SECTION 5
SANITARY SEWERS

5.01 GENERAL

A. Submittal Requirements

1. Sanitary sewer system design within a developing area shall conform to the General Plan, Master Sewer Plan, and any applicable Specific Plan of the City of West Sacramento and include provisions for size and capacity to adequately convey all domestic and industrial waste that can be reasonably anticipated under conditions of full ultimate development. Engineering calculations to support the sewer system design shall be submitted to the City Engineer for approval. The calculations shall include:

   a. Map indicating service area within the sewer system including any future contributing development with projected land use, zoning, and any physical features contributing to the sewer system design.

   b. Sanitary sewer waste volumes either existing or proposed within the service area of the system.

   c. Size and slope of each pipe between appurtenant structures.

   d. Invert/rim elevations of each pipe and appurtenant structure.

5.02 PIPE DIAMETER

A. Public Mains

1. The minimum size of any new public sewer main shall be 6 inches in diameter.

B. Residential Services

1. The minimum lateral size is 4 inches where grade requirements can be met and the intended use is to serve single family or duplex residences.

C. Non-Residential Services

1. Six-inch or larger laterals shall be installed where intended use is industrial, commercial or greater than single family or duplex residential flows.

5.03 DESIGN

A. Flow Calculation

The design sanitary sewer flow shall be computed using the following formula:

$$\mathbf{Q_D} = \mathbf{Q_P + I} \qquad \text{(eq.5-1)}$$

Where: Q_D = design flow

I = Infiltration and inflow

Q_P = peak flow

And: $\mathbf{Q_P} = \mathbf{Q_{ave} * PF}$ (eq. 5-2)

Where: Q_{ave} = Average Flow

PF = Peaking Factor

1. Residential Flow

   a. Average flow (Q_{ave}) shall be based upon the following criteria:

      1. 3.0 persons per single family dwelling unit
      2. 2.5 persons per multi family dwelling unit
      3. 100 gallons per person per day

   b. Peaking Factor (PF) shall be 3

   c. Infiltration and Inflow (I) shall be computed assuming 4000 gallons per inch diameter mile per day for sewer mains and laterals. Residential laterals shall be assumed to be a minimum of 75 feet in length.

2. Non-Residential Flow

   a. Average Flow (Q) shall be based upon the following criteria:

      1. Other Commercial[1] 1500 gpad*
      2. Prof. Office/Bus Park[2] 1500 gpad
      3. Recreation 500 gpad
      4. Schools 4.25 gpd/student
      5. Light Industrial 2000 gpad
      6. Heavy Industrial (case-by-case basis)

      * (gallons per gross acre per day)

[1] High volume generators such as restaurants shall be considered on a case-by-case basis.

[2] Multi-story structures will be considered on a case-by-case basis.

b. Peaking Factor (PF) shall be based upon the following criteria

1. Industrial = 2

2. Non-Industrial = 3

c. Infiltration & Inflow (I) shall be the same as for residential flows.

B. Pipe Capacity

1. Manning's Formula [$Q = A\ (1.49/n)\ R^{2/3}\ S^{1/2}$] shall be used to determine pipe capacity. The "n" value shall be 0.013 or the pipe manufacturer's recommendation. Manning's "n" values, which are less than 0.013 shall require City Engineer approval and shall only be allowed if minor losses are accounted for.
2. All main sewers shall be sized to carry the design flows at a maximum of 70% of pipe capacity.

C. Velocity

1. Sewer velocity shall be equal to or greater than 2 feet per second for all sewers when flowing full.
2. Where design velocities for main sewers exceed 10 feet per second, polyethylene lined ductile iron pipe conforming to Section 14 of the Standard Construction Specifications shall be used. The ductile iron pipe shall be wrapped with an 8-mil polyethylene encasement.

D. Pipe Cover and Clearances

1. Minimum pipe cover and clearance shall be maintained in the design of sanitary sewers. If certain conditions exist which make it impractical to meet the minimum cover and clearance requirements, the conditions and locations shall be specifically noted above the sewer profile on the plans. Each location not meeting the minimum cover and clearance requirements will require special approval. Any planned condition being specially approved with less than minimum cover will require special pipe, bedding and/or backfill as approved by the City Engineer.
2. Main and trunk sewers shall have a minimum depth of 4 feet as measured from the top of the pipe to the finished grade.
3. Laterals shall have a minimum depth of 3 feet from the top of the pipe to finished grade.
4. Pipe shall be laid with a minimum of 12 inches vertical clearance below water lines and 6 inches clearance from all other improvements and utilities, unless otherwise approved by the City Engineer. Other utilities

shall not, under any circumstances, be installed immediately over and parallel to any sanitary sewer line installation.

