

SEWER SPECIFICATIONS

1. Standard specifications to be followed. (1)
Unless otherwise approved in writing by the county approving agency, all specifications, methods, and materials used in the construction of central or community (public) water and/or sewer systems in Franklin County, Virginia, shall follow the standard specifications described herein.

2. Codes and regulations; inspections. (2, 111)

The construction of any central or community (public) water and/or sanitary sewerage facilities and their appurtenances and accessories within Franklin County shall be in strict accordance with the latest Building Officials [and] Code Administrators (BOCA) codes; the Virginia Department of Health's Water Works Regulations, latest edition; Virginia Department of Health and State Water Control Board, Sewerage Regulations, latest edition; the Franklin County specifications and standards, as amended, and all other applicable federal, state, and local regulations. During the progress of construction, the county or its authorized authority or representative shall have access to the location of the construction for the purpose of inspection to determine conformance with these regulations.

3. References. (3)

The work shall comply with the most recent standards or tentative standards as published at the date of the contract and as listed in these specifications using the abbreviations shown:

American Society for Testing and Materials	ASTM
American Water Works Association	AWWA
American Association of State Highways and Transportation Officials	AASHTO
Virginia Department of Transportation	VDOT
National Sanitation Foundation	NSF
Occupational Safety and Health Administration	OSHA

4. Protection of existing underground utilities and facilities. (4)

All work shall be performed in compliance with the "Underground Utility Damage Prevention Act," title 56, chapter 10.3, sections 56-265.14 through 56-265.32 of the Code of Virginia, as amended.

5. Separation of water mains and sanitary sewers. (5)

(a) Generally, there shall be no physical connection between any potable water supply system and a sewer, or any appurtenance thereto, which would permit the passage of any sewage or polluted water into the potable water supply. No water supply or distribution pipe shall pass through or come into contact with any part of a sewer manhole. Likewise, no water supply line shall be installed closer than ten (10) feet horizontally (measured edge to closest edge) to a septic tank nor closer than thirty (13) feet to septic tank leach or tile lines.

(b) Parallel installation Water lines shall be laid at least ten (10) feet horizontally from any existing sewer line (whether gravity line or force main) or sewer manhole wherever possible. When local conditions prevent a horizontal separation of ten (10) feet, this distance may be reduced, provided that the invert of the water line is at least eighteen (18) inches above the top of the sewer line and installed on an undisturbed earth shelf. Where this vertical separation cannot be achieved, the sewer line shall be constructed of AWWA-approved water pipe, pressure tested in place without leakage prior to backfilling. The sewer manhole shall be of watertight construction and tested in place.

(c) Crossing. Water lines crossing under sewer lines shall comply with VDH Waterworks Regulations, latest edition. Under normal conditions water lines crossing over sewer lines shall be constructed to provide a separation of at least eighteen (18) inches between the invert of the water line and the top of the sewer line wherever possible. When local conditions prevent a vertical separation as described above, sewer lines shall be constructed of AWWA-approved water pipe, pressure tested in place without leakage.

6. Waste areas. (6)

Disposal of unsuitable and surplus material will be carried out by the contractor at the direction of the engineer. All work in disposing of such material shall be considered incidental to the originally contracted work.

7. Underground utilities.(8)

The owner/contractor shall contact the appropriate utility companies and have utilities located prior to starting construction. Location of existing facilities should be determined by the owner/contractor far enough in advance of the construction to provide for modification in design, if required.

8. Blasting. (10)

Blasting shall be done in strict accordance with the most recent edition of the Virginia Statewide Fire Prevention Code (VR 394-01-6). The owner/contractor shall adhere to all the requirements of both the state and county and shall notify the county prior to any blasting.

9. Trench protection. (11)

The owner/contractor shall furnish and erect such sheathing, bracing, and shoring, and shall furnish necessary signs, barricades, and temporary lighting as may be pertinent to the protection of this work, employees, the public, adjacent structures, and to guard against any contingencies which might give rise to delays in the work. Sheathing left in place shall be at the contractor's expense. Responsibility for preservation of trench banks and other excavated spaces and the prevention of injury to any persons or property shall rest entirely with the owner/contractor. Normally, a maximum of two hundred (200) feet of trench will be allowed open at any one time. No trench will remain open overnight unless authorized by Franklin County.

10. Cleanup. (12)

Before final acceptance, all borrow pits, waste areas, storage areas, and all grounds occupied by the contractor in connection with the work shall be cleaned of all rubbish, excess materials, and temporary structures, and all parts of the work shall be left in a neat and presentable condition.

