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Project: U 5018A
County: Pitt

PROJECT SPECIAL PROVISIONS
Utility Construction



GENERAL CONSTRUCTION REQUIREMENTS

The proposed utility construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" dated January 2006 and the provisions listed below.

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

GUC will provide Representatives for inspections on their facilities only.

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, i.e., 8:00 a.m. to 5:00 p.m. After hours, holiday, or weekend work may be required. GUC 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.

The existing utilities (water, sewer and gas) belong to GUC. 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.

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

COMPENSATION:

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

WATER / 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 (2) 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 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.

All water and sewer construction on facilities to be owned by GUC 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 Embarq telephone pedestals were installed at the right-of-way line. Embarq telephone installed the underground fiber optic cable 4' deep except at the locations where the fiber optic cables come up to the pedestals. There will be approximately three (3) pedestals installed along NC 43.

On new sewer force mains and tie-in sections of sewer force main, 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.

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.

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

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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.

PIPE SIZE (inches)	ALLOWABLE LEAKAGE (Gallons per hour per 1000 feet of pipe)
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.

▪ 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.

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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 value:

1. 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 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 as necessary in obtaining sufficient bacteriological samples for complete testing. GUC 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.

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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

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

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.

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. 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;

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	3:46
6	5:40	398	.854 L	5:40	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.

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.

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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.

▪ **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.

NCDOT STANDARD SPECIFICATION DATED JULY 2006 SECTION 1505-3 (E) IS DELETED AND THE FOLLOWING SPECIFICATIONS FOR THRUST RESTRAINT IS BEING SUBSTITUTED.

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.

Restraint devices for use on ductile iron and C-900 PVC "push-on" joints shall be constructed of high strength ductile iron, ASTM A536, Grade 65-45-12 and shall incorporate machined serrations on the inside diameter to provide positive restraint, exact fit, full circle contact and support of the pipe in an even and uniform manner. Bolts and connecting hardware shall be of high strength, low alloy material in accordance with ANSI/AWWA C111/A21.11, latest revision thereof. All devices shall have a safety factor of no less than 2:1 at the full rated pressure of the pipe on which it is installed. They shall be UL listed and Factory Mutual approved. Restraining devices shall be Uni-Flange Block Buster Series 1390-C, Star Pipe Products Allgrip series 3600 and Pipe Restrainers Series 1200S, or approved equal.

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Restraint devices for use on mechanical joint to C-900 PVC, shall be constructed of high strength ductile iron, conforming to the requirements of ASTM A536, Grade 65-45-12, and shall incorporate machined serrations on the inside diameter to provide positive restraint, exact fit, full circle contact and support of the pipe in an even and uniform manner. Bolts and connecting hardware shall be of high strength low alloy material in accordance with ANSI/AWWA C111/A21.11, latest revision thereof. All devices shall have a safety factor of no less than 2:1 at the full rated pressure of the pipe on which it is installed. They shall be UL listed and Factory Mutual approved. Restraining devices shall be Uni-Flange Series 1500, Star Pipe Products, Allgrip Series 3600, Romac Industries, Inc. GripRing, or approved equal.

Restraint devices for use on mechanical. joint ductile iron shall be constructed of high strength ductile iron, conforming to the requirements of ASTM A536, Grade 65-45-12, and shall incorporate machined serrations on the inside diameter to provide positive restraint, exact fit, full circle contact and support of the pipe in an even and uniform manner. Bolts and connecting hardware shall be of high strength low allow material in accordance with ANSI/AWWA C111/A21.11, latest revision thereof. All devices shall have a safety factor of no less than 2:1 at the full rated pressure of the pipe on which it is installed. They shall be UL listed and Factory Mutual approved. Restraining devices shall be Uni-Flange Series 1300-C, Star Pipe Products, Allgrip Series 3600, Romac Industries, Inc. GripRing or approved equal.

Locked hydrant tees and fittings for fire hydrants shall meet the requirements of AWWA Standard C-111 (ANSI A21-11). Locked tees shall be as manufactured by American Cast Iron Pipe Company, Clow, U.S. Pipe, or approved equal.

