

SECTION 20

GRAVITY SEWERS

20.1 GENERAL CONSIDERATIONS

20.1.1 TYPE OF SEWERS

The CITY will approve PLANS for new sewer systems and extensions only when designed as separate systems in which precipitation, runoff and groundwater are excluded.

20.1.2 DESIGN PERIOD

Sewer systems should be designed for the estimated ultimate tributary population, as delineated in the approved City of Mascotte Wastewater Master Plan (latest edition) except in considering parts of the systems that can be readily increased in capacity.

20.1.3 LOCATION

Gravity sewers shall be located in dedicated rights-of-way or utility easements. Whenever possible, sewers shall be located under pavement in dedicated rights-of-way. All sewers located outside of dedicated rights-of-way shall require a minimum twenty (20) foot easement. Additional easement widths shall be provided when the pipe size or depth of cover so dictate. If a gravity sewer is located adjacent to a road right-of-way, a minimum ten (10) foot easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictated. No gravity sewers shall be placed under retention ponds, tennis courts, or other structures. In general, gravity sewers shall not be located along side or rear lot lines. Placement of a gravity sewer along side or rear lot line may be allowed on a case by case basis if such a sewer configuration results in efficient placement and utilization of the sewer system. This criteria shall also apply to sewer placement in retention pond berms. In any event, no manholes shall be placed along side or rear lot lines.

20.2 DESIGN BASIS

20.2.1 AVERAGE DAILY FLOW

The gravity sewer design shall be based on full ultimate development as known, or projected. Average daily wastewater flow shall be calculated by the Equivalent Residential Unit (ERU) method as outlined in Appendix A. Appendix A is subject to revision based upon passage, revision or amendment of any applicable City of Mascotte Ordinance.

20.2.2 PEAK DESIGN FLOW

Gravity sewers shall be designed on the basis of ultimate development maximum rates of flow, which shall be the product of selected peak factors times the accumulative average daily flow as calculated above. In general, the following minimum peak factors shall be applicable for the range of average daily flow rates.

Flow Range	Minimum Peak Factor
Flows to 100,000 GPD	4
100,000 GPD to 250,000 GPD	3.5
250,000 GPD to 1,000,000 GPD	3
Flows greater than 1,000,000 GPD	2.5

For design average daily flows above 2,000,000 GPD, peaking factors less than 2.5 may be considered if substantiated by extensive data. Under no circumstances shall peaking factors less than 2.0 be allowed.

20. 2. 3 DESIGN CALCULATIONS

DEVELOPER's ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all sewer projects. Calculations shall show that sewers will have sufficient hydraulic capacity to transport all design flows.

20. 3 DETAILS OF DESIGN AND CONSTRUCTION

20. 3. 1 MINIMUM SIZE

No gravity sewer main conveying wastewater shall be less than eight (8) inches in diameter.

20. 3. 2 MINIMUM COVER

The minimum cover over gravity sewers shall be no less than three (3) feet calculated from the finished grade. Exceptions to this requirement may be made for a short length of pipe where structural considerations are incorporated in the design.

20. 3. 3 SLOPE

All sewers shall be designed and constructed to give minimum velocities, when flowing full, of not less than 2.0 feet per second, based on Manning's formula using an "n" value of 0.012 for PVC and 0.013 for other pipe materials. The following minimum slopes shall be provided; however, slopes greater than these

are desirable:

Minimum Slope in Feet Per 100 Feet		
<u>Sewer Size</u>	<u>PVC</u>	<u>Other Material</u>
8 inch	0.28	0.33
10 inch	0.21	0.25
12 inch	0.17	0.19
15 inch	0.12	0.15
18 inch	0.10	0.11
21 inch	0.08	0.09
24 inch	0.07	0.08
27 inch	0.06	0.07
30 inch	0.05	0.06
36 inch	0.04	0.04

Under special conditions, if detailed justifiable reasons are given, slopes slightly less than those required for the two (2.0) feet per second velocity when flowing full may be permitted. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. Whenever such decreased slopes are selected, the DEVELOPER's ENGINEER must furnish his computations of the depths of flow in such pipes at minimum, average, and peak rates of flow.

Where design velocities greater than fifteen (15) feet per second are attained, due to topography or other reasons, special provisions shall be provided for sewer protection.

Sewers shall be laid with uniform slope between manholes.

