

**Town of Cicero/Cicero Area
Hamilton County, Indiana
Utility & Street Standards**

Section 1: General Requirements

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**Town of Cicero/Cicero Area
Hamilton County, Indiana
Utility & Street Standards**

Section 1: General Requirements

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- 1.03 Trench Safety System
- 1.04 Dust Control

PART 1: EXCAVATION, TRENCH SAFETY AND DUST CONTROL

1.01 GENERAL

This section provides for surface removal, excavation and disposal of surplus material within the public right-of-way, trench safety system and dust control.

Trench safety is a key and vital issue and Property Owners and Developers should take the necessary steps to ensure that the Contractor they use to construct infra-structure has included trench safety construction techniques and safety systems in the cost proposal.

All trenches or excavations shall be backfilled to the original surface of the ground or such other grades as shown on the design plans or as directed. In general, the backfilling shall be carried along as speedily as possible and as soon as the concrete, mortar, and/or other masonry work and pipe joints have sufficient strength to resist the imposed load without damage.

1.02 SURFACE REMOVAL (Within Public Right-of-Way)

For construction of utilities as indicated on the approved Plans within the Public Right-of-Way, the Contractor shall remove the surface materials only to such widths as will permit a trench to be safely excavated, affording sufficient room for proper efficiency and proper construction. Where sidewalks, driveways, pavements, curb and/or gutters are encountered, care shall be taken to protect such against fracture or disturbance beyond reasonable working limits. All pavements shall be cut with an abrasive saw and concrete streets, driveways, walks, alleys, etc. cut to the nearest joint, and as required by the design plans and the Town and its representatives. Any areas damaged during construction shall be re-sawed to provide a clean surface for rehabilitation.

Excavated topsoil shall be stored in a designated location as approved by the Town and its representatives. The topsoil shall be protected in such a manner as to ensure the preservation of its quality. The topsoil shall be inspected by the Town and its representatives before being backfilled in the work.

1.03 TRENCH SAFETY SYSTEM

The Contractor and the Developer are responsible for ensuring that safe working conditions exist and safety procedures are being followed at the work site. The Contractor shall also be responsible for notifying the Indiana Occupational Safety and Health Administration (IOSHA), Indiana Department of Labor and all other applicable governmental agency requirements.

The Town is NOT responsible for policing the Contractor's safety program. If, in the

opinion of the observer, an unsafe condition is noted, he will notify the Contractor of this condition and report it to the Developer. If the condition continues to exist the observer shall notify the Developer, document the unsafe condition in writing and/or through a photograph, and leave the job site. The Town representatives may contact IOSHA and request that they dispatch an inspector immediately.

Regarding Trench Safety Systems, the Contractor shall design, install and maintain a "Trench Safety Program" in strict compliance with OSHA (Occupational Safety and Health Administration) Part 1926 of the Code of Federal Regulations and all other applicable federal, state, and local regulations. The contractor shall be responsible to continuously upgrade the Trench Safety Program with changing governmental regulations.

1.04 DUST CONTROL

The Contractor shall be responsible for maintaining the site and adjoining paved surfaces in a dust free condition. Fugitive dust control is the sole responsibility of the Contractor.

End of Part 1

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Part 2 - SURFACE REPLACEMENT AND SITE RESTORATION

- 2.01 General
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- 2.04 Lawn and Grass Area Replacement
- 2.05 Mulching
- 2.06 Stand of Grass
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PART 2: SURFACE REPLACEMENT AND SITE RESTORATION

2.01 GENERAL

Part 2 pertains to the restoration of areas within the public Right-of-Way and/or acquired easements where infrastructure is being constructed. Surface restoration within the site being developed is per the direction of the Developer except that the erosion control permitting may have some application requirements and/or restrictions.

When the construction is complete, remove all surplus material and rubbish from the site or work. That portion of the surface disturbed by construction shall be rebuilt to as good condition as it was before the commencement of the work. The project site shall be promptly and regularly maintained. Contractor shall be responsible for repairs of unsatisfactory trench backfilling or other unsatisfactory contracted services.

2.02 PAVEMENT, CURB AND GUTTER REPLACEMENTS

In all streets, alleys or other areas that are to be paved, all backfilling shall be well compacted by hand held mechanical compaction machines per the requirements of the Indiana Department of Transportation and all other governing bodies. After the trench or excavation has been backfilled, the subgrade for the new paving, curb and/or curb and gutter shall be further compacted by rolling the backfill at subgrade elevation. After examination of the backfill and subgrade compaction by the reviewing agencies, the pavement, curb and/or curb and gutter shall be replaced.

