SECTION 500 - CONSTRUCTION METHODS

501. EXCAVATION GENERAL

It is the responsibility of the General Contractor, any subcontractor, their employees, and inspectors to job sites to observe all safety regulations. Deficiencies in safety measures noted should be immediately reported to the Contractor's superintendent, so that immediate corrective measures can be taken by the Contractor. It is, however, the Contractor's responsibility to conform to all safety regulations and practices as pertain to his construction site. The Contractor shall contact the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Region IV, Atlanta, Georgia for any assistance needed to complying with the appropriate regulations.

All unsuitable excavated material must be properly disposed of in a manner acceptable to the Cherokee County Roads and Bridges Department and in a manner that will not adversely affect the environment.

It shall be expressly understood that these Standards are for the installation of all sanitary sewer mains and appurtenances. All work shall conform to the applicable provisions of the AWWA Specifications or ASTM Specifications of latest revision except as otherwise specified herein.

502. EROSION AND SEDIMENTATION CONTROL

All erosion and sedimentation control methods shall be in compliance with the State, Federal and Local regulations, the Manual For Erosion Control In Georgia and the EPD requirements regarding the NPDES Storm Water Monitoring permit.

The Contractor shall designate one individual to be responsible for the implementation and maintenance of erosion and sedimentation controls on a 24-hour, everyday basis. The Contractor shall furnish the Authority the individual’s name, address, and 24-hour telephone number. This information shall be updated as is necessary.

503. CLEARING AND GRUBBING

Areas for sewer system construction shall be cleared and grubbed. All trees, shrubs, stumps, brush, paving and other waste material must be removed from the site. On sanitary sewer main extensions to the development, the road right-

of-way or easement width shall be cleared to the width necessary for trenching and pipe laying operations. All stumps and roots within the trench dimensions shall be grubbed to such depths and widths as will enable the trenching to be done. The trees, brush, stumps and other debris from clearing shall removed from the site. No trees or stumps shall be pushed beyond the right-of-way / easement or any timber beyond the right-of-way / easement damaged. The Contractor shall remove only such trees on or along the work as the Chief Inspector permits, and shall carefully protect all other trees adjacent to the work. The Contractor shall not permit excavating machinery or trucks to scrape the bark or tear the limbs from the trees, nor connect ropes or guy cables to them.

504. TRENCH EXCAVATION

A.) It is the responsibility of those installing sanitary sewers, lift stations, waste treatment plants, and related appurtenances to conform to OSHA regulations, 29 CFR Part 1926, Subpart P, Paragraph 1926.650 through 1926.653 during trench excavation. OSHA publications are available to assist the Contractor in having a safe construction site (i.e. **Excavating and Trenching Operations**, 1995(Revised), OSHA 2226). Publications from OSHA can be obtained by contacting OSHA Publications Distribution, Washington, D.C. The Authority assumes no liability nor responsibility for unsafe trench conditions.

B.) Trenches shall have a minimum width of twelve (12) inches plus the diameter of the outside of the bell of the sewer main and the depth thereof shall be such that there shall be a minimum of required cover measured below the roadway surface, natural ground, or proposed grade to the top of the pipe. The sides of the trench above the pipe shall be sloped or benched as necessary to maintain stability.

C.) In cases where water lines cross above sanitary sewers, there shall be a minimum of 18 inches vertical separation between the water and sewer mains. At crossings, one full length of water pipe must be located so that both joints are as far from the sanitary sewer as possible. Both mains shall be D.I.P. In cases where water mains parallel sewer mains there shall be a minimum of ten (10) feet horizontal separation maintained between the mains. In cases where water mains parallel sewer mains, the water lines shall be a minimum of twelve inches (12”) above the sanitary sewer. These distances are measured edge to edge. See Section 316 for further information regarding water and sewer mains in close proximity.

D.) Pipe trenches shall be cut straight and true to the lines and grades and in the locations shown on the plans. The bottom of the trench shall be cut carefully to the required grade of the pipe except where bedding materials or cradles

are shown, in which case the excavation shall extend to the bottom of the bedding or cradles as shown on the plans. Trenches shall be dug so that the pipe can be laid to the alignment and depth required, and the trench shall be of such width and shall be braced and drained so that the workmen may work therein safely and efficiently. No chocking under the pipe will be permitted. All joints shall be as specified herein.

E.) Bell holes shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length upon the bottom of the trench and the pipe weight shall not rest on the bells. Bell holes shall be large enough to permit proper installation of all joints in the pipe.

F.) All excavations shall be adequately guarded with barricades and lights in compliance with all OSHA, Cherokee County and the Georgia Department of Transportation requirements so as to protect the public and workers from hazard.

