

SANITARY SEWERAGE

1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.5.2.1M (1981; R 1995) Metric Round Head Short Square Neck Bolts

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA 1-5 (1993) Pipelines

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME/ANSI B16.1 (1996) Cast Iron Pipe Flanges and Flanged Fittings

ASME/ANSI B18.2.2 (1987; R 1993) Square and Hex Nuts (Inch Series)

ANSI/ASME B18.5.2.2M (1982; R 1993) Metric Round Head Square Neck Bolts

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 47M (1990; R 1996) Ferritic Malleable Iron Castings (Metric)

ASTM A 47 (1990; R 1995) Ferritic Malleable Iron Castings

ASTM A 48M (1994) Gray Iron Castings (Metric)

ASTM A 48 (1994; Rev. A) Gray Iron Castings

ASTM A 536 (1984; R 1993) Ductile Iron Castings

ASTM A 746 (1995) Ductile Iron Gravity Sewer Pipe

ASTM C 14 (1995) Concrete Sewer, Storm Drain, and Culvert Pipe

ASTM C 94 (1997) Ready-Mixed Concrete

ASTM C 150 (1997; Rev. A) Portland Cement

ASTM C 478M (1997) Precast Reinforced Concrete Manhole Sections (Metric)

ASTM C 478 (1997) Precast Reinforced Concrete Manhole Sections

ASTM C 923M (1996) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals (Metric)

ASTM C 923	(1996) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C 990	(1996) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C 990M	(1996) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants (Metric)
ASTM D 1784	(1997) Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(1996; Rev. B) Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	(1996; Rev. B) Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2321	(1989; R 1995) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 2412	(1996; Rev. A) Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D 2464	(1996; Rev. A) Threaded Poly (Vinyl Chloride) (PVC) Plastic Fittings, Schedule 80
ASTM D 2466	(1997) Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(1996; Rev. A) Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 3034	(1997) Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3139	(1996; Rev. A) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D 3212	(1996; Rev. A) Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals
ASTM F 402	(1993) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	(1996; Rev. A) Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 949	(1996; Rev. A) Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	(1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105/A21.5	(1993) Polyethylene Encasement for Ductile - Iron Pipe Systems
AWWA C110/A21.10	(1993) Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm), for Water and Other Liquids
AWWA C111/A21.11	(1995) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115/A21.15	(1994) Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
ANSI/AWWA C151/A21.51	(1996) Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153/A21.53	(1994) Ductile-Iron Compact Fittings, 3 in. Through 24 in. (76 mm Through 610 mm) and 54 in. Through 64 in. (1,000 mm Through 1,600 mm), for Water Service
AWWA C600	(1993) Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C606	(1997) Grooved and Shouldered Joints
AWWA M23	(1980) PVC Pipe - Design and Installation

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3	(1988) Installation of Polyvinyl Chloride (PVC) Pressure Pipe
UBPPA UNI-B-6	(1990) Low-Pressure Air Testing of Installed Sewer Pipe

1.2 SYSTEM DESCRIPTION

1.2.1 Sanitary Sewer Gravity Pipeline

Excavate and demolish existing sanitary sewer mains, manholes and service lateral lines. Replace with new polyvinyl chloride (PVC) and ductile iron pipe sewer mains, (6" and 8" diameter), PVC, schedule 40 service laterals (4" and 6" diameter) and precast concrete manholes (4' diameter unless indicated otherwise). Materials, installation and workmanship shall be as specified herein.

1.3 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.3.1 SD-02 Manufacturer's Catalog Data

- Pipeline materials including joints, fittings, and couplings
- Submit manufacturer's standard drawings or catalog cuts.

1.3.2 SD-04 Drawings

- Precast concrete manhole
- Metal items

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

1.4.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.4.1.2 Metal Items

Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

1.4.1.3 Cement, Aggregate, and Reinforcement

As specified in Section 03300, "Cast-In-Place Concrete"

1.4.2 Handling

Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care not to damage linings of pipe and fittings; if lining is damaged, make satisfactory repairs. Carry, do not drag, pipe to trench.

2 PRODUCTS

2.1 PIPELINE MATERIALS

2.1.1 Ductile Iron Gravity Sewer Pipe and Associated Fittings

2.1.1.1 Ductile Iron Gravity Pipe and Fittings

Ductile iron pipe shall conform to ASTM A 746, Thickness Class 50. Fittings shall conform to AWWA C110/A21.10 or AWWA C153/A21.53. Fittings shall have strength at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the joints specified hereinafter. Pipe and fittings shall have cement-mortar lining conforming to AWWA C104/A21.4, standard thickness.

