

SANITARY SEWER FORCE MAIN TESTING AND ACCEPTANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pressure Test

1.2 RELATED SECTIONS

- A. Section 02733 – Sanitary Sewer Force Mains
- B. Section 02676 – New Construction Water Usage

1.3 REGULATORY REQUIREMENTS

- A. Conform to SCDHEC Standards for Wastewater Facility Construction: R.61-67.

PART 2 EXECUTION

2.1 GENERAL

- A. Field test the entire length of all new below grade sanitary sewer force main and appurtenant structures and devices for tightness as described in this Section. Devices include, but are not limited to, ARV shutoff valves and sewer plug valves.
- B. Schedule timing and sequence of testing, subject to the approval of BCWS. Provide BCWS with a minimum of 72 hours' notice prior to the start of any test. The Engineer and BCWS representative must observe all tests. The Contractor shall successfully pre-test the system prior to scheduling testing with BCWS.
- C. Repair any leaks discovered during the initial filling of the water mains and during the testing sequence. Repair all known and visible leaks, whether or not the leakage rate is within allowable limits.
- D. Note presence of leaks and repair activities on the test report form for any affected section of water main and provide a copy to the Engineer and BCWS.
- E. Compaction testing will be performed in accordance with ASTM D1557.

2.2 PRESSURE TEST

- A. Pressure test all sections of the force main and appurtenances subject to internal pressure in accordance with AWWA C600 (DIP) or AWWA C-605 (PVC). Pump station above grade flanged header piping and below grade flanged piping shall be tested/recorded separately as determined by the Engineer of Record (EOR) and witnessed by both EOR and BCWS representative. Ensure all plug valves, check valves and flow meters where applicable are tested at safe operating pressures during pipe testing.
- B. Provide temporary blocking, bulkheads, flanges and plugs as necessary to assure all new pipes, valves and appurtenances will be pressure tested.
- C. Before applying test pressure, completely expel air from the force mains and all appurtenances. Utilize air release valves, as shown on the Drawings, to expel air as line is filled with water.
- D. Notify the BCWS in accordance with paragraph 2.2 of BCWS Standards 02670 Water Main Testing. Fill pipeline slowly with water from the BCWS system. Should water not be from BCWS service area, contractor responsible coordinating with utility owner for access to use other water sources. Utilize an accurate water meter and pump arrangement to pump the line to the specified test pressure.
- E. Measure test pressure at the lowest point in the test segment. Maintain test pressure for a minimum of two hours. Provide a test pressure of 150 psi or 1.5 times the working pressure in the finished force main, whichever is greater.
- F. Do not allow a variance in the test pressure of more than 5 psi for the test duration. If the pressure drops more than 5 psi at any time during the test period, line fails and test must restart. If pressure drops below 150psi at any time during testing, line fails and test must restart. Provide an accurate pressure gauge, four inches in diameter, with a range of pressure large enough to allow the specific test pressure to fall in the middle of the range (i.e. for 150 psi test pressure need 300 psi range on gage). Face gradations shall be at 20 psi intervals with tick marks every one psi, or equal approved by BCWS. Failure to provide 1 psi increment gauge at time of testing will constitute failure of test until gauges are acquired, installed and ready for testing. If rescheduling of testing is needed, it will be dependent upon BCWS staff availability.
- G. Definition of Leakage: The quantity of water that is pumped and metered into the test section to maintain test pressure within 5 psi of the specified

test pressure for the test duration, plus the quantity of water required to return line to test pressure at the end of the test.

- H. Test Results: Reject test section if the leakage exceeds the limits determined by the AWWA allowable leakage rate as stated in Section C605 and C600 as follows:

Ductile Iron

$$L = \frac{SD(P)^{0.5}}{148,000}$$

PVC

$$L = \frac{ND(P)^{0.5}}{8,223}$$

For the ductile iron pipe equation, “L” is the allowable leakage in gallons per hour, “S” is the length of water main tested in feet, “D” is the nominal diameter of the water main in inches, and “P” is the test pressure in pounds per square inch (psi).

For the PVC pipe equation, “L” is the allowable leakage in gallons per hour, “N” is the number of joints in the length of water main tested, “D” is the nominal diameter of the water main in inches, and “P” is the test pressure in pounds per square inch (psi).

- I. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to the Owner.
- J. Locate and repair defective joints and/or pipes, and retest until the allowable test rates are within specified allowances.

2.3 FINAL ACCEPTANCE

- A. No pipeline installation will be accepted until all known and visible leaks have been repaired in accordance with paragraph 3.1 of this Section.
- B. BCWS will conduct a final walkthrough inspection after all testing is complete normally in conjunction with walkthrough inspection of water infrastructure and only when site is ready. Should items not be ready for final inspection, BCWS does reserve the right to reschedule until all fully addressed. This is a final acceptance inspection, not a punch list generator. Minimum requirements for walkthrough inspection are below.
 - 1. All roadside curbing in and cleaned with applicable markings applied so that field curb markings are visible
 - 2. All weather reasonable access roads must be rocked and roadside curbing complete (If applicable) prior to any testing, and ready for pavement before final walkthrough
 - 3. Final grading complete within utility locations

4. All BCWS Utility Easement frontage staked where applicable
 5. All drainage easement frontage staked if ARVs or PVs nearby
 6. Record drawings brought to inspection by Engineer/Engineering Rep
 7. All sewer valves accessible, tracer wire in appropriate place, with full telescopic boxes installed, and all concrete collars set to grade
 8. All ARVs installed properly and all ARV manholes properly epoxy coated
 9. All fiberglass and concrete valve locating markers installed properly
- C. Certify that all testing has been successfully completed and items noted on walkthrough inspections are fully corrected. Line will only be fully accepted after items above are complete and all closeout documentation submitted per Appendix F27.
- D. If newly installed line has successfully passed testing after construction but fails to receive a permit to operate issued by SCDHEC within 1 year, BCWS will require the line be tested again prior to final acceptance

END OF SECTION