

SECTION 8

SANITARY SEWER INSPECTION, TESTING & ACCEPTANCE

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8.1 General

This section describes the minimum requirement and general procedures for the inspection, testing and acceptance of systems dedicated to the City.

Connection Permits for sanitary service will not be issued until all the requirements of this section are fulfilled.

8.2 Inspection

Inspection of the construction shall occur for the duration of the project, including the installation of service laterals. The Owner shall execute the Agreement with the City for such services. Inspection fees shall be as set forth in **Section 3**.

A. General Requirements

1. Contractor and/or Owner shall provide notice to the City and his representative of the planned commencement of construction forty-eight (48) hours prior to such commencement.
2. Once the construction starts, the Contractor shall be responsible for informing and/or notifying the inspection representative assigned of the following:
 - a. Daily work schedule, including any changes in schedule;
 - b. Prior notification if work is to be performed on weekends and/or holidays;
 - c. Date tests are to be performed; and
 - d. Date as-built verification is to be performed.
3. The City, upon request of the Contractor and/or Owner, will schedule the Final Inspection.

All testing required shall be performed under the observation of the City or the City's representative. It shall be the Contractor's responsibility to schedule the testing with the City representative and/or City. Test results obtained in the absence of the presence of the City will not be accepted.

8.3 Testing Gravity Sanitary Sewers

- A. 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 one

hundred (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.

- B. Any leakage found during the infiltration test shall be corrected at Contractor's expense. Grouting of the joint or crack to repair the leakage shall not be permitted for flexible or semi-rigid pipe. 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.
 - C. All gravity sanitary sewers constructed of flexible pipe and Truss pipe shall be deflection tested no sooner than thirty (30) days after installation.
 - D. The Contractor shall bear the complete cost and supply all equipment necessary to perform the tests required.
 - E. All tests shall be conducted under the observation of the Engineer. It shall be the Contractor's responsibility to schedule testing. The first one thousand (1,000) feet shall be leakage tested within fifteen (15) days after installation and deflection tested within forty-five (45) days after installation.
1. Low Pressure Air Test (All Approved Gravity Sanitary Sewer Pipe Materials Except Concrete)

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 Engineer for review and upon written approval by the Engineer.

a. 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:

- 1) Pneumatic Plugs
- 2) Air Control Panel
- 3) 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 ten (10) psig to avoid over pressurization
- 4) Continuous monitoring pressure gauge having a range of zero (0) to ten (10) psi — The gauge shall be no less than four (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.

b. Groundwater Elevation and Air Pressure Adjustment

Groundwater monitoring methods shall require the approval of the Engineer. Groundwater depth shall be determined in the field by the Contractor.

1) Air Pressure Adjustment

The air pressure correction, which must be added to the 3.5 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 drops of 1.0 psig and the timing in **Table 8-1** are not affected and shall remain the same.

2) 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.

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 nine (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 the “starting air pressure” of 4.0 psig greater than the average back pressure of any groundwater above the pipe, but not greater than 9.0 psig. Groundwater Elevation and Air Pressure Adjustment to determine the internal pressure to be applied.

c. Pressure Stabilization

After the starting air 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 starting pressure stabilized, 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 decreased to no less than 0.5 psig from the starting air pressure. At a convenient reading between 0.5 psig less than starting air and starting air pressure, timing shall commence with a stopwatch.

A predetermined required time for a specified pressure drop shall be used to determine the lines acceptability. A pressure drop of 1.0 psig shall be used.

e. Determination of Line Acceptance

If the time shown in **Table 8.1**, for the designated pipe size and length elapses before the air pressure drops 1.0 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 through the 1.0 psig drop has not occurred.

f. Determination of Line Failure

If the pressure drops 1.0 psig before the appropriate time shown

in **Table 8-1** has elapsed, the air loss rate shall be considered excessive and the section of pipe shall be determined to have failed the test.

3. 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 foot 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 x 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 OWNER of quality pipe materials, good workmanship, and tight joints.

c. Test Time Calculation

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

$$T = 0.085 \frac{D \times K}{Q}$$

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 upon approval of the Engineer. 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.

d. Testing Main Sewers with Building Sewers

In general, the Engineer will only approve the construction of the main line sewer and wye connections with the lateral stubbed-off to the property line. Building sewers will be allowed to be installed during the construction of the main line sewer only upon the written request to and written approval of the Engineer. This shall be clearly delineated on the design plans and specifications submitted for approval by the Engineer.

