SECTION 2

WATER DISTRIBUTION SPECIFICATIONS

2.00 WATER DISTRIBUTION PIPE

A. Design

Location: Water lines shall be extended along the entire roadway frontage length of any proposed project. All public water mains shall be located within dedicated right of way or dedicated easements with a minimum width of 20 feet. No water main shall be designed closer than 6 feet to the edge of pavement of an NCDOT maintained road. Large trees, fences, gates, or any type of structures (e.g. retaining walls or utility sheds) shall not be placed within any District utility easement. Fittings, including valves, shall be shown on the plan view for all intersecting water mains and at fire hydrants. Bends shall be labeled on the plan and profile views to include method of restraint.

Sizing: Water lines shall be sized as directed by the District Manager. In residential areas, mains shall be 6-inch and 8-inch diameters. Six-inch mains shall be used only when a good grid exists. The total maximum length of 6-inch and 8-inch line, without connection to a larger main, is 1200 feet and 2000 feet, respectively. Where a sufficient grid network does not exist, lines shall be upsized additionally to provide adequate fire flow as directed by the District Manager. If there is adjacent developable property, an adequate size line to properly serve future development shall be provided sufficient for any future project to meet district standards. Minimum main size shall be 2 inch, with a maximum of 20 residences connected (40 if looped). A 2 inch main shall not exceed 1,000 feet in length.

B. Material

Water mains shall be constructed of polyvinyl chloride (PVC), high-density polyethylene, or ductile iron. Water mains which are 12 inches or less in diameter can be polyvinyl chloride (PVC), while any water mains greater than 12 inches in diameter shall be ductile iron. Should the Contractor desire to use other materials not listed in these specifications, written permission must be obtained from the District Manager.

***Ductile Iron Pipe*:** shall be designed and manufactured in accordance with AWWA C150 and C151 for laying conditions Type 2. For pipe sizes 12-inches or less, ductile iron pipe shall be pressure class 350. For pipe sizes larger than 12-inches, pressure class 250 ductile iron

pipe shall be used.

PVC Pipe

Two (2) inch water main pipe shall be manufactured using Grade 1 PVC compound material as defined in ASTM D-1784 and shall be SDR21, pressure class 200 in accordance with ASTM D 2241. Two inch water main shall also meet NSF standard 61. Fittings for two (2) PVC pipe shall be solvent weld Schedule 80 PVC. Brass FIP x pack joint for PVC fittings shall be used to transition from PVC to brass. The pipe shall be plainly marked with the manufacturer's name, size, material (PVC) type and grade or compound, NSF seal, date of manufacture, pressure rating and reference to appropriate product standards.

All PVC pipe (4-inches through 12-inches diameter) shall be manufactured using virgin compounds as defined in ASTM D-1784, with a 4,000 psi HDB rating and designated as PVC 1120 to be in strict accordance with AWWA C-900. The pipe shall be Class 150 and conform to the thickness requirements of DR18. The pipe shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM D-1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D-1598. The pipe joints shall be of the integral bell type with rubber gaskets and shall conform to the requirements of ASTM D-3139 or ASTM F-477.

PVC fittings are not acceptable for water mains four (4) inches or greater. Fittings and specials shall be ductile iron, bell end in accordance with AWWA C-110, 150 psi pressure rating unless otherwise shown or specified. Ductile iron fittings to PVC pipe shall be adequately supported on a firm trench foundation. Ductile iron fittings and specials shall be cement mortar lined (standard thickness) in accordance with ANSI A21.4.

Pipe Joints shall be of the push-on type and certified to meet NSF/ANSI 61 standard. Pipe lining shall be cement mortar with a seal of bituminous material in accordance with AWWA C104.

All pipe shall be DIP (Ductile Iron Pipe Size) unless otherwise noted on the plans.