All pavements, curbs and/or gutters shall be replaced with the same materials as that removed in accordance with the latest revisions of Standards of the Indiana Department of Transportation and the Town of Cicero as applicable.

2.03 TRAFFIC CONTROL

The Contractor shall maintain vehicular and pedestrian traffic during all paving operations, as required by the Town, Hamilton County and/or INDOT as applicable.

The Contractor shall provide flagmen, barricades and warning signs for the safe and expedient movement of traffic through construction zones within the right-of-way. This shall be in accordance with the principles and standards in the Indiana Department of Transportation, Standard Specifications, latest revision, and the current Manual on Uniform Traffic Control Devices.

2.04 LAWN AND GRASS AREA REPLACEMENT

All lawn and grass areas disturbed or damaged during construction shall be restored to original or better condition. Backfills, fills and embankments shall be brought to a subgrade level six (6) inches below finished grade. When subgrades have settled, topsoil shall be placed to a finished depth of at least six (6) inches; fine raked, and prepared for seeding.

If the backfill, fill or embankment material is sand, an eight (8) inch layer of clay furnished by the Contractor at his expense shall be spread over the subgrade and thoroughly mixed into the sand subgrade. The clay shall be mixed into the sand subgrade, then leveled and smoothed. Topsoil shall be placed and spread to a finished depth of at least two (2) inches, and fine rake.

Commercial fertilizer 12-12-12 or equal shall be uniformly spread over the topsoil by a mechanical spreader and mixed into the soil for a depth of four (4) inches on areas to be seeded. This shall be done at least forty-eight (48) hours before the sowing of any seed at the rate of six hundred (600) pounds per acre. The area shall then be lightly raked or harrowed until the surface of the finished grade is smooth, loose and pulverized.

Then, the grass seed shall be sown by a mechanical seeder, and lightly raked into the surface or sown with a standard agricultural drill. The seeded areas shall be thoroughly watered with a fine spray in such a manner as not to wash out the seed. The Contractor shall use care in raking in order to avoid disturbance of the finished grade and seed distribution. Protect seeded areas against erosion by spreading mulch after completion of seeding operations.

Seeding shall be done only within the seasons extending from August 15 to October 15, and from April 1 to June 1, unless otherwise required by other entities and/or the Erosion Control Permit.

Contractor must submit a seed mixture certificate to the Town Representatives before using. Grass seed shall be sown at the rate as indicated in the following analysis:

Temporary Seeding:

<u>Seed Option</u>	<u>Seed Species and Mixtures</u>	<u>Rate per Acre</u>
1	Wheat or Rye	150 lbs.
2	Spring Oats	100 lbs.
3	Annual Ryegrass	40 lbs.
4	German Millet	40 lbs.
5	Sudangrass	35 lbs.

Permanent Seeding:

<u>Seed Option</u>	<u>Seed Species and Mixtures</u>	<u>Rate per Acre</u>
1	Bluegrass	105 to 140 lbs.
2	Perennial Ryegrass (Turf-Type) + Bluegrass	45 to 60 lbs. 70 to 90 lbs.

Hydro seeding shall be done in accordance with the Indiana Department of Transportation Specifications, latest revision.

2.05 MULCHING

Adequate mulching material following seeding and fertilizing shall be applied, followed by cultipacking.

Mulch shall consist of:

1. Dry straw or hay of good quality and at the rate of two and one-half (2-1/2) tons per acre; or
2. Wood cellulose or cane fiber mulch at a rate of one thousand (1,000) pounds per acre; or
3. A combination of good quality dry straw or hay free of seeds of competing plants at a rate of two and one-half (2-1/2) tons per acre and wood cellulose or cane fiber mulch at a rate of five hundred (500) pounds per acre; or
4. Manufactured mulch materials such as soil retention blankets, erosion control netting, or others that may be required on special areas of high water concentration or unstable soils. (When these materials are used, follow the manufacturer's recommendation for installation).

The seeded area shall be watered, maintained and patched as directed by the Town or other Regulatory Agency until the Contractor's work is completed and accepted.

2.06 STAND OF GRASS

The Contractor shall be required to establish a satisfactory stand of grass to be full coverage without bare spots. This is not required for areas subject to agricultural activities.

