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III. WATER SYSTEM DESIGN CRITERIA

A. GENERAL

Water system improvements proposed for inclusion into the District's service area shall be designed in accordance with the criteria set forth herein, unless otherwise approved in writing by the District.

The design shall take into consideration physical conditions known to exist at the time and place of each installation and the probable operating requirements. Where such conditions render sections of these Specifications inapplicable, alternate methods of design may be submitted to the District, and upon approval thereof, may be incorporated in the plan.

The design shall require at least two different sources of water from two different water pipelines available for each development; thereby providing a "looped system". Two sources from the same water transmission pipeline are acceptable if a source from a different location is unavailable.

B. GENERAL LAYOUT

1. The system shall be designed as a circulating grid with at least three (3) main line valves at each four way intersection.

2. Each line shall be valved so that any segment not exceeding one block (1,300$^{\pm}$ feet) or two fire hydrants of the system may be isolated from service.

3. Dead end mains shall be provided with means of flushing with a fire hydrant.

C. SYSTEM DEMAND CRITERIA

1. The District 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 mains, tanks, pump stations and appurtenances shall be sized to handle the highest demand on the system within the sphere of influence.

2. All flows shall be computed on the basis that the area served by the extension or addition is completely improved to limits imposed by its present zoning or the zoning required to allow construction of the proposed development.

   The design flow will be the greater flow produced by either:

   (a) Maximum day demand (of the maximum month) plus required fire flow, or:

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(b) Peak hourly demand on days of maximum demand.

3. Residential. Residential peak hour demands for distribution systems serving up to 400 residential units may be calculated from the formula Q = NCF, where Q = Peak hourly flow in G.P.M.; N = number of units; C = 5.0; F = a diversity factor which may be interpolated from the following table:

N (Number of Units)	F (Diversity Factor)
4	2.0
10	1.8
50	1.0
100	0.7
200	0.5
400	0.4

For distribution systems serving more than 400 units, demand will be determined by the District. The District reserves the right to specify sizing of any pipeline.

Residential maximum day demands can be calculated by dividing the peak hour demand by 1.5.

4. Commercial and Industrial:

(a) For initial planning, District will use 8100 gpd/gross acre to estimate maximum day demand.

(b) For final sizing of water systems, demand shall be based on building code requirements. Demand calculations shall be submitted to the District for its review and approval.

5. Agricultural demands will be determined by the District.

6. Fire Flow Demand. The minimum fire flow requirement shall be determined by the fire protection agency serving the area. Unless higher residual pressures are required by the Fire Agency, the computation shall be based upon a minimum of 20 PSI residual operating pressure in the water main from which the fire flow measurement is taken.

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D. SYSTEM PRESSURE

1. Internal pipe pressures shall be calculated based upon the maximum hydraulic grade line. Pumping suction and discharge lines shall be investigated as to water hammer under conditions of power failure at full flow. In general, pressures for each zone may be calculated from the following table (NAV88):

Pressure Zone Designation	Elevation of Water Surface (±) (HWL = High Water Level)	Highest Service Elevation	Lowest Service Elevation*
870	887	760	540
900**	N/A	770	550
980	984	860	640
1100	1110	980	760
1110	1120	990	770
1200	1204	1080	860
1350	1354	1230	1010

*Based on Class 150 pipe
**PRV Zone

2. A minimum pressure of 50 psi static based upon the high water level of the reservoir serving the pressure zone shall be provided to each and every customer service. The maximum design pipeline pressure shall be 150 psi unless otherwise approved by the District. The influence of any pumping facilities shall take into account in this analysis (i.e., include pumping head).

E. PIPE SIZING CRITERIA

1. The minimum pipe size shall be 8-inch diameter.

2. Pipeline velocities shall not exceed 5 feet per second during peak hourly domestic flow, or 10 feet per second at maximum day domestic demand plus the required fire flow. Use a "C" value of 120 in the Hazen-Williams formula for flow computations.

3. The District reserves the right to require 12-inch diameter minimum size pipelines in residential areas, with no incremental pipeline diameter upsizing cost to the District, when necessary, as determined by the District.