2.1.1.2 Ductile Iron Gravity Joints and Jointing Materials

Pipe and fittings shall have push-on joints or mechanical joints, except as otherwise specified in this paragraph. Mechanical joints only shall be used where indicated. Push-on joint pipe ends and fitting ends, gaskets, and lubricant for joint assembly shall conform to AWWA C111/A21.11. Mechanical joint requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA C111/A21.11.

2.1.2 Polyvinyl Chloride (PVC) Plastic Gravity Sewer Piping

2.1.2.1 PVC Plastic Gravity Pipe and Fittings

ASTM 3034, SDR 35 with ends suitable for elastomeric gasket joints.

2.1.2.2 PVC Plastic Gravity Joints and Jointing Material

Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

2.1.3 PVC Plastic Pipe and Fittings for Service Laterals

Pipe and fittings shall be solid wall manufactured from virgin rigid PVC vinyl compounds with a Cell Class o 12454-B as identified in ASTM D-1784. Pipe shall be PVC Schedule 40, Iron Pipe size (ips) conforming to ASTM D-2665. Pipe and fittings shall be manufactured to the normal dimension cited in the ASTM Standard.

2.2 CONCRETE MATERIALS

Concrete materials shall be as specified in Section 03300, "Cast-In-Place Concrete."

2.3 MISCELLANEOUS MATERIALS

2.3.1 Precast Concrete and Associated Materials

2.3.1.1 Precast Concrete Manhole Sections

Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478. Base and first riser shall be monolithic.

2.3.1.2 Gaskets and Connectors

Gaskets for joints between manhole sections shall conform to ASTM C 443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923.

2.3.2 **Metal Items**

2.3.2.1 **Manhole**

Manhole frames and covers shall be designed for heavy traffic weighting not less than 310 lbs. Iron shall be tough, dense and even grained, cast in a true symmetrical pattern free from defects of any kind with two vent holes.

2.3.2.2 **Manhole Steps**

Plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70 plus or minus 5. Aluminum steps or rungs will not be permitted. Steps are not required in manholes less than 4 feet deep.

3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

Apply except where specific exception is made in the following paragraphs entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at the edge of the existing street or utility easement right-of-way as indicated on the plan drawings.

1. *Sanitary Piping Installation Parallel With Water Line:*

- *Normal Conditions:* Sanitary piping or manholes shall be laid at least 10 feet horizontally from a water line whenever possible. The distance shall be measured edge-to-edge.
- *Unusual Conditions:* When local conditions prevent a horizontal separation of 10 feet, the sanitary piping or manhole may be laid closer to a water line provided that:
 - a. The top (crown) of the sanitary piping shall be at least 18 inches below the bottom (invert) of the water main.
 - b. Where this vertical separation cannot be obtained, the sanitary piping shall be constructed of AWWA-approved ductile iron water pipe pressure tested in place without leakage prior to backfilling.
 - c. The sewer manhole shall be of watertight construction and tested in place.

2. *Installation of Sanitary Piping Crossing a Water Line:*

- *Normal Conditions:* Lay sanitary piping crossing water lines to provide a separation of at least 18 inches between the top of the sanitary piping and the bottom of the water line whenever possible.
- *Unusual Conditions:* When local conditions prevent a vertical separation described above, use the following construction:
 - (A) Sanitary piping passing over or under water lines shall be constructed of AWWA-approved ductile iron water pipe, pressure tested in place without leakage prior to backfilling.
 - (B) Sanitary piping passing over water lines shall, in addition, be protected by providing:
 - A vertical separation of at least 18 inches between the bottom of the sanitary piping and the top of the water line.
 - Adequate structural support for the sanitary piping to prevent excessive deflection of the joints and the settling on and breaking of the water line.
 - That the length, minimum 20 feet, of the sanitary piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the water line.
 - (C) Sanitary Sewer Manholes: No water piping shall pass through or come in contact with any part of a sanitary sewer manhole.

3.1.1.2 **Earthwork**

Perform earthwork operations in accordance with Section 02302, "Excavation, Backfilling and Compacting for Utilities."

3.1.1.3 **Pipe Laying**

All sewer mains shall be bedded on a 4" bed of #57 washed stone. Pipe shall then be backfilled with #57 washed stone to crown of pipe. Bedding stone shall extend the full width of ditch line bed.

3.1.1.4 **Connections to Existing Lines**

Obtain approval from the Town of Southern Pines Public Works Department before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 **Special Requirements**

3.1.2.1 **Installation of Ductile Iron Gravity Sewer Pipe**

Unless otherwise specified, install pipe and associated fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of AWWA C600 for pipe installation and joint assembly.

