

**VALLECITOS WATER DISTRICT
SECTION 400**

**DESIGN CRITERIA
SEWER FACILITIES**

The three main components in a wastewater collection system include gravity sewers, force mains, and lift stations. This section contains criteria to be used in the design of the proposed gravity sewer system. The developer and engineer shall be responsible for ensuring that designs submitted to the District are consistent with, and comply with the latest editions of the VWD Master Plan, VWD Standard Specifications, VWD Standard Drawings, VWD Approved Materials List, VWD policies, rules and regulations, and generally accepted engineering practice.

400.1 MINIMUM SIZE

The District will not accept sewer mains smaller than 8-inches in diameter nor any sewer line that is within a common trench (two or more utilities in the same trench) for operation and maintenance. Adequate horizontal and vertical spacing shall be maintained from potable water systems as defined in the Department of Health Services standards. Continuity/consistency of pipe sizes shall be observed; for example, upstream mains shall not be larger in diameter than tributary/connecting downstream mains. Differing size sewer main pipe segments shall be combined at manholes by matching soffits.

Sewage lift stations and force mains, except those identified in the District's Master Plan, are discouraged. Private lift stations shall be avoided to the maximum extent possible and will only be considered as a last resort. The size of sewer force mains will be determined during the design phase which includes an analysis of alternatives. The minimum size for a force main shall be 6-inches. The capacity shall be the calculated design peak flow from the lift station. The design velocity may be between 2 fps to 6 fps. Discharge shall be into a coated sewer manhole.

Sewage lift stations shall be designed to meet current and proposed flow projections. A design report is required to be submitted for District review and approval. All lift stations, if approved, shall be public and comply with District standards and operation and maintenance requirements. In addition to the building, pumps (including duty and standby), motors and electric system, the station shall also include control systems, telemetry, stand-by power, security and other appurtenances as required by the District.

400.1.2 FULL FRONTAGE EXTENSION

Sewer lines will be required, at the District's discretion, along the entire length of at least one property line frontage of the property to be developed whenever there is a possibility of future main extension, or there are other lots that could connect to the new main at a later date. The property line frontage is that portion of the property along the public right-of-way. If a parcel to be developed has more than one property line frontage, the District may require a main line to be installed along the other frontage(s).

400.2 MINIMUM AND MAXIMUM SLOPE DESIGN

400.2.1 Slopes

All gravity sewers shall be designed and constructed to provide mean velocities, when flowing half full, of not less than 2.0 fps, based on Manning’s formula using an “n” value of 0.013. The following are minimum slopes; however, slopes greater than these are desirable:

<u>Sewer Size (inches)</u>	<u>Minimum Slope in Feet per 100 Feet (%)</u>
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08
27	0.067
30	0.058

The maximum allowable slope shall be the slope that generates a maximum flow velocity of 8 fps at the calculated peak flow rate.

400.2.2 Peak Flows

Design peak flows in sewer mains 12-inches in diameter and smaller shall be limited to $d/D = 0.5$, and in mains 15-inches and larger, $d/D = 0.75$.

400.2.3 Generation Rates

Sewerage generation rates (duty factors) for various land uses within the District are as established in the District’s Water, Wastewater and Recycled Water Master Plan, latest edition.

400.2.4 High Velocity Protection

In steep sections where flow velocities greater than 15 fps are calculated, special provision shall be made to protect the main against displacement by erosion (slope anchors required on slopes greater than 20%) and shock for pipe entering a manhole and for concrete manhole base and flow channels.

400.3 STANDARD LOCATION AND ALIGNMENT

400.3.1 Location

Sewer mains shall be constructed on the centerline of streets and easements, but not in the median or parking lanes. In those cases, mains shall be constructed to the north or west of centerline, as approved by the District. Where an existing main which is not in the standard location is to be extended or where streets are curved and the location or side of the street is questionable, the location of the proposed extension shall be reviewed by the Engineering Department. Sewer mains and laterals shall not be constructed in a common trench with other utilities. Horizontal or vertical curves in sewer mains are not allowed. In curvilinear streets, mains shall parallel the centerline as much as possible by means of horizontal deflection points at manholes (straight alignment between manholes). In multi-lane streets, it is preferable to locate sewers so that manholes are in the middle of traffic lanes.

400.3.2 Alignment

Barring other limiting design and construction considerations, a minimum separation between sewer and water mains in new subdivisions shall be achieved by the following construction procedures:

1. On curvilinear streets, the sewers shall parallel as nearly as possible the street centerline by means of horizontal deflection points at manholes.
2. Sewer mains should be installed on the opposite side of the centerline from the water mains.

400.3.3 Radius of Curvature

Horizontal or vertical curves in sewer mains are not allowed.

400.4 STATIONING PROCEDURE

Where water mains and sewer mains are shown as part of a street improvement project, street centerline stationing and offsets shall be used. When the improvement plans are for sewer and/or water construction only, stationing shall be along the centerline of the sewer and/or water mains. All manholes are to be numbered (example MH No. 1).

400.5 MINIMUM COVER

Minimum cover from finish street grade to top of sewer main pipe shall be 5 feet. Sewer laterals shall be designed and constructed with a minimum cover of 5 feet from the finish grade at property line. Construction stakes and cut sheets shall be provided. Installation of sewer mains prior to grading, or as part of the grading process is prohibited. Sewer mains shall not be constructed at depths less than 5 feet followed by fill/grading.

400.6 MANHOLE SPACING AND LOCATION

Manholes shall be installed at the end of each line; at all changes in grade, size, or alignment; at all intersections of two or more mains; and at distances not greater than 400 feet for 8- through 15-inch sewers and 500 feet for 18- to 30-inch sewers, or as otherwise approved.

