

**SECTION 3 DESIGN CALCULATIONS AND PLAN PREPARATION**

**3-01 Design Calculations.** When requested to do so by the District, the Job Engineer shall submit design calculations for District review and approval. Design calculations shall be submitted in duplicate and shall be in a neat, acceptable form and shall indicate the date, signature of the Job Engineer and his stamp with his State of California registration number and expiration date.

Calculations for sewers shall be presented in tabular form and shall include the following information for each section of sewer: Terminal manhole designation, ground elevations at terminal manholes, incremental and cumulative tributary population, incremental average and maximum domestic sewage flow, incremental infiltration allowance, cumulative design flow, invert elevations of terminal manholes, length of sewer run, and sewer size, slope, capacity and velocity. Design calculation for pumping stations shall include soils data, structural design calculations, hydraulic calculations including the basis for average and peak flows, calculations for wet well volume, curves indicating force main characteristics, and individual and combined pump head capacity curves.

All calculations shall be accompanied by a small scale map showing and identifying proposed sewerage facilities and tributary areas, etc.

**3-02 Size of Plans and Data Required.** Sheet sizes for plans for all sanitary sewerage facilities shall be 22 inches by 34 inches, unless otherwise specifically approved in advance by the District, and the plans shall include as a minimum the following information and data:

- A. **General** - The plans shall show the name of the project, subdivision, and each sheet shall bear the Job Engineer's signature and registration stamp with expiration date. Each map and plan sheet shall have a north arrow, appropriate scale or scales and date of preparation indicated thereon.
- B. **Sewer Plans** - The sewer plans shall show the true horizontal relationship between the proposed sewer improvements and the existing and/or proposed field conditions, including all existing or proposed utilities and other facilities in accordance with available information (see Section 11-02). Plans shall include sewer line sizes and designations and shall show all structures and their respective numbers, the property lines and corners adjacent to the sewer alignment, laterals and ties to property corners, all necessary required stationing, horizontal curve data and street names. Horizontal scale must be 20 feet to the inch with a vertical scale of 5 feet to the inch unless another scale is specifically permitted by the District.
- C. **Sewer Profiles** - The sewer profiles shall show the vertical relationship between the sewer line invert and the ground surface at the time of sewer construction and the finished ground and/or paving surface. The sewer line size, pipe type and pipe class shall be shown between each pair of consecutive structures on the profiles. Sewer profiles shall also show all existing and/or proposed utilities and/or other facilities in accordance with available

information (see Section 11-02), which cross the alignment of the sewer and shall accurately indicate clearance when less than twelve (12) inches. Sewer profiles must be prepared at the same horizontal scale as the plans and a vertical scale of five (5) feet to the inch, unless another scale is specifically permitted by the District.

- D. Easements - All existing and proposed easements and rights-of-way shall be shown on the plans.
- E. Vicinity Map - A small scale vicinity map showing the location of the development within the town or city, together with the streets and downstream sewer, shall be shown on the first sheet of the plans.
- F. Location Map - A location map at a scale of 100 feet to the inch shall be included on the first sheet of the plans showing the entire development, the overall sewer layout and appropriately indexing each plan sheet.
- G. Line Stationing - Each sewer line with a separate designation shall be stationed continuously upgrade from 0+00 at its point of connection to another line.
- H. Ties to Existing System - Horizontal and vertical ties to the existing District sewerage system shall be indicated on the plans.
- I. Structure Numbers - Manholes, rodding inlets, and all other sewer structures shall be numbered or stationed consecutively upgrade by type of structure. The structure number shall appear on the plans and profiles whenever the structure is shown or referred to.
- J. Side Sewer Locations and Elevations - All side sewers or laterals shall be shown on the plans with ties given to nearby property corners. The elevation of the lateral at the property line shall be shown on the plans and staked in the field by the Job Engineer.

Where properties are fronting on a cul-de-sac, the laterals for these properties shall be connected to a manhole. Normally, the lateral shall be shown to a point ten (10) feet from the lower lot corner at the property line on hillside lots (3%+ slope), and to the approximate center of the lot in relatively level terrain. The Job Engineer may locate laterals to fit building conditions, but the plans must show proper ties, and the completed lateral must be permanently marked with an "S" on the curb or a stake and accurately shown on the record drawings.