Make push-on joints with the gaskets and lubricant specified for this type joint and assemble in accordance with the applicable requirements of AWWA C600 for joint assembly. Make mechanical-joints with the gaskets, glands, bolts, and nuts specified for this type joint and assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendations of Appendix A to AWWA C111/A21.11.

3.1.2.2 **Installation of PVC Plastic Gravity Sewer Pipe**

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.2.3 **Installation of PVC Plastic Piping for Service Laterals and Cleanouts**

Installation shall comply with the manufacturer's recommended instructions. Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D-2564.

3.1.3 **Manhole Construction**

Use precast concrete base sections. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For precast concrete construction, make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging shall be required for precast concrete manholes. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer.

3.1.4 Miscellaneous Construction and Installation

3.1.4.1 Metal Work

- a. Workmanship and finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well defined lines and arises. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.
- b. Field painting: After installation, clean cast-iron frames, covers, gratings, and steps not buried in concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Town of Southern Pines Construction Inspector will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing and be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

3.2.2 Test for Non-pressure Lines

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. Any obstructions revealed during visual inspection of the line shall be removed by flushing with water at a minimum velocity of 2.5 feet per second until the line is clean. When pressure piping is used in a non-pressure line for non-pressure use, test this piping as specified for non-pressure pipe.

3.2.2.1 Leakage Tests

Test lines for leakage by performing low-pressure air tests.

- a. Low-pressure Air tests: Testing of gravity sewer lines shall be performed according to the manufacturer's recommended procedures for "Air Testing". The duration allowed for a prescribed low-pressure air exfiltration pressure drop between two consecutive manholes shall not be less than that shown in the table below or as specified by the manufacturer. If conflicting information exists, the more stringent of the two shall take precedence. The allowable pressure drop shall not exceed 0.5 psi from 3.5 psi to 3.0 psi in excess of ground water pressure above the top of the sewer. During air testing, manholes shall be plugged with inflatable stoppers to plug all pipe entrances being tested. Lines shall be tested completely including service connections.

Minimum Duration for Air Test Pressure Drop

Pipe Size (Inches)	Time (Minutes)
4	2.5
6	4.0
8	5.0
10	6.5
12	7.5
15	9.5

3.2.1.2 **Deflection Testing**

Deflection Testing: This test will be required on all PVC composite pipes and shall be conducted after the final backfill has been in place a minimum of 30 days to permit stabilization of the soil-pipe system. The test shall be performed using a nine-prong mandrel pulled through the pipe. The maximum allowable deflection will be five percent. Mandrel size will be in accordance with the following table:

<u>Main Size</u>	<u>Mandrel Dimensions</u>
8"	7.40"
10"	9.31"
12"	11.22"
15"	14.09"

3.2.2 **Tests for Manholes**

The Engineer shall require that all of the sanitary sewer manholes installed in this project shall be vacuum tested for infiltration. Each manhole shall be tested after assembly prior to backfilling as per ASTM C1244. All lift holes and pipe entrances shall be plugged and braced as necessary. A vacuum of 10-inches mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for which it takes the vacuum to drop 9-inches of mercury. The manhole shall be approved as passing the test if the time is greater than the values shown below:

<u>Manhole Depth</u>	<u>48"</u>	<u>60"</u>	<u>72"</u>
Less than 10'	60 sec.	75 sec.	90 sec.
10' – 15'	75 sec.	90 sec.	105 sec.
15' – 25'	90 sec.	105 sec.	120 sec.

If the manhole fails the initial test, necessary repairs shall be made with an approved non-shrink grout. Retesting shall continue until the manhole satisfactorily passes the test. All tests shall be performed in the presence of the Town of Southern Pines Construction Inspector. The Contractor will furnish all personnel, facilities, and equipment necessary to conduct the testing.

3.2.3 **Field Tests for Concrete**

Field testing requirements are covered in Section 03300, "Cast-In-Place Concrete."

4 PAYMENT

4.1 GENERAL REQUIREMENTS

Payment for work in this section shall be at the Contractor's unit prices for estimated quantities of sanitary sewer main, sanitary sewer structures and service laterals of the dimensions and types called for herein and on the plan drawings. Payment shall be full compensation for furnishing, hauling and placing all materials, equipment, tools and labor necessary for excavation and backfill, disposal of surplus materials, removal of existing structures, abandonment of existing structures, by-pass pumping, testing, and all other incidentals necessary to complete the work.

