

## **XIV. WATER (POTABLE)**

The municipal potable water supply consists of two intentionally separated systems – the San Francisco Public Utilities Commission (SFPUC) and Santa Clara Valley Water District (SCVWD) systems. Each system is divided into multiple pressure zones with greater hydraulic gradients in the higher elevations to the east. Designers shall ensure that new pipe line installations shall not cause or allow the mixing of water supply and/or pressure zones. See Exhibit A for the Water Supply and Distribution Map to determine applicable water pressure zones.

*NOTE: This publication is meant to be an aid to the staff to aid in code compliance of the California Department of Public Health (CDPH) Drinking Water Program and engineer of record designing water distribution system shall comply with code requirements regulated by community as the State of California's representation of the law. The published codes are the only official representation of the law. Refer to the published codes—in this case, 17 CCR and 22 CCR—whenever specific citations are required. Statutes related to CDPH's drinking water-related activities are in the Health & Safety Code, the Water Code, and other codes.*

Submittals shall show water pipes, appurtenances including valves (isolation, air relief, blow-off, etc.), laterals, fire hydrants and size and location of water meters, backflow devices, and intended use of water (potable irrigation). See Section IV - Improvements Plans General Requirements for more information on submittal requirements.

### **A. Design Criteria for the Public Distribution System**

#### **1. Required Minimum Fire Flow Delivery**

Provide the following minimum fire flow, simultaneous with the maximum day demand of the area, for the following areas:

Residential areas	1,500 gallons per minute (gpm).
Multiple family areas	2,500 gpm
Commercial areas	3,000 gpm
Industrial areas	5,000 gpm

If two or more uses are combined, the higher value use shall govern.

#### **2. Minimum Pressure**

Residual pressure under fire flow conditions shall be 20 psi or greater. Contact Utility Engineering at 586-3350 or 586-3348 for water pressure information at specific locations.

#### **3. Headloss**

Design velocity shall not exceed 8 feet per second. Headloss for pipes less than 16 inches diameter shall not be greater than 10 ft/1000 ft (4.2 psig per 1000 feet). Headloss for pipes equal to or greater than 16 inches diameter shall not be greater than 5 ft/1000 ft (2.2 psig per 1000 feet).

The Hazen & Williams formula with a coefficient of friction "c" = 110 for all pipe materials shall be used to estimate frictional head loss:

$$f = 0.2083 (100/c)^{1.852} q^{1.852} / d_h^{4.8655}$$

where:

$f$  = friction head loss in feet of water per 100 feet of pipe

$c$  = Hazen-Williams roughness constant

$q$  = volume flow (gal/min)

$d_h$  = inside hydraulic diameter (inches)

#### 4. Water Demand

The following flow factors are criteria for minimum-required capacity. Designer shall use professional engineering judgment for small and individual developments, since the capacity determined by calculation may be inadequate.

Commercial:	Town Center Area	10,900 GPD/Net Acre <sup>a</sup>
	Mixed Use	10,900 GPD/Net Acre
	Retail Subcenter(RSC)	4,300 GPD/Net Acre
	Professional/Admin Offices	3,200 GPD/Net Acre
	Other	2,400 GPD/Net Acre
Industrial:	Manufacturing/Warehousing	2,000 GPD/Net Acre
	Industrial Park	1,250 GPD/Net Acre
Residential:	Residential <sup>b</sup>	320 GPD/DU
	Residential <sup>c</sup>	245 GPD/DU
	Residential <sup>d</sup>	800 GPD/DU

Designer shall adjust for unaccounted water loss to size distribution pipes. Unaccounted water losses shall be assumed to be at least 7% of calculated total demand.

5. Peaking Factors	<u>Maximum Day/Average Day</u>	<u>Peak Hour/Average Hour</u>
Residential	190%	380%
Commercial/Industrial	150%	240%

#### 6. Easements

Public easements must be at least 10 feet wide. Trees or other deep-rooted plants are not permitted within easements.

#### 7. Pipeline Locations

Pipe centerlines shall be 5 feet from face of curb. Also, see Exhibit C for October 16, 2003 California Department of Health Services (now known as the California Department of Public Health (CDPH)) criteria for minimum separation of water from sewer, storm, and recycled water lines.

#### 8. Pipe Crossing Clearance

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<sup>a</sup> GPD is gallons per day. Net area is defined as development area excluding major public streets, freeways and railroad areas.

<sup>b</sup> DU is dwelling unit. Valley floor low and medium single family.

<sup>c</sup> Valley floor multiple family medium, high and very high.

<sup>d</sup> Hillside homes (areas above 200 feet elevation).

Minimum pipe crossing between pipes clearance shall be not less than one foot. Potable water lines shall be located above storm drain, sanitary sewer and recycled water lines.

**9. Minimum Pipe Cover**

- a. Streets - 42 inches
- b. Easement - 48 inches

**10. Pipe Size (minimum)**

- a. Residential = 6 inches (8 inches if flow is provided from one direction)
- b. Industrial/Commercial = 12 inches

**11. Dead Ends**

End lines with a blow-off valve, air and vacuum valve and plugged end assembly.

**12. Pipe Material**

Polyvinyl Chloride (PVC) Pipe: PVC pipe shall conform to the requirements of “Standard Specifications for PVC Pipe” (AWWA C900), or (AWWA C905). C905 pipe may be allowed in areas where there is no requirement for future tapping of the transmission line upon approval.

Ductile Iron (DI) Pipe: DI pipe shall conform to the requirements of “Standard Specifications for DI Pipe” ANSI A21.51 (AWWA C151).