G.) Pipe trenches shall not be excavated more than 100 feet in advance of pipe laying, and all work shall be performed to cause the least possible inconvenience to the public. Adequate temporary bridges or crossings shall be constructed and maintained where required to permit uninterrupted vehicular and pedestrian traffic. The Chief Inspector shall have the right to limit the amount of trench open at any one time to less than 100 feet if he believes the reduced limits are necessary.

H.) No excavation shall be made under highways, streets, alleys or private property until satisfactory arrangements have been made with the State, City, County or owners of the property to be crossed. All excavated material shall be placed so as to not interfere with public travel on the streets and highways along which the lines are laid.

Excavations adjacent to existing or proposed buildings and structures or in paved streets or alleys shall be adequately protected by the use of trench boxes, sheeting, shoring and bracing to prevent cave-ins of the excavation, or the undermining or subsequent settlement of adjacent structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition.

I.) Trenches shall be free of water during the work. Whenever water is present in the trench, it shall be removed in a manner satisfactory to the Authority and enough backfill shall be placed on the pipe to prevent floating. Any pipe that has floated shall be removed from the trench and re-laid later during dry conditions. No pipe shall be laid in wet trench conditions that preclude proper bedding, or on frozen trench bottom, or when, in the opinion of the Authority the trench conditions or the weather are unsuitable for proper installation.

The Contractor shall do all necessary pumping or bailing, build all drains and do all other work necessary at his own expense to keep the trenches clear of water during the progress of the work. No structure shall be built or pipe shall be laid in water, and water shall not be allowed to flow over or rise upon any concrete, masonry or pipe until the same has been inspected and the concrete or joint material has thoroughly set. All water pumped, bailed or otherwise removed from the trench or other excavation shall be conveyed in a proper manner to a suitable place of discharge where it will not cause injury to the public health or to public or private property or to work completed or in progress, or to the surface of the streets or cause any interference with the use of same by the public.

J.) Construction occurring around active sewer systems shall be done in such a way so as to prevent the passage of wastewater onto the ground. **Absolutely no wastewater shall be allowed to spill onto the ground.**

K.) During the sewer line construction an effort shall be made to minimize the cutting of trees.

L.) When possible, all crossings of paved highways or driveways shall be made by boring or jacking the pipe under the pavement and shall be done in such manner as not to damage the pavement or subgrade, unless the casing or pipe is in solid rock, in which case the crossing shall be made by the open cut method or by tunneling. Wherever streets, roads, or driveways are cut, they shall be immediately backfilled and compacted after the pipe is laid and shall be maintained in first-class condition as passable at all times until repaved. Backfilling, compaction, dressing and clean-up shall be kept as close to the line laying crew as is practical, and negligence in this feature of the work will not be tolerated.

Streets, sidewalks, parkways, and other public and private property disturbed in the course of the work shall be restored to as near as original condition as possible or better in a manner satisfactory to the Authority. The Contractor shall carefully protect all trees adjacent to the work. He shall not permit excavating machinery or trucks to scrape the bark or tear the limbs from the trees, nor connect ropes or guy cables to them. No trees or shrubs will be removed without the approval of the property owner and the CCWSA.

M.) In excavation and backfilling and laying pipe, care must be taken not to remove or injure any water, sewer, gas or other pipes, conduits or other structures without an order from the Designer. When an obstruction is encountered, the Contractor shall notify the Designer who will have the Owners of the obstruction adjust same or make necessary changes in grade and/or alignment to avoid such obstruction. Any house connection, drains or

other structures damaged by the Contractor shall be repaired or replaced immediately.

N.) In laying pipe across water courses, the top of the sewer main or casing shall be a minimum of two feet below the creek or river bed. Four feet of cover shall be maintained over sewer mains crossing ditches or depressions of any kind. Railroad crossings shall be installed according to American Railway Engineering Association requirements.

O.) All excavated material shall be placed on one side of the trench, unless permission is given by the Authority to place it on both sides. Excavated materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to all fire hydrants, water valve boxes, manholes, etc.

505. ROCK EXCAVATION

Wherever rock is encountered in the excavation, it shall be removed by suitable means. Drilling and blasting operations shall be conducted with due regard for the safety of persons and property in the vicinity and in strict conformity with requirements of all ordinances, laws and regulations relative to the handling, storing and use of explosives. The Developer is fully responsible for filing for and acquiring any blasting permits which may be required by those agencies with such jurisdiction. Before blasting, the Contractor shall cover the excavation with heavy timbers and mats in such a manner as to prevent damage to persons or the adjacent property. Rock excavation near existing pipelines or other structures shall be conducted with the utmost care to avoid damage. The Contractor shall be wholly responsible for any damage resulting from blasting, and any injury or damage to structures or property shall be promptly repaired by the Contractor to the satisfaction of the Authority and property owner.

Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

Size of Pipeline, Inches	Depth of Excavation Below Bottom of Sewer Pipe, Inches
4 and Less	4
4 to 6	6
8 to 18	8
18 to 30	10
Over 30	12

The space below grade for pipe lines shall then be backfilled with subgrade stabilizer or other approved bedding material and compacted.

In rock excavation, the backfill from the bottom of the trench to one foot above the top of the pipe shall be finely pulverized soil, free from rocks and stones. The rest of the backfill shall not contain over 50% broken stone, and the maximum sized stone placed in the trench shall not exceed two inches (2") in diameter. Excess rock and fragments of rock larger than 2" in diameter shall be loaded and hauled to disposal. If it is necessary, in order to comply with these specifications, selected backfill shall be borrowed and hauled to the trenches in rock excavation. Sides of the trench shall be trimmed of projecting rock that will interfere with backfilling operations. Rock excavation by blasting shall be at least 75 feet in advance of pipe laying.

506. SUB-GRADE AND PIPE BEDDING

All D.I.P., R.C.P. and Steel pipe shall have a minimum of Class "C" bedding. All PVC pipe shall have minimum bedding as described below and shown in the standard details. Wherever water or wet soil is encountered, Class "B" bedding shall be provided for D.I.P., R.C.P. and Steel Pipe. If specifically designated on the plans, Class "A" or "B" bedding may be required. Class "D" bedding is not allowed for use with gravity sewers. All bedding shall conform to ASTM C12 specifications.

A description of Class "A", "B", "C" and PVC Special Bedding is as follows:

1.) Class "A" Bedding

Class "A" bedding refers to bedding with concrete cradle or arch. The Contractor shall conform to details shown in the detailed drawings when Class "A" bedding is required.

a.) Concrete Cradle

The sewer pipe is bedded in a cast-in-place cradle of plain or reinforced concrete having a thickness equal to one-fourth the inside pipe diameter, with a minimum of 100 mm (4 in.) and a maximum of 380 mm (15 in.) under the pipe barrel and extending up the sides for at least the outside diameter of the sewer pipe barrel plus 200 mm (8 in.). Construction procedures must be executed carefully to prevent the sewer pipe from floating off line and grade during placement of the cradle concrete.

b.) Concrete Arch

The sewer pipe is bedded in carefully compacted granular material having a minimum thickness of one-eighth the outside sewer pipe diameter but not less than 100 mm (4 in.) or more than 150 mm (6 in.) between the sewer pipe barrel and bottom of the trench excavation. Granular material is then placed to the spring line of the sewer pipe and across the full breadth of the trench. The haunching material beneath the sides of the arch must be compacted so as to be unyielding. Crushed stone in the 5-mm to 20-mm (0.25 in. to 0.75 in.) size range is the preferred material. The top half of the sewer pipe is covered with a cast-in-place plain or reinforced concrete arch having a minimum thickness of 100 mm (4 in.) or one-fourth the inside pipe diameter but not to exceed 380 mm (15 in.), and having a minimum width equal to the outside sewer pipe diameter plus 200 mm (8 in.).

2.) Class "B" Bedding

The pipe shall be bedded in crushed granite material or other suitable materials approved by the Authority. The bedding shall be placed on a flat trench bottom with a minimum thickness beneath the pipe of one-eighth the outside pipe diameter, but not less than six inches (150 mm) and sliced under the haunches of the pipe with a shovel or other suitable tool to a height of one-half the outside pipe diameter, or to the horizontal centerline. The initial backfill shall be hand placed to a level of 12" (300 mm) over the top of the pipe and shall consist of finely divided materials free from debris, organic material and large rocks or stones.

3.) Class "C" Bedding

The pipe shall be bedded in crushed granite material or other suitable materials approved by the Authority. The bedding shall be placed on a flat trench bottom with a minimum thickness beneath the pipe of one-eighth the outside pipe diameter, but not less than six inches (150 mm) and sliced under the haunches of the pipe with a shovel or other suitable tool to a height of one-sixth the outside diameter of the pipe. The initial backfill shall be hand placed to a level of 12" (300 mm) over the top of the pipe and shall consist of finely divided materials free from debris, organic material and large rocks or stones.

4.) Special Bedding for PVC Pipe

The pipe shall be bedded in crushed granite material or other suitable

materials approved by the Authority. The bedding shall be placed on a flat trench bottom with a minimum thickness beneath the pipe of one-fourth the outside pipe diameter, but not less than six inches (150 mm) and sliced under the haunches of the pipe with a shovel or other suitable tool to a height of two-thirds the outside pipe diameter. The initial backfill shall be hand placed to a level of 12" (300 mm) over the top of the pipe and shall consist of finely divided materials free from debris, organic material and large rocks or stones.