If building sewers are approved for construction by the Engineer as part of the main line sewer, they shall be included in the test and their lengths may generally be ignored for computing the required test times. This can be done because in practice, ignoring the branch, lateral, or house sewers will normally increase the severity of the air test whenever the tested surface area is less than six hundred twenty-five (625) square feet so that the total rate of rejection may only be increased about 2%. If the total tested surface area is greater than six hundred twenty-five (625) square feet, ignoring the lateral sewers will only slightly decrease the severity of the test.

e. Specified Timetables

To facilitate the proper use of this recommended practice for air testing, the following tables are provided. **Table 8-1** contains the specified minimum times required for a 1.0 psig pressure drop from a starting pressure of at least 3.5 psig greater than the average back pressure of any groundwater above the pipe's invert. **Table 8-2** contains specified minimum times for required for a 0.5 psig pressure drop from a starting pressure of at least 3.5 psig greater than the average back pressure of any groundwater above the pipe's invert.

4. Water Infiltration Test for Air Test Failures (and for Concrete Gravity Sanitary Sewer Pipes)

The Contractor may conduct a water infiltration test (weir test) when an air test fails to establish whether the one hundred (100) gal/in/mi/day maximum allowable infiltration rate is being exceeded. Water infiltration test may also be used for concrete pipe. If field conditions do not allow for infiltration test, an exfiltration test may be used upon written approval from the Engineer.

If the air test on the sewer system or any segment thereof fails, but the water infiltration or exfiltration test on the sewer system or any segment thereof passes; the sewer system or segment thereof shall be deemed acceptable. However, the Contractor shall be responsible for repairing all visible leaks regardless of ability of the sewer system or segment thereof to pass any established test criteria enumerated in these Standards.

The infiltration test shall not be considered a valid leakage test unless the top surface of the groundwater level is at least two (2) feet above the pipe during the test measurement. The Contractor may simulate this condition by flooding the trenches.

The rate of infiltration of water into the sewer, including appurtenances, shall not exceed one hundred (100) gallons per day, per inch diameter, per mile of sewer. The infiltration between any two adjacent manholes shall not be greater than two hundred fifty (250) percent of the allowable

infiltration rate.

The infiltration allowance for manholes shall be computed using the total number of vertical feet of manhole expressed as the equivalent diameter sewer.

The maximum allowable infiltration expressed in gallons per hour is shown below for various pipe and manhole sizes.

Dia. of Sewer (inches)	Infiltration Per Ft./Per Hr. (gals.)	Dia. of Sewer (inches)	Infiltration Per Ft./Per Hr. (gals.)
4	0.0032	21	0.0166
6	0.0048	24	0.0189
8	0.0063	27	0.0213
10	0.0079	30	0.0237
12	0.0095	36	0.0284
15	0.0119	42	0.0332
18	0.0142	48	0.0379

48" diameter manhole = 0.0379 gal per vertical foot per hour

5. Deflection Test for Select Pipe

A five percent (5%) vertical Mandrel Deflection Test shall be performed on all PVC and Truss Pipe gravity sanitary sewer pipe.

These pipes shall be mandrelled with a rigid device sized to pass five (5) percent or less vertical 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.

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 mandrel shall be pulled through all sewer lines in a manner acceptable to the Engineer and any section of sewer not passing the mandrel shall be uncovered, replaced or repaired to the Engineer's satisfaction and retested.

The Contractor shall provide proving rings to check the mandrel. Drawings of mandrels with complete dimensions shall be furnished to the Engineer upon request for each diameter and specification type.

TABLE 8-1
Specification Time Required For a 1.0 PSIG Pressure Drop
For Size and Length of Pipe Indicated For Q = 0.0015

Pipe Dia. (in)	Min. Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692L	17:00	17:00	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470L	19:50	19:50	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

TABLE 8-2
Specification Time Required For a 0.5 PSIG Pressure Drop
For Size and Length of Pipe Indicated For Q = 0.0015

Pipe Dia. (in)	Min. Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	0.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.472L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

8.4 Sanitary Manhole Testing

All manhole vacuum tests shall be conducted in the presence of a representative of the City.