400.7 MANHOLE TYPE, MINIMUM SIZE AND DEPTH

400.7.1 Manhole Depth

Manhole depth is calculated from finish grade to lowest pipe invert. Minimum manhole depth shall be 6 feet. Manholes shall contain pre-cast reinforced concrete sections with eccentric cone style, no steps. Pre-cast manhole bases may be used if approved by District. The minimum diameter of manholes shall be as follows:

<u>Sewer Diameter</u>	<u>Min. Manhole Dia.</u>
8-12 in.	48 inches
15-24 in.	60 inches
Greater than 24 in.	96 inches

Depth of manhole shall be measured from the lowest pipe invert to the finished grade of the street.

The standards for the District sewers are generally based on a depth criteria of approximately 6 feet to 15 feet

for manholes. However, if deeper manholes, regardless of sewer size, are required and approved by the District, the following criteria will govern. The larger manhole, based on either diameter or depth, shall be constructed.

<u>Sewer Depth</u>	<u>Manhole Diameter</u>
6-15 ft.	48 inches
>15-22 ft.	60 inches
Greater than 22 ft.	72 inches

400.7.2 Allowable Head Losses

Allowable head loss in manholes shall be as follows:

1. Straight run through manholes based on 0.10-foot loss
2. Right angle turn in manholes based on 0.5 velocity head loss or 0.20 feet, whichever is greater

400.8 MANHOLE PROTECTIVE LINING

The interior of manholes equal to or greater than 60-inch in diameter and larger shall be coated with a polyurethane lining system. The interior of manholes 48-inch in diameter shall not be coated with a polyurethane lining system unless as determined by the Engineer or the District and shall be noted on the plans. 48-inch diameter manhole locations shall be evaluated to determine their potential to generate hydrogen sulfide gases, such as at sewer main alignment changes greater than 60 degrees, where significant grade changes occur, or at the convergence of large flows. The coating shall extend down to cover the manhole shelf in its entirety and to overlap joints in the inlet/outlet sewer pipe penetrations. The coating shall not extend into the channel and flowline. The protective lining system shall be Zebron lining system.

400.9 MANHOLE COVERS

400.9.1 Type of Covers

Cast-iron frames and covers shall be 36-inches in diameter. Covers shall be three-piece with the words “SEWER” and “VALLECITOS WATER DISTRICT” cast in the cover. Larger size covers may be specified for special conditions on plans. See Standard Drawings S-1, S-2, and S-3. Frames and covers shall be from the same manufacturer and originating from the same factory.

400.9.2 Position of Covers

The flat part of the eccentric cone section shall generally be oriented to the upstream flow through the manhole. Specifically cut plywood shall be placed in the bottom of the manhole after testing and before final grade adjustment. At the completion of final paving, the manholes shall be raised to final grade by using the necessary sized grade rings and the plywood shall be removed prior to occupancy.

400.10 ACCESS TO MANHOLE

All sewer manholes shall be designed and constructed with a direct paved or all weather access to them, as approved by the District.

400.11 SEPARATION BETWEEN WATERLINES AND SEWERLINES

See Subsection 400.3 herewith, and Subsection 500.7.

400.12 HOUSE LATERALS AND MINIMUM DEPTH AT PROPERTY OR EASEMENT LINE

Because the District does not have control over what enters the drain/lateral from private developments or dwellings nor does it have control over private properties, the proper operation and maintenance of all sewer laterals is the sole responsibility of the private property owner from the property line to the public sewer main.

All sewer laterals shall be located by the applicant and shown (with stationing) on the improvement plans.

House connections shall be constructed to the property line. There shall be one house sewer lateral (4" minimum) constructed for each individually owned dwelling unit (a granny flat on the same property as a primary dwelling can use the same sewer lateral as the primary dwelling). Minimum depth shall be 5 feet from finished grade at property or easement line. The sewer house connections shall be laid to the grade as established by the applicant so that the 4-inch house connection will have a minimum cover of 5 feet from the finished grade to the top of the pipe at the property line per Standard Drawing S-4.

400.13 TOWNHOUSES AND CONDOMINIUM LATERALS

For buildings containing two to four units, either one 4-inch diameter lateral to each unit or one 6-inch diameter, or larger, lateral to the building shall be used. For buildings containing more than four units, either one 4-inch diameter lateral to each unit or one 8-inch diameter, or larger, lateral to the building shall be used. In general, a lateral shall serve only one building regardless of the number of units per building.

400.14 INDUSTRIAL TREATMENT

Requirements for industrial pretreatment will be determined as a result of processing the Industrial Waste Questionnaire through the Encina Wastewater Authority office. Design requirements will be dependent upon those industrial pretreatment requirements.

400.15 GREASE INTERCEPTORS

The requirements for grease interceptors are governed by the Uniform Plumbing Code. All facilities which have the potential to discharge fats, oils and grease into the District's sewers may be required to install grease interceptors to minimize problems in collection systems and treatment plants. The Department of Health Services and/or the local agency building department issues permits and has jurisdiction and establishes the size and location of the interceptor(s).

It is the responsibility of the owner of each facility to maintain proper operation of the interceptor unit and to remove accumulated grease at suitable intervals to avoid excessive buildup in the unit.

400.16 STANDARD SEWER NOTES

The District's current General Notes for Improvement Plans and General Notes Grading Plans may be obtained from the Engineering Department or the District website, www.vwd.org.

****END OF SECTION****