Within one (1) year after work completion, the Contractor shall be required to correct any defective work, such as bare spots in grass coverage, erosion, gullies, etc. in a timely manner upon notification.

2.07 SODDING

The areas to be sodded shall be as shown on the plans and as required by the Town or other Regulatory Agencies.

The use of sod shall be in accordance with the Indiana Department of Highway Specifications, latest revision. As a minimum, sod shall be fibrous, well rooted bluegrass, or other approved sod, with the grass cut to a height of not more than three (3) inches. Edges of sod shall be cleanly cut, either by hand or machine, to a uniform thickness of not less than one and one-half (1-1/2) inches, to a uniform width of not less than sixteen (16) inches, and in strips of not less than three (3) feet in length.

Sod shall be free from all primary noxious weeds as defined by the Indiana State Seed Law.

End of Part 2

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Part 3 - INSPECTION, TESTING AND ACCEPTANCE

- 3.01 General
- 3.02 Inspection Costs and Fees
 - A. General
 - B. Estimated Cost
 - C. Inspection Scheduling
 - D. Building Inspection
- 3.03 Gravity Sewer Testing
 - A. Low Pressure Air Test
 - B. Mandrel Test
 - C. Manhole Testing
- 3.04 Lift Station and Force Main Testing
 - A. Force Main Testing
 - B. Wet Well Leakage Testing
 - C. Lift Station Pump Testing
- 3.05 Closed Circuit Television Inspection
- 3.06 Domestic Watermain Disinfection and Testing

Table 1A: Allowable time at 1.0 psig pressure drop table

Table 1B: Allowable time at 0.5 psig pressure drop table

Table 1C: Mandrel Table

PART 3: INSPECTION, TESTING AND ACCEPTANCE

3.01 GENERAL

Part 3 describes the minimum requirements and general procedures for the inspection and testing of sanitary sewer systems, domestic water systems and streets to be dedicated to the Town of Cicero or Hamilton County. Work within INDOT right-of-way shall comply with INDOT requirements.

The sanitary sewer system shall not be accepted nor will connection permits be issued until all requirements for inspection and testing, including the filing of affidavits and any other paperwork are completed. Town approval is subject to the Developer obtaining any required IDEM, INDOT or other Regulatory Agency approvals.

Any section of infrastructure not passing the tests prescribed herein shall be repaired to the satisfaction and approval of the Town, retested and re-inspected at the Developer's expense. The Developer will also be responsible for any Town or Town Representative costs for re-testing of failed infrastructure.

3.02 INSPECTION COST AND FEES

Inspection of the infrastructure shall occur throughout the construction of the system and upon the installation but prior to the backfilling of the utilities.

A. GENERAL

As previously discussed, prior to the issuance of a Construction Permit and the commencement of infra-structure construction, the Developer shall make arrangements with the Town of Cicero and other Regulatory Agencies for Construction Inspection Services to be provided.

B. ESTIMATED COST

The Town shall send a letter to the Owner/Developer stating the estimated amount of payment to be made to the Town for inspection services to be rendered by representatives of the Town. The amount provided in the letter shall be seventy-five (75) percent of the total estimated cost of the inspection services based on an estimated project completion time and approved construction plans. The Owner/Developer shall be responsible for fees associated with other Regulatory Agencies independently.

Where a pumping station is involved, additional time for the inspection during construction and final inspection of the station shall be added. Estimates for inspection costs can be obtained by contacting the Town and providing a construction schedule.

The inspection cost is a pre-construction estimate only. The actual Observation time will vary from project to project and may exceed or be less than this estimate based upon actual project duration. Deviations from approved construction documents or Developer established schedules that create the necessity of additional inspection, shall be at the Developer's expense.

Seventy five (75) percent of the cost shall be remitted prior to issuance of construction permit. The balance of the cost for observation services, based on total actual observation hours, shall be paid prior to the Town's acceptance of the system(s).

C. INSPECTION SCHEDULING

Contractor and/or Developer shall provide notice to the Town of the planned commencement of construction at least two (2) weeks prior to such commencement.

Once the construction starts, the Contractor shall be responsible for informing and/or notifying the Inspector assigned of the following:

1. Daily work schedule including any changes in schedule,
2. Prior notification if work is to be performed on weekends and/or holidays,
3. Date air and mandrel tests are to be performed, and
4. Date as-built verification is to be performed.