Bolted Couplings for PVC C-900 pipe and ductile iron pipe shall be constructed of a center sleeve and end rings of ductile iron in accordance with ASTM A536. Bolts and nuts shall be of high strength, low alloy steel per ASTM A242 and AWWA C-111. Center sleeve and end rings shall have a paint finish coat. Couplings shall be Ford Style FC1, Romac 501 Series, Smith Blair 441, or JCM 201.

The quantity of Restrained Retainer Glands, installed in accordance with the plans and provisions herein and accepted, will be considered as included in the contract price for the applicable utility item and no separate measurement or payment will be made. 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.

NCDOT STANDARD SPECIFICATION DATED JULY 2006 SECTION 1505-4 (B) IS DELETED AND THE FOLLOWING SPECIFICATIONS FOR METERS IS BEING SUBSTITUTED.

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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 ¾", 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. Meter boxes for protecting and servicing the meters are considered incidental to the appropriate pay item. 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.

Pay Item	Pay Unit
Relocate Existing Water Meter	Each

MATERIAL SPECIFICATIONS FOR WATER SYSTEM EXTENSIONS

The materials used for the construction of water mains and all accessories and appurtenances thereof shall be new, free of defects in product and workmanship and of the highest quality available in the industry. Materials not specified but deemed equal to those specified may be approved for use provided the documentation and samples necessary for approval are provided to the Commission thirty (30) days prior to the ordering of said materials. WRITTEN APPROVAL must be issued by the Commission before such material may be used in construction. Current specifications (latest revisions) shall apply in all cases where materials are described by reference to published standards such as ASTM, AWWA, ANSI., etc.

▪ **Water Main and Fittings**

Water mains shall be constructed of polyvinyl chloride (PVC), ductile iron (DIP) or polyethylene (PE) pipe at the option of the Developer or Engineer, except in instances where the Manual or the Commission specifically requires a particular pipe material be utilized for an installation. All plastic pipe shall bear the seal of the National Sanitation Foundation.

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PVC water main four inches and larger shall be manufactured in accordance with AWWA Standard C-900. The pipe shall have push-on type joints with elastomeric gaskets. The pipe shall be pressure rated at 150 psi with a dimension ratio of 18 for both bell and pipe thickness. Pipe shall be furnished in nominal twenty-foot (20') lengths.

PVC water main of two-inch (2") size shall be Class 200 SDR 21 conforming to ASTM D1784 and ASTM D2241 with "push-on" joints. Fittings shall be Schedule 80 PVC with solvent weld joints and shall bear the NSF seal. Pipe shall be furnished in nominal twenty-foot (20') lengths.

Tees, elbows and other fittings for PVC C-900 pipe and ductile iron pipe shall be of ductile iron unless otherwise permitted or required by the Commission. Standard dimension fittings or compact fittings may be used in accordance with the requirements of this Section.

The interior of all fittings shall be cement mortar lined with an asphaltic coating in accordance with AWWA Standard C-104 (ANSI 21.4). The exterior of all fittings shall have a one (1) mil bituminous coating in accordance with AWWA Standard C-110 (ANSI A21.10).

Compact fittings shall be ductile iron with either push-on or mechanical joints in accordance with ANSI/AWWA C153/A21.53-84. Cement lining and asphaltic coating shall be provided in accordance with ANSI/AWWA C104/A21.4.

Standard dimension fittings for PVC C-900 pipe and ductile iron pipe shall be of ductile iron with either "push-on" or mechanical joints (See Section 3.4.6.5). The fittings shall comply with all requirements of AWWA Standard C-110 (ANSI A21.10) and shall be designed for a minimum working pressure of 150 psi plus 100 psi surge pressure.

Ductile iron pipe for water mains shall be manufactured in conformance with AWWA C-151 and shall be cement-mortar lined with an asphaltic coating in accordance with AWWA C-104. The exterior of the pipe shall be bituminous coated in accordance with AWWA C-151. The minimum thickness Class of pipe shall be Class 50. Pipe shall be furnished in nominal 18 or 20 foot lengths. Pipe joints for ductile iron pipe shall be "push-on" unless the additional pipe deflection allowed by mechanical joints is necessary or other considerations dictate the use of mechanical joints (See Section 3.4.6.5). The joints for ductile iron pipe shall conform to AWWA Standard C-111 revision (ANSI, A21.11).

