

GENERAL WATER AND SEWER CONDITIONS

All work shall be subject to inspection by Botetourt County Inspectors. The Contractor shall notify the proper County officials prior to the start of the work.

All materials and construction shall comply with the most current version of the Water and Sewer Regulations of Botetourt County as adopted by the Botetourt County Board of Supervisors.

All existing utilities adjacent to the proposed work are not necessarily shown on the plans and where shown, are only approximately located. The contractor shall on his own initiative locate all underground lines and structures as necessary.

All materials and construction shall comply with the most current version of the Water and Sewer Regulations of Botetourt County as adopted by the Botetourt County Board of Supervisors.

All water and sewer pipes shall have a minimum of three (3.0) feet of cover measured from the top of the pipe, over the centerline of pipe. This includes all fire hydrant lines, service laterals, and water lines, etc.

Permanent twenty-five (25) foot wide easements for sewer and/or water lines, centered on the pipeline and appurtenances shall be dedicated to the County, except where the line is in a public road right-of-way or an access easement, in which case the access easement shall also be dedicated as an utility easement. Temporary easements should be sufficient width to allow contractor enough room to construct the utility while working safely and in compliance with OSHA Regulations.

All water and sewer appurtenances are to be located outside of roadside ditches.

Provide testing specifications on the plans for water and sewer in accordance with Botetourt County Water and Sewer Construction Standards and Specifications.

The contractor shall obtain a copy of the most current edition of Botetourt County Water and Sewer Construction Standards and Specifications and provide proof (a letter) that the contractor has and is familiar with the requirements therein.

A professional engineer registered in the State of Virginia shall document all testing.

All water shop drawings / cut sheets shall be submitted by the contractor to both the design engineer and Botetourt County for approval prior to installation / construction. Botetourt County will require (3) complete sets of shop drawings for review.

The contractor shall schedule a pre-construction meeting to be attended by the contractor's site superintendent, design engineer, the design engineer's field representative / inspector, Botetourt County Utility Department, Botetourt County Engineering Department and any materials suppliers the contractor feels necessary. The pre-construction meeting shall not be scheduled until all shop drawings have been approved by Botetourt County.

The contractor shall obtain a copy of the most current edition of Botetourt County Water and Sewer Construction Standards and Specifications and provide proof (a letter) that the contractor has and is familiar with the requirements therein.

As built plan submittals - Bounty County will require the following as built / record drawing information to be submitted by the owner or developer:

- One (1) complete reproducible set of water as-built / record drawings sealed by a Professional Engineer registered in the Commonwealth of Virginia.
- One (1) complete digital (AutoCad 2000 version) set of water as-built / record drawings.

All as built / record drawings shall show actual field surveyed locations (horizontal and vertical) of structures (manholes, clean-outs, service stub-outs, fire hydrants, valve boxes, water meter boxes, air release valves, etc.) and show recomputed pipe lengths and slopes based upon actual field locations.

Prior to conveyance of the water and sewer system (main lines and associated structures) the following information will be submitted:

- One (1) letter of documentation sealed by a Professional Engineer registered in the Commonwealth of Virginia, stating that the system has been built in accordance with the approved plans and specifications.
- Deed of conveyance from the owner to Botetourt County.
- Plot showing all water and sewer easements.
- Warranty to Botetourt County for one (1) year following date of acceptance by the Botetourt County Board of Supervisors.
- Two (2) complete copies of documentation sealed by a Professional Engineer registered in the Commonwealth of Virginia, of all required sewer testing to include at least the follow items:
 - Main line sewer line air pressure testing up to and against the first clean-out on service lines.
 - Main line sewer deflection mandrel testing.
 - Sewer manhole vacuum testing up to and including the manhole frame.
 - Main line water line pressure testing.
 - Main line water line acceptable bacteriological testing results.

The process of conveyance is as follows:

- Submit all information as outlined above and provide written request that Botetourt County accept ownership and operation of the system.
- Schedule a pre-final inspection of the system.
- Address any inspection / punch list items.
- Schedule a final inspection of the system.
- Botetourt County Department of Public Works makes formal recommendation to Botetourt County Board of Supervisors that the system is complete and ready for ownership and operation by Botetourt County.
- Botetourt County Board of Supervisors takes official action to either accept or reject ownership and operation of the system.

The contractor shall be responsible for notifying "Miss Utility" and comply with Virginia's underground utility damage prevention act, (1-800-552-7001).

Waterline Testing

All new water mains shall be tested, after backfilling to a hydrostatic pressure of not less than 100 psi above design water pressure for the system or 150 psi, whichever is greater. Allowable leakage shall be calculated by the following formula:

$$L = \frac{SDP^{1/2}}{133,200}$$

Where: L = allowable leakage in gallons per hour
S = length of pipe tested in feet.
D = nominal diameter of pipe in inches.
P = average test pressure during leakage test in psi.

No water line shall be placed in service until the leakage is less than the allowable leakage as indicated above. Testing of water mains shall only be done after installation of all valves, taps and service laterals are complete. All portions of the water system, including hydrants and service lines, shall be subject to the hydrostatic pressure during the leakage test. Testing of water mains shall be observed and documented by a County Utility or Engineering Inspector.

