

2.0 DESIGN CRITERIA FOR WATER DISTRIBUTION SYSTEMS

Water system improvements proposed for inclusion into Western's service area shall be designed in accordance with all appropriate AWWA standards, include all landscape demands for non-residential common areas, (i.e., landscape slopes, medians, parks, detention basins, etc.), have those demands integrated into the demand calculations, and maintain the following criteria:

2.01 SYSTEM DEMAND CRITERIA FOR TRACT DEVELOPMENT

Western's 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, however, 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 following conditions:

1. The peak hour demand.
2. The maximum daily demand plus fire flow.
3. Tank refill, if required.

Average day domestic demand shall be 200 gallons per capita per day (gpcd) on annual average, with 3.8 residents per house for 1140 gpd/unit. Assume maximum daily flow of 175% of average day flow and maximum hour flow of 300% of average day flow.

Fire flow requirements shall be in accordance with the specification of the Fire Protection Agency having jurisdiction, e.g. Riverside County, City of Riverside, or City of Murrieta.

Commercial and industrial development proposed use and demand requirements should be reviewed and approved by Western prior to any system analysis being performed.

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

2.02 SYSTEM ANALYSIS

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

1. Peak hour demands with wells/booster pumping plants on.

For the peak hour demand flow analysis, the pressure at each node shall be a minimum of 40 psi and a maximum of 120 psi.

2. Maximum day demand plus fire flow with wells/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 Western's distribution system, at the highest system elevation) and as directed by Western's staff. The pressure at each node shall be a minimum of 20 psi and the maximum velocity in the pipelines shall be 7.5 feet per second, (certain exceptions may apply).

3. Minimum hour demands (10% of maximum day demand) with wells/boosters on.

For the minimum hour demand analysis, the maximum velocity in the pipelines shall be 5.0 feet per second and the maximum pressure at each node shall be 120 psi.

The Developer's engineer will be required to submit an analysis of anticipated flow demands; average, maximum hour flow, and maximum day plus fire flow. Western shall accept or request modifications to the submitted analysis.

2.03 WATER PIPELINE SIZING CRITERIA

Minimum size water pipeline is 8-inch nominal diameter, 10", 14", and 20" pipelines are no longer utilized by Western.

For maximum hourly flow; pipeline to be sized to provide head losses not to exceed 3.5 feet per 1000 feet of water pipeline.

For maximum daily flow plus fire flow; pipeline to be sized to provide head losses not to exceed 5 feet per 1000 feet of water pipeline.

For all cases, mainline velocities are not to exceed 7.5 feet per second.

Use a "C" valve of 130 for polyvinyl chloride pipe and 120 for cement mortar lined steel pipe in the Hazen-Williams formula.

Provide a minimum of 40-psi pressure at the meter to each and every customer service using the pad elevation of the water tank, at half-full, serving the area as the starting hydraulic grade line. Fire hydrants are to have 20-psi minimum residual pressure at design capacities.

If any service at the meter is proposed to be less than 50 psi Engineer shall submit calculations demonstrating actual pressure at all fixtures being supplied by that meter. Services less than 40 psi at meter will require a low pressure service agreement.

Commercial and industrial developments are to be analyzed by Developer's Engineer for review by Western's staff. Western's staff shall accept or modify the proposed pipe sizing.

Western's staff reserves the right to specify sizing of any water pipeline.

Due to master planning, Western's staff may require a larger size pipeline than normally required for a particular project to satisfy Western's design standards for system distribution requirement purposes. Western's Board of Directors may authorize participation and payment of increased cost of such water pipeline in accordance with Western's criteria.

2.04 WATER PIPELINE LOCATION

Unless otherwise approved by Western's staff, all water pipelines shall be located on the southerly or westerly side of the street, 6 - 8 feet from curb face or berm. The curb face or berm location shall be per the Riverside County Transportation Department or City of Riverside design standards. Location shall not interfere with other existing utilities.

The cover over the water pipeline shall be a minimum of 30" from rough grade and 36" from finished surface 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 or smaller. For water pipeline 12-inch or larger, the depth shall be 4.0 feet. 10-inch water pipe is no longer utilized. Western's staff may increase or decrease this required depth as necessary to cover non-standard conditions. Minimum slope of water pipelines shall be 0.5% unless otherwise authorized by Western's staff.

