

DRAFT

**SECTION III
DESIGN CRITERIA
FOR
POTABLE WATER DISTRIBUTION SYSTEMS**

**SECTION III
DESIGN CRITERIA
FOR
POTABLE WATER DISTRIBUTION SYSTEMS**

Water system improvements proposed for inclusion into the District's Service Area shall be designed in accordance with all appropriate AWWA standards and the following criteria:

A. SYSTEM DEMAND CRITERIA

District staff reserves the right to determine criteria for each water system or sub-system based upon conditions that may exist for that particular location, anticipated level of development, planned use, or other criteria. In general, water pipelines, tanks, pump stations, pressure reducing stations, and appurtenances shall be sized to handle the highest demand on the system within the sphere of influence and shall provide capacity for the maximum hourly flow and the maximum daily flow plus fire flow.

1. Water System Unit Demands

Average Day Demand (ADD) is the average amount of water needed by a classification of user and shall be defined as follows:

Land Use	Average Day Demand (ADD)
Single Family Units with Lots Less than 20,000 Square Feet	700 gpd
Single Family Units with Lots Equal to or Greater than 20,000 Square Feet	1,100 gpd
Light Commercial	2,000 gpd/acre
Industrial	4,000 gpd/acre
Schools and Parks	4,000 gpd/acre

gpd=gallons per day

Where use of recycled water is required by the District, the water demand shall be divided as follows (see Section IV for Recycled Water System Design criteria):

Land Use	Average Day Potable Water Demand (ADD)	Average Day Recycled Water Demand (ADD)
Single Family Units with Lots Less than 20,000 Square Feet	280 gpd	420 gpd
Single Family Units with Lots Equal to or Greater than 20,000 Square Feet	330 gpd	770 gpd
Light Commercial	1,600 gpd/acre	400 gpd/acre
Industrial	3,200 gpd/acre	800 gpd/acre
Schools and Parks	1,200 gpd/acre	2,800 gpd/acre

gpd=gallons per day

2. Peaking Factors

Maximum Day Demand (MDD) shall equal 200 percent of the average day demand.

Peak Hour Demand (PHD) shall equal 400 percent of the average day demand.

Domestic water supplies shall be designed to produce 125 percent of the maximum day demand.

3. Fire Flows

The following fire flows shall be used for District planning and design purposes unless the local (approving) fire department stipulates or requires a different fire flow. However, the District shall require a minimum of 1,500 gallons per minute for duration of two hours as a minimum residential or commercial fire flow.

Type of Structure	Flow (gpm)	Duration (Hours)	Number of Fire Hydrants
Detached Single Family (Residential)	1,500	2	2
Attached Multi-Family (Residential)*	3,000	2	3
Light Commercial/Industrial (including schools)	3,000	3	3
Heavy Commercial/Industrial	5,000	4	4

* Ten or more units per acre

Water pipelines to all Service Areas shall be looped to provide dual direction supply and system flexibility. Dead end transmission mains are undesirable, but will be considered on a case-by-case basis.

B. SYSTEM ANALYSIS

1. Static Requirements

The minimum static pressure shall be 50 pounds per square inch (psi) at the highest water fixture within the proposed structures (e.g. 15 feet above pad elevation for two story structures, 7 feet above pad elevation for one story structures), said pressure being measured with the supply reservoir 1/2 full. The maximum static pressure at proposed building pads shall be 125 psi with the supply reservoir full.

