City of Santa Fe

Public Utilities Department
Water Division

Water System Design Criteria

Revision History

Revision #	Purpose/Changes	Date
2006	Initial Draft	06/23/2006
2024	Major update to all sections, first update since 2006. Made available via CoSFW website.	11/01/2024

Introduction

The purpose of this document is to describe criteria related to the design of distribution system expansions and improvements for City of Santa Fe Water (CoSFW) system. The criteria address the design of water distribution mains, domestic services, irrigation services, and fire services including all appurtenances. It does not cover the criteria necessary for the design of major transmission lines (i.e. mains larger than 12-inch diameter), wells or other production facilities, pumping facilities, or storage reservoirs.

Criteria presented are those determined to be the minimum necessary to result in system designs having satisfactory functional characteristics, durability, and operation. It is expected that the designer will strive for the best design to suit the circumstances involved, and that designs will always reflect sound professional judgment.

Special Note for Development Projects

CoSFW approval of development and/or construction plans is not an authorization to start water system construction. The Applicant must enter into an Agreement to Construct and Dedicate Water System Improvements (ACD) with CoSFW and pay all CoSFW fees prior to receiving notice-to-proceed for construction. Plats must be recorded and all easements granted prior to the start of construction.

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SECTION A – REGULATIONS AND REFERENCES

Below is a list of references that must be considered and used in conjunction with the City of Santa Fe Water System Design Criteria. Additional references may also apply. All designs should be consistent with industry standards and best practices.

Please note that CoSFW water system designs and construction must meet all applicable Federal, State, County and/or City Codes.

1. *Municipal Charter and Code of Ordinances City of Santa Fe, New Mexico Chapter XXV - Water*
   This code contains several items important to the design and construction of the water system including the utility rate structure, obligations of CoSFW service, and the line extension policy. Also called City Code Chapter 25.
   https://library.municode.com/nm/santa_fe/codes/code_of_ordinances?nodeId=CHXXVWA.

2. *City of Santa Fe Water Construction Standards and Specifications*
   This document contains system installation specifications, material specifications including a list of accepted materials and manufacturers, and standard detail drawings. This document can be found on the City of Santa Fe Water Service website https://santafenm.gov/public-utilities/water/water-service.

3. *Manual of Cross Connection Control, Current Edition, Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR), University of Southern California*
   This document provides the guidelines for backflow prevention and cross-connection control. Often abbreviated as "FCCCHR Manual". CoSFW requires FCCCHR accepted backflow prevention devices for protection of the CoSFW system. FCCCHR produces a list of accepted devices and updates the list regularly.

4. *New Mexico Drinking Water Regulations*
   Title 20, Chapter 7, Part 10, Drinking Water Bureau, New Mexico Environment Department (NMED).
   Discusses regulations for public water systems and types of construction projects requiring NMED approval. https://www.srca.nm.gov/wp-content/uploads/attachments/20.007.0010.pdf.

5. *American Water Works Association (AWWA) Standards*
   Refereced in this document: AWWA C622-19 Pipe Bursting of Potable Water Mains 4 in. (100 mm) to 36 in.
   C622-19 details acceptable replacement of burst mains.
   AWWA M22 Sizing Water Service Lines and Meters
   M22 details acceptable methods of sizing meters.

6. *International Fire Code (IFC)*
   Code accepted by City of Santa Fe for identifying fire flow requirements. The version of the IFC currently adopted is detailed in Chapter 12 of the City Code.
   https://library.municode.com/nm/santa_fe/codes/code_of_ordinances?nodeId=CHXIIFIPRPR_12-2FICO_12-2.1ADFICO.

SECTION B - DEFINITIONS

B.1. Abbreviations

ACD – Agreement to Construct and Dedicate

AWWA – American Water Works Association

CoSFW – City of Santa Fe Water

FCCCHR-USC - Foundation for Cross-Connection Control and Hydraulic Research – University of Southern California

FDC - Fire Department Connection for fire sprinkler system

GPM – flow rate in Gallons Per Minute

HDPE – High Density Polyethylene

IFC – International Fire Code

NMDOT – New Mexico Department of Transportation

psi – pressure in pounds per square inch

PRV - Pressure Reducing Valve

PVC – Polyvinyl Chloride

ROW – [Public] Right-of-Way

RPBP - Reduced Pressure Principle Backflow Preventor

SFFD – Santa Fe Fire Department

UPC – Uniform Plumbing Code

WVSP – Water Valve Shut-off Plan

B.2. Definitions

Agreement to Construct and Dedicate (ACD) Water System Improvements - An agreement executed between the Applicant and CoSFW for construction of water system facilities. This agreement must be in-place and all fees paid prior to start of construction.

Applicant for System Extension - Any person, agent, association, corporation, entity, or government agency desiring CoSFW water services for premises under their control. This term includes subdividers and developers. Also referred to as Applicant.

City of Santa Fe Water - The water utility of the City of Santa Fe responsible for operating and maintaining the City's water system.

City of Santa Fe Water Director – The water utility division director responsible for managing the City's Water Division. Equivalent to Division Director.

City of Santa Fe Water Engineer – An engineer licensed in the state of New Mexico and employed by the City of Santa Fe Water Division.

Commercial Development – One or more buildings constructed for nonresidential use. May include hotels, motels, offices, stores and other retail establishments and industrial, manufacturing, wholesaling and warehousing activities.

Customer Line - The customer line extends from the tail piece of the service line (i.e., on the downstream or customer side of the meter) to the premises to be served. The customer owns and is responsible for the maintenance of this line. The customer line is sometimes called the "yard line" or "private service line."

Design Engineer - A New Mexico licensed engineer responsible for developing drawings, specifications, reports and calculations, prepared in connection with the public water system, in full compliance with applicable CoSFW procedures, design criteria, and construction standards.

Distribution System - Mains of 12-inch and smaller diameter, together with all appurtenant and necessary valves, fire hydrants, taps, meters, service pipes, and associated materials, property, and equipment receiving potable water from Transmission and/or Collection Mains. Distribution mains provide local distribution of water and are the mains from which individual user service taps are made.

