

LOGAN TOWNSHIP
MUNICIPAL UTILITIES AUTHORITY

DESIGN,
CONSTRUCTION,
INSPECTION
AND
TESTING
MANUAL

February 2010

LOGAN TOWNSHIP UTILITIES AUTHORITY
INSPECTION AND TESTING PROCEDURE
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SECTION 1. TESTING OF PUBLIC SANITARY SEWER SYSTEMS

A. Infiltration

1. Objective

This procedure establishes the method(s) to be used for the testing of the sanitary sewer systems.

2. Purpose

The purpose of this procedure is to establish a uniform method and practice in testing sanitary sewers for infiltration when ground water is present.

3. Infiltration Test Procedures

* The test shall be performed in the presence of the MUA Inspector.

- a. Examine the sanitary sewer system for infiltration at the downstream end of the system after construction has been completed and prior to any sanitary building connections.
- b. In the event that there is infiltration and water is flowing at the downstream end of the system, then the source of flow must be determined.
- c. To isolate the source, it is necessary to go upstream one manhole at a time, to find where the flow is originating. This is done by plugging the first upstream manhole and observing to see if the flow stops. This procedure is repeated one manhole at a time until the infiltration has been isolated.
- d. When the infiltration has been isolated to a section or area, further investigation by the Contractor will be required to eliminate the infiltration.
- e. Allowable infiltration shall not exceed a rate of 50 gallons per mile, per inch of sewer diameter per 24 hours.

B. Exfiltration (Air Test)

1. Objective

This procedure establishes the method(s) to be used for the testing of the sanitary sewer systems.

2. Purpose

The purpose of this procedure is to establish a uniform method and practice in testing sanitary sewers for exfiltration.

3. Exfiltration (Air Test) Procedures

* The test shall be performed in the presence of the MUA Inspector.

- a. The low pressure air test is the most desirable method of testing and should be used when possible. The low pressure air test is very fast, and isolation of leaks is very precise.
- b. Prior to the start of the exfiltration test, all construction work for the system under test shall be completed. This includes backfilling and completion of all manholes. Installation of the curbing and stabilized base course must be completed prior to testing.
- c. Low pressure air test (4.0) to be conducted between two consecutive manholes, as directed by the MUA Inspector.
- d. The test section of the sewer line is plugged at each end. One of the plugs used at the manhole must be tapped and equipped for the air inlet connection for filling the line from the air compressor.
- e. All service laterals, stubs and fittings into the sewer test section should be properly capped or plugged, and carefully braced against the internal pressure to prevent air leakage by slippage and blowouts.
- f. Connect air hose to tapped plug selected for the air inlet. Then connect the other end of the air hose to the portable air control equipment which consists of valves and pressure gauges used to control:
 1. The air entry rate to the sewer test section, and
 2. To monitor the air pressure in the pipe line.
- g. More specifically, the air control equipment includes a shut-off valve, pressure regulating valve, pressure reduction valve and a monitoring pressure gauge having a pressure range from 0 to 5+ psi. The gauge should have a minimum division of 0.10 psi and an accuracy of 0.04+ psi. See Figure No. 1 for typical control equipment apparatus.
- h. Connect another air hose between the air compressor (or other source of compressed air) and the air control equipment. This completes the test equipment set-up. Subsequent to set-up, test operation may commence.

