GENERAL NOTES

1. All construction shall conform to the current standards and specifications of the City of Troy. Prior to construction, the contractor shall attend a preconstruction meeting at a time and place arranged by the City Engineer, in which various utility companies and governmental agency representatives will be present. The design engineer shall submit approved plans to all utility companies and governmental agencies 10 (ten) days prior to the preconstruction meeting. Construction shall start within 3 (three) weeks of the meeting. The contractor shall notify the City Engineer 72 hours prior to starting any work.

2. The entire project area of publicly funded projects, and all areas not under the ownership of any private developer for privately funded projects, shall be digitally recorded in color prior to the start of construction. The DVD shall be utilized by the City to determine construction related damage and to assure adequate restoration.

3. Before start of construction, the contractor must request and have in his possession a sewer inspection permit issued by the Water Resource Commissioner's (WRC) office and contact the WRC office at 248-885-1105 24 hours prior to starting work. WRC must witness the new connection and all testing.

4. Prior to any excavation, the contractor shall telephone Miss Dig (1-800-482-7171) for the location of underground facilities and shall also notify representatives of other utilities located in the vicinity of the work. The contractor shall assume responsibility for the protection of all existing utilities, services and mains during construction. All costs for locating, removing and replacing or relocating these utilities, services and mains shall be included in the cost of constructing the sanitary sewer. All utilities, services and mains damaged during construction shall be repaired with like material. The contractor shall verify the depth and horizontal location of all existing utilities, services and mains before any work is started. The exact location of existing utilities, services and mains shall be determined by hand digging.

5. A City of Troy, Road Commission for Oakland County, and/or Michigan Department of Transportation permit is required for all construction within their road Right-of-Ways. It is the contractor's responsibility to secure all permits and bonds prior to construction, or to insure that all required permits and bonds have been obtained prior to starting construction.

6. The contractor shall abide by all the requirements of the road Right-of-Way owner regarding construction of sanitary sewer mains, maintaining traffic, barricading, boring, backfill and restoration. There will be no additional compensation due the contractor for complying with these requirements.

7. Prior to the start of construction, the contractor shall furnish material certificates to the City Engineer verifying that all the materials used on the project are in accordance with the specifications.

8. All construction changes must have written approval of the City Engineer.

9. Sewer Pipe Material:

a. 8" through 15" pipe shall be PVC (Poly Vinyl Chloride) composite sewer pipe conforming to the current ASTM D2680 specifications with elastomeric rubber gasketed joints for PVC.

b. 18" and larger pipe shall be reinforced concrete circular sewer pipe conforming to the current ASTM specification C-76 (Wall C) with size and class as indicated on the plans. All reinforced concrete sewer pipe shall be cast with reinforcing steel extending into the spigots. All joints and gaskets shall be modified tongue and groove, conforming to the requirements of ASTM (C-443).

c. Extra strength vitrified clay pipe conforming to the current ASTM specification (C-700). For use in industrial areas only.

10. All new manholes shall have approved flexible, water-tight seals where pipes pass through walls. Manholes shall be precast reinforced concrete in accordance with ASTM C478 current specifications. Precast manhole joints and gaskets shall be modified tongue and groove in accordance with ASTM C443 current specifications. Precast manhole cone sections shall be City of Troy modified eccentric cone type. All manholes shall be provided with bolt down frames and bolted, water-tight covers reading "City of Troy" in raised letters.

11. All precast manholes, slab bases, concrete pipe and concrete channelization shall be manufactured with Type II, IP or IIA cement.

12. Manhole steps shall normally be provided on a back wall of the manhole furthest from traffic, manhole steps shall be factory installed at 16 inches center to center spacing. Steps shall be M.A. Industries P.S.I. Polypropylene MSU #360 ALU Poly or approved alternate.

13. At the connections to manholes, sewers or extensions thereto, drop connections will be required when the difference in invert elevations exceeds 18 inches. All drop connections are to be interior, minimum manhole diameter is 5 feet.

14. Existing manholes shall be tapped with the "Kor-N-Seal" method, with a water-tight rubber boot for sewers 6" thru 15" in diameter. Manhole taps for 18" diameter sewers and larger shall have holes drilled at 4 inches on center around the periphery of the opening to create a plane of weakness before breaking out the section. Non-shrink grout shall be used to seal the opening and a concrete collar shall be poured 12 inches around the pipe and extend 12 inches beyond the opening.