Dry Utilities - Dry utilities generally include electricity, cable television, telephone, fiber optic, and other communications lines.

Dwelling Unit - One or more rooms connected together constituting a separate, independent housekeeping establishment occupied by one family, for either owner occupancy, rental or lease and physically separated from any other dwelling unit that may be in the same structure and containing independent cooking and sleeping facilities; provided that the term does not include group housing, hotels or motels.

Flushing Device - A device installed on the distribution main for purposes of flushing the main. Dead-end lines shall be built with a flushing device. No service line shall be located downstream of the flushing device. Flushing devices include the following: fire hydrant, flush hydrant, or below grade blowoff.

Inside Meter – An inside meter is a meter located behind a private gate or fence or located indoors.

Master Meter – A master meter is a meter that 1) transfers water to CoSFW customers through a single service line to more than one dwelling unit or building, or 2) transfers water to a CoSFW wholesale customer for distribution or resale on that customer's private system.

Private Fire System – A privately-owned network of fire suppression that CoSFW is delivering water to, which may include private fire hydrants or fire sprinkler systems.

Pro rata - A prorated charge for CoSFW water distribution facilities that have been financed and constructed by either CoSFW customers or CoSFW itself. The proration is based on methodology presented in Chapter 25, Rule 19 of the City Code.

Public Water Infrastructure - Any public infrastructure that is used for the diversion, storage, treatment, conveyance, reticulation, and distribution of water from the source to the customer. Or any public infrastructure used in connection with water and declared to be water infrastructure owned by the City of Santa Fe. This does not include any pipe, fitting, or apparatus that is situated downstream of a customer's metered service connection.

Residential Development – One or more structures primarily intended for or restricted to dwelling units. It does not include hotels or motels. Each residence or dwelling unit will be served by a separate meter or submeter.

Service Area - The CoSFW service area is the corporate limits of the City of Santa Fe, New Mexico and those areas outside the presumptive City limits to which service has been required by the City and County Settlement Agreement. The City of Santa Fe does not assume any responsibility to serve or extend its water facilities to serve additional customers located outside the current service area boundaries.

Service Line - Service lines are lines providing service from the local distribution line directly to the individual user's meter. The service line is owned by the utility from the distribution main to a point 2 feet behind the meter when the meter and tail piece are located within public right-of-way or within dedicated easement. Otherwise, municipal ownership of the service line ends at the property line.

Sewer - In this document, the term sewer means the municipal sanitary sewer system. Storm sewers are generally referred to as drainage structures or drainage facilities.

Transmission Main - Transmission mains are generally pipes conveying water between major facilities such as pumping stations or reservoirs, or from major facilities to the distribution system. Such lines shall not be tapped for any purpose without specific CoSFW approval. Within the CoSFW system, all mains over 12-inch in diameter are considered transmission mains.

Well and other collector Lines - Collector or Well Collector lines are pipes which gather water directly from wells and convey to pumping or reservoir facilities. These lines shall not be tapped for any purpose and cannot be relied upon for any direct service.

Water Valve Shut-off Plan – A step-by-step instructional detailing the process for isolating water main flow for constructing water line improvements.

SECTION C - AUTHORITIES

All water service availability statements, technical evaluations, design concept approvals, and CoSFW water system construction plans shall be approved by a CoSFW Engineer.

Any exception to the criteria presented in this document must be approved in writing by the authorized CoSFW Engineer or the CoSFW Director prior to design approval. Requests for policy exceptions are reviewed by the Division Director and/or the Public Utilities Director to determine if deviation from established policies is reasonable under the circumstances or if the issue requires City Council approval.

All CoSFW water system drawings, construction plans, related calculations and engineering work, and cost estimates shall be signed by a professional engineer licensed in New Mexico.

Design Engineers are responsible for assuring that they are following the most recent CoSFW procedures, design criteria, and construction standards.

The Contractor performing construction work that will affect the public water lines or making water line improvements shal be a licensed contractor and listed on the approved contractor list. This list is updated and maintained by the CoSFW and is available on the CoSFW Water Service website.

Archaeological requirements are detailed in Chapter 14 of the Santa Fe City Code.

SECTION D – WATER LINE DESIGN CRITERIA

D.1. Overall System Design

D.1.1 Pipe Diameter

The minimum pipe diameter for distribution mains is 6 inches. On dead-end mains with fire hydrants or private fire service lines, the maximum length for a 6-inch main is 200 feet. Larger pipe diameters may be required based on fire flow requirements, existing system capabilities, or master plan improvements.
A pipe diameter of 4 inches may be permitted if the follow conditions are met:

- Dead-end main with no potential for extension.
- Less than 300 feet in length.
- No fire hydrants or private fire services are required.
- Approval by a CoSFW Engineer.

Pipe diameters of 10-inch and 14-inch are not permitted.

CoSFW reserves the right to size mains otherwise to provide service for existing customers and to meet future needs. Main extensions across the property will be required in accordance with the CoSFW Line Extension Policy Rule 19, in Chapter 25 of the City Code.

D.1.2. Looping/System Grid

Distribution mains shall be looped into the existing or proposed distribution system wherever practical to ensure at least two feed sources to hydrants and services installed on the new mains and to maintain system pressure and reliability. If completing a loop is impractical at the time of the extension, the main extension shall be designed in a way to accommodate looping via future main extension(s).
Permanent dead-end mains will be evaluated and approved on a case-by-case basis. Depending on project needs and the existing CoSFW system, CoSFW may require several feeds into an area.

D.1.3. Pipe Velocity

For all new pipe design and system changes, CoSFW will run the in-house hydraulic model to verify maximum velocities in the pipe. The Design Engineer shall work with CoSFW engineering to size minimum pipe diameters based off hydraulic model runs to meet the following constraints:

- 3 feet per second under peak day demand
- 10 feet per second under fire flow with average day demand.

If demands for a new development cause maximum velocities to be exceeded on existing mains, CoSFW shall analyze the need for possible off-site system improvements on a case-by-case basis. Under special circumstances, pipes may be sized to maintain a minimum velocity to prevent sediment buildup and to maintain water quality.