- i. Supply air to the test section slowly, filling the pipe line until a constant pressure of 4.0 psig is maintained. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding a dangerously high level of air pressure.
- j. When constant pressure of 4.0 psig is reached, throttle the air supply to maintain the internal pressure above 3.5 psig for at least 5 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall. During this stabilization period, it is advisable to check all capped and plugged fittings with a soap solution to detect any leakage at these connections. If leakage is detected at any cap or plug, release the pressure in the line and tighten all leaky caps or plugs. Then start the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new five minute interval must be allowed after the pipe line has been refilled.
- k. After the stabilization period, adjust the air pressure to 4.0 psig and shut off or disconnect the air supply. Most Authorities consider it unnecessary to determine the air temperature inside the pipe line and the barometric pressure at the time of the test unless so ordered by the Authority's Engineer.
- l. If the air pressure drops but remains above 3.5 psig. (3.5 psig being the cut off) and does not exceed the starting pressure of 4.0 psig in the allowable time, in minutes and seconds, shown in Table 1 for the designated pipe size, the section be presumed to be free of defects. The test may be discontinued at that time.
- m. If the air pressure drops below 3.5 psig in the allowable time, in minutes and seconds, shown in Table 1 for the designated pipe size, the section undergoing the test shall not have passed the test; therefore, adequate repairs must be made and the line retested.

TEST AT 4.0 PSI WITH 0.5 PSI MAXIMUM ALLOWABLE LOSS

TABLE 1

*Pipe sizes with their respective Recommended Minimum Times, in Minutes and Seconds, for Acceptance by the Air Test Method.

TIME REQUIREMENTS FOR AIR TESTING		
PIPE SIZE (In Inches)	TIME	
	Minutes	Seconds
4	2	32
6	4	00
8	5	06
10	6	22
12	7	39
14	8	56
15	9	35
16	10	12
18	11	34
20	12	45
21	13	30

SANITARY MAIN INSPECTION

DATE: _____ CONTRACTOR: _____

PROJECT: _____ FOREMAN: _____

LOCATION: _____

AIR TEST / 4 POUNDS

Pipe Size (Inches): _____ Test Time (Minutes) _____

* Test at 4.0 PSI with 0.5 PSI Maximum Allowable Loss

LINES TESTED

MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:
MH	TO MH	LOSS:	LAMP:

Inspector: _____

MANHOLE INSPECTION

DATE: _____ CONTRACTOR: _____

PROJECT: _____ FOREMAN: _____

LOCATION: _____

MANHOLES

MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	
MH -	

Inspector: _____

To: Logan Township Municipal Utilities Authority
PO Box 71
Jefferson Lane
Bridgeport, NJ 08014

Reference: _____
Project

Section

As-Built Sanitary Sewer

This is to inform you that the sanitary sewer mains referred to above have been pressure tested and tamped in accordance with the project specifications.

A final inspection will be performed when the developer requests a release from the Performance Bond.

Sincerely,

Signature

Company

cc Executive Director, Logan Township MUA
Authority Engineer

- a. Determine air pressure correction, which must be added to the 4.0 psig normal starting pressure of test, by dividing the vertical height in feet by 2.31. The result gives the air pressure correction in pounds per square inch to be added.

Example: If the vertical height of water from the sewer invert to the top of the water column measures 11.55 feet, the additional air pressure required would be:

$$\frac{(11.55)}{2.31} = 5 \text{ psig}$$

Therefore, the starting pressure of the test would be 4.0 plus 5.0 or 9.0 psig, and the one half pound drop becomes 8.5 psig. There is no change in the allowable drop (0.5 psig) or in the time requirements established for the basic air test.

C. Pipe Alignment (Lamp Test)

1. Objective

This procedure established the method(s) to be used for the testing of the sanitary sewer systems.

2. Purpose

The purpose of this procedure is to establish a uniform method and practice in testing sanitary sewers for alignment.

3. Pipe Alignment (Lamp Test) Procedures

* The test shall be performed in the presence of the MUA Inspector.

- a. Alignment (tamp test) shall be done on all gravity sanitary sewer lines.
- b. Alignment consists of visually examining inside of pipe between two consecutive manholes with the aid of a light and mirror.
- c. A mirror is held at the invert of the pipe and adjusted so the light and barrel of pipe can be seen.
- d. The barrel of the pipe shall have no vertical deflection and at least 75% of the barrel shall be visible in the horizontal direction.

