

3.0 DESIGN CRITERIA FOR SANITARY SEWER FACILITIES

All sanitary sewers shall be designed in accordance with these Design Standards, LBUD Rules and Regulations, and to accepted engineering principles. In all newly developed areas and/or in all existing areas where new sanitary sewers are required, the design shall include the provisions that the sewer system size and capacity can adequately accommodate the ultimate anticipated conditions.

3.01 SYSTEM FLOW RATE CRITERIA

Residential Use

Since the quantity of domestic sewage is a function of the population and of water consumption, sanitary sewer mains and laterals shall be designed for the saturation density of population expected in the areas served. The sanitary sewer system shall be designed for tributary areas, land use and population estimates based on the most recent General Plan and Sewer Master Plan.

All sanitary sewer mains shall be designed based on the peaked average daily flow. Design flow rates shall be in accordance with the following:

$$Q_p = \text{Peaked Average Daily Flow}$$

$$Q_p = \text{Average daily flow} \times \text{Per Capita Factor} \times \text{Number of Households} \times \text{Peak Factor}$$

Average daily flow: 95 gpcd (gallons per capita per day)

Per Capita Factor: 2.8 persons/household (from U.S. Census Bureau, 2010 Census)

Peak factor: 2.0

Commercial and Industrial Use

Commercial and industrial dischargers will be investigated on a case-by-case basis.

3.02 SANITARY SEWER PIPELINE SIZING and Slope

Pipeline sizing for gravity pipelines shall be determined on the basis of the design Peak Average Daily Flow Rate (Q_p) and incorporating the following criteria:

<u>Pipe Diameter</u>	<u>Manning's Roughness Coefficient</u>	<u>d/D Maximum</u>
8" to 12"	0.013	0.50
15" or greater	0.013	0.75

A minimum pipe size of 8 inches shall be used for all public sewers, collection sewers, and private sewers within streets.

Required velocities at design flow (Q_p) shall be as follows:

	<u>Minimum</u>	<u>Maximum</u>
Sanitary Sewer Pipelines	2 fps	8 fps

The maximum velocity at Q_p flow allowed in any sanitary sewer pipeline is 8 fps.

Do not increase sewer sizes in flat topography to justify use of flatter grades. Under minimal flow conditions, wastewater in larger pipelines can have velocities lower than that in smaller pipelines.

Gravity sewers shall have the following minimum slopes:

<u>Pipe Diameter (in.)</u>	<u>Slope</u>
8	0.0036
10	0.0030
12	0.0024
15	0.0020

Slopes shall be set to 2 decimal figures, evenly distributed by 4, where possible.

3.03 SYSTEM ANALYSIS

Flow monitoring and a sewer capacity study is required when proposed development intensifies the land use from the existing development on the site, proposed development requires a general plan amendment to a more intense use, or required by the Department. The capacity study is to ensure the sewer system can accommodate a proposed development, and if not, help identify needed improvements required for the development. The Developer is required to cover the costs associated with flow monitoring, sewer capacity study, and sewer modeling.

Flow Monitoring requirements include:

1. Flow monitoring shall be performed for seven (7) continuous days without interruption of data.
2. Data shall be taken at fifteen (15) minute intervals.
3. Location of flow meter(s) and type of flow meter shall be approved by the Department.
4. Number of flow monitoring locations will be determined by the Department, based on existing sewer system, and size and capacity of the development.
5. Raw data of the flow level (inches), flow velocity (feet per second), and flow rate (gallons per minute) in 15 minute intervals for the duration of the flow monitoring period shall be provided to the Department in Microsoft Excel file format.
6. Confined Space Entry Permit, if required prior to start of work.
7. Temporary Street Occupancy Permit prior to start of work.
8. Traffic Control may be required and must be approved by the Public Works Department prior to start of work.

Sewer Capacity Study shall include, but not limited, to the following:

1. Site description (traffic, surface condition, weather).
2. Site map showing location of flow meter manhole(s).
3. Dates of the flow monitoring period.
4. Company name, contact person, address, phone number, e-mail address performing the study.
5. Flow meter equipment information (sensor type, calibration history).
6. Manhole inspection report (pipe size, pipe material, manhole depth, condition of channel, bench, rungs, cone, ring, and cover).
7. Diagram of manhole channel showing direction of flow and north arrow.
8. Charts showing depth of flow, flow velocity, and flow rate.

9. Site analysis for each flow meter location including, but not limited to, maximum and minimum flow level, velocity and flow rate, estimated capacity, capacity used, evidence of surcharge, hydraulic conditions.
10. Flow monitoring study shall be reviewed by a licensed civil engineer.
11. One (1) colored hard-copy and electronic copy in .PDF format of the flow monitoring study shall be submitted to the Department for review and acceptance.

Sewer modeling shall be performed by the Department where available at the cost of the Developer. The Department will model at least two scenarios:

1. Existing Condition – using raw flow monitoring data to identify existing deficiencies in the system
2. Existing Condition with Proposed Development – to identify additional deficiencies created by the proposed development

The cost of modeling is dependent on the scope of the proposed project and an estimate shall be provided to the Developer by LBUD. Developer will deposit the estimated amount for the proposed sewer study. The Department will input the developer's project parameters into the Sewer Master Plan model to identify the project's impact to the sanitary sewer system.

Development in areas with a downstream deficient sewer will be restricted. Where uses are discontinued on a property to allow for new development, new development up to the sewer generation rate of the previous use on the property will be allowed in sewer deficient areas.

The Developer may make the needed improvements to the sewer system at his/her own cost and request a reimbursement agreement to recover a portion of the costs from other developments that tie into the system and benefit from the improvements. Reimbursement agreements run a term of twenty years and are not guaranteed to be paid in full.