C. Installation

All water mains shall be installed with a minimum cover of 3.5 feet measured from the top of the pipe to the finished subgrade of the roadway. Water mains shall not be installed under pavement section, curb and gutter, or sidewalk except when crossing perpendicular to those surfaces, in which case DIP (Ductile Iron Pipe) will be required. In addition, all waterlines shall be installed to prevent conflict with future road improvements or

of the specified limitations or as determined by the District, bends shall be utilized. Joint deflection shall not exceed the limits recommended by the pipe manufacturer.

Each water main shall be installed with tracer wire attached to the top of pipe in such a manner that it will not be displaced during construction. Tracer wire shall be 12 GA copper installed in a continuous length for the full length of pipe run. Locater tape shall also be required to be installed 12" to 18" above the pipe. Locator tape shall be 3" wide aluminum core, 5mil, APWA blue and read "CAUTION BUIRED WATER LINE BELOW"

All construction relating to the utility improvements which will be maintained by Eastover Sanitary District must be performed by a contractor licensed in North Carolina. Proof of licensure will be required at the Project Preconstruction Meeting. Operation of existing valves and fire hydrants shall be by District staff only.

2.01 FIRE HYDRANTS

A. Location

Generally, fire hydrants should be located at street intersections and property corners. Intermediate fire hydrant placement shall be located at property corners. Consideration should be given to other utilities such as power, telephone, and cable locations. In all instances, hydrants should be placed to afford protection from vehicle collisions. Fire hydrants shall be installed 18 inches inside the right-of-way measured to the hydrant centerline. Hydrants shall not be located in the back slope of a roadside ditch. All fire hydrants shall be installed on a minimum 6-inch waterline. Only one fire hydrant may be installed on a dead end 6-inch line. Each fire hydrant shall have a valve on the hydrant service line, located within 15 feet of the fire hydrant. Fire Hydrants shall be spaced no more than 1,000 feet apart and at a maximum of 500 feet from any lot or unit within a subdivision

B. Specifications

Hydrants shall meet the AWWA Standard C502. Hydrants shall be furnished by American Darling, model shall be Mark 73-5. Hydrants shall be equipped as follows: 4 ½-inch steamer and double 2 ½-inch hose connections with caps and chains, National Standard Threads, mechanical joint, 1 ½-inch pentagon operating nut, open left, painted fire hydrant red, bronze to bronze seating, a minimum 3 ½-foot bury depth with break away ground line flange and break away rod coupling. The hydrant bonnet will be designed with a sealed oil or grease reservoir with O-ring seals and a Teflon thrust

bearing. Fire hydrant caps shall be attached to the body of the hydrant with a minimum 2/0 twist link, heavy duty, non-kinking, machine chain.

C. Installation

Hydrants shall be set plumb, properly located with the pumper nozzle facing the closest curb. Fire hydrants shall be located on the same side of the roadway as the water main, unless otherwise approved. No fire hydrant older than three (3) years shall be installed, as determined by the manufacture date stamped on the hydrant. The back of the hydrant opposite the pipe connection shall be firmly blocked against the vertical face of the trench with 1/3 cubic yard of concrete. Each hydrant, hydrant valve and associated piping shall be restrained by use of an approved retaining gland. All fire hydrants shall be newly painted in accordance with NFPA standards. A minimum of 8 cubic feet of stone shall be placed around the drains. The backfill around the hydrants shall be thoroughly compacted. Hydrant installation shall be in accordance with the Standard Details section of these Standards. Fire hydrant shall be installed with a minimum of 18"-24" from center of 6" cap to grade and shall be installed with positive drainage.

2.02 VALVES AND APPURTENANCES

A. Location

Valves shall be installed at all pipeline intersections, changes in pipe diameter, and on hydrant braches according to the following schedule: 3 valves at crosses; 2 valves at tees; and 1 valve on each hydrant branch. Size and type of valves shall be shown on plan view. Maximum valve spacing (in-line valves) shall be 1,500 feet in the distribution system and 2,500 feet for transmission mains 16 inches in diameter and larger. Valves shall not be located in curb and gutter or in the flow line of wedge asphalt curb or in ditches and ditch slopes. Street intersection valves shall be located at the tee, unless otherwise approved the District. A proposed connection of a new water line to an existing water line may include provisions for the addition of sufficient valves to the existing water line to meet the requirement of a tee intersection, as deemed necessary by the District.