The vacuum test equipment shall consist of: inflatable plugs for all incoming and outgoing sewer lines; an inflatable test collar to seal the manhole at the manhole frame; and a vacuum pump. A vacuum gauge shall be located in-line between the test collar and the pump to accurately indicate the vacuum in inches of mercury within the manhole. The vacuum gauge shall have a range to no more than thirty (30) inches of mercury, with scale markings of no greater than one-half (1/2) inch of mercury vacuum and an accuracy to within \pm two percent (2%) of true vacuum.

The vacuum test shall be conducted by plugging all incoming and outgoing sewer lines in the manhole at a location beyond the connection of the sewer pipe with the manhole. All plugs shall be blocked in place so as not to move during the test. The vacuum testing collar shall be inflated in the frame in accordance with the equipment manufacturer's recommendations. A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump turned off and the valve between the vacuum pump and the vacuum gauge shall be turned off.

The time period which is taken for the vacuum to fall from ten inches (10") of mercury to nine inches (9") of mercury shall be determined. If the time taken for the vacuum to reduce the ten inches (10") of mercury to nine inches (9") of mercury is less than the time indicated in the following Table, then the manhole work shall be considered not acceptable and shall be rejected. If the time is equal to or exceeds the time indicated below, the manhole work shall be accepted.

Manhole Dept (ft.)	Diameter		
	48"	60"	72"
Time (sec)			
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	65
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121
For each add'l 2' add:	5	7	8

Contractor shall submit to the City the results of each manhole vacuum test. Such reports shall include a description of the location of the manhole, the time, date and weather of the test, a list of all persons' present, the diameter and depth of the manhole and the allowable test results, and the actual test results.

All manholes shall be repaired by Contractor and retested as described above until a successful test is made. After each test, the temporary plugs shall be removed.

Once all manholes have been tested, the manholes will be given a field visual inspection. The inspection shall be performed at the discretion of the City during the warranty period following a rainfall sufficient enough to raise the groundwater table above the problem areas. All leakage problems determined by this inspection shall be corrected by the Contractor within an agreed upon time to the satisfaction of the City. Where necessary to complete the work, the Contractor shall be responsible for the bypassing and/or blocking of the flow in the manholes and must have prior approval by the City Engineer or City. It will be the Contractor's responsibility to supply his own traffic control as required by the particular location and/or jurisdiction.

8.5 Force Main Testing

A. General

After the pipe has been laid and partially backfilled, all newly laid pipe or any valved sections of it shall be subjected to a hydrostatic pressure test. The duration of each pressure test shall be for a period of not less than two hours and not more than six hours. The basic provisions of AWWA C-600, Section 4 shall be followed for all pressure testing.

The test pressure shall not exceed pipe and/or thrust resistant design pressures. The test pressure shall not vary by more than plus or minus five (5) psi for the duration of the test.

All newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing or fifty (50) psig whichever is greater.

B. Pressurization

Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City. The pump pipe connection and all necessary apparatus, including gauges and meters shall be furnished by the Contractor. Before applying the specified test pressure, air shall be expelled completely from the test section.

Any exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or joints that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the City or his representative.

C. Leakage Test

After the completion of the pressure test a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within five (5) psi of the specified test pressure after the pipe has been filled with water and the air has been expelled.

Leakage shall be measured by a drop-in pressure in a test section over a period of time.

For sanitary pressure lines, no leakage shall be permitted during the 2-hour test period.

8.6 Lift Station Pump Testing

Lift station pump test will be performed by the City or his 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(s).

A. Manufacturer's Start-Up

Prior to the City'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 City or his representative must be present at the time of manufacturer's start-up.

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:

1. Three (3) copies of a letter certifying that all pumping and electrical equipment has been installed and is operating in accordance with manufacturer's requirements;
2. Two (2) sets of Operation and Maintenance Manuals; and
3. One (1) complete set of Spare Parts as specified.

B. Final Inspection

The Contractor shall provide the following pump test equipment and materials:

1. Water to conduct test;
2. Amp/voltmeter;
3. Stopwatch;
4. Tape or level rod to measure float settings;
5. Keel to mark float settings on lift station wall;
6. Calibrated test gauge to measure operating head. The gauge shall be calibrated in feet of water from zero (0) to one hundred (100) feet in one (1) foot increments; and
7. Manufacturer's pump performance curves.