E. Horizontal Alignment

1. Sewer mains and trunks shall be located 6 feet south or east of and parallel with the street centerline unless otherwise approved by the City Engineer.
2. Alignment of sanitary sewer mains shall be straight between manholes. Whenever it is essential that a curved alignment be used, a minimum radius of 200 feet shall be required, but shall be greater whenever possible. The radius and delta of all curves shall be indicated on the plans adjacent to the curve.
3. The deflection in the joint between any two successive pipe sections shall not exceed eighty (80) percent of the maximum deflection as recommended in writing by the pipe manufacturer.
4. Minimum horizontal separation between parallel sewer and water mains shall be 10 feet.

F. Lateral Sewers

1. Laterals are those portions of the sewer system between the sewer main and the portions of the sewer maintained by the property owner. The usual location of the line separating responsibility of the City and property owner is the back of sidewalk cleanout. In all cases, City maintained sewer lines will lie in a street right-of-way or dedicated public easement. In all new subdivision work, the house lateral line and cleanout from the sewer to the property line shall be installed at the time the sewer main is constructed. Each lateral line shall be referenced to the Improvement Plan stationing.
2. All laterals, from property line or edge of easement to the point of connection with the main line or a manhole shall have an alignment that provides an angle of intersection with the downstream section of the main sewer of no less than 90 degrees.
3. The maximum deflection at any one point in a lateral, not including fittings at saddle or wye connection to main sewer or at angle points having cleanouts, shall be 22-1/2º (1/16 bend) and any two consecutive deflections (bends) shall not be less than 2 feet apart.
4. For single family and duplex uses, cleanouts shall be provided on the lateral sewer at the back of sidewalk as shown on the Standard Details.
5. For sewer laterals 6 inches and larger in diameter, manholes shall be provided at or near the street right of way line.
6. Laterals connecting houses having a finished floor elevation 12 inches or less above the rim elevation of the nearest upstream manhole or structure shall require the installation of a backflow prevention device next to the cleanout.
7. Sewer laterals shall be installed with a minimum of two (2) foot horizontal separation from water services for all single family and duplex uses.

8. Laterals shall connect to the main at manholes whenever possible. Laterals for residential properties located within cul-de-sacs shall be connected at a manhole.
9. A single sewer connection shall not serve more than one parcel. Each individual parcel shall have a separate sewer connection.

G. Appurtenances

1. Manholes

   a. Along straight alignments of mains, the maximum spacing for manholes shall be 500 feet. Where the location of two manholes is determined by intersecting lines, the distances between intervening manholes shall be approximately equal.

   b. Sewers constructed on curved alignments where 200' feet < radius < 400' feet shall have additional manholes placed per the following criteria:

      1. Where curve length < 50' feet; no additional manholes required

      2. Where 50' feet < curve length < 150' feet; a manhole shall be required at either the BC or the EC

      3. Where curve length > 150' feet; a manhole shall be required at the BC and the EC and at 300 ft intervals along the length of the curve.

   c. Whenever, at manholes, a change in the size of pipe, or a change in the alignment of 20 degrees or more occurs, the flow line of the incoming pipe shall be a minimum of .12 feet above the flow line of the outgoing pipe. The invert elevations in and out of the proposed manhole shall be shown on the improvement plans.

   d. Manholes shall be used at the termination of all sewer mains including cul-de-sacs. Cleanouts may be installed at the upstream end of mains, which are proposed to be extended in the future on an approved development plan.

   e. Manholes shall be lined as specified in Section 14 of these Standard Specifications when located on a regional trunk line with a diameter of 10 inches or greater unless otherwise approved by the City Engineer. Alternative methods of addressing corrosive conditions may be considered by the City Engineer.

H. Unusual Design

1. Special design of sewer force mains, siphons or other unusual features or structures shall be subject to the approval of the City Engineer.

5.04 WASTEWATER PUMP STATION DESIGN STANDARDS

Please refer to the supplemental publication available from the Community Development Department titled, *Wastewater Pump Station Design Standards*.

All pump stations shall be designed and constructed to conform to OSHA standards.

5.05 RIGHT OF WAY POLICY

A. Requirements

1. All public sewers shall be located in easements or rights of way granted or dedicated for sewers and/or public use. In the case of public right-of-way for streets, further dedication is not necessary.

B. Width

1. Easements for sanitary sewers shall meet both of the following width criteria:

    a. Minimum width of any easement shall be 15 feet.

    b. All easements shall have a minimum width in feet equal to the required trench width according to the standard detail for trench backfill plus 2 additional feet of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All sewer pipes shall be centered within their easements.