

**DRAFT**

**SECTION V  
DESIGN CRITERIA  
FOR  
SEWER SYSTEM FACILITIES**

**SECTION V  
DESIGN CRITERIA  
FOR  
SEWER SYSTEM FACILITIES**

Sewer system improvements proposed for inclusion into the District's Service Area shall be designed in accordance with the following criteria.

**A. SYSTEM FLOW RATE CRITERIA**

Design flow rates shall be in accordance with the following:

**1. Average Daily Flows**

Average daily flows for residential areas are as follows:

Average Daily Flow for Residential Units	
Unit	gpd/Unit
Single Family	250
Multi-Family	250

gpd=gallons per day

**2. Peak Flows**

The peak flow for residential developments shall consist of a peaking factor applied to an average daily flow. Average flows and corresponding peak flows for residential developments are provided below:

Average Flow (MGD)	Peak Factor
0.0 - 0.01	4.0
0.05	3.4
0.10	3.2
0.20	3.0
0.30	2.8

Average Flow (MGD)	Peak Factor
(Continued)	
0.50	2.7
0.8	2.6
1.0	2.5
1.5	2.4
2.5	2.3
4.0	2.2
6.0	2.1
10.0	2.0
15.0	1.9
30.0	1.8

**3. Commercial Flows**

Commercial and industrial developments shall be determined on an individual basis. Calculations and criteria shall be submitted to the District engineer for review and approval.

**B. SEWER PIPELINE SIZING**

1. Pipe sizing for gravity mains shall be determined on the basis of the design flow rate using the "Manning" formula with the following criteria:

Formula - Capacity of all sewers shall be determined by the use of the "Manning" formula:

$$Q = A \frac{1.486}{n} r^{2/3} s^{1/2}$$

Where: Q = flow capacity, CFS  
A = cross-sectional area, ft<sup>2</sup>  
n = coefficient of roughness  
r = hydraulic radius, ft  
s = slope

- a. For 12 inch mains and smaller, a Manning  $n = 0.013$  shall be used and the pipe shall not flow more than 1/2 full.
  - b. For 15 inch mains and larger, a Manning  $n = 0.013$  shall be used and the pipe shall not flow more than 3/4 full.
2. Sewer pipes shall be sized no smaller than 8 inches in diameter except for house laterals.
3. Design velocities at design flow (Q) are provided as follows:

	<u>Minimum</u>	<u>Maximum</u>
Sewer Mainlines	2.0 fps	10.0 fps
Force Mains	3.0 fps	10.0 fps
Inverted Siphons	4.0 fps	10.0 fps

4. Gravity Sewers

Gravity sewers shall be designed in accordance with the following minimum slope inclinations (except as noted in Item 5 below):

- a. Individual house laterals shall be typically 4 inch diameter and commercial laterals shall be 6 inch diameter with a minimum 2 percent slope and attain a minimum velocity of 2 fps.

- b. Sewer mainlines shall be designed with the following minimum slope:

- 8" Pipe at  $s=0.0040$  feet per foot
- 10" Pipe at  $s=0.0029$  feet per foot
- 12" Pipe at  $s=0.0022$  feet per foot
- 15" Pipe at  $s=0.0016$  feet per foot
- 18" Pipe at  $s=0.0012$  feet per foot
- 21" Pipe at  $s=0.0010$  feet per foot
- 24" Pipe at  $s=0.0008$  feet per foot

5. Sewer mainlines with fewer than ten equivalent dwelling units shall have a minimum slope of 2 percent.

6. Force Main Sewers

In force main sewers, a continuous uphill slope shall be provided from the source(s) to the outlet. Combination air and vacuum valves shall be provided where high points cannot be avoided.

7. Sewer sizes shall not be increased in flat areas to justify use of flatter grades.

**C. GENERAL CRITERIA FOR MATERIALS AND INSTALLATION**

Sewers shall be extra strength vitrified clay pipe (VCP) with bell and spigot compression joints. All materials shall conform to and be installed in accordance with District standards and the Standard Specifications for Public Works Construction (Green Book). District standards shall take precedence over the Standard Specification for Public Works Construction.

**D. GENERAL CRITERIA FOR SEWER FACILITY LOCATION**

1. Sewers shall be located 6 feet north or east of the street centerline.

2. Horizontal curves are allowed for the sewer collection system and must meet the following design criteria:

- a. No more than one horizontal circular curve shall be permitted between any two manholes.
- b. The upstream or downstream end of the curve shall terminate in a manhole.
- c. No sewer on a curvilinear alignment shall be less than 8 inches in diameter.
- d. The radius of curvature shall not be less than 125 feet.
- e. The deflection of joints shall not exceed that recommended by the pipe manufacturer.

3. Vertical curves are not permitted within the sewer system.
4. Depth shall be more than 6.5 feet below finished street grade. The depth to the flow line is typically 7.5 feet. If an existing sewer structure is too shallow to obtain such depths, a shallower depth may be approved with special construction.

The minimum depth of cover over the pipe shall be sufficient to collect sewage from adjacent properties. The District may require greater depths when it is necessary to extend the main line sewers to serve other areas.

