Professional Engineer. The cost of the as built plans shall be incidental to the Install 4" MDPE Gas Main pay item.

The scale and coordinates for the as-built plans shall be the same as the construction plans. The actual elevations shown on the as-built profiles shall be based on USGS datum only.

**Greenville Utilities Commissions (GUC) and Town of Winterville  
(Water and Sewer)**

No work on the existing water and sewer facilities may occur without an owner inspector present, and the work must be coordinated with the owner, with two weeks notice given in writing.

The Contractor performing the water and sewer relocation work shall contact the Owner's Representative before operating any valves or hydrants necessary to perform the work. Owner shall require the contractor to estimate the length of time services will be interrupted and the number of customers to be affected.

Upon completion of construction, the Contractor shall contact the Resident Engineer to schedule a pre-final inspection with owner. At the scheduled pre-final inspection, the Owner's Representative shall perform a visual inspection of the work in the presence of the Contractor. The Owner's Representative and the Contractor shall record any deficiencies discovered. Any defective items noted shall be corrected prior to the final inspection.

Upon approval of the work, the Contractor shall submit as built plans to owner either in a reproducible mylar or digital copy format. Two (2) print of

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the final as-built plans shall also be provided. The as-built plans shall include both water and sewer combined on each drawing. The sewer as-built plans shall include plan and profile. The minimum sheet size for as-built drawings shall be 18" x 24". The as built plans shall be signed and sealed by a Register North Carolina Professional Engineer. The cost of the as built plans shall be incidental to each pipeline pay item.

The scale and coordinates for the as-built plans shall be the same as the construction plans. The actual elevations shown on the as-built profiles shall be based on USGS datum only.

### **CSX RAILROAD**

Upon approval of the work, the Contractor shall submit 2 -11" x 17" as built plans (Plan and Profile) to CSX Railroad. The plan and profile view shall be shown on separate sheets. The as-built plans shall include the 4" gas line, 8" force main, 12" water line and 6" water line combined on one plan sheet. The as built plans limits are from Sta. 47+50 to Sta. 59+50 Line -L-. The railroad milepost for each utility crossing shall be show on the plans and profiles. The railroad right of way and track locations shall also be shown on the plans and profiles. The as built plans shall be signed and sealed by a Register North Carolina Professional Engineer. The cost of the as built plans shall be incidental to each pipeline pay item.

The scale and coordinates for the as-built plans shall be the same as the construction plans. The actual elevations shown on the as-built profiles shall be based on USGS datum only.

#### Utility Locations Shown on the Plans:

The location, size, and type material of the existing utilities shown on the plans are from the best available information. The Contractor will be responsible for determining the exact location, size, and type material of the existing facilities. There is Subsurface Utility Engineering (SUE) test holes available for this project and will be provided to the Contractor at the preconstruction meeting.

No direct payment will be made for utility construction work required by the preceding provisions, which are general requirements applying to utility construction, and all of the requirements stated will be considered incidental work, paid for at the contract unit prices of the various utility items included in the contract.

#### **II. COMPENSATION:**

No direct payment will be made for utility construction work required by the preceding provisions, which are general requirements applying to utility

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construction, and all the requirements stated will be considered incidental work, paid for at the contract unit prices of the various utility items included in the contract.

**1. INSTALL 4" MDPE GAS MAIN:**

**GREENVILLE UTILITIES COMMISSION  
CONSTRUCTION OF  
4" MDPE, SDR 11 - NATURAL GAS PIPELINE  
NCDOT BRIDGE PROJECT U-3613B  
GREENVILLE, NC**

**PROJECT SPECIFICATIONS**

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## **1.0 General**

This section contains the specifications for the installation of the approximately 13,900 feet of 4" MDPE Gas pipeline. The installation of the pipeline and all work on the natural gas system shall be in accordance with all applicable sections of Title 49 of the Code of Federal Regulations, Chapter I, Part 192, "Transportation of natural and other gas by pipeline: minimum Federal safety standards". Should there appear to be a conflict between these specifications and Part 192, the Federal standards shall take precedence and the conflict shall be brought to the attention of the Commission.

### **1.1 Survey Stakes**

Contractor will use survey stakes to determine extent of clearing required on the permanent and temporary construction easements, and to locate the centerline of the proposed pipeline as shown on the plans. The cost of replacing survey stakes that have been destroyed due to the carelessness of Contractor shall be paid by Contractor. Contractor will maintain the survey stakes throughout the construction period of the pipeline. Any property corners, monuments or markers destroyed by Contractor shall be replaced by and at the expense of the Contractor.

### **1.2 Horizontal Directional Drilling**

Medium-density polyethylene (MDPE) Gas Pipe shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

MDPE Gas Pipe shall be 4", SDR 11, 160 # WP, manufactured in accordance with ASTM D 2513, CSA B137.4 (Polyethylene Pressure Pipe and Fittings, 4" through 64", For Gas Distribution, MDPE Pipe Size. MDPE pipe materials shall be made from materials conforming to standard PE code designation PE 2406.

The 4" MDPE Gas Pipe, SDR 11, 160# WP and fittings will be supplied by GUC.

Drilling fluid to be bentonite slurry. Use admixtures suitable to the site conditions.

MDPE Gas Pipe to be fused and tested prior to placement beneath the buffer zones and creeks. Join pipe segments by cutting the ends square, heating and fusing under sufficient pressure to create a single length of pipe sufficient to complete installation in one continuous pulling operation. The pipe

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manufacturers listing of fusion parameters validated by appropriate testing and the parameters of the contractor's fusion system shall be submitted to the Resident Engineer prior to fusing of segments of MDPE Gas Pipe into the pipe string. MDPE Gas Pipe string to be tested in accordance with testing procedure outlined in these specifications under pneumatic testing - Section 1.15 prior to being placed beneath the buffer zones and creek.

MDPE Gas Pipe to be installed beneath buffer zones and creeks by boring or drilling a small pilot hole along a parabolic arc beneath the creek and buffer zones. A minimum cover of 3 feet shall be maintained over the MDPE Gas Pipe at all times. Enlarge the pilot hole by use of a reamer or reamers to the desired diameter. When the bored hole is of the diameter recommended by the pipe manufacturer for the MDPE Gas Pipe, the contractor will pull the pipe string through the hole by the drill string. Cap the pipe string during the pulling operation. Pulling operation to incorporate a swivel connection to minimize torsional stress imposed upon the pipe string. Fully support the pipe string before and during pull back so that the pipe string will move freely without damage. MDPE Gas Pipe installed by directional boring shall not be connected to existing pipe or fittings for one week from the time of installation to allow tensional stresses to relax.

Drilling fluid to be re-circulated through use of a solids control system to remove spoil from drilling fluid surface returns. After cleaning, return the drilling fluid surface returns to the active system. No drilling fluid shall enter the stream.

The Contractor may elect to conduct reaming and pulling of the pipe string in one operation at the discretion of the Engineer. The reamer head shall be fitted with a sleeve to prevent possible spalling that may become lodged and prohibit the pull back of the pipe string.

### **1.3 Right-of-Way Clearing and Grading**

- a. The right-of-way shall be cleared of trees, shrubs and other obstructions only to the width required to permit the construction equipment to efficiently perform the necessary pipeline installation activities. In every case, the Contractor shall confine the clearing work to inside the right of way or the construction easements.
- b. Prior to commencing clearing operations, the Contractor shall familiarize itself with all of the provisions and restrictions included in the permits procured by Commission, including the preservation of certain trees and

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shrubs, and shall carefully comply with these provisions and restrictions.

- c. All trees and shrubs shall be cut level with the surface of the ground, and shall be piled along the right-of-way and promptly disposed of in a manner satisfactory to the landowner and/or tenant, and the Commission's Authorized Representative. Disposal of this material shall also be performed in compliance with federal, state and local regulations.
- d. The right-of-way along the ditch line and in the ditch spoil area shall be cleared of stumps and other debris to ensure that the spoil from the ditching operation will remain free of any debris.
- d. Adequate care shall be exercised in conducting the right-of-way clearing operations in order to avoid damage or injury to adjacent property.
- e. Burning of timber, brush, or any other clearing debris or materials is not permitted on this project.

**1.4 Ditching**

- a. The Contractor shall dig the pipeline ditch on the staked survey line or the designed offset provided by Engineer. No deviation from the survey line shall be made unless field conditions necessitate a change in routing, and approval has been obtained from Commission's Authorized Representative. The Contractor will excavate the ditch such that the 4" pipeline will, upon installation in the ditch, have the finished elevation as shown on the project drawings.
- b. For lateral connections to existing facilities, unless specified otherwise in the job description, special provisions, Commission drawings, and/or Permit Drawings, the pipeline ditch shall be excavated to the minimum width and depth to provide the minimum cover as listed below. The pipe cover shall be measured from the top of the pipe to the graded ground level on each side of the ditch.