507. BEDDING MATERIAL

Bedding material shall conform to ASTM D2487 standards.

1.) Class I

This class includes angular, 6 to 40 mm (0.25 to 1.5 in.), graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells. Class I material provides the best material for the construction of a stable sewer pipe - soil system.

2.) Class II

This class comprises coarse sands and gravels with maximum particle size of 40 mm (1.5 in.), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included.

3.) Class III

This class comprises fine sand and clayey gravels, including fine sands, sand - clay mixtures, and gravel - clay mixtures. Soil types GM, GC, SM and SC are included.

4.) Class IV

Class IV materials require special effort for compaction, thus may be suitable for sewer pipe foundation if special care is taken during excavation to provide a uniform, undisturbed trench bottom. Use of Class IV materials for bedding, haunching or initial backfilling is not recommended. Soil types include ML, CL, MH, and CH.

5.) Class V

Class V materials present special problems in providing an adequate foundation and should not be used for any part of the sewer pipe envelope. Soil types include OL, OH and PT.

508. INSTALLATION OF SEWER PIPE

1.) Section 400 of these Standards, entitled “Materials for Sanitary Sewers”, includes several requirements for the installation and testing of the different types of pipe materials that are approved for sanitary sewers. In addition to those material-specific requirements, the general requirements below will be followed.

2.) Pipe and accessories shall at all times be handled with care to avoid damage. Whether moved by hand, skidways or hoists, material shall not be dropped or bumped. The interior of all pipe shall be kept free from dirt and foreign matter at all times. Each joint of pipe shall be unloaded opposite or near the place where it is to be laid in the trench.

3.) All such material that is defective in manufacture or has been damaged in transit or after delivery shall be removed from the job site.

4.) Sewer pipes shall be joined by "push-on" joints using elastomeric gaskets to affect the pressure seal. The ends of pipe to be joined and the gaskets shall be cleaned immediately before assembly, and the assembly shall be made as recommended by the pipe manufacturer. Lubricant used must be non-toxic and supplied or approved for use by the pipe manufacturer. Sewer pipes shall be laid in the uphill direction with the bells pointing upgrade. Any variation from this procedure shall require approval from the Authority. Pipe grades shall be obtained by use of a laser and double-checked with a surveying level and rod. Where PVC pipe is connected to DI pipe, the Contractor shall use a solid sleeve if the two pipe sizes are equal.

5.) When pipe laying is not in progress, the open ends of installed pipe shall be plugged by approved means to prevent entrance of trench water into the line.

6.) No special laying conditions are required for ductile iron pipe (DIP) other than haunching and soil compaction to twelve (12) inches above the spring line and any other conditions which are stipulated elsewhere in these specifications. See Section 402A.

7.) The following laying conditions shall be followed with PVC pipe:

PVC pipe shall be installed in accordance with the requirements of ASTM D 2321.

a.) In any area where the pipe is below the existing ground water level, the contractor will embed PVC pipe in sand or graded gravel. By embedding PVC pipe in sand or graded gravel, no special compaction requirements will be necessary. However, the sand or gravel must extend from six inches below the pipe to twelve inches above the pipe and the material must be firmly placed under the pipe haunches. See the standard details.

b.) When embedding PVC pipe in friable, compressible soils (E.G., silt, clay, sandy clay, silty clays, etc.), special care must be exercised to provide a uniform (undisturbed or fully compacted) trench bottom. Additionally, the backfill must be compacted to 95% Standard Proctor in six inch lifts to twelve inches above the top of the pipe.

c.) Initial backfill shall be compacted to the densities outlined in D2321. The Authority may require random compaction tests to insure compliance with D2321. If any material tested is less than the required density, the contractor shall re-compact said material.

d.) The Contractor shall use SDR-35 material for pipe with 0-16 feet of fill. PVC pipe cannot be used at depths exceeding 16 feet.

e.) Deflection Limit: Vertical deflection of installed pipe shall not exceed 5 percent of the undeflected diameter as defined in Table X1.1 of ASTM D3034.

8.) Bell holes shall be provided of sufficient size to allow ample room for making the pipe joints properly. The bottom of the trench between bell holes shall be carefully graded so that the pipe barrel will rest on a solid foundation for its entire length as shown on the plans. Each joint shall be laid so that it will form a close concentric joint with adjoining pipe and in order to avoid sudden offsets or inequalities in the flow line.

9.) Water shall not be allowed to run or stand in the trench before the trench has been backfilled. The Contractor at no time shall open up more trench than his available pumping facilities are able to dewater.

10.) Any pipe which has its alignment, grade or joints disturbed after installation shall be taken up and relaid.