D.1.4. Operating Pressures

For all new pipe design and system changes, CoSFW will run the in-house hydraulic model to verify pressure in the pipe. The Design Engineer should make every effort to adhere to the following guidelines for pressure in pipes:

- 50 to 140 psi under static conditions.
- Minimum daily delivery pressure of 30 psi on peak day.
- Minimum residual pressure of 20 psi under peak day with fire demand condition.
- Fire sprinkler pressures shall be calculated with sprinkler flow plus peak hour demands.
- The maximum pressure fluctuation at any location between peak hour on average day and the minimum demand, (i.e. the minimum demand hour on average day with either full tank or with booster pumps running) shall not exceed 30 psi.
- Pumps shall not be allowed in the CoSFW system to boost pressure for a unique Applicant situation.
- Booster pumps may be added to the private plumbing in any building, at the customer's expense for installation, as well as operation, maintenance, repairs and replacement. Such an installation shall require a plumbing permit from the City, and the review and approval by COSFW. Installation itself shall be in strict compliance with the Plumbing Code. Systems with booster pumps shall require backflow prevention.

All customer-owned lines must be rated to the maximum operating pressure in the City water system (at least 150 psig).

D.2. Installation Design

D.2.1. Depth of Cover

The minimum depth of cover shall be 4 feet and the maximum depth of cover shall be 5 feet, as measured from top of pipe to final grade for all distribution mains and service lines. Exceptions to this requirement will require CoSFW Engineer approval and will be considered on a case by case basis by a CoSFW Engineer as necessary to avoid conflicts with other subsurface utilities or structures.

D.2.2. Bends and Deflections

Bending lengths of straight piping is prohibited, with the exception of HDPE piping. All deflection in piping shall be at joints or with the use of fittings. When it is necessary to deflect pipes at joints, the maximum angle of deflection shall not exceed manufacturer specifications. Avoid high points in pipes whenever possible. Piping shall be installed to minimize strain on pipe material.

D.2.3. Connections to Existing Water Systems

Connection to existing distribution and transmission mains shall be made either with a pressurized tap using an approved tapping sleeve or a non-pressurized connection and insertion of fittings. Site conditions may dictate which type of connection is used and may require insertion of a valve to minimize the negative impact the connection may have to existing customers.

Pressurized taps where the new main is larger than the existing distribution or transmission main shall not be permitted. Pressurized taps where the new main is the same size as the existing main will be considered on a case-by-case basis.

D.2.4. Service Taps

Pressurized taps for new mains larger than 12-inch are not permitted without CoSFW written approval. Service taps sized 2-inch and smaller on existing and proposed distribution mains shall be tapped in accordance with the Tapping Table included in the latest version of the CoSFW Construction Standards and Specifications document. All service taps 2-inch and smaller shall include a corporation stop.

Service taps larger than 2-inch on existing distribution mains shall be tapped directly from the main using a tapping sleeve and pressurized connection. The tapping sleeve shall be on the approved materials list included in the latest version of the CoSFW Construction Standards and Specifications document. The criteria outlined for pressurized connections in the section titled “Connections to Existing Water System” also applies to pressurized service taps.

Service connections larger than 2-inch on new main construction shall be made using a tee fitting or tapping sleeve. All services larger than 2-inch require a gate valve within three feet of the main.

No service taps shall be made within two (2) feet of a pipe bell, valve, fitting, service tap, or other line appurtenance. All new service taps which will be parallel to an adjacent service line or fire line shall have a minimum of five (5) feet of horizontal separation from the adjacent line.

Separate taps shall be made for domestic services, fire services, and irrigation services unless permitted otherwise by CoSFW.

Under no circumstances shall any size or manner of tap be made on a fire hydrant branch line (i.e. the fire hydrant leg) or private fire service line. The hydrant leg is considered to be the pipe from the fire hydrant isolation valve to the fire hydrant.

D.2.5. Fittings

Fittings installed on all ductile iron and PVC water mains, fire hydrant legs, fire service lines, and domestic or irrigation services larger than 2-inch shall be ductile iron meeting the requirements of the latest version of the CoSFW Construction Standards and Specifications document.

Non-standard fittings such as wyes and expansion connectors are not permitted without prior approval by a CoSFW Engineer.

D.2.6. Thrust Restraint

Thrust restraint must be provided using approved mechanical restraint devices, and shall be provided at all tees, bends, valves, caps, and other fittings. Concrete thrust blocking shall not be used unless specifically authorized by CoSFW Engineers. Concrete blocking details and restrained length tables are provided in the CoSFW Construction Standards and Specifications document. Thrust restraint calculations shall be performed by the design engineer for pipe diameters or installation conditions not included in the CoSFW Construction Standards and Specifications. Allowable mechanical restraint devices are identified in the approved materials list included in the latest version of the CoSFW Construction Standards and Specifications document.

D.2.7. Location of Pipe in the Road Right-of-Way

All distribution and transmission mains shall be located within public right of way or a granted public utility easement. Based on the opinion of the CoSFW engineer, an exclusive water utility easement may be required.

D.2.8. Location and Accommodation of Existing Utilities

As part of the design process, the engineer shall contact all utilities regarding the location of existing facilities. Existing utilities are to be shown on construction plans. Utility locations must be identified by using the New Mexico One-Call system (811). Record drawings for water lines may be provided by request to CoSFW. In some scenarios, it may be necessary to pothole to accurately locate existing utilities.

The design of public water infrastructure shall always make reasonable accommodations for other existing subsurface pipelines, conduits and other structures, or make provisions for their relocation if necessary. Relocation of other utilities, if required, will be coordinated by the Applicant.

D.2.9. Separation of Water from Other Utilities

Adequate horizontal and vertical separation shall be designed between the water facilities and sewer, drainage structures, gas, and all dry utilities to allow maintenance of the water line without affecting other utilities. Generally, a 1:1 slope is required to excavate and maintain the water line. Minimum separation requirements are as follows for water mains and water service lines. In situations where it is not feasible to maintain the prescribed separation, the distance required may be reduced on a case-by-case basis with approval from a CoSFW Engineer. The Design Engineer must provide documentation to support the need for reduced separation. Figure 1 below illustrates the various vertical crossing separation requirements from the public water main.

