WATER DISTRIBUTION SYSTEM DESIGN STANDARDS

Adopted by the Board of Public Utilities
Resolution No. RES-
Date:

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WATER DISTRIBUTION SYSTEM DESIGN STANDARDS

I. PURPOSE

To provide guidelines for the design of water utilities projects and thereby reduce the time required for processing the plans. These guidelines do not include, but may reference, additional conditions which may be promulgated by all other pertinent ordinances, codes, and official policy set forth by the Water Department or other departments of the City of Santa Rosa or other government agencies. These guidelines establish minimum acceptable design criteria. More stringent requirements may be imposed by the Director of Santa Rosa Water based on specific project conditions.

Portions of these standards apply to fire systems, both public and private, and are intended as general reference to aid in the design of the public water distribution system. Final designs are subject to approval of the Fire Department.

Wherever the approval, discretion or opinion of the Water Department Director, or any other City staff, is called for herein, the project applicant shall submit a written request for the same. Variance requests must clearly identify the unusual circumstance that would warrant an exemption or waiver from the standards or specifications. The project applicant shall be responsible for providing any calculations or studies needed to support the proposal and for resolving specific design problems with the appropriate agencies, departments or divisions. Any final decision by City staff may be appealed pursuant to the City Code, but may be first directed to the Board of Public Utilities for a recommendation.

II. REQUIREMENTS FOR IMPROVEMENT PLANS AND SUBDIVISION MAPS

A. Provide a detailed utility plan showing onsite and offsite public and private water and fire protection systems, including mains, services, hydrants, and all other required appurtenances, and their connections to existing City-maintained water facilities. Show the location, type, and diameter of public and private water mains. Reference any existing fire hydrants within 300' of the project boundary. Show any wells, existing or to be abandoned. When a separate irrigation service is necessary, an irrigation plan is required per section X-O of these standards. (See section XI-B for submittal of plans for private fire systems.)

B. Annotate the local agency information sheet of the Subdivision Map with any information that is needed to notify property owners of requirements for connection to the City's water distribution system. These include, but are not limited to:
    1. Payment of fees prior to issuance of Building Permits.
    2. Lots requiring pressure regulating valves or booster pumps.
    3. Backflow protection.
    4. Public water access requirements, such as gates or access roads.

    The appropriate information may be obtained from Santa Rosa Water Engineering.

C. Miscellaneous specific items required on improvement plans are indicated throughout these Standards.

D. Before combustible materials may be delivered, stored or constructed on site, fire flow and access must be provided and approved by the Fire Department per current City Fire Code. In addition, public and/or private fire hydrants must be installed, flushed and operational unless an alternant supply of water is onsite that has been approved by the City for this purpose. This information must be included on all improvement plans. Provide any necessary calculations with the submittal of improvement plans or with the Tentative Map submittal to demonstrate adequate fire flows are available. Newly installed fire hydrants shall be flow tested per the methods described in NFPA 291, Chapter 4 and the results transmitted to the City Water Department for inclusion into the Geographic Information System (GIS).

E. Any known areas of contamination shall be delineated on the improvement plans.

III. WATER MAINS - GENERAL

A. Public water mains may not be designed outside the street right-of-way without approval from the Director of Santa Rosa Water..

B. In general, publicly maintained water distributions systems shall be designed only where they serve multiple ownership lots and where appropriate access for maintenance can be provided.

C. Water mains installed at a slope of 15% or greater shall be designed with restrained joints. The Design Engineer must provide adequate drainage measures to protect the trench from erosion.

D. Water mains installed outside of any roadway, called “cross-country mains”, shall be Ductile Iron Pipe (DIP) and shall have suitable access for maintenance by City personnel and vehicles. Cross-country mains shall be designed and constructed with isolation valves installed in the public right-of-way and shall be identified with blue locating posts (Carsonite 492 CW-112 or an approved equivalent) at approximate 500' intervals, at any angle point, and at the entrance to an easement. Stakes should have vandal-proof metal bottoms. Access requirements as established in Section XIV of the Sanitary Sewer System Design Standards may be imposed on a project based on site conditions.

E. For system reliability, to minimize pipe size, and to minimize the number of people affected by a system shutdown, either for domestic or fire protection purposes, no

more than 100 residential units may be served by a single-feed water system. A dual-feed (looping) public water system shall be designed to provide a secondary source of water to developments serving more than 100 units or in situations where a single feed does not have sufficient hydraulic and/or fire flow capacity Onsite private fire requirements, such as dual fire services and looping mains, will be determined by the Fire Department for residential and nonresidential developments.

