City of Sunnyvale

Sanitary Sewer Systems

Design Standards

Published by Sunnyvale Department of Public Works
and
Sunnyvale Environmental Services Department

Revised: June 2015

1.0 SANITARY SEWER SYSTEMS – DESIGN STANDARDS

1.1 GENERAL

A. All sewer system construction shall conform to the most recent edition of the City of Sunnyvale Standards. If the standard that is sought does not appear in this Manual, then the following standards shall be utilized in the order listed:

1. State of California Department of Health Services
2. City of Sunnyvale Municipal Code
3. City of Sunnyvale Standard Details
4. City of Sunnyvale Consolidated General Plan
5. Standard Specifications for Public Works Construction (SSPWC or "Greenbook"), latest Edition
6. Standard Details for Public Works Construction (SSPWC or "Greenbook"), latest edition
7. Santa Clara County Drainage Design Manual
8. All other applicable local state and federal guidelines

Exceptions to this and all other guidelines appearing in this manual may be allowed only upon the approval of the City.

B. The sewer facilities listed below shall require telemetry and control equipment to be incorporated into the design of the facility. The City shall provide specific design requirements when improvement plans are submitted for Plan Check.

1. Treatment Facilities
2. Sewer Lift Stations and force mains
3. Metering Stations

C. If the standards as described in these guidelines cannot be met due to existing constraints, then the Engineer shall provide, to the City, written documentation of the deviation and how their specific design meets the intent of these standards.

1.2 MAINS

A. Minimum size shall be eight (8) inches; and criteria 1.2.B. below.

B. For diameters 10 inches and smaller, maximum depth of flow shall not exceed ½ the diameter for wet weather peak flow unless otherwise directed by the City. For diameters 12 inches and larger, depth of flow shall not exceed 3/4 the diameter for wet weather peak flow unless otherwise directed by the City.

1. If a new development results in an existing main flowing over 3/4 the diameter, the pipe shall be upsized to meet the flow design criteria or a relief line may be installed as approved by the City.

C. No vertical or horizontal curves shall be permitted, unless otherwise approved by the City.

D. The maximum slope of sewer line between two (2) adjacent manholes shall be 14 percent unless otherwise approved by the City.

E. Locations:

1. Alley: This shall be determined by the City on a case by case basis.
2. Street: Sewer main locations shall be located in center of the street with a minimum 10-foot separation, outside of pipe to outside of pipe, from waterlines, or per CDPH requirements, whichever is more conservative.
3. Minimum cover for sewer pipe shall be five (5) feet below the finished grade, unless otherwise approved by the City.
4. Streets with 84 feet of right-of-way or more may require special location as approved by the City.

F. Minimum Slopes:

A minimum velocity of two (2) FPS shall be maintained at wet weather peak flow. Where two (2) FPS is not attainable, a minimum slope of one (1) percent shall be used. The City shall determine if other requirements to mitigate odors is required. When velocities are two (2) FPS or greater the following design criteria shall govern:

Pipe Diameter	Minimum Slope
8 Inch	0.50%
10 Inch and larger	0.40%

G. Wastewater flow factors for average daily flows:

Zoning Classification	Zoning Code	*gpd/unit*	*gpd/1000 sqft*	*gpd/acre*
Low Density Res.	R0	***170***	**-**	***1,100***
Low Density Res.	R1	***215***	**-**	***1,000***
Low-Med. Den. Res.	R1.5	***190***	**-**	***900***
Low-Med. Den. Res. PD	R1.7	***165***	**-**	***1,500***
Low-Med. Den. Res.	R2	***145***	**-**	***1,450***
Med. Den. Res.	R3	***135***	**-**	***2,900***
High Den. Res.	R4	***150***	**-**	***3,500***
High Den. Res./Office	R5	***100***	**-**	***4,500***
Res. Mobile Home	RMH	***160***	**-**	***1,400***
Commercial	C1, C2, C3, C4 & MPC	**-**	***245***	***2,300***
Downtown Specific Plan	DSP	**-**	**-**	***1,600***
Lakeside Specific Plan	LSP	**-**	**-**	**-**
Industrial	M3, MPI, MS	**-**	***115***	***1,500***
Moffett Park TOD	MPT	**-**	***170***	**-**
Admin-Prof. Office	O	**-**	***170***	***1,950***
Public Facility	PF	**-**	***245***	***1,700***
Split Zoning	SP	**-**	**-**	**-**

1. Dry weather peak flows for residential and non-residential developments shall be based on the ratio of the peak to average flow per the dry weather peaking factor shown below.