D.2.9.a. Sanitary Sewer Horizontal Separation

Sanitary sewer lines (including low pressure sewer mains and non-potable or effluent water mains) shall be at least ten (10) feet horizontally from any existing or proposed potable water main. For parallel installations, the water main must be installed in a separate trench and at an elevation such that the bottom of the water main is at least eighteen (18) inches above the top of the sewer line.

D.2.9.b. Sanitary Sewer Vertical Separation

Where water mains must cross over a sanitary sewer line, a minimum vertical separation of eighteen (18) inches shall be provided between the outside diameter of the water main and outside diameter of the sewer line. If the water main must cross below the sewer line, a minimum vertical separation of twenty-four (24) inches shall be provided, and any water and sewer joints within ten

(10) feet of the crossing shall be mechanical joints. The sewer line shall use pressure rated pipe with a minimum rating of 100 psi for ten (10) feet on each side of the crossing (as measured perpendicular to the water main). The water main and sewer line should be constructed so that the joints of each pipe are equidistant and a minimum of ten (10) feet in each direction from the centerline of the crossing.

Where twenty-four (24) inches of vertical separation cannot be provided, the sewer line shall be encased in concrete to a minimum distance ten feet from the water main in each direction from the crossing as measured perpendicular to the water main. Additional encasement distance may be required depending on field condtions. These configurations shall be approved by a CoSFW engineer.

D.2.9.c. Storm Sewer, Gas, and Dry Utilities Horizontal Separation
A minimum horizontal separation of five (5) feet shall be maintained between water infrastructure (mains, service lines, meter cans, hydrants, etc.) and drainage pipes and structures, gas, or dry utilities. Joint trenching of the water lines and storm sewer, gas, or dry utilities shall not be permitted.

D.2.9.d. Storm Sewer, Gas, and Dry Utilities Vertical Separation
A minimum vertical separation of twelve (12) inches shall be provided between the outside diameter of the water main and outside diameter of the crossing utility or structure for all dry utilities and eighteen (18) inches for storm drains.

Water facilities cannot be located under drainage ponds and catch basins without prior CoSFW approval.

Additional horizontal or vertical separation may be necessary for larger gas lines or electrical lines and will be evaluated on a case-by-case basis.

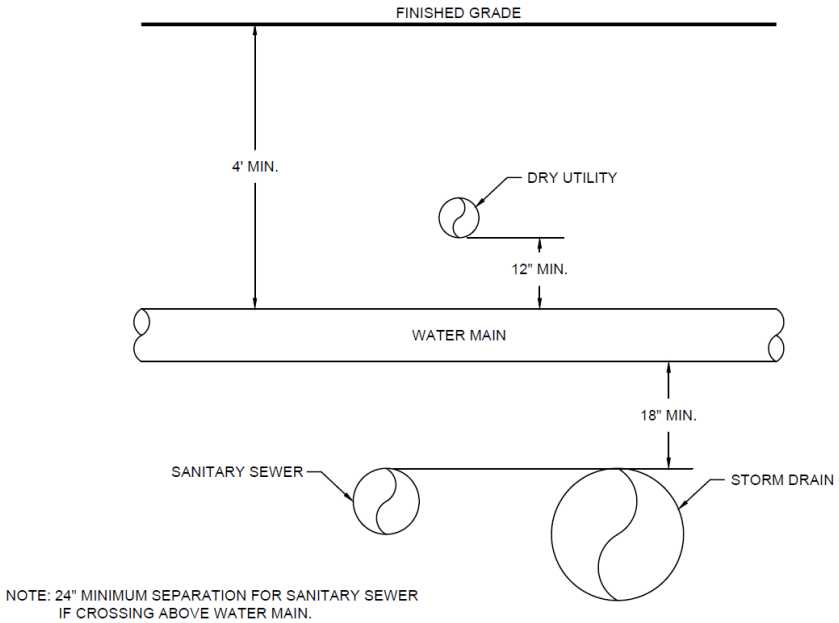

Table 1 – Illustration of minimum vertical crossing requirements

D.2.10. Crossing of Railways
Railroad Crossing requirements shall adhere to NMDOT requirements.

D.2.11. Crossing of Arroyos
All work in arroyos must be performed in accordance with the standards of the agency having jurisdiction of the arroyo. Casing, concrete, flowable fill, or other materials shall be used to protect water mains that cross arroyos from erosion.

D.2.12. Crossing of Bridges
Water mains that cross bridges shall be encased to protect the main from vandalism and freezing temperatures.

D.2.13. Work in Roadways and Public Rights-of-Way
All work in roadways and public rights-of-way must be performed in accordance with the standards of the agency having jurisdiction of the roadway or right-of-way. Street cut and/or water facility installation permits must be secured from the agency prior to the start of construction. The utility contractor is responsible for on-site safety, proper barricading and traffic control, public notification of road/lane closures, and any other job site requirements of the permit.

D.2.14. Shut Off Plans
Construction plans for water system improvements must include a WVSP if a shut off is required to complete the work, or to provide dry pipe conditions during construction operations. Design documents shall instruct contractors about CoSFW being the only agency authorized to operate valves in the service area, and the Contractor to be the responsible party to coordinate with CoSFW about any construction operation that might affect the operation of the existing system in any way. Before any work that may affect the operation of the water system begins, contractors shall coordinate with CoSFW for the necessary operation of valves and other features of the water system and submit a shut off plan to the CoSFW Engineer. Contractors shall also be made aware of the need CoSFW may have to conduct shut-off operations outside of peak demand and after regular business hours. At a minimum the shut off plan shall include the following:

- Mark-up of CoSFW system maps showing valve locations, water line sizes and types, and affected streets/customers in the shut off area.
- CoSFW valve maps for all valves to be closed.
- A plan notation that the Applicant's utility contractor is responsible for coordinating the shut off with CoSFW personnel and CoSFW customers. The Applicant or Contractor is required to provide at least 48 hours notification in writing to impacted CoSFW customers prior to a scheduled shut off.