Blowoff assemblies shall be a minimum of 2 inches and installed at the end of all dead-end waterlines. Where there is not sufficient pressure or fire hydrants located to thoroughly flush the system, a larger blowoff may be required. On large diameter mains or other circumstances, larger blowoffs may be required by the District Manager. The blow-off or fire hydrant shall be located as to provide proper drainage and minimize impacts to any adjacent property or structures.

Combination air valves shall be installed at high points of waterlines 12 inches in diameter or larger, as directed by the District Manager. Water lines shall be installed at a grade which will allow the air to migrate to a high point where the air can be released through an air valve. A minimum pipe slope of 1 foot in 500 feet should be maintained. The size of air valve shall be designed by a Professional Engineer registered in North Carolina. Combination air valves or other types of air release valves may be required at other locations as directed by the District Manager.

B. Specifications

Gate Valves greater than 2 inches shall meet all requirements of AWWA C500 for a working pressure of 250 psi. All shall be mechanical joint with iron body, resilient wedge seat type in accordance with AWWA C509. All valves shall have a 2" square operating nut and shall open counterclockwise. Valve body and bonnet shall be coated on all interior and exterior surfaces with a fusion bonded epoxy in accordance with AWWA C-550-90. Valve Gate valves shall be installed in a vertical position. All two (2) inch valves shall be quarter turn ball valves, in accordance with District specifications. Acceptable brands CLOW, Kennedy, Mueller or equal. Valves shall be of one manufacture per project.

Valve Boxes shall be cast iron of the slip type with a 5-inch opening with "water" stamped on the cover. Valve box ring adjustments will not be allowed. Locking valve boxes may be required a determined by the District Manager. All casting shall be made in the United States.

Butterfly Valves shall be installed in waterlines 16 inches or greater. All shall meet the requirements of AWWA C504 with mechanical joints, 2-inch operation nut and open left. Acceptable brands, Pratt, CLOW, K-Flo, Milliken or equal.

Blowoff Assemblies All two (2) inch valves shall be quarter turn ball valves, in accordance with ESD specifications. Programmable blowoff assemblies shall be installed as directed by the District Manager. Acceptable brand, Kupferle 9400 Eclipse

Pipe Fittings shall be certified to meet the NSF/ANSI 61 standard. Joints for fittings shall be mechanical joint and lined with cement mortar with a seal coat of bituminous material, all in accordance with AWWA C104.

Reaction Blocking for all fittings or components subject to hydrostatic thrust shall be securely anchored by the use of concrete thrust blocks poured in place. The required

reaction areas are shown in the Standard Details Section of these Standards. Compact fittings are not acceptable, standard fittings shall be used with concrete thrust blocking. Concrete shall be installed so that it does not interfere with the removal of fittings. Material for reaction blocking shall be 3000 psi concrete. Alternative restraining methods may be considered only in unusual circumstances and must be designed by a Professional Engineer registered in North Carolina and approved by the District Manager.

Tapping Sleeves shall be stainless steel sleeves with stainless steel flanges. The sleeves shall be mechanical joint to the main line and flanged to the tapping valve. Acceptable material Mueller, Rockwell, CLOW or equal.

Tapping Saddles shall be used on mains 16 inches and larger. Saddles shall be made of ductile iron providing a factor of safety of 2.5 with a working pressure of 250 psi. Saddles shall be equipped with an AWWA C110 flange connection on the branch. Sealing gaskets shall be O-ring type, high quality molded rubber having approximate 70 durometer hardness, placed into a groove on the curved surface of the saddles. Straps shall be alloy steel.