11.) For force mains, the Contractor shall place a vertical piece of 2” diameter PVC pipe on top of the pipe at all bends, fittings, valves, elevation transitions and every 50’ along the length of the force main for the purpose of enabling the surveyor to locate the force main for “As-Builts”. The Contractor will then

be responsible for removing the vertical PVC sections after the as-built locations have been verified by the Authority. All ductile iron force mains shall be encased in green polyethylene tubing.

12.) At the point of connection to the Authority's existing sanitary sewer system, the new sanitary sewer line shall remain plugged or otherwise disconnected from the system until the new sanitary sewer lines are inspected, tested and determined to be acceptable to the Authority's Chief Inspector. The Developer will be fined for any storm water flows, mud or other construction debris that enters the Authority's system due to non-compliance with this requirement.

13.) If the as-built capactity decreases below the approved plan capacity in excess of the acceptable percentages listed below, the pipe shall be taken up and relaid.

Proposed Flow Rate	Acceptable Percent Decrease In Capacity
0 – 400 GPM	5%
401 – 800 GPM	7.5%
>801 GPM	10%

509. BACKFILLING TRENCHES

1.) Backfill material shall consist of fine, loose earth containing sufficient but not excessive moisture content for thorough compaction. Material that is too dry for adequate compaction shall receive a prior admix of sufficient water to secure adequate moisture content. Material having excessive water content shall not be placed at any time. Backfill material shall be free of large clods, stones, vegetable matter, debris, and other objectionable material. All unsuitable excavated material and excess material must be properly disposed of in a manner that will not adversely affect the environment.

After the pipe has been laid, backfilling shall be done in two (2) distinct operations. In general, all backfill beneath, around and to a depth of twelve (12") inches above the top of the pipe shall be placed by hand in four (4") inch layers for the full width of the trench and thoroughly compacted by hand with vibratory equipment. The remainder of the backfill shall be placed in 6" layers and compacted to the top of the trench, either by pneumatic hand tamps, hydro-tamps, or other approved methods. Care shall be taken so that the pipe is not laterally displaced during backfilling operations. The backfill lifts shall be placed by an approved method in accordance with that hereinafter specified. Backfill materials shall be the excavated materials without bricks, stone, or corrosive materials.

2.) Backfill under permanent concrete or bituminous pavement and as elsewhere specified or indicated on the plans shall be compacted graded aggregate free from large stones and containing not more than ten percent (10%) by weight of loam or clay. This backfill shall be compacted to ninety-five percent (95%) as determined by the Standard Proctor test from pipe bedding to one foot below the top of the trench, and the top one foot of the trench shall be compacted to one hundred percent (100%) as determined by the Standard Proctor test. Mechanical vibrating equipment shall be used to achieve the required compaction.

3.) Backfill under gravel or crushed stone surfaced roadways and surface treated type bituminous roadways shall be the approved suitable excavated material placed in six (6) inch layers thoroughly compacted for the full depth and width of the trench. Backfill shall be free from large stones and contain not more than ten percent (10%) by weight of loam or clay. This backfill shall be compacted to ninety-five percent (95%) as determined by the Standard Proctor test from pipe bedding to one foot below the top of the trench, and the top one foot of the trench shall be compacted to one hundred percent (100%) as determined by the Standard Proctor test. Mechanical vibrating equipment shall be used to achieve the required compaction.

4.) Backfill in unpaved areas shall be compacted with mechanical vibrating equipment to ninety percent (90%) as determined by the Standard Proctor Test. Backfill material from pipe bedding to ground surface by shall be excavated earth free from large stones and other debris.

5.) Contractor shall fully restore and replace all pavement, surface structures, etc., removed or disturbed as part of the work to a condition equal to that before the work began. Pavement shall be replaced immediately after the backfilling is completed.

6.) Contractors which are utilizing the roadway shoulders for construction are required to stabilize the earth shoulders every three days as a maximum time period. Also they are required to stabilize the shoulder before leaving the work area on any particular day if rain is forecast within the next 24 hours.

7.) Where sheeting is used in connection with the work, it is in no case to be withdrawn before the trench is sufficiently filled to prevent damage to banks, road surfaces, adjacent pipes, adjacent structures or property. When the removal of sheeting endangers adjoining improvements, it will be left in place.

8.) All costs of compaction testing shall be the responsibility of the Developer.

510. RAILROAD CROSSINGS

All railroad crossings shall conform to the requirements of the American Railway Engineering Association Manual for Railway Engineering, Part 5. The Developer shall secure permission from the railroads to schedule the work so as not to interfere with the operation of the railroads. The Developer shall be held responsible for any delays or damages occurring to the railroads. The Developer will furnish the railroad with such additional insurance as may be required, cost of same to be borne by the Developer, together with the costs for flagmen, watchmen, temporary work of any nature, safety devices and any other items that may be imposed by the railroad.