Vertical

Horizontal

- e. In the event that alignment shows the pipe not laid true and to grade, it shall be repaired and be aligned as necessary until the alignment complies with these requirements.

D. Television Inspection

1. Objective

This procedure establishes the method(s) to be used for the televising of sanitary sewer systems.

2. Purpose

The purpose of this procedure is to establish a uniform method and practice in testing sanitary sewers for defects via, television inspection.

3. Television Inspection Procedures

* The test will be performed by the MUA prior to final acceptance of the sanitary sewer system. The MUA maintains the option to require the Contractor to perform the testing.

- a. Television inspection will be employed as the method of final inspection of the completed gravity sewer mains. The Contractor shall furnish a complete portable closed-circuit television system for visual inspection of the interior of the sewers.
- b. The system to be furnished by the Contractor shall include all required television equipment, related equipment, electrical power to operate the

equipment, trained personal, and all floats, cables, reels, footage, counting devices, lights and other materials necessary to perform the inspection.

- c. The equipment used shall produce a clear, sharp image on the monitor screen. Any equipment not producing a satisfactory result on the monitor screen shall be replaced with another unit. The personnel operating the equipment shall be thoroughly familiar with the operation of the equipment and in interpreting the visual results obtained.
- d. Any irregularities in the pipe such as cracks, misalignment (horizontal or vertical) or poor joints, shall be corrected by the Contractor at his expense prior to acceptance of the project or for final payment.
- e. Contractor shall provide all information on attached televised inspection form. Alternate report format may be accepted if all requested information is clearly presented.
- f. The Authority or the Authority Engineer, has the right to waive the television inspection, if all other forms of testing meet the proper specifications.

*NOTE

1. Other methods of testing gravity sanitary sewer lines may be used, however, prior approval of the Authority Engineer, in writing, must be obtained prior to the test being performed.
2. The MUA Inspector may request a mandrel test to be performed, if not satisfied with other forms of testing and/or the construction practices in the field.
3. The Contractor shall comply with all OSHA requirements for confined space entry during testing operations.

SECTION II. TESTING OF PUBLIC FORCE MAINS & PRESSURE LINE SYSTEMS

A. Exfiltration (Pressure Test)

1. Objective

This procedure establishes the method(s) to be used for the testing of public force main.

2. Purpose

The purpose of this procedure is to establish a uniform method and practice in testing public force main for exfiltration.

3. Exfiltration (Pressure Test) Procedures

- * The test shall be performed in the presence of the MUA Inspector.
- a. After the pipe has been laid or installed, it shall be subjected to a pressure and leakage test. For pressure piping, this shall be conducted prior to the complete backfilling of the trench, unless otherwise permitted by the MUA Inspector, and for pressure piping in structures, this shall be conducted prior to the completion of any construction which would make it impossible or difficult to gain access to the pipe if found defective. The Contractor shall test sections of the pipes between valves, where practicable or where ordered by the MUA Inspector.
- b. The Contractor shall make the necessary arrangements with the Authority for the procurement of water for the pressure and leakage tests, and shall furnish the necessary labor, pumps, valves, pressure gauges, water meters and all other equipment required for this purpose. Each section of pipe, with water services installed, shall be subjected to a hydrostatic pressure of 50 PSI or 2 times the operating pressure, whichever is greater, and maintained for a period of two (2) hours.
- c. When the test pressure has been reached, the amount of make-up water to maintain the test pressure shall be measured. Leakage shall be defined as the quantity of water that must be supplied into the newly installed pipe or any valved section thereof to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
- d. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

When using 5 gallons of water in a bucket for make-up water:

(1) Measure H

(2) Measure h_2

$(5 \text{ gals.}) - (h_2/H) \times (5 \text{ gals.}) = \text{Gallons of Water Lost}$

Where H is the original height of water in the bucket and h_2 is the height of water in the bucket at the end of the 2 hr test.