2. Operating Requirements

The proposed water system shall be analyzed for the following three conditions:

a. Peak Hour Demands with Booster Pumping Plants On

For the peak hour demand flow analysis, the pressure at each service shall be a minimum of 40 psi and a maximum of 125 psi at the proposed pad elevations with the supply reservoir 1/2 full. The maximum velocity in the pipelines shall be 7.0 feet per second (fps).

b. Maximum Day Demand Plus Fire Flow with Booster Pumping Plants Off

For the maximum day demand plus fire flow analysis, fire flow should be selected for the worst-case scenario (typically the hydrant furthest from the connection(s) to District's distribution system, at the highest system elevation) and as directed by District staff. The pressure at all locations within the proposed system shall be a minimum of 20 psi with the supply reservoir 1/2 full and the maximum velocity in the pipelines shall be 10.0 fps.

c. Minimum Hour Demands with Wells and Boosters On

For the minimum hour demand analysis, the maximum velocity in the pipelines shall be 5.0 fps and the maximum pressure at each node shall be 125 psi.

The Developer's engineer will be required to submit an analysis of anticipated flow demands, average, peak hour flow, and maximum day plus fire flow. District will accept or modify the submitted analysis.

C. WATER PIPELINE SIZING CRITERIA

Minimum size water pipeline is 8 inch inner diameter (I.D.).

For peak hourly flow, pipeline shall be sized to provide a residual pressure of 40 psi and a maximum velocity of 7.0 fps.

For the maximum daily flow plus fire flow, pipeline shall be sized to provide a residual pressure of 20 psi within the entire proposed system and maximum velocity of 10.0 fps.

The capacity of water mains shall be determined by using the Williams and Hazen Formula with a "C" factor of 120.

District staff reserves the right to specify sizing of any water pipeline. For master planning purposes, District staff may require a larger size pipeline than normally required for a particular

project to satisfy the District's design standards for system distribution. The District's Board of Directors may authorize participation and payment of increased cost of such water pipeline in accordance with the District's criteria.

D. WATER PIPELINE LOCATION

Unless otherwise approved by District staff, all water pipelines shall be located on the southerly or westerly side of the street, 7.0 feet from curb face or berm. Location shall not interfere with other existing utilities.

The cover over the water pipeline shall be sufficient to provide protection of the water pipeline and for the operation of the appurtenances. The depth shall be 3.0 feet from the ground surface (pavement, graded travel way, or open ground) to the top of the water pipeline for 8 inch pipe and 12 inch pipe. For water pipeline 14 inch or larger, the depth shall be 3.5 feet. District staff may increase or decrease this required depth as necessary to cover non-standard conditions. Minimum slope of water pipelines shall be 0.5 percent unless otherwise authorized by District staff. Where parallel pipelines are proposed (generally at pressure breaks), pipeline depths shall be staggered with the higher pressure pipeline being located above the lower pressure pipeline.

E. CURVE DATA

Water pipeline joints shall not be pulled more than 60 percent of the manufacturer's recommended offset. The minimum bending radius for water pipelines are as follows:

Pipe Diameter	Allowable Pipe Deflection	DIP (18' JTS) Min. Radius (ft)
8"	3°13'	320
12"	3°13'	320
16"	2°9'	480

Where a smaller radius of curvature is required, pipe stick lengths shall be reduced or fittings shall be used.

F. OTHER UTILITIES

Water pipeline installation near sewer lines shall be in accordance with State of California, Regulations Related to Drinking Water, Title 22, Chapter 16, California Waterworks Standards or the District's criteria, whichever is most restrictive. In general, water pipelines should cross perpendicular to sewer and recycled water pipelines a minimum of 1 foot above. If water pipeline crosses beneath the sewer or recycled water pipeline, it shall comply with the State Regulations and plans shall be reviewed and approved by the California Department of Public Health. Water pipelines parallel to sewer pipelines shall be located a minimum of 10 feet (outside to outside) from the sewer pipeline. Water pipelines parallel to recycled water pipelines shall be located a minimum of 4 feet (outside to outside) from the recycled pipelines.

When crossing other utilities, a minimum vertical clearance of 6 inches shall be provided (outside to outside).

G. WATER PIPELINE MATERIALS

Unless otherwise authorized by District staff, all water pipelines shall be ductile iron pipe, Class 350 (Class 300 for 16 inch diameter and larger) in accordance with the District's standards unless conditions dictate the use of CML/CMC welded steel pipe.