511. HIGHWAY CROSSINGS

1.) The Developer shall be responsible for the coordinating and scheduling of all construction work in the State Highway right-of-way with the Georgia Department of Transportation.

2.) Work along and across Georgia State Highway right-of-way shall conform to Georgia D.O.T. Standard Specifications for Construction of Roads and Bridges. The Developer is required to obtain all necessary permits.

3.) Traffic control within the state of Georgia right-of-way shall comply with Section 107.09 of the State of Georgia D.O.T. Standard Construction Specifications, or Sections 104.05 and 107.07 of the U.S. Manual On Uniform Traffic Control Devices For Streets and Highways, latest editions.

512. STREAM CROSSINGS

Crossing streams shall be done in compliance with the Federal, State and Local laws and permit requirements. The methods described below are subject to change due to more recent regulations implemented by the varying government agencies. The Developer is liable for knowing and complying with the most stringent regulations in force at the time of construction.

1.) The suggested method of crossing a river, stream, creek, impoundments, or wet weather ditch is with a bore under the creek or river with a minimum of two feet (2') of cover between the lowest point in the stream and the top of outside diameter of the casing. Casings and ductile iron pipe are required for all stream crossings and shall extend a minimum of twenty feet (20') beyond the vegetative buffer (State or County buffer, whichever is wider) on each side. An open cut of the stream is allowable if no endangered species are

affected and if the Developer obtains permission from the various governing agencies. If the stream is open cut, concrete collars or encasement must be provided at all joints for ductile iron pipe with less than three feet (3') of cover.

2.) Design engineer is responsible for checking and designing against floatation.

3.) The stream bed and sides at the crossing site shall be protected from erosion in accordance with the **Manual For Erosion and Sediment Control In Georgia**, 2000 or most current edition.

4.) Where streams are allowed to be open cut by variance, the construction in stream beds shall follow the following guidelines:

A.) Construction in and around stream beds must adhere to the current regulations of the Georgia EPD, the Corps of Engineers, Cherokee County and the U.S. Department of Fish and Wildlife. The design engineer and contractor are responsible for knowing and complying with these regulations. All necessary permits and buffer variances must be acquired by the Developer prior to the final approval of the plans by the Authority. Any item published within these specifications that is in conflict with the EPD's stream bed protection regulations is hereby deemed invalid, unless the specification herein is considered more stringent by the reviewing agency.

B.) Fording of live streams with construction equipment will not be permitted, unless specifically approved in writing. Unless, otherwise approved in writing, mechanized equipment shall not be operated in live streams except as may be required to construct temporary diversion structures, and temporary or permanent structures.

C.) Erosion control measures shall be installed prior to performing any stream crossings. All work should be performed when stream flows are at their lowest, and all work should be performed as quickly and safely as possible. As soon as conditions permit, the stream bed shall be cleared of all false work, debris, and other obstructions placed therein or caused by the construction operations.

D.) Erosion control measures can include, but are not limited to, the following items:

a.) Silt fencing, types A, B, and/or C
b.) Erosion control checkdams
c.) Channel diversion through temporary storm drain pipe
d.) Rock filter dams
e.) River Stone in the creek bed

f.) Geotextiles for stream bank restoration
g.) Special vegetative installations

The construction and installation of these various structures are detailed in the **Manual For Erosion And Sedimentation Control In Georgia** or the Georgia Department of Transportation Standards and Construction Details, both of which are available for purchase by the Contractor. All measures must be approved by the NRCS and the EPD.

513. PLACING OF STEEL CASING PIPE

1.) Casing pipe shall be installed at the locations required by the Authority. Unless directed otherwise, the installation procedure shall be the dry bore method. The hole is to be mechanically bored and cased through the soil by a cutting head on a continuous auger mounted inside the casing pipe. The installation of the casing and boring of the hole shall be done simultaneously by jacking. Lengths of pipe are to be full circumference butt-welded to the preceding section installed. Excavation material will be removed and placed at the top of the working pit. Backfill material and methods of backfilling and tamping shall be as required under Section 509. Carrier pipe shall be D.I.P.

2.) Jacks for forcing the casing pipe through the roadbed shall have a jacking head constructed in such a manner as to apply uniform pressure around the ring of the pipe. The pipe to be jacked shall be set on guides, braced together, to properly support the section of the pipe and direct it to the proper line and grade. In general, roadbed material shall be excavated just ahead of the pipe, the excavated material removed through the pipe, and the pipe then forced through the roadbed into the excavated space.

3.) Where pipe is required to be installed under railroads, highways, streets or other facilities by jacking or boring methods, construction shall be done in a manner that will not interfere with the operation of the facility, and shall not weaken the roadbed or structure.

4.) The use of water or other fluids in connection with the boring operation will be permitted only to the extent necessary to lubricate cuttings. Jetting will not be permitted.