D.2.15. Trenchless Pipe Rehabilitation and Replacement
Replacement or rehabilitation of a pipe via trenchless method shall follow AWWA C622. The design of all trenchless pipe replacement or rehabilitation shall by reviewed and approved on a case-by-case basis.

D.2.16. Corrosion Control

New metallic mains, services, and fittings shall be poly-wrapped. Installation of new buried mains may require additional corrosion control at the discretion of CoSFW Engineering or the Design Engineer. The decision process criteria may include the pipeline's size, function, accessibility, anticipated corrosiveness of the soil, and the potential for stray currents that may affect the main. Based on an evaluation of these criteria, CoSFW or the Design Engineer will determine if further testing or design for corrosion protection is required for new buried mains. The Design Engineer would be responsible for additional testing, design for corrosion control, and installation of corrosion protection if necessary. The methods of protection will be considered on a case-by-case basis for each main and service line and includes the following:

1. Enhanced protection (non-metallic encasement and/or mechanical joint coating)
2. Specific corrosion control design (joint bonding and/or cathodic protection)
3. Alternative non-metallic main materials (e.g. PVC)
4. Stray current mitigation
5. Rerouting of main

D.3. Valves

D.3.1 Isolation Valves

All valves used shall be gate valves, unless specified otherwise by a CoSFW engineer. All valves shall meet the specifications in the latest version of the CoSFW Construction Standards and Specifications. All valves shall be the same size as the main or service line unless specified by a CoSFW engineer.
At a minimum, valves shall be installed based on the following criteria:

- 1,000 feet maximum between inline valves on mains 12 inches and smaller.
- At intervals specified by CoSFW engineer on mains greater than 12 inches.
- At tees and crosses, all legs shall have valves installed.
- All fire hydrant legs
- At tapping sleeves, the branch shall be valved.
- All domestic and irrigation services larger than 2-inch
- All fire services

System valving must be arranged so that lines may be shut down with a minimum number of valves and affecting the minimum service area.

All buried valves shall be installed with a valve box. Valves and valve boxes shall comply with the specifications and details in the latest version of the CoSFW Construction Standards and Specifications.

D.3.2. Flushing Devices

Construction of all dead-end lines shall include a flushing device installed within three feet of the end of the main. No service connection shall be located downstream of the flushing device or less than three (3) feet upstream of it.
Flushing devices include the following:

- Fire hydrant.
- Flush hydrant.
- Below grade blowoff.
- Approved automatic flushing systems.

Fire hydrants are the preferred device if fire protection is also needed at the end of the main. Otherwise, flush hydrants are preferred where above ground locations are available. Below grade blowoffs shall require approval by a CoSFW Engineer and shall be used only in highly developed areas where space for a hydrant is not available. All flushing devices shall comply with the specifications and details in the latest version of the CoSFW Construction Standards and Specifications.

Flushing devices shall be located such that they can be easily accessed, and water can be directed easily to a drainage/detention area or to the municipal sewer system.

D.3.3. Air/Vacuum Valves

Air relief/vacuum valves are generally not required on mains 8-inch and smaller where there are services at frequent intervals on the line. Where air/vacuum valves are required, they shall comply with the specifications and requirements in the latest version of the CoSFW Construction Standards and Specifications. On distribution and transmission lines greater than 8-inch, sizing and location of air relief/vacuum valves shall be coordinated with CoSFW.

D.4. Fire Protection

D.4.1. Use of International Fire Code

Fire protection requirements of the CoSFW Service Area, both within and outside the City limits, are based on the latest version of the International Fire Code (IFC) adopted by the Santa Fe Fire Department. Appendix B of the IFC contains the fire flow requirements for individual buildings based on size and construction type. A copy of this Appendix can be obtained from the Santa Fe Fire Department if desired. Please note the fire flow availability varies within the CoSFW system depending on the existing infrastructure. The maximum fire flow that could be provided at any location is limited based on location within its pressure zone and the size and configuration of existing water infrastructure.

D.4.2. Number and Location of Fire Hydrants

The Santa Fe Fire Department is the ultimate authority for determining number and location of fire hydrants. As part of Development Plan approval and construction drawing preparation, the Santa Fe Fire Department will review the number and location of existing and proposed hydrants. Fire hydrants must be accessible to firefighting apparatus. Generally, one fire hydrant is required for each 1500 GPM of required fire flow. In addition, a hydrant needs to be located within 100 feet (IFC 507) of any Fire Department Connection (FDC) on the building fire sprinkler system.

Fire hydrants shall generally be installed at each intersection and elsewhere as necessary and depending on layout to meet the hydrant spacing requirements identified in this document and by SFFD. Fire hydrants installed at street intersections shall be installed a minimum of twenty (20) feet beyond the end of the curb radius return. Fire hydrants not located at street intersections shall be installed at a property line boundary between lots wherever practical. Fire hydrants shall have a minimum of 36” of clearance on all sides.

The maximum fire hydrant spacing shall be such that no structure is greater than 400 linear feet from a fire hydrant as measured along the centerline of the street or other fire access route. More frequent spacing may be required as determined by CoSFW or SFFD.

D.4.3. Fire Services

Fire services will be sized by the Applicant’s engineer or fire sprinkler system designer. The Applicant or Applicant’s engineer shall work in conjunction with SFFD to determine the required fire flow for each private fire service and the overall site and provide this to CoSFW. CoSFW reserves the right to verify sizing based on fire service demand and CoSFW system capabilities.

Upon written request, CoSFW shall provide system pressures for fire services at the nearest point of connection on existing mains via a Fire Flow Analysis Application. This analysis will provide the available fire flow and residual pressures at the location requested by the Applicant within the existing water system using the City’s hydraulic model. The fire flow analysis results are not a guarantee or rating of fire flow to the site, but instead provide a reasonable projection of the available fire flow under peak day conditions.

All fire services require backflow prevention with an approved backflow prevention device. Fire services shall be designed and installed in accordance with Section F – Backflow Prevention and Cross-Connection Control and the details and specifications in the latest version of the CoSFW Construction Standards and Specifications.

For more details regarding private fire services, please refer to the CoSFW/SFFD document Installation and Maintenance of Private Fire Hydrants and Fire Service Mains.

