CITY OF ASHEBORO

SEWER LINE SPECIFICATIONS

A. GENERAL

The work involved in the construction of sewer lines shall include the furnishing of all materials, labor, tools and equipment necessary for the complete construction of the sewer lines and appurtenances shown on the plans and specified herein.

All work within rights-of-way of streets maintained by the N. C. Department of Transportation shall be done in accordance with Department of Transportation specifications and the applicable encroachment agreement. The contractor shall notify the local Department of Transportation office prior to construction and obtain any permits or bond that may be required. After construction, the contractor shall notify the local Department of Transportation office and obtain approval of work completed.

The contractor shall provide the City a traffic control plan that meets all MUTCD requirements prior to starting work on any public street right-of-way maintained by the City or the NCDOT.

Work must be coordinated to cause the least inconvenience to the public, and safe traffic flow must be maintained at all times. The City Engineering Department must be notified prior to construction, and interruptions to fire or domestic service must be reported to the City Utilities Inspections Department in advance.

Construction should be scheduled so that no street or block of a street is left in an incomplete condition in excess of 45 days. Construction work must be scheduled to be performed Monday thru Friday during daylight hours.

The contractor will be responsible for properly safeguarding the public against accidents and shall save harmless the City and shall assume responsibility for any suits or actions for damages or other lawsuits, which may be instituted against the City because of any incident arising from the construction.

Work shall be done in accordance with guidelines of the N. C. Department of Environment and Natural Resources Division of Environmental Management.

It is the intent of these specifications to provide materials and workmanship of good quality resulting in the best long term performance possible. Where other specifications are referenced, the latest revision shall apply. Alternate items will be considered, but approval must be obtained from the City Engineer prior to use.

All materials and work performed shall be guaranteed by the contractor for a period of one (1) year after acceptance by the City. Work and/or materials found defective or unsuitable within this period shall be corrected by the contractor, or at the contractor's expense, and at no additional cost to the City.

Prior to installation of any materials, the contractor shall provide two (2) copies of shop drawings and/or submittals designating the brand, model, type and specifications of all materials to be used. A representative of the City will review these drawings and return one (1) copy to the contractor marked approved, approved as noted or not approved. Corrected submittals shall be provided for any items not approved.

B. SEWER LINE MATERIALS

The pipe interior, sealing surfaces, fittings and other accessories shall be kept clean. Pipe bundles shall be stored on flat surfaces with uniform support. Stored pipe shall be protected from prolonged exposure (six months or more) to sunlight with a suitable covering (canvas or other opaque material). Air circulation shall be provided under any covering. Gaskets shall not be exposed to oil, grease, ozone (produced by electric motors), excessive heat and direct sunlight. Consultation with the manufacturers shall be undertaken for specific storage and handling recommendations.

DUCTILE IRON PIPE

Ductile iron pipe shall be furnished with mechanical or "push on" type joints and meet current applicable ANSI and AWWA standards for materials, joints and thickness design. Provide pipe with interior polyethylene or cement-mortar lining in compliance with AWWA C104 standard, and outside coating of bituminous material. Unless noted otherwise, pipe shall be thickness class 50 or pressure class 350.

VITRIFIED CLAY (VC) PIPE

Vitrified clay pipe shall conform to ASTM C700 standards for extra strength pipe. Pipe shall be of the bell and spigot type with compression joints conforming with ASTM C425 standards.

ACROYLONITRILE BUTADIENE STYRENE (ABS) PIPE (RESIDENTIAL USE ONLY)

ABS pipe shall meet the requirements of ASTM D2680 standards with solvent cemented joints. Pipe of 8 inch and larger diameter shall be truss type. Service lines and fittings of 4 inch and 6 inch diameter shall be solid wall Schedule 40 ABS-DWV pipe in accordance with ASTM D2661. Provide proper adaptor to connect service line to main line pipe saddle.

POLY VINYL CHLORIDE (PVC) SEWER PIPE (RESIDENTIAL USE ONLY)

PVC pipe shall meet the requirements of ASTM standard D3034 - Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings for SDR 35 pipe. These specifications shall be clearly marked on the pipe with the manufacturer's name and trademark. Pipe shall have elastomeric gasket joints providing a water tight seal.

PVC Truss Sewer Pipe shall be PVC composite pipe per ASTM D2680 (smooth interior and exterior) with elastomeric gasketed joints per ASTM D3212.