The Town, upon written request of the Contractor and/or Developer, will schedule the Final Inspection.

All testing required shall be performed under the observation of the Town and/or the other applicable Agency Inspector. It shall be the Contractor's responsibility to schedule the testing with the Observer and/or Town. Test results obtained in the absence of the presence of the Town's Observer will not be accepted.

D: BUILDING SEWER INSPECTION

A Sewer Connection Permit shall be obtained for any repair, modification or connection of a building sewer to a public sewer. Connection permits shall not be issued for connections to sanitary sewers not yet dedicated to and accepted by the Town.

Following the installation/repair/modification and prior to the backfilling of the Building Sewer, the Contractor/Plumber shall notify the Town that the Building Sewer is ready to be inspected. The Town shall then have four (4) hours to make the inspection after which the Contractor/Plumber may backfill the

trench.

If notification is not provided and the building sewer is backfilled prior to inspection, at the Town's request the Contractor/Plumber shall be required to re-excavate the trench so that an inspection can be made.

3.03 GRAVITY SEWER TESTING

Once constructed, all sanitary sewers and manholes shall be watertight and free from leakage. The rate of infiltration into the sanitary sewer system between any two adjacent manholes or the entire system shall not be in excess of 100 gallons per inch of pipe diameter per mile per day (100 gpd/in/mi.). The Contractor shall be required to repair all visible leaks to the satisfaction of the Town, even if the infiltration requirements are met.

Any leakage found during the infiltration test shall be corrected by the Contractor at his expense. The method of repair shall be per the approval of the Town; however, grouting of the joint or crack to repair the leakage shall not be permitted. If the defective portion of the sanitary sewer cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary to obtain a system that passes infiltration requirements.

All gravity sanitary sewers constructed of flexible pipe (PVC) shall be mandrel tested no sooner than thirty (30) days after installation per the requirements herein.

The Contractor shall bear the complete cost and supply all equipment necessary to perform the tests required.

All tests shall be conducted under the observation of the Town's Inspector. It shall be the Contractor's responsibility to schedule testing with the Inspector.

A. LOW PRESSURE AIR TEST

All gravity sanitary sewers shall be tested for infiltration by means of a low pressure air test as generally described herein. Any other infiltration test procedure will only be allowed following the submittal of the procedure to the Town for review and upon written approval by the Town.

1. Equipment

The Contractor shall be responsible for providing all equipment and supplies necessary for the performance of a Low Pressure Air Test including but not limited to the following:

- a. Mechanical or pneumatic plugs;
- b. Air control panel;
- c. Shut-off valve, pressure regulative valve, pressure relief valve and

- input pressure gauge. The pressure regulator or relief valve set shall be set no higher than 10 psig to avoid over pressurization;
- d. Continuous monitoring pressure gauge having a range of 0 to at least 10 psi. The gauge shall be no less than 4 inches in diameter with minimum divisions of 0.10 psi and an accuracy of ± 0.04 psi.

To reduce the potential for sewer line over-pressurization, two (2) separate hoses shall be used to: (1) connect the control panel to the sealed line for introducing low pressure air, and (2) a separate hose connection for constant monitoring of air pressure buildup in the line.

If pneumatic plugs are utilized, a separate hose shall be required to inflate the pneumatic plugs.

- a. General

The ground water level shall be determined by excavation by the Contractor.

- b. Air Pressure Adjustment

The air pressure correction, which must be added to the 4.0 psig normal test starting pressure, shall be calculated by dividing the average vertical height, in feet of groundwater above the invert of the sewer pipe to be tested, by 2.31. The result gives the air pressure correction in pounds per square inch to be added. The allowable pressure drop of 1.0 psig (or 0.5 psig) and the minimum time periods are given in Table 1A (or Table 9.1B) are not affected and shall remain the same.

- c. Maximum Test Pressure

In no case should the starting test pressure exceed 9.0 psig. If the average vertical height of groundwater above the pipe invert is more than 12.7 feet, the section so submerged may be tested using 9.0 psig as the starting test pressure. The 9 psig limit is intended to further ensure workman safety and falls within the range of the pressure monitoring gauges normally used.

2. Test Procedure

Following are general procedures to be employed in the performance of the test. Test data sheets shall be submitted to the Town.

- a. Plug Installation and Testing

After a segment of pipe has been backfilled to final grade, prepared for testing, and the specified waiting period has elapsed, the plugs shall be securely placed in the line at the ends of each segment to be tested.