Polyethylene pipe, tubing and fittings shall comply with AWWA C901, AWWA C906 or CSA B137.1 which ever applies

Polyethylene encasement shall be applied to all underground ductile iron pipe and fitting installations. Materials and installation procedures shall be in accordance with ANSI/AWWA C-105/A21.5-88.

Detectable marking tape shall be installed in accordance with Section 3.4.7.6. Tape shall be three (3) inches in width with a minimum thickness of 0.5 millimeters (minimum solid center foil thickness of 0.35 millimeters). Color of the tape shall be blue meeting the American Water Works Association color code. Tape shall read: "Caution - Buried Water Line Below". Tape shall be manufactured by Lineguard, Inc., Pro-Line Safety Products Co., Empire Level Mfg. Corp., or approved equal.

▪ **Force Main Pipe and Appurtenances**

Sewer force main pipe shall be a minimum of Class 200 PVC pipe or Class 50 ductile iron pipe.

PVC shall be Class 200 SDR 21 conforming to ASTM D1784 and ASTM D2241 (latest revisions). Fittings for PVC force main shall be ductile iron meeting the requirements of ANSI A21.1 0 and shall be designed for a minimum working pressure of 150 psi plus 100 psi surge pressure. The interior of all fittings shall be cement-mortar lined in accordance with ANSI 21.4 and the exterior of the fittings shall be bituminous coated in accordance with ANSI 21.51.

Ductile iron force main and fittings shall meet the requirements for ductile iron water main set forth in Section 8.2.2.

▪ **Check Valves**

Check valves, unless otherwise directed by the Commission, shall be lever and spring type, iron body, bronze mounted with pin, seat ring and disc of brass or bronze designed for working pressure of not less than 150 pounds per square inch. Valves shall have a suitable opening for cleaning without disconnection from the pipe. Valves shall be manufactured by American Flow Control, Mueller Clow, or approved equal.

The 6" Sewer Force Main Check Valve installed in accordance with plans and provisions herein and accepted, will be measured and paid for at the contract unit price per each for 6" Sewer Force Main Check Valve.

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Such prices and payments will be full compensation for all materials, equipment, excavation, pressure testing, labor, installation, backfilling, and incidentals necessary to complete the work as required.

Pay Item	Pay Unit
6" Sewer Force Main Check Valve	Each

▪ **Air Relief Valves**

Air relief valves shall be manually operated unless otherwise required by the Commission.

Manual air relief valves shall be identical to the valve described in Section 7.8.1 of the Manual, except that 1) the control valve shall be installed in a standard manhole, and 2) the service tubing shall be SDR 9 polyethylene in lieu of copper.

▪ **Relocate Fire Hydrant**

The Commission will furnish a new hydrant & assembly to the contractor for the contractor to place on the new twelve inch main. The contractor shall return the old hydrant & assembly, after taken out of service to the Commission's shop at 801 Mumford Road-Greenville, NC 27835.

LOCATOR WIRE

Locator wire shall run continuously and if direct bury, shall be taped securely to the water or sewer pipe at intervals no greater than 16 feet. The locator wire shall be accessible for hook-up at all tracing stations and valve boxes 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 water or sewer pipe. In the areas where the pipe will be installed by directional bore, two-locator wires shall be attached to the pipe. Use # 12 AWG solid copper wire for the locator wires with blue insulation for water and green insulation for sewer.

Acceptable Wire Connections:

- a. 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.
- b. C-Tap for two way splicing of tracing wire, for use with 10 gauge stranded wire. T&B #54705 or approved equal.
- c. Split bolts, three wire type for splicing of tracer wire, for use with 10 gauge stranded wire. ILSCO Catalog #SEL-2S or equal.

The design and selection of automatic air release valves shall be in accordance with the direction of the Commission and shall be handled on a case by case basis.

