

PART VII - WATER SYSTEM DESIGN CRITERIA

A. Water Distribution, General

1. The water system layout shall be approved by the City Engineer. The fire hydrant layout shall be approved by the Redwood City Fire Department.
2. The developer shall provide easements as necessary and required by the Engineering Division for water lines and accessories. The minimum width of easement shall be 15' clear of any property line fences.
3. Minimum size water main shall be eight inches in diameter; otherwise, the pipes must be sized for the design flow.
4. Calculations or computer modeling may be required for sizing more complicated water systems and for evaluating the impact on the existing systems, as determined by the City Engineer.

B. Water Demand Projection

1. The Average Day domestic Water Demand Projection for new buildings, is calculated using the ATTACHMENT Q.
2. The Maximum Day Demand is equal to twice the Average Day Demand.
3. The Peak Hour Demand is equal to three times the Average Day Demand (one and a half the Maximum Day Demand).

C. Fire Flow Requirement

1. Estimate the fire flow requirement per Uniform Fire Code (UFC) Appendix IIIA.
2. For other than single and two family dwellings, the required fire flow may be reduced up to 75% when a building is provided with an approved automatic fire sprinkler system and meets the following criteria:
 - a Fire Sprinkler System is monitored by an Approved Central Station (25%).
 - b All valves are supervised by an Approved Central Station (25%).
 - c The building is provided with an approved secondary water supply (25%).

D. Water Storage and Transmission Facilities

1. Size storage tanks using 3 days of Average Day Demand volume.
2. Size pump station, piping, and appurtenances for the largest of:
 - a Peak-Hour Demand,
 - b Maximum-Day Demand plus fire flow, or
 - c The tank replenishment flow.

3. Maximum allowable main line pressure is 120 psi measured at a fire hydrant.
4. Maximum allowable service pressure measured at a faucet is 80 psi; minimum service pressure shall be 35 psi.
5. Flow velocities shall be in the range of 4-7 fps, but in no case shall exceed 10 fps.
6. If the service pressure exceeds the maximum of 80 psi, an individual pressure regulator will be required on the service line. If the pressure does not meet the minimum of 35 psi, an individual pressure booster station will be required on the service line.
7. Fire flows shall have a minimum residual pressure of 20 psi.
8. For calculating pressures in high pressure zones, calculate the maximum pressure using the elevation of the reservoir at half full.

E. Alignment

1. Minimum clearances shall be 5 feet horizontal and 1 foot vertical clearance from any other underground pipe, and 10 feet horizontal clearance to sanitary sewer lines.
2. Water mains shall be installed above sanitary sewers. Where this clearance is not practical, consult the California Administrative Code (Health Code) for separation standards and alternatives.
3. Minimum cover shall be 3' from finished grade to top of pipe, or 2' below subgrade, whichever is greater.
4. The system shall be 'looped' from the street main, as required to provide adequate fire flow.
5. Gate or butterfly valves shall be installed to isolate each branch run from main supply run. Valves 12" and larger shall be butterfly valves, and 10" and smaller shall be gate valves.
6. Air release valves will be installed at locations required by the Engineering Division.

F. Materials

1. Pipeline materials for mains shall be PVC conforming to the requirements of the City's Standard Technical Specifications.
2. Valves, burys and fittings shall be cast iron and fusion epoxy coated and lined, conforming to City Standard Specifications.

3. Water mains shall be pressure tested and disinfected prior to connection to the City's system, conforming to City Standard Technical Specifications.

G. Cathodic Protection

1. Water systems in areas east of El Camino Real shall, in addition to other coatings called for in the specifications, have cathodic protection using a sacrificial anode system.
2. For water systems in areas west of El Camino Real, and east of the Alameda de las Pulgas the soils shall be tested for corrosivity using the procedures described in Appendix "A" of AWWA C-105. Any soil having a soil-test evaluation of 10 points or more shall require the use of cathodic protection.