3.04 LOCATION:

Sanitary sewer mains shall be located in the street along the centerline wherever possible and shall not be located underneath sidewalks, along curbs and gutters, in parkways, or closer than five feet to the exterior wall of any building or foundation. Location shall not interfere with other existing utilities.

Horizontal curves are not permitted within the Department's sanitary sewer system. Use manholes for all changes in direction of sewer mains.

Vertical curves are not permitted within the Department's sanitary sewer system. Use straight grade from manhole to manhole. Use manholes for all changes in direction of sewer mains.

Sanitary sewer installation near potable water pipelines shall be in accordance with the California Waterworks Standards, Section 64572, Chapter 16, Title 22 of the California Administrative Code, or the Department's criteria, whichever is most restrictive. Sanitary sewer pipelines shall be located a minimum of ten feet (outside to outside) from the potable water pipeline.

When crossing other utilities, a minimum vertical clearance of 6" shall be provided (outside to outside), unless otherwise approved by the Department and the California Department of Public Health.

3.05 SEWER LATERALS

Sewer laterals shall have a minimum diameter of 6". Laterals shall have a minimum slope of 2% from the sanitary sewer main to the property line and shall have a minimum cover of 5 feet at the property line.

Connection:

6 inch to main line (8 inch or larger): tee or wye

8 inch to main line (8 inch or larger): manhole

House connections shall be connected at a 90-degree angle to the sanitary sewer main. The wye-connection shall be located in the direction of flow. The minimum distance from the last lateral to an end structure shall be 10 feet.

Provide a lateral for each lot.

3.06 MATERIALS

All pipes shall be designed to withstand an H-20 highway loading and existing sub-surface conditions.

- Vitrified clay pipe (VCP)
 - Extra strength for sanitary sewer mains up to 20 feet in depth
 - Extra strength reinforced with concrete cradle or concrete encasement, for sanitary sewer mains more than 20 feet in depth as may be directed by the Department
 - Extra strength encased in concrete or placed inside of steel casing for sanitary sewer mains as may be directed by the Department under railways, freeways, major highways and such other streets as may be designated by the Department. Refer to WDS-106 (Water Main Encasement) for details.
 - Reinforced as required by the Department for sanitary sewer mains under large conduits or other structures

3.07 MANHOLES

Manholes shall be designed per applicable LBUD standard drawing.

Manholes shall be sized accordingly:

<u>Pipe Diameter (in.)</u>	<u>Manhole Size (in.)</u>
8 to 27	48
> 27	60

Manholes shall be spaced at 350 foot maximum intervals. Manholes shall be placed at all of the following locations: grade breaks, changes in horizontal alignment, changes in sewer diameter, at street intersections, at sewer pipe intersections, and at the beginning of sewer runs.

Junction manholes shall be designed with the soffits of the intersecting sewer at the same elevation as the soffit of the upstream sewer.

A manhole shall be constructed at the end of construction with a 1' and 2' stub outs for future connection. Stub shall be plugged with brick and mortar.

In unpaved areas where there is a danger of the manhole becoming lost, set the top of cover elevation so as not to be less than 1-foot above existing ground.

Cleanouts in a sewer lateral shall be made by inserting either a wye branch or a two-way cleanout fitting in the line with the cleanout hub placed vertically above the flow line of the pipe. A cast iron cover shall be tightly sealed in the bell of the access or vertical outlet. Refer to WDS-506 (Sewer Cleanout) for details.

Cleanouts shall be accessible for maintenance and shall be placed in every sewer lateral at:

- The junction with the Building Sewer at the building;
- Intervals of not more than fifty feet in straight runs. Cleanouts in straight runs longer than fifty feet shall be uniformly spaced;
- The junction with the Main Line Sewer; or the junction of the House Connection and Building Sewer at the Property Line; and
- All significant changes in alignment or grade or when required by the Department.

A four inch or larger cleanout is required to receive any video inspection services from the Department. Installation is at the property owner's expense.

Elevation drop thru manholes:

Minimum Drop Across Manhole (ft)

<u>Pipe Size</u>	<u>Channel Configuration</u>		
	Straight	Turn	Right Angle
No Change	0.1	0.1	0.2
Change	Match Soffit/0.2	Match Soffit/0.2	Match Soffit/0.2

Protect sanitary sewer mains when:

- Crossing sewer main is 6" minimum above water main, or
- Crossing sewer main is 12" minimum below water main.

Refer to WDS-129 (Blanket Protection for Pipes) and WDS-405 (Perpendicular Crossing and Parallel Construction) for details.

SEWER LATERAL ABANDONMENT

Before the use of any Sewer Lateral is discontinued, the person discontinuing the use, or some person authorized by him to do so, shall apply for, and obtain from the Department, a permit to cut and cap the Sewer. The permit is to specify the manner in which the Sewer is to be cut and capped.

EASEMENTS

When sewers cannot be located within streets, it shall be located in an approved easement.

Sewer easements shall be a minimum 20 feet in width.

Easements for public sewers shall be dedicated to the Department on a recorded map or by a separate deed with the approved easement sketch and the legal description (including closure calculations).

PERMITTING

Permits are required for all sanitary sewer work, including but not limited to the following:

- Private construction of public infrastructure
- Excavation
- Street obstruction
- Traffic control
- Other as necessary

PRIVATE SEWERS

Private on-site sewers designed to meet the California Plumbing Code will be reviewed, permitted and inspected by Long Beach Development Services. These plans will not be reviewed by the Long Beach Water Department, but must meet all requirements of the California Plumbing Code and Long Beach Development Services. Contact Long Beach Development Services at (562) 570-6230 for plumbing plan check requirements.