11. Shop drawings. (18)

Five (5) copies of shop drawings for materials shall be submitted by the contractor to Franklin County for review prior to construction.

12. Safety. (19)

All pertinent safety regulations, including federal and state OSHA standards, shall be followed. In addition, all safety precautions noted on the manufacturer's product data sheets and labels shall be observed for both material and equipment. The owner/contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work.

13. Manhole and cleanout locations. (119)

A manhole shall be constructed at every change in alignment, grade, or pipe size. The maximum distance between manholes shall be four hundred (400) feet for sewers fifteen (15) inches or less and five hundred (500) feet for sewers eighteen (18) inches to thirty-six (36) inches. No house connection shall be made into any manhole. A cleanout shall be constructed at the end of every lateral, except when said lateral exceeds one hundred fifty (150) feet in length, in which case a manhole shall be constructed. All sewer lines eight (8) inches or larger shall terminate with a manhole.

14. Field tests. (121)

(a) Gravity sewers. The owner or contractor shall conduct infiltration, exfiltration, and/or air tests as directed by the county. Tests shall be performed on each completed segment of the sewer, not to exceed one thousand (1,000) feet in length. Tests shall be conducted only in the presence of the county's authorized representative. Leakage into the sewer shall not exceed one hundred (100) gallons per inch of nominal diameter per day per mile for any section including manholes and never exceed two thousand four hundred (2,400) GPD/mile. In the event that leakage exceeds the stated allowance in any section tested, the owner/contractor shall make such repairs to the line, manholes or appurtenances as may be necessary to comply with the leakage allowance and satisfy the county.

15. Service connections. (139)

(a) Pipe between the sewer and the property line shall conform to the applicable sections of these specifications and standards and in no case shall be less than four (4) inches inside diameter. All connections and wyes which are for future use shall be capped as directed by the county. No pipe shall be cut for service connections except as approved by the county. The ends of pipe which enter sewer lines shall be neatly cut to fit the inner face of the pipe. When directed, such cutting shall be done before the pipes are built in. No service connections shall be made into any manholes.

(b) Wyes for service connections shall be installed where indicated on the approved plans. Wye and service connections shall be installed in conformance with these construction standards. Each service lateral shall terminate at the property line with a standard cleanout. Where dissimilar materials exist between the service connection and the house sewer, a satisfactory adaptor shall be provided in order to ensure a tight joint. If no adaptor is available, a concrete encasement shall be provided to joint the dissimilar materials.

(c) Service connections shall be marked by a wooden marker at the end of the service. Marker to be 4 feet long, standing 3 feet above ground, and painted yellow. Marker dimension may be 2"x4" or 4"x4", or as approved by developer.

16. Testing. (140)

(a) Generally. All sewer lines shall be tested by any or all of the following methods for both displacement or structural faults and for water tightness by the owner/contractor. The testing methods shall be at the option of Franklin County. The owner/contractor shall make all preparations and shall supply the labor for all tests. The owner/contractor shall supply specialized equipment, such as T.V. cameras for the conduction of such tests. No charge shall be made for initial witnessing of tests, but each succeeding test required on the same section of line caused by failure of the tests shall be charged to the contractor.

(b) Displacement testing—Lights. A light will be flashed between manholes by means of a flashlight or by reflecting sunlight with a mirror. If the illuminated interior of the pipeline shows visible leaks, poor alignment, displaced pipe or any other defects, they will be remedied by the owner/contractor at his expense.

(c) Displacement and structural testing—T.V. A T.V. camera may be used to locate defects in the pipeline. These shall then be remedied by the owner/contractor at his expense. T.V. inspection will only be required upon failure of the sewers to pass other tests and failure of the owner/contractor to make necessary repairs such that the pipe fails subsequent retests.