5.) The diameter of the excavation shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation shall be pressure grouted.

6.) The pipe shall be jacked from the low or downstream end. At each end of the casing pipe the void between the carrier pipe and casing shall be sealed with brick and mortar. Any pipe damaged in jacking operations shall be removed, and replaced by the Contractor at his expense.

7.) After the steel casing pipe has been installed, the DIP carrier pipe shall be installed in the casing pipe. Care shall be exercised at all times to protect the coating and lining of this pipe and to maintain tight, full-seated joints in the carrier pipe. The Contractor shall also take great care in setting the pipe on guides within the casing to insure that the carrier pipe stays on the correct grade without sagging. Where the carrier pipe is 24" in diameter or less, joint gaskets shall be "Field-Lok" gaskets or approved equal inside of the casing.

514. REPLACEMENT OF PAVEMENT

1.) General

Contractor shall fully restore and replace all pavement, curbs, gutters, sidewalks and other surface structures removed or disturbed, to a condition that is equal to or better than the original condition in a manner satisfactory to the Authority.

Contractors which are utilizing the roadway shoulders for construction are required to stabilize the earth shoulders every three days as a maximum time period. Also they are required to stabilize the shoulder before leaving the work area on any particular day if rain is forecast within the next 24 hours.

2.) Pavement Cuts

a.) All paved roads will be bored and cased. A bore must be attempted before consideration will be given to cutting the street.

b.) Existing roadways shall not be open cut unless permission is granted by the Georgia D.O.T. and/or the Cherokee County Roads and Bridges Department (CCRBD). Submittal of an authorization letter from the D.O.T. or the CCRBD is required.

c.) One lane of traffic shall be maintained open at all times. Construction work shall be limited to time between 9 A.M. and 4 P.M.

d.) The Contractor shall furnish traffic control devices and certified personnel to direct traffic, if required.

e.) The above requirements may be altered with the written approval of the CCRBD in extenuating circumstances.

f.) Assuming that a road bore has been attempted and failed, or that the

Developer has received permission to open cut a road, pavement replacement shall adhere to the following guidelines:

i.) Removing and replacing pavement shall consist of removing the type of pavement and base encountered, and replacing same to its original shape, appearance and riding quality, in accordance with the detailed plans. Final asphalt patches shall match the existing pavement type but be no less than 1 1/2 inches thick. Special care shall be exercised to match existing slopes and grades for a smooth transition. Casing will be required where the installation is under any roadway. Carrier pipe shall be D.I.P.

ii.) Concrete pavement shall be replaced with pavement of a thickness equal to that removed, or 6" for driveways and 9" for roads, whichever is thicker. The concrete shall meet the specifications of the D.O.T. for concrete paving.

iii.) Where bitumastic paving is replaced, a base course of 3000 psi concrete shall be placed over the ditch line. The concrete shall be 6" thick for driveways and parking lots and 9" thick for public roads. The top of this base course shall be left with a rough float finish 1-1/2" below the surface of the existing paving. After the concrete has attained its strength, a tack coat of AC-15 or equal shall be applied at the rate of 0.25 gallons per square yard, and a plant mix asphalt course 1-½" thick applied over this, and finished off level with existing pavement. (9.5 mm Superpave Level B for State Roads and 12.5 mm Superpave for County Roads.)

iv.) Unless otherwise directed in writing all pavement will be removed to a width of the trench plus 12" on each side as shown on the detailed drawings.

v.) All pavement cuts on County roads shall be made by sawing prior to excavation to eliminate uneven and ragged edges.

3.) The Contractor shall adhere to the Georgia D.O.T. Specifications for the Installation of Safety Barricades, Section 107.09 during construction in the roadway or shoulder.

4.) Where possible, all pipe under existing paved driveways will be either free bored or installed in casing. Free bores under driveways will be made with D.I.P.

5.) Where sewer lines are installed in existing paved streets, the streets in which the sewer lines are installed shall receive a full width asphalt repaving in

accordance with these specifications.

515. LOCATION AND PROTECTION OF EXISTING UNDERGROUND UTILITIES

It is the responsibility of the Contractor to locate and protect all underground utilities and structures. No utility is to be moved or disturbed without the approval of the utility company. Any damage caused by sewer line installation to any utility or structure shall be immediately reported to the Chief Inspector of the CCWSA and repaired at the Contractor's expense.

During construction and after the sewer main is operational and throughout the one year maintenance period, the Developer will be responsible for locating all water and sewer facilities when called upon by the Utilities Protection Center or the Authority. These utilities must be marked within 72 hours of the time notified. Any water or sewer facilities cut by others will be repaired by the Developer's contractor at the Developer's expense if the lines are not located or if they are improperly located. The Developer shall provide the name and telephone number of the company providing this locate service for the Developer.