F. For purposes of leak detection and maintenance access, no reinforced concrete may be designed over publicly maintained water facilities. Unreinforced concrete will be allowed under special circumstances such as crosswalks, sidewalks and driveways.

G. Extent of water main improvements will be as follows:

1. Any offsite water main improvements needed to serve the project must be shown on the improvement plans, including upgrades to existing mains that may be required as a result of a flow analysis or modeling effort.
2. In general, water mains must be designed at least across one-half of the property frontage or to the last service connection, whichever is greater; or where the project is required to provide new street improvements over the water main alignment and the water main will serve properties beyond the project limits, the water main must be designed to cross the full property frontage or to the limits of the street improvements, whichever is greater.

H. Streets with both water and sewer mains must be at least 20 feet wide, face-of-curb to face-of-curb. Streets having a width of 16 feet or less may only have one public utility. Public Water and public sewer mains may not be installed in alleys.

IV. MATERIALS

A. All materials used shall be lead free per California Health & Safety code, Section 116875.

B. Service laterals shall be high density polyethylene (HDPE), blue polyethylene coated type “K” copper, Polyvinyl Chloride (PVC), or Ductile Iron Pipe (DIP) per applicable City Standards.

C. 8" and 12" public water mains and 4"-12" private fire mains shall be; Polyvinyl Chloride (PVC) Pressure Class (PC) 235, DR18 per AWWA Standard C900, minimum or Ductile Iron Pipe Pressure Class 350 per AWWA Standard C151 minimum. Where the normal mainline static pressure exceeds 100 psi, or when required per SWRCB separation criteria, Ductile Iron Pipe or PVC PC305, DR14 shall be used. *Note: Fire Department may also require DIP or PVC PC305 DR14*

pipe downstream of fire line backflow assemblies.

D. 16" diameter water mains shall be; PVC PC165, DR25 per AWWA Standard C900 or Ductile Iron Pipe per AWWA Standard C151, or as shown on plans and specifications. Where the normal mainline static pressure exceeds 100 psi, PVC PC235, DR18 per AWWA Standard C900 or Ductile Iron Pipe shall be used.

E. 20" diameter and larger water mains shall be concrete cylinder pipe, wrapped steel pipe, or Ductile Iron Pipe unless otherwise approved by the Director of Santa Rosa Water.

F. Asbestos cement pipe shall not be allowed under any circumstances.

~~G. Per U.S. et al., ex rel. Hendrix v. J-M Manufacturing Co., Inc., et al., Case No. ED CV-06-0055-GW (C.D. of CA), the City of Santa Rosa is not currently accepting PVC pipe manufactured by J-M Manufacturing Co. or JM Eagle for installation on City projects.~~

V. CONNECTION TO AN EXISTING PUBLIC WATER MAIN

A. Indicate a "hot tap" for connection of service laterals 2" in diameter and smaller unless a mainline valve is also to be installed for isolation.

B. Indicate connection of pipes 4" - 12" in diameter with a hot tap or a cut-in tee in conformance with the provisions of the City's Water Distribution System Construction Specifications Section 132-1.20. Hot taps will be allowed only when no main line valves are required.

C. Design a cut-in tee if additional valves are required on the existing main. If the new main/lateral is larger than the existing main, the tee and main/lateral valve shall be the size of the existing main unless it is hydraulically necessary to increase the tee and valve to the size of the new main/lateral.

D. Tie-ins to the existing City water distribution system shall be inspected by an authorized City representative and the improvement plans shall be so annotated.

E. Size-on-size taps are allowed up to 8" for cast iron, ductile iron and PVC mains in accordance with the approved standards. Size on size taps on asbestos cement mains are not recommended and shall only be allowed with prior authorization from

the Director of Santa Rosa Water. 12" size-on-size taps are allowed only under emergency situations and with the specific approval of the Director of Santa Rosa Water.

F. In most major streets, or where the street surface is less than five years old, installation methods other than open cutting may be required. The Encroachment Officer or the City Engineer, as appropriate, will determine the requirements based on the condition of the existing street.