In no case shall a pipeline depth to top of pipe be greater than 60" without written approval by Western.

If any service at the meter is proposed to be less than 50 psi, the Engineer shall submit calculations. Services with less than 40 psi at the meter will require a low pressure agreement.

All projects will be required to extend water pipeline facilities across the full extent of the project parcel.

2.05 CURVE DATA

Water pipeline joints shall not be pulled more than the manufacturer's recommended offset. Directional changes for PVC pipe may be accomplished by curvature of the water pipeline itself. The minimum bending radius for water pipelines are as follows:

<u>Diameter</u>	<u>PVC (20' JTS)</u> <u>Min. Radius (ft.)</u>
8"	259'
12"	374'

Where a smaller radius of curvature is required, fittings shall be used.

2.06 OTHER UTILITIES

Water pipeline installation near sewer lines, recycled water lines, or storm drains shall be in accordance with State Department of Health guidelines. These can be obtained at AWWA. Western may specify more stringent criteria where deemed necessary.

When crossing other utilities, a minimum vertical clearance of 12" shall be provided (outside to outside).

2.07 WATER PIPELINE MATERIALS

Unless otherwise authorized by Western's staff, all 8" and 12" water pipelines shall be in accordance with AWWA standards, C-900 Polyvinyl Chloride Pipe (PVC) unless conditions dictate the use of current standard CML/CMC welded steel pipe and all fittings for PVC shall be ductile iron. All water pipelines 16" and larger shall be CML/CMC welded steel pipe and fittings in accordance with AWWA standards.

2.08 RESTRAINED JOINTS

2.08.01 Pipeline calculations shall demonstrate adequacy of thrust protection.

Restraint locations must be indicated on improvement plans.

Adequate means of restraints in order of preference:

1. Restrained joints and fittings
2. Fully welded joints for steel pipeline
3. Concrete thrust block
4. Concrete thrust ring

2.08.02 Thrust restraint for existing pipeline in order of preference:

1. Documentation (E.G. as-built) of restraint
2. Physical verification (E.G. pot-holing) of restraint
3. Modifying existing pipeline to meet restraint requirements (See 2.08.01)

2.09 VALVES

Location:

- Large water pipelines (16-inch diameter and larger): To be determined for each system to meet operational requirements.
- Small water pipelines (12-inch diameter and smaller): To provide flexibility of operation, generally located on discharge side of pipeline connections; 4 at crosses, 3 at tees and at beginning of dead end mains.
- If one of the options above does not apply, valves shall be spaced at 1,320-foot maximum intervals or as directed by Western.
- Valve spacing shall be that no more than 20 lots are to be out of service at one time.
- At all times the maximum spacing to in service hydrants shall not exceed 700 feet.

Size:

- Full line size gate valves through 12-inch. For 16-inch and larger, use full line size butterfly valves. Maximum velocity through valves normally limited to 12 feet per second, never to exceed 20 feet per second.

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

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

Pressure class rating shall be the same as the water pipe on which the valve is being installed.

2.10 COMBINATION AIR VACUUM AND AIR RELEASE VALVES

Air valves shall be located at all high points of water pipelines; however, air valves shall not be installed at the end of cul-de-sacs unless the slope of the water pipeline is 5% or greater. Minimum size of air valves shall be 1" and shall be sized as follows:

<u>Pipeline Diameter</u>	<u>Air Valve Size</u>
8"	1"
12", 16", 24"	2"
30"	4"
> 30"	Consult with Western

In phased tract development, air valves are often 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.

Provide 4-inch bollard on either side per Western's Standard Drawings and paint all above ground material with 2 coats of safety yellow.

2.11 BLOW-OFF VALVE ASSEMBLIES

Blowoffs shall be in accordance with Western'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. Other valves may be required for system maintenance during the plan check process based on water quality requirements. Where possible, fire hydrants shall be used in place of blowoffs. Minimum size of permanent blowoffs shall be 4". Minimum size of temporary blowoffs shall be 2". Where possible, isolated low points shall be located at fire hydrant tees; otherwise, blow-off valves are required.

Minimum size of blowoff assemblies to be 2" for temporary end of line and 4" for permanent side outlet wharfheads.

