

**SPECIAL DISTRICTS DEPARTMENT
COUNTY OF SAN BERNARDINO**

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DIVISION "F"
DESIGN CRITERIA AND PLAN PREPARATION
WATER**

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**SPECIAL DISTRICTS DEPARTMENT
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**DESIGN CRITERIA AND PLAN PREPARATION
WATER**

The following requirements pertain to the design and preparation of plans for construction of the various components to the water system.

1.1 General

1.1.01 Scope -- All wells, transmission and distribution mains, storage reservoirs and booster stations to be owned, maintained, and/or operated by the District shall be designed and plans prepared according to the criteria set forth in this section, and shall be so designed to conform to all applicable State and local laws, ordinances and regulations. The design shall also take into consideration any environmental restrictions applicable to a particular region.

1.1.02 Design Competence -- In general, all water facilities shall be designed by licensed Professional Engineers in the state of California according to accepted practice in the water field.

Generally, the design standards and construction standards provided herein shall be in compliance with the American Water Works Association (AWWA) and the Insurance Services Office (ISO). Other recognized standards may be accepted; however, request for use of other standards shall be offered to this agency in writing and shall include reasons for requesting a variance from the above mentioned authorities.

1.1.03 Legal Access -- Each lot to be served by water shall have frontage to a public street or recorded easement containing a water line, or be provided with permanent legal access to such a water line.

Any water facilities required for operation shall be provided within lands which have been dedicated in perpetuity and recorded, or which have been provided in fee title and recorded. Dimensions of property offered either for dedication or in fee title shall be adequate to facilitate the ultimate size of the proposed water facility and be adequate to provide space required for turning movements of heavy equipment which normally would be required to construct, maintain and replace the water facility.

1.1.04 Deviations -- Deviations from any of the criteria adopted herein may be permitted upon written request to and approval by the District.

1.2 Water Demand

1.2.01 Domestic Use -- Domestic flows shall be based on consumption records of surrounding water systems. In the absence of such records, domestic flows shall be based on the following: an average daily use of 180 gallons per capita per day; a peak daily flow of two times the average daily flow; and a peak hourly flow of four times the average annual daily flow.

1.2.02 Fire Flow -- Fire flow demand on the system shall be per the standards entitled "Guide for Determination of Required Fire Flow" published by Insurance Services Office. All fire protection water systems shall require the approval of the fire authority having jurisdiction in that given area prior to final approval of the water system design.

All fire flow requirements are over and above the average daily consumption of water, and shall be achieved at not less than twenty-(20) psi minimum residual pressure at the point of fire flow.

1.3 Design For Future Growth

Transmission and distribution mains shall be designed for ultimate demand. Storage, supply, and booster station facilities shall be reviewed by the District on a per case basis.

1.4 Supply

1.4.01 General -- The supply system shall be designed as a multi-source system capable of handling peak daily demand with the largest source of supply not in operation.

1.4.02 Wells -- Wells shall be housed in a structure compatible with the surroundings. Provisions within this structure shall be made to facilitate removing of pumps, motors and other equipment. Wells shall be located upon land to which legal access is provided and for which a permanent easement or title is recorded. Vertical turbine pumps shall meet the standards set forth in AWWA Standard E-101. All wells shall be furnished with sounding tube, air line, water meter, electric kilowatt hour meter, running time meter, air valve, gravel shoot casing vent, check valve or pump control valve, and shutoff valve on the discharge piping.

1.5 Storage

Storage capacity shall consist of operational storage plus fire flow storage as related to each pressure zone. Operational storage shall be the maximum day demand. The inclusion of emergency storage should be considered depending upon the reliability of supply.

1.6 Booster Stations

1.6.01 Pumps in Hydropneumatic Systems -- In systems where pumps shall be instantaneous peak demands, without supplementary flows from storage, the pump capacity shall be based on peak hour demand together with coincidental fire flow demand for the highest fire flow anticipated for the proposed land use with one pump out of service.

1.6.02 Pumps in Gravity Systems -- In systems with adequate available flows from storage to supplement pumping, pumping capacity should be based on peak day demand together with coincidental fire flow demand for the highest fire flow anticipated for the proposed land use with one pump out of service.