**MINIMUM DITCH REQUIREMENTS**

<u>Nominal Pipe Size</u>	<u>Width</u>	<u>Cover</u>
2"	12"	36"
4"	16"	36"
6"	18"	36"



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8"	20"	36"
10"	22"	36"
12"	24"	36"
14"	26"	36"
16"	28"	36"
18"	30"	36"
20"	32"	36"
22"	34"	36"
24"	36"	36"
26"	38"	36"
30"	42"	36"
36"	48"	36"

- c. In the event partial or all rock areas are encountered along the route, the pipeline ditch shall be excavated to a depth to provide the minimum cover as shown in paragraph b. above, plus an allowance for the placement of dirt-filled sack benches at 20 foot intervals to support the pipe and maintain a minimum four inches of clearance between the pipe and the bottom of the ditch for subsequent ditch padding.
- d. As directed by Commission's Authorized Representative, the Contractor shall excavate the ditch across cultivated or improved land in a manner that will separate and preserve a minimum of 12 inches of top soil from the remaining excavated subsoil (double ditching).
- e. The Contractor shall construct temporary bridges or leave dirt plugs in the pipeline ditch in areas along the pipeline route wherever necessary to provide the landowners or tenants safe ingress and egress to their property or residence.
- f. During ditch excavation operations, the Contractor shall provide and maintain erosion and sedimentation control structures as required by city, county, and state agencies.

### **1.5 Handling and storage of Pipe and Materials**

The Contractor shall make prompt arrangements at his expense for the hauling and proper handling and storage of all pipe, valves, fittings and other materials furnished by Commission (except for storage facilities provided by Commission for materials stockpiled prior to the commencement of the work). The Contractor shall be responsible for loading, unloading and storing of these materials in a manner to prevent damage and loss, and to allow ease for future handling and distribution. All damages or losses of Commission materials incurred after receipt of these materials by the Contractor shall be the Contractor's responsibility to replace. Pipe shall be handled with approved equipment in the manner to prevent damage to the pipe. Appropriate unloading and handling equipment of

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adequate capacity must be used to unload the truck. Pipe must not be rolled or pushed off the truck.

- a. Several storage or staging areas along the project may be appropriate. The site should provide protection against physical damage to the pipe. The site shall be large enough to accommodate the pipe, accessories and provides access to equipment to enter and exit the site.
- b. Pipe store in coils shall be placed on wooden palettes that are evenly placed to support the pipe against deformation or damage to the pipe surface. The pipe coils shall be stored at a sufficient height to prevent ground water runoff from enter or touching the pipe. Special handling and laying equipment may be required for coiled pipe. During installation the coiled pipe may require field processing through re-rounding and straightening equipment.
- c. Standard pipe in 40' or 50' sections may be stacked in rows on a platform of adequate strength to prevent pipe deflection. The platform requires blocking on each side to contain the pipe sections. Pipes shall be laid straight, not crossing over or entangled with each other. The platform shall be high enough to prevent any part of the pipe surface from touching the ground or allowing ground runoff water to enter the pipe. The pipe platforms shall be made of padded wood stringers that are properly spaced to evenly support the pipe joints against deformation or damage to the pipe surface. The Contractor shall stack the pipe in an acceptable number of tiers; however, the number of tiers shall be reduced if Commission's Authorized Representative determines that a safety risk exists or that damage to the surface of the pipe or pipe deformation has occurred.
- d. Materials that can be easily lost, or damaged by exposure to rain, humidity or extreme temperatures should be stored in a building.

## **1.6 Hauling and Stringing**

- a. The hauling of pipe and other materials shall be performed in compliance with the rules and regulations of the State Highway Department, the Interstate Commerce Commission, and any other governmental agencies, which have jurisdiction. Contractor shall obtain from these agencies the necessary permits or licenses required for the hauling operations.
- b. Padded bolsters and nylon straps shall be used by Contractor to protect the pipe from damage during the hauling operations. The pipe shall be adequately supported on the trailers, and the number of tiers shall be kept to an

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- acceptable limit to prevent deformation of the pipe joints and/or damage to the pipe surface.
- c. Careful loading and stringing shall be followed by the Contractor to avoid damage to the pipe. After unloading, the pipe shall be supported above ground, level, and in a manner that will prevent rain runoff water and sediment from entering the pipe.
  - d. When applicable, the A-frames of the sideboom tractors (if used to unload the pipe along the right-of-way shall be sufficiently padded to protect the pipe from damage.
  - e. The Contractor shall string pipe and materials on the right-of-way in a manner that will cause the least interference possible in the normal use of the land that is crossed. The Contractor will string pipe and materials such that property owners or tenants of property adjacent to the right-of-way shall at all times have at least one driveway clear for ingress and egress of vehicles.

**1.7 Laying**

- a. The pipe lay shall proceed along the route of the previously excavated ditch with the lineup and butt fusion of the pipe joints being performed alongside the ditch by the Contractor. The Contractor shall keep the ditching, laying and butt fusion operations within reasonable distance of each other consistent with good pipeline construction practices.
- b. The open ends of the pipe sections that cannot be visually inspected shall be securely closed at the end of each workday to prevent the entrance of animals or foreign matter into the pipe. Canvas or watertight nightcaps shall be used, and shall not be removed until the resumption of work.

**1.8 Inspection**

- (1) A GUC's Representative should inspect all materials for defects prior to installation.
- (2) All butt fusion joints shall be visually inspected by a GUC' Representative. The size and shape of the external fusion beads indicate if a proper joint has been made. The double bead width should be 2 to 2 ½ times the bead height from the pipe surface. The beads should be uniform in size and shape all around the joint and the depth of the v-groove between the beads must not be more than half the bead height. If the v-groove is too deep, a "cold" fusion may be have occurred. Cold fusion results when most of the melt is pressed out of the joint.

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## 1.9 Lowering-In

- a. Before the pipe is lowered, the Contractor will confirm the following:
  - (1) Large rocks or material that could damage the pipe have been removed.
  - (2) Any rock bed areas have been removed.
  - (3) The ditch bottom shall have an even and continuous grade, so that the pipe has a substantial and continuous bearing.
- b. Wherever possible when lowering pipe into the trench, vertical bends shall be lowered first and anchored with backfill material. Horizontal bends shall be placed to bear against the outside wall of the trench. All verticals bends and shall fit the ditch, it being the intent to lower the pipe in such a manner that will cause the pipeline to be installed without tension.
- c. During the lowering-in operations, the pipe shall be handled at all times with wide canvas or nylon slings to prevent damage pipe. Bare wire rope slings, chains, hooks or metal bars will not be permitted for handling the pipe sections.
- d. Lowering-in and backfilling operations shall not be permitted until the Contractor has notified Commission's Authorized Representative and obtained his approval to proceed. Should lowering-in or backfilling be performed without the approval or presence of Commission's Authorized Representative, Contractor may then be required to uncover that section of line for inspection at Contractor's expense.
- e. The distance between the lowering-in operation and the backfill operation shall not exceed one thousand feet, or as approved by Commission's Authorized Representative.
- f. Locator Wire: A 10 gauge, stranded copper wire with 45 mil polyethylene insulation and jacketing shall run continuously and shall be taped securely to the gas main at intervals no greater than 16 feet. The wire shall be colored-coded yellow for gas. The locator wire shall be accessible for hook-up at all tracing stations at locations not to exceed 1000 feet. Cost and installation of the locator wire and tracing stations shall be considered incidental to the installation of the 4" MDPE gas main. In the areas where the pipe will be installed by directional bore, two-locator wire shall be attached to the pipe.

Acceptable Wire Connections:

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1. Set screw pressure type for use with 10 gauge stranded wire, Model #1007-PE45-GN by Kris-Tech Wire Company, Rome NY, or approved equal.
2. C-Tap for two way splicing of tracing wire, for use with 10 gauge stranded wire. T&B #54705 or approved equal.
3. Split bolts, three wire type for splicing of tracer wire, for use with 10 gauge stranded wire. ILSCO Catalog #SEL-2S or equal.

Tracing Station (flush with the grade) – Cast Iron valve box for corrosion protection. Height shall be a minimum of 10” to be installed at grade with cast iron lid and frame. Lid shall be imprinted with the wording “TRACING STATION”. Tracing Station Box shall be placed on 3’ of #57 stone, approximately 3’ square. Each of the two wires entering the station shall be encased in 1” Sch. 80 PVC piping and arranged in a manner as to indicate their direction. Five (5) feet of slack shall be left at the end of each wire inside the box. A pipeline marker will accompany each tracing station of this type. Each tracing station of “flush with grade” type shall be model 1575 by East Jordan Iron Works, Inc., model R-1975 by Neenah Foundry Company or approved equal. See plans for details.