All high points and service lines in the portion of the system under test shall be vented and all air shall be expelled from the system prior to beginning the test.

All fittings and hydrants shall be properly braced or blocked before applying pressure. Where concrete thrust blocks are used, they shall have attained their set prior to testing.

After the portion of the system under the test has reached the required pressure as stated herein, said pressure shall be maintained for two (2) hours. At the conclusion of the pressure test, the volume of makeup water required to refill the pipeline shall be determined by measurement with a displacement meter or by pumping from a vessel of known volume.

All joints or fittings at which leakage occurs shall be re-worked to insure tightness. All visible leaks shall be repaired regardless of amount of leakage. If the measured amount of leakage exceeds the values for the appropriate size as found in AWWA Specifications C600, Hydrostatic Testing (Table 6), the pipe-line shall be repaired prior to re-testing will be done the Utility or Engineering Departments approval and inspection. Repairs of new construction will be by adjustment or replacement of replacement of material only. The use of repairs clamps or bell clamps will not be acceptable.

SANITARY SEWER TESTING

Manhole Acceptance Tests (Vacuum Testing)

Manholes, including frame, shall be tested by vacuum testing from the top of the frame. Inflatable stoppers shall be used to plug all lines into and out of the manhole being tested including any vent line. The stoppers shall be positioned in the lines far enough from the manhole to insure testing to those portions of the lines not air tested. Vacuum tests shall be made with a vacuum of 10" Hg. The time for the vacuum to drop from 10" to 9" of Hg must be greater than 60 seconds.

Contractor shall furnish weirs, stand pipes, pipe plugs, water, pressure gauges, stop watches, air compressor, vacuum pump, hose and such materials and assistance as required to perform these tests. All acceptance tests shall be conducted by Contractor in the presence of a County Inspector.

Acceptance tests shall not be made until sanitary sewer, manholes and proposed sewer service connections, as shown on the approved sewer plans, have been installed, the sewer trenches (including manholes and cleanout stacks) backfilled and compacted to finish sub-grade.

Contractor shall schedule all acceptance tests with the project inspector at least forty-eight (48) hours in advance. Each section of completed sewer shall be tested from manhole to manhole. No sewers or sewer service connections are to be excluded from this testing procedure.

Sewer Pipe Testing Procedure

Whenever it is necessary to construct underdrains or place gravel under pipe lines in order to dewater trench during construction of sewers, acceptance test will not be made until any pumps, which have been used in dewatering process, have been disconnected of drains have been taken out of service.

Contractor shall schedule all acceptance tests with the Engineering/Utility Department at least forty-eight (48) hours in advance. Each section of completed sewer shall be tested. Generally, sewers will be tested from manhole to manhole. No sewer or sewer service connection is to be excluded from this testing procedure.

Low Pressure Air Testing Procedure - The test procedure shall be conducted in the following manner: (Vacuum test of manholes is generally inverse of low pressure air test of sewer lines)

- Contractor shall thoroughly clean and remove all debris, silt, earth or other materials from the sewer prior to acceptance testing.
- Proper test plugs shall be supplied and installed by Contractor. Test gauges used in air test procedure shall have a range of 0-10 psi and shall be calibrated in divisions of 0.10 psi with an accuracy of +/- one percent. Test gauges shall be calibrated at least once a year and the date and results displayed on the equipment including date of calibration. Calibrations shall be certified by an independent testing lab. Test gauges shall be located outside of manhole during testing.
- If pipe to be tested is expected to be below ground water table, Contractor shall either:
 - Install a small diameter perforated vertical pipe from invert elevation of the sewer to the surface prior to backfilling; or
 - Insert a pipe probe by boring or driving into the backfilling material adjacent to the invert elevation of the pipe, and determine the depth of the ground water level above the pipe invert immediately prior to acceptance testing the sewer.
 - All gauge pressures for test shall be increased by the amount of this back pressure due to ground water over the invert of the pipe.
 - In lieu of the above water depth determination, Contractor may add three (3) psi to the gauge pressure in the test.
- Contractor shall add air slowly to the portion of the pipe under test until the internal air pressure is raised to 4.0 psi gauge plus the ground water pressure.
- As a safety precaution, no one shall be allowed in manhole after air pressure is increased in the sewer line. If the inspector suspects that the test plug may be leaking, pressure shall first be relieved before any adjustments are made to eliminate air leakage at the plug.
- Contractor shall allow air temperature to stabilize for at least two (2) minutes with the pipe subjected to an internal pressure of 4.0 psi by adding only the amount of air required to maintain the pressure.
- After temperature stabilization, the test will begin. If the internal air pressure decreases, the time required for the pressure to drop from 3.5 to 2.5 psi gauge will be observed and recorded. The time interval shall be compared with the standards in accordance with the DD-30 or DD-31 for time and length of test section for various diameters of the sewer. All pipes 15 inches or less shall be tested for a pressure drop of 1.0 psi gauge.
- Pipe which fails to maintain the stipulated pressure for a period equal to or greater than the holding time shown in Table I shall be deemed to have failed the low pressure air test and is unsatisfactory for acceptance by the County. Any sewer the fails to pass this test shall be replaced by the Contractor at his expense.