(e) Vacuum test. Vacuum testing of manhole construction may be used on precast concrete manholes only. Manholes should be tested after assembly and prior to backfilling and all subvents, manhole boots and pipe plugs shall be secured to prevent movement during the test. Equipment utilized for vacuum testing shall be approved by the Virginia Department of Health. A measured vacuum of ten (10) inches of mercury shall be established in the manhole. The time for the vacuum to drop to nine inches of mercury shall be recorded. This time is the leakage rate and the maximum allowable rate shall be as follows:

(SEE TABLE 1)

(f) Water tightness testing—Infiltration. When, in the opinion of the county or the owner/contractor's engineer, the trench or

excavation is sufficiently (four (4) feet above crown) saturated as a result of ground water or rain, tests may be made on the basis of infiltration. The contractor shall carefully measure the flow of water at the nearest downgrade manhole. The necessary supply of water, plugs, labor and equipment shall be furnished by the owner/contractor at his expense. Three (3) series of measurements shall be made at not less than one-hour intervals and the results shall be reduced to an average. This average shall then be computed so as to apply for the 24-hour period. All such tests shall be made only under the supervision of the county or the owner/contractor's engineer. The infiltration test shall be allowed only when it can be proven that the hydrostatic head outside the pipe is a minimum of four (4) feet above the pipe for the entire test length. All defective work shall be immediately repaired and retested until proven to be satisfactory. Infiltration shall not exceed a rate of one hundred (100) gallons per inch of pipe diameter per mile per day for any section of the system.

(g) Water tightness testing—Exfiltration. When conditions are not suitable for making infiltration tests, an exfiltration test may be made. The line to be tested shall be filled so that a head of at least four (4) feet is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than four (4) hours. After absorption, the head shall be re-established. The amount of water required to maintain this water level during a two-hour test period shall be measured. Exfiltration shall be determined by measuring the amount of water added to keep the upper manhole filled to a depth of four (4) feet above the barrel of the pipe. Three (3) series of measurements shall be made at not less than one-hour intervals, and the results shall be reduced to an average exfiltration rate, and then applied to the 24-hour period. Manholes shall be tested in a similar manner. Leakage measured by this test shall not exceed one hundred (100) gallons per inch diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished.

(h) Water tightness testing—Air. The owner/contractor shall plug the pipe and shall conduct a low pressure air test to determine the acceptability of the completed work. The air testing equipment shall be Air-Lock, as manufactured by Cherne Industrial, Inc., or approved equal. All air used shall pass through a single control panel. Individual air hoses shall be used from the control panel to pneumatic plugs in the sealed line for introducing air, and from the sealed line to the control panel for continuously monitoring the air pressure rise in the sealed line. The following procedure shall be followed for the air test:

(1) Clean pipe to be tested by propelling snug-fitting inflated rubber ball through the pipe with water if necessary.

(2) Plug all pipe outlets with suitable test plugs. Brace each plug securely.

(3) If the pipe to be tested is submerged in groundwater insert a pipe probe by boring or jetting into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to groundwater submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

(4) Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to four (4.0) psig.

(5) After an internal pressure of four (4) psig is obtained, allow at least two (2) minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

(6) After stabilizing the internal pressure at four (4.0) psig, reduce the internal air pressure to three and one-half (3 1/2) psig, and start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach two and one-half (2 1/2) psig.

(7) The portion of sewer tested shall be deemed acceptable if the time required for the pressure to fall one pound is not less than that shown in the following table for the respective pipe sizes:

(SEE TABLE 2)

(8) If air testing is employed, the manholes shall be tested by exfiltration not to exceed one-half gallon per hour.

NOTE: The air test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. Inasmuch as a force of two hundred fifty (250) pounds is exerted on an eight-inch plug by an internal pipe pressure of five (5) psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous. As a safety precaution, pressurizing equipment should include a regulator set at perhaps ten (10) psi to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

(i) Manhole exfiltration testing. A separate exfiltration test shall be conducted on each manhole. Inlet and outlet lines shall be suitably plugged before starting the presock period. After a presock period of at least four (4) hours but not more than twelve (12), the manhole shall be filled to the top of the rim. The amount of water required to maintain this level during a two-hour test period shall be measured. A detectable leakage shall be cause for rejection and the leakage shall be corrected and retesting accomplished at the expense of the owner/contractor.

(j) Manhole vacuum testing. Manholes shall be tested after assembly and prior to backfilling. Stubouts, manhole boots and pipe plugs shall be secured to prevent movement while the vacuum is drawn. Installation and operation of vacuum equipment and indicating devices shall be in accordance with equipment specifications for which performance information has been provided by the manufacturer and approved by the health department. A measured vacuum of ten (10) inches of mercury shall be established in the manhole. The time for the vacuum to drop to nine (9) inches of mercury shall be recorded. Acceptance standards for leakage shall be established from the elapsed time for a negative pressure change from ten (10) inches to nine (9) inches of mercury. The maximum allowable leakage rate for a four-foot diameter manhole shall be in accordance with the following:

(SEE TABLE 3)

For manholes five (5) feet in diameter, add an additional fifteen (15) seconds and for manholes six (6) feet in diameter, add an additional thirty (30) seconds to the time requirements for four-foot diameter manholes. If the manhole fails the test, necessary repairs shall be made and the vacuum test and repairs shall be repeated until the manhole passes the test or the manhole shall be tested in accordance with the standard exfiltration test and rated accordingly. If a manhole joint sealer is completely pulled out during the vacuum test, the manhole shall be disassembled and the sealer replaced.