### 1.10 Backfilling

- a. Backfilling shall follow the laying and lowering of the pipe as closely as possible and shall be done so that no excavated material remains undistributed on adjoining ground.
- b. Sections of the ditch that have been “double-ditched” shall be backfilled with subsoil to within 12 inches of the ground level, or top of subsoil and compacted. Topsoil shall be placed in the ditch for the top 12 inches and the topsoil backfill shall be heaped over the center of the ditch to a height that will insure complete filling of the ditch after settlement. Backfill through cultivated field or fields suitable for cultivation shall be rounded off so as not to interfere with farming operations.
- c. Where the right-of-way has been graded or leveled to facilitate the operation of ditching machines or other equipment, the backfill shall be completed so that the original contour of the ground will be restored unless otherwise directed by Commission’s Authorized Representative.
- d. Excavated rocks whose largest dimension is not larger than six (6) inches may be returned to the ditch, however, no rocks larger than 1 1/2 inches in diameter will be permitted to be placed directly on top of or around the pipe. Rocks returned to the pipe ditch shall be prevented from contacting the pipe by the use of rock shield or padding. Rocks that are six (6) inches or larger in diameter can be placed in cuts in the

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- pipeline right-of-way providing the cuts are backfilled with soil and graded back to their original contours. Excavated rock not returned to the ditch shall in no case be left in cultivated fields or fields suitable for cultivation. When rock shield is not used, the pipe shall be protected by earth bedding and padding of not less than four (4) inches around the entire pipe circumference. No barrels, cans, drums, stumps, rubbish, waste or refuse shall be placed in the ditch.
- e. The backfilling shall be performed with care to prevent damage to the external coating of the pipe, fittings or other appurtenances. Hand backfilling shall be used where necessary.
  - f. Where additional backfill material is required, beyond that available from the ditch excavation, such material shall be furnished and placed in the ditch at the Contractor's expense.
  - g. Any backfilling omitted because of installation of sack breakers, taps, tie-in connections, test stations, valves, concrete foundations, anchor blocks, etc., shall be performed after such installations have been completed and approved.
  - h. Any drainage ditches that have been disturbed as a consequence of the installation of the pipeline shall be restored by the Contractor to their original elevation during the backfilling operation.

### **1.11 Highway, Road, and Railroad Crossings**

This specification includes all work required to haul, unload, excavate, bore, and install the pipeline, with casing as permitted, under all highways, roads and railroad crossings.

- a. The Contractor shall comply with all crossing permit requirements and restrictions, and shall not start work on any crossing without prior notification to, and approval from, Commission's Authorized Representative.
- b. The Contractor shall provide and maintain temporary construction entrances, as required, to any public and private roads or to any entrances that may be opened for construction.
- c. The installation of all public road crossings shall be performed in accordance with plans and with any general specifications that may be required by the state or city highway engineer.
- c. In all cases where specified, the crossing of existing roads shall be accomplished by boring and jacking or directional bore. The Contractor shall not install any pipes across the existing roads by open cut without written permission from the resident engineer. The 8" steel encasement use to install the 4" gas main under the railroad track shall be 0.188" thick and

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- will be furnished by GUC.
- d. The Contractor shall furnish and maintain lanterns, barricades, warning signs, guard rails and other safety devices at all road crossings while work is in progress, as required by state or city regulations or as directed by Commission's Authorized Representative.
  - e. At specified highways, road and railroad crossing the carrier pipe (with spiders installed 24" from the end and subsequent spiders placed at 10' intervals within the casing) shall be installed inside a continuous length of welded casing pipe. Vent pipes shall be attached at each end of the casing and shall extend underground to the NCDOT Right of Way boundaries unless shown otherwise on the plans. The vent pipes shall be installed outside the CSX Right of Way. Link seals will be installed to provide a watertight seal at each end of the encasement pipe.
  - f. In the event voids between the casing pipe and the soil develop during and after boring and installation of the casing pipe, then such voids shall be filled by pressure grouting by the Contractor at no additional cost to Commission.
  - g. Earth filled sacks shall be placed beneath the carrier pipe at ten (10) foot intervals to support the pipe in the areas from the end of the casing pipe to the point where the carrier pipe rests firmly on the bottom of the ditch.

#### **1.12 Stream and Buffer Zone Crossings**

- a. The Contractor shall provide all labor and equipment to directional bore the pipeline across streams and buffer zones. Such crossings are to be considered as part of the scope of work.
- b. The pipelines installed by directional bore shall be installed to a minimum depth of 5' below the streambed.
- c. The Contractor shall perform all operations outside the buffer zones. The stream and buffer zones cannot be impacted.

#### **1.13 Valves, Taps, and Connectors**

- a. All designated valves, taps other appurtenances shall be installed by the Contractor at the locations shown on the plans or as directed by Commission's Authorized Representative. Installation shall be in accordance with the detailed drawings and applicable sections of these Specifications.
- b. The Contractor shall be compensated for the installation of valves, taps, etc. The compensation shall include all costs associated with the work required to fabricate, pre-test and

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install these appurtenances where shown on the plans and shall be incidental to the unit price to install the 4" MDPE gas main.

- c. Unless shown otherwise on the plans, or as directed by Commission's Authorized Representative, placement and tie-in of all valves, taps and other appurtenances shall be performed by the Contractor in conjunction with the laying of the pipeline, prior to the cleaning and testing of the completed pipeline sections.
- d. In the event hot cuts are required to connect the newly installed pipeline to an existing pipeline which is in service, then Commission shall make arrangements to have this work performed by the Contractor's employees or others under the direct supervision and scheduling of Commission's Authorized Representative.
- e. Valves, fittings, piping, etc., that are uncoated and are to be installed below ground shall be coated in the following manner:
  - (1) All surfaces to be coated shall be cleaned with a suitable non-oily solvent and wire-brushed clean of all foreign material.
  - (2) The cleaned surfaces shall be coated by applying epoxy primer and two coats of coal tar epoxy as specified in the coating manufacturer's data sheet for mixing, application and drying times.
- f. Special care shall be taken by the Contractor while performing the necessary backfill operations at valve, tap, etc., installations to prevent movement of the pipeline adjacent to these installations which might result in added tensile and bending stresses to the pipe.

#### **1.14 Internal Pipe Cleaning**

- (1) Pigging Line: After a section of pipeline is lowered and backfilled and prior to pressure testing, Contractor shall run a cleaning pig through the section to clean the line and check for obstructions.
- (2) Cutting out Pig: In the event the pig lodges in the line, Contractor shall cut the line, remove the obstruction, butt fuse the pipe joint and repeat the pigging operation until a successful run of the pig has been completed, at no additional cost to the Commission.
- (3) Commission's Authorized Representative must be present when Contractor inserts pig in the line, removes such pig from the opposite end of the pipe section or cuts out obstructions and repairs line, or the cleaning operations will not be accepted, and such



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cleaning operations not witnessed by Commission's Authorized Representative shall be repeated at no additional cost to Commission.

- (4) Types of Pigs and Construction: Commission shall supply all pigs for cleaning the test sections.
- (5) The intent of these specifications is not to cover every aspect of the cleaning process, but is to provide specific requirements that are necessary for this particular job. Contractor shall be solely responsible for the cleaning operation and shall pursue the work in a diligent manner so as to complete the work in the least possible amount of time.

## **1.15 Pneumatic Testing**

### **1.15.1 General**

- (1) Upon completion of the line or a substantial part thereof, sections of the line shall be cleaned and tested in accordance with the procedure specified herein. Contractor shall give three (3) days notice prior to testing any section of the pipeline in order that proper notification can be made by Commission to other parties.
- (2) The Commission shall specify the test procedure and the test pressures, including test pressures for special construction, valve assemblies and other installations as designated in the Special Provisions, in the plans, or by Commission's Authorized Representative.

### **1.15.2 Test Equipment, Materials and Labor Furnished by Contractor**

- (1) Contractor shall provide air compressor(s) capable of increasing line pressure to the specified test pressure.
- (4) Contractor shall furnish all fill and test fittings, manifold piping, valves, high pressure hose, temperature and pressure recorders, gauges, squeegees, brush pigs, swabs, sizing plates, charts and all other test apparatus as may be required by Commission's Authorized Representative.
- (3) Fittings, pipe, valves, etc. shall be of proper rating for the test pressure specified. The use of cast iron materials shall not be permitted.

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**113****1.15.3 Determining Test Pressures and Test Sections**

- (1) Contractor shall notify Commission's Authorized Representative three (3) days in advance concerning plans for testing any section of the pipeline. Contractor shall furnish all materials (except materials furnished by Commission), and fabricate and install manifolds required for testing in accordance with the applicable drawings or to the satisfaction of Commission's Authorized Representative.
  - (a) The test pressure for the 4" MDPE Gas Pipe, SDR 11, 160# WP shall be 90 psig.

**1.15.4 Pretest Procedures**

- (1) The Contractor shall install manifolds at agreed points. The installation of the manifolds shall be in strict accordance with MDPE pipe manufacturer standards.
- (2) The test section shall be backfilled throughout its entire length, except at valve settings and necessary tie-in locations approved by Commission's Authorized Representative.
- (3) All main line valve assemblies shall be installed in the line prior to main line testing.
- (4) The Contractor shall install all test instrument lines. All lines shall be either high—pressure tubing or hose.

