



Project: B-3685
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.

Lay water mains at least 10 feet laterally from existing or proposed sanitary sewers.

In the following provisions, Greenville Utilities Commission can be referred to as either the Commission 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, i.e. 8:00 a.m. to 5:00 p.m. After hours, holiday, or weekend work should include only such tasks that do not require observation by the GUC's Representative. Under certain conditions, GUC may agree to provide construction observation after hours or on weekends and holidays.

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 utilities 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 construction work, GUC shall be contacted to schedule a separate preconstruction conference. No construction shall occur until after the preconstruction conference is held.

Prior to the commencement of hydrostatic testing and chlorination, Greenville Utilities Commission (GUC) shall be contacted to request scheduling of inspection and testing. GUC's Representative 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, Greenville Utilities Commission (GUC) shall be contacted to request scheduling of inspection and testing. GUC's Representative 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.

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 Commission 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 a Commission's Representative, unless otherwise directed by the Commission. 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 a GUC 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 GUC.

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

The Commission 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 a GUC 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.

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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.

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 Commission'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 Commission 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.

Test Sequence

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

- (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 Commission, 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 Commission. 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 Commissions 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

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

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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 Commission, 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 Commission.

The Commission shall be contacted prior to testing to schedule the test time such that the Commission's Representative may be present. The Commission's Representative shall be present during all testing unless otherwise approved by the Commission.

All lift holes shall be plugged from the outside with an approved non-shrink grout.

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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.

Owner and Owner's Requirements:

The existing utilities belong to the East Carolina University Steam Plant, East Carolina University (Power and Telephone), Sprint Telephone, Greenville Utilities Commission (GUC) - (Gas), Greenville Utilities Commission (GUC) - (Power) and Greenville Utilities Commission (GUC) - (Water and Sewer). The Contractor shall provide access for the owner's representatives to all phases of construction. Notify the owner two weeks before commencement of any work and one week before service interruption.

**East Carolina University Steam Plant Utility
Expectations and Contingency Planning**

Steam for heating the entire ECU campus is provided by the steam plant located south of 14th Street. The steam tunnel, connecting the steam plant to the campus, passes under 14th Street. The steam plant will be in operating during the proposed construction period and a steam outage would have significant negative impacts to the campus. Every effort should be made to avoid damage to the steam tunnel.

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It is East Carolina Universities expectation that the contractor will develop contingency plans for the repair and/or recovery of a steam outage and that the repairs and recovery will be accomplished within 24 hours of the outage. The plan will be reviewed and approved by ECU.

The steam tunnel is comprised of a steam line of 12" schedule 40 seamless carbon steel pipe and a condensate line of 6" schedule 80 seamless carbon steel pipe both encased in a concrete/tile "ric-well" conduit. Steam operating pressure is approximately 100 psi. Welding method used is Electric Arc Weld.

In the unlikely event that the steam tunnel is damaged the contractor will immediately activate the contingency plans to resupply steam to the campus within the expected time frame. The contingency plan will cover repair of the 12" and/or 6" lines and will include but not be limited to the following:

- 1) Pipe, fittings, materials, etc., required to make necessary repairs, will be standing by on-site to complete repairs within the 24 hr. window.
- 2) A company, routinely engaged in the repair of underground pipe, will be contracted to provide a sufficient crew within one (1) hour of pipe damage to make repairs (remove & replace as required).
- 3) Repair crews will work around the clock to perform needed repairs within the 24 hour period.
- 4) This will be a permanent repair and the contractor will provide employees during pressurization of the pipe in the event repairs to installed piping are needed.
- 5) Steam pressure will be vented off pipe but, in order to expedite repairs, the contractor will be expected to begin work on the pipe while still hot.
- 6) The repair contractor will conduct a pre-construction meeting to include appropriate ECU personnel, (contact ECU's project manager at 252-328-6858).

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For reference, companies local to the area include:

Edwards of Greenville, Greenville, NC.....ph: (252) 752-0857 or
(800) 336-3180

The Roberts Company, Winterville, NC.....ph: (252) 355-9353

INCO, Inc., Rocky Mount, NC.....ph: (252) 446-1174 or (800) 672-4626

Quate Industries, Morrisville, NC.....ph: (919) 596-5963

Boiler Masters, Greensboro, NC.....ph: (336) 272-9044

For reference, suppliers and availability:

Frischkorn, Inc., Washington, NC....ph: (800) 682-0751
21'...12" Schedule 40 seamless carbon steel (app. \$630)
21'....6" Schedule 80 seamless carbon steel (app. \$375)

Ferguson, Greenville, NC....ph: (252) 756-6101
21'...12" Schedule 40 seamless carbon steel (app \$660)
21'... 6" Schedule 80 seamless carbon steel (app \$400)

Note: Above prices as of 7/1/04. Prices do not include tax. Both companies have pipe in stock as of 7/1/04. Both companies require a 15% restock fee.

Although this plan primarily address the steam tunnel and potential steam outage, every effort should be made to avoid damage and interruption of ECU's other utilities in the area (power, water, fiber optic). It is ECU's expectation that all necessary means to protect and if necessary repair all of ECU's facilities at the 14th Street project site will be explored and implemented.

All excavation under the concrete steam tunnel shall be limited to a maximum of 3 feet below and 3 feet wide to install the proposed water, sewer and gas lines. The contractor shall hand dig all excavation under the concrete steam tunnel and shall provide temporary shoring when required. The Contractor shall backfill each location under the concrete steam tunnel within 24 hours with flowable fill. Before any excavation can begin under the concrete steam tunnel, the Contractor shall determine the condition of the concrete steam tunnel for each location of proposed excavation. The Contractor shall expose the concrete steam tunnel from the top to determine the condition of the tunnel. Once the condition of the concrete steam tunnel is determined at each location, the contractor shall submit a

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detailed installation procedure for each location to the Resident Engineer for approval.

**East Carolina University (Power and Telephone) Utility
Expectations and Contingency Planning**

East Carolina University will install a new fiber optic and power line conduit crossing 14th Street on the east side of the proposed bridge to replace the existing fiber optic and power line conduit in conflict with the project. The Contractor will need to coordinate the construction of GUC's water, sewer and gas mains with the installation of the proposed fiber optic and power line conduits.

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 supply all materials for the proposed 6" gas main.

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.

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.