2.12 FIRE HYDRANTS

Design per requirements of the fire protection agency having jurisdictional authority. Developer's engineer should obtain hydrant location and spacing information from the governing fire protection agency. Developer shall provide hydrant cap painting per fire protection agency having jurisdiction.

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

2.13 APPURTENANCE LOCATION

All above ground appurtenances shall be placed at property line, a minimum of 18" back from the curb.

2.14 SERVICE INSTALLATIONS

Services shall be in accordance with Western's Standard Drawings unless otherwise approved in writing by Western's staff. All service installations larger than 2" shall be approved by Western's staff in writing.

Saddles for PVC pipe are only acceptable for services 2-inches in diameter and smaller with tees being required for pipe outlets larger than 2-inches.

2.15 CORROSIVE SOIL

Where pipelines are to be constructed in known or likely to be corrosive soil conditions, corrosion test stations shall be provided in accordance with Western's Standard Drawings at locations determined by Western's staff. If required, Developer will be required to install sacrificial anodes, etc. utilizing Western's Standard Drawings and approved materials list.

Cathodic protection stations are required to be installed every 500 feet on all pipelines.

2.16 PRESSURE REDUCING STATION

Where required by Western's staff, pressure reducing stations, including various types of control valves, pressure relief valves, and other unique valves shall be individually designed specifically for each installation utilizing Western's Standard Drawings.

2.17 BACKFLOW PREVENTION

Where Western'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 Western's Standard Drawings and approved materials list. A certified backflow tester shall test the backflow device and submit the report for final approval by Western prior to use of the service. An approved backflow prevention device is required for any fire service connection except for fire protection system of Classes 1 and 2. For further information, see Western's backflow ordinance. All non-residential water services shall have a Western approved backflow prevention device installed adjacent to meter unless otherwise approved by Western.

2.18 BEDDING AND BACKFILL

Pipe bedding shall be chosen and placed in accordance with Western's Standard Drawings.

2.19 TELEMETRY INSTALLATIONS

Direct burial cable and terminal housings may be required with some water systems. Reference

Western's Standard Drawings and Approved Materials List. If SCADA is required, connection points to existing cable are required to be shown on plans.

2.20 CONSERVATION REQUIREMENTS

To promote water-efficient landscaping, water use management and water conservation through the use of water-efficient landscaping, wise use of turf areas and appropriate use of irrigation technology and management.

At least one model home within a tract development shall demonstrate a water conserving landscape per the City or Riverside's Ordinance 6234 and the County of Riverside's Ordinance 859.

Riverside County Ordinance 859

- a. In residential subdivisions, all model homes in the project shall comply with the provisions of Article XIXf of this ordinance.
- b. The project applicant shall provide home buyers with sample water-efficient landscape and irrigation plans and additional educational material as approved by the Planning Director upon the sale of each dwelling unit within the project. The plans shall include a key identifying the common names of the plants used in the landscaping.
- c. The project applicant shall distribute outdoor water conservation pamphlets provided by local water purveyors, if available, to buyers upon the sale of each dwelling unit with the development. *Western can provide these at no cost.*
- d. A sign shall be displayed in the front yard of each model home which is clearly visible to home buyers. The sign shall indicate that the model home features water-efficient landscape irrigation design and approved materials list and consult with Western's staff for requirements.

City of Riverside Ordinance 6234 § 3, 1995 and 6032 § 1, 1993 Chapter 19.67

- a. In each project consisting of eight or more homes, at least one model home that is landscaped shall demonstrate via installed landscaping and irrigation, the principles of water efficient landscaping and irrigation described in chapter 19.67.
- b. The water efficient landscaped and irrigated model home site shall be identified as such by signs posted which identify such water efficient elements as hydrozones, irrigation equipment and others which contribute to the overall water efficient theme.
- c. The developer shall provide information at the model home site about designing, installing, and maintaining water efficient landscaping and irrigation.

Western can make available brochures on our water conservation education garden for your model homes and inclusion in your new buyer packets. The one-acre garden exhibits water-wise landscaping, showcases more than 250 water-efficient plants, opens daily at 10 a.m. closing at 4 p.m. and is free to the public. Additionally, anyone can take a virtual tour of the garden at Western's website – www.wmwd.com - where they'll discover lots of valuable water conservation information.

2.21 GENERAL NOTES FOR WATER PIPELINES

See Section 5.06 for General Notes for Water Pipelines