5. When an area outside the development can be logically served by future extension of a proposed sewer, the sewer shall extend to the tract boundary or to the end of a paved street in a manner to facilitate the future extension.
6. Oversizing of sewers will be required where such sewers can logically serve an upstream tributary area and extra size is required for such future use. The District may participate in the cost of oversizing which shall be limited to the material costs only.
7. Sewer lines crossing waterlines shall be located at least 1 foot below the waterline. Sewer lines shall be located at least 10 feet clear (outside to outside) laterally from waterlines in parallel construction. Refer to the California Department of Health Services requirements in special situations where minimum separations cannot be met.

#### **E. GENERAL CRITERIA FOR LIFT STATIONS AND INVERTED SIPHONS**

Lift stations, inverted siphons, or non-standard construction should be avoided whenever possible. In situations requiring such installations, they shall be designed by District staff, a District retained consultant, or the Developer's engineer in conjunction with District staff. The District Engineer should be consulted in the early planning stages to assess the need for such installations and to develop site specific design criteria. At that time, the District will determine whether the District or the Developer's engineer will perform the design.

**F. GENERAL CRITERIA FOR BACKWATER VALVES**

1. Backwater valves are required whenever the building pad is lower in elevation than 12 inches above the rim of the nearest upstream sewer manhole.
2. Backwater valves are not required wherever intermediate manholes can be placed to economically preclude the need for backwater valves. Such spacing shall not be less than 120 feet. Ordinarily, one additional manhole can be economically justified if it eliminates four backwater valves.
3. Valves shall be in accordance with the most recent District standard drawings and installed at the shallowest location allowing for future inspection and maintenance.
4. The Developer's engineer shall show all backwater valves and their locations where installation is proposed on private property by the property owner or Developer. These valves shall be indicated on both the location map (cover sheet) and the plan and profile sheets.

**G. GENERAL CRITERIA FOR MANHOLES**

1. Spacing of manholes shall not exceed 350 linear feet.
2. Marker posts shall be installed if manholes or cleanouts are to be installed outside of paved areas.
3. Different diameter sewers shall be designed to match top of pipe at sewer manhole junctions. Manholes shall be placed at junctions where pipe sizes change.
4. Manholes shall have a minimum 0.1 foot elevation drop across the manhole base. Side inlets shall have a minimum 0.2 foot elevation drop to the outlet of manhole.
5. Junction manholes shall have the crowns (soffits) of the intersecting pipes at the same elevation where their projections intersect the manhole centerline.

6. Minimum manhole diameters are 48 inches.
7. Drop manholes are not allowed unless specifically pre-approved by the District.
8. Manhole bases shall be cast-in-place.

#### **H. GENERAL CRITERIA FOR SERVICE LATERALS**

1. Laterals shall be VCP and installed to each dwelling unit or commercial unit unless otherwise approved by the District. Laterals for multistory structures and apartments shall be designed by the property owner's engineer and submitted to the District for approval.
2. Four inch diameter laterals shall be installed for single dwelling units; all multi-unit and commercial/industrial developments must be approved by the District, but laterals shall generally be 6 inch in diameter.
3. Laterals shall be graded at a minimum 2 percent slope utilizing a 45 degree wye connection at the main.
4. Depth of laterals shall be sufficient to provide service to the lowest or most distant point to be served on each lot at a minimum grade of 2 percent with not less than 1 foot of cover over the top of the pipe.

The minimum depth of the lateral line shall be 5 feet at the property and 4.5 feet beneath the curb and gutter flow line as required by the most recent edition of the District's construction standards.



## I. GENERAL CRITERIA FOR GREASE INTERCEPTORS

A grease interceptor shall be installed for all restaurants, hospitals, nursing homes, and all other commercial/industrial facilities as directed by the District Engineer and shall be sized in accordance with the following formula:

Restaurants -

$$\text{CAPACITY} = (D) \times (\text{GL}) \times (\text{ST}) \times (\text{HR}/2) \times (\text{LF})$$

D = Number of seats in dining area

GL = Gallons of wastewater per meal

- Restaurants = 5 gallons,
- Fast Food = 1 gallon

ST = Storage capacity

- Sewered:
  - ⇒ Restaurant = 2.0;
  - ⇒ Fast Food = 1.5
- Septic System:
  - ⇒ Restaurant = 3.0;
  - ⇒ Fast Food = 3.0

HR = Number of hours open

LF = Load Factor

- Interstate freeway access = 1.25
- Major highway access = 1.0
- Local streets = 0.5

Hospitals, Nursing Homes, and Other Commercial Developments -

$$\text{SIZE OF INTERCEPTOR}^{(1)} = (M) \times (\text{GL}) \times (\text{ST}) \times (2.5) \times (\text{LF})$$

M = Meals per major period

GL = Gallons of wastewater per meal,

- normally 4.5 gallons

ST = Storage capacity (Minimum of 1.7)

- On-Site Disposal use 2.5

LF = Load factor

- 1.25 Garbage disposal & dish washing
- 1.0 without garbage disposal
- 0.75 without dish washing
- 0.5 without dish washing & garbage disposal

<sup>(1)</sup> The minimum size grease interceptor should be 750 gallons.