4.2 MEASUREMENT AND PAYMENT

4.2.1 Sanitary Sewer Replacement / Relocation

4.2.1.1 Sanitary Sewer Main

Measurement of installed sanitary sewer main, 6-inch and 8-inch diameter as shown in the profile view of the plan drawings shall begin at the end of the pipe and proceed through to the end of the installed line including distances through fittings, intermediate manholes and/or cleanout assemblies, complete, in-place and accepted. The measured quantity shall be paid for at the Contractor's unit prices for the actual linear footage of sanitary sewer main installed with respect to diameter, depth of installation and particular material and class of pipe.

4.2.1.2 Manholes and Cleanout Assemblies

Manholes shall be measured by individual unit, complete in-place and accepted. Payment shall be made at the Contractor's unit prices for "Manholes" with respect to diameter and varying depth classifications. The depth shall be the measured distance from the invert to the top of the rim at finished grade. Separate pay items for special drop manholes are furnished in the Schedule of Bid Items.

4.2.2 Service Lateral

4.2.2.1 Service Lateral Piping

Service lateral piping shall be measured from the connection to the new sewer main through the connection with the existing service lateral piping. The measured quantity shall be paid for at the Contractor's unit price for "Service Lateral Piping" which should include required sewer main wye fitting, plus all required couplings, bends, adapters, primers, and glue needed for extension of the piping.

4.2.2.2 Service Lateral Cleanout Assemblies

Cleanout assemblies installed on the 4-inch service laterals as indicated in the plan view on the drawings shall be measured by individual unit complete, in-place and accepted. Payment shall be made at the Contractors unit price for "Service Lateral Cleanout Assemblies" which should include an in-place wye fitting, required length of stack piping, couplings, bends, adapters, caps, collars, primers, glue, etc.

4.2.2.3 "Double Cleanout" Assemblies for Service Laterals

Cleanout assemblies shall be measured by individual unit, complete, in-place and accepted. Payment shall be made at the Contractors unit price for "Double Cleanout Assemblies" which should include two in-place wye connections, required lengths of stack piping, couplings, bends, adapters, caps, collars, primers and glue.

SANITARY SEWER SYSTEM

SPECIAL PROVISIONS

01. **COMPLETION TIME:** Work shall be commenced with adequate forces on or after the date of availability and the Project shall be fully completed within ____ consecutive calendar days thereafter.
02. **LIQUIDATED DAMAGES:** Should the Contractor exceed the time limitations, as set forth above, liquidated damages shall be assessed, against the Contractor, at the rate of \$300.00 per day. In addition, the Contractor will be responsible for additional inspection costs incurred by the Owner for the time by which contract time is exceeded.
03. **PIPE:** All pipe shall be SDR 35, PVC or ductile iron Class 50 as shown on the plans and in the Schedule of Bid Items. No solvent weld will be permitted on any size pipe.
04. **PIPE JOINTS:** All pipe joints shall use a gasket system.
05. **DUCTILE IRON FITTINGS:** Fittings and specials for this project shall be mechanical joint conforming to ANSI A21.10 (AWWA C-110) and ANSI A21.11 (AWWA C-111) latest revision. No push-on fittings will be allowed.
06. **SEDIMENTATION AND EROSION CONTROL:** The Contractor is instructed to control sedimentation run-off by methods approved by the Engineer's during the course of construction of this project. The Contractor is reminded that all work shall meet all applicable requirements of the rules and regulations of Erosion and Sediment Control as published by the Division of Environment, Health and Natural Resources, North Carolina Sedimentation Control Commission.
07. **PIPE SEPARATION:** The following minimum pipe separations will be maintained: 12 inches vertical separation between crossing of sanitary sewer and storm sewers; 18 inches vertical separation between crossing of sanitary sewer (including force main) and water main, and 10 feet horizontal separation between sanitary sewer (including force main) and water mains. If these separations cannot be maintained, ductile iron pipe will be used 10 feet either side of crossing and along entire length of lines less than 10 horizontal feet from water mains. The Contractor shall receive approval from the Engineer in the field before payment will be made at the ductile iron prices.
08. **DAMAGE TO EXISTING UTILITIES:** The Contractor shall be responsible for contacting the Town of Southern Pines to accurately determine the location of mains within the project area. The Contractor shall take extreme caution in excavating around the service lines and mains while working within this project. Any damage to the mains or service lines shall be the responsibility of the Contractor.