Average Dry Weather Flow	**Dry Weather Peaking Factor**
Less than 8,000 gpd	3.5
8,000 gpd to 15,000 gpd	3.25
15,000 gpd to 35,000 gpd	3.0
35,000 gpd to 80,000 gpd	2.75
80,000 gpd to 250,000 gpd	2.5
250,000 gpd to 600,000 gpd	2.2
Over 600,000 gpd	2.0

2. Wet weather flows for residential and non-residential developments shall include an infiltration and inflow allowance based on a 10-year storm event that is 65% of the average dry weather flow (ADWF). This allowance is added to the peak dry weather flow.

   Peak Wet Weather Flow (PWWF) = ADWF x (Dry Weather Peaking Factor + 0.65)

H. Sewer easements shall be created by the developer. Securing of the easements shall be determined on a case by case basis by the City. Easements shall be dedicated to the City and maintained by the Property Owner.

I. All sewer mains not located within the public right-of-way shall be provided with a minimum 15-foot wide sewer easement. In some special cases, a wider easement may be required; the City shall determine size. All easements shall at all times be easily accessible to the City's maintenance equipment. No trees or structures or building overhang are allowed within the City easements. When easements are located on private properties, the property owner shall keep the easement free and clear of weeds and debris. An all-weather access road shall be required as approved by the City. The access road shall be three (3) inches of asphalt concrete over six (6) inches of aggregate base and a minimum of 12' wide.

J. Where water and sewer mains are located within the same easement, the minimum jurisdictional width shall be 30 feet wide. All easements shall at all times be easily accessible to the City's maintenance equipment with all-weather access roadways. No trees or structures or building overhang are allowed within the City easements. When easements are located on private properties, the property owner shall keep the easement free and clear of weeds and debris. An access road shall be built as approved by the City. The access road shall be three (3) inches of asphalt concrete over six (6) inches of aggregate base and a minimum of 12' wide.

K. Three (3) inch minimum width green color coded (per USA Mark Out System) detectable tape marked "SEWER" in 1-½ inch black letters shall be placed on the compacted and graded bedding material within one foot above and centered over the sewer main prior to backfilling the trench.

1.3 MANHOLES

A. Minimum pipe inlet—to—outlet invert elevation drop through manholes shall be 0.20 feet or one (1) inch per foot, whichever is more stringent.

B. Manholes shall be required:

1. At all changes of slope;
2. At all changes of direction;
3. At all intersections of mains – match soffits;
4. At all ends of main lines and beginning of main lines;
5. At interfaces between private and public sewer systems;
6. Changes in pipe size and/or material;
7. At the right-of-way line where a private street intersects a public street for residential development with five (5) units or more. For less than five (5) units, a clean-out is required.

C. Prohibited locations for Manholes.
Manholes shall not be placed in the following locations:

1. Inaccessible locations;
2. Gutters and other depressions;

3. In sidewalks, crosswalks, or pedestrian ramps;
4. In driveways;
5. In freeway ramps or lanes;
6. Between railroad tracks (within a railroad right-of-way the manhole shall be located a minimum of fifteen feet from the track bed and in accordance with the jurisdictional authority);
7. Within fifteen feet of any structure;
8. Within any area subject to localized flooding.

D. All manholes shall be numbered and stationed on the improvement plans, and on the sewer table calculations.

E. The maximum allowable spacing between manholes is 300 feet for pipelines up to, and including, 18 inches in diameter, and 400 feet for pipelines greater than 18 inches, or as approved by the City.