- K. Elevation Datum - The elevation datum used shall be USC & GS mean sea level (National Geodetic Vertical Datum NGVD). The plans shall include a note indicating the elevation datum and describing the location of one or more benchmarks in the area of the work.
- L. Standard Notes - In addition to any other notes which may be appropriate or required, the following notes shall be included on all plans:

1. "All sewer construction shall be in accordance with the Sausalito-Marín City Sanitary District Standard Specifications and Drawings."
2. "The Contractor shall notify the District 48 hours prior to starting any sewer work."
3. "For any work in a public street, the Contractor shall obtain an encroachment permit from the agency having jurisdiction."
4. "The locations of utilities shown on these plans are approximate only, and it is the Contractor's responsibility to verify locations and depths with appropriate agencies or by potholing. The Contractor shall call USA Underground Service Alert at least 72 hours prior to commencing work."
5. "The Contractor shall pothole all underground utilities and sewers prior to any trenching operation."
6. "The Contractor shall notify the District immediately of any conflict between sewers and other underground facilities."
7. "The Contractor shall shore all excavations in accordance with applicable safety orders."
8. "All sewer laterals shall be a minimum 4 inches inside diameter and shall have a minimum slope of 1.0% and minimum depth of cover at the property line of 3.0 feet (measured from the top of curb), unless otherwise noted on these plans."

3-03 Rights-of-Way. Rights-of-way define and establish the rights for the District to maintain a sewer facility in the location designated by the Job Engineer (see Section 1-05). When main sewers are to be installed outside of public street rights-of-way in subdivisions, the required easements shall be shown on the subdivision final map and shall be granted to the District in a separate deed of easement. Outside of subdivisions, when sewers are to be installed on private property, an easement must be granted to the District and the easement description and required easement map shall be provided to the District by the Job Engineer, along with the name and address of the property owner or owners of record. Unless otherwise specifically approved by the District, public sewer permits will not be approved nor will any work be permitted to proceed until the District receives, approves and accepts and records all required easements.

- A. Easement Descriptions - Easement descriptions shall provide legal metes and bounds description of all easements to be granted. The preamble of the easement description shall read as follows:

"AN EASEMENT for the construction and maintenance of sanitary sewer facilities and appurtenances, together with the right of ingress and egress, over, on or under the following described property:"

- B. Easement Maps - The easement map shall show the entire parcel over which the easement is granted, and all necessary survey ties, courses and distances, the point of beginning of the easement description, the last names of each grantor, the name of the sewer main extension involved, a north arrow, map scale, and the Job Engineer's signature and registration stamp with expiration date. Bearings and distances of easement courses shown shall conform to those given in the easement description. Two (2) black line prints of the easement map shall be submitted (for each grantor involved).
- C. Easement Deeds - After approval of the required easement map and description, the Permittee shall prepare the necessary easement deed on an appropriate form and furnish the District with a properly signed and notarized deed of easement for recordation by the District.

3-04 Easements for Future Extensions. Easements shall be granted to the District through the property to serve the upstream property in all cases where future extensions of sewer lines could be required beyond the property being sewered. Such easements shall be included on the construction plans where there is any doubt as to the ability to properly serve the ultimate service area.

3-05 Flood Control Approval. In the event that a proposed sewer is to cross a creek, storm water channel, conduit, structure or drainage course under the jurisdiction of the Marin County Flood Control and Water Conservation District, a detailed large scale profile of the crossing shall be incorporated in the plans with approval of the Flood Control District, County and/ or city of jurisdiction prior to approval of the plans by the District.

3-06 Soils Investigation. Due to the inherent hazards involved in excavation, trenching, and pipe laying in certain common soil formations within the District, the right is reserved to required geological investigation and report prior to the approval of construction plans. In general, locations on steep side hills, locations in areas of established instability, locations in areas of bay mud or filled marshland, spring or seepage areas, or areas where concentrated or unusual development exists or is planned, shall be investigated and construction controlled by the recommendations contained in the Soils Engineer's report. The costs of all soils investigations shall be paid for by the Permittee.

3-07 Construction Permits. The Permittee shall be responsible for securing all necessary construction permits. Such permits include, but are not necessarily limited to, permits from BCDC, the U.S. Army Corps of Engineers, State Department of Fish and Game, Cal/OSHA, Division of Industrial Relations, street or railroad encroachment permits, etc.

**SECTION 4 DESIGN STANDARDS**

4-01 Design Criteria. The following criteria for the design of gravity sewers within the jurisdiction of the Sausalito-Marín City Sanitary District is hereby established.

- A. Population Density - Population densities for determining the ultimate tributary population shall be based on actual count, current General Plan of the agency exercising jurisdiction, or based upon the character of proposed development, whichever is the greatest.
- B. Average Single Family Unit - The average single family unit shall be taken as 2.5 persons per residence.
- C. Per Capita Domestic Sewage Flow - The average per capita dry weather domestic sewage flow shall be taken as eighty (80) gallons per day.
- D. Design Flows - Areas Containing less than 2,000 Persons - In the design of sewers for residential tributary areas containing 2,000 persons or less, the unit design flow used shall be 400 gallons per capita per day. This factor includes appropriate allowance for storm water infiltration.
- E. Design Flows - Areas Containing More Than 2,000 Persons - For tributary areas containing more than 2,000 persons, the total design flow shall be determined by multiplying the average dry weather sewage flow times the ratio of peak flow to average flow and adding an appropriate allowance for storm water infiltration.
  - 1. Ratio of Peak to Average Sewage Flow - The ratio of peak to average dry weather sewage flow is a function of the tributary population, and the values tabulated below shall be used.