Sewer Force Main Testing Procedure - Sewer force mains shall be hydrostatically tested at 150% of the design operating pressure of (60 psi) for 30 minutes. Allowable leakage shall be the same as established for water pipe lines in the Botetourt County Water and Sewer Standard and Specifications.

Mandrel Testing

The Contractor shall deflection test the entire length of pipe by means of a go-no-go mandrel to assure that a 5.0% deflection has not been exceeded. The testing shall be performed completely at the expense of the Contractor and shall be performed in the presence of Engineer. Mandrel and proving ring details shall be approved by the Engineer and shall be sized at 5% less than ASTM dimensions for the sewer pipe (in accordance with ASTM D-3034 and F-679). The mandrel test shall be performed no sooner than three (3) months after backfill of the pipe is completed. All pipe that fails the deflection test shall be removed and replaced at the Contractor's expense. The "rerounder" technique shall not be allowed. The Contractor shall use approved nine (9) arm mandrels and proving rings for each size of mainline pipe. The contract length "L" of the mandrel arms and the actual mandrel diameter "D" (ID of the ring) shall equal the dimensions in Table I below. Critical mandrel dimensions shall carry a tolerance of +/- .01.

TABLE 9 Arm Mandrel D Dimension			
Nom. Dia.	(MIN) L	ASTM D3034 SDR 35	ASTM D2751 (6" only)* ASTM D2680
6"	6"	5.65"	5.65" (SDR 35) 5.49" (SDR 23.5)
8"	8"	7.56"	7.40"
10"	10"	9.45"	9.31"
12"	12"	11.26"	11.22"
15"	15"	13.78"	14.09"
18"	18"	16.69"	
21"	18"	19.67"	
24"	18"	22.13"	
27"	18"	24.95"	

Mandrel and proving ring may be obtained from Worico, Inc., 220 High Street, Franklin, Ohio 45005 (1-513-746-6439), or Hurco Enterprises (1-800-843-1300), or Cherne Industries (1-800-843-7584).

All tests are to be performed in the presence of the design engineer and properly documented by the design engineer for submittal with record drawings to Botetourt County prior to conveyance to Botetourt County. Tests submittals documented by anyone other than the design engineer (ie. the contractor) will not be acceptable as proof of compliance.

Developer to provide video camera inspection documentation prior to conclusion 1-year warranty period. Video camera inspection work to be performed no sooner the 6 months after the date of system acceptance by Botetourt County and no later than 8 months after the date of system acceptance by Botetourt County. One (1) copy of the videotape to be provided to Botetourt County. Video camera inspection work to be coordinated with Botetourt County such that County personnel can be present during video inspection operations.

The contractor shall schedule a pre-construction meeting to be attended by no less than the following: Botetourt County representatives, contractor representative including the proposed sewer contractor site superintendent, design engineer, any material suppliers or subcontractors that the sewer contractor feels necessary to attend.

All sewer and water pipes (mains and service lines) shall have both magnetically locatable detection wire and or tape AND warning tape. Magnetically locatable detection wire and or tape shall be installed at same elevation of spring line of pipe. Warning tape (Caution!! Buried Sewer / Water Pipe Below) to be installed no more than 18 inches above top of the pipe.

All water and sewer shop drawings / cut sheets shall be submitted by the contractor to both the design engineer and Botetourt County for approval prior to installation. Botetourt County will require three (3) complete sets of shop drawings for review.

DATE: 11/17/05

REVISIONS
△
△
△
△

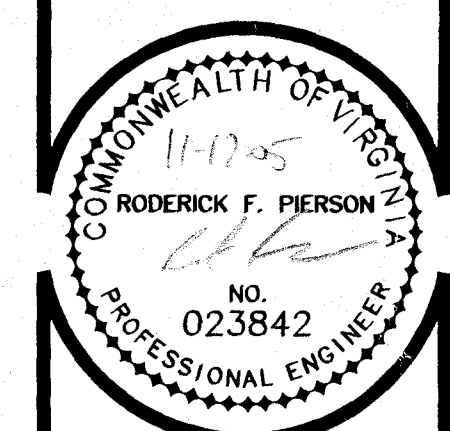
PIERSON
ENGINEERING
&
SURVEYING

P.O. BOX 311
1324 ROANOKE ROAD
DALEVILLE, VA 24083

(540) 966-3027 TEL
(540) 966-5906 FAX
e-mail: rpierson@rbnet.com

DEVELOPMENT PLANS FOR
LOT 13, SECTION II, ASHLEY PLANTATION
SHOWING A SANTIARY SEWER RELOCATION
BOTETOURT COUNTY, VIRGINIA

WATER &
SEWER NOTES



COMMISSION
R200548

SHEET
20

WHERE ARE
SEWERS 4-19?