

DIVISION II
DESIGN STANDARDS

SECTION 20

GRAVITY SEWERS

20.1 GENERAL

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 Sanford Comprehensive Plan (latest edition).

20.1.3 LOCATION

Gravity sewer mains shall be located within dedicated rights-of-way, alleys, or established utility easements with sufficient width. Where this is not possible, a minimum of a twenty (20) foot wide CITY SERVICES EASEMENT shall be provided. If a gravity sewer main is located outside and adjacent to an existing or at least a sixty (60) percent designed road right-of-way, a minimum of a fifteen (15) foot CITY SERVICES EASEMENT shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictates. In general, the additional width of the easement shall be calculated by adding fifteen (15) feet to the facility's greatest depth and rounding up to the nearest even whole foot.

No mains shall be placed under buildings, retention ponds, tennis courts, swimming pools, or other structures. Unless approved in writing by the DIRECTOR, mains shall not be located within side or rear lot lines. Placement of a main within side or rear lot line may be allowed on a case by case basis if such a configuration results in efficient placement and utilization of the system. This criteria shall also apply to placement of mains in retention pond berms. In general, manholes shall not be placed on side or rear lot lines.

DIVISION II
DESIGN STANDARDS

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.

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.

<u>Minimum Flow Range</u>	<u>Peak Factor</u>
Flows to 50,000 GPD	3.5
50,000 GPD to 250,000 GPD	3.0
250,000 GPD to 2,000,000 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 DESIGN AND CONSTRUCTION

20.3.1 MINIMUM SIZE

Gravity sewer mains conveying wastewater shall not be less than 8 inches in diameter.

DIVISION II
DESIGN STANDARDS

20. 3. 2 MINIMUM COVER

The minimum cover over gravity sewers shall be no less than three (3) feet measured from the top of pipe to finished grade with the minimum invert depth being 3.67 feet below finish grade for a eight (8) inch in diameter main, unless otherwise approved by the DIRECTOR.

The maximum manhole depth shall be twelve (12) feet, unless otherwise approved by the DIRECTOR.

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 0.011 for PVC and 0.013 for other pipe materials. The following minimum slopes shall be provided with slopes greater than these being desirable:

<u>Minimum Slope in Feet</u>	<u>Per 100 Feet</u>	<u>Other</u>
<u>Sewer Size</u>	<u>PVC</u>	<u>Material</u>
8 inch	0.28	0.40
10 inch	0.21	0.28
12 inch	0.17	0.22
15 inch	0.12	0.15
18 inch	0.10	0.12
21 inch	0.08	0.10
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 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 10 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.

DIVISION II
DESIGN STANDARDS

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, air conditioning condensate discharge, 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 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 pipe run, all changes in grade, size, or alignment, and all sewer intersections. Mains with diameters between 8 and 15 inches shall have a manhole spacing not exceeding three hundred (300) feet. Diameters of 18 to 24 inches shall have manholes spaced not more than four hundred (400) feet apart. For mains larger than 24 inches in diameter, the manhole spacing shall be approved by the DIRECTOR.

Private sewer systems must be separated from the CITY sewer system by a manhole located at the right-of-way line.

DIVISION II
DESIGN STANDARDS

20. 4. 2 DROP MANHOLE

An outside drop pipe shall be provided for a sewer entering a manhole where its invert elevation is 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 24 inches, the manhole invert shall be filleted or benched to prevent solids deposition.

20. 4. 3 DIAMETER

For mains 21 inches in diameter and smaller, the minimum inside diameter of manholes shall be 48 inches. For mains between 24 inches and 36 inches, the minimum inside diameter shall be 60 inches. For mains larger than 36 inches in diameter, a 72 inch inside diameter manhole shall be provided.

A minimum access cover diameter of 24 inches shall be provided.

The maximum vertical distance between the top of the manhole cover and the inside top of the manhole structure shall be twenty four (24) inches.

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 90 degrees shall not be included in sewer alignments without special consideration. When directional changes exceeding 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 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.

DIVISION II
DESIGN STANDARDS

20. 4. 7 ACCESS

A ten (10) foot wide access road shall be provided for all manholes which are located outside of the CITY's roadways. The top 8 inches of the access road shall be stabilized to a Florida Bearing value of 75 psi and compacted to 95 percent of AASHTO T-180. Special consideration may be given when conflicts with required landscaping occurs.

20. 5 **SERVICE AND LATERAL CONNECTIONS**

20. 5. 1 GENERAL

Service connection shall be through a gravity or vacuum sewer lateral, whichever is applicable, and miscellaneous appurtenances, as shown on the STANDARD DRAWINGS. Laterals not requiring the open cutting of a roadway or driveway shall be made to an existing CITY sanitary sewer system by the CITY after payment of all applicable fees and charges. The CITY may perform opencuts to install laterals to an existing CITY sanitary sewer system for single family and duplex residential in-fill type structures, on a case by case basis, upon payment of all required fees and charges. Laterals to new and existing sanitary sewer systems for structures within new subdivisions, non-residential uses, multi-family residential improvements, and those installations which require the open cutting of a roadway or driveway shall be made by the CONTRACTOR and inspected by the CITY. The CONTRACTOR shall be responsible for all costs related to the lateral installation and the restoration of all disturbed public and private improvements to CITY standards.

20. 5. 2 SIZE AND LENGTH

Laterals and fittings shall be a minimum of six (6) inches in diameter. Services and fittings shall be a minimum of four (4) inches in diameter for single family residential installations and six (6) inches in diameter for all other installations. Single or double laterals shall be allowed. All laterals shall extend from the sewer main to the right-of-way terminating with a cleanout at each building service branch stub-out. Cleanouts shall be installed by the individual building contractor.

20. 5. 3 SLOPE

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

DIVISION II
DESIGN STANDARDS

20. 5. 4 CONNECTION

In general, 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 and service establishments shall have exterior in-ground grease traps with traffic rated tops, two access manholes, and sized in accordance with the following requirements. All wastewater flow from the food preparation areas of these establishments must flow through approved grease traps prior to entering the CITY system. A minimum trap capacity of 750 gallons shall be utilized.

20. 6. 2 FAST FOOD RESTAURANTS

Single grease trap capacity shall be sized at the rate of 10 gallons per seat. If two grease traps are used in series, total capacity of the grease traps shall be based on 5 gallons per seat.

20. 6. 3 GENERAL RESTAURANTS

Single grease trap capacity shall be sized at the rate of 20 gallons per seat. If two grease traps are used in series, total capacity of the grease traps shall be based on 10 gallons per seat.

20. 6. 4 24 HOUR RESTAURANTS

Single grease trap capacity shall be sized at the rate of 30 gallons per seat. If two grease traps are used in series, total capacity of the grease traps shall be based on 15 gallons per seat.

20. 6. 5 CONFERENCE CENTERS AND MANUFACTURING CAFETERIAS

Single grease trap capacity shall be sized at the rate of 3 gallons per meal. If two grease traps are used in series, total capacity of the grease traps shall be based on 1.5 gallons per meal.

DIVISION II
DESIGN STANDARDS

20. 6. 6 MISCELLANEOUS FOOD PREPARATION AND SERVICE ESTABLISHMENTS

The DEVELOPER's ENGINEER shall consult with the DIRECTOR before finalizing the design. As a general rule, convenience stores and similiar establishments shall install the minimum size grease trap.

20. 7 MATERIALS, INSTALLATION, AND TESTING

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

20. 8 LOCATION AND IDENTIFICATION

All lettering shall be legible and colors correct for the intended use. See the STANDARD DRAWINGS.