<u>Population Range</u>	<u>Rate of Peak to Average Dry Weather Sewage Flow</u>
2,000 - 5,000	2.5
5,000 - 7,000	2.3
7,000 - 9,000	2.2
9,000 - 13,000	2.1
13,000 - 18,000	2.0

- 2. Storm Water Infiltration - Investigation has shown that areas of the existing sewerage system constructed prior to 1962 contribute significantly higher amounts of storm water infiltration than can be expected from more recently constructed sewers. Accordingly, the following allowances shall be made for storm water infiltration flows:

Areas sewered prior to 1962 - 6,000 gallons per acre/day

Areas sewered after 1962 - 2,500 gallons per acre/day

Areas sewered after 1975 - 1,000 gallons per acre/day

- F. Commercial or Industrial Flows - Unit design flows used for commercial or industrial areas shall be used on the type of existing or proposed development and shall be determined by special study subject to the review and approval of the District.
- G. Manning Formula - The diameter of gravity sewers shall be determined by use of the Manning formula, using a roughness coefficient, "n", of 0.013 or the pipe manufacturer's recommendation, whichever is greater.
- H. Special Design Problems - Special design problems involving siphons, pumps, pump stations, force mains, non-residential connections, or other unusual features, require individual study and approval by the District Engineer.
- I. References - Reference is made to WPCF and ASCE manuals, and to Minimum Design Standards of the Federal Housing Administration (FHA-G-4518.1).

#### 4-02 Prohibited Wastes.

- A. Prohibited Materials - It shall be unlawful for any person to connect any drain into the public sewer system. Dumping of garbage or septic tank sludge into manholes or sewers is strictly prohibited as set forth in District Ordinance 112. It shall be unlawful to discharge any industrial waste or any solid or semisolid or liquid substances resulting from any industrial manufacturing or commercial process or from any garage, service station or wash rack, into any sewer in the District without first having obtained a permit to do so from the Sanitary District.

Except as hereinafter provided, no person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewer.

1. Any solid or viscous pollutants in amounts which will cause obstruction to the flow in the system, or which will require unusual attention or expense to convey and/or treat. In no case shall there be discharge of any solid material not capable of passing through a 3/8 inch mesh screen.
2. Pollutants which create a fire or explosive hazard in the system, including, but not limited to, wastestreams with a closed-cup flashpoint of less than 140°F (60°C) using the test methods specified in 40 CFR 261.21.
3. Heated discharges in amounts which will inhibit biological activity in the treatment facility resulting in interference. Heated discharges in such quantities that the

temperature at the treatment plant exceeds 104°F (40°C), or which pose a hazard to District personnel.

4. Any discharge which has been diluted as a partial or complete substitute for treatment to achieve compliance with this Ordinance, the user's waste discharge permit, or the National Categorical Standards.
  5. Any discharge of hazardous waste, as defined by Title 22 of the California Code of Regulations, without the written approval of the District.
  6. Any discharge which causes noxious or malodorous gases at or near the District's facilities or which otherwise creates a public nuisance.
  7. Pollutants which result in the presence of toxic gases, fumes, or vapors within the District's facilities in a quantity that endangers the health or safety of District's personnel.
  8. Any storm water, surface water, groundwater, roof runoff or subsurface drainage, except in cases of discharge of contaminated groundwater in accordance with Section 8.
  9. Any radioactive wastes, except as allowed under the "California Radiation Control Regulations", CCR Title 23 sec 30100 et seq.
  10. Any discharge of any pollutant, including oxygen demanding pollutants (BOD, etc.), released at a flow rate and/or concentration which will cause interference with the system.
  11. Any discharge containing petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that, alone or in conjunction with other discharges, will cause interference or pass-through.
  12. Any discharge which, alone or in conjunction with a discharge or discharges from other source, will compromise the use of District's treated wastewater for any adopted reclamation use.
  13. Pollutants which will cause corrosive structural damage to the system.
  14. Substances containing greater than five percent copper by weight, added to control roots or for any other purpose.
- B. Interceptors Required - Grease, oil, and sand interceptors shall be provided when, in the opinion of the District, they are necessary for the proper handling of liquid wastes, containing grease in excessive amounts, or any flammable wastes, sand and other harmful ingredients; except that such interceptors shall not be required for buildings used for residential purposes. All interceptors shall be of a type and capacity approved by the District and shall be so located as to be readily and easily accessible for cleaning and inspection.