H. VALVES

1. Location

- Small water pipelines (12 inch diameter and smaller): To provide flexibility of operation, generally located on discharge side of pipeline connections; 1 at 90 degree bends, 3 at tees, 4 at crosses, and at beginning of dead end mains.
- Large water pipelines (14 inch diameter and larger): To be determined for each system to meet operational requirements.

- If one of the options above does not apply, valves shall be spaced at 1,000 foot maximum intervals or as directed by the District.

2. Type

- For 8 inch and 12 inch diameter pipelines, use full line size gate valves. For 14 inch and larger pipelines, use full line size butterfly valves.

Unless otherwise provided for, all valves 2 inches through 12 inches shall be resilient seat gate valves in accordance with AWWA Standard C509.

Valves shall be installed with valve can and cover as shown on the District's Standard Drawings.

Pressure class rating shall be minimum 250 psi.

I. COMBINATION AIR VACUUM AND AIR RELEASE VALVES

Combination air vacuum valves shall be located at all high points of water pipelines and, for transmission facilities, at maximum 2,000 foot intervals (even if not at a high point). Minimum size of air valves shall be 1 inch and shall be sized as follows:

<u>Pipeline Diameter</u>	<u>Air Valve Size (Minimum)</u>
8" & 12"	1"
16", 20", & 24"	2"
30"	4"

In phased tract development, air valves shall be located at the end of the pipeline as dictated by the phasing plan. When additional phases are constructed, the air valve shall be removed unless it is required by one of the criteria listed above.

J. BLOWOFF VALVE ASSEMBLIES

Blowoffs shall be in accordance with the District's Standard Drawings, located behind the curb face at right angles to the water pipeline. Blowoffs shall be located at all low points of the pipeline, and at all dead-ends or terminal points. Where possible, fire hydrants shall be used in

place of blowoffs. Where possible, isolated low points shall be located at fire hydrant tees; otherwise, blowoff valves are required.

Minimum size of permanent blowoffs shall be 4 inches for mainlines 12 inches or less, and 6 inches for mainlines larger than 12 inches. Minimum size of temporary blowoffs shall be 2 inches.

K. FIRE HYDRANTS

Design per requirements of the fire protection agency having jurisdiction (Counties or Cities). Developer's engineer shall obtain hydrant location and spacing information from the governing fire protection agency.

Fire hydrants shall be in accordance with the District's Standard Drawings, installed behind the curb face at right angles to the water pipeline.

L. SERVICE INSTALLATIONS

Services shall be in accordance with the District's Standard Drawings unless otherwise approved in writing by District staff. One inch service runs shall be provided for 3/4 inch and 1 inch meters, and 2 inch service runs shall be provided for 1-1/2 inch and 2 inch meters. One inch and 2 inch service runs shall be copper.

Separate service installations are required for potable service, recycled water service (where applicable), and fire sprinklers (where applicable). If residential units are served by both potable and recycled water services, potable service runs may be reduced to 3/4 inch diameter.

M. CORROSIVE SOIL

Ductile iron pipelines shall be encased in polyethylene bags unless a report is provided, prepared by a qualified corrosion consultant, indicating encasement is not required.

N. BACKFLOW PREVENTION

Where District's Domestic Water System has the potential of becoming cross-connected to other water supplies or sources, an approved backflow prevention device is required by Title 17, Drinking Water Supplies, of the California Administrative Code, and shall be installed in accordance with District's Standard Drawings and approved materials list. A certified backflow tester shall test the backflow device and submit the report for final approval by the District prior to use of the service. An approved backflow prevention device is required for all fire service connections. For further information, see District's backflow ordinance. A backflow device is required on the potable service for all residential sites that are served by both potable and recycled water. All non-residential water services shall have a District approved backflow prevention device installed adjacent to meter.