**1.15.5 Pressuring Procedures**

The Contractor shall pressure the pipeline test section as described below:

- (1) Pressuring Operations
  - The Contractor shall increase the pressure to the specified test pressure in small increments. The pressure sensing point shall be at each end point in the test section.
  - When testing at pressures above the system design pressure, the maximum test duration shall be eight hours. If the test is not completed due to leakage, equipment failure, or any other reason, depressurize the test section completely, and allow it to relax for at least eight (8) hours before pressurizing the test section again. All thermoplastic pipes have reduced

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strength at elevated temperatures. Test pressure must be reduced when the test section is at elevated temperature either from service conditions or from environmental conditions. The maximum test pressure is measured at the lowest elevation in the test section. See pipe manufacturer specifications for elevated temperature test pressure adjustments. The pneumatic test should be gradually increased to not more than one-half of the test pressure, and then increase in small increments until the test pressure is reached. The contractor shall stop the compressor when pressure in the pipe test section reaches the test pressure. A pressure chart or recorder, which produces a permanent pressure record, will be attached to the pipeline in order to monitor the pressure of the test section. The recording device shall be of a type that continuously records the pressure for a period of 8 hours and shall be approved by the Commission's Authorized Representative. The test shall be considered successful if the specified test pressure is maintained for the specified test duration, with allowances for changes in temperature. However, the success of the test shall be determined by Commission's Authorized Representative.

- (2) Procedure for Locating and Repairing Leaks or Failures During Pneumatic Testing
  - (a) Should the procedure outlined in Paragraph (1) above indicate that a leak exists, the Contractor shall then check all possible sources of leaks by inspecting all valves, instrument lines, exposed piping and test equipment. Should no leaks be found, an underground leak is then evident.
  - (b) At this point, the Contractor shall furnish labor and equipment to locate the leak or failure. The Contractor shall repair all leaks and failures. After repairs are made and the pipe is depressurized for 8 hours, the Contractor shall restore the pressure to the specified test section.
  - (c) Should a leak be due to faulty workmanship by the Contractor, or due to failure or negligence on the part of the Contractor, then the

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- Contractor shall bear all costs incurred for locating and repairing the leak.
- (d) Should a leak be due to faulty or defective material furnished to the Contractor by the Commission, then the Commission shall reimburse the Contractor for all costs incurred for locating and repairing the leak, and for the cost to bring the testing operation back to the point attained at the time the leak was detected. Reimbursement shall be made on an extra work basis in accordance with labor and equipment rates provided for in the proposal. Any leaks found shall be repaired according to Commission's specifications.
- (e) Upon detecting that a leak exists in any test section, the Contractor shall then proceed to locate the leak using the initial list of equipment and personnel approved by the Commission prior to commencing the testing program. Commission's Authorized Representative shall be furnished the following information prior to proceeding to locate and repair the leak:
- 1) The list of approved equipment to be used in locating the leak.
  - 2) A list of approved personnel, including names and classifications, to be utilized in locating the leak.
    - Proper records shall be kept in accordance with the extra work provisions of the General Conditions with regard to all work performed in locating and repairing all leaks or failures.

(3) Procedure After Repair of Leak or Failure

After the repair of the leak or failure and the pipe has been depressurized for 8 hours, the Contractor shall repeat the pressure testing procedure as outlined previously and then proceed as follows:

- (a) The Contractor shall then pressurize the pipeline section to the specified test pressure. Contractor shall terminate the pressure operations when the specified test pressure is reached.

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- (b) The Contractor shall hold the test pressure for a continuous period of 8 hours, and providing a continuous test recording for the duration of the test. If depressurization occurs during the test, then the pressure shall be allowed to stabilize. At such time as the test pressure stabilizes for a period of one (1) hour, the Contractor shall then pressurize the test section back to the test pressure in accordance with the test procedure. The test period shall begin again after any re-pressure. No re-pressuring shall be performed during the test period. Immediately following completion of the pressure test, all data shall be analyzed by Commission's Authorized Representative to determine the acceptability of the test.

**1.15.6 Change in Pressure**

In the event a continuous decrease in pressure is observed, the Contractor shall re-pressure the section to the specified test pressure after an elapsed time of two (2) hours. If a continuation of pressure decay is observed within the next two (2) hour period, a leak is evident. Therefore, the Contractor shall discontinue the testing until the leak has been located and subsequent repair (or repairs) made. If the pressure stabilizes within these four (4) hours, the Contractor shall re-pressure to the specified test pressure and proceed with the test program. Contractor shall not permit the pressure during the test to increase in excess of 50 psig above the test pressure.

**1.15.7 Records**

The Contractor shall keep an accurate report of all data obtained. The Contractor shall complete the approved test form for each section. All records shall reflect, but not be limited to the following:

- (1) Tests shall be numbered by test sections, i.e., Test #1, #2, #3, etc.
- (2) Commission's name.
- (3) Date and time the test starts.
- (4) Date and time the test ends.
- (5) Test pressure.
- (6) Test medium.
- (7) Certification by the Contractor.

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- (8) Certification by Commission.
- (9) Explanation of any discontinuity in pressure on any chart.
- (10) Continuous pressure recording charts for each test section.

Should a leak occur in any test section, in addition to the above information, the following will also be furnished:

- (1) Location of the leak by engineering station.
- (2) Pressure at time leak was detected (furnish chart).
- (3) Date and time leak was detected.
- (4) Date and time leak was found.
- (5) Date and time leak was repaired.
- (6) Cause of leak (split seam, crack or other, etc.).

**Note:** After each leak, the entire test procedure is to be repeated, starting with a new chart.

All records shall be sent to Commission's Authorized Representative as specified in the Contract Documents.

#### **1.16 Purging and Introducing Natural Gas**

Purging air from the pipeline prior to introducing natural gas shall be accomplished by using a slug of nitrogen gas to keep air and natural gas from mixing. Contractor is to supply all materials and equipment necessary to perform the purging operation. The specific procedures to be followed shall be supplied by the Commission prior to the activity. In general, however, the purging and gas up process will take place as follows:

- (a) Notification shall be given to proper authorities at least three days in advance of the procedure taking place.
- (b) Contractor will attach purging and venting connections on opposite ends of the completed pipeline.
- (c) The Contractor will introduce the specified amount of nitrogen into the pipeline.
- (d) Immediately following the nitrogen introduction, natural gas will be introduced, at the same location, in such a manner as to push the nitrogen slug towards the end of the pipeline that has the vent installed.
- (e) Contractor will employ a combustible gas indicator to sample the gas venting from the vent stack. When it is determined that 100% natural gas is venting the pipeline, the venting operation will cease.

The pipeline will be pressured with natural gas, and Contractor will cap the purging connections.

### **1.17 Right-of-Way Cleanup**

- a. The Contractor shall begin the right-of-way cleanup work immediately following the backfilling operations, and shall diligently perform all of the required cleanup activities until final completion of the project.
- b. As backfilling is completed, the Contractor shall clear the right-of-way and adjacent property of all surplus materials, rubbish, debris and any surplus excavated material or loose rocks remaining from the excavation operations.
- c. Brush, stumps, broken skids and other such debris shall be burned, hauled away, or otherwise disposed of in a manner and at a location acceptable to Commission's Authorized Representative, and in compliance with all applicable environmental regulations.
- d. After removal of all surplus materials, rubbish and debris, the Contractor shall finish grading the right-of-way using a disc or other approved implements to obtain a smooth and natural appearance. A crown of backfill material shall be placed directly over the ditch, and across cultivated lands the crown shall be smoothed and rounded down to a height of approximately 12 inches above the finished grade.
- e. Final grading shall be performed in compliance with all applicable environmental permits, and the Contractor shall install permanent erosion and sedimentation control structures as required by local environmental agencies.
- f. Wherever roads, culverts, driveways, sidewalks and curbs have been cut or damaged during construction, the Contractor shall repair these surfaces and structures with the same type and quality material as that used in the original installation. Road repairs shall be performed in compliance with the requirements of the local authority having jurisdiction, and to the approval of Commission's Authorized Representative.
- g. All Surplus construction materials furnished by Commission shall be hauled to Commission's storage yard by the Contractor and unloaded in a designated area. The Contractor shall furnish the necessary labor and equipment to unload the surplus materials.
- h. The Contractor, at each railroad crossing and at other locations shall install pipeline markers as shown on Commission's drawings and as directed by Commission's Authorized Representative.
- i. Immediately after final grading is completed, for any area, the Contractor shall spread lime, fertilizer, mulch, and a grass seed approved by Commission's Authorized Representative, over the entire graded area.