15. Individual sanitary service leads shall be required for each separate unit within a proposed commercial, industrial and/or multiple family residential buildings.

16. Building lead connections shall be made with 6" wyes for PVC and 6" tees for concrete pipe. Wyes for PVC and pipe shall be factory fabricated (not extruded) and shall be checked for irregularities which could affect the deflection test prior to installation. Building lead pipe, wyes and caps shall be solid wall plastic pipe, 6" dia., SCH 40 or SDR 23.5 with chemically welded joints. The joint between two dissimilar sizes or types of building lead pipe shall be made with a proper fitting acceptable to the City Engineer.

17. All sanitary sewer leads shall be marked with a 2"x2"x8' location stake buried to 6" below finish grade.

18. No ground water, storm water, construction water, downspout drainage or weep tile drainage shall be allowed to enter any sanitary sewer installation.

19. In industrial areas, or any other areas where deemed necessary by the City Engineer, private service connections made to the service lead must have an accessible sampling and monitoring manhole. The manhole shall be located on private property at a location approved by the City Engineer.

20. Grease, oil and sand interceptors shall be installed by the user when the City Engineer determines they are necessary for the proper handling of liquid wastes, to remove grease in excessive amounts, to remove any flammable wastes, sand and other harmful ingredients. All interceptors shall be of a type and capacity approved by the City, shall be located so as to be rapidly and easily accessible for cleaning and inspection, and shall be continuously maintained by the user in an operating condition to accomplish the required result. All restaurants or establishments involved in the preparation of food shall install a grease interceptor. All grease interceptors shall be constructed in accordance with the detail and shall have a minimum capacity of 1000 gallons. The detail shown below is not designed to withstand traffic loads.

21. A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point. Lay mainline trace wire continuously, by-passing around the outside of manholes/structures on the North or East side. Trace wire on all sanitary service laterals must terminate at an approved trace wire access box color coded green and located directly above the service lateral at the edge of road right of way.

22. All sewer installations shall pass low pressure air test, deflection test and television inspection as specified in the city standards. All testing shall be carried out under the direct supervision of the inspector and the contractor. Any testing performed in the absence of a representative of the City will not be approved.

Air Test Table
Minimum holding time in seconds required for pressure to drop from 4 to 3 psi

Length Of Line In Feet	Pipe Diameter												
X	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"
25	4	10	18	28	70	62	89	121	158	200	248	299	356
50	9	20	35	55	79	124	178	243	317	401	495	599	713
75	10	30	53	83	119	186	267	364	475	601	743	898	1020
100	18	40	70	110	158	248	356	485	634	765	851	935	|
125	22	50	88	138	198	309	446	595	680	|	|	|	|
150	26	59	406	165	238	371	510	|	|	|	|	|	|
175	31	69	123	193	277	425	|	|	|	|	|	|	|
200	35	79	141	220	317	|	|	|	|	|	|	|	|
225	40	89	158	248	340	|	|	|	|	|	|	|	|
250	44	99	176	275	|	|	|	|	|	|	|	|	|
275	48	109	194	283	|	|	|	|	|	|	|	|	|
300	53	119	211	|	|	|	|	|	|	|	|	|	|
350	62	139	227	|	|	|	|	|	|	|	|	|	|
400	70	158	|	|	|	|	|	|	|	|	|	|	|
450	79	170	|	|	|	|	|	|	|	|	|	|	|
500	88	|	|	|	|	|	|	|	|	|	|	|	|
550	97	|	|	|	|	|	|	|	|	|	|	|	|
600	106	|	|	|	|	|	|	|	|	|	|	|	|
650	113	170	227	283	340	425	510	595	680	765	851	935	1020

NOTE: TO BE USED WHEN TESTING ONE DIAMETER ONLY

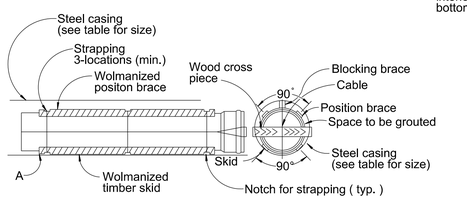
23. All television inspections shall be recorded on digital video disk (DVD) and turned over to the City for reference at a later date. The digital video recording shall display continuously the date, time and engineering stations and shall periodically display the name of the project, name of the area covered and direction of travel.