(k) Water tightness testing— Force mains. The owner/contractor shall make all preparations, furnish all equipment, and shall supply the labor for all tests. Pressure and leakage tests shall be in accordance with AWWA C.600, Section 4. The test pressure shall be one hundred fifty (150) psi or one and one-half (1 1/2) times the working pressure at the lowest point in the test section. The pressure and leakage tests shall be conducted concurrently for a duration of two (2) hours. The section of pipe under consideration shall be slowly filled with water and brought to the specified pressure by means of a pump. Before supplying the specified test pressure, all air shall be expelled from the pipe.

Testing shall not begin until at least seven (7) days after the last concrete anchor has been poured on the section of line being tested (if high early concrete is used, two (2) days). Leakage shall be defined as the quantity of water that must be supplied into the pipe section to maintain pressure within five (5) psi of the specified test pressure.

Franklin County or its designated representative shall observe all leakage tests. If the pipe fails to meet test requirements, all leaks shall be repaired and defective pipe repaired or replaced at the owner/contractor's expense. The test shall be repeated until satisfactory results are obtained. The owner/contractor shall be charged for all retests at the normal rates for inspection services.

(SEE TABLE 4)

17. Gravity sewer pipe. (151)

(a) Generally. Sanitary sewer and lateral pipe shall be one of the following materials, at the owner/contractor's option, except where otherwise indicated on the plans. Ductile iron pipe with locked gaskets or restrained joints such as "Lock Tylon" or "Mega-Lug" shall be used where sewer pipe is installed in casing.

(b) Ductile iron pipe. Ductile iron pipe shall be centrifugally cast in accordance with AWWA C.151. Pipe shall be Class 50 unless noted otherwise. Pipe shall be in nominal eighteen-foot or twenty-foot lengths and be cement lined in accordance with AWWA C.104.

(c) Polyvinyl chloride (PVC) pipe. PVC pipe shall be SDR 35 furnished in twenty-foot nominal lengths, conforming to ASTM Specification D.3034, or type PS-46 furnished in twenty-foot nominal lengths, conforming to ASTM Specification F.789, or corrugated sewer pipe conforming to ASTM Specification F.949.

18. Joints. (152)

(a) Ductile iron joints. Jointing materials for mechanical or slip-on joints in ductile iron pipe shall conform to the requirements of AWWA C.111. Joints for ductile iron pipe shall be one of the following:

(1) Rubber gasket (push-on) type joint. Rubber gasket type joints shall be manufactured in accordance with ANSI specification A21.11 and designed to lock against displacement without caulking. The gasket shall be a resilient rubber of heavy section, high durometer, and single molded and shall be installed in accordance with the pipe manufacturer's recommendations. The gasket lubricant shall be a nontoxic, tasteless, odorless grease that will not support bacteria. Each gasket lubricant container shall be labeled with the trade name and the pipe manufacturer's name.

(2) Mechanical joint. Standard mechanical joints shall be manufactured in accordance with ANSI Specification A21.11 (AWWA Specification C111). The mechanical joint bolts shall be a U.S.Standard size, high strength, corrosion-resistant steel alloy with hexagon nuts. Mechanical joints shall be used for the connection of all fittings, valves, and hydrants. Fittings shall be manufactured of cast iron and shall be in accordance with the requirements of ANSI Specification A21.10 (AWWA Specification C110). Fittings shall be compatible with the pipe and shall provide at least equal resistance to internal and external loads on the pipe. Fittings shall be bituminous coated on the outside and cement mortar lined on the inside according to ANSI Specification A21.4 (AWWA Specification C104).

(b) Polyvinyl chloride pipe joints. PVC piping joints shall be the gasket, push-on type, such as "Ring-Tite" or equal unless otherwise indicated. Joint assembly shall be made according to the manufacturer's directions and shall comply with the guidelines for installation of PVC pipe as developed by the Uni-Bell Plastic Pipe Association. PVC pipe joints with cast iron fittings shall be installed in accordance with manufacturer's directions and in compliance with these specifications. Integral bells shall be required.