VI. ALIGNMENT

A. Horizontal

1. Alignment shall be in accordance with the provisions of Standard 871 or as directed by the Engineer.
2. New water systems shall be designed as “Restrained Joint Systems” wherever possible, minimizing the use of concrete thrust blocks and/or harnesses except as otherwise specified herein, in the Water Distribution System Construction and Rehabilitation Specifications, or on the plans. The Design Engineer shall show system restraint lengths on the plans, and all restraint calculations shall be provided to the Engineer.
3. Installations of 90-degree bends shall only be installed where site constraints do not allow the installation of two 45-degree bends. Where two 45-degree bends are required per these specifications there shall be as much separation between the bends as practical for the design.
4. In general, the water distribution system shall be designed in straight segments parallel to the sanitary sewer or storm drain system, or to the curb line when no other utilities are present, so that future locating and maintenance is simplified. When deflection of the system is required, the minimum allowable radius of curvature for an 8" water main is 250 feet and for a 12" water main is 350 feet. Any deflection in mains larger than 12” must first be approved by the Director of Santa Rosa Water.
5. Conform to the latest revision of the State of California State Water Resources Control Board (SWRCB) "Criteria for the Separation of Water Mains and Non-Potable Pipelines" (See Appendix ”A”) and any modifications herein or as approved by both the SWRCB Division of Drinking Water and the Water Department Director. 4” and larger service laterals shall the same separation requirements as water mains.
6. The minimum horizontal separation from storm drains, monuments, gas, electrical, and telephone lines shall be 4 feet clear between facilities except at crossings.
7. The minimum clear horizontal separation from a metallic pipeline with an

induced current or from an anode field shall be 5 feet. Where the new water main will be in proximity to an anode field, special design shall be required for approval by the Director of Santa Rosa Water.

8. All public water mains shall be designed a minimum of 5 feet from all structures, such as manholes or drop inlets. Provide a minimum of 3 feet separation from the lip of gutter to edge of pipe for future maintenance. The edge of water main pipes shall be designed a minimum of 5 feet from the edge of easements.

9. All water main trenches that are parallel to and deeper than the footing of any adjacent structure must be designed at least 45-degrees from the footing as required in the Uniform Plumbing Code. Any exceptions must first be approved in writing by the Director of Santa Rosa Water and the Chief Building Official, and shall comply with all applicable Codes and Regulations. (See City Std. 517)

10. Where dual water mains are designed, a minimum of 5 feet clear horizontal separation shall be maintained unless otherwise approved by the Director of Santa Rosa Water.

11. In general, water main crossings over or under other underground facilities shall be designed as close as 90 degrees to that facility as possible. Crossings of less than 45 degrees shall only be approved when no other design is possible.

B. Vertical

1. Generally, provide a minimum of 6" of vertical separation from water mains and; telephone (non-fiber optic) and cable TV, and 12" vertical separation from water mains and; gas, electric, fiber optic lines, and the County's Aqueduct mains. When the minimum cannot be maintained, plans shall indicate installation of felt expansion material, Styrofoam, or an approved equivalent between facilities. Other measures, such as the use of control density backfill, or ductile iron pipe may be submitted for review by the Director of Santa Rosa Water. . The absolute minimum separation between water lines and other underground facilities, except sewer shall be 0.1'.

2. Conform to the latest revision of the State of California Water Resources Control Board (SWRCB), "Criteria for the Separation of Water Mains and Non-Potable Pipelines "(See Appendix "A"), and any modifications herein or as approved by both the SWRCB Division of Drinking Water and the Water Department Director.

3. Comply with section VI-A-2 above.

4 Where dual water mains are designed, a minimum 1' clear vertical separation shall be maintained.

5 Where the new water main will be in proximity to an anode field, special design will be required for approval by the Director of Santa Rosa Water.

VII. MAIN SIZING CRITERIA

A. Allowable nominal sizes for public water mains are 8", 12", and 16". Any main size other than those specified must first be approved by the Director of Santa Rosa Water.

B. Public water mains shall be sized to meet minimum Fire Code requirements in addition to domestic and irrigation demands. Private fire protection mains shall be sized to meet minimum Fire Code requirements (see Section XII-L for fire flow requirements).

C. The minimum new public main size shall be 8 inches. New public mains serving commercial, industrial and/or multi-family residential developments greater than two units shall be a minimum of 12 inches. Existing mains that will serve such proposed uses must be upgraded as required to meet the current Fire Code.

D. Analysis and design of water systems shall be based upon the criteria listed in the City's Water Distribution System Master Plan where applicable. The Director of Santa Rosa Water may require an increased pipe size for overall system benefit. When the project is required to provide larger water mains than needed for the development, the applicant may apply to Water Department Engineering for oversize reimbursement.