The maximum size saddle outlet for each size of pipe to be tapped shall be as follows:

Size pipe to be tapped	Maximum size saddle outlet
16"	12"
20"	16"
24" and larger	20"

Acceptable brands Mueller, Rockwell, Ford.

Combination Air Valves shall be of the single housing style that combines the operation of both an air/vacuum and air release valve. The valve shall be manufactured for a 150 PSIG working pressure and be sized by the Design Engineer of Record. The valve must meet the requirements of AWWA C512 and be installed in accordance with the Standard Details Section of these Standards. Mains 12-inches or larger in diameter, which have a change in elevation of ten (10) feet or greater, shall have an air release valve installed at the highest elevation of such change, unless otherwise approved by the District. Acceptable Brands Cla-Val 36 series, ARI, Golden Anderson, Crispin or equal.

C. Installation

Valves shall be properly located, operable and at the correct elevation. All valves and reducers shall be rodded to a nearby tee or cross if possible. As shown in the Standard Details Section of the Standards. If reducers cannot be rodded, concrete blocking or other restraining methods will be required. Valves located within sections of restrained joint ductile iron pipe shall be restrained to the pipe. For valves on mains 12-inches and smaller, the use of a mechanical restraint system (i.e., mega-lugs) shall be utilized. For valves on mains 16-inch and larger, the use of factory restraint systems (i.e., Harness-Lok, etc.) shall be utilized. The valve box shall be centered over the wrench nut and seated on compacted backfill without touching the valve assembly. The maximum depth of the valve nut shall be 5 feet unless approved by the District Manager. When valve extension kits are used, they must be manufactured by the same company which manufactured the valve. All tapping sleeves shall be hydrostatically pressure tested. This test shall be witnessed and approved by a ESD project coordinator prior to beginning the tapping process.

All valve boxes in roadways shall be encased in a trowel-finished 12" diameter circle by 8" thick circular pad of 3000 psi concrete beneath the asphalt course with the cover flush with the top of the pavement.

Valve protector rings shall be installed around valve box in unpaved non-traffic areas. Concrete protector rings shall be 2500 psi precast reinforced concrete. Valve box shall be installed at grade with protector ring ½" above grade.

2.03 WATER SERVICE TAPS

A. Materials

Taps shall be located at 10 or 2 o'clock on the circumference of the pipe. Service taps shall be staggered alternating from one side of the water main to the other, and at least 12 inches apart. The taps must be a minimum of 24 inches apart if they are on the same side of the pipe. All taps shall include service saddles.

Service Saddles Shall be bronze body (85-5-5 waterworks brass) and double strap for taps with silicon bronze nuts conforming to ASTM A98 and factory-installed grade 60 rubber gaskets.

Water Service Tubing Shall be 1" PE pipe of copper tubing size (CTS) with a 250 psi pressure rating. A 12 GA tracer wire shall be installed with the service piping and extend into the meter box with a minimum of 6" of wire wrapped around the meter valve.

Corporation Stop: Shall be 1 inch ball valve constructed of bronze with AWWA inlet by CTS compression.

Meter Setter: Shall be 1" X ¾" and shall include vertical inlet, integral ball angle valve and a dual check valve. Meter setters shall be manufactured by Ford

Meter Boxes for ¾-inch and 1-inch Services shall be 12 X 17 NDS 113 with cast iron meter reader. Meter box grade adjuster rings are not acceptable.

Meter Boxes for 1 ½ and 2-inch Services shall be 18 -inch depth NDS 1730. Piping for 1 ½ and 2-inch water meters shall be constructed from brass and copper tubing and shall be equipped with angled check valve outlets and by-pass flanged valve or by-pass flanged ball valve inlets. Meter box shall not be allowed in travel lanes or traffic areas. Meter box grade adjuster rings are not acceptable.

Meter for ¾" services shall be supplied and installed by Eastover Sanitary District.

Meters for services 1 inch and greater shall be paid for by the Developer and installed by Eastover Sanitary District after approval by the District Manager. A strainer shall be provided upstream of the meter on lines greater than 2 inches.