D.4.4. Private Fire Hydrants

Private fire hydrants are those hydrants which meet any of the following conditions:

- Installed on private property outside of the public right-of-way (ROW) or Easement.
- Installed downstream of a service meter or backflow preventer assembly.
- Installed behind a wall, fence, gate, or other site condition limiting the use and benefit of the hydrant solely to the property it is installed on.

Owners with private fire hydrants downstream of a master meter shall have the master meter sized to a minimum of 6". If more than 2 private hydrants are to be installed downstream of a master meter or fire service connection, more than one point of connection to the site may be required.

The installation of private hydrants for municipal fire protection purposes is permitted only under all the following circumstances:

- Installation of a private hydrant is approved by SFFD.
- Installation must be approved by CoSFW for compliance with standards and any adverse effects on the CoSFW system.
- Connections will be metered (either with a detector check on the backflow prevention device or an in-line meter).
- Connection of private fire hydrants to the CoSFW system will require backflow prevention in accordance with CoSFW criteria.

Owners of private fire hydrants are responsible for following the CoSFW/SFFD document Installation and Maintenance of Private Fire Hydrants and Fire Service Mains. The installation of a private fire system shall be approved by CoSFW as part of the development process. The owner of all water system components that are not within public Right-of-Way or in a public utility easement is responsible for all maintenance, testing, and repairs. Private infrastructure that falls within a public utility easement or public Right-of-Way may be specified by the CoSFW Construction Standards and Specifications and would still be the responsibility of the owner. Private hydrant installations shall comply with the manufacturer and installation requirements in the latest version of the CoSFW Construction Standards and Specifications.

D.5. Services and Meters

D.5.1. General Service Information

That portion of the service line between the main and the property line or meter shall be in a continuous straight line perpendicular to the main. Exceptions may be allowed for cul-de-sac or hammerhead dead-ends as part of the water plan review.

The service line, corporation stop, meter, and tail piece two feet behind the meter shall be sized as indicated in the standard details included with the latest version of the CoSFW Construction Standards and Specifications.

The meter and tail piece shall be located within public right-of-way or in a utility easement located directly behind the property line. Meters, pits, and service cans shall not be located in roadways. Meters, pits, and service cans shall not be located in sidewalks or ramps unless prior approval is given by CoSFW. CoSFW shall have final approval of the meter location and point of delivery to any premises.

When a building or property includes more than one unit requiring separate meters, all of the meters shall be grouped adjacent to each other and shall be individually numbered and identified according to the units served.

Indoor meter locations are not permitted, except under special circumstances considered by CoSFW on a case-by-case basis. Access to all inside meter locations shall be provided at all reasonable times. For inside meter settings, that portion of the service line between the main and the meter shall not exceed a horizontal distance of fifty (50) feet without CoSFW approval. The meter shall be supplied and installed by CoSFW personnel. For all inside settings, an isolation valve shall be provided outside on the service line in the public right-of-way or utility easement.

D.5.2. Water Service Crossing Lots

CoSFW will locate water meters as close to the water main as possible. Property owners may require domestic water service that crosses other private property downstream of the meter. **All** of the following conditions must be met:

a. A private utility easement at least 10 feet wide is provided across, and situated entirely within, the boundaries of the proposed property being crossed.
b. CoSFW determines that a water main extension is not necessary to perpetuate the water system, or that future development of abutting properties cannot benefit from a main extension.
c. The water service line shall be located within the private easement an appropriate distance away from other public and private utilities, installed in compliance with applicable plumbing codes.

D.5.3. Meter Sizing

The Applicant shall provide CoSFW with instantaneous and average demands for all non-single family residential domestic services or submit a CoSFW Meter Sizing Form (based on AWWA Standard M22). CoSFW may request a basis for the demand such as fixture count or water usage at similar projects. CoSFW shall size the service based on AWWA standard meter capacities.

The Applicant may request a meter size different from that which was calculated from the CoSFW Meter Sizing Form by submitting a written memo justifying the size requested with supporting calculations from a qualified engineer or plumber using an industry-standard methodology. CoSFW will review the request and make the final meter sizing determination.

D.5.4. Irrigation Services

Dedicated irrigation services shall be installed where required by Chapters 14 and 25 of the City Code and elsewhere as requested by the Applicant. Generally, this includes ROW landscaping, open space or other common area landscaping, and all commercial and multi-family developments that have at least 1,000 square feet of landscaped area. CoSFW Irrigation services must be equipped with an appropriate backflow prevention device as required in the plumbing code. Upon written request, CoSFW will provide system pressures for irrigation services at the nearest point of connection on existing mains.

D.5.7. Master Meters

Master meters in the CoSFW system are meters that:

1. Transfer water to CoSFW customers through a single service line to more than one dwelling unit or building on a single lot.

2. Transfer water to a CoSFW wholesale customer for distribution or resale on that customer's private system.

D.5.7.a. Master Meters to CoSFW Customers

Master meters for CoSFW customers may be approved where permitted by Chapter 25 of the City Code and by a CoSFW Engineer. Where master meter installations are approved in the CoSFW system, an Agreement to Construct and Dedicate (ACD) and an approved water plan will be required for the new water infrastructure from the public water main to the master meter and backflow prevention device. The Applicant's water plan shall show primary appurtenances on the private side of the water system (hydrants, valves, tees, etc.).

All master meters shall have an approved backflow prevention device downstream of the meter. All water infrastructure downstream of the master meter shall be owned, operated, and maintained by the property owner, property management agency, or other governing agency for the property being served by the master meter, and comply with all applicable plumbing codes.

Master meter sizing shall be completed in accordance with the Domestic and Irrigation Service Sizing section with consideration for fire flow requirements to the property or properties being served.

Master meters shall be sized to consider fire services downstream. Master meters shall be sized to a minimum of 6" if fire hydrants are located downstream. If more than 2 private hydrants are to be installed downstream of a master meter or fire service connection, more than one point of connection to the site may be required.