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### **1.18 Environmental Protection**

- a. The Contractor shall conduct all of its construction operations in a manner that minimizes detrimental impact to the soil and water resources located along the pipeline route, and that protects, to the highest degree possible, the surrounding lands and natural scenery from any adverse effects that may occur as a result of the necessary construction activities
- b. The Contractor shall strictly comply with the requirements of the Contract Documents, and with the requirements of the federal, state and local environmental protection agencies having jurisdiction in the areas along the route of the proposed pipeline.
- c. Erosion and sediment control measures include, but are not limited to, the installation of, silt fences, trench plugs, temporary culvert and crushed stone bridges, riprap, mulch, erosion control mats, and geotextile fabrics. Erosion control mats for stabilizing slopes shall be biodegradable jute netting or equal approved by Commission's Authorized
- d. The Contractor shall exercise extreme care while performing the necessary construction work near streams and buffer zones. The streams and buffer zones cannot be disturbed, the contractor shall install the gas line under the streams and buffer zones by direction bore as shown on the plans.
- e. An adequate number of trash receptacles will be furnished by the Contractor during the construction operation to provide a means for Contractor's personnel to dispose of garbage and construction waste materials. Under no circumstances shall these materials be thrown away or disposed of on the pipeline right-of-way or the adjoining properties.

### **1.19 Safety**

The Contractor shall take all possible measures necessary to protect all personnel in the work areas and the general public as set out in the General Conditions.

### **1.20 Qualifications of Contractors**

A Contractor, Sub-Contractor, or individual performing work on Owner's facilities on this project that requires compliance with the Code of Federal Regulations Title 49, Part 192, SubPart N, "Qualification of Personnel", must provide evidence satisfactory to Owner of a written Plan of Qualification of Personnel that complies with the regulations



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contained in that Federal Regulation.

Additionally, Contractors and Sub-Contractors must provide Owner with documentation, records, and/or evaluations verifying that all individuals that will be on-site and performing certain tasks on this project are qualified to perform those tasks.

No Contractor, Sub-Contractor, or individual may perform work on Owner's facilities unless they have satisfied the requirements stated herein, except that work performed that does not require compliance with the Federal Regulation cited above may be performed, at the sole discretion of the Owner. Owner reserves the right to be the sole judge of the acceptability of any Qualification Plan submitted for its approval.

Greenville Utilities Commission (GUC) will supply all materials for the 4" MDPE gas main

The 4" gas pipe, installed in accordance with the plans and provisions herein and accepted, will be paid for by lump sum for "Install 4" MDPE Gas Main ". Such prices and payments will be full compensation for installation, excavation, labor, testing, backfilling and incidentals necessary to complete the work as required.

## **2. BEDDING MATERIAL:**

Bedding material for utility lines shall be installed in accordance with the applicable utility provisions herein, as shown on the utility construction plans, and/or as directed by the Engineer.

Bedding material shall meet the requirements of Article 1016-3 of the Standard Specifications. Bedding material shall be installed in accordance with Articles 300-6 and 300-7 of the Standard Specifications and the detail sheets, which are part of the Utility Construction Plans.

Bedding material installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per ton for "Bedding Material, Utilities Class IV". Such prices and payments shall be full compensation for all materials, labor, equipment, compaction and shaping the bedding material in accordance with Article 300-4 of the Standard Specifications, and incidentals necessary to complete the work as required.

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**121****3. DUCTILE IRON WATER PIPE:**

Ductile iron water pipe shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Ductile iron water pipe shall be of the thickness and pressure rating class, shown on the utility plans and shall conform to ANSI A21.51 (AWWA C151). Such pipe shall be either mechanical joint or push-on-joint and installed with rubber gaskets in accordance with ANSI A21.11 (AWWA C111) (rubber gasket joints for cast iron pipe) or as designated by the Engineer.

All ductile iron water pipe shall be cement mortar lined with a seal coat in accordance with ANSI A21.4 (AWWA C104).

All ductile iron pipe shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105).

All ductile iron water pipe shall be installed in accordance with laying condition Type 2 as stated in ANSI A21.51 (AWWA C151) unless otherwise shown on the plans.

Ductile iron water pipe installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end, with no deductions for fittings or valves, and paid for at the contract unit price per linear foot for "12" DI Water Pipe, PC 350". Such prices and payments will be full compensation for all materials, including pipe accessories, excavation, labor, anchoring pipe fittings, pressure testing, sterilization, backfilling, and incidentals necessary to complete the work as required.

**4. HDPE WATER PIPE BY DIRECTIONAL BORE:**

High-density polyethylene (HDPE) Water Pipe shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

HDPE Water Pipe shall be SDR 9, 200 # WP, manufactured in accordance with ANSI/AWWA C906 (Polyethylene Pressure Pipe and Fittings, 4" through 64", For Water Distribution, Iron Pipe Size (IPS)). HDPE pipe materials shall be made from materials conforming to standard PE code designation PE 3408.

The Contractor shall furnish fittings necessary to connect the DI Water

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Pipe to the HDPE, and fuse the fittings onto each end of the HDPE section of Water line.

Concrete for thrust restraint shall be class A concrete meeting the requirements of Section 1000 of the Standard Specification. The concrete shall be placed around the pipe as shown on the plans and/or as directed by the Engineer. The proposed HDPE water pipe shall have a fitting with an integral ring for thrust restraint fused into the pipe string adjacent to the proposed adapter from HDPE to the DI fitting. The proposed DI reducer shall be tied to the concrete thrust collar by threaded rods.

The reinforcing steel shall meet the requirements of Section 1070 of the Standard Specifications. Reinforcing steel shall be placed in the center of the thrust block and shall be tied to the threaded rods.

Threaded rods shall be A-36 steel and shall match the diameter of the bolts in the coupling and/or ductile iron water pipe fitting, but shall be no less than 3/4" diameter. The proposed transition coupling and/or the nearest ductile iron water pipe fitting shall be tied to the thrust block. A minimum of four threaded rods shall be used, located as shown on the plans.

Drilling fluid shall consist of a bentonite slurry. Admixtures may be added which are suitable to the site conditions encountered.

HDPE Water line shall be fused prior to placement beneath the stream noted on the plans. Join pipe segments by cutting ends square, heating and fusing under sufficient pressure to create a single length of pipe sufficient to complete installation in one continuous pulling operation. The pipe manufacturer's listing of fusion parameters, validated by appropriate testing, and the parameters of the Contractor's fusion systems, shall be submitted to the Resident Engineer prior to fusing segments of HDPE Water Pipe into the pipe string.

After installation, the HDPE Water Pipe string shall be tested under the stream to a hydrostatic pressure of 200# in accordance with the testing procedures outlined in Section 1510 of the Standard Specifications.

HDPE Water Pipe shall be installed beneath the stream by boring or drilling a small pilot hole along a parabolic arc beneath the stream. A minimum cover of 4' shall be maintained over the HDPE Water Pipe at all times. Enlarge the pilot hole by use of a reamer or reamers to the desired diameter. When the bored hole is of the diameter recommended by the pipe manufacturer for the HDPE Water line, the Contractor shall pull the pipe string through the hole by the drill string. Cap the pipe string during the pulling operation. The pulling operation shall incorporate a swivel connection to minimize torsional stresses imposed upon the pipe string.

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Fully support the pipe string before and during pull back so that the pipe string will move freely without damage.

HDPE Water Pipe installed by directional boring shall not be connected to existing pipe or fittings for one week from the time of installation to allow tensional stresses to relax.

The Contractor may elect to conduct reaming and pulling of the pipe string in one operation at the discretion of the Engineer. The reamer head shall be fitted with a sleeve to prevent possible spalling that may become lodged and prohibit the pull back of the pipe string.

Drilling fluid that does not remain in the bore hole shall be collected and disposed of properly. No drilling fluid shall enter the stream.

HDPE Water Pipe, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end, with no deductions for fittings or couplings, and paid for at the contract unit price per linear foot for "\_\_\_" HDPE Water Pipe, SDR 9, 200# WP by Directional Bore". Such prices and payments will be full compensation for furnishing all labor, equipment, material, couplings and fittings, excavation, installation, testing, backfilling, and incidentals necessary to complete the work as required.

##### **5. DUCTILE IRON WATER PIPE FITTINGS:**

Ductile iron water pipe fittings and specials shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Ductile iron water pipe fittings shall conform to ANSI/AWWA C110/A21.10 for standard size fittings or ANSI/AWWA C153/A21.53 for compact fittings. All joints shall be either mechanical joint or push-on joint conforming to ANSI/AWWA C111/A21.11. Fittings shall be cement mortar lined with a seal coat in accordance with ANSI/AWWA C104/A21.4. All fittings shall have a minimum pressure rating of 250 #. The exterior of the fittings shall be bituminous coated in accordance with ANSI 21.51.

All ductile iron fittings shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105).

The quantity of ductile iron water pipe fittings will be measured based on the published weights listed in ANSI/AWWA C110/A21.10 exclusive of the weights of any accessories. If the Contractor elects to use compact ductile iron water pipe fittings, measurement shall be based on the weight of standard size ductile iron water pipe fittings as published in ANSI A21.10 (AWWA C-110). No measurement of the accessories will be made as the

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accessories are considered incidental to other work being paid for by the various items in the contract.

The quantity of water pipe fittings, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per pound for "Ductile Iron Water Pipe Fittings, 250 # Min. WP". Such price and payment will be full compensation for all materials, including accessories, labor, installation, anchoring pipe fittings, pressure and leakage tests, sterilization, backfilling, and incidentals necessary to complete the work as required.