Service lines and fittings of 4 inch and 6 inch diameter shall be solid wall Schedule 40 PVC-DWV pipe in accordance with ASTM D2665. Provide proper adaptor to connect service line to main line pipe saddle.

CAST IRON SOIL PIPE

Cast iron soil pipe utilized for service lines shall be service weight, coated, and hub and spigot type meeting Commercial Standards CS188 and Federal Specifications WW-401. The joints shall be rubber type elastomeric per ASTM C425 standard.

C. SEWER LINE INSTALLATIONS

EXISTING UTILITIES

Verify location and existence of all underground utilities, as information provided may not constitute existence or definite location.

Take necessary precautions to protect existing utilities and property from damage due to construction activity. Damage to any property that results from construction must be fixed at the contractor's expense.

USE OF EXPLOSIVES

The contractor shall obtain a blasting permit from the Asheboro Fire Inspection Department (146 North Church Street, (336) 626-1201 ext. 240) prior to using explosives and shall make sure that insurance coverage on the use of explosives is provided.

Contractor shall have a copy of blasting permit on site during working hours.

Store, handle, and use explosives in accordance with local and state regulations.

Conduct survey and document existing conditions of facilities prior to blasting. Provide seismographic monitoring during progress of blasting operations.

Use explosives in such a way to minimize vibration to existing utilities and structures.

Provide only experienced personnel for blasting in accordance with accepted practices.

Contractor is responsible for safety of life and damage to property resulting from the use of explosives.

EXCAVATION

Excavation shall comprise the removal of all materials as necessary to provide the grade indicated on the plans. The banks of the trench shall be kept as nearly vertical as practicable, and where required shall be properly sheeted and braced. The width of the trench from the bottom of the pipe to 2 feet above the pipe shall be no greater than the width of the pipe plus 18". Above this level the width shall be wider as necessary for safe construction.

The bottom of the trench shall be accurately graded to provide uniform bearing for each section of the pipe, with hand excavated depressions for pipe joints. When rock excavation is required, carry excavation a minimum of 6 inches below grade and backfill with suitable material. When unstable soil is encountered, it shall be removed or stabilized as required by the engineer.

The Contractor is particularly cautioned that the use of dynamite to shatter any rock that may be encountered will be permitted only to the extent that property and streets are not damaged. Use of dynamite will be at the Contractor's risk and any damage to the roadway or property that appears as a result of the use of dynamite will be repaired at the Contractor's expense to the satisfaction of the North Carolina Department of Transportation and/or City officials.

PIPE LAYING

Pipe shall be installed according to the manufacturer's recommendations.

Materials at all times shall be handled in such a manner as to protect them from damage. Pipe and fittings should be handled with mechanical equipment where work sites permit. At no time shall pipe and fittings be dropped or pushed into ditches or from hauling equipment.

Pipe and fitting interiors shall be protected from foreign matter and will be inspected for damage and defects prior to installation. In the event that foreign matter is present in pipe and fittings, it shall be removed before installation.

Sewer lines and water lines shall have a 10 foot minimum horizontal separation, or an 18 inch vertical separation (water over sewer), or both shall be constructed of ferrous materials.

When a water main crosses over a sewer line, there shall be an 18 inch vertical separation or both shall be constructed of ferrous materials for a distance of 10 feet on each side of the point of crossing.

When a water main crosses under a sewer, both shall be constructed of ferrous materials for a distance of 10 feet on each side of the point of crossing and a section of water main pipe shall be centered at the point of crossing.

Each joint of sewer pipe shall be set exactly to line and grade by the use of batter boards and string lines or by the use of laser beams.

Lay pipe in finished trenches starting at the lowest point, with spigot ends pointing in direction of flow. Lay all pipe with ends abutting true to line and grade.

Vitrified clay pipe shall be installed in accordance with ASTM C12 procedures. ABS and PVC pipe shall be installed in compliance with ASTM D2321 standard.

Pipe shall be cut when necessary per manufacturer's recommendations.

Manufactured adaptors shall be furnished when different types of pipe are joined together.

SEWER LINE INSTALLATIONS BORED UNDER STREETS

Steel casing pipe shall be furnished and installed when boring under streets is required.

Casing pipe shall be smooth wall or spiral welded steel having a minimum yield strength of 35,000 psi.