Irrigation Connections shall be metered separately. Minimum meter size is 1 inch.

Meter Boxes shall be set in accordance with the District standard detail, located 18 inches inside the street right of way at the center of the lot for which service is installed, and located 18 inches away from the sanitary sewer cleanout, unless approved by the District. Water meter boxes shall not be installed within a ditch slope. Where the right-of-way limit for a street is within a ditch slope, the meter box shall be installed a minimum of 2.5 feet behind the top of the ditch bank. Water meter boxes shall not be located within driveways, sidewalks, or other paved areas subject to vehicular traffic unless approved otherwise. Easements dedicated for District maintenance shall be provided for all water meter boxes not located in existing rights-of-way.

Meter Vaults within paved area shall meet HS-20 loading requirements and shall be located outside travel areas. The access door shall be aluminum with a flush drop lift handle, stainless steel hinges and bolts, a stainless steel slam lock, an automatic hold open arm, and compression springs to allow for easy opening. Positive drainage shall be

provided for all meter vaults. Positive drainage shall be construed to mean a "daylight" drain not less than 4" schedule 40 PVC pipe with flap valve on the end.

B. Individual Water Services

The District requires individual water services to each building, tenant space or customer. If the building is single use, only one (1) service is required. For those building with multiple uses, each tenant/space shall be served with an individual service, unless approved by the District. An individual water service shall be provided for each residential lot. All connections shall be made by wet taps.

Service connections shall be made perpendicular from the main line and shall run straight horizontally toward the meter and then vertically to the meter which shall be located at the edge of the right of way or easement of the served property. Refer to the standard detail on water service installations for more information. No water meter box or vault shall be located in streets, sidewalks, or parking areas in residential areas. In non-residential areas, meter locations shall be approved on a case-by-case basis.

Service taps to existing water lines shall be made by Eastover Sanitary District, unless otherwise approved by the District Manager. Service taps to new water lines shall be made by the Contractor in accordance with these Standards. All existing services that are not to be used in the current development shall be killed out at the main by closing the corporation stop and cutting the pipe off at the corporation and capping.

Water meters shall be sized based on water demand. Water meter size shall be determined from the following table; or as otherwise specified by the District Manger. All non-residential projects shall submit sealed calculations prepared in conformance with the AWWA Manual of Practice for approval of type of meter and meter size by the District.

WATER METER SIZING			
Meter Size (inches)	Flow Range (GPM)	Load Range (number of fixture units)	
		Supply Systems Predominately for Flush Tanks	Supply Systems Predominately for Flush Valves

5/8" PD	0-20	1-22	1-8
1" PD	20-50	22-140	9-50
1 ½" PD	50-100	140-450	50-275
2" C	100-200	450-1000	275-1000
3" C	200-400	1000-2500	1000-2500
4" C	400-600	2500-5000	2500-5000

PD = Positive Displacement
T = Turbine (may be required on a case-by-case-basis)
C = Compound (must be sized on a case-by-case-basis)

2.04 CLEARANCE BETWEEN WATER MAINS, SANITARY AND STORM SEWERS

Water mains shall be laid at least 10 feet laterally (measured edge to edge) from existing or proposed sanitary or storm sewers unless NCDENR determines that local conditions or barriers prevent a 10-foot lateral separation—in which case:

(1) The water main is laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or

(2) The water main is laid in the same trench as the sewer with the water main located at one side on a bench of undisturbed earth, and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

Whenever it is necessary for a water main to cross over a sewer, the water main shall be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer, unless local conditions or barriers prevent an 18 inch vertical separation—in which case both the water main and sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10 feet on each side of the point of crossing.

Whenever it is necessary for a water main to cross under a sewer, both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10 feet on each side of the point of crossing. A section of water main pipe shall be centered at the point of crossing.

Water mains and storm sewer mains shall have a minimum vertical separation of 12 inches when horizontal separation is less than 5 feet.