- e. Allowable exfiltration rate is determined below

(1) Gallons of water lost over 2 hr test x 12 = gallons loss/day

(2) Miles of Pipe Tested = (force main test length in feet) / (5280 feet/mile)

(Gallons loss/day) / (Miles of Pipe Tested) = Gallons loss/mile/day

(3) (Gallons loss/mile/day) / (Pipe diameter in inches) =
Exfiltration in gallons/inch dia./mile/day

*Allowable exfiltration rate is 50 gallons/inch dia./mile/day

Example:

Test Pressure = 2 x TDH x 0.4333

Total Dynamic Head (TDH) = 130

Test Pressure = 90 PSI

*NOTE:

Other methods of testing public force mains and/or pressure lines may be used; however, prior approval of the Authority Engineer, in writing, must be obtained prior to the test being performed.

FORCE MAIN INSPECTION

DATE: _____ CONTRACTOR: _____
PROJECT: _____ FOREMAN: _____
LOCATION: _____

EXFILTRATION TEST

All force mains shall be subjected to a hydrostatic pressure 50 PSI or 2 times the operating pressure whichever is greater or as required by specifications and maintained for a period of one (1) hour.

Pipe Size: _____ Linear Feet: _____
2 x TDH 0.4335 = Test Pressure

TDH: _____ Test Pressure: _____ PSI

Hydrostatic
Time/Pressure

Start: _____ : _____ / _____ psi
Finish: _____ : _____ / _____ psi _____ Gallons of make-up water

Pressure Test: Passed Failed

No pipe installed will be accepted until the amount of leakage does not exceed 50 gallons per day per inch diameter per mile of pipe.

** TDH = Total Dynamic Head

Inspector: _____

Calculations to determine loss per inch of pipe per day per mile shall be done as follows:

(1) Gallons of water lost over 2 hr test x 12 = gallons loss/day

(4) Miles of Pipe Tested = (force main test length in feet) / (5280 feet/mile)

(Gallons loss/day) / (Miles of Pipe Tested) = Gallons loss/mile/day

(5) (Gallons loss/mile/day) / (Pipe diameter in inches) =
Exfiltration in gallons/inch dia./mile/day

*Allowable exfiltration rate is 50 gallons/inch dia./mile/day

SHOW CALCULATIONS BELOW

Both the Authority and Authority Engineer have the right to substitute and/or adopt new methods of testing procedures, into the Design, Construction, Inspection and Testing Procedures Manual, to meet with any required or changing specifications.

The attached Standard Details are required for all sanitary sewer system construction with no exception.

SANITARY

1. To make sure all construction performed in the field is in accordance with the approved plans and M.U.A. specifications (w/no exceptions) unless approved by our office.
2. Laser and target used for main and set to proper slope per plan.
3. Check all plans and cut sheets for any changes from approved plans.
4. 3/4" Stone under all manholes and first pipe in and out
5. MH must have protective coating on outside.
6. MH's must have rubber gasket between sections and ram's neck when soil conditions are wet. And if wet soil conditions are, present, 3/4" stone bed under main.
7. MH seams inside must be rubbed down with a non shrink grout.
8. Channels are to be smooth and properly constructed if not pre-cast.
9. No more than 12" of block can be used to raise casting to proper grade.
10. Make sure proper castings are used per plan.
11. Make sure castings are grouted in place.
12. If MH sections are damaged (mark them with paint) and don't accept.
13. Drop manholes to be constructed with DIP pipe. PVC drop pipe to be used in connection with precast drop manhole base. If DIP is used, use IDIP sleeve with transition rubber or a dresser clamp to adapt to PVC. DIP to be installed 20 LF out of drop manhole.
14. Anything over 2 FT. is a drop manhole, and must always be inside MH.
15. All lateral clean out stacks need PVC female adapters with 4" brass cleanout plugs.
16. Concrete encasement must be installed if 18" or less vertically clearance exist between pipes.
17. Minimum fall for 8" PVC is 0.003 feet per foot and maximum is 0.100 feet per foot
The minimum fall for 8" PVC is 0.004 feet per foot for section of sewer main

originating with terminus manholes. All pipe sections installed at the minimum allowable slope shall have as-built installation surveyed by a licensed surveyor to confirm the minimum slope is provided. The slope must be met prior to acceptance by MUA.