20.3.4 SIZE AND ALIGNMENTS

Size conversion between manholes shall not be allowed. All sewers shall be laid with straight alignments between manholes.

20.3.5 ADDITIONAL REQUIREMENTS

Main drain and back wash systems for pools and spas and storm drain systems shall not connect to the gravity sewer system.

In general, all sewer extensions for future connections shall terminate at a manhole. The City may allow such extensions without a terminal manhole on a case by case basis subject to all of the following conditions:

1. Total sewer extension length shall be limited to fifty (50) feet.
2. Sewer extension location at the initiating manhole shall be plugged to the satisfaction of the CITY.
3. Such sewer extensions shall not be a part of the accepted sewer facilities. This shall be clearly delineated on the PLANS.
4. All such sewer extensions shall be inspected and accepted as part of the future construction phase.

20.4 MANHOLES

20.4.1 LOCATION

Manholes shall be installed at the end of each gravity sewer; at all changes in grade, size or alignment; at all sewer intersections; and at distances not greater than four hundred (400) feet. Private sewer systems must be separated from the CITY sewer system by a manhole located at the right-of-way line.

20.4.2 TYPE

An outside drop pipe shall be provided for a sewer entering a manhole where its invert elevation is twenty-four (24) inches or more above the manhole invert.

Where the difference in elevation between the incoming sewer invert and the manhole invert is less than twenty-four (24) inches, the manhole invert shall be filleted to prevent solids deposition.

20.4.3 DIAMETER

For sewers twenty-four (24) inches in diameter and smaller, the minimum inside diameter of manholes shall be forty-eight (48) inches. For sewers between twenty-four (24) inches and thirty-six (36) inches, the minimum inside diameter shall be sixty (60) inches. For sewers larger than thirty-six (36) inches in diameter, a seventy-two (72) inch inside diameter manhole shall be provided.

A minimum access cover opening of twenty-two and one-half (22½) inches shall

be provided. (U.S. Foundry type USF 170 or equal)

20. 4. 4 FLOW CHANNEL

The flow channel through manholes shall be made to conform in shape and slope to that of the sewers. Flow direction changes in excess of ninety (90) degrees shall not be included in sewer alignments without special consideration. When directional changes exceeding forty-five (45) degrees occur, an additional flow line elevation drop of 0.1 foot across manholes shall be provided. Benching shall be provided which shall have a minimum slope of two (2) inches per foot.

20. 4. 5 MATERIALS

Manholes shall be constructed of precast units as specified in Section 42. Brick manholes shall not be permitted. Cast-in-place manholes may be accepted on a case by case basis for conflict resolution.

20. 4. 6 CASTINGS

Cast iron frames and covers shall be as specified in Section 42.3. Bolt down and/or gasketed covers shall be provided where manholes are located in areas subject to ponding or flooding.

20. 4. 7 ACCESS

A ten (10) foot wide access road shall be provided for all manholes which are located outside of City roadways. The top eight (8) inches of the access road shall be stabilized to a Florida Bearing value of 50 psi, and compacted to ninety-five (95) percent of AASHTO T-180 for the top eight (8) inches.

20. 5 SERVICE CONNECTIONS

20. 5. 1 GENERAL

Service connection shall be through a lateral and miscellaneous appurtenances, all as shown on the STANDARD DRAWINGS, to connect the gravity sewer to the house or establishment being served.

20. 5. 2 SIZE AND LENGTH

Service laterals and fittings shall be a minimum of six (6) inches in diameter. All service laterals shall be less than one hundred (100) feet in length.

20. 5. 3 SLOPE

Service laterals shall have a minimum slope of one (1) percent.

20. 5. 4 CONNECTION

In general, service laterals shall not be allowed to discharge into sanitary manholes, except at terminal manholes. A case by case exception to this requirement may be allowed if the lateral discharges at the same elevation as the manhole invert.

20. 6 GREASE TRAPS

20. 6. 1 GENERAL

All Food Preparation/Service Establishments shall have outside grease traps sized in accordance with Lake County Health Department requirements. A set of drawings stamped "Approved" by the Health Department showing the number and size of grease traps must be submitted to the City Building Official prior to issuance by the Building Official of a building permit. All wastewater flow from the kitchen areas of these establishments must flow through approved grease traps prior to entering the CITY system.

20. 7 MATERIALS, INSTALLATION AND TESTING

Applicable provisions of Divisions III, IV and V shall apply.