- C. Maintenance of Interceptors - All grease, oil and sand interceptors shall be maintained by the Owner, at his expense, in continuously efficient operation at all times.
- D. Swimming Pools - It shall be unlawful for any person to discharge the contents of a swimming pool into a sanitary sewer except in the manner specified herein. The size of pipe carrying discharge water shall not be larger than two (2) inches and shall not be under a head to exceed twenty (20) feet. If the water is discharged by pumping, the rate of flow shall not exceed 50 gallons per minute. Each swimming pool discharging to a sanitary sewer shall be equipped with an approved separator to preclude any possibility of a backflow of sewage into the swimming pool or piping system.

4-03 Sewer Pipes.

- A. Pipe Materials - All main sewer and lateral sewer pipes shall be PVC plastic pipe, polyethylene pipe, ductile iron pipe, cast iron pipe, or reinforced concrete (large diameter - special situations), unless otherwise specifically required or approved by the District. Selection of the pipe type for a given project shall be made by the Job Engineer, subject to the approval of and final selection by the District. The type of pipe used for side sewer installations shall conform to the "Approved Side Sewer Pipe Materials List," on file in the District office. The type of pipe used for force mains shall be PVC plastic pipe, polyethylene pipe, cast iron pipe or concrete steel cylinder pipe, as specifically approved for the particular project by the District. Special pipe and/or design provisions may be required by the District.
- B. Minimum Pipe Sizes - The minimum pipe size for main sewers shall be eight (8) inches in diameter unless otherwise specifically allowed by the District. The minimum pipe size for side sewers shall be four (4) inches or the same size as the building plumbing stub, whichever is greater. Where more than 150 fixture units are to be connected, the side sewer shall have a six (6) inch minimum diameter. When more than one building sewer is allowed to be connected to a single side sewer, the side sewer from the point of intersection of one or more building sewers to the main sewer shall be not less than six (6) inches in diameter.
- C. Minimum Slope - Main Sewers - The slope of the sewer shall be such that the velocity of flow in the pipe when flowing full shall be equal to or greater than two (2) feet per second. The minimum acceptable slopes for various main sewer sizes are tabulated below. For construction in filled marshland or bay mud, or other areas subject to possible differential settlement, the District may specify acceptable minimum slopes greater than those shown.

<u>Pipe Size In Inches</u>	<u>Minimum Slope Ratio in Feet per Foot</u>
6	0.006
8	0.004
10	0.0028



12	0.0022
15	0.0015
<u>Pipe Size</u> <u>In Inches</u>	<u>Minimum Slope Ratio</u> <u>in Feet per Foot</u>
18	0.0012
21	0.0010
24	0.0008

- D. Minimum Slope - Side Sewers - The minimum slope for four (4) inch diameter side sewers shall be 1.0 feet per 100 feet (1.0%). The minimum slope for side sewers greater than four (4) inches shall be 0.7 feet per 100 feet (0.7%).
- E. Steep Slopes - For sewers installed in areas with steep ground slopes, special design features may be required. Depending upon conditions of the specific installation, such items as check dams, rip-rap, trench dams, special anchorage or special pipe materials may be required by the District.
- F. Minimum Pipe Cover - The following minimum pipe covers shall be attained in design and construction of sanitary sewers. If certain conditions exist which make it impractical to meet the minimum cover and clearance requirements, special pipe, bedding, encasement, rip-rap, and/or backfill will be required as directed by the District Engineer.
1. Main Sewers - The minimum pipe cover for main sewers within street rights-of-way shall be 3.0 feet. The minimum cover for mains within easements or other rights-of-way not expected to become streets shall be 3.5 feet. Lesser pipe cover may be approved by the District with use of special pipe materials or concrete slab protection.
  2. Side Sewers - That portion of a side sewer within a street right-of-way (lateral sewer) shall have a minimum cover of 3.0 feet. The minimum cover for side sewers from the property line to the building drain (building sewer) shall be three (3) feet. However, when the cover over the side sewer is less than twenty-four (24) inches, special pipe, bedding and/or concrete encasement may be required by the District.
- G. Pipe Strengths and Maximum Depths - The minimum pipe strengths and classes given as standard in these specifications (see Sections 14-02 and 14-03) and in the "Approved Side Sewer Pipe Materials List," are based upon the attainment of standard bedding conditions (see Section 13-02), maximum allowable trench widths (see Section 13-02B), and upon the assumption of average pipe depths (depths up to 12 feet). Where, for any reason, the standard bedding conditions cannot be attained, or the maximum allowable trench width is exceeded, or the pipe depth is greater than average, special pipe, bedding, backfill and/or encasement may be required as directed by the District. Where pipe depths or other known conditions required pipe strengths other than those specified as standard, the Job Engineer shall indicate the required pipe classes on the plans.