E. Maximum flow velocity for new public or private water mains shall be 10 feet per second, to be calculated by applying the demands from Section VII-B above.

VIII. MAIN / LATERAL COVER

A. Cover is the distance from the top of the pipe to final finished grade measured directly over the pipe.

B. Typically, the minimum standard depths of cover for public water mains and private fire protection mains are:

Pipe Size	4" through 8”	10"	12"	16" or Larger
Cover (in.)	36"	40"	44"	48"

C. Where minimum cover is less than standard or greater than 8', special permission from the Director of Santa Rosa Water. is required. All new water mains shall be shown in a profile on the Improvement Plans or Encroachment Permit applications. Where cover is less than the standard, Pressure Class 350 Ductile Iron Pipe is required, but in no cases shall a cover of less than 24" be approved.

D. Where standard cover cannot be maintained, such as at the crossing of a water main with a sewer line or any other utility line, the Design Engineer shall propose lowering or raising the water main utilizing either a gradual deflection of the water main pipe itself, without installed elbow fittings, and that does not exceed the manufacturer's recommended instructions for this type of installation, or by utilizing ductile iron pipe with restrained mechanical joint type elbows. Where restrained joints are used to lower or raise the water main, all connected piping and appurtenances shall also be restrained, as needed, to safeguard all system components, new and existing, that may be affected. Evaluation by the Design Engineer should include, at a minimum, the need for higher class pipe, use of control density backfill, pipe encasement, ability to meet State Water Recourses Control Board (SWRCB) Criteria for the Separation of Water Mains and Non-Potable Pipeline, need for additional joint restraint beyond the structure, and the resulting need for combination air and vacuum release valves(ARV). This evaluation shall be submitted to both the SWRCB and the Water Department for review with any proposal.

   Where the raising or lowering does not satisfy the current SWRCB Waterworks Standards criteria for the separation of Water Mains and Non-Potable Pipelines and City Standards, the proposed installation shall be submitted to the SWRCB "Drinking Water Division" for review. Once approved by the SWRCB, the proposal along with all documentation shall be submitted to the City of Santa Rosa Water Department for review. Approval by the SWRCB does not guarantee an approval by the City.

E. The minimum cover for service laterals shall be as shown on the appropriate City Standard Plan. Where service laterals have conflicts with other facilities, a detail or profile shall be shown on the plans, or the plans shall be sufficiently annotated to give clear direction for the installation.

F. When designing a cut-in tee or cross for a service or main connection that is larger than the existing main, the new assembly shall be shown at the minimum depth for the size of tee or cross per section VIII above. The depth shall also be sufficient to allow the valves to remain below the street subgrade, which may necessitate lowering the existing main.

IX. VALVING

A. Valve installations at intersections shall be in accordance with the provisions of Standard 871. A minimum of three mainline valves are required at three way intersections and four valves are required at four way intersections. A valve may not be required on any leg of a tee or cross intersection if another valve is within 250 feet, except as needed to isolate fire hydrants, fire lines, commercial or multi-unit services, or dialysis centers.

B. All hydrants shall be on separately valved sections of the public main, including fire lines serving private hydrants.

C. Any water main which does not have a fire hydrant, fire line, commercial or multi-unit service, or dialysis center lateral connection shall have valves designed at approximately 1,000 foot intervals or as required by the Director of Santa Rosa Water.

D. Water main valves shall be designed outside of concrete areas wherever possible to facilitate repairs.

E. Cross-country water mains must be isolated with valves in the public right-of-way and shall be identified with locating posts at 500-foot intervals, at any angle point and at entrances to easements.

F. Gate Valves

1. Water gate valves shall comply with City Standard 877.
2. Water gate valves shall be ductile iron conforming to either AWWA Standard C509 or C515 of the latest revision and shall be resilient seat type with non-rising stem opening counter clockwise, with O-ring stem seal and suitable ends for connecting to the type of pipe or fitting used.
3. The working pressure rating of the water gate valve shall meet or exceed the pressure rating of the pipe.
4. External bolts and nuts shall be stainless steel grade 304 or better.
5. For shallow installations where the operating nut of the valve will be 6 inches or less below finished grade, the design shall call for installation of a horizontal gate valve unless otherwise directed by the Engineer.