The City's representatives attending the final inspection shall re-check any deficiencies. The City's representatives shall then complete a cursory final inspection checklist and perform pump down tests which shall include the following:

1. Manual check of all level ON-OFF operation, alarm and run lights;
2. Determination of inflow rate (if any);
3. Determination of pump capacity for each pump individually and both/all pumps simultaneously;
4. Determination of pump capacity with force main full. Verification of full force main shall be determined by pressure gauge provided by Contractor. Force main shall be considered full when the line pressure stabilizes; and
5. Plot performance of each pump or pump curves provided by Contractor.

Contractor shall provide all water necessary to conduct the pumping tests 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 City 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 City and reinspected/retested prior to final acceptance.

8.7 Lateral Location Forms

The Developer/Contractor shall submit a lateral location form for each lot, measuring from the nearest upstream and downstream manhole to the lateral. The form shall be completed and signed by the Contractor, the City or his representative during lateral inspection. This form shall include one (1) digital photograph taken from the point of connection to the public sewer, looking back along the lateral to the building.

8.8 Acceptance

In order for the City to issue final acceptance, the following items shall be submitted, completed or on file:

- A. Copies of all testing reports and data;
- B. Copies of all O & M Manuals for lift station(s) (if applicable);
- C. Pump manufacturer's certification letter (if applicable);
- D. Lift station final inspection checklist (if applicable);
- E. Final payment for inspection services;
- F. Lateral location forms;
- G. As-Built drawings;
- H. Maintenance bonds; and
- I. Daily inspection reports.

FINAL INSPECTION

SUBMERSIBLE LIFT STATION CHECK LIST

Job No.:
Address:
Contractor:
Engineer:
Pump Supplier:
KW Meter No.:
Date:

I. ELECTRIC

- A. Is the power system 3 phase or 1 phase?
- B. If 3 phase, is grounded neutral provided? YES () NO ()
- C. If above answer is "No", is transformer installed? YES () NO ()
- D. Voltage Readings:
 - 1. Between phases: L1, L2 _____ L1, L3 _____ L2, L3
 - 2. High phase to ground:
 - 3. Other legs to ground:
- E. High leg (L₃) is connected to motor only and not to any auxiliary circuits:
YES () NO ()
- F. Do latches on control panel work smoothly? YES () NO ()

Remarks

II. PUMP AND MOTOR CONTROLS

- A. Breaker switches operate properly:
 - 1. No. 1 Pump YES () NO ()
 - 2. No. 2 Pump YES () NO ()
 - 3. Control Circuit YES () NO ()
 - 4. Remote Monitor Circuit YES () NO ()
- B. Hand-Off-Automatic Switches:
 - 1. No. 1 Pump Hand Position Operates YES () NO ()
 - 2. No. 2 Pump Hand Position Operates YES () NO ()
- C. Amperage:
 - 1. Name Plate Rating (amps) No. 1 Motor
 - 2. Amps Pulled By No. 1 Motor
 - 3. Name Plate Rating (amps) No. 2 Motor
 - 4. Amps Pulled By No. 2 Motor
- D. Automatic Operation:
 - 1. No. 1 Pump Automatic Position Operates YES () NO ()
 - 2. No. 2 Pump Automatic Position Operates YES () NO ()

- | | | | |
|----|---|---------|--------|
| 3. | Do the level controls sequence pumps properly properly with relation to lead pump on, lag pump on, and alternation? | YES () | NO () |
| E. | Seal Failure/Heat Sensor: | | |
| 1. | Seal failure wires connected properly to seal failure circuit? | YES () | NO () |
| 2. | Test seal failure circuit OK: | YES () | NO () |
| 3. | Heat sensor wires connected properly to heat sensor circuit? | YES () | NO () |
| 4. | Test heat sensor circuit OK: | YES () | NO () |
| F. | 1. High water alarm light and horn activate with test button: | YES () | NO () |
| | 2. Horn silence with silence button? | YES () | NO () |
| | 3. High water alarm light and horn activate with float? | YES () | NO () |
| G. | Level Setting: | | |
| 1. | Lead pump kicks on at EL ___ (___' ___") from wet well bottom. | | |
| 2. | Lead pump kicks off at EL ___ (___' ___") from wet well bottom. | | |
| 3. | Lag pump kicks on at EL ___ (___' ___") from wet well bottom. | | |
| 4. | Lag pump kicks off at EL ___ (___' ___") from wet well bottom. | | |
| 5. | Height of influent sewer above floor of wet well ___' ___". | | |
| 6. | Height of high water above floor of wet well ___' ___". | | |
| 7. | Top of basin EL _____.
Total basin depth ___' ___". | | |