**13. Corrosion Control for Ductile Iron Pipe and Metallic Casings**

Installation of all metallic piping shall include protection against corrosion. Applicant shall complete and submit the City’s standard cathodic test station data table shown below.

<b>CORROSION PROTECTION DATA</b>								
<b>PUBLIC FACILITIES</b>								
Sheet No.	Location of Electrolysis Station	Pipe		Protection Type				Date Measured
		Material	Size	Impressed current (mA)	Pipe to Soil (mV)	Anode Current (mV)	Life (years)	

Firm name:						Phone no.		
Address:								

**14. Casings**

All water system transmission and distribution piping spanning creeks, highways, transit corridors, railroads, and other physical barriers shall be contained in casings.

**15. Seismic Backbone Distribution System**

Special design of pipelines along the City’s backbone distribution alignments shall apply. The purpose of a backbone line is to withstand a design earthquake. Exhibit B-1 shows the alignment where special design standards apply. Exhibit B-2 shows the design standards that apply.

**16. Distribution System Valves**

- a. Valves shall be gate valves (AWWA).
- b. Maximum 500 feet apart (may vary for transmission main).
- c. Provide at least one isolation valve between any two fire hydrants.
- d. One at each leg of crossings.
- e. The valve covers shall be as follows:  
9 inch circular black to designate SFPUC  
6 inch circular blue to designate SCVWD  
12 inch circular red to designate ISOLATION between SFPUC and SCVWD

NOTE: See Exhibit A for Water Supply and Distribution Map to determine extent of SFPUC and SCVWD zones.

**17. Air Relief and Blow-off Valves**

Provide appropriate air relief valves (pressure air release at all high points to vent; air and vacuum to vent air while filling and to allow air to re-enter while draining to prevent collapse, etc.) at all high points. Air relief valve and air vacuum valve shall be located above ground. Nozzle shall be set at which ever is greater; a minimum of 1 foot above the 100-year base flood level elevation or adjacent grade. The air relief valve shall be installed in

a protective cage. Blow off pipe and valve shall be provided at all low points in the pipeline.

**18. Fire Hydrants**

Type shall be as specified in Standard Drawing No. 742 or approved equal list. In general, a two-port hydrant is used in single-family residential areas and a three-port hydrant is used in all commercial, industrial and multiple family areas.

Maximum spacing shall be 500 feet apart in single family areas and 300 feet apart in all other areas. On cul-de-sac streets, hydrants shall be placed a minimum of 100 feet and a maximum of 200 feet from the end of the street. If the hydrant is 300 feet or less from the connecting street, a 6" line may be used. If greater than 300 feet, use an 8" line, or looped 6" line. No fire hydrant shall be allowed on a 6" line farther than 600 feet from its connection to a larger line, even in the case of a looped line.

Service lateral connections are not allowed on public fire hydrant laterals.

**19. Sampling Stations**

Water quality sampling stations on the distribution line may be required.

**B. Water Services**

**1. Water Service Agreement Required**

Developer shall complete Water Service Agreement to obtain water service (contact Land Development Engineering). Water service shall be issued prior to building permit issuance.

**2. House Laterals**

Use copper pipe for all services (2 inch or smaller) from water main to water meter and ductile iron for services larger than 2 inches. Wet tap of the same size or larger than the water main is not allowed. Each parcel shall have separate services unless ownership, operation, and maintenance responsibilities are sufficiently documented in the Covenants, Conditions, and Restrictions.

**3. Meters**

All water services and meters shall be sized by the Developer's Engineer per AWWA M6 Manual and reviewed by the City.

Residential: Minimum service/meter size may be required by City on a case-by-case basis. Developer shall confirm with Fire Department whether fire sprinklers are required for residential dwelling units. A combined domestic and fire service is allowed for meters serving one or two dwelling units per Standard Drawings 723 and 724. Separate domestic and fire services are required for meters serving three or more dwelling units. Hillside residences with fire sprinkler systems shall have a minimum of 1"

water service and 1" water meter. Non-single family swimming pools (e.g., clubhouses) shall be served by a separate domestic water meter and backflow device. Separate irrigation meters and backflow devices are required for all uses except common areas within single family lots.

Commercial: Separate domestic meters are required for each building and are highly recommended for each tenant space (provides advantage to tenant and owner since most appropriate sewer service charge can be applied). Split service from the detector check lateral is not allowed for services less than 8", or if the domestic or irrigation split service is greater than 2".

#### **4. Backflow Preventers**

Backflow preventers shall be installed back of the water meter for all new developments. A reduced pressure principal (RP) backflow prevention device shall be installed on all irrigation systems. On sites where both potable and recycled water supplies exist, a reduced pressure principal backflow preventor (RP) shall be installed on the potable supply line.

An RP backflow prevention device shall be installed on all domestic systems, except residential services serving two or less dwelling units. The backflow device is not required on residential services serving two or less dwelling units unless potential for contamination of the public water system supply exist (see Ord. 233, Section VIII).

A reduced pressure principle detector check (RPDA) assembly shall be installed on all fire services which may have direct connection with pumps, injectors, pressurized tanks, auxiliary water supplies, or elevated storage tanks (Class III, IV, V and VI). A double check detector assembly (DCDA) shall be installed at public water line connections for all looped private fire service lines. An RPDA assembly may replace DCDA on a fire service requiring an DCDA assembly.

An air gap is required on all potable services where recycled water is use in a building.

All backflow prevention devices shall be installed per City Standard Drawing No. 734 and shall be tested upon installation and annually thereafter. All testing results shall be submitted to the Utility Section of the Engineering Division.

#### **C. Construction Water**

Construction meters are available for soil compaction and dust control. Construction meters are not allowed for temporary potable irrigation service.