

2. Gravity Pipe Leakage Testing (Method of testing to be determined by Utilities Inspector)

A. General

Tests shall be made by the low-pressure air test or the infiltration test. The infiltration test shall be used when the groundwater level is at least two feet (2') above the crown of the pipe measured at the upstream manhole. The exfiltration test shall be conducted from manhole to manhole. Trenches shall be completely backfilled and sewer line should be free of debris prior to testing. Plug all pipe outlets including laterals and secure plugs to prevent leakage blowout due to testing pressure.

B. Infiltration Test

a) Performance:

The infiltration, as determined by hydrostatic head test, shall have a minimum test head of two feet (2.0) above the crown of a pipe at an upstream manhole. For construction within the 100-year flood plain.

b) Execution:

Stop at dewatering operations and allow the groundwater to return to its normal level and allow to remain so for at least 24 hours. Leakage shall be determined by any flow in the line.

C. Water Table Determination

The water table present at the time of testing shall determine the test method to be utilized. If the water table is above the bottom of the sanitary sewer, then infiltration testing shall be utilized. If the water table is below the bottom of the pipe, then exfiltration testing will be used.

D. Exfiltration Tests

The sewer section to be tested shall be filled to the top ring of the manhole with clear water or to a specified elevation (normally three feet (3') above the sewer crown) and then replace the manhole cover. The exfiltration is determined by any loss. Manholes or standpipes may be used to maintain the specified water level.

3. Manhole Leakage Test

Manholes shall be examined for visible leakage due to infiltration of ground water if the water table is greater than five feet (5') above the manhole invert or by filling with water to the base of the manhole frame. Infiltration or exfiltration shall not exceed the requirements specified above.

F. Force Main Construction

1. All pipe within the City R/O/W shall be laid to a minimum cover of thirty six inches (36") from established grade if not otherwise indicated. Any variation shall be approved by the Public Utilities Director.
2. All force mains under roadways shall be HDPE piping for directional bore or PVC inside of a steel casing for Jack and Bore or open cut.
3. All force mains under roadways shall follow the established rules promulgated by the entity that owns the roadway; the City of Lake Wales requires force mains to be forty-eight inches (48") from the bottom of the asphalt to the crown of the pipe or casing.
4. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed into the pipe.
5. Pipe laying procedures will adhere to manufacturer's specifications or the PVC/HDPE handbook.
6. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or cap. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
7. The cutting of pipe for inserting fittings or closure shall be done in a neat and workmanlike manner without damage to the pipe so as to leave a smooth end at right angles to the axis of the pipe.
8. Install a green-coated #10 gauge copper head high strength (HS) solid trace wire with all force main installations in accordance with City requirements.
9. All plugs, caps, tees, and bends shall be provided with restraining glands in accordance with City standards, manufacturer's specifications and the PVC handbook.

G. Force Main Testing

1. Before pressure testing force main, place a minimum cover of six inches (6") above the top of pipe, the contractor may leave all joints exposed. The backfill should be free of stones and hard earth. Pressure test the pipe in the presence of the City Inspector.
2. Pressure test shall be conducted at a minimum pressure of 150 psi. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or in any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
3. PVC Testing

No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{ND\sqrt{P}}{7,400}$$

L equals the allowable leakage in gallons per hour;
 N is the number of joints in the length of the pipeline tested;
 D is the nominal diameter of the pipe in inches;
 P is the average test pressure during the leakage test, in pounds per square inch.

4. HDPE Testing

The test procedures consist of two steps; the initial expansion and the test phase.

After the pipe has been joined, fill it with water and carefully bleed off any trapped air. Subject the pipe to a pressure of 150 psi and check for any leaks. Fill the pipeline with water after it has been laid; bleed off any trapped air. Subject the lowest element in the system to a minimum test pressure of 150 psi, and check for any leakage. When test pressure is applied to a water-filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system at hourly intervals for 3 hours to maintain the test pressure. After about 4 hours, initial expansion should be complete and the actual test can start.

When the test is to begin, the pipe is full of water and is subjected to a minimum test pressure of 150 psi. The test phase should not exceed 2 hours, after which time any water deficiency must be replaced and measured. Add and measure the amount of make-up water required to return to the test pressure and compare this to the maximum allowance.

NOTE: If specified by the engineer, pressure testing may be conducted prior to pipe installation. It shall be the responsibility of the contractor to ensure that appropriate safety precautions are observed during hydrostatic testing above ground.

5. Upon completion of all testing the force mains shall be cleaned by means of pigging to remove debris.

H. Warranty

All portions of the installed sewer system and site restoration shall be fully guaranteed against material defects of improper workmanship for a period of one year from acceptance by the City. During this time, repairs will be made by the developer at no cost to the City. Any repairs made on the newly installed system by the City during this period will be charged to the developer.


I. AS-BUILTS

The engineer of record, or such Registered Engineer, as may apply, shall submit to the City two sets of certified "As-Built/Record Drawing" (Hard copy), one set on mylar and one set in electronic media compatible with the City (AUTOCAD) system. The "As-Built" shall contain a certification from a registered Engineer in the state of Florida that indicates that the project has been substantially completed in accordance with the approved plans and specifications, or that the deviations noted on the "Record Drawings" will not prevent the project from complying with the design function of the project.

In order to effectively comply with this requirement, it would be necessary for the certifying Engineer to have provided periodic review and inspection of the installation of those facilities within the project. The Engineer may supplement his review and inspection of the project by utilizing information taken from a valid survey. THE "AS-BUILT/RECORD DRAWINGS" SHALL PROVIDE INFORMATION ON PROJECT FACILITIES THAT INDICATES SUFFICIENT HORIZONTAL AND VERTICAL DIMENSIONAL DATA IN STATE PLANE COORDINATES SO THAT THE CONSTRUCTED IMPROVEMENTS MAY BE LOCATED AND DELINEATED. All dimensions both horizontal and vertical shall be placed on the "As-Built/Record Drawings" and certified by a Professional Surveyor or Mapper and Professional Engineer before submitting to the City.

"As-Built/Record Drawings" that contain disclaimers that essentially render the Professional Engineer's certification meaningless will not be accepted.

CITY OF LAKE WALES
211 W. CENTRAL AVE. LAKE WALES, FLORIDA 33853



CITY OF LAKE WALES
 Greater Spirit of the South

ISSUE CODE	A PRELIMINARY	B DESIGN	
C BIDS	D CONSTRUCTION	E APPROVAL	
DESIGN:	SCALE:		N.T.S.
CHK'D BY:	DATE:		
DRAWN BY:	ENGR.		
DRAWING TITLE			
SEWER NOTES			
AREA	JOB NO.		
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REVISED :
 MODIFIED MJC 08-12-21