24. PVC composite pipe and any approved plastic pipe shall be subject to deflection test 30 days after construction with a nine sided mandrel. The contractor must supply the mandrel and perform the test. The City will witness the test. Deflection shall not exceed 5%. The City reserves the right to test the sewer for deflection not to exceed 7% during the period of the maintenance bond. Any sewer found exceeding these limits shall be replaced by and at the contractor's expense.

25. Infiltration testing when required cannot exceeding 100 gallons per inch of diameter per mile of pipe per 24 hour period. Test sections shall generally be limited to a maximum length of one half mile. The city reserves the right to test shorter pipe length segments if deemed necessary to assure that no segment exceeds the infiltration limits.

26. The contractor shall provide a 3 year maintenance and guarantee bond to the City, dated from the time of final acceptance by the City. The bond shall be for 35% of the construction costs.

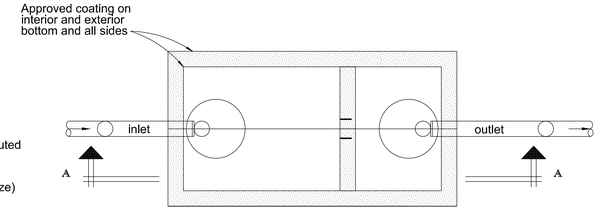
27. Before final acceptance, As-Built drawings must be submitteto the City of Troy Engineering Department. One electronic copy (PDF) and one digital copy (DWG or DGN) is required.

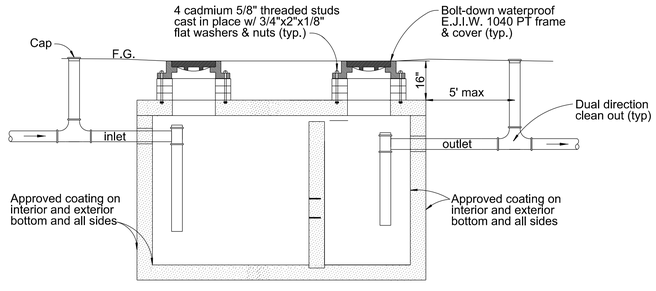


NOTE:
The ends of the casing shall be sealed after the sewer is installed through the casing

PIPE SIZE	RECOMMENDED MINIMUM CASING DIAMETER	MINIMUM WALL THICKNESS
6"	12"	.375
8"	16"	.375
10"	18"	.375
12"	20"	.375
15"	24"	.406
18" & 21"	36"	.532
24"	42"	.563
27" & 30"	48"	.625
36"	54"	.688
42"	60"	.750
48"	66"	.813

STEEL CASING REQUIREMENTS





GREASE INTERCEPTOR (EXTERIOR)
NOTE : Capacity - 1000 gallons (min)

TROY MICHIGAN

STANDARD SANITARY SEWER DETAILS (2 of 2)
ENGINEERING DEPARTMENT
APPROVED BY : WILLIAM J. HUOTARI, CITY ENGINEER DATE : JUNE 2019

REVISIONS	DATE	REMARKS

REVISIONS	DATE	REMARKS
	APRIL 2019	GENERAL UPDATES

STATE OF MICHIGAN ★ LICENSED PROFESSIONAL ENGINEER
WILLIAM J. HUOTARI ENGINEER NO. 43231
WILLIAM J. HUOTARI, P.E. #43231

Contractor Note:
The locations of existing underground utilities are shown in an approximate way only. The contractor shall determine the exact location of all existing utilities before commencing work. The contractor will be fully responsible for any and all damages which might be occasioned by the failure to exactly locate and preserve any and all underground utilities.

3 FULL WORKING DAYS BEFORE YOU DIG CALL 811
Know what's below Call before you dig
MISS DIG System Inc. 1-800-482-7171 www.missdig.net

CONTRACT NO. XX-XX
PROJECT NO. XX.XXXX.X

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