4. Whenever possible, pipelines shall be looped to provide dual direction supply and system flexibility.

5. In commercial and industrial areas, the standard minimum mainline pipe size shall be 12-inch diameter.

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6. The District may require pipe sizing in excess of the minimum size as determined by the design criteria herein when the systems being constructed will serve, or may be extended to serve, additional lands. If oversizing is required by the District, the District's Board of Directors may authorize participation and payment of increased costs of such pipeline in accordance with District criteria.

7. Services and meters shall be sized in accordance with the provisions of Section 1009 of the Uniform Plumbing code, using minimum pressure expected in the system. Minimum service pipe diameter and meter size shall be: 1" line and 3/4" meter.

8. The minimum steel plate thicknesses utilized for water pipeline shall be as shown in Section VI. The Water Pipeline Materials Specifications, Section B.2.

F. PIPELINE MATERIALS

1. All District watermains shall be constructed of cement mortar lined and cement mortar coated welded steel pipe (10 gauge minimum plate thickness). As approved in writing by the District**,** residential developments may be allowed to use 8" and 12" diameter AWWA C909 PVC pipelines.

2. Pipe shall be provided only from District-approved pipe manufacturers. See list in Appendix J of Section VIII.

G. PIPELINE LOCATION

1. On south side or west side of the street and out of the main traveled lanes of the road where possible. Locate 7 feet from curb face or berm. Location is not to interfere with other existing utilities.

2. Pipeline is to be installed <u>after</u> roads are constructed to final sub-grade, and developer certifies this in writing on District form.

3. Adjacent to existing or proposed sewer lines, installation shall be in accordance with the State Board's Division of Drinking Water (DDW), or District requirements; whichever is greater. Generally, always cross above sewer lines, preferably with a minimum clearance of 1 foot, and parallel at least 10 feet (O.D. to O.D.) away from sewer lines. Where required by DDW and/or Engineer, water pipe joints shall be fully welded (double pass) and the pipe zone shall be backfilled with a 1 (one) sack cement sand slurry.

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4. When minimum cover cannot be provided, concrete encasement or protective slab construction over the pipeline may be substituted. Consult with District staff. Requires special approval.

5. District will require pipeline looping whenever possible. Dead end mains are undesirable.

H. VALVES

1. Location:

   (a) Large mains (14" and larger): To be determined for each system to meet operational requirements.

   (b) Small mains (12" and smaller): To provide flexibility of operation, usually located on discharge side of pipe connections; minimum 4 at crosses, 3 at tees and always at beginning of dead end mains. District may require additional valving on critical sections or where proposed valving requires closing more than 3 valves to isolate a section of pipeline.

   (c) Each main shall be valved so that any segment not exceeding 1,300 feet may be isolated from service.

2. Size & Type:

   Full line size gate valves through 12-inch (normal pressure rating 200 psi; specify a gate valve rated to a maximum pressure of 250 psi if required). For 14-inch and larger, use full line size butterfly valves (normal pressure rating 150 psi; specify a butterfly valve rated to a maximum pressure of 250 psi if required).

3. Refer to Standard No. B-1 (Gate Valves) and Standard No. B-3 (Butterfly Valves). Valves shall be provided only from District approved manufacturers. See list in Appendix J of Section VIII.

I. BACKFLOW PREVENTION

1. Where domestic service water and/or fire service water may become cross-connected to other water supplies or sources as determined by the District, 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 requirements.

2. All materials, installation, and testing shall be in accordance with District backflow prevention Ordinance No. 67.

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3. On all commercial and/or irrigation services, the water meter shall not be installed until an approved backflow prevention device is installed "immediately" behind the meter box.

J. PRESSURE REDUCING STATION

1. Where required by the District, pressure reducing station shall be individually designed specifically for each installation, subject to District review and approval of design and materials.

K. FIRE SERVICE INSTALLATIONS

1. Where fire service installations are necessary, the minimum service construction requirement shall be in accordance with Standard No. H-1. If required by the County of Riverside Fire Department or fire flow requirements, two or more fire services shall be installed in accordance with Standard No. H-1.