F. Drop manholes shall be evaluated by the Designer on a case by case basis by the City. If there are other alignments and/or methods that be used to eliminate the use of drop manholes these shall be used in lieu of drop manholes. When drop manholes are used, drops shall be inside.

G. When changes in grade of the inlet and outlet pipes are greater than 10 percent and the potential for a hydraulic jump exists, the grade change shall be made in a smooth vertical curve, upstream of the manhole, with the manhole located 25 feet downstream of the lower end of the vertical curve. Each hydraulic jump shall be carefully evaluated by the Designer and submitted to the City for review.

H. Large Diameter Manholes. For sewer mains greater than 36 inches in diameter, special design and structural details for the manholes or vaults shall be shown on the plans. Vaults shall require a minimum of two (2) access manholes.

I. Deep Manholes. For manholes that exceed 25 feet in depth, vaults shall be provided with a minimum of two (2) access manholes for each vault. Structural calculations (signed by a California licensed structural engineer) shall be provided to verify that the structure is designed to accommodate the design depths.

J. Inspections of Existing Manholes. The removal of existing City manhole covers shall be coordinated with the City in advance. If access to any City manhole is required for design or construction purposes, then the City inspection staff shall be contacted.

K. For all industrial, multi-family/high density housing properties, an inspection manhole on the lateral is required, per Standard Drawing 6A, immediately behind the property line. For all single family residential uses, a clean out shall be provided within two (2) feet of the property line.

L. All manholes shall have a minimum five (5) foot horizontal separation from dry utilities unless jurisdictional agency requirements are more stringent.

M. An approved seal or water-stop shall be placed over the plastic sewer main at the manholes.

N. Interior of Manholes: Coat entire interior of new and retrofitted manholes with Sewpercoat, Mainstay or Sancon calcium aluminate cementitious mortar.

1.4 LATERALS

A. Size - Minimum four (4) inches for single family and minimum six (6) inches for all multi-family and commercial.

B. All lateral piping and appurtenances located within private property shall be the responsibility of the owner. All installation, maintenance, repair, and replacement shall be at the expense of the owner and conform to City standards.

C. All laterals, including sizes, are to be shown on improvement plans by stationing or a lateral table. On "As-Built" plans all laterals shall be shown in plan view to scale and dimensioned from the nearest sewer manhole.

D. Locations:

1. Right angle or radial to street right-of-way, or angled with the direction of flow of the main with a manhole.
2. Standard is from the center of lot to five (5) feet above downstream lot line (shown on "As-Built" plans), deviations shall be reviewed and approved by the City.
3. Service shall not be located in the driveway, variations shall be reviewed and approved by the City.
4. An "S" shall be stamped on the curb face directly above the lateral location.
5. Separation between sewer and water laterals shall be per Department of Health Guidelines.
6. Sewer laterals shall be at right angles to the sewer main at terminus manholes, except in a cul-de-sac.
7. Minimum of five (5) feet from the edge of existing and new trees.

E. Cover: Five (5) feet minimum at property line unless approved by the City.

F. Each parcel or lot shall be a separate connection to public sewer main.

G. Access manhole to be provided at all change of direction, size, and material.

H. House and property line clean outs are to be installed unless a continuous burst from the house to sewer main.

I. At points of convergence of pipes of various sizes, the soffits of the pipe elevations shall match.

J. Sewer laterals connected to systems having a pumping system or houses having a finished floor elevation 12 inches or less above the rim elevation of the nearest upstream manhole structure shall require installation of a City approved sewer Backwater Valve, as designed by a California licensed engineer, immediately upstream of the clean out at the

right-of-way. The valve must be installed in a valve box for easy access and be visible from the public right-of-way. The property owner shall be responsible for the installation, routine service and all maintenance of the sewer Backwater Valve. The Backwater Valve shall be shown on the precise grading and improvement plans.