(c) Pipe couplings. Watertight, semi-flexible couplings for connecting different types of sewer pipe, or plain ends, shall be FERNCO Series 1000 with #305 stainless steel clamps or approved equal.

19. Fittings. (153)

Tees or wyes installed shall be the same type as the main gravity sewer. Plugs or caps used shall be those manufactured specifically for the type of pipe used. They shall be secured such that they will be watertight and will withstand the internal pressure applied by air or exfiltration testing. Pressure pipe fittings shall be cast or ductile iron in compliance with AWWA C.110 or C.153 and AWWA C.104. The proper adaptor and/or transition gasket shall be supplied with PVC pressure pipe. Pipe ends shall be prepared for installation in accordance with the manufacturer's directions.

20. Marking tape. (158)

Marking tape shall be required on all pipe lines except sanitary sewer mains where manholes will be exposed at both ends of the pipe segment. Detectable mylar marking tape shall be similar to Lineguard, Inc. utility marking tape, Type II or equal. The tape shall bear the printed identification "Caution: Sewer Line Below". The printing shall be under mylar (reverse printed) so as to be readable through the clear mylar. Surface painting on the tape is not acceptable. The tape shall be "Safety Orange" in color and shall be one and one-half (1 1/2) inches or two (2) inches in width. Marking tape colored green to comply with the color coding of the Underground Utilities Damage Prevention Act shall also be permitted.

21. Concrete. (160)

(a) Generally. Concrete used for shaping of manhole channels, sidewalk, and miscellaneous work shall meet requirements of VDOT Type A3 or C1. All work shall comply with the "Building Code Requirements for Reinforced Concrete", ACI 318, latest edition. Concrete for miscellaneous purposes, such as fill concrete, thrust blocks, concrete encasement, etc., shall have a 28-day strength of twenty-five hundred (2500) psi. The mix proportions and test data for this concrete shall be submitted by the contractor for approval by the County. All concrete shall be made with type II Portland Cement manufactured in accordance with ASTM C-150.

(b) Steel reinforcement. All reinforcement bars shall be deformed new billet steel conforming to ASTM A615-40. Bars shall be formed to the dimensions indicated by the drawings.

(c) Wire reinforcement. Welded wire fabric shall conform to ASTM Designation A185.

(d) Curing compound. Curing compound shall conform to ASTM Designation C309, Type 2.

(e) Joint filler. Expansion joint material shall be pre-formed, conforming to AASHTO M213.

(f) Joint sealant. All concrete joints shall be prepared and sealed with "Colma Joint Sealer" as manufactured by Sika Chemical Corporation, W. R. Grace Joint Sealer, or equal.

(g) Waterstops. Flexible waterstops shall be manufactured from virgin polyvinylchloride pipe. Properties of polyvinylchloride used shall conform to Corps of Engineers Specification CRD-C572. All waterstops shall be capable of withstanding a head of water equal to the depth of installation or thirty (30) feet, whichever is greater.

(h) Slump. Slump shall be from two (2) to four (4) inches and will be determined in accordance with ASTM Method C143. Samples for slump determination will be taken from the concrete during placement in the forms.

(i) Testing. The 28-day concrete compressive strengths will be verified during the progress of the work by testing standard concrete cylinders. The owner or developer shall furnish the necessary labor, molds, and facilities for taking the samples and handling and storing the cylinder at the site of the work. The making, curing, and testing of specimens will be in accordance with ASTM Method C31 and C39. For the first twenty-four (24) hours after molding, the cylinders shall be kept moist in a storage box constructed and located so that its interior air temperature will be between sixty (60) and eighty (80) degrees Fahrenheit. At least three (3) cylinders will be required for each fifty (50) cubic yards of concrete placed or for each item of work. Should the cylinder specimens fail to meet the specified strength, sample areas may be cut from the suspect concrete at the county's direction. Concrete shall be deemed acceptable if these cores test at eighty-five (85) percent design strength. If not, a load test shall be performed as outlined by ACI 318. All core testing shall be performed at the owner or developer's expense. If still unsatisfactory, any necessary support and remedial work shall be furnished by the owner or developer's contractor.