#### **6. DUCTILE IRON LOCKING TEE:**

Ductile iron water pipe locking tees shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Ductile iron water pipe tees shall conform to ANSI/AWWA C110/A21.10 for standard size fittings or ANSI/AWWA C153/A21.53 for compact fittings. All joints shall be mechanical joint conforming to ANSI/AWWA C111/A21.11. Fittings shall be cement mortar lined with a seal coat in accordance with ANSI/AWWA C104/A21.4. All fittings shall have a minimum pressure rating of 250 #. The exterior of the fittings shall be bituminous coated in accordance with ANSI 21.51.

The DI tee shall have a locking device that restrains the gate valve on the branch run of the tee.

All ductile iron tees and shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105).

The quantity of water pipe fittings, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "\_\_\_x \_\_\_DI Locking Tee". Such price and payment will be full compensation for all materials, including accessories, labor, installation, anchoring pipe fittings, pressure and leakage tests, sterilization, backfilling, and incidentals necessary to complete the work as required.

#### **7. RESTRAINED RETAINER GLANDS:**

Restrained retainer glands shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans and/or as directed by the Engineer.

Restrained retainer glands shall be design for PVC pipe.

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Restrained retainer glands shall be high strength ductile iron conforming to ASTM A536. Restrained retainer glands shall be capable of restraining push on or mechanical joints for a minimum working pressure of 200# WP. The Restrained retainer glands shall have a series of machined serration on the inside diameter of the retainer, which provides a grip on the pipe surface, with 360° contact and support of the barrel.

All restrained retainer glands shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105).

The quantity of Restrained Retainer Glands, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "\_\_\_" Restrained Retainer Gland 200# WP". Such price and payment will be full compensation for all materials, including restrained retainer gland, labor, installation, backfilling, and incidentals necessary to complete the work as required.

#### **8. INSERTING GATE VALVE AND VALVE BOX (Water):**

Install inserting gate valves and valve boxes in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Inserting valves shall be installed on active water lines that cannot be shut down.

The inserting gate valves shall be restrained with a thrust collar and rods. The contractor shall be careful not to damage the existing AC water line while installing the inserting valve and the thrust restraint. The design for the thrust restraint shall be signed and sealed by a North Carolina Professional Engineer.

Inserting gate valves shall consist of two basic assemblies. A sleeve permanently attached to the water main and a valve mechanism inserted into the sleeve to complete the installation. Sleeves shall be stainless steel ASTM A 240, type 304 and pressure rated at 200 psi. Bolts, nuts and washers shall conform to stainless steel ASTM A 193, A 194 type 304. The Contractor shall verify the type material, size, etc. of the existing pipe to be valved before ordering the sleeve. Inserting gate valve mechanism shall be iron body and shall conform ANSI/AWWA C509 for resilient seat type valves. Inserting gate valves shall have non-rising stems with a 2 inch square operating nut and O-ring seals, and shall open by turning clockwise. Inserting gate valves shall have a design working water pressure of 200 psig.

Install inserting gate valves with an approved valve box set flush with the ground or pavement. Valve boxes shall be of the screw or slip type with a

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base to fit the valve yoke and removable plug cap with the word "WATER" cast therein. Install cast iron valve boxes conforming to ASTM A48, Class 30, unless otherwise shown on the utility plans and/or as directed by the Engineer.

The quantity of inserting gate valves and valve boxes, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "\_\_\_" Inserting Gate Valve And Valve Box, 200 # WP (Water)". Such prices and payments will be full compensation for all materials, labor, excavations, installation, sterilization, pressure testing, valve box installation with the necessary extension pieces, backfilling, and incidentals necessary to complete the work as required.

#### **9. POLYETHYLENE (PE) PLASTIC WATER TUBING:**

Polyethylene plastic water tubing shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

PE water tubing shall conform to ASTM D2737 or AWWA C901. PE tubing materials shall be either PE 2406, PE 3406 or PE 3408 depending upon the required pressure class and dimension ratio (SDR) specified on the plans. Polyethylene plastic water tubing shall meet the requirements of the National Sanitation Foundation Seal of Approval for potable water.

The ends of the plastic water tubing shall be connected using approved compression type couplings and/or compression type fittings. Such couplings and fittings shall have been approved by the Engineer.

Polyethylene plastic water tubing, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end, with no deductions for fittings or couplings, and paid for at the contract unit price per linear foot for "1" PE Water Tubing, SDR 9, 200# WP". Such prices and payments will be full compensation for furnishing all labor, equipment, material, compression couplings and fittings, excavation, chlorinating, backfilling, and incidentals necessary to complete the work as required.

#### **10. BALL VALVES:**

Ball valves and valve boxes shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Ball valves shall be installed on 2" service lines and shall conform to AWWA C800. Valves shall be made of heavy brass components with a

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PTFE coated ball on a "blow-out" proof stem with double O-ring seals, and shall be rated for 200# working pressure. Operating nut shall be "curb key" design for quarter turn open or close and shall open left.

All valves shall be installed with an approved valve box normally flush with ground or pavement. Valve boxes shall be of the screw or slip type with a base to fit the valve yoke and a removable plug cap with the word "WATER" cast therein. Valve boxes shall be made of cast iron conforming to ASTM A48, class 30, unless otherwise shown on the utility plans and/or as directed by the Engineer.

The quantity of ball valves and valve boxes, installed in accordance with the plans and utility provisions herein and accepted, will be measured and paid for at the contract unit price per each for "2" Ball Valve". Such prices and payments will be full compensation for all materials, labor, installation, valve box installation, backfilling, and incidentals necessary to complete the work as required.

#### **11. RELOCATE EXISTING WATER METER ASSEMBLY**

The existing water meters with and meter box that are to be relocated shall be installed at the locations shown on the utility plans, and/or as directed by the Engineer.

The relocation of water meters shall consist of the removal and installation of the existing water meter, valves, and valve box at the appropriate location. Any pipe or fittings necessary to complete the work will be considered incidental.

The water meters sizes are  $\frac{3}{4}$ ", 1" or 2". All are in meter boxes.

All work shall be in accordance with the applicable plumbing codes, as shown on the plans, and as directed by the Engineer.

The water meter assembly, installed in accordance with plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "Relocate Existing Water Meter ". Such prices and payments will be full compensation for all materials, relocation of existing water meter, new vault, equipment, excavation, pressure testing, labor, installation, backfilling, and incidentals necessary to complete the work as required.



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**12. RELOCATE EXISTING WATER METER ASSEMBLY WITH NEW VAULT:**

The existing water meters with new vaults that are to be relocated shall be installed at the locations shown on the utility plans, and/or as directed by the Engineer.

The relocation of water meters shall consist of the removal and installation of the existing water meter, valves, and bypass at the appropriate location with a new vault. Any pipe or fittings necessary to complete the work will be considered incidental.

All work shall be in accordance with the applicable plumbing codes, as shown on the plans, and as directed by the Engineer.

The new vault will be supplied by GUC.

The existing water meter is 2"

After the existing water meter assembly is relocated to the new vault, the existing vault to be abandoned shall be removed and disposed of properly.

The water meter assembly with new vault, installed in accordance with plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "Relocate Existing Water Meter with New Vault". Such prices and payments will be full compensation for all materials, relocation of existing water meter, new vault, equipment, excavation, pressure testing, labor, installation, backfilling, and incidentals necessary to complete the work as required.

**13. RELOCATE EXISTING BACKFLOW ASSEMBLY:**

The existing backflow assembly to be relocated shall be installed at the locations shown on the utility plans, and/or as directed by the Engineer.

The relocation of backflow assembly shall consist of the removal and installation of the existing backflow device and valves at the appropriate location with the existing enclosure service box. Any pipe or fittings necessary to complete the work will be considered incidental.

Backflow assembly shall be tested by an individual certified in accordance with the GUC or Town of Winterville Cross Connection Control Section. The tester shall obtain and complete a "Cross Connection Control Device Permit" from the GUC or Town of Winterville Cross Connection Control Section.

All work shall be in accordance with the applicable plumbing codes, as

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shown on the plans, and as directed by the Engineer.

The relocated service box enclosure shall be placed on a concrete pad 4" thick and 6" larger than the perimeter of the enclosure. The concrete pad shall be Class B in accordance to section 1000 of the Standard Specifications for Roads and Structures.

The backflow assembly, installed in accordance with plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "Relocate Existing RPZ Backflow Prevention System". Such prices and payments will be full compensation for all materials, relocation of existing backflow assembly, equipment, excavation, pressure testing, labor, installation, backfilling, and incidentals necessary to complete the work as required.

#### 14. STEEL ENCASEMENT PIPE:

Steel encasement pipe shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer. Steel encasement pipe may be of the following types: - spiral welded steel pipe in accordance with ASTM A211; circular black or galvanized steel pipe in accordance with ASTM A53 or A589; high strength smooth wall steel casing in accordance with API-5L, Grade B, or other grades; or other steel pipe of acceptable quality and meeting the approval of the Engineer.

Minimum Wall Thickness for Steel Casing under Railroad Tracks (E80 Loading) not coated.