- H. Pipe Clearance - All sewer pipes and structures shall be designed and contracted to have a minimum of ten (10) feet from domestic water lines and twenty-four (24) inches clearance from all other utilities and/or improvements, unless a special approval is received from the District.
- I. Horizontal and Vertical Curves - Horizontal curves may be used on curved streets when the alignment can be kept concentric with street improvements and when pipe deflection requirements can be met. Vertical curves may be used in hilly terrain, when permitted by the District, in order to reduce the number of required manholes. The deflection in the joint between any two successive pipe sections shall not exceed 70% of the maximum deflection as recommended in writing by the pipe manufacturer. Shorter pipe joint lengths may be used for vertical or horizontal curves with approval by the District.
- J. Sewer Connections to Existing System - Connection of new main sewers to the existing sewer system shall be made at existing manholes or by constructing a new manhole at the point of connection. The elevation of new sewer mains or laterals connecting to a manhole shall be set so that the pipe crowns match. Side sewer connections to existing main sewers shall be accomplished by connecting to wye or tee branches or laterals where they exist, by installing a spliced-in-wye, by installing a Tap-Tite drilled connection or by connecting to an existing manhole. Insert a tee lateral connection may not be used on sewer mains with a diameter less than 12 inches. Side sewers eight (8) inches and larger shall be connected with manholes only.
- K. Individual Sewage Ejector Pumps - Special application must be made for installation of an individual sewage pump where gravity service is not feasible. All pumping systems shall be installed in accordance with all applicable codes. The District will inspect the pump station and pressure line from the sewage pump to the point of connection to the District sewer system.

The gravity discharge line from the building outlet to the sewage pump holding tank shall be gravity flow. When the distance between the building outlet and the sewage pump holding tank is greater than five (5) feet, the District shall have jurisdiction, and the gravity line shall be inspected by the District Inspector.

The holding tank, pumps and electrical work are under the jurisdiction of the District.

- L. Sewer Alignment - Where sewer lines are to be installed within street rights-of-way, they shall, wherever practical, be designed and installed five (5) feet off the center line of the existing or future street (usually the side opposite the water line). In streets in hilly areas, the sewer shall be installed on the uphill side of the street where possible. Where practical, all sewer lines within easements shall be designed and installed with not less than five (5) feet between the center line of sewer and the edge of the easement. All sewer lines and structures shall be designed and installed well in the clear of all other improvements and utilities (see "Pipe Clearance" above).

- M. Sampling Manhole - Dischargers of non-domestic wastes may be required to install a sampling manhole at the location where the lateral sewer connects to the sewer main as designated by the District.
- N. Manhole Accessibility - Insofar as possible, all manholes shall be situated so that they are accessible to the District's cleaning vehicles.
- O. Sewer Pipe Stubs - Sewer pipe stubs shall be designed and installed in all manholes from which future sewer line extensions are anticipated. Pipe stubs shall be minimum eight (8) inches in size or as directed by the District and shall be of an approved type of pipe. Stubs shall protrude a minimum of five (5) feet outside of the manhole base and shall be channeled as though a regular sewer line within the manhole. A rubber coupling on the outside of the pipe shall be encased in the manhole base to prevent leakage. The outboard end of stubs shall be a standard bell joint end and shall be plugged with a standard watertight plug and cap, as supplied by the pipe manufacturer.
- P. Sewer Line Extensions - In all new streets, where sewer lines are expected to be extended, the sewer line shall be designed and installed to the end of the proposed street improvements, prior to street construction. The sewer extension shall terminate with a manhole, at a location which will minimize the amount of pavement to be disturbed by future sewer extensions.
- Q. Sewers to be Installed in Existing Improved Streets - Where sewers are being designed for installation in existing City and/or County streets, the Job Engineer shall submit the plans for the proposed work to the City and/or County Public Works Department for location and encroachment permit approval.
- R. Sewers to be Installed in or Across Utility, Highway, Railroad Rights-of-Way or Creeks - Where sewers are to be constructed across or within utility, railroad rights-of-way, or creeks requiring tunnels, bores and/or special pipe, the special pipe or construction shall extend the full length of the sewer line within the particular right-of-way. The Permittee shall secure all necessary encroachment permits or joint use permits for utility, highway, railroad rights-of-way or creek crossings.
- S. Separate Side Sewers Required - Each individual building site shall be connected to the main sewer with a separate side sewer. Combined side sewers for buildings under the same ownership will be permitted only on specific approval of the District when the property is not likely to be subdivided in the future. A common side sewer may be used for connected buildings (i.e., buildings with common walls or multi-story buildings) under different ownership where the Covenants, Conditions and Restrictions (CC&R's) provide that the homeowners' association maintains all common laterals.
- T. Side Sewer Connections - Side sewers shall be installed into manholes where possible. Side sewers shall connect near the bottom of the manhole, matching pipe crowns, unless a formal external drop connection is provided.