The Contractor shall install one 6" Mueller Bottom-Out Stopper Fitting (thin wall) (#H-17275) on the existing pipeline. GUC will supply the fitting. The Contractor shall supply all equipment, labor, and fittings necessary to perform the cutting and stopping of the existing pipeline using the appropriate Mueller Tapping and Stopping equipment.

Upon completion of construction, the Contractor shall contact the Resident Engineer to schedule a pre-final inspection with GUC. At the scheduled

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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 GUC either in a reproducible mylar or digital copy format. One (1) print of the final as-built plans shall also be provided. The gas main as-built plans shall include plan and 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 actual elevations shown on the as-built profiles shall be based on USGS datum only.

Greenville Utilities Commissions (GUC) - (Water and Sewer)

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

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

The proposed 4" water meter assembly and vault (with 4" DI piping installed through the vault walls) that will service East Carolina Steam Plant will be provided by GUC. The contractor shall install the 4" service line and 4" meter assembly and vault with all necessary valves and fittings as shown on the plans.

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 GUC either in a reproducible mylar or digital copy format. One (1) print of the final as-built plans shall also be provided. The as-built plans shall

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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 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.

STREAM REPAIR FOR UTILITY CROSSINGS

The Contractor will be required to use an impervious dike to divert the water at locations where utility lines are installed crossing the stream. Other methods to divert the stream may be used but must be approved by the Engineer.

Coir Fiber Matting

Furnish materials, install and maintain coir fiber matting in locations as shown on the plans or as directed by the Engineer. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber matting.

Coir fiber matting will only be used in the areas as shown on the plans to repair trenching operations for the proposed utility lines or as specified by the Engineer.

Specifications shall meet or exceed the following:

100% Coir Matting

Provide Coir fiber matting to meet the following specifications:

Physical Specification (Roll)	
Material	100% (coconut fiber) coir twine woven into a high strength matrix
Thickness	0.30 in. minimum
Tensile Strength	1348 x 626 lb/ft. minimum
Elongation	34% x 38% maximum
Flexibility	65030 x 29590 mg-cm
Flow Velocity	Observed 11 ft./sec.
Weight	20 oz/SY
Size	6.6 x 164 ft (120 sy) or (100 sm)
"C" Factor	0.002
Open Area (measured)	50%

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Stakes

Provide hard wood stakes 24 to 36 inches in length with a notch cut 1 in. from the top. The notch must be able to sufficiently grab and retain matting when installed. Stakes shall be of sufficient thickness for soil penetration without cracking or breakage.

Install the coir fiber matting immediately upon backfilling the trenches at proposed utility lines crossing buffer zone 1 or as directed by the Engineer. Matting shall be installed prior to allowing water to flow over the trench along the stream bed. Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the matting with the soil. Take care to preserve the required line, grade, and cross section of the area covered. Apply seed and mulch prior to installing matting. Install matting in the direction of flow. Stake the matting as directed by the Engineer. The matting will only be used from the existing water surface to the top of bank, not in the stream bed, to repair trenching operations for the proposed utility lines or as specified by the Engineer. At each utility crossing the same excavated material in the stream bed removed shall be backfilled in the stream bed.

Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. There are to be no creases or bulges in the matting. Bury the top slope end of matting in a narrow trench at least 6 in. deep by 6-in. wide and tamp firmly.

Place stakes across the matting at ends, sides, junctions, check overlaps, and the toe of the channel bank approximately 1 ft. (0.3 m) apart with notch facing upslope. The toe of the channel bank stakes are to be a minimum of 36 inches in length, and all other stakes must be a minimum of 24 inches in length.

Place stakes along the center of matting 3 feet apart. Place stakes along all lapped edges 1 ft. apart.

The Engineer may require adjustments in the trenching or staking requirements to fit individual site conditions.

Coir fiber matting and stakes used to install it shall be considered incidental to the installation of water, sewer, and gas pipes used to cross the stream.

In addition to the Coir matting, the Contractor shall provide a procedure to stabilize the steep slopes along the stream banks during and after the completion of utility relocations. The geotechnical unit shall review and approve the method of slope protection submitted by the contractor. The bank stabilization shall

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be considered incidental to the installation of water, sewer, and gas pipes used to cross the stream

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 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.

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1. INSTALL STEEL GAS MAIN:

**GREENVILLE UTILITIES COMMISSION
CONSTRUCTION OF
6" STEEL NATURAL GAS PIPELINE
NCDOT BRIDGE PROJECT B3685
GREENVILLE, NC**

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**GREENVILLE UTILITIES COMMISSION
CONSTRUCTION OF
6" STEEL NATURAL GAS PIPELINE
NCDOT BRIDGE PROJECT B3685
GREENVILLE, NC**

SPECIFICATIONS

1.0 General

This section contains the specifications for the installation of the approximately 600 feet of 6" steel 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. 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 Directional Drilling

THIS SECTION HAS BEEN DELETED.

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 the permanent and construction easements of right-of-way. No clearing work will take place on public right of way unless stated

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otherwise in these specifications or special provisions, or on the plan drawings.

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

- b. 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 land owner 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.
- c. 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 stacked survey line or the designed offset provided by Commission. 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 6" 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.

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80**MINIMUM DITCH REQUIREMENTS**

<u>Nominal Pipe Size</u>	<u>Width</u>	<u>Cover</u>
2"	12"	36"
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"

- 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.

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1.5 Handling and Storage of Pipe and Materials

- a. 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 charged to the Contractor's account.
- b. Pipe shall be handled with approved equipment in manner to prevent damage to the pipe, the pipe end bevels or the external coating. When handling the pipe, end hooks shall be used which have bronze or equivalent nonferrous metal bearing surfaces which properly fit the curvature of the pipe.
- c. Bare and coated pipe shall be stored in an approved manner by placing the pipe joints in close rows and tiers on pipe racks that are of sufficient height to prevent the bare pipe surface or the uncoated pipe from touching the ground or allowing ground runoff water to enter the pipe. The pipe racks shall be made up of earth or sand berms or padded wood stringers that are properly spaced to evenly support the pipe joints against deformation or damage to the coating and pipe ends. The Contractor shall stack the pipe an acceptable number of tiers high; however, the number of tiers shall be reduced if Commission's Authorized Representative determines that a safety risk exists or that damage to the coating or pipe deformation has occurred.
- d. Materials that can be easily lost, or damaged by exposure to rain, humidity or extreme temperatures, shall be suitably stored by the Contractor inside 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.