It is advisable to seal test all plugs before use. Seal testing may be accomplished by laying one length of pipe on the ground and sealing it at both ends with the plugs to be checked. The sealed pipe should be pressurized to 9 psig. The plugs shall hold against this pressure without bracing and without any movement of the plugs out of the pipe. No persons shall be allowed in the alignment of the pipe during plug testing.

It is advisable to plug the upstream end of the line first to prevent any upstream water from collecting in the test line. This is particularly important in high groundwater situations.

When plugs are being placed, the pipe adjacent to the manhole shall be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole. A probable point of leakage is at the junction of the manhole and the pipe. This fault may be covered by the pipe plug, and thus not revealed by the air test.

b. Line Pressurization

Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater above the pipe, but not greater than 9.0 psig.

c. Pressure Stabilization

After a constant pressure of 4.0 psig (greater than the average groundwater back pressure) is reached, the air supply shall be throttled to maintain that internal pressure for at least 2 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.

d. Timing Pressure Loss

When temperatures have been equalized and the pressure stabilized at 4.0 psig (greater than the average groundwater back pressure), the air hose from the control panel to the air supply shall be shut off or disconnected. The continuous monitoring pressure gauge shall then be observed while the pressure is maintained at no less

than 4.0 psig (greater than the average back pressure of any groundwater over the pipe). Timing shall commence with a stop watch or other timing device that is at least 99.8% accurate.

A predetermined required time for a specified pressure drop shall be used to determine the lines acceptability. Traditionally, a pressure drop of 1.0 psig has been specified. However, other pressure drop values may be specified, provided that the required holding times are adjusted accordingly. If the specified pressure drop is 0.5 psig rather than the more traditional 1.0 psig, then the required test times for a 1.0 psig pressure drop must be halved. Specifying a 0.5 psig pressure drop is desirable in that it can reduce the time needed to accomplish the air test without sacrificing test integrity. Therefore, the following subsections contain provisions for both the traditional 1.0 psig pressure drop and the more efficient 0.5 psig drop are given in parentheses.

Test time criteria are presented later in subsection 3.03 A.4.

e. Determination of Line Acceptance

If the time calculated by the following equation or shown in Table 1A (or Table 1B), for the designated pipe size and length elapses before the air pressure drops 1.0 psig (or 0.5 psig), the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued once the prescribed time has elapsed even though the 1.0 psig (or 0.5 psig) drop has not occurred.

f. Determination of Line Failure

If the pressure drops 1.0 psig (or 0.5 psig) before the calculated or appropriate time shown in Table 1A (or Table 1B) has elapsed, the air loss rate shall be considered excessive and the section of pipe shall be determined to have failed the test.

4. Test Times

a. Test Time Criteria

The Ramseier test time criteria requires that no test section shall be accepted if it loses more than "Q" cubic feet per minute per square foot of internal pipe surface area for any portion containing less than 625 square feet internal pipe surface area. The total leakage from any test section shall not exceed 625 Q cubic feet per minute.

b. Allowable Air Loss Rate

A "Q" value of 0.0015 cubic feet per minute per square foot shall be utilized to assure the Town of quality pipe materials, good workmanship, and tight joints.

c. Test Time Calculation

All test times shall be calculated using Ramseier's equation:

$$T = (0.085)(D * K)/Q$$

Where: T = Shortest time, in seconds, allowed for the air pressure to drop 1.0 psig,

K = 0.000419 DL, but not less than 1.0,

Q = 0.0015 cubic feet/minute/square feet of internal surface,

D = Nominal pipe diameter in inches, and

L = Length of pipe being tested in feet.

For more efficient testing of long test sections and/or sections of larger diameter pipes, a timed pressure drop of 0.5 psig may be used in lieu of the 1.0 psig timed pressure drop. If a 0.5 psig pressure drop is used, the appropriate required test times shall be exactly half as long as those obtained using Ramseier's equation for "T" cited above.

B. MANDREL TEST FOR SELECT PIPE

A five (5) percent "GO-NO-GO" Mandrel Deflection Test shall be performed on all PVC, HDPE and PVC Composite gravity sanitary sewer pipe.