(j) Forms. All concrete shall be formed unless directed otherwise. Forms shall be true to line and grade and shall be mortar tight. All exposed joints, edges, and external corners shall have 3/4-inch chamfer. Forms shall be of wood, plywood, or steel. Form design shall be subject to approval, but the adequacy of ties, supports, bracing and shoring to support the imposed live and dead loads, etc., shall remain the responsibility of the owner/contractor. Embedded wall ties shall be set one and one-half (1 1/2) inches from exposed concrete surfaces. The heights of form for each vertical lift shall not exceed ten (10) feet unless indicated on the drawings. Embedded items such as anchor bolts, frames, curb angle, conduit, pipe sleeves, and openings shall be carefully located and securely anchored in the forms. Forms for columns, walls, sides of beams, and other members not supporting the weight of the concrete may be removed thirty-six (36) hours after placing of concrete. Supporting forms for beams, girders, and slabs shall remain in place until the concrete has reached its 28-day strength.

(k) Construction joints. Construction joint surfaces shall be thoroughly cleaned before placement of concrete. All laitance, coatings, stains, debris, and other foreign material shall be removed from the surface before the new concrete is deposited. Waterstops and shear keys shall be provided at construction joints. Joints in metal waterstops shall be brazed, welded or soldered. Joints in rubber waterstops shall be vulcanized. Waterstops shall be installed so as to form a continuous watertight seal in each joint. Construction joints will not be permitted within two (2) feet of design water level on wetted surfaces. Shear keys shall be installed for ease of removal of the form. Blockouts for pipe sleeves, if approved by the county, shall be provided with keyway and waterstops and shall be detailed as a plug.

(l) Placement of reinforcement. Steel reinforcement bars shall be placed in accordance with the approved detail drawings and shall be supported by concrete blocks or galvanized metal bar chairs. Reinforcement shall be free from loose rust, mill scale, oil, grease, and other coatings that would destroy bond. Reinforcement shall be held in place to prevent dislocation during concrete placement.

(a) Protection and curing. Concrete shall be protected adequately from injurious action by the sun, rain, flowing water, frost and mechanical injury, and shall not be allowed to dry out for seven (7) days after placing. Vertical wall forms shall be kept continuously wet while the forms are in place.

TABLE 1
Minimum Elapsed Time for one Inch of Hg Pressure Change

Manhole Depth	4-foot Diameter	5-foot Diameter	6-foot Diameter
10 ft. or less	60 seconds	75 seconds	90 seconds
>10 ft. or <15 ft.	75 seconds	90 seconds	105 seconds
>15 ft. or <25 ft.	90 seconds	105 seconds	120 seconds

TABLE 2

Pipe Dia.(Inches)	4	6	8	10	12	15	18	21	24
Time (minutes)	2	3	4	5	5.5	7.5	8.5	10	11.5

TABLE 3

Manhole Depth	Minimum Elapsed Time for a Pressure Change of one inch Hg
10 ft. or less	60 seconds
>10 ft. but < 15 ft.	75 seconds
>15 ft. but < 25 ft.	90 seconds

Table 4
Allowable Leakage per 1,000 feet (305 Meters) of Pipeline *
(Gallons per Hour)

Ave. Test Pressure (psi)	2	3	4	6	8	10	12	14	16	18	20	24
300	0.26	0.39	0.62	0.78	1.04	1.30	1.66	1.82	2.08	2.34	2.60	3.12
275	0.25	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99
250	0.24	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.66
225	0.23	0.34	0.46	0.68	0.90	1.13	1.36	1.68	1.80	2.03	2.26	2.70
200	0.21	0.32	0.43	0.64	0.86	1.06	1.28	1.48	1.70	1.91	2.12	2.66
175	0.20	0.30	0.40	0.69	0.80	0.99	1.19	1.39	1.69	1.79	1.98	2.38
150	0.18	0.28	0.37	0.66	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21
125	0.17	0.25	0.34	0.60	0.67	0.84	1.01	1.18	1.34	1.61	1.68	2.01
100	0.15	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.36	1.50	1.80

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

DESIGN CDS
DRAFT CDS
CHECK RDS

SEWER SPECIFICATIONS FOR
LAKEWATCH PLANTATION
GRAVITY SEWER 4 REVISION, GRAVITY SEWER 5 & 6
LOCATED ON ROUTE 122
GILLS CREEK MAGISTERIAL DISTRICT
FRANKLIN COUNTY, VIRGINIA

DATE 11/20/08
SCALE AS SHOWN
SHEET 7 OF 8
PROJECT NUMBER 08113

Stone Engineering
P.O. BOX 1058
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COMMONWEALTH OF VIRGINIA
RODNEY DEAN STONE
Lic. No. 032060
11-20-08
PROFESSIONAL ENGINEER

REVISIONS
DATE DESCRIPTION