K. Building drains, sump pumps, and area stormwater drains shall not be connected to the sanitary sewer system.

L. All-weather access roads with turnarounds shall be provided for any sewer or storm drain line installed in undeveloped areas or properties. The access road shall be three (3) inches of asphalt concrete over six (6) inches of aggregate base and a minimum of 12' wide.

1.5 LIFT STATIONS

A. Lift Stations shall not be employed unless deemed essential by the City. Designer shall develop design criteria that are subject to the review and acceptance of the City.

1.6 LIST OF AUTHORIZED MATERIALS USED IN THE CITY SEWER SYSTEM

A. Manhole Steps: ½ inch round grade 60 steel encapsulated with plastic copolymer propylene coating on bottom rung only. The only manhole step allowed is to hook safety equipment.

B. Interior of manholes: Coat entire interior of new and retrofitted manholes with Sewpercoat, Mainstay or Sancon calcium aluminate cementitious mortar.

C. Pipe:

1. Sewer residential laterals in public right-of-way or public easements shall be HDPE, SDR-26 or higher standard as specified in item 2 below. Any exceptions require prior approval by the City.
2. Sewer Mains:
    a. Preferred material for mains shall be either HDPE or PVC. However, DIP, and other alternative material may be approved by the City.
    b. PVC Pipe: Minimum size of eight (8) inches is required. 4"-15" PVC shall meet ASTM D3034—SDR-26 requirements, minimum. 18"-24" shall meet ASTM F679 requirements, minimum and shall be submitted to the City for approval.
    c. For depths greater than 12 feet use SDR-26 or better (non-IPS) (PVC C-900 or C-905 may be used in some cases).
    d. PVC pipes shall not have slopes less than two (2) percent. The maximum diameter shall be 24 inches. A PVC material selection may be allowed for a slope of less than two (2) percent provided that the length of each section does not exceed 12½ feet, a minimum two (2) FPS velocity is maintained, or as approved by the City. The size of pipes and maximum spacing of manholes to be the same as required for VCP.
    e. Joint gasket material shall be an elastomeric seal meeting ASTM Specification F 477 unless otherwise specified.
    f. All pipe placed between manholes shall be the same material.

g. Plastic sewer pipe shall meet the applicable material specification of 207-17 of the City of Sunnyvale Standard Specifications, most recent edition.
h. Ductile Iron Pipe shall be polyethylene lined, or approved equal.
i. Polyethylene Encasement: All Ductile Iron pipe fittings and appurtenances in pressurized conditions are to be encased with two (2) layers of eight (8) mil thick tubing of white or black polyethylene in accordance with City of Sunnyvale Standard Specifications, as approved by the City.
j. Design calculations shall be submitted to verify line size. Normally a Manning "n" = 0.013 shall be satisfactory.

D. Backfill and Bedding Materials

1. Bedding standards are contained in the City of Sunnyvale Standard Details. All sewer mains shall meet these requirements.
2. Where sand or native materials are specified, they shall meet the testing specification requirements of the Construction Standards and Requirements section of this Manual.
3. Trench backfill to be compacted to a minimum of 95 percent.

1.7 PRIVATE SEWER SYSTEMS

A. All private sewer systems shall be governed by and permitted through the Building Division. An inspection manhole shall be set at the property line and at the mainline if required.

B. Property owner to adequately maintain private sewer system for functionality. Property owner shall be responsible for any impacts due to discharge from the private system. Property owner shall be held financially responsible for any and all impacts due to discharge from the private system.

C. The sewer system upstream of the inspection manhole at the property line shall be considered private. If no inspection manhole is required, the entire lateral from the main shall be considered private and the responsibility of the property owner.

D. In the event that a private sewer system is proposed to be converted to a public system, the entire system must be upgraded to meet the public standards as presented in this manual.