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NATURAL GAS

NCDOT and/or Contractor must insure that any sub-contractor(s) 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" and "Drug and Alcohol Testing", respectively. 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". NCDOT must review and have sole approval rights of the programs of the contractor. GUC reserves the right to view and inspect any and all pertinent documentation of Contractor(s) performing work on gas facilities.

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

GUC will supply all materials and appurtenances for the proposed 2" MDPE Gas Pipe, SDR 11, 4" and 6" MDPE Gas Pipe, SDR 11.5, 60# working pressure (WP) and ¾" gas pipe for gas facilities that will reconnect to the new gas main.

GUC will have final authority over contractor methods and practices pertaining to any gas facilities installation. GUC will also determine final acceptance of the work. GUC and NCDOT will provide construction inspectors for all phases of the gas line installation.

Gas related work must be coordinated with the GUC Gas Department 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 a digital copy and two (2) paper prints of as-built plans to the GUC Gas Department. 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 scale and coordinates for the as-built plans shall be the same as the construction plans. The as-built plans shall be signed and sealed by a registered North Carolina Professional Engineer. The cost of the as-built plans shall be incidental to each gas related pay item.

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GENERAL

This section contains the specifications for the installation of the approximately 106 linear feet of 2" MDPE Gas pipeline, 137 linear feet of 4" MDPE Gas pipeline, 4,931 linear feet of 6" MDPE Gas pipeline, the abandonment of approximately 5,027 linear feet of 4" MDPE Gas pipeline and the connect of nine (9) - 3/4" MDPE gas services. 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.

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" or 6", as applicable, SDR 11.5, 60# 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 2", 4" and 6" MDPE Gas Pipe, SDR 11.5, 60# WP and fittings will be supplied by GUC.

DITCHING

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 pipeline will, upon installation in the ditch, have the finished elevation as shown on the project drawings.

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

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.

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).

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.

During ditch excavation operations, the Contractor shall provide and maintain erosion and sedimentation control structures as required by city, county, and state agencies.

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

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 provide access to equipment to enter and exit the site.

Pipe stored in coils shall be placed on wooden pallets 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 entering 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.

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.

Materials that can be easily lost, or damaged by exposure to rain, humidity or extreme temperatures should be stored in a building.

HAULING AND STRINGING

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.

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 acceptable limit to prevent deformation of the pipe joints and/or damage to the pipe surface.

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.

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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.

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.

LAYING

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.

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.

INSPECTION

A GUC Representative should inspect all materials for defects prior to installation.

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 1/2 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 have occurred. Cold fusion results when most of the melt is pressed out of the joint.

LOWERING-IN

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.

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 vertical bends 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.

During the lowering-in operations, the pipe shall be handled at all times with wide canvas or nylon slings to prevent damage to the pipe. Bare wire rope slings, chains, hooks or metal bars will not be permitted for handling the pipe sections.

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.

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.

LOCATOR WIRE

GUC will provide the locator wire. Locator wire shall run continuously and if direct bury, shall be taped securely to the gas main at intervals no greater than 16 feet. The locator wire shall be accessible for hook-up at all tracing stations and valve boxes 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" and 6" MDPE gas main. In the areas where the pipe will be installed by directional bore, two-locator wires shall be attached to the pipe.

Acceptable Wire Connections:

- a 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.
- b C-Tap for two way splicing of tracing wire, for use with 10 gauge stranded wire. T&B #54705 or approved equal.
- c. Split bolts, three wire type for splicing of tracer wire, for use with 10 gauge stranded wire. ILSCO Catalog #SEL-2S or equal.

BACKFILLING

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.

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.

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.

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 pipeline right-of-way provided 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.

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.

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.

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.

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.

STREAM AND BUFFER ZONE CROSSINGS

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.

The pipelines installed by directional bore shall be installed to a minimum depth of 5' below the streambed.

The Contractor shall perform all operations outside the buffer zones. The stream and buffer zones cannot be impacted.

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VALVES, TAPS, AND CONNECTORS

All designated valves, taps, or other appurtenances shall be installed by the Contractor at the locations shown on the plans or as directed by Commission's Authorized Representative and approved by the NCDOT Inspector. Installation shall be in accordance with the detailed drawings and applicable sections of these Specifications.