Remarks

III. PUMPS AND MOTORS

A. Operation

- | | | |
|------------------------------------|---------|--------|
| 1. Are pumps running quietly? | | |
| a. No. 1 | YES () | NO () |
| b. No. 2 | YES () | NO () |
| 2. Are motors running quietly? | | |
| a. No. 1 | YES () | NO () |
| b. No. 2 | YES () | NO () |
| 3. Is excessive vibration noticed? | | |
| a. No. 1 | YES () | NO () |
| b. No. 2 | YES () | NO () |

Remarks

IV. REMOTE MONITOR PANEL (if required)

- | | | |
|---|---------|--------|
| A. Verify start-up procedure completed properly and put "On-Line" by remote monitor panel supplier: | YES () | NO () |
|---|---------|--------|

V. VALVES

A. Check Valves

- | | | |
|--|---------|--------|
| 1. Do clappers swing freely? | YES () | NO () |
| 2. Does packing leak? | YES () | NO () |
| 3. Are counterweights adjusted properly? | YES () | NO () |

B. Plug Valves

- | | | |
|---|---------|--------|
| 1. Do valves open and close properly? | YES () | NO () |
| 2. Does packing leak? | YES () | NO () |
| 3. During operation, are all gates completely open? | YES () | NO () |

Remarks

VI. PUMP DOWN TEST

A. Diameter of wet well _____' _____".

(Re: 6'0" = 212 gallon/ft) (7'0" = 288 gallon/ft) (8'0" = 376 gallon/ft)

<u>ITEM</u>	<u>LEVEL</u>	<u>LEVEL</u>		<u>GAL.</u>	<u>TIME</u>		<u>GPM</u>
			<u>DIFFERENCE</u>		<u>TIME</u>	<u>DIFFERENCE</u>	
Pump #___ ON	_____		_____	_____	_____		_____
Pump #___ OFF	_____		_____	_____	_____		_____
Pump #___ ON	_____		_____	_____	_____		_____
Pump #___ OFF	_____		_____	_____	_____		_____
Pump #___ ON	_____		_____	_____	_____		_____
Pump #___ OFF	_____		_____	_____	_____		_____
Pump #___ ON	_____		_____	_____	_____		_____
Pump #___ OFF	_____		_____	_____	_____		_____
Pump #___ ON	_____		_____	_____	_____		_____
Pump #___ OFF	_____		_____	_____	_____		_____
Pump #___ ON	_____		_____	_____	_____		_____
Pump #___ OFF	_____		_____	_____	_____		_____
Pump #___ Average GPM							
Pump #___ Average GPM							
Pump #___ Average GPM							
Pump #___ Average GPM							

VII. ALARM SYSTEM

A. Code Indication - Functioning

- | | | |
|------------------------------|---------|--------|
| 1. Pump overload trip: | YES () | NO () |
| 2. Wet well high water: | YES () | NO () |
| 3. Submersible seal failure: | YES () | NO () |
| 4. Power failure: | YES () | NO () |
| 5. Open: | YES () | NO () |
| 6. Restore to normal: | YES () | NO () |
| 7. Low battery: | YES () | NO () |

Remarks

VIII. EQUIPMENT

- | | Manufacturer | Model | Size | Serial # |
|-----------------------------|---------------------|--------------|-------------|-----------------|
| A. Pumps: | | | | |
| B. Motors: | | | | |
| C. Pump Circuit Breaker: | | | | |
| D. Starters: | | | | |
| E. Heaters: | | | | |
| F. Control Circuit Breaker: | | | | |
| G. Remote Monitor: | | | | |
| Circuit Breaker: | | | | |
| H. Alternator: | | | | |
| I. H-O-A Switches: | | | | |
| J. Plug Valves: | | | | |
| K. Check Valves: | | | | |
| L. Other: | | | | |
| 1. | | | | |
| 2. | | | | |

Remarks