- U. Side Sewer Cleanouts Required - Cleanouts shall be installed in the side sewer as provided in the Uniform Plumbing Code. The cleanout riser shall be equal in size to the side sewer (see Drawing SD-5).

Cleanouts shall be installed at the following locations:

1. At the junction of the house plumbing and side sewer two (2) feet outside the building.
2. At each bend or change in direction of the side sewer 45° or over.
3. Where a run of pipe without bends exceeds ninety (90) feet.

Note: All cleanouts, except the blowoff cleanout, shall be brought to grade, properly capped and completely watertight.

- V. Backwater Prevention Devices - All side sewers shall be equipped with an approved backwater prevention device, as detailed on the Standard Drawings (see Drawing SD 6).
- W. Check Valve - If the difference between the elevation of the lowest fixture and the backwater prevention device is less than six (6) inches, a check valve shall be installed between the backwater prevention device and house (see Drawing SD 7).
- X. Abandoned or Unused Side Sewers - Any abandoned or unused side sewers connected to District mains, including side sewers from homes or buildings that are demolished, or any side sewer from property line to District mains shall be dug out and followed to the District main, and the old wye or tee or old connection area shall be cut away and spliced with a solid piece of pipe of the same size and dimension. The District Inspector shall be present when this procedure is done.

#### 4-04 Sewer Structures.

- B. Manholes - Manholes shall be placed at all intersections of sewer lines other than side sewer connections less than eight (8) inches in diameter, at all vertical or horizontal angle points, and at intervals not greater than 350 feet. Where practical, manholes shall be located near the center of street intersections and shall be accessible to maintenance vehicles. All manholes from which future sewer line extensions are anticipated shall have a pipe stub planned and installed at the grade and the direction of the anticipated sewer extension. The pipe stub shall be installed with permanent watertight plug in bell of 5-foot pipe stub out of manhole. The following regulations shall also apply:
1. A standard drop manhole with external hubbed ductile iron drop connection shall be installed when the invert elevation of the incoming sewer is greater than two (2) feet higher than the outgoing sewer. Otherwise, the crown elevation of the incoming sewer must match the crown elevation of the outgoing sewer, allowing for the appropriate slope through the manhole. The District must specifically approve all proposed drop manholes.

2. Where there is to be more than thirty (30) degrees deflection between any inlet line and the outlet line of a manhole, the fall through the manhole shall be a minimum of 0.10 of a foot.
  3. The angle of deflection between incoming and outgoing lines in a manhole shall not be greater than ninety (90) degrees.
  4. Unless special arrangements are made, all lines connecting to existing manholes shall conform to the Standard Drawings for new manholes.
  5. A manhole shall be located at the terminus of all main sewers in street.
- B. Rodhole - A rodhole may be installed only in easements out of the road right-of-way at the terminus of a main sewer where there is no possibility that the sewer will be extended to serve upstream properties. The distance from a rodhole to the nearest manhole shall be no greater than two hundred (200) feet.
- C. Flushing Inlets - A flushing inlet shall be installed on the force main near each new pump station, at a location specified by the District, in order to provide easy access for flushing the system for a temporary pumping connection if the pump station is out of service.
- D. Test Fittings - All test fittings shall, unless otherwise approved, be tees or wye branches of the same size, type and quality as that of the line in which they are being installed. The branch of all test fittings shall be installed in an upright position and shall be brought to grade as a cleanout or removed after testing.
- E. Pressure Frame and Covers - Pressure (watertight) frames and covers shall be installed when specified by the District, where drainage conditions may cause storm waters to inundate sewer structures.
- F. Remodeling Structures - All structures to be remodeled shall comply with the Standard Drawings. Any remodeling of any structure shall be specified and/or detailed on the plans and approved by the District prior to any remodeling work.
- G. Special Structures - Trunk sewer manholes, siphons, pumping systems, and other unusual structures require specific design approval by the District.
- H. Locator Wire and Detection Tape - An AWG No. 14 locator wire and plastic detection tape shall be installed above all gravity sewers and force mains between manholes. There shall be a minimum of 1 foot of separation between locator wire and detection tape. The locator wire shall terminate with a minimum of three (3) feet of a coiled wire inside the manholes at each end of the sewer. Wire shall be neatly rolled with ends securely taped and hung in an out-of-the-way location. Wire is to be brought into manhole through a neat hole drilled through riser ring on top of taper a maximum of one (1) foot from the bottom of the casting.