18. All laterals must be installed before pressure test is performed.
19. Standard pressure test for 8" PVC is 4 LBS. for 5 min. with a 1/2 pound loss. Pipe size will vary test procedures. Follow chart in manual.
20. Lamping of lines = look for belly in pipe/straightness/silted in/75% of moon. As-builts must be ready before pressure test is performed.
21. Laterals to be 4 Ft. deep behind the curb (at clean out) min. of 3 FT. and max. 5 Ft.
22. If you are not present at time of installation and backfilling, leave all pipe crossing and MH's exposed until you arrive for inspection. If backfilling occurs it will be exposed before our acceptance. If not back before end of day, they may backfill for safety reasons.
23. The method and equipment to be used for compaction must be submitted for approval prior to construction.
24. As-built plans, signed and sealed by the applicants engineer, must be submitted and approved by the Authority before a final test is performed. Along with as-builts, applicant shall supply a CD with GIS coordinates of all manholes affected by the work, and a video tap of new or modified sanitary mains. The Authority inspector/Engineer will note on the as-built and sign subsequent to a satisfactory test.

LTMUA CONSTRUCTION GENERAL NOTES:

1. ALL CONSTRUCTION, MATERIALS, RESTORATIONS AND METHODS OF INSTALLATION IN TOWNSHIP ROADS SHALL BE SUBJECT TO THE REQUIREMENTS AND APPROVAL OF THE MUNICIPALITY.
2. SANITARY SEWER CONSTRUCTION, MATERIALS AND TESTING SHALL BE SUBJECT TO THE APPROVAL OF AN INSPECTION BY THE LOGAN TOWNSHIP M.U.A. REPRESENTATIVE, AND SUBJECT TO L.T.M.U.A. RULES AND REGULATIONS.
3. SANITARY SEWER MAINS SHALL BE A MINIMUM SIZE OF 8" POLYVINYL CHLORIDE (PVC) PIPE (MEETING ASTM 03034, SDR 35 SPECIFICATIONS. CONNECTION TO NEW SEWER MAIN SHALL BE WITH 8 " X 4" - TEE, A 4" PVC SEWER PIPE LATERAL CONSTRUCTED AT 1/4" PER FOOT MINIMUM SLOPE AND ONE (1) BUILDING TRAP WITH VENT SHALL BE PROVIDED FOR EACH UNIT.
4. ALL SANITARY SEWERS SHALL BE CONSTRUCTED WITH CLASS "C" MODIFIED BEDDING UNLESS OTHERWISE NOTED.
5. WHEREVER THE TRENCH BOTTOM DOES NOT AFFORD SUFFICIENT BEARING STRENGTH TO SUSTAIN THE WEIGHT OF THE PIPE AND SUPERIMPOSED LOADS, IT SHALL BE OVER EXCAVATED AND STABILIZED WITH A LAYER OF CRUSHED STONE.
6. THE CONTRACTOR SHALL CONSTRUCT TEST PITS AS REQUIRED TO VERIFY THE LOCATION AND. THE DEPTH OF ALL EXISTING UTILITIES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND PROPOSED FACILITIES.