<u>Size</u>	<u>Wall Thickness</u>
12 ¾" and under	0.188"
14"	0.250"
16"	0.250" or 0.281"
18"	0.312"
24"	0.250" or 0.375"

The steel encasement pipe for the 4" Gas main will be supplied by GUC as shown on the plans.

Steel encasement pipe shall be installed with leak proof joints. The joints shall be butt-welded by a certified welder using approved techniques and materials.

Steel encasement pipe installed under the railroad shall be by boring and jacking.

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Simultaneous boring and jacking of casing under the railroad shall be as follows: The pipe shall be installed by a special rig designed to bore and push or jack the casing on a controlled grade and line under the railroad in a continuous operation. As the dry boring operation progresses, each new section of casing shall be butt-welded to the section previously jacked into place. The boring auger shall not be of a greater diameter than the outside diameter of the casing.

The carrier pipe shall be installed inside the encasement pipe by use of spiders to support the carrier pipe from deflection. Spiders shall be placed 24 inches from each end of the casing and subsequent spiders spaced at 10-foot intervals. Spiders shall be sized to raise the carrier pipe bells above the encasement pipe and to restrict excessive radial movement. Spiders shall be securely attached to the carrier pipe and shall be approved by the Engineer.

Spiders shall consist of a two piece shell made from T-304 stainless steel of a minimum 14-gauge thickness. Each shell section shall have one bolt flange formed with ribs for added strength and one hook and eye section for added shear strength. Each connecting flange shall have a minimum of three 5/16" T-304 stainless steel bolts. The shell shall be lined with a ribbed PVC extrusion with a retaining section that overlaps the edges of the shell and prevents slippage. Bearing surfaces (runners) shall be ultra high molecular weight polymer for abrasion resistance and a low coefficient of friction. The runners shall be attached to support structures (risers) at appropriate positions to properly support the carrier within the casing and to ease installation. The riser section and bolt heads shall be TIG welded for strength. Risers shall be made of T-304 stainless steel of a minimum of 10 gauge. All risers over 6" in height shall be reinforced and MIG welded to the shell.

After the carrier pipes are installed and tested, the ends of the encasement pipes used for the 6" PVC, 12" PVC water lines and 8" PVC Force Main Sewer Pipe shall be plugged or capped with mortar and bricks or other approved materials. The plug or cap shall have a 1-inch diameter weep hole at the bottom to facilitate drainage of the encasement pipe.

Steel encasement pipe, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end and paid for at the contract unit price per linear foot for "\_\_\_" Steel Encasement Pipe, \_\_\_" Thick, by Boring and Jacking". Such prices and payments will be full compensation for all materials, excavation, equipment, labor, installation, grouting, backfilling, and incidentals necessary to complete the work as required.

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**15. DUCTILE IRON FORCE MAIN SEWER PIPE:**

Ductile iron force main sewer pipe shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Ductile iron force main sewer pipe shall be of the thickness class or pressure class shown on the utility plans and shall conform to ANSI A21.51 (AWWA C151). Such pipe shall be either mechanical joint or push-on-joint and installed with rubber gaskets in accordance with ANSI A21.11 (AWWA C111) or as directed by the Engineer.

All ductile iron force main sewer pipe shall be cement mortar lined with a seal coat in accordance with ANSI A21.4 (AWWA C104).

All ductile iron force main sewer pipe shall be installed in accordance with laying condition Type "2" as stated in ANSI A21.50 (AWWA C150) unless otherwise shown on the plans.

All ductile iron fittings shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105).

Ductile iron force main sewer pipe, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end, with no deductions for fittings, and paid for at the contract unit price per linear foot for "8" DI Force Main Sewer Pipe, PC 350". Such prices and payments will be full compensation for all materials, including pipe accessories, excavation, labor, anchoring pipe fittings, pressure testing, backfilling, and incidentals necessary to complete the work as required.

**16. POLYVINYL CHLORIDE (PVC) SEWER PIPE:**

Polyvinyl chloride (PVC) sewer pipe and fittings shall be installed as shown on the plans, as required herein, and/or as directed by the Engineer.

This item covers 4" and 6" gravity service sewer lines only

PVC sewer pipe and fittings shall conform to the requirements of ASTM D2665 Sch. 40 (Type I) with solvent cement joints.

PVC sewer pipe and fittings, furnished and installed as required and accepted, will be measured along the pipe from end to end, with no deductions for fittings, and paid for at contract unit price per linear foot for "\_\_\_" PVC Sewer Pipe, SCH 40". Such prices and payment shall be compensation in full for all materials, labor, installation, connections, pipe,

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fittings, excavation, and backfill, and incidentals necessary to complete the work as required.

#### **17. HDPE FORCE MAIN SEWER PIPE BY DIRECTIONAL BORE:**

High-density polyethylene (HDPE) Force Main Sewer Pipe shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer

HDPE Force Main Sewer Pipe shall be 10", SDR 9, 200 # WP, manufactured in accordance with ANSI/AWWA C906 (Polyethylene Pressure Pipe and Fittings, 4" through 64", For Water Distribution, Iron Pipe Size (IPS) ). HDPE pipe materials shall be made from materials conforming to standard PE code designation PE 3408.

The Contractor shall furnish fittings necessary to connect the ductile iron force main sewer to the HDPE, and fuse the fittings onto each end of the HDPE section of Force Main Sewer line.

Concrete for thrust restraint shall be class A concrete meeting the requirements of Section 1000 of the Standard Specification. The concrete shall be placed around the pipe as shown on the plans and/or as directed by the Engineer. The proposed HDPE force main sewer pipe shall have a fitting with an integral ring for thrust restraint fused into the pipe string adjacent to the proposed adapter from HDPE to the DI fitting. The proposed DI reducer shall be tied to the concrete thrust collar by threaded rods.

The reinforcing steel shall meet the requirements of Section 1070 of the Standard Specifications. Reinforcing steel shall be placed in the center of the thrust block and shall be tied to the threaded rods.

Threaded rods shall be A-36 steel and shall match the diameter of the bolts in the coupling and/or ductile iron water pipe fitting, but shall be no less than 3/4" diameter. The proposed transition coupling and/or the nearest ductile iron sewer pipe fitting shall be tied to the thrust block. A minimum of four threaded rods shall be used, located as shown on the plans.

Drilling fluid shall consist of a bentonite slurry. Admixtures may be added which are suitable to the site conditions encountered.

HDPE Force Main Sewer line shall be fused prior to placement beneath the stream noted on the plans. Join pipe segments by cutting ends square, heating and fusing under sufficient pressure to create a single length of pipe sufficient to complete installation in one continuous pulling operation. The pipe manufacturer's listing of fusion parameters, validated by appropriate testing, and the parameters of the Contractor's fusion systems,

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shall be submitted to the Resident Engineer prior to fusing segments of HDPE Force Main Sewer Pipe into the pipe string.

After installation, the HDPE Force Main Sewer Pipe string shall be tested under the stream to a hydrostatic pressure of 200# in accordance with the testing procedures outlined in Section 1520 of the Standard Specifications.

HDPE Force Main Sewer Pipe shall be installed beneath the stream by boring or drilling a small pilot hole along a parabolic arc beneath the stream. A minimum cover of 3' shall be maintained over the HDPE Force Main Sewer Pipe at all times. Enlarge the pilot hole by use of a reamer or reamers to the desired diameter. When the bored hole is of the diameter recommended by the pipe manufacturer for the 10" HDPE Force Main Sewer line, the Contractor shall pull the pipe string through the hole by the drill string. Cap the pipe string during the pulling operation. The pulling operation shall incorporate a swivel connection to minimize torsional stresses imposed upon the pipe string. Fully support the pipe string before and during pull back so that the pipe string will move freely without damage.

HDPE Force Main Sewer Pipe installed by directional boring shall not be connected to existing pipe or fittings for one week from the time of installation to allow tensional stresses to relax.

The Contractor may elect to conduct reaming and pulling of the pipe string in one operation at the discretion of the Engineer. The reamer head shall be fitted with a sleeve to prevent possible spalling that may become lodged and prohibit the pull back of the pipe string.

Drilling fluid that does not remain in the bore hole shall be collected and disposed of properly. No drilling fluid shall enter the stream.

HDPE Force Main Sewer Pipe, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from end to end, with no deductions for fittings or couplings, and paid for at the contract unit price per linear foot for "10" HDPE Force Main Sewer Pipe, SDR 9, 200# WP by Directional Bore". Such prices and payments will be full compensation for furnishing all labor, equipment, material, couplings and fittings, excavation, installation, testing, backfilling, and incidentals necessary to complete the work as required.

#### **18. DUCTILE IRON SEWER PIPE FITTINGS:**

Ductile iron sewer pipe fittings and specials shall be installed in accordance with the applicable utility provisions herein and as shown on the utility plans and/or as directed by the Engineer.