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- b. Padded bolsters and nylon straps shall be used by Contractor to protect the pipe coating from damage during the hauling operations. The pipe shall be adequately supported on the pipe 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 coating.
- c. Careful loading and stringing shall be followed by the Contractor to avoid damage to the pipe and the pipe coating. 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 coating 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 Bending

- a. The Contractor shall make all necessary field bends to accommodate changes in the ditch grade or direction. All bends shall have a uniformly distributed curvature with no buckles, wrinkles or any other mechanical damage.
- b. All field bends shall be made by the Contractor using a properly sized bending machine equipped with a lined bending set approved by Commission's Authorized Representative. A suitable pipe bending mandrel shall be used when bending pipe 20 inches in diameter or larger.
- c. The difference between the maximum and minimum diameter along the bend in the pipe shall not be more than 2.5 percent of the nominal diameter. Bending of the pipe shall not exceed 1.5 degrees per the length of pipe equal to the pipe diameter.
- d. Each bend shall be spaced a distance of 1 pipe diameter to be measured at the inside radius of the bend (crotch).
- e. Bending of pipe containing a longitudinal weld shall be performed in such a manner that the longitudinal weld shall be as near as practicable to the neutral axis of the bend (i.e. at a right angle to the direction of the bend).
- f. For single joints of pipe, bending shall not be performed on the pipe within five feet from each end of the joint. However,

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for double jointed pipe, no bending point shall occur closer than 1 foot from the circumferential weld used in making the double joint. In all cases, suitable precautions shall be taken to prevent out-of-roundness at the end of the pipe joint due to the bending action.

- g. Any pipe bends made by the Contractor which are buckled, wrinkled, waved or are otherwise unsatisfactory to Commission's Authorized Representative, shall be removed from the line, as a cylinder, and replaced at the Contractor's expense.

1.8 Welding

This specification supplements the requirements and specifications used to weld the pipeline in accordance with governing codes and specifications.

1.8.1 Standards and Codes

The following standards and codes are applicable:

- (1) CFR 49; DOT 192, Subpart E- Welding of Steel in Pipelines.
- (2) API 1104 Standard for Welding Pipelines and Related Facilities (Current Edition)
- (3) AWS Filler Metal Specifications

1.8.2 General

Welding of the pipeline shall be performed in accordance with DOT 192 Subpart E- Welding of Steel in Pipelines and all supplemental requirements incorporated by reference within the regulation. In addition to the provisions contained in this specification, all welding shall adhere to the details listed in the Welding Procedure Specification WPS, issued by the Commission, for this project.

1.8.3 Welding Processes

All welding shall be performed by the shielded metal arc welding (SMAW) process. Proposed alternate welding processes will be considered when sufficient details of the welding process and mechanical test data are made available for review. Additional or unique welding procedures may be utilized if approved by GUC Engineering. In addition, the welding procedure(s) will require qualification in the presence of an authorized GUC representative. Also, the

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costs incurred by GUC, for the Welding Procedure Qualification(s) will be paid by the Contractor.

1.8.4 Welding Consumable

All welding consumable shall conform to the requirements of API 1104 specifications for filler Metals and American Welding Society Specification for filler Metals A 5.1 and 5.5 Low Alloy Steel covered Electrodes. The electrodes used must meet the applicable Welding Procedure Specification (WPS) stipulated by the Commission. Where necessary and upon approval by the Commission an additional WPS may be qualified. Cost for this Procedure Qualification and all materials including the pipe will be paid by the Contractor. Further, if use of this procedure requires the welders to requalify, cost of all requalifications will also be paid by the Contractor.

1.8.5 Electrode Storage

Electrodes shall be stored in a clean, dry area on pallets above ground. The electrodes shall be stored in their original containers, unopened. When necessary, unused electrodes in opened containers shall be stored in a holding oven and maintained at a temperature of 200°F. All electrodes shall be returned to the rod control area at the end of the work day for storage in the holding oven.

Any electrode coating which becomes contaminated with water or moisture, oil, grease, dirt, etc., shall be scrapped and removed from the area. Further, any electrode(s) that are deemed unacceptable by the Commission's Authorized Representative shall also be removed from the job. Replacement electrodes will be supplied by the Contractor at his cost.

1.8.6 Welding Machines and Equipment

Welding machines and equipment shall be in first class operating condition and shall be capable of operating within the voltage and ampere ranges required by the Welding Procedure Specifications (WPS). Should any equipment not perform to Owner's Authorized Representative's satisfaction, it shall be removed from the site and replaced with satisfactory equipment.

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85**1.8.7 Welding Procedures and Welding Performance Qualifications**

- (1) All welders or anyone performing welding on the pipeline and attachments shall be qualified in accordance with the following Parts: (1) The Commission shall provide all pipe necessary for welder performance qualifications. The Contractor shall supply at his expense, all other materials, equipment, labor and testing of weld specimens as required by API 1104. (2) All procedures for welding of the pipe shall be qualified in accordance with DOT part 192 Title 49, which includes those codes incorporated by reference within DOT 192 Subpart E. All Welding Procedure Specifications and Performance Qualification Reports shall be specified and supplied by the Commission. However, all Welder Performance Qualification Reports and the ongoing maintenance thereof shall be the responsibility of the Contractor. All Welder Performance Qualifications shall be either conducted by the Commission or witnessed and approved by the Commission's Authorized Representative.
- (2) GUC reserves the right to require each welder to take and pass the Butt Weld portion of the API 1104 Multiple Qualification Test with pipe having an outside diameter greater than 12-3/4" and/or a wall thickness exceeding .250". However, the fabricated tee portion of the Multiple Qualification Test will remain as 12—3/4" O.D. x .250" Wall.

1.8.8 Welding Position

All Welding shall be performed downhill and as specified in the Welding Procedure Specification.

1.8.9 Cleaning

- (1) When required, the interior of each pipe joint shall be cleaned of debris, dirt, scale, or other substances with a suitable swab before the joint is lined for welding. However, in all instances, the interior of the pipe will be cleaned, with a power brush or a power grinder, for a distance of 2 inches from the bevel's land, both inside and outside of the pipe. Each cleaned joint shall be welded into the line before the end of the workday.

