SECTION 02651

SEWER PIPELINE TESTING

PART 1 GENERAL

1.01 DESCRIPTION

A. The Work of this section includes, but is not limited to:

1. Testing Gravity Sewer Pipelines

a. Low-pressure air test

b. Mandrel test

c. CCTV Inspection

2. Testing Pressure Pipelines

a. Hydrostatic leakage test

B. Related Work Specified Elsewhere

1. Sanitary Sewer Pipe: Section 02610

1.02 QUALITY ASSURANCE

A. Test Acceptance

1. No test will be accepted until the results are below the specified maximum limits.

2. The Contractor shall, at his own expense, determine and correct the causes of test failure and retest until successful test results are achieved.

1.03 SUBMITTALS

A. Testing procedures

B. List of test equipment

C. Testing sequence schedule

D. Provisions for disposal of flushing and test water

E. Certificate of test gauge calibration

1.04 JOB CONDITIONS

A. Do not allow personnel in manholes during pressure testing.

B. Provide relief valves set at 10 psig to avoid accidentally over-pressurizing gravity sewer line during low pressure air testing.

PART 2 PRODUCTS

2.01 AIR TEST EQUIPMENT

Air compressor
Air supply line
Shut-off valve
Pressure regulator
Pressure relief valve
Stop watch
Plugs, braces
Pressure gauge, calibrated to 0.1 lbs/sq.in.

2.02 DEFLECTION TEST EQUIPMENT

Go, No-Go mandrels
Pull/retrieval ropes

2.03 HYDROSTATIC TEST EQUIPMENT

Hydro pump
Pressure hose
Water meter
Test connections
Pressure Gauge, calibrated to 0.1 lbs/sq.in.
Pressure relief valve

2.04 CCTV INSPECTION EQUIPMENT

Television inspection equipment with accurate footage counter
Color Camera shall be remotely operated with a 360° pan and tilt features.
Color televising monitors
Camera equipment capable of televising laterals

PART 3 EXECUTION

3.01 PREPARATION

A. Backfill trenches in accordance with Section 02221

B. Provide pressure pipeline with concrete reaction support blocking.

C. Cleaning

1. The cleaning shall be accomplished with high velocity jet hydro cleaning equipment. No mechanical bucket machinery will be acceptable for the cleaning process.

2. High velocity jet hydro cleaning equipment shall be capable of producing flows from a fine spray to a solid stream and shall have a selection of two or more high pressure nozzles (Approximately 2,000 psi). The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high velocity gun for washing and scouring manhole walls and floor. The equipment shall carry its own water tank, auxiliary engines, pumps and hydraulically driven hose reel.

3. Satisfactory precautions shall be taken to protect the sewer lines at all times. Precautions shall be taken so that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. All workmen shall be experienced and skilled in the use of the equipment used.

4. Sewer manhole reaches shall be cleaned using high velocity jet hydro cleaning equipment. The equipment and methods selected shall be in accordance with the National Association of Sewer Service Companies (NASSCO) Recommendations. The equipment shall be capable of removing dirt, grease, roots, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire reach cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole reach, the equipment should be checked for performance. If the equipment is found to perform to standards, it will be assumed that a major blockage exists and the cleaning effort shall be abandoned.

D. Plug outlets, wye-branches and laterals. Brace plugs to offset thrust.

3.02 TESTING GRAVITY SEWER PIPELINES

A. Low Pressure Air test

1. Test each newly installed section of gravity sewer line between manholes.

2. Slowly introduce air pressure to approximately 5.0 psig above groundwater pressure.

3. Allow pressure to stabilize for at least five (5) minutes. Adjust pressure back to 5.0 psig above groundwater pressure.

4. Test

a. The test shall pass if the air pressure remains at 5.0 psig for a period of five (5) minutes.

b. If the line fails, determine the source of the air leakage, make corrections and retest. The Contractor has the option to test the section in incremental stages until the leaks are isolated. After the leaks are repaired, retest the entire section between manholes.

B. Testing Pipe Over 36" Diameter

1. Pipe over 36" diameter shall be subjected to a visual interior inspection.

C. Mandrel Testing Procedures

1. Mandrel test shall be performed a minimum of thirty (30) days after sanitary sewer pipe is installed. Mandrel testing is not required for ductile iron pipe.

2. Use Go-No-Go device in accordance with pipe manufacturer's requirements. Method to be approved by Owner prior to testing.

3. Repair and retest sections of sewer not meeting test requirements.

D. CCTV inspection

1. CCTV inspection shall be performed prior to dedication of sewer mains and laterals to the Authority, in accordance with the Pipeline Assessment Certification Program (PACP)

2. The travel speed of the camera shall be variable but uniform and shall not exceed 30 feet per minute. Smooth not jerky movement of the camera is required.

3. Procedure for Sewer Main Televising

1. Prior to performing CCTV inspection, the contractor shall follow the cleaning procedures listed in section 3.01(C) 4.

2. Just prior to performing the video inspection procedure, water must be introduced into the nearest upstream manhole until it is observed at the nearest downstream manhole. This will insure that any pipe segments with bellies are easily identified during the CCTV process.

3. Prior to the beginning of each CCTV inspection, manhole identification numbers, as indicated on the record drawing, will be displayed in the title and become a part of the video record.

4. The interior of the pipe shall be carefully inspected in accordance with the PACP. The operator of the CCTV camera must be certified to perform PACP inspections. Proof of certification will be required. All deficiencies found during the CCTV inspection shall be documented and become a permanent part of the inspection.

5. As directed by the Authority's inspector, the developer's engineer, or their representative the camera may be stopped to view and analyze conditions that appear unusual or uncommon.

4. Procedure for lateral inspections

1. The lateral may be televised using a lateral camera utilizing the cleanout located on the property owner's side to the sewer main, or by utilizing a lateral launching main line camera.

2. Prior to the beginning of each CCTV inspection, the service address, as indicated on the record drawing will be displayed in the title and become part of the video record.

5. Deliverables

1. The contractor shall record the inspection in a PACP format and the video shall be recorded in extra-high quality CD/DVD format. The contractor shall provide all televising logs generated during the inspection process.

3.03 TESTING PRESSURE SEWER PIPELINES

A. Hydrostatic Leakage Test

1. Test each newly laid pressure pipeline, including any valved section thereof, hydrostatically at 1.5 times the working pressure of the pipeline based on the elevation of the lowest point in the pipeline corrected to the elevation of the test gauge. Obtain test pressure from the Owner.

2. Slowly fill the section to be tested with water, expelling air from the pipeline at the high points. Install corporation stops at high points if necessary. After all air is expelled, close air vents and corporation stops and raise the pressure to the specified test pressure.

3. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

4. After visible deficiencies are corrected, continue testing at the same test pressure for an additional two hours to determine the leakage rate. Maintain pressure within plus or minus 5.0 psi of test pressure. Leakage is defined as the quantity of water supplied to the pipeline necessary to maintain test pressure during the period of the test.

5. Compute the maximum allowable leakage by the following formula:

$$\frac{L = (ND)\,P^{1/2}}{7{,}400}$$

Where: L = the allowable leakage in gallons/hour
N = the number of joints in the section tested
D = the nominal diameter of the pipe in inches
P = the average test pressure in psig

If the line under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size.

6. If the test of the pipe indicates leakage greater than that allowed, locate the source of the leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of the amount of leakage.

*** END OF SECTION ***