**SECTION 5 PLAN APPROVAL AND PERMIT ISSUANCE**

5-01 General. The procedure outlined in this Section shall be followed for submittal, review and approval of plans, and permit issuance for sewer main extensions.

5-02 Plan Checking Deposit. The Plan Checking Deposit shall be paid to the District prior to any review of plans. This deposit is not refundable but, upon issuance of a main extension permit, the deposit will be credited against the total Plan Checking and Inspection Fees due under District rules and regulations.

5-03 Preliminary Review. To facilitate the processing and review of plans for main extensions, all of the following materials shall be submitted at least three weeks prior to the District Board meeting at which approval of plans is desired.

1. Two (2) complete sets of sewer plans and profiles.
2. Two (2) complete sets of any required special specifications.
3. Two (2) copies of the Job Engineer's preliminary cost estimate.
4. Two (2) copies of maps and descriptions for any required sewer easements.
5. If the project is a subdivision, submit one (1) copy of the final map, including the proposed certificate page, and one (1) copy of the proposed grading plans.

After submittal, the above materials will be reviewed by the District staff and the District Engineer. If there are any required corrections and/or recommended revisions, they will be noted on the plans, easements, etc., and one set will be returned to the Job Engineer for revisions and resubmittal. This procedure will be repeated until all District requirements are met and the plans are ready for approval of the District Board.

5-04 Final Review and Approval. In order to obtain final approval, the Job Engineer shall submit the following materials, as revised in accordance with the above paragraph.

1. Four (4) complete sets of sewer plans and profiles.
2. Four (4) complete sets of any required special specifications.
3. One (1) copy of maps and descriptions for all required easements, together with signed and notarized deeds from each grantor, ready for recordation by the District.
4. If the project is a subdivision, submit one (1) copy of the final map, including one (1) copy of the grading plans (both in form to be presented to the City or County for final approval).

5. One (1) copy of the Job Engineer's estimate for all sanitary sewer facilities.
6. Any other pertinent plans, information or materials specifically required by the District Manager or District Engineer.

When all of these materials are received and given final review, the plans will be submitted to the District Board for approval. The Board meets regularly twice each month (specific dates may be obtained from the District office) and the Job Engineer will need to schedule his work and submittal of plans to meet an appropriate Board meeting date. After approval of the plans by the District Board, the District Manager will stamp "Approved" and sign all copies. He will then transmit one approved copy to the owner and one to the Job Engineer for his use. NOTE: The plan approval by the District shall become void six (6) months from the date of approval, unless a main extension permit for the work has been issued within that time.

5-05 Plan Revisions. In the event that any plan or field condition is encountered during construction that necessitates deviation from the approved plans, all work shall be halted until the plans are revised by the Job Engineer, resubmitted to the District and the revisions approved by the District. When revisions are required, the Job Engineer shall submit two (2) preliminary copies of the proposed revised sheets of the plans along with a letter explaining the recommended revisions. When the revisions are in approvable form, four (4) copies of the revised plan sheets shall be submitted for signature of the District Manager and distribution similar to the original plans. The Permittee shall bear all costs for any plan revisions. The Job Engineer shall be responsible for seeing that all revisions are appropriately shown on the "Record Drawings" for the project.

5-06 Statement of Fees and Charges. During District review of the plans but prior to final approval, the District Manager will prepare a Statement of Fees and Charges which will be sent to the Permittee, with a copy to the Job Engineer, detailing the fees and charges which must be paid and setting forth the required performance bond amount, and any other information or materials which may be required (other than approval of plans, specifications, etc.) prior to issuance of the main extension permit.

5-07 Issuance of Main Extension Permit. Written permission to construct the main extension will be granted only after all District requirements have been met, including final approval of all plans and specifications, payment of all appropriate fees and charges, posting of the required performance and maintenance bond, acquisition of all required easements, and the filing of a permit application form, receipt of the certificate of insurance from the Contractor, etc. (See Section 10-12.) No work shall be permitted to proceed until the main extension permit has been issued.

5-08 Subdivisions. Before approving the recordation of a subdivision final map, the City, Town and/or the County require a letter from the District stating that plans and specifications for necessary sewerage facilities to serve each lot in the subdivision have been approved by the District and that financial arrangements have been made to insure installation of these facilities.



Before this letter is written, the property must be annexed to the District (if not already in the District) and the main extension permit must have been issued as above provided.

5-09 Items to Consider before Submitting Plans. The following is a general list of items which should be considered by the Job Engineer before submitting plans for review and approval of the District.