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- (2) In addition to the requirements of the Commission-issued WPS, all slag shall be thoroughly removed from each weld bead immediately after the weld bead is completed, to facilitate visual inspection and minimize weld defects due to slag. This shall be accomplished by rotary wire brushing or grinding. Any undercut adjacent to the cap pass on the exterior of the pipe or the root bead on the inside of the pipe may be cause for rejection. Pneumatic chipping hammers or peening shall not be allowed.

1.8.10 Weather Conditions

During Adverse weather conditions the weld area shall be protected to prohibit rain, snow, or sleet from coming in contact with the weld joint during welding or cooling periods. If suitable measures are not employed, in the judgement of GUC's Authorized Representative, to protect the weld area from adverse weather conditions, then GUC's Authorized Representative may halt the welding operation until such time as conditions are made suitable to continue.

1.8.11 Preheat and Interpass Temperature

Preheat requirements are specified in the GUC issued Welding Procedure Specification for this project.

1.8.12 Alignment and End Preparation

- (1) The alignment of pipe ends for welding shall be accomplished using line-up clamps. External line-up clamps shall be the primary approved type, however internal clamps may be used if approved by GUC's Authorized Representative. If external clamps are used the clamps must not be removed until root bead segments that are uniformly spaced around the circumference of the pipe have an aggregate length of at least 50% of the pipe circumference. If internal clamps are used they shall not be removed until 100% of the root bead is completed.
- (2) End preparation shall be conducted using a flat disk type grinder to remove scale, dirt, paint, or other foreign matter from the weld area. The bevel and land shall be maintained, or brought to, the condition specified in the GUC issued Welding Procedure

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Specification, as relates to the acceptable dimensional and angle tolerances. End preparation shall leave the welding area bright metal, and free of nicks, dents, gouges, or other material defects. If the pipe end contains defects that cannot be repaired, the pipe end shall be removed and a new bevel and land shall be created using a bevel cutting torch and power grinder, respectively. All longitudinal seams shall be aligned such that the seams are at a 90 degree offset from each other.

1.8.13 Additional Requirements

- (1) When welding the root bead and hot pass, two welders may be employed. The hot pass shall be made within five minutes after the root pass is completed.
- (2) No incomplete weld shall be left overnight, or longer, until the root bead, hot pass, and the first filler pass have been completed.
- (3) Each weld started must be completed within 72 hours, while adhering to the preheat and interpass requirements in the applicable WPS.
- (4) Each weld pass must be completed in its entirety, on both sides of the pipe, before subsequent passes are initiated.
- (5) The required minimum distances between welds shall be a distance equal to not less than one-half the diameter of the pipe.
- (6) The Contractor shall pick up, and insert in the pipeline, pieces of pipe which have been cut off when tying sections of the pipeline together. Minimum length of such pieces shall be six feet. Pipe sections of less than six feet in length shall be removed from the job site and returned to Commission's designated material storage area.

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88**1.8.14 Inspection**

- (1) Commission's Authorized Representative shall have the authority to visually inspect, during welding and after completion of the weld, the quality of the welds made by each welder. Should the quality of any of the welds so inspected be questionable, the Commission's Authorized Representative shall have the right to direct the Contractor to cut the weld out of the pipeline. In the event the cut out weld is within the limits of the specifications, the cost to the
- (2) Contractor to cut out and replace the weld will be compensated for at the lump sum price shown in Bid Proposal. Should the weld not meet the specification limits, however, the cost of the cut out and replacement weld will be to the account of the Contractor.

1.8.15 Repairs

All repair welding shall be approved by Commission's Authorized Representative. Any repair performed without this approval is subject to rejection.

1.8.16 Radiographic Inspection

- (1) The Contractor shall conduct its operation in a manner to allow Commission to have 25% of the welds inspected by radiographic or other inspection methods. Full cooperation will be given to the third party inspection personnel by the Contractor to ensure complete and timely inspection of the welds. When weather or terrain conditions make it necessary, the Contractor shall assist the third party inspection firm in the movement of its equipment along the route of the pipeline at no additional cost to the inspection firm or to Commission.
- (2) The radiographic inspection shall be conducted in accordance with API 1104 radiographic requirements, using qualified radiographic procedures and radiographers certified to ASNT-TC- 1A.
- (3) The Commission's Authorized Representative may increase or decrease the number of welds inspected by radiographic or other inspection methods, at Commission's discretion.

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89**1.9 Laying**

- a. The pipe lay shall proceed along the route of the previously excavated ditch with the lineup and welding of the pipe joints being performed alongside the ditch by the Contractor. The Contractor shall keep the ditching, laying and welding operations within reasonable distance of each other consistent with good pipeline construction practices. If, in the opinion of Commission's Authorized Representative, any of these distances become excessive and result in complaints from property owners and/or loss of welding quality control, the Contractor shall take immediate action to correct these conditions. Once the stringer is completed, do not allow the adjoined pipe to be raised or lowered more than one (1) timber (row) on the skid, until the hot pass is finished. The supports shall be spaced and cribbed in a manner that prevents the pipe from falling off of the supports because of expansion or contraction of the pipe string. The length of any one pipe string shall not exceed 3,000 feet.
- c. The open ends of the pipe sections that cannot be visually inspected, shall be securely closed at the end of each work day to prevent the entrance of animals or foreign matter into the pipe. Canvas or water tight night caps shall be used, and shall not be removed until the resumption of work. Metal night caps that are welded to the pipe shall not be used.

1.10 Coating of Field Joints and Coating Repairs

This specification covers the minimum requirement for the coating of field joints and damaged areas of coating. The work required under this specification includes furnishing all supervision, labor, equipment and materials required to perform the operations and incidental activities necessary for surface preparation, coating application, and inspection.

1.10.1 Wraparound Shrink Sleeves

THIS SECTION HAS BEEN DELETED.

1.10.2 Hot Applied Tape Wrap

- a. Surface Preparation
 - (1) The pipe surface at field joints shall be cleaned of rust, scale, weld splatter, charred coating and other foreign materials by knives and power driven wire brushes.

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Imperfections to the pipe surface such as burrs, knurls, slivers, etc., shall be removed by grinding.