7. CONTRACTOR EFFORTS SHALL BE MADE TO RETAIN EXISTING TREES, VEGETATION AND NATURAL CHARACTERISTICS OF THE TRACT.
8. THE CONTRACTOR SHALL PAY ALL STREET OPENING FEES AND GIVE NOTICES NECESSARY FOR AND INCIDENTAL TO THE DUE AND LAWFUL EXECUTION OF THE PROJECT.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES BEFORE EXCAVATION.
10. NO MATERIALS SHALL BE PLACED NOR ANY DISTURBANCE PERMITTED BEYOND THE PROJECT PROPERTY LINE WITHOUT THE WRITTEN PERMISSION OF THE PROPERTY OWNER DIRECTLY INVOLVED.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING, PAVING, TOPSOILING, SODDING, FERTILIZING AND SEEDING ALL AREAS DISTURBED BY HIS ACTIVITIES. ROAD PAVEMENT, REPLACEMENT, AND ALL RESTORATION IN COUNTY ROADS SHALL MEET THE REQUIREMENTS OF THE COUNTY ENGINEER.
12. INSPECTION OF, OR FAILURE TO INSPECT ANY MATERIALS OR WORKMANSHIP BY STATE, COUNTY OR TOWNSHIP OFFICIALS SHALL IN NO WAY RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITIES TO PERFORM THE WORK IN ACCORDANCE WITH APPLICABLE PLANS, SPECIFICATIONS AND LAWS.
13. PRIOR TO CONSTRUCTION, ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE APPROVED BY THE SOIL CONSERVATION DISTRICT IN COMPLIANCE WITH CHAPTER 251 OR THE PUBLIC LAWS OF 1975. ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE LEFT IN PLACE UNTIL CONSTRUCTION IS COMPLETED OR THE AREA IS STABILIZED IN ACCORDANCE WITH THE SOIL CONSERVATION DISTRICT'S RECOMMENDATIONS.
14. ALL SEWER INSTALLATIONS SHALL CONFORM TO THE REQUIREMENTS OF THE PROCEDURES MANUAL OF THE L.T.M.U.A.
15. THRUST BLOCKS ARE TO BE INSTALLED AT ALL FORCE MAIN BENDS.
16. SANITARY SEWER LATERALS SHALL NOT BE CONNECTED DIRECTLY INTO MANHOLES. AN EXCEPTION TO THIS RULE MAY BE MADE FOR COMMERCIAL OR INDUSTRIAL USERS AT THE DECISION OF THE LTMUA. DOMESTIC LATERAL CONNECTIONS SHALL BE MADE A MINIMUM TWO FEET AWAY FROM MANHOLE AND NOT INTO JOINT OF MAIN.
17. THE APPLICANT/OWNER IS AWARE AND AGREES THAT THE REVIEW BY THE L.T.M.U.A. AND AUTHORITY ENGINEER IS BASED UPON THE BEST INFORMATION AVAILABLE AND IN NO WAY DOES IT GUARANTEE THE EXISTENCE OF, OR NON EXISTENCE OF SANITARY SEWER AND FORCE MAINS, AND/OR APPURTENANCES. IT IS THE RESPONSIBILITY OF THE APPLICANT/OWNER TO VERIFY THE LOCATION OF SUCH MAINS/APPURTENANCES.
18. ANY UNITS HAVING FOOD PREPARATION FACILITIES SHALL INSTALL A GREASE TRAP WITHIN THE SEWER LATERAL. SIZING OF GREASE TRAP SHALL BE IN ACCORDANCE WITH L.T.M.U.A. RECOMMENDED CALCULATIONS AND SUBMITTED FOR REVIEW.