These pipes shall be mandrelled with a rigid device sized to pass five percent (5%) or less deflection (or deformation) of the base inside diameter of the pipe. The mandrel test shall be conducted no earlier than thirty (30) days after reaching final trench backfill grade, provided that in the opinion of the Town sufficient water densification or rainfall has occurred to thoroughly settle the soil throughout the entire trench depth. If densification, in the opinion of the Town, has not been achieved within the thirty (30) day time frame, the mandrel size shall be increased to measure a deflection limit of three percent (3%).

The mandrel (GO-NO-GO) device shall be cylindrical in shape and constructed with nine (9) or ten (10) evenly spaced arms or prongs. Mandrels with less arms shall not be allowed due to being insufficiently accurate. The mandrel diameter

dimension "D" shall be equal to the inside diameter of the sanitary sewer. Allowances for pipe all thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall not be deducted from the "D" dimension but shall be counted as part of the 5% or lesser deflection allowance. Each pipe material/type required to be Mandrel tested shall be tested with a mandrel approved by the pipe manufacturer and meeting the requirements of this Section. The "D" mandrel dimension shall carry a tolerance of ± 0.01 inches.

The mandrel shall be hand pulled through all sewer lines and any section of sewer not passing the mandrel shall be uncovered, replaced or repaired to the Town's satisfaction and retested.

The contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than as shown in Table 9.2.

The Contractor shall provide proving rings or other acceptable method to check the mandrel. Drawings of mandrels with complete dimensions shall be furnished by the Contractor to the Town upon request for each diameter and specification of pipe.

C. MANHOLE TESTING

All sanitary manholes installed in this project shall be air tested in accordance with ASTM C 1244-93, *Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test* to insure water tightness and integrity. Tests shall be conducted prior to acceptance and placement into service. The Contractor shall notify the Town prior to test and no test results will be accepted unless witnessed by the Town's Representative. All testing costs for equipment, labor, etc. shall be included in the Contractors bid price to the Town. Any manholes failing the test shall be corrected in a manner acceptable to the Town and shall be retested by the Contractor until satisfactory test results are achieved. The Contractor shall be responsible for any costs incurred by the Town for testing of failed manholes.

The procedure for testing shall be in accordance with the following steps:

1. Each manhole shall be tested immediately after assembly and prior to backfilling if possible. If the Contractor elects to perform tests after backfilling, he shall be responsible for re-excavation to locate and correct any leaks that may be necessary.
2. All lift holes shall be plugged with nonshrink grout.
3. All pipes entering the manhole shall be plugged and adequately braced within the manhole.
4. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.

5. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off.
6. The time for the vacuum to drop from 10 inches to 9 inches of mercury shall be measured. The manhole shall pass if the following times are exceeded:

Manhole Size	Minimum Time for Drop
42"	52 seconds
48"	60 seconds
60"	78 seconds
72"	98 seconds

This table governs the size of manholes referenced to depths up to 24 feet. If larger diameter or deeper manholes are tested, compliance shall be measured in accordance with TABLE 1 of ASTM C 1244-93 or as otherwise directed by the Town's Observer.

The Town's Observer shall witness all tests. All equipment used shall be specifically designed for the purpose of testing manholes. If a test fails, corrections shall be made and the manhole shall be retested until a satisfactory test is achieved. No manhole shall be placed into service or accepted by the Town until it has passed the testing requirement.

3.04 LIFT STATION AND FORCE MAIN

The following section describes the testing that shall be performed on the lift station pumps, piping and force main for acceptance and dedication to the Town.

A. FORCE MAIN TESTING

1. General

Under the observation of the Town's Inspector, force mains shall be tested for leakage after installation and prior to final acceptance. The contractor shall be responsible for providing all equipment and tools necessary to perform an air pressure test or hydrostatic pressure test conducted in accordance with AWWA standards for testing pressure pipe.

These standards are material specific and generally reference manufacturer's guidelines. The standards apply to method of conducting air pressure tests only. Established pass/fail criteria are contained in the following sub-sections.

2. Air Pressure Testing

Air pressure testing of force mains is, in general, not accepted by the Town due to safety considerations.

3. Hydrostatic Pressure Testing

The Contractor shall be responsible for providing all of the equipment and tools necessary to conduct the hydrostatic test.

Test procedures shall meet the requirements of AWWA Standard C600.

The piping shall be complete, and thrust blocks shall have been in place for not less than 10 days prior to being tested.

All temporary restraints, plugs, etc. shall be provided by the contractor to allow testing of the proposed forcemain prior to its connection to the existing sewer. The proposed main shall be tested to a point within 10 feet of the final connection. Restrained joints on the existing pipe segments shall be provided in accordance with the standard detail sheet to allow proper restraint for testing.