- (2) Oil grease or other foreign matter shall be removed by using a suitable non-oily solvent such as naphtha or equivalent and clean rags. Dust, dirt, mud, etc., shall be removed from the pipe coating on each side of the field joint for a minimum distance of six (6) inches.
- (3) The surface at coating repair locations shall be cleaned, all loose or rough damaged coating shall be removed by abrading, filing or cutting. A small area of the undamaged coating (approximately one inch) around the repair area shall be abraded with a file, and the whole area shall be wiped free of contaminants and/or moisture.
- (4) In addition, the pipe and coating shall be heated to approximately 120° with a large-flame torch to remove moisture and to prepare the surface for application of the primer. Immediately after heating the pipe, apply the primer to the cleaned surface in a thin uniform coat using a 6" wide paint brush. Ensure no drips, floods, or curtains are left hanging from the bottom of the pipe. The primer must extend 2" to 4" past the ends of the area to be wrapped. Let primer dry to tacky consistency before applying tape.

b. Application of Hot Applied Tape Wrap

(1) Spiral Wrap

When primer becomes tacky, apply tape with 50% lap. Heat lightly with torch to obtain a softening or bleeding of the pitch. Only enough tape should be heated to remain in a liquified state during application. Alternately heat and spiral wrap, pulling tape to properly conform to the irregular surfaces of the pipe or fittings. On tape with plastic film separators, the film remains on the tape and becomes an outer protective wrapping. When the end of the joint to be wrapped is reached, discontinue all tension on the tape during the last spiral, cut the tape and add primer lightly, smoothing into place over the previous lap. The completed joint wrap should be lightly torched to insure overall sealing of the overlap. The tape wrap should extend a minimum of 2" past pipe coating.

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91**(2) Cigarette Wrap**

Use length and width of tape that will go around the pipe and provide a 4" overlap. Prepare surface and apply primer as in spiral wrap. Heat the tape to keep wrinkles to a minimum. Bring ends together, heat, seal and fold back onto the wrap. The entire coating shall be lightly heated with the torch to cause the coating to flow together.

1.10.3 Inspection

- (1) All pipeline coating, including coated field joints, shall be inspected by using an approved electronic holiday detector furnished and operated by the Contractor. Coating inspection shall begin only after prior notification to Commission by the Contractor to allow Commission's Authorized Representative to be present for this inspection. The holiday detector shall be operated at a minimum of 10,000 volts when inspecting shrink sleeves, between 1750 volts and 1900 volts when inspecting standard pipeline coating and shall be checked at the beginning of each workday and near the middle of each workday in the presence of the Commission's Authorized Representative with an accurate voltage meter.
- (2) Any holidays detected by this inspection procedure shall be cleaned and repaired as specified below, and inspected again with the holiday detector.

1.10.4 Damaged Coating Repairs

Small pinhole type damaged areas of coating shall be repaired using a patch stick which is compatible with the mill applied coating, and a small torch to heat the pipe surface at the damaged coating location. Larger damaged areas of coating shall be cleaned by abrading the areas as specified above, and re-coated using a two-part, liquid epoxy compound supplied by the manufacturer of the epoxy powder. This compound shall not be applied if the pipe temperature gets below 50°F. The patch stick and epoxy compound applications shall be performed in a manner to obtain a minimum thickness of 15 mils.

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92**1.11 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 or properly padded. This is critical at sag bends and tie-in points.
 - (3) If padding is required, verify the proper spacing and number of pads. The distance between padding will be reduced by one—half at sag bends. Verify that the sag bend does not rest directly on any padding.
 - (4) If the pipe cover exceeds 6 feet at tie—in welds, overbends and sag bends, the pads will be replaced with select fill material that is approved by the Commission.
 - (5) If padding is not required for the project, 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, sag bends shall be lowered first and anchored with backfill material. Side bends shall be placed to bear against the outside wall of the trench. All sag bends and overbends 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 and/or lowering-in cradles to prevent damage to the coating. 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.

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93**1.12 Backfilling**

- a. Backfilling shall follow the laying and lowering in 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 which 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 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 coating 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

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restored by the Contractor to their original elevation during the backfilling operation.

1.13 Highway, Road, and Railroad Crossings

This specification includes all work required to haul, unload, excavate, bore, weld and install the pipeline, with or without 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. Permits for all road crossings will be obtained by Commission.
- 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 Commission drawings and with any general specifications that may be required by the state, county or city highway engineer.
- d. In all cases where specified, the crossing of public roads shall be accomplished by the boring or tunneling method. The Contractor shall not install any road crossing by the "opencut" method without written permission from the governing authority and approval from Commission's Authorized Representative.
- e. Bored road crossings which do not require casing shall be installed by the slick bore method, whereby the crossing shall be bored using a bore pipe casing of at least the same outside diameter as the outside diameter of the coating on the carrier pipe. Upon completion of the bore, the proper length of road crossing carrier pipe shall be welded to the bore pipe casing and pulled into the hole taking the place of the bore pipe. The carrier pipe weld joint shall be externally coated with wraparound shrink sleeves. When required, the carrier pipe to be installed at road and railroad crossings will be cut to fit the exact length shown on the construction plans and permit drawings.
- f. 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, county or city regulations or as directed by Commission's Authorized Representative.
- g. At specified highway and road crossings, the carrier pipe

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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 railroad, highway or road right-of-way boundaries unless shown otherwise on Commission drawings.

- h. In the event voids between the casing (or carrier pipe) and the soil develop during and after boring and installation of the casing (or carrier pipe), then such voids shall be filled by pressure grouting by the Contractor at no additional cost to Commission.
- i. 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 (or carrier pipe) to the point where the carrier pipe rests firmly on the bottom of the ditch.

1.14 Water Crossings

- a. The Contractor shall provide all labor, equipment and materials, except materials to be furnished by Commission, to install the pipeline across drainage and irrigation ditches, major and minor streams, canals, rivers, reservoirs and adjacent lowlands and floodplains. Such crossings are to be considered as part of the scope of work.
- b. The pipeline ditch across waterways shall be excavated to a depth to provide the cover specified on the Commission drawings, and to a width at the bottom of the ditch to provide a clearance of a minimum of six (6) inches on each side of the pipe.
- c. At waterway locations where profile drawings have not been made, the Contractor shall install the pipeline generally in accordance with Commission's standard drawing for waterway crossings. Special attention shall be given to each individual crossing, however, in establishing the required pipe cover depth below the stream bed to protect the pipe from possible flood water scouring action. The required distance back from inside the waterway banks to install sag bends to protect the up-slope sections of the pipeline crossing from the effects of possible bank erosion, must also be given special consideration.
- d. Waterway crossing pipeline sections, when required, shall be weighted to a specified specific gravity by the addition of concrete coating or concrete weights to the pipe, as shown on the Commission drawings or as directed by Commission's Authorized Representative.
- e. The Contractor shall perform all operations required to install the pipeline across waterways in a manner to minimize the

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disruption of water flow, and to return the waterway banks and bottom to as near original condition as possible. Applicable erosion and sediment control structures shall be installed as required.