516. CLEAN-UP

1.) The Contractor shall remove all unused material, excess rock and earth, and all other debris from the construction site as closely behind the work as practical. If the Contractor fails to maintain clean-up responsibilities as directed by the Authority's representative, the Authority may choose to use their own forces to do so, followed by an invoice to the Developer for the Authority's work.

2.) All trenches shall be backfilled and tamped before the end of each days work.

3.) Prior to requesting the "completion of sewer main construction" inspection, the Contractor shall do the following:

- **a.)** Remove and dispose of in an acceptable manner all shipping timbers, shipping bands, spacers, excess materials, broken material, crates, boxes and any other material brought to the job site.
- **b.)** Repair or replace any work, trees, lawns, shrubs, fences, flower beds, drainage culverts or other property damaged by the sewer line construction. All items damaged beyond repair shall be replaced with the same kind of material as existed prior to the damage occurring.
- **c.)** All easement areas shall be cleared of trees, stumps and other

debris and left in a condition such that the easement can be maintained by bush-hog equipment.

d.) All shoulders, ditches, culverts, and other areas impacted by the sewer line construction shall be at the proper grades and smooth in appearance.

e.) All manhole covers shall be brought to grade.

517. GRASSING

A uniform stand of grass is required over all construction easements and sanitary sewer easements prior to the Authority's acceptance of the sewer. Grass shall be as defined and installed or constructed in conformity with the Temporary and Permanent Disturbed Area Stabilization of the **Manual For Erosion and Sediment Control In Georgia**, 2000 or most current edition. The grassing shall be maintained for by the Contractor or Developer until final acceptance of the sewer line and appurtenances by the Authority.

Grass seed shall be selected based on the type of seed suitable to the area and season of year. Refer to the **Manual For Erosion and Sediment Control In Georgia** for grass growing schedule, selection of grass seed, fertilizers, lime, inoculants, mulching, etc.

The Contractor shall provide water for irrigation from the nearest available metered source. The soil must be thoroughly wet to a depth that will insure germination of the seed. Water must be applied at a rate not causing runoff or erosion.

Growth and coverage on areas grassed shall be considered in reasonably close conformity with the intent of this requirement when a viable stand of grass covers at least 98% of the total area with no bare spots exceeding one (1) square foot and the ground surface is fully stabilized against erosion. The Contractor shall repeat all work, including plowing, fertilizing, watering, and seeding as necessary to produce a satisfactory stand.

The Contractor or Developer shall do all maintenance work necessary to keep all planted areas in satisfactory condition until the work is finally accepted. This shall include mowing, repairing washes that occur, reseeding, and water as required to produce a healthy and growing stand of grass. Mowing will be required to remove tall and obnoxious weeds before they go to seed.

518. STANDARD DETAILED DRAWINGS

Installation of sewer lines, bedding, manholes, services, force mains, etc. shall

be made in accordance with the Standard Detailed Drawings in these specifications.

519. CONSTRUCTION PERMITS

No construction shall be allowed until a construction permit has been issued by the Cherokee County Water and Sewerage Authority. (See Sections 103 and 105.)

The contractor shall submit one copy of the approved construction plans which have been stamped approved. The contractor shall furnish his name and address, telephone number, Certificate of Liability Insurance, and proof of his Cherokee County business license to do this type of work. He shall also furnish the name of the person in charge of the project and any subcontractors and the name and telephone number of a responsible person who can be contacted in case of emergencies during nonworking hours.

The contractor (whose name shall appear on the approved contractor's list) shall furnish his construction schedule and shall notify the Chief Inspector a minimum of four (4) days prior to doing any work. Once the contractor begins work, he shall proceed in a workmanlike manner and shall complete the work in a reasonable time without undue off days and periods of inactivity which make it hard for the Chief Inspector to keep up with his activity.

520. BARRICADES

The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient red lights, danger signals and necessary precautions for the protection of the work and the safety of the public. Streets closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall extend completely across the street which is to be closed, and shall be illuminated at night by lights not farther than (5) feet apart, and lights shall be kept burning from sunset to sunrise.

521. FENCES

On sewer line extensions to the development, the Contractor shall take down fences on or crossing right-of-way for such periods of time only as are necessary to prosecute the work of clearing, grubbing, trenching, pipe laying and backfilling. Gaps made in fences shall be closed in a substantial manner at night and during any suspension of work, and, upon completion of the pipe line, fences shall be

restored to as good condition as before disturbed.

522. RIP-RAP

Where required, stone rip-rap shall be dumped and hand placed to form a compact layer. Stone rip-rap shall be placed to a thickness of not less than 8" and not more than 18", to the length and width shown on the plan or as directed by the Inspector. Rip Rap shall have a geotextile underliner between the soil and the stone.