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Ductile iron sewer pipe fittings and specials for cast iron or ductile iron sewer pipe shall conform to ANSI A21.10 (AWWA C-110) and ANSI A21.11 (AWWA C-111) for standard size fittings or ANSI/AWWA C153/A21.53 for compact ductile iron fittings. These fittings shall be cement mortar lined with a seal coat in accordance with ANSI A21.4 (AWWA C104). All fittings shall have a minimum pressure rating of 250 #.

All ductile iron fittings shall be wrapped with polyethylene and shall be in accordance with ANSI A21.5 (AWWA Standard C105).

The quantity of ductile iron sewer pipe fittings to be paid for will be the delivered weight in pounds of the pipe fittings exclusive of the weight of any accessories. If the Contractor elects to use compact ductile iron fittings, payment shall be based on the weight of standard size fittings as published in ANSI/AWWA C110/A21.10. No measurement of the accessories will be made as the accessories are considered incidental to other work being paid for by the various items in the contract.

The quantity of sewer pipe fittings, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per pound for "Ductile Iron Sewer Pipe Fittings, 250 # Min. WP". Such price and payment will be full compensation for all materials, including pipe accessories, labor, installation, anchoring pipe fittings, backfilling, and incidentals necessary to complete the work as required.

#### **19. SEWER LINE GATE VALVE AND VALVE BOX:**

Gate valves and valve boxes shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Gate valves shall be iron body and shall conform to ANSI/AWWA C509 for resilient seat type valves. Gate valves shall have non-rising stems with a 2 inch square operating nut and O-ring seals, and shall open by turning counterclockwise. Gate valves shall have mechanical joint ends conforming to ANSI/AWWA C111/A21.11 unless otherwise shown on the plans or directed by the Engineer. Gate valves shall have a design working water pressure of 200 psig.

All gate valves shall be installed with an approved valve box, normally flush with the ground or pavement. Valve boxes shall be of the screw or slip type with a base to fit the valve yoke and removable plug cap with the word "WATER" cast therein. Valve boxes shall be made of cast iron conforming to ASTM A48, Class 25, unless otherwise shown on the utility plans and/or as directed by the Engineer.

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The quantity of gate valves and valve boxes, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "8" Sewer Line Gate Valve And Valve Box, 200# WP". Such prices and payments will be full compensation for all materials, labor, excavations, installation, sterilization, pressure testing, valve box installation with the necessary extension pieces, backfilling, and incidentals necessary to complete the work as required.

## **20. INSERTING GATE VALVE AND VALVE BOX (Sewer):**

Install inserting gate valves and valve boxes in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Inserting valves shall be installed on active force main sewer lines that cannot be shut down.

The inserting gate valves shall be restrained with a thrust collar and rods. The contractor shall be careful not to damage the existing PVC sewer line while installing the inserting valve and the thrust restraint. The design for the thrust restraint shall be signed and sealed by a North Carolina Professional Engineer.

Inserting gate valves shall consist of two basic assemblies. A sleeve permanently attached to the water main and a valve mechanism inserted into the sleeve to complete the installation. Sleeves shall be stainless steel ASTM A 240, type 304 and pressure rated at 200 psi. Bolts, nuts and washers shall conform to stainless steel ASTM A 193, A 194 type 304. The Contractor shall verify the type material, size, etc. of the existing pipe to be valved before ordering the sleeve. Inserting gate valve mechanism shall be iron body and shall conform ANSI/AWWA C509 for resilient seat type valves. Inserting gate valves shall have non-rising stems with a 2 inch square operating nut and O-ring seals, and shall open by turning clockwise. Inserting gate valves shall have a design working water pressure of 200 psig.

Install inserting gate valves with an approved valve box set flush with the ground or pavement. Valve boxes shall be of the screw or slip type with a base to fit the valve yoke and removable plug cap with the word "WATER" cast therein. Install cast iron valve boxes conforming to ASTM A48, Class 30, unless otherwise shown on the utility plans and/or as directed by the Engineer.

The quantity of inserting gate valves and valve boxes, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for "4" Inserting Gate Valve And Valve Box, 200 # WP (Sewer)". Such prices and



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payments will be full compensation for all materials, labor, excavations, installation, sterilization, pressure testing, valve box installation with the necessary extension pieces, backfilling, and incidentals necessary to complete the work as required.

**21. BREAK DOWN REBUILD AND ROTATE TOP FOR EXISTING MANHOLE:**

Manholes that will require rebuilding with the top rotated shall have the frame and cover removed, the manhole taper removed, and necessary manhole wall removed. Reconstruction shall include rebuilding manhole wall, manhole taper, rotating top, and replacing frame and cover. All work shall meet the approval of the Engineer.

Manholes with concentric top shall be replaced with an eccentric top.

Manhole shall be rotated away from the proposed curb and gutter sections.

Manhole construction shall also conform to the applicable requirements of Section 840 of the Standard Specifications.

Payment for rotating top or replacing top, removing and replacing manhole frame and cover, removing and rebuilding manhole taper and removing and rebuilding manhole wall will be based on a unit price for each manhole.

The quantity of sewer manholes rebuilt and accepted will be measured and paid for at the contract unit price per each for "Break Down Rebuild and Rotate Top for Existing Manhole" or "Break Down Rebuild and Rotate Top for Existing Manhole (Concentric Top)". Such price and payments will be full compensation for all labor, materials, breaking down manhole, new manhole construction, manhole pargetting, steps, excavation, backfilling, and incidentals necessary to complete the work as required.

**22. ROTATE TOP FOR EXISTING MANHOLE:**

Manholes tops shall be removed and rotated. Reconstruction shall include replacing and rotating the top. All work shall meet the approval of the Engineer.

Manholes with concentric top shall be replaced with an eccentric top.

Manhole shall be rotated away from the proposed curb and gutter sections.

Manhole construction shall also conform to the applicable requirements of Section 840 of the Standard Specifications.

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Payment for rotating and replacing manhole top will be based on a unit price for each manhole.

The quantity of sewer manholes rebuilt and accepted will be measured and paid for at the contract unit price per each for "Rotate Top for Existing Manhole" or "Rotate Top for Existing Manhole (Concentric Top)". Such price and payments will be full compensation for all labor, materials, rotating and replacing manhole top, excavation, backfilling, and incidentals necessary to complete the work as required.

### **23. RELOCATE SANITARY SEWER CLEANOUT:**

Relocated sanitary sewer cleanouts shall be installed in accordance with the applicable utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer. Cleanouts shall have screw type PVC covers installed flush with the ground as approved by the Engineer.

PVC sewer pipe and fittings shall conform to the requirements of ASTM D2665 Sch. 40 (Type I) with solvent cement joints.

The existing sanitary sewer cleanout shall be removed and replace along the service line with PVC Sch. 40 pipe.

Relocated sanitary sewer cleanouts, installed in accordance with the plans and utility provisions herein and accepted, will be measured and paid for at the contract unit price per each for "Relocate \_\_\_\_" Sanitary Sewer Cleanout". Such price and payment will be full compensation for all labor, excavation, Class B concrete, pipe, water tight plugs, sewer pipe fittings, backfilling, and incidentals necessary to complete the work as required.

### **24. CEMENT GROUT FOR FILLING ABANDONED PIPES AND ENCASEMENTS WITHIN THE RAILROAD RIGHT OF WAY:**

All abandoned pipes and encasements located in the railroad right of way shall be filled with a portland cement and sand grout to the satisfaction of the Engineer.

The cement grout shall have a minimum compressive strength of 500 #. Such grout shall consist of portland cement, sand and water. The grout shall be of a consistency to flow and be vibrated, if necessary, in order for the mix to flow uniformly into the pipe to be filled.

The quantity of cement grout placed and accepted will be measured and paid for at the contract unit price per linear foot for "Cement Grout for Filling \_\_\_\_" PVC Abandoned Pipe and Encasement". Such price and payment will be full compensation for all materials, pumping or placing

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grout, labor, excavation, backfilling, and incidentals necessary to complete the work as required.

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PROJECT SPECIAL PROVISIONS

Utility

UTILITY CONFLICTS:

General:

The following utility companies have facilities that will be in conflict with the construction of this project:

- A. GUC Power
- B. Sprint
- C. AT&T
- D. Cox Communications

The conflicting facilities of these concerns will be adjusted prior to the date of availability, unless otherwise noted and are therefore listed in these special provisions for the benefit of the Contractor. All utility work listed herein will be done by the utility owners. All utilities are shown on the plans from the best available information.

The Contractor's attention is directed to Article 105.8 of the Standard Specifications.

Utilities Requiring Adjustment:

A. GUC Power

- 1. See "Utility By Others Plans" for utility conflicts.
- 2. All Power Poles will be relocated by July 29, 2006.

B. Sprint

- 1. See "Utility By Others Plans" for utility conflicts.
- 2. All facilities will be relocated by October 1, 2006.

C. AT&T

- 1. See "Utility By Others Plans" for utility conflicts.
- 2. All facilities will be relocated by the Date of Availability.

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D. Cox Communications

1. See "Utility By Others Plans" for utility conflicts.
2. All facilities will be relocated by October 1, 2006.