1.15 Cathodic Test Lead Stations

- a. The Contractor shall install cathodic test lead stations at locations shown on Commission alignment drawings or as directed by Commission's Authorized Representative, and in accordance with Commission's standard test lead drawings.
- b. Test leads shall be installed by the Contractor at all cased road and railroad crossings, at metallic foreign pipeline crossings, at insulating flange/joint assemblies, and at other designated locations along the pipeline.
- c. Damage to the external pipe coating resulting from the test lead installations shall be repaired by the Contractor at Contractor's expense, in accordance with Section 1.9 of these Specifications.

1.16 Valves, Taps, and Connectors

- a. All designated valves, taps other appurtenances shall be installed by the Contractor at the locations shown on Commission alignment and detailed drawings, 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., as provided for in the Proposal. The compensation shall include all costs associated with the work required to fabricate, pre-test and install these appurtenances within the area and limits shown on the Commission's drawings and shall be included in the unit price to install the 6" pipe.
- c. Unless shown otherwise on Commission drawings, 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

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- 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.

1.17 Insulating Joint Assemblies

- a. Insulating joint assemblies shall be installed in the pipeline at locations shown on Commission drawings, and as designated by Commission's Authorized Representative. The insulating joints shall be assembled in the field in accordance with Commission's standard drawing, and shall be electrically and pressure tested prior to welding into the pipeline. In the event factory assembled and tested insulating joint units are furnished by Commission, the Contractor shall electrically test these units prior to installation in the pipeline to assure the effective electrical resistance of the insulating material.
- b. Commission's Authorized Representative shall be present for the electrical test of the flange/joint insulation, and shall be the sole judge as to the acceptability of the test.

1.18 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, re-weld the line and repeat the pigging operation until a successful run of the pig has been completed, at no additional cost to Commission.

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

- (3) Types of Pigs and Construction: Commission shall supply all pigs for cleaning the test sections. Pigs used for cleaning may also contain brushes, knives or rubber disks, at the Commission's option.
- (4) 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.

1.19 Pneumatic Testing

1.19.1 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, such as rivers, valve assemblies and other installations as designated in the Special Provisions, in the construction drawings, or by Commission's Authorized Representative.

1.19.2 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.
- (3) Contractor shall furnish all fill and test fittings, manifold piping, valves, high pressure hose, temperature and

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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.

1.19.3 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 maximum pressure to be applied to the section tested shall be 120 PSIG, and the minimum acceptable pressure shall be 90 psig.

1.19.4 Pretest Procedures

- (1) The Contractor shall install manifolds at agreed points. All welds made in the installation of the manifolds shall be in strict accordance with API Standard 1104 specifications.
- (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.

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100**1.19.5 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. The pressure sensing point shall be at each end point in the test section.
- 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 pressure for a period not less than 24 hours and shall be approved by the Commission's Authorized Representative. The test duration shall be not less than 24 hours unless otherwise specified by 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, the Contractor shall restore the pressure to the specified test pressure.

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- (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 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 a leak or failure, the Contractor shall reinstate the necessary and pressure testing procedure as outlined previously and then proceed as follows:

- (a) The Contractor shall then pressurize the

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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 twenty—four (24) hours, or for the length of time required in the Special Provisions, and providing a continuous test recording for the duration of the test. If a decay 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.

1.19.6 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 repressure 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.

1.19.7 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.

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- (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.
- (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 in plate 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.

1.20 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.

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- (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.

1.21 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.

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- 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.

1.22 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 and stream banks shall be biodegradable jute netting or equal approved by Commission's Authorized Representative. Geotextile fabric to be placed under the crushed stone bridges at stream crossings shall be "Exxon GTF-150" (or equal). These measures shall be implemented by the Contractor as applicable to each phase of the construction, to reduce to a bare minimum any erosion and sediment movement in the areas disturbed by the construction activities required to install the pipeline.
- d. The Contractor shall exercise extreme care while performing the necessary construction work in or near streams or other waterways to prevent oil spills and other types of pollution.
- 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.

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105 A**1.23 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.

1.24 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 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.

All materials for the 6" gas main will be supplied by Greenville Utilities Commission (GUC)

The gas pipe, installed in accordance with the plans and provisions herein and accepted, will be paid for by lump sum for "Install 6" 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.

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105 B**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.

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. The ductile iron water pipe shall be polyethylene wrap on the outside.

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). Bituminous outside coating shall be in accordance with ANSI A21.51 (AWWA C151).

The polyethylene wrap shall be in accordance with ANSI A21.588 (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.

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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 "____" 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. 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. The ductile Iron water pipe fittings shall be polyethylene wrap on the outside.

Ductile iron water pipe fittings and specials for cast iron or ductile iron water pipe 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 polyethylene wrap shall be in accordance with ANSI A21.588 (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 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.

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106**5. INSTALL 4" WATER METER ASSEMBLY AND VAULT:**

The 4" water meter assembly and vault shall be installed as shown on the utility plans, or as directed by the Engineer.

Greenville Utility Commission will provide the 4" meter assembly and vault (with 4" DI piping installed through the vault walls).

The Contractor shall install the 4" water meter and vault and make the necessary connection to the proposed 4" service line paid for separately under DI water pipe.

The quantity of water meters and vaults installed and accepted will be measured and paid for at the contract unit price each for "Install 4" Water Meter and Vault". Such price and payment will be full compensation for all labor, excavation, removing, installing and reconnecting, backfilling, and incidentals necessary to complete the work as required.

6. DUCTILE IRON SEWER PIPE:

Ductile Iron 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. The ductile Iron sewer pipe shall be polyethylene wrap on the outside.