Hydrostatic testing must be witnessed by the Town or their designated representative.

Test pressure piping as follows:

1. Expel all air from the piping prior to the application of test pressure. Tap the piping at high points, if necessary, to release all air from the piping. Plug taps after the test is successfully completed. Plugs shall be watertight.
2. Leakage shall not exceed the allowable leakage in the following formula when tested at 1-1/2 times the working pressure as calculated by the ENGINEER (100 psig minimum). In no case shall the test duration be less than two (2) hours. The CONTRACTOR shall make any necessary repairs and repeat the testing if readings exceed these figures.

$$L = \frac{S * D * P^{1/2}}{133,200}$$

Where L = maximum 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 test in pounds per square
inch (gauge)

If the force main or any portion thereof fails the hydrostatic pressure test, the Contractor shall remove and replace or otherwise repair the force main to the satisfaction of the Town, and the forcemain shall be retested.

B. WET WELL LEAKAGE TESTING

Leakage tests shall be made and observed by the Town's Inspector in the lift station wet well. The test shall be the exfiltration test made as described below:

After the wet well has been assembled in place, all lifting holes shall be filled with an approved non-shrinking mortar. The test shall be made prior to placing any fill material. If the ground water table has been allowed to rise above the bottom of the wet well, it shall be lowered for the duration of the test. All pipes and other openings into the wet well shall be suitably plugged and the plugs braced to prevent blow out.

The wet well shall then be filled with water. If the excavation has not been backfilled and observation indicates no visible leakage after 1 hour; the wet well may be considered to be satisfactorily water-tight. If the test described above is unsatisfactory or if the wet well excavation has been backfilled, the test shall be continued. A period of time up to 24 hours may be permitted, if the Contractor so wishes, to allow for absorption. At the end of this period, the wet well shall be refilled to the top, if necessary; and the measuring time of at least 8 hours begun. At end of the test period, the wet well shall be refilled to the top, measuring the volume of water added. This amount shall be extrapolated to a 24-hour rate and the leakage determined on the basis of depth. The leakage for each wet well shall not exceed 1 gallon per vertical foot for a 24-hour period. If the test fails this requirement, but the leakage does not exceed 2 gallons per vertical foot per day, repairs by approved methods may be made as approved by the Town to bring the leakage within the allowable rate of 1 gallon per foot per day. Leakage due to a defective section or joint or exceeding the 2 gallon per vertical foot per day maximum shall be cause for rejection of the wet well. It shall be the Contractor's responsibility to uncover the wet well as necessary and to disassemble, reconstruct, or replace it as directed by the Town. The wet well shall then be retested at the Owner's/Developer's expense.

No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc.; i.e., it will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.

Furthermore, the Contractor shall take any steps necessary to assure the Town's

Inspector that the water table is below the bottom of the wet well throughout the test.

C. LIFT STATION PUMP TESTING

Lift Station pump test will be performed by the Pump Manufacturer's Representative during the lift station's final inspection. The Contractor shall be responsible for providing the clean water to run the pumps and perform the test.

1. Manufacturer's Start-Up

Prior to the Town's final inspection of the lift station equipment, the Contractor shall be responsible for coordinating start-up activities with the pump manufacturer's representative in accordance with the manufacturer's requirements. The Town's Inspector **must** be present at the time of manufacturer's start-up.

The manufacturer's representative shall completely inspect and certify the station's installation. Complete control panel, amp draw, and pump capacity tests shall be conducted by the manufacturer's representative. Any deficiencies in equipment and/or workmanship noted during the manufacturer's start-up shall be remedied by the Contractor prior to final inspection.

Upon successful completion of the manufacturer's start-up, the manufacturer shall deliver to the Contractor:

- a. Three (3) copies of the completed, witnessed report with cover letter certifying that all pumping and electrical equipment has been installed and is operating in accordance with manufacturer's requirements;
- b. Five (5) sets of Operation and Maintenance Manuals as specified in Section 2 of these Standards;
- c. One (1) complete set of Spare Parts as specified in Section 2 of these Standards.

2. Final Inspection

Contractor shall deliver two (2) copies of the manufacturer's start-up report at the time of final inspection. In addition, the Contractor shall provide the following pump test equipment and materials:

Water to conduct test,
Amp/volt meter,
Stop watch,
Tape or level rod to measure float settings,

Keel to mark float settings on lift station wall,
Influent flow measuring equipment.

