

ARTICLE 27

WASTEWATER FACILITIES DESIGN

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Section	27.01	<u>GENERAL</u>
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The following design criteria shall pertain to the general requirements of all sanitary manholes, gravity sanitary sewers, lift stations, and force mains. Additionally, the Water Environmental Federation (WEF), Manual of Practice No. 9, entitled "Design and Construction of Sanitary and Storm Sewers", latest edition, may generally be used as a design guide, if not in conflict with State, local, or other regulatory agency requirements or with any material presented herein.

27.01.01 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.

27.01.02 Design Period

Sewer systems shall be designed for the estimated ultimate tributary population as derived for the City's approved future land uses or as delineated in the approved City of Ocoee Wastewater Master Plan, latest edition, except when considering parts of the systems that can be readily increased in capacity.

27.01.03 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 20' easement. If a gravity sewer is located adjacent to a road right-of-way, a minimum 10' easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictate. No gravity sewers shall be placed under retention ponds, tennis courts, or other structures. In general, gravity sewers shall not be located alongside of rear lot lines. Placement of a gravity sewer alongside a 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. These criteria shall also apply to sewer placement in retention pond berms. In any event, no manholes shall be placed alongside of rear lot lines.

27.01.04 Design Calculations

Design 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. In lieu of calculation, the Design Engineer may submit design computer model and associated information including inputs, assumption, model run result(s) that indicate system is designed to comply with City requirements and signed and sealed design report. Model shall be integrated into City model for simulations.

Section **27.02** **DESIGN STANDARDS**

Sanitary sewer force mains and gravity design shall specifically be in accordance with ARTICLE 28 and ARTICLE 29 of this Manual.

27.02.01 Average Daily Flow (ADF)

The average daily flow is the standard base reference in the design of all wastewater systems. It represents the annual average daily flow of wastewater generation. All service area generators such as domestic, commercial, institutional, and industrial shall be included in the determination of the total average daily flow. Either per capita unit flows, fixture unit methods, and/or historical flows shall be used by the designer in determining the ultimate project flow in accordance with those rates currently in effect and available at the City of Ocoee.

27.02.02 Peak Flow

The peak flow is used in the design of all wastewater systems. It is the product of a peaking factor and the average daily flow. The peaking factor is a ratio of the average daily flow and the peak discharge, occurring during the maximum daily flow of the year. The selection of the peaking factor is based upon the following table for flows (ADF) up to 3.0 MGD. Peaking factors for flows with larger average daily flows will be evaluated by the Engineer on an individual basis.

<u>Flow Range</u> (MGD-ADF)	<u>Peaking Factors</u> (PF)
0.000-0.100	4.0
0.101-0.300	3.5
0.301-0.900	3.0
0.901-3.000	2.5

Section 27.03 MANHOLES

27.03.01 General

Manholes shall be in accordance with ARTICLE 17 and per the latest revision of the City's Typical City Details. Manholes shall be precast concrete with integral slab and lower ring, or be poured-in-place concrete slab with precast ring wall, or be of all fiberglass construction meeting ASTM D-3753 standards.

27.03.02 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 400 feet. When Private sewer systems must be separated from the City sewer system, a manhole shall be required at change of ownership.

27.03.03 Manhole Base

Bottom slabs for fiberglass and poured-in-place manholes shall be a minimum of 8" thick and reinforced with No. 4 bars at 9" on centers. Precast manholes shall be in accordance with FDOT Standard Specifications. All bases shall have proper lifting hooks in the bottom slabs (minimum of 3). There shall be no penetrating lifting holes on any structures, and no holes shall be allowed within 6" of any joint on structures.

27.03.04 Rings and Covers

See Article 16 Section 16.11 for more rings and covers details

27.03.05 Top Elevation

Precast manhole tops shall be adjustable between 6" and 12" by means of solid clay bricks or precast grade rings laid in mortar. Vertical walls of manhole entrances shall not exceed 18" in length, including the ring and cover.

27.03.06 Coating

Typical coating for concrete sanitary manholes shall be coated, at a minimum, with coal tar epoxy. All manholes with drop connections, force main connections, receiving manholes and large manholes shall be coated with spray on Green Monster™ Liner at a 90 to 110 mil thickness or approved equal. This work shall be accomplished prior to TV inspection.

27.03.07 Joint Sealer

A pre-formed plastic joint sealer shall be required. All exterior joints shall be sealed with approved rapid seal tape with a minimum of 8" width.

27.03.08 Connections to Manholes

Connections shall be as specified in the Typical City Details attached as part of this Manual. Connections shall be made with a wall penetration boot. The specific manufacturer and model are as listed in the approved materials list. Space between boot and pipe OD shall be filled with appropriately sized cavity O-ring. Clay pipe shall have a short nipple (18" or 24") between the manhole fitting and the first full length of pipe. All openings for pipes into existing structures shall be made by cutting with a power driven circular coring machine.

27.03.09 Non-Shrink Mortar

All holes in manholes and wet wells shall be thoroughly plugged with an approved non-shrinking mortar, applied and cured in strict conformance with the manufacturer's recommendations. The mortar shall be finished smooth and flush with the adjoining interior and exterior manhole and wet well wall surfaces. When mortar is set, coat with an approved coating as listed in the approved materials list.

27.03.10 Stubs and Stoppers

Pipe stoppers shall be installed in all manhole stubs. When connecting to an existing stub and prior to removing the existing stopper, brick the inside opening to prevent any flow until the new system has been tested and cleaned. The brick shall not be removed until the final inspection.

27.03.11 Bulkheading Stub Channels

The downstream end of all outlets in the manholes of sub-out-channels not in use shall be bulkheaded to prevent the creation of a septic condition resulting from ponding of sewage or debris.

Section **27.04 SERVICE CONNECTIONS**

27.04.01 General

Service connections connecting the gravity sewer to the house or establishment being served, shall be through a lateral and miscellaneous appurtenances, all as specified in the Typical City Details attached as part of this Manual.

27.04.02 Size and Length

Service laterals and fittings shall be a minimum of 6" in diameter and shall be less than 100' in length.

27.04.03 Slope

Service laterals shall have a minimum slope of 1%.

27.04.04 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.

Section 27.05 LINE LOCATIONS

- A) Mains shall be installed in the center of paved right-of-way on new construction.
- B) Where sewers are to be installed in existing paved areas, mains may be installed in unpaved portions of the right-of-way. All utility lines to be dedicated to the public, located outside of dedicated rights-of-way, shall require a minimum 20' easement. If a utility line to be dedicated to the public is located adjacent to a road right-of-way, a minimum 10' easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictates.
- C) Mains shall not be allowed inside of back lot easements unless approved by the Engineering Department prior to construction.
- D) Mains shall not be installed beneath canals, retention areas, or swales without prior approval of the Engineering Department. Any lines in these areas must be installed within a pipe casing that extends the full length of the body being crossed.