The Contractor shall be compensated for the installation of valves. The compensation shall include all costs associated with the work required to fabricate, pre-test and install these appurtenances where shown on the plans.

The installation of taps shall be considered incidental to the unit price to install 4" and 6" MDPE gas mains.

Unless shown otherwise on the plans, or as directed by NCDOT Inspector and approved by the 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.

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.

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.

INTERNAL PIPE CLEANING

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.

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.

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.

Types of Pigs and Construction: Contractor shall supply all pigs, as approved by Commission's Authorized Representative, for cleaning the test sections.

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.

PNEUMATIC TESTING

Upon completion of the line or a substantial part thereof, sections of the line shall be 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.

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.

- **Test Equipment, Materials and Labor Furnished by Contractor**

Contractor shall provide air compressor(s) capable of increasing line pressure to the specified test pressure using air or other inert gas (nitrogen) approved by the GUC Authorized Representative.

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.

Fittings, pipe, valves, etc. shall be of proper rating for the test pressure specified. The use of cast iron materials shall not be permitted.

- **Determining Test Pressures and Test Sections**

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.

The test pressure for the gas facilities shall be 90 psig unless otherwise

authorized by the Commission's Authorized Representative.

▪ **Pretest Procedures**

The Contractor shall install manifolds at agreed points. The installation of the manifolds shall be in strict accordance with MDPE pipe manufacturer standards.

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.

All main line valve assemblies shall be installed in the line prior to main line testing.

The Contractor shall install all test instrument lines. All lines shall be either high-pressure tubing or hose.

Test cannot be performed against a closed valve.

▪ **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 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 increased in small increments until the test pressure is reached. The contractor shall stop the compressor or inert gas flow 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

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.

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.

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 Contractor shall bear all costs incurred for locating and repairing the leak.

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.

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.
- b. The Contractor shall hold the test pressure for a continuous period of 8 hours or according to GUC's O & M Plan for mains & services, 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.

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.

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.

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 pressurized with natural gas, and Contractor will cap the purging connections.

ABANDONMENT OF EXISTING FACILITIES

Gas facilities to be abandoned in place shall be physically disconnected from the piping system and their open ends shall be capped, plugged, or otherwise effectively sealed.

The mains shall be purged of gas using an inert gas such as nitrogen.

ENVIRONMENTAL PROTECTION

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.

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.

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.

QUALIFICATIONS OF CONTRACTORS

A Contractor, Sub-Contractor, or individual performing work on Owner's facilities on this project which 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 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.

MEASUREMENT AND PAYMENT

The 2', 4" and 6" gas line, installed in accordance with the plans and provisions herein and accepted, will be paid for per linear foot for 2", 4" gas line and 6" gas line. Such prices and payments will be full compensation for installation, excavation, labor, testing, backfilling, and incidentals necessary to complete the work as required.

The gas valves, listed in the pay items will be measured and paid for per each for the

appropriate size and type. Such prices and payments will be full compensation for installation, excavation, labor, testing, backfilling, and incidentals necessary to complete the work as required.

Reconnect gas service means to transfer or replace the appropriate size piping from a new gas line to an existing gas meter that is not to be relocated. Measurement and payment will be made per each. Such prices and payments will be full compensation for installation, excavation, labor, testing, backfilling, and incidentals necessary to complete the work as required.

Payment will be made under:

Pay Item	Pay Unit
___" Gas Line	Linear Foot
___" Gas Valve	Each
Reconnect ¾" Gas Service	Each

PROJECT SPECIAL PROVISIONS
Utilities by Others

General:

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

<u>Utility Company</u>	<u>Contact Name</u>	<u>Telephone</u>
A. Greenville Utilities Commission (Electric Dept)	Chris Corey	252-551-1586
B. Embarq	Rod Medlin	252-413-7711
C. Suddenlink Cable	Dedric Staton	252-792-9184

The conflicting facilities of these concerns will be adjusted prior to the date of availability. 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.