1.6.03 Structure -- Booster pumps shall be housed in a weather-tight structure compatible with the surroundings. Provisions within this structure shall be made to facilitate removing of pumps, motors and other equipment.

1.7 Transmission and Distribution Mains

1.7.01 Pipe Size -- Mains shall be sized to accommodate the greater of the following while maintaining a minimum pressure as specified in subsection 1.7.02 herein at street service connections. The minimum pipe diameter is 8".

- 1) peak hour demand
- 2) peak day demand plus fire flow
- 3) nighttime storage replenishment flow

The capacity of water mains shall be determined by using the Williams and Hazen Formula with an appropriate "C" value. The velocity of the water in the pipe shall be limited to 8-feet per second maximum, except in hydrant branch lines.

The maximum loss of head during either peak hour or nighttime replenishment flow conditions shall be 3-feet per 1,000 lineal feet of pipeline.

1.7.02 Operating Pressures -- Maximum pressure in mains shall not exceed 125 psi. Pressure reducers will be required on service connections where static pressure exceeds 90 psi.

Minimum pressure in mains shall be 40 psi during peak hour operation without fire flows and shall not be less than 20 psi during peak hour operation with fire flows.

1.7.03 Depth of Cover -- A minimum four – foot depth of cover from top of pipe to finish grade or top of pavement shall be maintained on all pipelines below grade. Additional cover may be required where deemed necessary by the District.

1.7.04 Location and Alignment -- Wherever possible, water mains shall be located in public streets parallel to street centerlines.

1.7.05 Clearance from Sewer Lines -- Where possible, a minimum horizontal clear distance of 10-feet shall be provided between water and sewer line laid parallel. Where such lines cross a minimum vertical clearance of 3-feet shall be provided with the sewer under the water line.

If the above conditions cannot be met, special construction will be required according to the requirements set forth on Standard Drawing No. H-1 herein.

1.7.06 Mains under Structures -- No water mains shall be located beneath a structure (including fences and block walls) except as approved in writing by the District.

1.7.07 Looped Lines and Flushouts -- Looped lines shall be provided where practical. Where dead ends are necessary, provisions for flushing shall be included. No flushing device shall be connected directly to a sewer. Flushout assembly and size shall conform to Standard Drawing No. H-8A. Blowoff assemblies shall be utilized on pipelines greater than or equal to 24 inches in diameter.

Fire hydrants may be used for flushout, where applicable, and upon approval by the District.

1.7.08 Valves -- Provide sufficient valves to permit isolation and repair of leaks and breaks, and in accordance with good water works practice. Except for transmission lines, in no case should a length of pipe greater than 1,320 feet be left without valve control. A valve box and cover shall be provided for all valves below grade and shall conform to Standard Drawing No. H-11 herein, unless part of an assembly covered by another standard drawing.

1.7.09 Fire Hydrants -- Fire hydrants shall be spaced along distribution mains as follows:

Single Family Residential (R-1)	660 feet maximum
Multiple Residential, Commercial & Industrial	330 feet maximum

Spacing of fire hydrants shall not exceed the above maximum distances but fire hydrants may be spaced at closer intervals in conformance with requirements of local fire control authorities.

Hydrants shall be located at street corners or intersection whenever practical. Hydrants shall be 5 1/4-inch Type "B" according to land use as follows:

Medium to High density residential,
Commercial, and Industrial

Type "B"

Hydrant installation assembly shall conform to Standard Drawing No. H-2A and H-2B herein.

1.7.10 Service Connections -- Service connection assemblies shall conform to Standard Drawings No. H-4A and H-4B herein.

1.7.11 Air and Vacuum Valves -- Air release valves, air-vacuum valves, and air-vacuum combination valves shall be used in supply, transmission and distribution lines according to accepted practice in the water field. Air-vacuum combination valves shall be provided at high points in distribution system mains.

Valve assemblies shall conform to Standard Drawing No. H-6 herein.

1.7.12 Blowoffs -- Blowoff assemblies will be required at low points in distribution system mains 4 inches or greater in diameter.

Blowoff assemblies shall conform to Standard Drawings No. H-7A herein.