Ductile Iron Sewer Pipe shall be of the thickness class as shown on the utility plans and shall conform to ANSI A21.51 (AWWA C151). Push-on joints for such pipe shall be in accordance with ANSI A21.11 (AWWA C111). Pipe thickness shall be designed in accordance with ANSI A21.50 (AWWA C150) and based on laying conditions and internal pressures as stated on the plans.

Cement mortar lining and seal coating for pipe shall be in accordance with ANSI A21.4 (AWWA C104). Bituminous outside coating shall be in accordance with ANSI A21.51 (AWWA C151).

The polyethylene wrap shall be in accordance with ANSI A21.588 (AWWA Standard C105).

All Ductile Sewer Pipe shall be installed in accordance with laying condition as shown on the plans, as stated in ANSI A21.51 (AWWA C151), and as directed by the Engineer.

Ductile iron sewer pipe, installed in accordance with the plans and provisions herein and accepted, will be measured along the pipe from centerline of manhole to centerline of manhole and paid for at the contract

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unit price per linear foot for " 8" DI Sewer Pipe, Class 50 ". Such prices and payments will be full compensation for all materials, excavation, labor, leakage tests, fittings, saddles, backfilling, removal of existing sewer pipe, and incidentals necessary to complete the work as required.

7. DUCTILE IRON RESTRAINED JOINT SEWER PIPE:

Ductile Iron Restrained Joint 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. The ductile iron restrained joint sewer pipe shall be polyethylene wrap on the outside.

Cement mortar lining and seal coating for pipe shall be in accordance with ANSI A21.4 (AWWA C104). Bituminous outside coating shall be in accordance with ANSI A21.51 (AWWA C151).

Polyethylene wrap shall be in accordance with ANSI A21.588 (AWWA Standard C105).

Ductile Iron Restrained Joint Sewer Pipe shall be of the thickness class and pressure rating shown on the utility plans and shall conform to ANSI A21.51 (AWWA C151) Push-on joints for such pipe shall be in accordance with ANSI A21.11 (AWWA C111). Pipe thickness shall be designed in accordance with ANSI A21.50 (AWWA C150) and based on laying conditions and internal pressures as stated on the plans.

All Ductile Iron Restrained Joint Sewer 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 Restrained Joint Sewer 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, " 8" DI Restrained Joint Sewer Pipe, Class 50". Such prices and payments will be full compensation for all materials, including pipe accessories, excavation, labor, testing, backfilling, and incidentals necessary to complete the work as required.

8. CLASS A CONCRETE FOR PIERS:

Concrete piers shall be used to support pipes at all stream crossings, where, in the opinion of the Engineer, such piers are necessary. Such piers shall be constructed as shown on the utility plans.

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The concrete shall meet the requirements of Section 1000 of the Standard Specifications for class A concrete.

The reinforcing steel shall meet the requirements of Section 1070 of the standard specifications.

Steel for straps and bolts shall be AISI type 316 stainless steel.

Class A concrete for piers, installed in accordance with the plans and provisions herein and accepted, will be measured and paid for at the contract unit price per cubic yard for "Class A Conc. for Piers". Such price and payment will be full compensation for furnishing all materials, steel, straps, bolts, forms, labor, excavation and backfilling, and incidentals necessary to complete the work as required.

9. FLOWABLE FILL:

Flowable fill shall be used to backfill the excavation under the concrete steam tunnel. Such fill shall be placed as shown on the plans and/or as directed by the Engineer.

The flowable fill materials shall meet the requirements of Division 10, Section 340-2 of the Standards Specifications for Roads and Structures.

Flowable fill shall consist of cement, fly ash, fine aggregate and water. The flowable fill shall be of a consistency to flow and be vibrated if necessary in order for the mix to flow uniformly.

The quantity of flowable fill placed and accepted will be measured and paid for at the contract unit price per cubic yard for "Flowable Fill ". Such price and payment will be full compensation for all work covered by this provision including but not limited to the mix design, furnishing, hauling, labor, placing the flowable fill, containing the flowable fill, and incidentals necessary to complete the work as required.

10. SANITARY SEWER MANHOLES WITH WATERTIGHT RING AND COVERS:

Sanitary sewer manholes shall be installed in accordance with the utility provisions herein, as shown on the utility plans, and/or as directed by the Engineer.

Sanitary sewer manholes shall be precast concrete, shall conform to ASTM C478 and shall be as shown on the plans and/or in Roadway Standard Detail Drawings 840.67 or 840.74.

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Sanitary sewer manholes with brick bases as shown in Standard Detail 840.73 shall be used where directed by the Engineer for manholes of extra depth with more than 2 pipes entering or where an extra large pipe is entering. Such manhole bases shall be constructed of standard size common red brick conforming to ASTM C32 grade MS, and shall be constructed as required in Section 830 of the Standard Specifications with approved mortar. The inside and outside of brick bases shall be plastered with mortar a minimum of 1/2 inch thick.

Joints between precast manhole sections shall be O-ring rubber gaskets conforming to ASTM C-443 or butyl rubber gaskets conforming to AASHTO M198.

Connection of pipe to manholes for cored or precast holes shall be by a resilient connector conforming to ASTM C923 and for "horseshoe" type holes shall be by resilient material of rubber or butyl rubber and cement grout.

Manholes, either designated by the plans or having sewer pipes entering with two and one-half (2-1/2) feet or more vertical drop shall have an outside drop assembly as shown on the plans and/or as shown on Standard Details 840.68 and 840.69.

Sewer manholes over 3 feet in depth shall have steps, spaced 16 inches on center, of the type shown in Standard Detail 840.66. Cast iron shall be ASTM A48 Class 30. Steps shall be installed in accordance with the plans or standard details and shall be tested as required in ASTM C478.

Sanitary sewer manholes shall be constructed with invert channels, as shown on the plans or standard details, to confine and direct the flow through the manhole. The invert channels shall be smooth finished and shaped to provide an easy transition from inlet to outlet. The benches or shelves shall be finished to a non-slip texture and shall be sloped toward the invert channel. Precast invert channels are recommended but not required.

The minimum elevation difference between the "invert in" and the "invert out" of manholes shall be 0.1'. Exceptions are 1) when there is a change in flow direction of greater than 90 degrees the minimum difference shall be 0.2', and 2) when pipes of different sizes converge in a manhole, the inside tops of the pipes shall be at the same elevation.