Calibrated test gauge to measure operating head. The gauge shall be calibrated in feet of water from 0 to 100 feet in one foot increments, and Manufacturer's pump performance curves.

Contractor shall provide all water necessary to conduct the pumping tests detailed in Section 2 of these Standards, and shall provide a connection for the test gauge on the blind flanged tee in the valve vault. The stem connection shall be equipped with a plug valve to close the connection after testing is complete. The connection shall be left in place and shall be suitable for use as an air bleed off.

The pumping test results must meet or exceed the design pumping criteria approved by the Town to successfully pass the final inspection. Any deficiencies noted during the final inspection shall be repaired/replaced by the Contractor to the satisfaction of the Town and re-inspected/retested prior to final acceptance. Significant exceedence of the design flow may also be a basis for failure necessitating system modifications to avoid downstream surcharging conditions.

The Lift Station shall be equipped with complete telemetry system compatible with the Town's existing system. Any necessary modifications to the existing system shall be at the Owner's/Developer's expense.

3.05 CLOSED CIRCUIT TELEVISION INSPECTION

When Mandrel Test shows areas of deflection failure along the pipe or when air testing fails, the Contractor shall be required to perform a closed circuit television inspection of the sanitary sewer between manholes as follows:

- A. A camera equipped with remote control devices to adjust the light intensity and one thousand (1,000) lineal feet of sewer cable shall be provided. The camera should be able to transmit a continuous image to the television monitor as it is being pulled through the pipe. The image shall be clear enough to enable the Town representative and others viewing the monitor to easily evaluate the interior condition of the pipe. The camera should have a digital display for lineal footage and project number and an audio voice-over shall be made during the inspection identifying any problems.
- B. The pipe shall be thoroughly cleaned by the Developer or his agent before the camera is installed and televising is commenced.
- C. The DVD of the entire sewer line and reproduction map indicating the pipe

segment numbers of all the pipe that has been televised is to be delivered to the Town's Representative.

If any pipe and/or joint is found to be leaking, the Contractor shall be required to repair that portion of the pipe to the satisfaction and approval of the Town.

3.06 DOMESTIC WATERMAIN DISINFECTION AND TESTING

A. PRESSURE TESTING

All domestic water lines will be pressure tested with the Town's Inspector present. The Owner/Developer/Contractor shall notify the Town and Inspector at least 72 hours in advance. The Contractor shall provide all equipment necessary for the testing.

Test procedures shall meet the most recent requirements of AWWA Standard C600.

The piping shall be complete, and thrust blocks shall have been in place for not less than 10 days prior to being tested.

Test pressure piping as follows:

1. Expel all air from the piping prior to the application of test pressure. Tap the piping at high points, if necessary, to release all air from the piping. Plug taps after the test is successfully completed. Plugs shall be watertight.
2. Leakage shall not exceed the allowable leakage in the following formula when tested at 1-1/2 times the working pressure as calculated by the ENGINEER (100 psig minimum). In no case shall the test duration be less than two (2) hours. The CONTRACTOR shall make any necessary repairs and repeat the testing if readings exceed these figures.

$$L = \frac{S * D * P^{1/2}}{133,200}$$

Where L = maximum 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 test in pounds per square inch (gauge)

If the watermain or any portion thereof fails the hydrostatic pressure test, the Contractor shall remove and replace or otherwise repair the watermain to the satisfaction of the Town, and the watermain shall be retested.

B. FLUSHING

All potable water piping shall be flushed prior to disinfection.

Flush piping with a flushing velocity of at least 2.5 feet per second.

Flush piping and hydrants until the water discharged is clear.

C. DISINFECTION

Disinfect potable water piping prior to placing the piping in service in accordance with AWWA C-651-86. Disinfect pipe, fittings, valves, and hydrants with a chlorine solution containing 50 mg/l of available chlorine.

The chlorinating material shall be chlorine gas, calcium hypochlorite, or sodium hypochlorite. Calcium hypochlorite shall have 70% available chlorine weight. Sodium hypochlorite shall have 5.25% to 14.7% available chlorine. Placing Chlorine tablets in the piping during construction is not an acceptable method of disinfection.

The Contractor shall obtain two (2) satisfactory bacteria tests/24-hours apart prior to acceptance and system use.

End of Part 3