1. Have arrangements been made for the payment of the Plan Checking Deposit?
2. Are there any special details needed, such as special drawings, notes, and/or specifications to supplement the Standard Specifications?
3. Is the property to be sewerred within the District boundaries?
4. If the property is not in the District, has the Owner requested in writing that his property be annexed and submitted the required Annexation Fee?
5. Can the proposed sewerage system provide service to properties other than those arranging for the installation? If so, have full provisions been made for the additional service or future extension?
6. Has County/City Flood Control approval been secured for all sewer line crossings of storm water channels?
7. Are all necessary easements prepared?
8. Are there any special permits and/or licenses required in connection with the work?
9. Have all existing and future underground utilities been shown on the plans and are there any conflicts or special requirements for field location?



**SECTION 6 CONSTRUCTION ENGINEERING**

6-01 Staking Requirements. The Job Engineer shall be responsible for providing all necessary field surveys and construction staking. Grade and alignment stakes shall be set in advance of any trenching or excavation and, in general, stakes for straight sewers shall be set at either 25 or 50 foot intervals, depending upon topography and grade of the sewer. Intervals of 25 feet, or less, shall be used through all horizontal and vertical curves and for sewers with a grade flatter than 0.005. Stakes shall be approximately marked to show the Engineer's station, the offset, and the cut to sewer invert.

6-02 Side Sewer Locations. Prior to installation of lateral sewers, the lateral location and elevation at the property line shall be staked and flagged in the field by the Job Engineer.

6-03 Survey Authorization and Responsibility. When a survey is to be made on private property for a public sewer, permission of the property owner shall be obtained by the Job Engineer or his representatives prior to entry. The District will not be answerable or accountable in any manner for any loss or damage that may come about during or as a result of survey work by others.

6-04 Field Changes. During construction the District, through the District Manager, District Engineer or District Inspector, may request the Job Engineer to make changes in the work. The Job Engineer shall review such changes and prepare the necessary drawings and descriptions for execution by the Construction Contractor.

6-05 Soil Compaction Tests. For all works in public streets and works not in public streets as required by the District, the Applicant shall retain a Soils Engineer to take compaction tests in the trench backfill or embankment construction. On District projects, the District will retain a Soils Engineer.

The Soils Engineer shall take compaction tests at intervals and depths as required by the agency having jurisdiction on the right of way or as required by the District; as a minimum, one compaction test shall be taken midway in the intermediate backfill and on the surface every 100 feet of sewer line length. The Soils Engineer shall immediately provide the District Inspector the results of the soils tests. At the end of the job, the Soils Engineer shall provide the District with a summary of the soils tests taken.

6-06 Record Drawings. Upon completion of the work and prior to acceptance by the District, the Job Engineer shall provide "record drawings" to the District. Record drawings shall consist of all details shown on the original approved plans, corrected and/or expanded to reflect all design or construction changes from the approved plans. Particular attention should be paid to changes in the following items:

1. Sewer line and structure locations.
2. Surface and invert elevations of structures.
3. Slope, size, type of pipe, and length between structures.
4. Wye and lateral locations.

The Job Engineer shall submit a preliminary copy of the record drawings for review by the District. After review and approval by the Inspector or other District representative, the Job Engineer shall submit one (1) complete set of high quality prints and one (1) complete set of high quality duplicate tracings, noted and signed by the Job Engineer as "Record Drawings".

**SECTION 7 DISTRICT PERMITS, LICENSES AND BONDS**

7-01 Permits. All work performed in relation to and for connection to the District sewer system requires a specific permit in accordance with District rules and regulations. In the case of District contract work, the contract is considered to be the District permit for all work included in the contract under District jurisdiction.

- A. Main Sewer, Structure and Manhole Installation Permits - Engineering plans and profiles are required in accordance with Sections 1 through 6 of these specifications.
- B. Side Sewer, Lateral and Building Sewer Connection Permits - Location plans are required when a 6-inch or larger side sewer is to be installed and at any other time when specifically required by the District.

7-02 Licenses. Contractors performing work requiring a permit by the District shall be licensed by the State of California. Work on public property, streets, roads and other rights-of-way shall be performed only by duly licensed Contractors. Property owners may perform side sewer work on their own property.

7-03 Bonds. Prior to the issuance of a permit for a sewer main extensions (public sewer construction), the applicant shall furnish to the District a 100% faithful performance bond, cash, or other improvement security acceptable to the District, in the amount of the total estimated cost of the work as determined by the District, based on the District's Table of Current Construction Costs. Such faithful performance bond, cash deposit, or other improvement security shall be conditioned upon the performance of the work in accordance with the terms and conditions of the permit, and unless more stringent requirements are otherwise specified by the District Board, and 10% of the bond shall remain in effect to guarantee the correction of faulty workmanship and the replacement of defective materials for a period of one (1) year from and after the date of acceptance of the work by the District Board.