Installation of master meters may not be approved if any of the following statements are true:

1. It would prevent the looping of a water main.

2. It would hinder future access to CoSFW water service by an unserved property in the CoSFW service area.

3. It would affect the implementation of any other CoSFW improvement plan.

4. It would cause any detrimental effect to existing customers or the existing City water system.

D.5.7.b. Master Meters to Wholesale Customers

The acceptability, design, and installation of master meters for wholesale customers will be evaluated on a case-by-case basis by CoSFW, taking into account the requirements in Chapter 25 of the City Code and any other agreements in place between the City and the entity requesting the wholesale master meter.

D.5.8. Private Distribution Systems

Private distribution systems shall not be approved where CoSFW service can reasonably be provided. In some situations, CoSFW service may not be economically reasonable for the utility or the customer. An example of this situation would be properties which are higher in elevation than what the CoSFW storage tanks can support. In this type of situation, the Applicant shall coordinate with CoSFW to develop a system which meets all applicable city standards.

D.5.9. Specialty Items

Specialty items such as system pressure reducing valves (PRV's), design and installation of surge relief valves, and domestic or irrigation services larger than 2-inch, shall be addressed on a case-by-case basis.

D.5.10. Professional Engineer Requirements

All plans submitted to CoSFW for approval shall be signed and sealed by a professional engineer licensed in New Mexico.

SECTION E – BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL

Backflow prevention requirements are based on the guidelines presented in the *Foundation for Cross Connection Control and Hydraulic Research Manual (FCCCHR),* University of Southern California, latest revision and the *New Mexico Drinking Water Regulations*.

F.1. General

At a minimum, backflow prevention shall be required on the following connections to the CoSFW system:

- All fire services (See discussion below).
- All commercial services.
- All irrigation services (whether used solely or partially for irrigation).
- All services over 2-inches.
- Domestic services sized 2-inch and smaller that, based on FCCCHR criteria or in the opinion of CoSFW technical staff and/or the Public Utilities Department Director, present a health or aesthetic hazard to the water system.
- All sites where a secondary source of water is present (i.e. domestic well).
- All master meter services.

The type of backflow prevention device required will be based on the particular project circumstances. Backflow prevention shall be discussed during water plan review to assure that adequate space for the device is included in the site design.

All backflow prevention devices used to protect the CoSFW system shall have been tested and approved by FCCCHR for the configuration and position in which they are proposed to be used. The owner shall provide CoSFW with the proposed location of the device, and the make and model number for approval prior to installation.

All backflow prevention devices are owned and maintained by the Customer. The owner is responsible for annual testing. Tests shall be performed by a certified tester and test results shall be submitted to CoSFW within 7 days of the test date. Any backflow prevention devices that do not pass the annual test shall immediately be repaired or replaced at the owner's expense.

F.2. Fire Service Line Backflow Prevention

The following guidelines shall be followed for backflow prevention on Fire Service lines:

1. The owner or their plumbing/fire protection contractor is responsible for providing backflow prevention on the fire service line. Currently, the City of Santa Fe requires Reduced Pressure Backflow Preventors (RPBP) with detector check on fire service lines.

2. RPBP's must be located in approved heated above ground housing or in a mechanical room where adequate drainage is available. The RPBP shall be located to minimize the unprotected length of the fire service line.

3. The RPBP shall include an integral metered bypass detector assembly. The backflow preventor and the metered bypass shall be designed and furnished as a unit and approved by the FCCCHR-USC as a unit and meet City of Santa Fe standards.

4. The owner shall provide CoSFW with the proposed location of the RPBP, and the make and model number of the proposed RPBP along with the manufacturer's drawings and data for review and approval prior to construction. The RPBP shall be installed in accordance with the manufacturer's requirements (horizontal position unless alternate positions are allowed by the manufacturer and have been approved by FCCCHR-USC).

SECTION F – ALIGNMENT AND EASEMENTS

Water facilities must be located in public rights-of-way, granted water or utility easements, or when on City-owned lands, in established utility corridors. Wherever possible, distribution mains are to be located in public rights-of-way. Private utilities (i.e. customer yard lines) cannot be located in public rights-of-way.

E.1. Public Rights-of-Way

Public rights-of-way include dedicated city and county roads as well as New Mexico State Highways. All road work (i.e. street cuts and repairs, traffic control, road closures, and public notices) in public rights-of-way must be performed in accordance with the standards of the road agency having jurisdiction. Street cut and water facility installation permits are issued by the road agency and must be secured before starting construction.

E.2. Easements

E.2.1. Easement Requirements

When the proposed improvements cannot be designed to be within a public right of way, they should be within one of the following boundaries:

- An existing, officially designated public utility easement
- A new utility or water easement that is specifically and permanently granted to CoSFW for the proposed improvements and that meets all CoSFW requirements stated elsewhere in this document
- A utility or water easement located within a planned or designated green/open space with adequate access for water utility maintenance equipment, from a public right of way or access easement. Trees may not be planted within 10’ of the centerline of the main.
- Any special circumstances affecting the conditions described above will be considered on a case by case basis by CoSFW

Public utility or public water line easements are required for all CoSFW water facilities located outside public rights-of-way. Easements shall conform with minimum easement dimensions as shown in Table 1 and Figure 2. The water main and appurtenances shall be located at least 7 feet from the edge of the easement. Location in the center of the easement is preferred. An easement is required for all fire hydrants, water service lines and meter cans as shown in Figure 2. A water utility easement may be shared with sewer and/or dry utilities only with prior CoSFW approval of utility locations. Separate trenches will be required for water and sewer or dry utilities. Deeper mains or unique installations may require larger easement dimensions and will be evaluated on a case-by-case basis. Typical dimensions for this combined easement are shown in Figure 3. For larger water or sewer mains, additional easement width may be required.