The minimum size of casing pipe required is as follows:

Carrier Pipe Size ID (Inches)	Minimum Casing Pipe Size OD (Inches)	Minimum Casing Wall Thickness (Inches)
4	12	.188
6	16	.250
8	18	.250
10	20	.250
12	24	.250
14	26	.312
16	28	.312

Carrier pipe inside casing shall be restrained joint ductile iron pipe. Install carrier pipe through casing by the use of spiders manufactured to support the carrier pipe. Place spiders at intervals sufficient to support carrier pipe without sagging. Install spiders sized to raise the carrier pipe bells above the encasement pipe invert to prevent damage to pipe bells. Install at least three spiders on each individual piece of carrier pipe as per detail. Seal ends of casing with 8" brick masonry.

Casings shall be furnished and installed in accordance with the Policies and Procedures for Accommodating Utilities on Highway Rights of Way, per the N. C. Department of Transportation.

BACKFILLING

Backfill with suitable material free from blasted rock, broken concrete, pavement or other hard materials having any dimension greater than 6 inches, or large clods of earth, debris, or frozen material. Insure that trench is free of water prior to backfilling.

Backfill around ABS or PVC pipe shall be Class I bedding material (gravel $^1/_4$" to $1^1/_2$" particle size) in accordance with ASTM D2321 standard, and placed as shown on the City standard detail sheet.

Backfill around VC pipe shall be size # 67 aggregate (gravel $^1/_4$" to $^3/_4$" particle size) in accordance with ASTM D448 standard, and placed as shown on the City standard detail sheet.

Hand tamp backfill under and around pipe. Backfill and compact remainder of trench in lifts not exceeding 6 inches loose thickness.

Perform pneumatic tamping evenly on both sides of pipe to top of excavation with care such that pipe will not be damaged or displaced.

Water ponding for backfill consolidation will not be permitted.

Whenever it is necessary for a sanitary sewer main to cross under an existing structure such as a storm sewer, sanitary sewer, water main, curb, sidewalk or other concrete structure flowable fill shall be installed from the bottom of the ditch to the spring line of the existing pipe or to the bottom of the structure for stability.

COMPACTION

Compact all trench backfill within street rights of way, in areas under paved roads, road shoulders, parking areas, sidewalks and other structures as directed by the Engineer to a density of 95 percent of maximum dry density as determined by AASHTO Method T99. In locations where trench will not be under paved areas, or street rights of way, compact trench backfill to a minimum 90 percent of maximum dry density as determined by AASHTO Method T99. Insure that backfill material has moisture content in range of 5 percent above to 3 percent below optimum moisture at time it is placed.

The owner and/ or developer is required to pay for the services of a qualified geo-technical firm to certify that compaction of utility trenches meets required standards. Backfill that does not meet the above requirements must be removed, corrected, and retested at the expense of the contractor.

PAVEMENT CUTS AND REPAIR

All pavement cuts shall be made to true line and the pavement removed just prior to the trenching operation. The Contractor will be allowed to excavate no more trench width than the pipe outside diameter plus 18 inches in all paved areas. The pavement will be trimmed an additional six inches (6") beyond the trench edge on each side to give firm bearing for the patching operations.

It shall be the contractor's responsibility to provide drag boxes, ditch jacks, sheeting, etc., as required to maintain the trench width as specified. It shall be the contractor's responsibility to maintain all pavement cuts in good order until asphaltic patching is completed. At the time of patching, all broken down, ragged edges shall be trimmed to true line.

The Contractor shall backfill all trenches within asphalt paved areas to a point fourteen inches (14") below the existing pavement and then backfill with crushed stone flush with the existing pavement(or 2" below existing pavement if asphalt repair can begin immediately), unless shown otherwise on the plans or by requirements of the NCDOT. The aggregate base course shall be compacted to a density equal to at least 100% as required by the NCDOT Standard Specifications. The contractor shall dry or add moisture to the aggregate as required to produce a maximum density and uniform compaction.

Driveways and road shoulders shall be stabilized or paved to a condition equal to or better than existed prior to construction. Asphalt paving shall be patched with Type S-9.5A or S-9.5B asphalt paving 2 inches thick per N. C. Department of Transportation specifications, unless shown otherwise on the plans or by requirements of the NCDOT.