G. Butterfly Valves

1. In general, butterfly valves will not be allowed without special permission from the Director of Santa Rosa Water.
2. Butterfly valves shall comply with City Standard 878.
3. Butterfly valves shall typically be mechanical joint type and shall conform to AWWA Standard C504 of the latest revision and shall be the rubber seat type. (flanged connections may be approved for specific installations)
4. Butterfly valve discs shall rotate 90 degrees from the full open position to the tight shut position.
5. Butterfly valve seat shall provide a tight shut off at a pressure differential of 150 psi upstream and 0 psi downstream in either direction.
6. The butterfly valve operator shall be the travelling nut type.
7. The butterfly valve shall open with a counter-clockwise rotation on the operating nut.
8. External bolts and nuts shall be 304 stainless steel.

X. SERVICE LATERALS AND METERS FOR DOMESTIC AND IRRIG. SERVICE

A. Developments will be provided City domestic and/or irrigation water service via water meters located at the frontage of a public street.

B. The City may allow meters to be located on private street frontages and/or within public utility/water easements if a Santa Rosa Water Departmentt evaluation concludes that it is reasonable under the circumstances. However, meters must be readily accessible for reading and maintenance.

C. Design meter boxes out of traveled ways and a minimum of 10' from street trees whenever possible.

D. Base any required hydraulic calculations for the water meter and service lateral sizes on criteria from the latest edition of AWWA Manual M22 and any additional requirements from the City's Fire Department, and submit to the Director of Santa Rosa Water for approval.

E. The maximum velocity in domestic, irrigation, fire line, or combination water service laterals from the main to the meter shall be 15 feet per second.

F. Maintain a minimum 5' horizontal separation between water and sewer laterals.

G. Meter manifolds other than those shown in various City Standards shall be detailed

on the plans and must be approved by the Engineer.

H. Residential (single units)

1. Each lot shall be separately metered.
2. Where conditions allow, install a dual water service lateral per Standard 864 to serve two single-family residential lots, providing each lot is less than 2 acres. Upon approval by the Engineer, individual 1" services may be installed where conditions are not practical for a dual water service lateral installation.
3. Provide a 1-1/2" HDPE water service lateral with a 1" meter for any lot greater than 2 acres. The Santa Rosa Water Department may, at their discretion at specific sites, require the installation of a 1" copper water service lateral in place of the 1-1/2" HDPE.
4. Water service laterals shall not cross lots they do not serve.

I. Residential with second unit (as defined in the City Zoning Code Section 20-03.111 Article 6), two SFD=s on one lot, and Duplexes.

1. Each unit shall be served by separate meters.
2. If a new second unit is constructed and the total water flow for both units exceeds the capacity and allowable velocity of the existing water service lateral, based on the criteria established in the latest edition of AWWA Manual M22, the service lateral shall be upsized to accommodate the additional flows as directed by Water Department Engineering staff. If first approved by the Director of Santa Rosa Water, the existing lateral may be utilized and an additional water service lateral installed to serve the second unit.
3. If the primary unit and the second unit are to be constructed at the same time, design a 1-1/2" Dual water service per Standard 864 for the site. The Santa Rosa Water Department may, at their discretion at specific sites, require the installation of a 1" copper dual water service lateral in place of the HDPE.
4. The appropriate service lateral shall be shown on the Public Improvement Plans and/or Encroachment Permit submitted for approval.

J. Multi-Family Residential (3 or more units)

1. For triplexes or lots with three PUDs, condominiums, or townhomes, individual meters shall be required for each unit.
2. For multi-family developments of 4-99 units, whether rental units or separate ownership units, design for an appropriately sized single master meter, a master meter for each building cluster, or individual meters for each

unit.

3. For complexes of 100 units or more, metering shall be designed as in (2) above, except that at least two metered connections shall be required if the project is to be master-metered.
4. See Section X-O for irrigation meter requirements for any landscaped or common areas.
5. All meters shall be within public right-of-way or easements and easily accessible, and multiple meters shall be clustered where possible.

K. Mobile Home Parks

1. Mobile home parks that have rental spaces may have a master meter (two master meters if more than 100 spaces) or each unit may have an individual meter. Parks with individually-owned lots shall have individual meters. When master meters are used, the mobile home park owner may sub-meter to the tenants at their own expense, providing they comply with P.U.C. Requirements.
2. Individual meters shall be clustered and located within the public right-of-way or easement and located for ease of access.
3. See Section X-O for common area irrigation meter requirements.

