

GRAVITY SEWERS AND MANHOLES

TESTING OF SEWERS AND MANHOLES

- A. General. The completed lines shall be tested for leaks and visually checked for straightness of line and cracked pipe. If any deficiencies in line or grade are found which will be detrimental to the proper functioning of the sewer, the deficiencies shall be corrected. Any damaged or cracked pipe shall be excavated and relined in a manner satisfactory to the Engineer. Any section of sewer which is found to be leaking in excess of the allowable quantity shall be repaired.
- B. Acceptance Test: The Contractor shall furnish all equipment necessary for testing. Acceptance tests shall be made in the presence of the Engineer. All defects shall be repaired to the satisfaction of the Engineer. Each reach of sewer shall meet the requirements for the following acceptance tests:
- Lapping. Each section of sewer line between manholes shall be straight and uniformly graded. Each such section will be lapped. Lapping will be performed by the Engineer.
 - Leakage Tests. Leakage test may be by exfiltration, by infiltration, or by low-pressure air testing as specified.

- Exfiltration. The total exfiltration shall not exceed 200 gallons per inch of nominal diameter per mile of pipe per day. For purposes of determining maximum allowable leakage, manholes shall be considered section of 48 inch pipe.
 - Testing Procedures
 - The contractor shall furnish all equipment for testing.
 - Seal off the downstream end to the line to be tested. Fill with water to a minimum head of 2 feet in the manhole at the upstream end.
 - A period of at least one hour will be allowed for absorption time before making the test.
 - A suitable meter or method of measuring the quantity of water used is necessary.
 - The test shall be run a minimum period of 2 hours.
 - Infiltration. Pipe joints shall be protected from damage in the field prior to laying. Lubricants, primers, adhesives, etc., shall be recommended by the pipe manufacturer's specifications to obtain the degree of water-tightness required. The maximum rate of infiltration shall not exceed 200 gallons per inch of pipe diameter per day per mile. Infiltration exceeds this rate the leakage source(s) shall be located and repairs made as necessary. The infiltration test shall be performed with a minimum positive head of 2 feet. A suitable meter or method of measuring the quantity of water leaked into the sewer line is necessary.

AIR TEST

- LOW PRESSURE AIR TEST. The air test, if used shall conform to the test procedure described in ASTM C-828, for vitrified clay pipe, ASTM C-924 for concrete pipe, and ASTM F-1417 for plastic pipe.
 - Test Procedure:
 - Before testing, the pipe shall be thoroughly cleaned.
 - The Contractor shall seal off the section of pipe to be tested at each manhole connection. Test plugs must be securely braced within the manholes.
 - UNDER NO CIRCUMSTANCES ARE WORKERS TO BE ALLOWED IN THE CONNECTING MANHOLES WHILE A PRESSURE TEST IS BEING CONDUCTED.
 - Add air slowly into the test section. After an internal pressure of 4.0 psi is obtained, allow internal air temperature to stabilize.
 - After stabilization period, adjust the internal air pressure to 3.5 psi, disconnect the air supply and begin timing the test.
 - Refer to the following Table A at the end of this section to determine the length of time (minutes) the section under test must sustain while not losing in excess of 1 psi as monitored by the test gauge.
 - Sections so determined to have lost 1 psi or less during the test period will have passed the leakage test. Those sections losing in excess of 1 psi during the test period will have failed the leakage test.
 - Appropriate repairs must then be completed and the line re-tested for acceptance.

SANITARY SEWER AIR TEST (TABLE A)											
Minimum Specified Time Required For A 1.0 psig Pressure Drop For Size and Length of Pipe Indicated for Air Leak Rate+0.0015 CFM / S.F. For Plastic Pipe											
Specification Time For Length (L) Shown, min's											
Pipe Diameter In.	Minimum Time, minis	Length For Minimum Time, Ft	Length For Longer Length, s	SPECIFICATION TIME FOR LENGTH (L) SHOWN, min's							
				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	11:24	14:15	17:05	19:56	22:47	25:38	28:29
15	14:10	159	5.342L	14:10	17:48	22:15	26:42	31:09	35:36	40:04	44:31
18	17:00	123	7.692L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	46:34	56:58	68:52	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	33:37	53:27	71:13	89:02	106:50	134:38	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

- Vacuum Test of Manholes. The vacuum test, if used, shall conform to the test procedure described in ASTM C-1244. Test shall be performed with suitable apparatus made for such purpose and shall draw vacuum of 10 inches of Mercury (hg). Test passes if vacuum remains at 10 inches of Hg or drops to not less than 9 inches of Hg in 1 minute.
- Deflection Test. Not less than thirty (30) days after final backfill has been placed the Contractor shall perform a deflection test on all flexible pipe with the Engineer present. The test is to be run using a rigid ball or mandrel having a diameter equal to 95% of the inside diameter of the pipe. The tests shall be run without mechanical pulling devices. The pipe shall not exceed a deflection of 5%.