1.7.13 Thrust Blocks -- Concrete thrust blocks shall be installed as required according to Standard Drawing H-3A and H-4B herein. Where circumstances prevent the use of standard thrust blocks, special thrust restraint design shall require District approval.

1.7.14 Casing Spacers-- Installation of pipeline into a casing will require the use of restrained casing spacers, the number of spacers will vary by size, type and length of pipe. Quantities and brand to be approved by engineer/inspector.

1.8 Electrical Equipment

Electrical starters, switches, lights, motors, fixtures, controllers and instruments shall be enclosed and constructed in accordance with the National Board of Fire Underwriter's Specifications to meet hazardous conditions anticipated. The Health and Safety Code of the State of California and National Electrical Code shall also be met.

Starters shall be of the magnetic type and shall be provided with hand-off automatic selector switches. The design of electrical equipment shall require District approval.

1.9 Automatic Controls

Wells, booster stations, and storage facilities shall be electrically inter-connected to give the system complete automatic control. Provision shall be made for manual operation of controls in the event of failure of automatic controls, and automatic controls shall be designed fail-safe, and shall meet the District's approval. Where additions to existing automatic control systems are contemplated, the design of the proposed additions and the interfacing methods shall require District approval.

1.10 Miscellaneous Requirements

1.10.01 Pump Discharge Runs -- A gate valve shall be placed on the discharge line of each pump. A pump control valve shall be placed on each discharge line between the gate valve and the pump.

Sufficient valves shall be provided to isolate each pump from the system.

An air release valve, properly vented to the outside of the pump house, shall be provided on each pump discharge line.

Pump discharge lines shall be protected from pressure surges created by starting and stopping of pumps. Pump control valves or other surge controls shall be utilized where required by the District. A pressure relief valve is required in the discharge line.

1.11 Plan Preparation

Plans prepared for additions to the District's water system and submitted to the District for approval shall be in substantial form and contain the information herein set forth. A sample plan is enclosed in the rear of Division "F."

1.11.01 -- Drawings shall be in ink on mylar. Sheet size shall be 36-inch by 24-inch with standard District title block. FINAL drawings shall be placed in AutoCAD electronic format, copied and given to the District for archiving.

1.11.02 -- The General Notes shall appear once on the first sheet of the Plans. All required certifications and approvals shall also appear on the first sheet.

1.11.03 -- Each sheet shall have a title block in the lower right hand corner.

1.11.04 -- Each sheet shall have a North arrow, where applicable.

1.11.05 -- A key (vicinity and location) map having a scale of 1 inch – 500 feet or larger shall be shown on the first sheet of each set of drawings. Said key map shall show water lines, their sizes, gate valves, fire hydrants, and appurtenances in their scaled relation to one another. All roads shall be shown.

1.11.06 -- Plan and profile are required for pipelines. Double plan and profile sheets may be used. Scales to be used are as follows:

Plan and Profile	1 inch =	40 feet horizontal
	1 inch =	4 feet vertical

If approved by the District, the following scales may be used:

	1 inch =	80 feet horizontal
	1 inch =	8 feet vertical

Profiles shall show pipe size; existing ground elevation or finish grade elevation; appurtenances; the depth, size, location, and nature of other utilities which cross over or under the water line; the location and nature of special construction such as concrete blankets or encasement; flow line elevations at grade changes; and any other information pertinent and necessary to the proper construction and recordation of the water lines.

1.11.07 -- At least one BenchMark shall be shown and/or described on each sheet. The indicated elevation shall be referenced to U.S.C. & G.S. datum.

1.11.08 -- The plans shall show the Tract and Lot numbers of property adjacent to the water line to be constructed.

1.11.09 -- The plans shall show all right of way lines, the distance from the centerline of roads, rights of way and easements to the center of the water line and other distances necessary to easements.

1.11.10 -- Show limits and type of street payment, curb, gutter, and sidewalk.

1.11.11 -- Show location of proposed service connections.

1.11.12 -- Show exact location of all structures within 20 feet of the water centerline.

1.12 Technical Specifications

The District's Technical Specifications shall be utilized in the design of water facilities. Technical Specifications are in Division "G" of the District's policies.

1.13 Standard Drawings

The District's Standard Drawings shall be utilized in the design of water facilities. Standard Drawings are in Division "H" of the District's policies.