Water lines that cross and run beneath storm drainage pipes that are greater than or equal to 42" diameter (single pipe) or 36" diameter (multiple pipes) shall be installed as

restrained joint pipe and enclosed in casing pipe. Installation may be by bore and jack or excavation at discretion of the District Manager.

Water lines that cross streams and/or creeks shall be installed without disturbance inside the top of bank of either side of the stream/creek. Installation may be by bore and jack or horizontal directional drilling (HDD). Other means of crossing must be approved by the District Manager

Where distribution systems are installed in areas of groundwater contaminated by organic compounds, pipe and joint materials which do not allow permeation of the organic compounds shall be used. Non-permeable materials shall be used for all portions of the system in contact with contamination, including: pipe, joint materials, hydrant leads, and service connections.

2.05 BACKFLOW PREVENTION AND CROSS CONNECTION

A. GENERAL

Cross-Connection shall mean any unprotected actual or potential connection or structural arrangement between a public or a consumer's water system and any other source or system through which it is possible to introduce any contamination or pollution, other than the intended potable water with which the system is supplied.

All residential water services for domestic purposed shall be provided with a dual check backflow prevention device on the meter setter within the meter box.

All irrigation services and non-residential services shall be provided with reduced pressure principle backflow prevention installed in accordance with the State of North Carolina and the Foundation for Cross Connection Control and Hydraulic Research.
Reduced pressure zone (RPZ) backflow preventers shall be installed immediately behind the meter (on the private side) with the preferred installation to be above ground. Alternate installations require approval of the District Manager. Above-ground installations that service any use other than single family residential users will require an insulated box mounted on a 4" concrete slab, wired for a heater and provided with a heater. A 4" concrete slab shall be provided for underground RPZ's and for insulated

boxes. It is a requirement that backflow prevention assemblies be tested immediately after installation and at least once a year thereafter by a person approved by the District. A copy of the test results must be sent to the Districts Cross Connection Control ORC immediately (within 10 days) after testing.

Cross-connection control protection devices are required based on degree of health hazard involved as listed in Appendix-B of the Rules Governing Public Water Systems in North Carolina. These guidelines are the minimum requirements. The devices shall meet American Society of Sanitary Engineering (ASSE) standards or be on the university of Southern California approval list. The devices shall be installed and tested (both initial and annual thereafter) in accordance with the manufacturer's recommendations or the local cross-connection control program, whichever is more stringent.

2.06 TESTING AND INSPECTION

Under no circumstance shall any waterline system valve be operated without prior approval by the Construction Inspector. Damage to District infrastructure resulting from illegal operation of valves shall be the responsibility of the Contractor. In addition, the Contractor shall be subject to a fine for operation a valve without prior approval.

All materials shall be inspected by the Construction Inspector before they shall be allowed to be installed. Materials rejected by the Construction Inspector shall be immediately removed from the job site.

The Contractor shall furnish all materials, labor, equipment, and shall pay for the water used to perform all testing and inspections to the satisfaction of the Construction Inspector. The Contractor shall obtain a Water Blowoff Permit from the District Manager for use when blowing of water mains.

Water service taps shall not be made until after all water main testing is completed, and bacteriological testing is satisfactory.

A. Hydrostatic Testing

No valve in the existing Eastover Sanitary District water system shall be operated without authorization from the Construction Inspector via a Water Blowoff Permit. Each section of line which is to be hydrostatically tested shall be slowly filled with water at a rate which will allow complete evacuation of air from the line. Once the line is full, it shall be blown off at a minimum of 2.5 FPS to flush and remove any debris. The line

must be pretested at 200 psi for 2 hours prior to contacting inspector for testing. Hand pumps shall not be used for the pressure testing of water mains. Taps used for testing purposes shall be removed after testing.