EXFILTRATION AND INFILTRATION LINE TESTS

After sewer lines are in place and backfilled, the contractor shall provide all labor and equipment required for the air test, which shall be performed by the contractor in the presence of a representative of the City Utilities Inspection Department.

Prior to air testing, the service laterals shall be installed complete with cleanout to right-of-way line and plugged.

Pneumatic plugs shall be installed in the sewer line at manholes to seal off a test section. The test shall then be monitored from test equipment that has a hose to introduce air into the sewer line, and a separate hose to monitor the air pressure in the sewer line.

Air shall be slowly introduced into the sealed sewer line until the internal air pressure reaches at least 4 psi, but not exceeding 9 psi. The air pressure shall then be allowed to stabilize for a minimum of 2 minutes at no less than 3.5 psi plus groundwater pressure determined by the Engineer/Inspector. The test will then be accepted if the pressure does not drop more than 1 psi in the time prescribed in the air test table on the City standard detail sheet.

If the installation fails to meet the above requirement, the contractor shall locate and repair the leak, then retest the sewer line following the above procedure.

Sewer lines shall also be tested for infiltration, and if infiltration exceeds 100 GPD / inch pipe diameter / mile of pipe, the contractor shall locate and repair the leak.

DEFLECTION TEST

Deflection tests shall be performed on all plastic pipe installations. The test shall be conducted after the final backfill has been in place at least 30 days to permit stabilization of the soil-pipe system. As an alternative to waiting 30 days to permit stabilization of the soil-pipe system, the City will accept certification from a soil testing firm verifying that the backfill of the trench has been compacted to at least 95% maximum density.

No pipe shall exceed a deflection of 5 percent. If deflection exceeds 5 percent, replacement or correction shall be accomplished in accordance with requirements in the approved specifications.

The rigid ball or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is

specified in the ASTM Specification, to which the pipe is manufactured. The pipe shall be measured in compliance with ASTM D 2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings. The test shall be performed without mechanical pulling devices.

CLEAN UP

Upon completion of the work, the site shall be restored as nearly as possible to its original condition and paved areas shall be flushed to remove all dirt and debris.

All debris and materials unsuitable for backfill shall be disposed of by the contractor.

D. MANHOLES

Manholes shall be precast reinforced concrete with monolithic base and 5" thick walls manufactured according to the latest revision of ASTM C-478 standard. Openings for pipe connections shall be precast for the correct invert angle and elevation, and shall include rubber watertight flexible pipe sleeves with stainless steel bands. All manholes must be approved by the N. C. Department of Transportation for support of H-20 traffic loadings.

Manholes shall be furnished with steps of heavy duty cast iron or polypropylene coated steel precast into the manhole. Steps shall be at least 10" wide, project at least 4" from the wall, and be offset at 12" or 16" on center.

Manhole frames and covers shall be standard design made of cast iron and designed for H-20 traffic loading. The casting shall have a 22" minimum opening and not weigh less than 310 lbs. Provide a cover cast with the words "Sanitary Sewer".

Construct manholes as shown on the City standard detail sheet with precast or concrete mortar inverts and stone base.

Manhole joints must be waterproofed with an O-ring or gasket joint, and mastic seal as shown on the typical detail on the plans, or any type of manufactured joint will be acceptable.

Seal all lift holes and spaces around pipe inverts with hydraulic cement, non-shrink grout or mastic as appropriate for a water tight installation.

All sanitary sewer manholes constructed by the Contractor shall be vacuum tested for leakage in the presence of a City Inspector. The vacuum test will not apply to any existing manholes.

The Contractor shall furnish all labor, equipment, and any appurtenant items necessary to satisfactorily perform the vacuum test. All testing equipment shall be approved for vacuum testing manholes.

Each manhole shall be tested after assembly and prior to backfilling unless directed otherwise by the Engineer per the following procedure:

- All pipes entering the manhole shall be plugged. The contractor shall securely brace the plugs in order to keep them from being drawn into the manhole.

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

- A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time for the vacuum to drop to 9-inches of mercury shall not be less than that shown in the following table.

	Diameter of Manhole		
Manhole Depth	**48" Dia.**	**60" Dia.**	**72" Dia.**
10 Ft. or Less	60 Sec.	75 Sec.	90 Sec.
> 10 Ft. But < 15 Ft.	75 Sec.	90 Sec.	105 Sec.
> 15Ft.	90 Sec.	105 Sec.	120 Sec.