Water/Sewer Main Size	Minimum Easement Width Water Only	Minimum Easement Width Water and Sewer	Minimum Easement Length Past End of Main
<16"	20'	25'	7'
≥16"	25'	30'	10'

Table 1. Easement dimension requirements for mains with standard 4’ bury depth

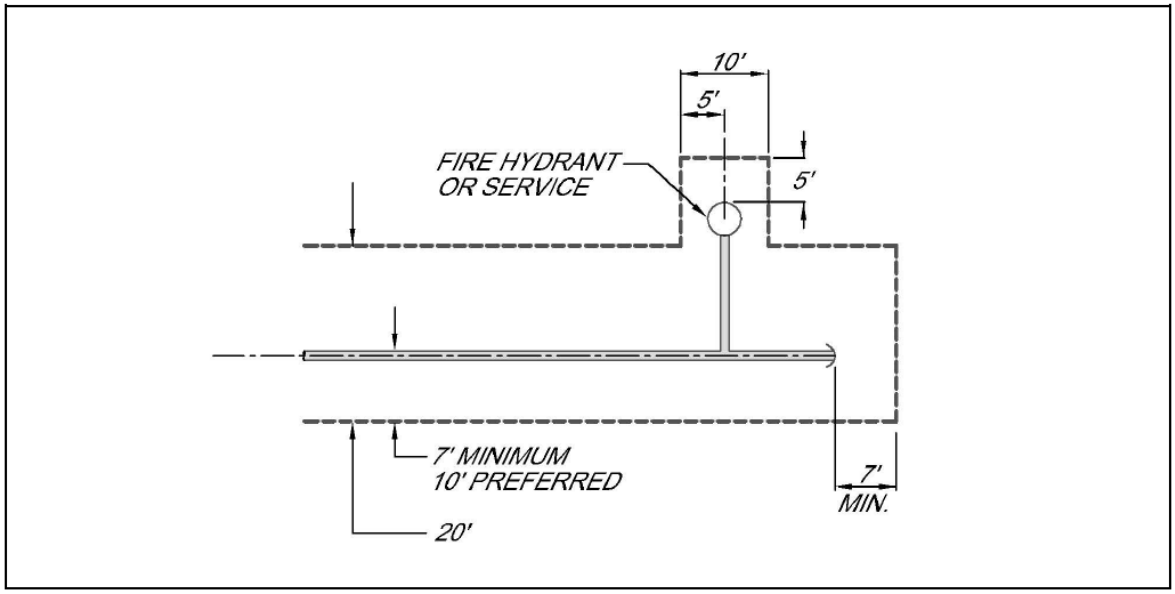

Figure 2. Typical layout for 20-foot water utility easement.

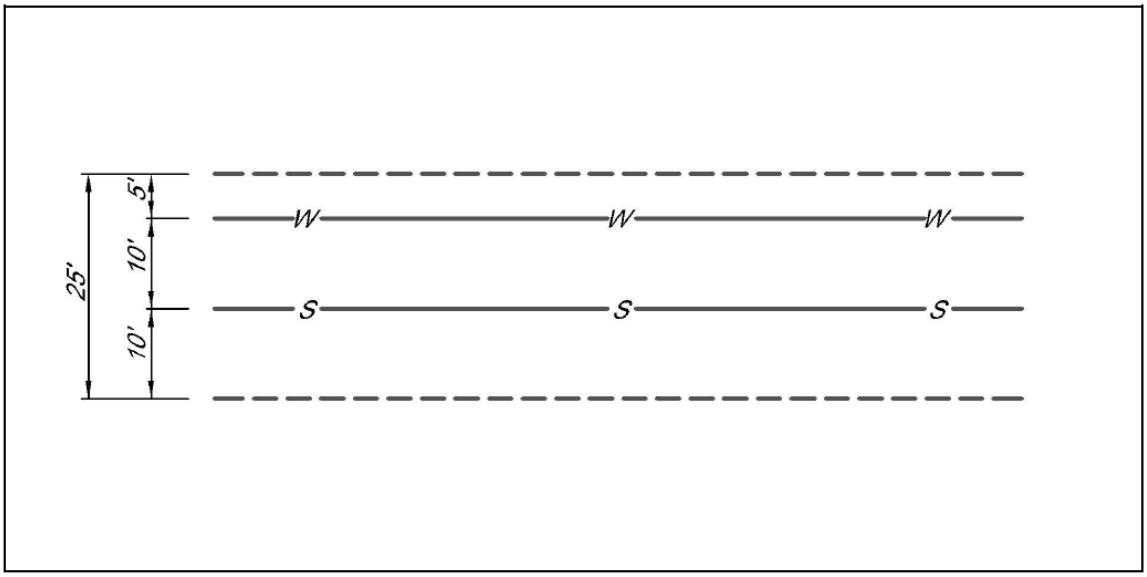

Figure 3: Typical layout for 25' combined water and sewer easements.

E.2.2 Easement Dedications
All water facility easements must be granted and recorded with Santa Fe County. Easement descriptions must include the following:

- The width and length of the easement.
- If the easement does not abut and parallel property lines, distances and bearings must be provided for the centerline of easement.
- A tie from a corner of the easement to an established property corner.
- Must meet New Mexico state standards for legal property description.

The preferred method for dedicating easements is through recording of the property plat. If the property does not require platting for any other reasons, easements may be granted through the use of an "Easement" form, which can be obtained from CoSFW.

E.2.3. Vacation of Easements
Existing water and/or utility easements may be vacated only under the following conditions:

- If needed, suitable alternate easements are provided.
- The easement is not required to serve the property on which it lies or any adjacent properties.
- The easement is no longer required by CoSFW for any existing or planned future water facilities.

Easements may be vacated using the same methods as easement dedications, either by plat or by the use of an easement form. Easement vacations must be recorded with Santa Fe County. Vacation of easements shall be reviewed and approved by the City and require approval by all affected utilities.

E.2.4. Easement Encroachments
Approval for encroachments on utility easements shall be requested in writing and describe the encroachment. If the encroachment is an existing situation, the request shall include a survey sketch showing the location and measured area of the encroachment. Upon review, CoSFW may allow the encroachment. However, under no circumstances shall CoSFW accept any responsibility or liability for improvements which encroach upon the easement.

E.2.5. Other
Other special easement or crossing permit situations, such as temporary construction permits or railroad right-of-way permits shall be addressed with the Applicant on a case-by-case basis. Special circumstances that come under the jurisdiction of other agencies may require an additional level of input and review. These agencies include NMDOT, Bureau of Land Management, New Mexico Environment Department, Army Corps of