Each water line shall be tested to a pressure of 200 psi as measured at the lowest elevation of the line for duration of 2 hours. The pressure gauge used in the hydrostatic test shall be calibrated in increments of 10 psi or less. At the end of the test period, the leakage shall be measured with an accurate water meter. Note that all visible leaks are to be repaired regardless of the amount of leakage. The construction inspector may require pressure tests to be performed in small section to determine if there is a problem with a particular section of waterline. No chlorine dosage will be allowed in line during testing.

Allowable leakage shall be calculated by using AWWA Formula L=SDVP/148,000 where L=allowable leakage in gallons per hour; S= length of pipe tested, in feet; D= nominal diameter of pipe, in inches; and P= average test pressure during leakage test, in pounds per square inch.

B. Chlorination

All additions or replacements to the water system shall be chlorinated before being placed in service. Such chlorination must take place under the supervision of the Construction Inspector.

Chlorination of a completed line shall be carried out in the following manner:

1) The specific procedure and order of testing and blowoffs shall be approved by the Construction Inspector before beginning the chlorination process.

2) Taps shall be made at the control valve at the upstream end of the line and at all extremities of the line including valves.

3) A solution of water containing high test hypochlorite (65%) available chlorine shall be introduced into the line by regulated pumping at the control-valve tap. The solution shall be of such a concentration that the line shall have a uniform concentration of 100 ppm total chlorine immediately after chlorination. The following chart shows the required quantity of 65% HTH compound to be contained in solution in each 1000 foot section of line to produce the desired concentration of 100 ppm.

HYPOCHLORITE SOLUTION	
Pipe Size (inches)	High Test Hypochlorite (65%) (pounds per 1000 feet of line)
6"	1.88
8"	3.35
10"	5.70
12"	7.53
14"	10.26
16"	13.43
20"	20.92
24"	30.14

4) The HTH solution shall be circulated in the main by opening the control valve and systematically manipulating hydrants and taps at the line extremities. The HTH solution must be pumped in at a constant rate for each discharge rate in order that a uniform concentration will be produced in mains. *Note that for projects that are surrounded by populated development areas, the Construction Inspector can require that the circulation of HTH solution be accompanied with mechanical pumping.*

5) HTH solution shall remain in lines for no less than 24 hours or as directed by the District Manager.

6) Extreme care shall be exercised at all times to prevent the HTH solution from entering existing mains.

C. <u>Bacteriological Sampling</u>

All new water systems shall be valved off from the existing water system until a satisfactory bacteriological sample is obtained and the Construction Inspector has authorized the use of the new water system.

1. Free residual chlorine after 24 hours shall be at least 10 ppm or the Construction Inspector shall require that the lines be rechlorinated.

2. Flushing of lines may proceed after 24 hours, provided the free residual chlorine analysis is satisfactory. Flushing shall be continued until a chlorine test kit shows that the lines contain only the normal chlorine residual.

3. Samples for bacteriological analysis shall be collected 24 hours after flushing is completed. The Contractor shall furnish such help as may be required to secure the required samples. Samples shall be collected and delivered as specified by the Construction Inspector.

4. If bacteriological test results are unsatisfactory, the Contractor shall immediately obtain another Water Blow off Permit, rechlorinate and retest the lines, proceeding with such measures as are necessary to secure properly disinfected lines.

5. Bacteriological samples following water main disinfection shall be analyzed by a state approved laboratory per Rule .1001 of *the Rules Governing Public Water Systems.*

2.07 FIRE PROTECTION DURING CONSTRUCTION

The fire protection water supply system, including fire hydrants, shall be installed and tested prior to placing combustible materials on the project site.

2.08 IRRIGATION SYSTEMS

Lawn irrigation systems are required to have a split tap service or a designated lawn irrigation service tap. The connection of a lawn irrigation system to a domestic tap is prohibited. Irrigation systems shall have a backflow preventer installed in accordance with the Eastover Sanitary District Cross Connection Control Ordinance. All irrigation systems are required to secure a plumbing permit from the Cumberland County Inspection Department prior to installation and shall be inspected after installation. A separate meter is required for irrigation systems.