09. **ADJUSTMENT OF MANHOLE RIM ELEVATIONS:** All manhole rims shall be adjusted to be flush with the finish grade prior to project completion. These adjustments shall be considered incidental to project costs and included in the unit price for manholes.
10. **WORK SCHEDULE:** Prior to commencing work, the Contractor will submit to the Town of Southern Pines a schedule delineating the order in which the mains will be installed and approximately beginning dates for each.
11. **SAFETY REQUIREMENTS:** All Contractor personnel on the job site will be required to wear hard hats, safety glasses, safety vests, and hard sole shoes. No tennis shoes will be allowed.
12. **CONCRETE:** The Contractor will be required to supply batch tickets for concrete where the bid item is paid for on a cubic yard basis such as concrete for blocking. Concrete for storm sewer separation as detailed shall not be paid directly but will be considered under the bid item for concrete blocking.
13. **GRAVEL:** The Contractor will be required to supply certified weigh master tickets for gravel where the bid item is paid for on a per ton basis such as gravel driveway repair.
14. **SUBMITTALS:** Approval for all shop drawings and submittals will be obtained before the Contractor is allowed to begin work.
15. **TIE-INS:** The Contractor will be required to coordinate all tie-ins with the Town of Southern Pines Inspector so that he may be present when they occur.
16. **TESTING:** The Town of Southern Pines will be present at all pressure test of lines, at all mandrel testing of lines, and at all vacuum testing of manholes. The mandrel only shall be provided by the Town of Southern Pines.
17. **COMPACTION OF TRENCHES:** All trenches will be compacted by mechanical means. All stone placed in trenches for road cuts will be compacted by mechanical means. All compaction shall conform to NCDOT standards.
18. **EXISTING LINE LOCATION:** The Contractor will be required to pay for any repair work from disturbing existing mains that have been properly located by the Town of Southern Pines.
19. **SHOP DRAWINGS:** Shop drawings shall be submitted for all metal casings including manhole rings and covers, valve boxes and catch basin frames and grates. Manufacturer's certifications shall be submitted to the Town of Southern Pines Inspector certifying that all pipe meets the project specifications. Concrete mix designs, the detail specifications and bituminous concrete mix designs of the detail specifications shall be submitted to the Engineer for approval. None of the above listed materials shall be used on the projects unless the necessary approval for that particular material has been given by the Engineer. The Contractor shall submit (3) three sets of all shop drawings, certificates and mix designs required within this contract prior to commencement of any work.

20. **AS-BUILT DRAWINGS AND SPECIFICATIONS AT THE JOB SITE:** The Contractor shall maintain, in readable condition at the job site, one complete set of working drawings and specifications for his work, including shop drawings. Such drawings and specifications shall be available for use by the Owner or his representative at all times. This set shall be marked, or notes acceptable to the Engineer provided, in order to reflect as-built conditions; changes indicating such conditions shall be kept current at all times. Upon completion of the project, this complete set of drawings and specifications or notes, showing as-built conditions, shall be returned to the Owner or his representative.
21. **ENGINEER:** The Engineer shall provide all construction layouts for this project for a fee negotiated.
22. **POINT OF CONTACT:** All Contractor personnel shall use the Town of Southern Pines Inspector as a point of contact on matters concerning the contract after the contract has been awarded.
23. **PAY REQUEST:** All pay requests shall be submitted to the Town of Southern Pines Inspector by the 20th of the month to receive payment by the 30th.
24. **CONTRACTOR:** Prime Contractor shall do a minimum of 50% of work in place.
25. **CONTRACTOR SUPERINTENDENT:** The Contractor shall submit a letter giving the names and home and work phone numbers of both the onsite superintendent and the company point of contact. The superintendent shall be on site when any work is being done on the project.
26. **STORM SEWER CROSSINGS:** Concrete for storm sewer separation as detailed shall not be paid directly, but will be considered under the Bid Items for Concrete Blocking. Where utility work crossed storm sewers, concrete shall be utilized as per details as directed by the Engineer.

The Contractor shall remove and replace existing culverts and drainage structures as necessary during the construction of the water lines. Any damage to the culverts shall be replaced by the Contractor at no additional cost to the Owner.

27. **INSTALLATION WITHIN NCDOT RIGHTS-OF-WAY:** All work performed within North Carolina Department of Transportation rights-of-way shall be performed in strict accordance with the NCDOT Construction and Maintenance Operations Supplement to the Manual on Uniform Traffic Control Devices. The Contractor shall be responsible for performing the work and adhering to the Right-of-Way Encroachment contract Standard and Special Provisions. A copy of the Standard Provisions and Special Provisions will be sent out by Addendum. The Contractor shall obtain a copy of the Right-of-Way Encroachment Agreement from the Owner or Engineer and keep a copy on-site at all times. The Contractor shall also furnish any required bonds with NCDOT and notify NCDOT 48-hours prior to beginning construction.
28. **VIDEO TAPING:** The Contractor is required to video tape all areas to be disturbed prior to start of work. The completed tape shall be given to the Town of Southern Pines Inspector and become property of the Town.