19. THE CONNECTION TO THE EXISTING MUA MANHOLE **MUST BE MADE WITH A CORING MACHINE AND WITNESSED BY THE MUA INSPECTOR.**
20. AN A-LOCK SEAL SHOULD BE USED AT THE PIPE PENETRATION. ONLY IN THE CASE THAT AN A-LOCK IS NOT POSSIBLE, THE ANNULAR SPACE SHOULD BE FILLED WITH NON-SHRINK GROUT.
21. WHEN POSSIBLE THE NEW BENCH CHANNEL SHOULD BE MADE WITH THE CORING MACHINE; OTHERWISE, THE BENCH CHANNEL SHOULD BE CAREFULLY SAWCUT OR HILTI CUT TO ACCOMMODATE THE NEW SEWER CONNECTION.
22. CHANNEL RECONSTRUCTION CEMENT SHALL BE SPEED-CRETE AS MANUFACTURED BY TAMMS, INC FORMED PORTLAND CEMENT CONCRETE OF 4,000 PSI COMPRESSION STRENGTH. ANY SUBSTITUTES MUST BE APPROVED BY THE LTMUA.
23. MANHOLE INTERIOR WALLS AND BENCHES SHALL BE PATCHED WITH CEMENTITIOUS PATCHING/PLUGGING COMPOUNDS AS MANUFACTURED BY TAMMS INC, OR APPROVED EQUAL.
24. A PIPE JOINT SHOULD BE PROVIDED WITHIN FOUR FEET OF THE MANHOLE CONNECTION TO ALLOW FOR DIFFERENTIAL SETTLEMENT.
25. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGES TO THE MANHOLE, THE SEWER OR THE ADJACENT PROPERTY DUE TO CONNECTION CONSTRUCTION.
26. **THE LOGAN TOWNSHIP MUA AND ITS ENGINEER MUST BE GIVEN 48 HOURS ADVANCE NOTICE OF SANITARY SEWER WORK AND AN LTMUA REPRESENTATIVE MUST BE PRESENT TO WITNESS THE CONNECTION.**

DROP MANHOLE:

1. A LINER OF MULTIPLE LAYERED FIBERGLASS FABRIC IMPREGNATED WITH A MODIFIED EPOXY RESIN MUST BE INSTALLED IN ALL DROP MANHOLES. THCP-610-SL-68 MULTIPLEX LINER SYSTEM OR APPROVED EQUAL. THE LINER SHALL BE OF THE TYPE THAT ALLOWS REHABILITATION OF A CONCENTRIC, ECCENTRIC OR FLAT TOP MANHOLE WITHOUT REMOVING THE MANHOLE RING AND TOP SECTION OR CORBEL. ONE SUCH SUPPLIER OF THE MULTIPLEX LINER SYSTEM IS TERRE HILL COMPOSITES, TERRE HILL, PENNA.
2. **THE LINER SHALL BE INSTALLED BY AN INSTALLER THAT IS QUALIFIED BY THE LINER MANUFACTURER.** THE CONTRACTOR SHALL WARRANT TO THE LTMUA IN WRITING THE INSTALLATION, FABRICS, AND RESINS TO BE FREE

OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF FIVE YEARS.

3. ALL SURFACES OF THE MANHOLE SHALL BE CLEANED WITH A HIGH PRESSURE WATER JET SPRAYER WITH AN OPERATING PRESSURE OF AT LEAST 3,500 PSI. THE LINER SHALL BE INSTALLED AND CURED IN PLACE IN LESS THAN TWO HOURS. OUTLETS AND BENCHES SHALL BE PROTECTED AND SEALED TO THE LINER BY THE APPLICATION OF THE EPOXY MASTIC-FIBERGLASS CLOTH CONSTRUCTION.
4. THE INSTALLER SHALL PLACE A FLEXIBLE TRANSITION PIECE BETWEEN THE LINER AND THE EXISTING STRUCTURE. THE FLEXIBLE CONNECTOR SHALL PROTECT THE LINER AGAINST DAMAGE FROM FROST HEAVE AND TRAFFIC IMPACT LOADS.
5. DROP MANHOLE PIPING SHALL BE " RELINER INSIDE DROP SYSTEM " AS SUPPLIED BY DURAN INC. OF LYNNE, CT, PHONE # 860-434-0277, DURAN@RELINER.COM

LOGAN TOWNSHIP MUNICIPAL UTILITIES AUTHORITY
ESTIMATED CONSTRUCTION COSTS
FOR SANITARY SEWER STEMS

Contact the Authority for current values to be used for estimating construction costs.