SEWER MAIN INSTALLATION ALWAYS KEEP THE SEWER MAIN ON EASEMENT

- Sewer mains are to be at least 8" PVC with a SDR35 rating.
- Metropolitan Sewer District Specifications are to be followed, unless otherwise directed by the City.
- On new construction and sewer taps, as-built location of laterals must be provided to the City.
- Final Testing: A Mandrel must be pulled through and an air test may be required.
- Brick shall not be used on sanitary manholes.
- All sanitary sewer manholes shall be waterproofed on the exterior in accordance with the Missouri D.N.R. Specification 10CSR-8, 120(7) (E).
- All sanitary sewer construction shall conform to current City of O'Fallon Sewer District Standards and Specifications.
- All pipes shall have positive drainage through manholes. No flat base structures are allowed. All terminal manholes shall have positive drainage.
- All trench backfill under paved areas shall be 1" clean (minus rock may be used with written approval by the Street Superintendent), granular backfill, water jetted, and all trench backfills may be earth material (free of large clods or stones, nothing over a 6" diameter) and shall be water jetted, inspected and approved by the O'Fallon Street Superintendent.
- All sewer taps built without elevations furnished by the Engineer will be the responsibility of the sewer contractor.
- Easements shall be provided for storm sewers sanitary sewers, and all utilities on the record plat. See record plat for location, size, and width of easements.
- The City of O'Fallon Sewer District shall be notified at least 48 hours prior to construction of sanitary sewers for coordination and inspections.
- All drop sewer lines are to be ductile iron for the first 20', upstream from the manhole.
- All drop manholes are to be 48", waterproofed. All double drop manholes are to be 60" water proofed.
- 42" manholes/Waterproofed are used for 8" sewers only. 48" manholes/Waterproofed are used for all sewer over 8".
- All sewer mains 20' in depth are to be C900PVC.
- Small field changes may be made by the City Inspector. Larger changes have to be resubmitted to the City Engineer for approval by the Developer's Engineering Company.
- As-built drawings must be sent to the City before the project can be turned in as complete.

NOTE: 24 HOUR NOTICE REQUIRED ON ALL INSPECTIONS

INSTALLATION OF WATER MAINS

"ALWAYS KEEP THE WATER MAIN ON EASEMENT"