L. Mixed residential and commercial uses shall have separate meters.

M. Commercial

1. See Section X-O below for irrigation requirements.
2. A minimum 1-1/2" HDPE domestic service lateral is required for commercial use. The Santa Rosa Water Department may, at their discretion at specific sites, require the installation of a 1" copper water service lateral in place of the HDPE.
3. Critical use facilities such as hospitals, jails, elderly care facilities, and others as determined by the Director of Santa Rosa Water, shall require at least two separate water services for domestic use that must be connected to separately valved sections of the public water distribution system.

N. Combination Services for Private Fire Service with Domestic and/or Irrigation Service

1. Only 6", 8" and 12" combination service laterals are allowed.
2. The combination service lateral shall equal or exceed the size of the required fire line and shall be hydraulically sized to provide adequately combined domestic, irrigation, and fire flows without exceeding the allowable velocity of 15 feet per second.

3. A minimum 8" combination service lateral shall be required for lots with unknown commercial, multi-family, industrial and shopping center uses where onsite hydrants are not likely to be required for development.
4. A minimum 12" combination service lateral shall be required for lots with unknown commercial, multi-family, industrial or shopping center uses where onsite hydrants are likely to be required for development.

O. Irrigation

1. Provide separate irrigation meters for landscaped areas of all commercial uses.
2. Provide separate irrigation meters for common areas of all condominium, townhome, PUD, apartment complexes, and mobile home parks.
3. Provide reduced pressure (RP) backflow devices for all irrigation services. Backflow device types shall be specified on the irrigation plan and shall conform to City Standard 876 and the most current USC Approved List of Devices at time of installation.
4. Sizing of irrigation meters shall be determined by the Water Department after reviewing the landscape plans. Irrigation meter size shall be determined by the maximum flow required at the meter and shall be based on the latest edition of AWWA manual M22's criteria for meter sizing. Water demand purchased shall be based on the estimated gallons required to maintain the planned landscape in a healthy condition for our climate. Along with landscape and irrigation plans, the applicant shall submit the planned square footage of planted areas and categories of plants to be used as selected from the following:

    a. High water use plants: turf, annuals, and container plants;
    b. Moderate water use plants: ornamental trees, shrubs ground covers, and perennials primarily irrigated by sprinklers. (Note that there may be some use of drip or bubblers in this category but not a predominance.)
    c. Low water use plants: drought tolerant plants recognized as having a plant factor of 0.3 or less and irrigated primarily through drip emitters.

XI. PUBLIC IMPROVEMENTS FOR PRIVATE FIRE SYSTEMS

A. Santa Rosa Water is responsible for mapping private fire systems, including hydrants, for the Fire Department and for assuring properly sized services. Design plans showing private fire systems shall be submitted to the appropriate Fire and/or Building jurisdiction for approval and;

1. may be included with the Public Improvement Plans for the project, or

2. copies of the approved plans may be submitted to Santa Rosa Water Engineering prior to requesting a meter set and activating the fire system.

B. Generally, the lateral size shall be designed to be the same size or larger than the size required for the fire sprinkler system and/or the private hydrant system. **Caution** - onsite fire system design may necessitate changes to preapproved public improvements. The hydraulic calculations for laterals serving private fire systems shall be based on the required fire flow or the fire sprinkler demand, whichever is greater, combined with the peak domestic flow.

C. All private fire systems that only serve onsite hydrants require aboveground single detector check valves in accordance with Standard 888. Where aboveground installations are not reasonable due to site constraints, in the opinion of the Water Department and Santa Rosa Fire, design for single detector check valves in vaults per Standard 879.

a. Double-check detector backflow assemblies per Standard 880 are required for:

1. All connections serving commercial fire sprinkler systems; or
2. Any property with multiple fire service connections; or
3. Any fire line connections to properties with auxiliary water supply.

D. Reduced-pressure detectors are required for:

1. Any fire line utilizing chemical additives such as antifreeze or fire suppressants; or
2. Any building where an extreme hazard exists.

E. For one- and two-family residential fire sprinkler systems:

1. Where the multipurpose water system circulates for fire sprinklers and domestic supply, no backflow device is required.
2. Where the fire system does not circulate water with the domestic supply, double-check backflow assemblies must be designed where the fire system connects to the domestic system. Design the backflow assembly as close as possible to the water meter.
3. Where a fire sprinkler system is to be installed in a one or two unit family dwelling, design the service lateral from the street main to the water meter and the water meter to be 1” minimum. Larger size laterals and meters may be required where hydraulic calculations indicate the need.