L. CORROSIVE SOIL DESIGN

1. Where pipelines are to be constructed in known or likely corrosive soil conditions, cathodic test stations shall be provided in accordance with District requirements and standards at the locations determined by the District.

2. The District, at its option, may also require cathodic test stations for its transmission mains and major pipelines, regardless of existing soil conditions.

3. In order to determine whether or not unfavorable soil conditions exist, the District may request that soil boring samples and laboratory analysis be provided as part of the project. The analysis shall include an evaluation of the following:

   - PH
   - Redox
   - Sulfide
   - Resistivity
   - Sulfate

4. Under certain circumstances, the District may require special pipe installation procedures or types of pipe, including special protective coatings **or** sheathing for pipe and fittings.

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M. WATER SAMPLING STATIONS

1. Where water sampling stations are required, as determined by the District, the stations shall be constructed in accordance with Standard No. K-1.

N. SERVICE INSTALLATIONS

1. All services shall be constructed in accordance with the applicable District Standard Drawing.

2. Services shall not be connected to 20-inch or larger mains unless specifically permitted by the District.

3. In addition to a domestic water service meter, all commercial/industrial projects shall be required to provide a separate landscape irrigation meter and service, in conformance with District Standards.

O. FIRE HYDRANTS

1. Fire hydrants shall be designed per requirements of the Fire Protection Agency having jurisdiction. Developer's Engineer must obtain hydrant location approval prior to the District approval of water system improvement plans. Hydrant top and cap painting color shall be per agency having jurisdiction and per District Standard Drawings. Hydrant shall be properly prepped and painted Safety Yellow per Devoe Devthane color.

2. All hydrants shall be constructed per District Standard Drawing No. G-1, G-1A, G-2, and/or G-2A.

3. Fire hydrants shall be provided only from District approved manufacturers (see Section VIII, Appendix J).

4. Fire hydrants not in service shall be bagged per District Requirements.

P. BLOWOFFS

Appropriately sized blowoffs shall be located at all low points along the pipeline alignment and at all "dead end" locations. Blow-offs on 8-inch diameter waterlines will also be required unless otherwise directed by the District. Additionally, for all pipelines 14" in diameter and greater, a blowoff shall be located on the upgrade side of all mainline valves. All blowoffs shall be constructed per District Standard Drawing No. F-1, F-1(A), F-2, F-4, and F-4(A).

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Q. COMBINATION AIR/VACUUM RELEASE VALVES

Appropriately sized air/vacuum release valves shall be located at all high points along the pipeline alignment and at all "dead ends" that occur at a high point. Additionally, for all pipelines 14" in diameter and greater, an air/vac valve shall be located on the downgrade side of all mainline valves. All air/vac valves shall be constructed per District Standard Drawing No. E-1 and E-2.

R. AVAILABLE FIRE FLOW DETERMINATION

Where required, the District's water system fire flow characteristics will be provided to the Developer's Engineer as shown on Figure III-A. The following should be noted.

1. The Developer's Engineer shall be responsible for all calculations required by the Riverside County Fire Department to verify the required fire flow can be obtained at the project site.

2. The results of computer simulation(s) performed by the District shall be used by the Developer's Engineer as a basis of system flow capabilities.

3. The hydraulic data provided are estimates based on various assumptions that may or may not occur. This information is provided as a convenience and not as a guarantee of flow capabilities at specific pressure by Jurupa Community Services District.

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FIGURE III-A
JURUPA COMMUNITY SERVICES DISTRICT
FIRE FLOW REVIEW

Project Identification: _____ W.O. No. _____

Date of Riverside County Fire Department Condition of Approval (attach copy):

Minimum Required Fire Flow: _____ gpm For a _____ hour

Duration at a _____ psi Residual Operating Pressure

COMPUTER SIMULATION RESULTS

System Model Results (if applicable)

Pressure Zone: _____

System Loading of Maximum Day Demand + _____ gpm Fire Flow At Node _____

Resultant Pressure at Node _____ = _____ psi

The minimum required Fire Flow ☐ was ☐ was not obtained