H. Water Services

1. Separate water services and meters shall be installed in separate trenches for each dwelling unit.
2. Minimum service size shall be one inch.
3. Meter boxes shall be located where they are easily accessible to the meter reader, in the sidewalk, 18" behind and set parallel with the curb. Meters may not be closer than three feet to a driveway to be out of the way of parked vehicles.
4. Services shall not be located closer than five feet from a sewer lateral, with a minimum of 24" of cover.
5. Water meters and fire detector check meters may be installed by the City upon payment of the appropriate fee.
6. Detector meters and detector check valves, where required by the City Engineer, are to be supplied, installed and maintained by the property owner.

I. Fire Protection Systems

1. Fire hydrants come in four (4) different styles depending on location and water main size, and shall be provided as approved by the Engineer.
 - a Type A – At Emerald Lake Hills area, fire hydrants shall be Mueller A-423 dry barrel or approved equal fusion epoxy lined and coated; provided with two 2-1/2" and one 4-1/2" outlets, conforming to AWWA C502.
 - b Type B – At Redwood Shores, fire hydrants shall be Clow 92 low silhouette, wet barrel or approved equal fusion epoxy lined and coated; provided with two 2-1/2" and one 4-1/2" outlets, conforming to AWWA C503.
 - c Type C – At all other locations, for water main size under 10", fire hydrants shall be Clow 76 wet barrel or approved equal fusion epoxy lined and coated; provided with two 2-1/2" and one 4-1/2" outlets, conforming to AWWA C503.

- d Type D – Wherever the water main size is 10” or larger, fire hydrants shall be Clow 865 wet barrel or approved equal fusion epoxy lined and coated; provided with one 2-1/2” and two 4-1/2” outlets, conforming to AWWA C503.
2. Location of fire hydrants must be approved by the Fire Department. Use the following criteria as a reference:
 - a. The minimum number of fire hydrants shall be in accordance with Appendix III-B of the Uniform Fire Code.
 - b. Fire Hydrants shall be installed along both sides of divided, or arterial streets.
 - c. A fire hydrant shall be located on the same side of the street at all Fire Department Connections (FDC) within 50 linear feet.
 - d. Landscape materials shall be designed so that, when fully grown shall not obscure the FDC’s and fire hydrants (three foot minimum clearance required on all sides).
 - e. Fire Department Connections approved by the Fire Department, are required for each commercial building and shall be located as close as possible to the street frontage.
 - f. FDC’s shall be designed to provide one 2 ½” outlet for each 250 gpm of sprinkler system demand.
 3. For buildings requiring a separate fire sprinkler system, the system layout shall be shown, including the complete fire service line to the first joint above finish grade on the automatic sprinkler riser; riser location by dimension to the building wall; a profile to the riser, which shows how thrust is restrained at its base and where cathodic protection (if applicable) is “cut off” by an insulating flange; location of Backflow Prevention Device, Fire Department Connection (even if it’s on building wall); Fire Hydrant and Post Indicator Valve or Wall Indicator Valve.
 4. Before combustible materials may be stored or constructed on site, the Fire Department must approve fire flow and access. Before a fire hydrant may be placed in service, a high velocity flush of the fire hydrant shall be witnessed and approved by the City Engineer.

J. Thrust Blocks

5. Thrust blocks shall be designed for a minimum operating pressure of 225 psi, with soil bearing pressures of 2000 psf, unless smaller soil pressures are recommended by the project geotechnical engineer.

6. In Bay Mud conditions, thrust blocks shall be designed with spread footings so as not to exceed the allowable bearing pressure of the soft Bay Mud (approximately 700 psf). Consult the project geotechnical engineer.

K. Backflow Prevention Devices

1. All commercial private water supply pipelines shall be provided with an approved backflow prevention device.
2. Backflow prevention device shall be in the form of either a Double Check Valve Assembly or a Reduced Pressure Principal Backflow Preventor, per City Standard Details.
3. The type of Backflow preventor will be determined by the Engineer, depending on whether the location is deemed to be a low hazard potential, or whether dangerous or toxic substances are involved.
4. Backflow prevention devices shall be approved by the County of San Mateo, and shall bear the stamp of Underwriters Laboratories (U.L.).
5. Devices shall be installed on private property.

L. Maintenance Requirements

1. The City will maintain water mains and services in both public and private streets up to and including the domestic meter and the detector meter.
2. Property owners shall maintain backflow prevention devices, and service runs beyond the meter.