F. The location of any Fire Department connection shall be approved by the Fire Department.

G. Critical use facilities such as hospitals, jails, elderly care facilities, and others as determined by the Director of Santa Rosa Water and/or the Fire Marshal, require at least two fire line service connections to separately valved sections of the public water main, so that service can be maintained in the event of a main line shutdown.

XII. FIRE HYDRANTS

A. Generally, fire hydrants required onsite to serve one lot shall be private.

B. Generally, fire hydrants required onsite to serve two or more lots shall be public.

C. Design of hydrant locations shall meet the Fire Code requirements and must be approved by the Fire Department for logistics and by Santa Rosa Water Department for maintainability.

Each hydrant shall be connected to a water distribution system main with a 6" diameter or larger lateral controlled by an independent valve.

D. Whenever possible, locate hydrants near street intersections.

E. If it is not possible to locate near an intersection, locate the hydrant near a property line or where it will minimize interference with property use.

F. Locate hydrants a minimum of 10' from roll down of driveways for commercial or multi-family sites and 5' from residential driveways.

G. On streets with raised medians or with four or more travel lanes, design hydrants on alternate sides of the street per current City Fire Code. Each side of the street will be considered independently relative to hydrant placement per subsections XII-J and XII-K below.

H. Residential property with one or two dwelling units - Typical locations

1. Design hydrants with a maximum spacing of 500', or as approved by the Fire Department. Design hydrants at a maximum spacing of 300' in Wildland – Urban Interface Fire Areas as designated by the City Fire Department.

2. Generally, design hydrants at intersections and then evenly distribute

hydrants throughout the project.

3. Specify "residential" hydrants per City Std. 857 on the plans.

I. Commercial, Industrial, and Multi-family (3 or more units) - Typical locations

1. Generally, design hydrants at intersections or near driveway entrances and then evenly distribute hydrants throughout the project.

2. No portion of the exterior wall of the facility or building shall be more than 150' from the nearest hydrant as measured by an approved route around the building per the City Fire Code. Onsite fire hydrants and mains shall be provided where required by the Fire Department per City Ord. 3958.

3. Specify "commercial" hydrants per City Std. 857 on the plans.

J. Minimum fire flow required at all hydrants:

1. Fire Flow is the flow rate of a water supply, measured at 20 pounds per square inch (psi) (138kPa) residual pressure, measured in the water main in the vicinity of the flowing hydrant, that is available for firefighting. (City Ord. 3852)
2. Single and two family residential uses require 1,500 gallons per minute flow.
3. The required fire flows for schools, commercial, industrial, and multi-family residential (3 or more units) uses shall be based on the City Fire Code. The water system shall be designed so that 1,500 gpm is available from the hydraulically most demanding hydrant and the remaining flow required is available at the next most demanding hydrant(s), up to a maximum of 1,500 gpm per hydrant.
4. Fire flow requirements are under the jurisdiction of the Fire Department. The guidelines given above are general. Actual flow requirements shall be verified with the Fire Department prior to submittal of plans. Calculations may be required by the Fire Department to verify the adequacy of the proposed design.

XIII. BACKFLOW DEVICES (EXCEPT FOR FIRE LINES)

A. Backflow device installations shall be in accordance with State of California Title 17 and current City of Santa Rosa Code, Section 14-16, Backflow Regulations.

B. All backflow devices shall be listed on the latest revision of the approved USC Foundation for Cross-Connection Control and Hydraulic Research list.

C. Design the installation of backflow assemblies as near as possible to the water meter as shown on Standards 874, 875 and 876.

D. Backflow preventer type shall be designed in accordance with Appendix ”B“. For uses not listed contact Santa Rosa Water Engineering.

XIV. PRESSURE

A. To obtain water distribution system data for these calculations, contact the City’s Engineering Department. A fee shall be imposed if flow testing is required.

B. Mainline

1. The minimum allowable static pressure in the system is 20 psi.
2. The maximum allowable static pressure in the system is 120 psi.
3. The maximum allowable pressure in a high-level zone is calculated by assuming the reservoir full. In the Aqueduct zone or other reduced pressure zones, calculate the pressure by using the high setting of the pressure regulating valve at the nearest aqueduct connection or system regulator.
4. The minimum allowable pressure in a high level zone is calculated by assuming the reservoir drawn down 10' from the high water level. In the Aqueduct zone or other reduced-pressure zones, use the low setting of the pressure regulating valve at the nearest aqueduct connection or system regulator.

