

SECTION 15043
SEWER LEAKAGE AND INFILTRATION TESTING

PART 1 GENERAL

1.01 DESCRIPTION

This section describes the requirements and procedures for leakage and infiltration testing of gravity sewer systems.

1.02 REFERENCED STANDARDS

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

UNI-B-6	-	Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
SSPWC	-	Standard Specifications for Public Works Construction ("Greenbook")

1.03 RELATED WORK SPECIFIED ELSEWHERE

Standard Drawings
Standard Specifications 01000, 02222, 02223, 15045, 15065.

1.04 REQUIREMENTS PRIOR TO TESTING

Trenching for all dry utilities such as electrical, telephone and cable television shall be completed prior to performing any tests on the sewer pipe.

1.05 TESTING

The following tests shall not be conducted until after all other utilities have been installed and trench compaction has been completed. All tests shall be conducted in the presence of the District Engineer.

- A. Leakage Test: Each section of sewer pipe between two successive manholes, or between a manhole and its corresponding cleanout or end plug, shall be tested for leakage. The sewer laterals to the property line shall be included in the test.
- B. Infiltration Test: In addition to the leakage test, an infiltration test shall be made where groundwater is encountered, or evidence exists that ground water has encroached to the elevation of the sewer, and as directed by the District Engineer.
- C. Closed-Circuit Television: A closed-circuit television (CCTV) inspection shall be performed by Contractor on the sewer installation in accordance with

Section 15045.

- D. Manhole Test: Manholes shall be vacuum-tested in accordance with Section 03461.
- E. Testing may be repeated, as directed by the District Engineer, if the subsequent construction operations of the Contractor or others may have damaged or affected the structural integrity of the sewer pipe and/or laterals.
- F. All tests must be completed before the street or trench is paved, unless otherwise allowed by the District Engineer.

PART 2 MATERIALS

The Contractor shall furnish all equipment and materials required for testing.

PART 3 EXECUTION

3.01 AIR TEST FOR PVC GRAVITY SEWERS

The testing described in UNI-B-6 shall be followed except as modified below:

- A. Each section of sewer pipe, as measured between manholes or manhole and cleanout, shall be tested by plugging all pipe outlets with suitable test plugs.
- B. Air shall be slowly added until the internal pressure is raised to 34.5 KPa (5 psi). The compressor used to add air to the pipe shall have a relief valve set to ensure that the internal pressure in the pipe does not exceed 41.4 KPa (6 psi). At no time shall the internal pressure in the pipe exceed 41.4 KPa (6 psi).
- C. The internal pressure of 34.5 KPa (5-psi) shall be maintained for at least two minutes to allow the air temperature to stabilize, after which the air supply shall be disconnected.
- D. The time in minutes that is required for the internal air pressure to drop from 34.5 KPa (5 psi) to 27.6 KPa (4 psi) shall be measured. The results shall not be less than the minimum permissible duration for air test pressure drop shown in the table below.

Minimum Duration for
Air Test Pressure Drop

Pipe Size <u>mm (inches)</u>	Time <u>(Minutes)</u>
<u>tes</u> 200 mm (8")	5

250 mm (10")	6
300 mm (12")	7
375 mm (15")	9

- E. If the pressure drops from 34.5 KPa (5 psi) to 27.6 KPa (4 psi) occurs in less time than shown above, the pipe shall be examined and repaired, and if necessary, replaced or re- laid including backfill and compaction, and retested.

3.02 AIR PRESSURE ADJUSTMENT FOR GROUNDWATER

- A. In areas where groundwater is evident at an elevation above the sewer pipe, or where it can be determined through past physical evidence or known history that groundwater will again achieve an elevation above the sewer pipe, an adjustment shall be made to the leakage test pressure. The highest anticipated groundwater pressure shall be added to the sewer leakage test pressure as compensation.
- B. The air pressure correction, which must be added to the 34.5 KPa (5 psi) normal test starting pressure, shall be calculated by dividing the average vertical height of groundwater above the invert of the sewer pipe to be tested, by 704.1mm (2.31').
- C. In no case shall the starting test pressure exceed 62.1 KPa (9.0 psi), or the manufacturer's allowable maximum.

3.03 INFILTRATION TEST

- A. Prior to testing for infiltration, the ends of the sewer pipe section to be tested shall be capped or plugged to prevent the entrance of water, and pumping of groundwater shall be discontinued for at least three days.
- B. Any infiltration discovered before completion and acceptance of the sewer shall be corrected. The sewer shall be examined and the source of infiltration eliminated. Following repairs or replacement as necessary, including backfill and compaction, the subject line shall be retested to assure no infiltration.

3.04 PRESSURE TESTS FOR SEWER FORCE MAINS

Pressure tests for sewer force mains shall be in accordance with Section 15044 except that the allowable leakage shall be zero (0). All leak points shall be located and stopped. All defective pipe, fittings, valves and other appurtenances discovered shall be removed and replaced with sound material and tests repeated until the leakage is zero (0).

3.05 CLOSED-CIRCUIT TELEVISION (CCTV) INSPECTION

In addition to the leakage and infiltration tests, closed-circuit television (CCTV) inspections shall be conducted in accordance with Section 15045.

3.06 VACUUM TESTING OF MANHOLES

Vacuum testing of manholes shall be performed in accordance with Section 03461.

3.07 FINAL ACCEPTANCE

The requirements of this section shall be considered acceptable when each sewer section's air leakage rate is less than the maximum allowed, the television inspection is satisfactory, and the water infiltration rate is zero.

END OF SECTION 15043