END OF SEWER SYSTEMS—DESIGN STANDARDS SECTION

REQUIRED NOTES FOR SANITARY SEWER SYSTEMS CONSTRUCTION PLANS

1. All work shall be in accordance with the most recent editions of the City of Sunnyvale Standards; and Standard Specifications for Public Works Construction (SSPWC) (Greenbook) and Supplemental Amendments, most current editions.
2. The Contractor must secure approval from the City prior to backfill over any sewer line. 24 hour advanced notice required.
3. No revisions shall be made to these plans without the approval of the City.
4. No disruption to existing sewer services shall be allowed during connections to existing mains without the expressed approval of the City.
5. The Contractor shall notify the Underground Service Alert 48 hours prior to starting excavation so that existing sewer facilities may be marked in the field. (UNDERGROUND SERVICE ALERT: 800-227-2600 or 811).
6. Potholing location and elevation of existing sewer facilities shall be confirmed by field measurements and excavation exploration by the Contractor, in the presence of the City after a two (2) working day notice prior to the beginning of new work. This shall allow time to permit revision of plans, as necessary, because of conflicts with other facilities.
7. The contractor is responsible for field verification of the accuracy of the information provided. The existence and location of sewer facilities shown on these plans were obtained from available City records. The City of Sunnyvale does not guarantee the accuracy of these records.
8. The City shall be notified at least two (2) working days prior to commencing work on the sewers. To arrange for inspection call the City at (408) 730-7605.
9. All sewer lateral connections shall be placed prior to surfacing of streets and other surface restorations.
10. All new and rehabilitated manholes are to be coated in accordance with the City Standard Specifications and Details.
11. All manhole covers for public sewer systems shall be manufactured with “SANITARY SEWER” stamped on top of the manhole covers.
12. All sewer mains shall be inspected by closed circuit television at the Contractor’s expense prior to final acceptance. The inspection shall take place after completion of trench backfill and finish grading but prior to the placement of pavement or permanent trench resurfacing to determine the existence and extent of any obstructions, structural deficiencies, sags, or foreign material. Both a verbal description and a written manuscript of the inspection shall be submitted to the City for review and approval prior to final acceptance. The CCTV Inspection shall meet the requirements of TELEVISING SEWER MAINS in the City Design Standards.
13. All sewer mains shall pass a 95 percent mandrel test and air pressure test per the manufacturer’s requirements, prior to street paving, but after all other utilities have been completed, backfilled, tested, and testing certified compaction approved.
14. Plastic sewer pipe shall be bedded in strict accordance with City of Sunnyvale Standard Drawing 16A-1. Bedding shall remain undisturbed by subsequent construction.
15. PVC pipe shall be stored on a flat surface so the barrel is evenly supported. Do not stack pipe higher than four (4) feet. Pipe shall not be exposed to direct sunlight while being stored. Gaskets shall be stored in a cool, dark place out of contact with oil or grease.
16. Existing sewer mains shall not be used for discharge of storm waters, drainage, or other similar uses per City of Sunnyvale Municipal code 12.12.020 and California State Water Quality Control Board.

17. During any activity or work around, or in, an existing sewer line, the contractor at their expense, shall protect against debris entering the system by installing “traps” in the outlet side of the closest manhole. The “traps” and their location shall be submitted to the City for approval. The “traps” shall remain in place until all requirements (testing, cleaning, videotaping, etc.), have been completed and approved.
18. Upon activation of a sewer line, the Contractor—at their expense—shall protect the line from foreign material by installing plywood over the manhole base until all grading, paving, and manhole raising is complete and accepted by the City.
19. The inside and outside of the pipe shall be clean and free from foreign material of any kind before being installed.
20. Three (3) inch minimum width green color coded (per USA Mark Out System) detectable tape marked “SEWER” in 1-½ inch black letters shall be placed on the compacted and graded bedding material within one (1) foot above and centered over the sewer main prior to backfilling the trench.
21. All water discharge from cleaning, CCTV inspection, and other activities shall comply with all requirements of the City of Sunnyvale Municipal Code, California Regional Water Quality Control Board—San Francisco Bay Region (RWQCB), along with any other jurisdictional regulatory agencies.

END OF REQUIRED NOTES FOR SEWER SYSTEM DESIGN PLANS