(Times shown are minimum elapsed times for a drop in vacuum of 1-inch of mercury).

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

E. SEWER SERVICE CONNECTIONS

Taps for services into trunk lines shall be made on the top quarter of the main with the wye saddle angled with the main sewer line flow.

Service connections should be perpendicular from the main line to the edge of the serviced lot's right-of-way line or easement with the following minimum grades:

4" service - 2% slope ($^1/_4$ inch per foot)
6" service - 1% slope ($^1/_8$ inch per foot)

Service lines connected into manholes shall terminate at the edge of the invert in the manhole, or be of the drop type shown on the City standard detail sheet.

Saddles for PVC or ABS services shall be of the same material as the main; solvent welded and fastened with double stainless steel bands as shown on the City standard detail sheet. Saddles for VC mains shall be cast iron with a stainless steel band or VC which shall be blocked and sealed with mortar. Cast iron saddles shall be sealed with a generous layer of mortar around the outside edge of the saddle. On new installations of VC main lines, VC wyes shall be used.

Manufactured adaptors shall be furnished when different types of pipe are joined together.

F. EROSION CONTROL

All precautions are to be taken to avoid excessive siltation of water courses during construction. The erosion control used shall comply with the rules and regulations promulgated pursuant to the N. C. Sedimentation and Pollution Control Act of 1973 and as amended. Erosion Control measures will be required as shown on the plans or as necessary to prevent erosion of sediment. Temporary measures shall be removed after areas are stabilized and the possibility of erosion has passed.

The following measures shall be considered and implemented by the contractor:

1. Plan buffer zone erosion control measures in advance.
2. Install preliminary controls in advance or concurrent with clearing and grubbing.
3. Prohibit pumping of ditches directly into any stream or lake. Provide settling basins.
4. Require excavated materials to be piled uphill from ditch - NOT on stream side of ditch.
5. Protect backfill material against accelerated erosion.
6. Tamp, seed and mulch as rapidly as possible after line is installed.
7. Maintain buffer zone protection until area is stabilized.

G. GRASSING

All unpaved areas disturbed by construction shall be seeded with limestone, fertilizer, mulch and tack. Preparation of seedbed and application of these items shall be performed in accordance with N. C. Department of Transportation Standard Specifications. Limestone and fertilizer must be thoroughly incorporated into the soil.

Type of seed to be used and the application rates of seed, fertilizer, limestone, mulch and tack shall vary seasonally according to the following table, unless modified by the NC Department of Transportation for streets maintained by the NCDOT:

GRASSING SCHEDULE (APPLICATION RATES PER 100 SQUARE YARDS)

August 15 to February 15

3 Lbs. Fescue
25 Lbs. Type 10-20-20 or 8-24-24 Fertilizer
(or 50 Lbs. Type 5-10-10 Fertilizer)
80 Lbs. Limestone
1 Bale per 400 Sq. Ft. Mulch
2 Gallons Emulsified Asphalt Tack to Anchor 400 Sq. Ft Mulch

February 1 to May 15

2 Lbs. Fescue
1 Lb. Korean or Kobe Lespedeza
25 Lbs. Type 10-20-20 or 8-24-24 Fertilizer
(or 50 Lbs. Type 5-10-10 Fertilizer)
80 Lbs. Limestone
1 Bale per 400 Sq. Ft. Mulch
2 Gallons Emulsified Asphalt Tack to Anchor 400 Sq. Ft Mulch

May 1 to September 1

1 Lbs. Fescue
$1^1/_2$ Lbs. Korean or Kobe Lespedeza
$^1/_2$ Lb. Sudan Grass
25 Lbs. Type 10-20-20 or 8-24-24 Fertilizer
(or 50 Lbs. Type 5-10-10 Fertilizer)
80 Lbs. Limestone
1 Bale per 400 Sq. Ft. Mulch
2 Gallons Emulsified Asphalt Tack to Anchor 400 Sq. Ft Mulch

H. CLEAN UP

After completion of construction, the project site shall be cleaned up to provide a neat appearance. This will include:

1. Removal of all surplus materials resulting from construction.
2. Restoration of property damaged by construction.
3. Grading of disturbed areas for proper drainage, and repair seeding.
4. Removal of erosion control measures that are no longer required.
5. Repair of washed out areas using erosion control measures for stabilization.