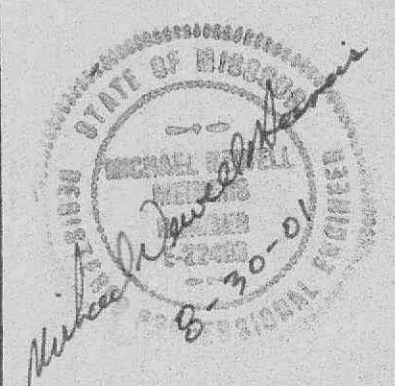
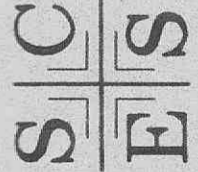
- Water main should be located 5' behind the curb, as not to interfere with other utility locations.
- All water mains should be 8 inches in diameter, or larger. The last 300' can be 6" diameter pipe. The Pipe should have a Minimum Pressure Rating (PR) of 200 PSI or SDR-21 for 8" and C-900 class 150 or SDR 18 for 12" or larger pipes. All water mains of PVC Material shall be certified by NFS and listed in NFS Standard 61. NFS stands for NSF International which is an agency that certifies materials, such as pipe, valves, etc., for use in potable water systems among other things. Standards 61 is the (ANSI/NSF Standard 61) is a listing of certified drinking water components. The Missouri DNR requires that products which come in contact with drinking water be listed in NSF Standard 61. If the pipe is NFS certified, it will have a stamp on the pipe that says "NSF-pw".
- Fire Hydrants must be Mueller Steamer Centurion and painted yellow in color and all valves must be Mueller Mechanical joint resilient wedge gate valve. A fire hydrant is required at the end of all dead end waterlines, including those which may be extended at a later date.
- All fire hydrants are to have valves flanged to the tee and (with a total length of 38" or less) hydrants swivel anchored to the valve. Clean 1" rock should be used to backfill above the weep holes of the fire hydrant.
- The contractor shall place all fire hydrants between 1.5 feet and 3 feet from the street curb (measured from the edge of the fire hydrant). The buryline should be set 6" higher in elevation than the top of curb.
- These water bends (45 degrees, 22 1/2 degrees, 11 1/4 degrees), are to be made with mechanical joint fittings using mega lugs up to 10" diameter, 12" or larger requires mega lugs and concrete blocking. Concrete not to be on nuts or bolts. Ninety degree bends are not allowed. The first slip joint, up and down stream after fittings, should be restrained per pipe manufacturer specs.
- Tees, 4-ways, etc. shall have concrete blocking. Concrete not to be on nuts or bolts.
- Rocky soils shall require bedding 6" under and 6" over water pipe.
- Concrete encasement required, to DRN Specification, when crossing storm or sanitary sewers. Sanitary: Vertical is 18", horizontal is 10". Storm: vertical is 12", horizontal is 3".
- Must use appropriate sized casings when crossing streets.
- Must attach coated solid core, #6 bare or #6 coated tracer wire, taped to the top of pipe. All wire must run up the outside of the PVC SDR 21 valve box and 1 to be tucked inside the valve box under the water lid.
- Use 3M waterproof splice kits for all splicing of tracer wire.
- Any project with over 1500' of pipe should use the 2500' rule of tracer wire to eliminate splicing. Any project where the fire hydrants, or valves, are over 600' apart, tracer wire with a connection box must be installed every 500'.
- A chlorine test is required. It must initially test at 25 PPM, or greater, and 24 hours later 10 PPM must be present. It must be tested by the City Inspector, and have 24 hours notice prior to that inspection. The main will be tested for CL2 every 1,200' of pipe.
- If chlorine test fails then the main must be re-chlorinated.
- The contractor will meter water and pay for it, or they may purchase one (1) day usage tags. Daily tags are \$25.00 per day, not to exceed five (5) days. Hydrant meters are at Public Works and meters require a \$1,600 deposit.
- Coliform samples should be collected every 1,200'.
- Final Pressure Test: The water main must be pumped up to 150 PSI and maintain this pressure for two hours without any drop in pressure. The city may require higher pressure test if deemed necessary.
- Gas, water and other underground utilities shall not conflict in depth or horizontal location of existing and proposed sanitary and storm sewers including house laterals.
- All waterline construction shall conform to current City of O'Fallon Standards and Specifications.
- The contractor shall place the "streamer" outlet of a fire hydrant towards the street.
- Backfill no debris larger than 6" in diameter.
- All creek crossings will require ductile iron pipe. If less than 3' of cover, concrete encasement with rip-rap required.
- Hydrant distances: 600'/300' - Residential/commercial pending.
- Easements shall be provided for water mains, and all utilities in the record plat. See record plat for location, size, and width of easements.
- The City of O'Fallon Water Department shall be notified at least 48 hours prior to the construction of water mains for coordination and inspections.
- All open mains should be properly capped when the main is unattended for more than 4 hours. Duct tape the end closed so it is visually seen.
- All bore casings, except service lines, shall have a casing spacer every 10'.
- All service lines under the streets are to have a 2" PVC casing installed, at a minimum of 30" depth. Larger casings may be required depending on service size requested or required. All water mains shall be buried at a depth to allow a minimum cover of 42".
- Notify the City when work stops and when the Contractor will not be continuing work. Twenty-four (24) hour notice is required notifying when work will continue.
- All water mains are to be installed in a straight line (no bends in individual pipes). A 5% deflection in joints is allowed. Bends around cul-de-sacs are to be made with 22 1/2 degree elbows.
- Small field changes may be made by the City Inspector. Larger changes have to be resubmitted by the Developer's Engineer for approval.
- As-Built drawings must be sent to the City before the project can be considered Final. (Ex. Showing location changes of elbows, elevations, easements, etc.)

NOTE: 24 HOUR NOTICE REQUIRED ON ALL INSPECTIONS

REVISED AS PER CITY COMMENTS
07/11/01
06/23/01

PUND PLACE
SANITARY NOTES

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