C. Domestic service

1. The minimum allowable pressure is 20 psi measured at the meter. If pressure measured at any faucet is less than 35 psi, a pressure booster system shall be required.
2. The maximum allowable pressure at a meter is 120 psi. If service pressure measured at any faucet exceeds 80 psi, a private pressure regulating device shall be required.

XV. SPECIALTY VALVES AND WATER SAMPLING STATIONS

A. Specific locations shall be reviewed for each project by the City’s Engineering Department.

B. A combination air and vacuum valve shall be required at substantial high points in

the system such as over a hilltop or at the upper end of a dead end main.

C. Design pressure reducing valves to maintain overall system balance and to maintain service pressure levels within the parameters established within these system design standards.

D. Typically surge or pressure relief valves are to be designed near the low points of any high level pressure zone where discharge may be directed to an approved disposal system.

E. Water sampling stations shall be required to provide representative sampling within each pressure zone. At a minimum, one water sample station shall be required in each pressure zone, at each reservoir and at pump stations.

XVI. SPECIAL CONDITIONS FOR DELINEATED FAULT ZONES

A. Fault zones shall be identified on improvement plans.

B. Ductile iron pipe shall be indicated on the improvement plans in delineated fault zones and extend to 100' outside each side of the delineated fault boundaries.

C. Pumper connections or fire hydrants shall be designed approximately 50' outside each side of the delineated fault zone. Gate valves shall be designed between the fault zone and the fire hydrant/pumper connection.

D. Mechanical joint double-ball Flextend assemblies with 8" expansion/contraction capability, as manufactured by EBAA Iron, Inc. of Eastland, Texas, or an approved equivalent, shall be designed adjacent to each side of the fault zone.

XVII. EASEMENTS

A. An easement shall be provided over any public water system when it is installed outside a public right-of-way.

B. The easement shall be a minimum of 15' wide if it only contains a water main or 20' wide if it contains another facility as well, such as sewer, storm drain, or other utility. The easement will be dedicated as a "public water easement" if it contains water only. It will be dedicated as a "public utilities easement" if it contains other facilities as well.

C. Easements shall be configured to encompass all publicly maintained appurtenances, such as water service laterals, meters and fire hydrants and shall be generally centered over the facility. Separate access easements may be required depending

on site conditions. When water mains are to be installed along a property line the easement shall be wholly contained on one parcel.

D. All property restrictions placed as a result of dedication of easements shall be so noted on the Subdivision Map or on the Easement Deed if the easement is not dedicated as part of a subdivision. Required notes are:

1. No structures may encroach on, above or below the surface of the ground in any public water easement. This includes footing of foundations or eaves from the roof of any adjacent structure, pools, ponds or outbuildings on slabs or foundations. Decks, sheds, or other structures which may be easily removed for maintenance of the water system may be allowed at the discretion of the Director of Santa Rosa Water.
2. No trees shall be planted in a public water easement without first obtaining approval of the Director of Santa Rosa Water. Trees may be allowed to the extent that damage to the water system does not occur from root intrusion and adequate access can be provided for maintenance and repair vehicles.

XVIII. ABANDONMENT OF WATER DISTRIBUTION SYSTEM COMPONENTS

A. Any existing water mains and service laterals larger than 2" that will not be used shall be abandoned per Standard 507 and shall be shown on the Improvement Plans with appropriate notation.

B. For all abandoned water services up to and including 2", on water mains that are to remain active, annotate to remove the valve and saddle and install a full circle stainless steel clamp on the main under City inspection.

C. For tees or crosses on water mains that are to remain active, annotate the Improvement Plans to show removal of the tee or cross, any associated valve(s) and thrust blocks, and install a section of ductile iron pipe with approved couplers under City inspection.

D. Valve boxes and riser pipes for abandoned valves shall be removed and so noted on the Improvement Plans.

E. Abandoned mains, valves and riser pipes located within any street structural section or within any new trench shall be shown on the Improvement Plans to be removed.

F. Show all 12" diameter and larger water mains to be abandoned within the public right-of-way as removed or broken into every 50' and filled with an approved flowable fill per Standard 507.

G. Where a fire hydrant is to be abandoned, note that the hydrant barrel, break off riser, and check valve are to be removed, and the bury is to be capped or plugged in an approved manner, and the lateral abandoned at main per Standard 507. Abandonments of fire hydrants must first be approved by the Fire Department.