The elevation difference between the "invert in" and invert out" of manholes shall be either (1) $< 0.5'$ or (2) $> 2.5'$. Manholes having pipes entering at elevations $> 2.5'$ above the outlet shall be drop manholes. Manholes shall not be designed utilizing a difference in invert elevations between 0.5' and

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2.5' except as follows. A difference in the "invert in" and the "invert out" elevations of up to 1.0' will be allowed in instances where there is sufficient justification, the incoming sewer is installed at a grade which exceeds the minimum by at least 50% and a smooth flow path is constructed between the influent and effluent piping.

Manhole rings and covers shall be manufactured in the USA of Class 30, gray cast iron conforming to the requirements of ASTM-A48 (latest revision thereof). The manufacturer's name and part number shall be cast into each component and the words "Sanitary Sewer" shall be cast into the cover. Pick holes shall be the non-penetrating type. Bearing surfaces of both ring and cover shall be machined to insure proper fit and to prevent rattling.

The list of manhole ring and covers shown below have been approved by Greenville Utilities Commission for use on municipal projects. The manhole ring and covers listed below are show as a reference only. Approved manhole ring and covers of equal quality will be accepted.

APPROVED MANHOLE RING AND COVERS

	Model No.	Manufacturer
Standard	V-1384	East Jordan Iron Works/Vulcan Foundry
	<u>USF 669 Frame & KLCover</u>	US Foundry
<u>Low Profile</u>	V-1384-3	East Jordan Iron Works/Vulcan Foundry
	<u>USF 664 Frame & KL Cover</u>	US Foundry
Watertight	<u>202701</u>	East Jordan Iron Works/Vulcan Foundry
	<u>USF 579 Frame & DC-SSG Cover</u>	US Foundry
<u>Locking</u>	<u>202725</u>	East Jordan Iron Works/Vulcan Foundry
	<u>USF 579 Frame & DC-SSG-LOC Cover</u>	US Foundry

Watertight units shall contain a locking device comprised of a stainless steel petagon head bolt locking device which functions in the manner of a quarter turn fastener, as a part of the cover. The low profile ring is to be used only when grades will not allow use of a standard height casting. All castings shall meet industry standards in regard to appearance and tolerances for dimensions and weight.

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Sanitary sewer manholes with watertight ring and covers will be measured on the "per each" basis.

Measurements will be made for the appropriate diameter of manhole on the actual number constructed as required and accepted.

Sanitary sewer manholes measured as provided above and accepted will be paid for at the contract unit price per each for "4' Dia Precast Conc Sewer Manhole, 0-6' Depth with Watertight Ring and Cover". Such prices and payments will be compensation in full for all materials, labor, equipment, excavation and backfill, and incidentals necessary to complete the work as required.

11. REMOVE AND STOCKPILE EXISTING FIRE HYDRANT:

The existing fire hydrants to be removed and stockpiled will be separated at the hydrant base from the existing pipe and stockpiled in an area accessible by truck or as directed by the Engineer.

After the fire hydrants are stockpiled, the Contractor shall contact Tom Beck of Greenville Utilities Commission at 252-551-1556 to receive and remove the fire hydrants.

The quantity of fire hydrants removed, stockpiled, and accepted, will be measured and paid for at the contract unit price per each for "Remove and Stockpile Exist Fire Hydrant". Such price and payment will be full compensation for all labor, excavation, removal, stockpiling, and incidentals necessary to complete the work as required.

12. BUTTERFLY VALVE AND VALVE BOX:

Butterfly valves and valve boxes shall be installed as shown on the plans, as required by the provisions herein, and/or as directed by the Engineer.

Butterfly valves shall conform to ANSI/AWWA C504 for Class 150B valves with O-ring shaft seals. Such valves shall have mechanical joint ends, a manual actuator with 2 inch operating nut and shall be designed for buried installation. Butterfly valves shall open counterclockwise.

The 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 30, unless otherwise shown on the utility plans and/or as directed by the Engineer.

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The quantity of butterfly 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 "16" Butterfly Valve and Valve Box". Such prices and payments will be full compensation for all materials, labor, installation, excavation and backfill, testing and sterilization, and incidentals necessary to complete the work as required.

PROJECT: B-3685

COUNTY: Pitt

PROJECT SPECIAL PROVISIONS

Utility

UTILITIES BY OTHERS:

General:

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

- A. Greenville Utilities Commission (Gas, Power, Water, and Sewer)
- B. East Carolina University Facilities Engineering and Architectural Services (Fiber Optic and Electric)
- C. Sprint
- D. Cox Communications

The conflicting facilities will be adjusted prior to the date of availability except where 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. Greenville Utilities Commission

1. See "Utilities By Others Plans" for utility conflicts.
2. Abandon and remove the existing power pole line left of Line -L- from Sta. 8+64 to Sta. 20+82 after a new power pole line is installed left of Line -L- from Sta. 8+64 to Sta. 14+65 then crossing Line -L- at Sta. 15+27 and continuing right to a new power pole at Sta. 16+63. Install a new power pole line left of Line -L- from Sta. 19+63 to Sta. 20+82, all to be done prior to the date of availability. The power pole line abandoned and removed within the limits of the bridge construction left of Line -L- from Sta. 14+65 to Sta. 19+63 will be replaced with a new power pole line on the left side of Line -L- after the bridge is completed. The temporary pole installed by GUC at approximately Sta. 16+63 -L-, 67' RT. will remain in place for Sprint and COX to use permanently.

B. East Carolina University Facilities Engineering and Architectural Services

1. See "Utilities By Others Plans" for utility conflicts.
2. The proposed fiber optic duct bank and proposed electric duct bank shall be installed after the 16" and 8" water lines, 6" gas line, and 8" sewer line are installed. The existing fiber optic duct bank and existing electric duct bank shall remain in service and not be disturbed until the proposed fiber optic duct bank and proposed electric duct bank are installed. The Contractor shall give ECU Facilities two weeks notice and 60 calendar days to complete the installation.

C. Sprint

1. See "Utilities By Others Plans" for utility conflicts.
2. After clearing and grubbing is completed, Sprint will need two weeks notice and 60 calendar days to complete the work.

D. Cox Communications

1. See "Utilities By Others Plans" for utility conflicts.
2. Cox will be on two poles installed by Sprint, so after clearing and grubbing is completed, Cox will need the same two weeks notice as Sprint and the same 60 calendar days as Sprint to complete the work.